

# REPRINT

## MODEL R182 & TR182 SERIES 1978 THRU 1986 SERVICE MANUAL

1 MARCH 1996

D2069-3-13

THIS REPRINT SUPERSEDES AND REPLACES THE R182 & TR182 SERIES  
SERVICE MANUAL D2069-1-13 AND INCORPORATES REVISION 2, DATED 1  
OCTOBER 1991 AND REVISION 3, DATED 1 MARCH 1996

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# Service Manual

**1978  
Thru  
1986**

# **MODEL R182 & TR182 SERIES**



FAA APPROVAL HAS BEEN OBTAINED ON TECHNICAL DATA IN THIS PUBLICATION THAT AFFECTS AIRPLANE TYPE DESIGN.

REVISION 3 TO THE BASIC MANUAL INCORPORATES TEMPORARY REVISION 1, DATED 1 APRIL, 1992, TEMPORARY REVISION 2, DATED 1 JUNE, 1992, TEMPORARY REVISION 3, DATED 3 OCTOBER, 1994 AND TEMPORARY REVISION 4, DATED 21 JULY, 1995.



## TEMPORARY REVISION NUMBER 6

DATE 7 July 2003

<b>MANUAL TITLE</b>	<u>1978 Thru 1986 Model R182 &amp; TR182 Service Manual</u>	
<b>MANUAL NUMBER - PAPER COPY</b>	<u>D2069-3-13</u>	
<b>MANUAL NUMBER - AEROFICHE</b>	<u>D2069-3-13AF</u>	
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This Temporary Revision consists of the following pages, which affect and replace existing pages in the paper copy manual and supersede aerofiche information.

SECTION	PAGE	AEROFICHE FICHE/FRAME	SECTION	PAGE	AEROFICHE FICHE/FRAME
2	49	1/D10			
2	50	1/D11			
2	50A	Deleted			
2	53	1/D13			
2	54	1/D14			
2	54A	Added			
15	30C	Added			
15	30D	Added			

### REASON FOR TEMPORARY REVISION

1. To add a Component Time Limits section and a fuel quantity indicating system operational test.

### FILING INSTRUCTIONS FOR THIS TEMPORARY REVISION

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# TEMPORARY REVISION NUMBER 5

DATED 7 January 2000

MANUAL TITLE 1978 THRU 1986 MODEL R182 & TR182 SERVICE MANUAL

MANUAL NUMBER - PAPER COPY D2069-3-13 AEROFICHE D2069-3-13AF

TEMPORARY REVISION NUMBER PAPER COPY D2069-3TR5 AEROFICHE N/A

MANUAL DATE 15 JUNE 1985 REVISION NUMBER 3 DATE 1 MARCH 1996

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SECTION	PAGE	AEROFICHE FICHE/FRAME	SECTION	PAGE	AEROFICHE FICHE/FRAME
2	50A	Added			
17	6A	Added			
17	6B	Added			

## REASON FOR TEMPORARY REVISION

To include the inspection requirements of Cessna Service Bulletin SEB99-18.

To provide additional information for the stop drilling of cracks that originate at the trailing edge of control surfaces with corrugated skins.

## FILING INSTRUCTIONS FOR THIS TEMPORARY REVISION

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## LIST OF EFFECTIVE PAGES

**INSERT LATEST CHANGED PAGES, DESTROY SUPERSEDED PAGES.**

### NOTE

The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands.

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Revision	..... 1	..... 22 October 1985
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**TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 808.**

\* The asterisk indicates pages changed, added, or deleted by the current change.

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Upon receipt of a revision to this book, personnel responsible for maintaining this publication in current status should ascertain that all previous revisions have been received and incorporated.

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### WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CROSS REFERENCE LISTING OF POPULAR NAME VS. MODEL NUMBERS AND SERIALS

All aircraft, regardless of manufacturer, are certified under model number designations. However, popular names are often used for marketing purposes. To provide a consistent method of referring to these aircraft, the model number will be used in this publication unless the popular name is necessary to differentiate between versions of the same basic model. The following table provides a listing of popular name, model number and serial number.

POPULAR NAME	MODEL		SERIAL BEGINNING	SERIAL ENDING
	YEAR	MODEL		
SKYLANE RG SKYLANE RG II	1978	R182	R18200002	R18200583
REIMS/CESSNA SKYLANE RG	1978	FR182	FR18200001	FR18200020
SKYLANE RG SKYLANE RG II TURBO SKYLANE RG TURBO SKYLANE RG II	1979	R182	R18200001, R18200584	R18201313
F SKYLANE RG F SKYLANE RG	1979	FR182	FR18200021	FR18200045
SKYLANE RG SKYLANE RG II TURBO SKYLANE RG TURBO SKYLANE RG II	1980	R182	R18201314	R18201628
F SKYLANE RG F SKYLANE RG II	1980	FR182	FR18200046	FR18200070
SKYLANE RG	1981	R182	R18201629	R18201798
SKYLANE RG II	1982	R182	R18201799	R18201928
TURBO SKYLANE RG	1983	R182	R18201929	R18201973
TURBO SKYLANE RG II	1984	R182	R18201974	R18201999
SKYLANE RG	1985	R182	R18201315, R18202000	R18202031
SKYLANE RG with Value Group A and B	1986	R182	R18202032	R18202039
TURBO SKYLANE RG TURBO SKYLANE RG With Value Group A and B				

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## INTRODUCTION

This manual contains factory-recommended procedures and instructions for ground handling, servicing, and maintaining Cessna R182/TR182 Series Models. The R182 and TR182 Series Models covered in this manual are identical, except the Model TR182 is turbocharged. Besides serving as a reference for the experienced mechanic, this manual also covers step-by-step procedures for the less experienced.

This service manual is designed for aerofiche presentation. To facilitate the use of the aerofiche, refer to the aerofiche header for basic information.

## KEEPING CESSNA PUBLICATIONS CURRENT

The information in this publication is based on data available at the time of publication and is updated, supplemented, and automatically amended by all information issued in Service News Letters, Service Bulletins, Supplier Service Notices, Publication Changes, Revisions, Reissues and Temporary Revisions. All such amendments become part of and are specifically incorporated within this publication. Users are urged to keep abreast of the latest amendments to this publication through information available at Cessna Authorized Service Stations or through the Cessna Product Support subscription services. Cessna Service Stations have also been supplied with a group of supplier publications which provide disassembly, overhaul, and parts breakdowns for some of the various supplier equipment items. Suppliers publications are updated, supplemented, and specifically amended by supplier issued revisions and service information which may be reissued by Cessna; thereby automatically amending this publication and is communicated to the field through Cessna's Authorized Service Stations and/or through Cessna's subscription services.

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1. **REVISIONS/CHANGES.** These are issued to the Service Stations by Cessna Aircraft Company for this publication as required, and include only pages that require updating.
2. **REISSUE.** Manual is reissued to Service Stations as required, and is a complete manual incorporating all the latest information and outstanding revisions/changes. It supersedes and replaces previous issue(s).

REVISIONS/CHANGES and REISSUES can be purchased from your Cessna Service Station or directly from the Cessna Parts Distribution, (CPD 2) Dept. 701, Cessna Aircraft Company, 5800 East Pawnee, Wichita, Kansas 67201.

All supplemental service information concerning this manual is supplied to all appropriate Cessna Service Stations so that they have the latest authoritative recommendations for servicing these Cessna aircraft. Therefore, it is recommended that Cessna owners utilize the knowledge and experience of the Cessna Service Station Organization.



# MODEL R182 & TR182 SERIES SERVICE MANUAL

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A Customer Care Supplies and Publications Catalog is available from your Cessna Service Station or directly from the Cessna Parts Distribution, (CPD 2) Dept. 701, Cessna Aircraft Company, 5800 East Pawnee, Wichita, Kansas 67201. The Supplies and Publications catalog lists all publications and Customer Care Supplies available from Cessna for prior year models as well as new products.

## SUPPLEMENTAL TYPE CERTIFICATE INSTALLATIONS

Inspection, maintenance and parts requirements for supplemental type certificate (STC) installations are not included in this manual. When an STC installation is incorporated on the airplane, those portions of the airplane affected by the installation must be inspected in accordance with the inspection program published by the owner of the STC. Since STC installations may change systems interface, operating characteristics and component loads or stresses on adjacent structures, Cessna provided inspection criteria may not be valid for airplanes with STC installations.

## CUSTOMER COMMENTS ON MANUAL

Cessna Aircraft Company has endeavored to furnish you with an accurate, useful, up-to-date manual. This manual can be improved with your help. Please use the return card, provided with your manual, to report any errors, discrepancies, and omissions in this manual as well as any comments you wish to make.

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 1

### GENERAL DESCRIPTION

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- 1-1. GENERAL DESCRIPTION. The R182 Series aircraft described in this manual are high-wing, single-engine monoplanes of all-metal, semimonocoque construction. They are equipped with hydraulic retractable tricycle landing gear. The steerable nose gear is an air-hydraulic shock strut and the main gear is a tubular spring steel type. The standard four place seating arrangement consists of two individual front seats, a split-back bench in the rear, and an optional child's seat. A luggage compartment is located aft of the rear seat. These aircraft are powered by an air-cooled, horizontally-opposed, six-cylinder, Lycoming "Blue-Streak", engine, driving an all-metal, constant-speed propeller.
- 1-2. AIRCRAFT SPECIFICATIONS. Leading particulars of these aircraft, with dimensions based on gross weight, are given in figure 1-1. If these dimensions are to be used in determining size for construction of a hangar, remember such factors as nose gear strut inflation, tire pressure, and load distribution may result in some dimensions, that are considerably different than those given.
- 1-3. STATIONS. A station diagram is shown in figure 1-2 to assist in locating equipment, when a written description is inadequate or impractical.
- 1-4. Deleted - not used.
- 1-5. Deleted - not used.

## MODEL R182 AND TR182 SERVICE MANUAL

<b>MAXIMUM WEIGHT</b>	
Ramp .....	3112 LBS
Takeoff and Landing .....	3100 Lbs
<b>STANDARD EMPTY WEIGHT</b>	
Skylane RG .....	1782 LBS
Skylane RG II .....	1827 LBS
Turbo Skylane RG .....	1827 LBS
Turbo Skylane RG II .....	1870 LBS
<b>MAXIMUM USEFUL LOAD</b>	
Skylane RG .....	1330 LBS
Skylane RG II .....	1285 LBS
Turbo Skylane RG .....	1285 LBS
Turbo Skylane RG II .....	1242 LBS
<b>FUEL CAPACITY</b>	
Standard Wing	
Total .....	.61 Gal. ★
Usable .....	.56 Gal. ★
Long Range Wing	
Total .....	.80 Gal. ★
Usable .....	.75 Gal. ★
Total (Wet Wing) .....	.92 Gal. ●
Usable (Wet Wing) .....	.88 Gal. ●
	THRU 1978 ★
	1979 & ON ●
<b>ENGINE</b>	
Model .....	O-540 Series Lycoming
Oil Capacity	
Sump .....	.8 Qts.
With Filter .....	.9 Qts.
PROPELLER (Constant Speed) .....	.82" McCauley
<b>MAIN LANDING GEAR</b>	
Tire Size .....	.15x6.00-6 (6-Ply Rated)
Pressure .....	.68 Psig
<b>NOSE GEAR</b>	
Tire Size .....	.5.00-5 (6-Ply Rated)
Pressure .....	.50 PSI
Strut Pressure (Extended) .....	.55 PSI
<b>WHEEL ALIGNMENT (At Empty Weight)</b>	
Camber .....	.6° ± 1°
Toe-in .....	.0.0" to + .06" - .00"
<b>AILERON TRAVEL</b>	
Up .....	.20° ± 2°
Down .....	.15° ± 2°
<b>WING FLAP TRAVEL</b>	
	THRU 1981
	0° ± 0° to 40° + 1° -2°
	1982 & ON Down
	0° ± 0° to 38° + 0° -1°
	Down

Figure 1-1. Specifications (Sheet 1 of 2)

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<b>RUDDER TRAVEL (Parallel to Water Line)</b>		
Right .....	.24° ± 1°	
Left .....	.24° ± 1°	THRU 1980
Right .....	.24° + 0°, -1°	
Left .....	.24° + 0°, -1°	1981 & ON
<b>RUDDER TRAVEL (Perpendicular to Hinge Line)</b>		
Right .....	.27° 13' ± 1°	
Left .....	.27° 13' ± 1°	THRU 1980
Right .....	.27° 13' + 0°, -1°	
Left .....	.27° 13' + 0°, -1°	1981 & ON
<b>ELEVATOR TRAVEL (Relative to Stabilizer)</b>		
Up .....	.28° ± 1°	
Down .....	.17° ± 1°	THRU 1980
Down .....	.21° ± 1°	1981 & ON
<b>ELEVATOR TRIM TAB TRAVEL</b>		
Up .....	.25° ± 2°	
Up .....	.24° ± 2°	THRU 1980
Down .....	.15° ± 1°	1981 & ON
<b>PRINCIPAL DIMENSIONS</b>		
Wing Span .....	.432.00"★	
Tail Span .....	.140.00"	
Length .....	.341.12"	
<b>Fin Height (Nose Gear Depressed and Flashing Beacon Installed on Fin)</b>		
Track Width .....	.105.08"	
Track Width .....	.109.25"	
<b>BATTERY LOCATION</b>		
Tailcone		
BEGINNING WITH 1980 MODEL YEAR		
★ Measured with strobe lights installed.		

Figure 1-1. Specifications (Sheet 2 of 2)

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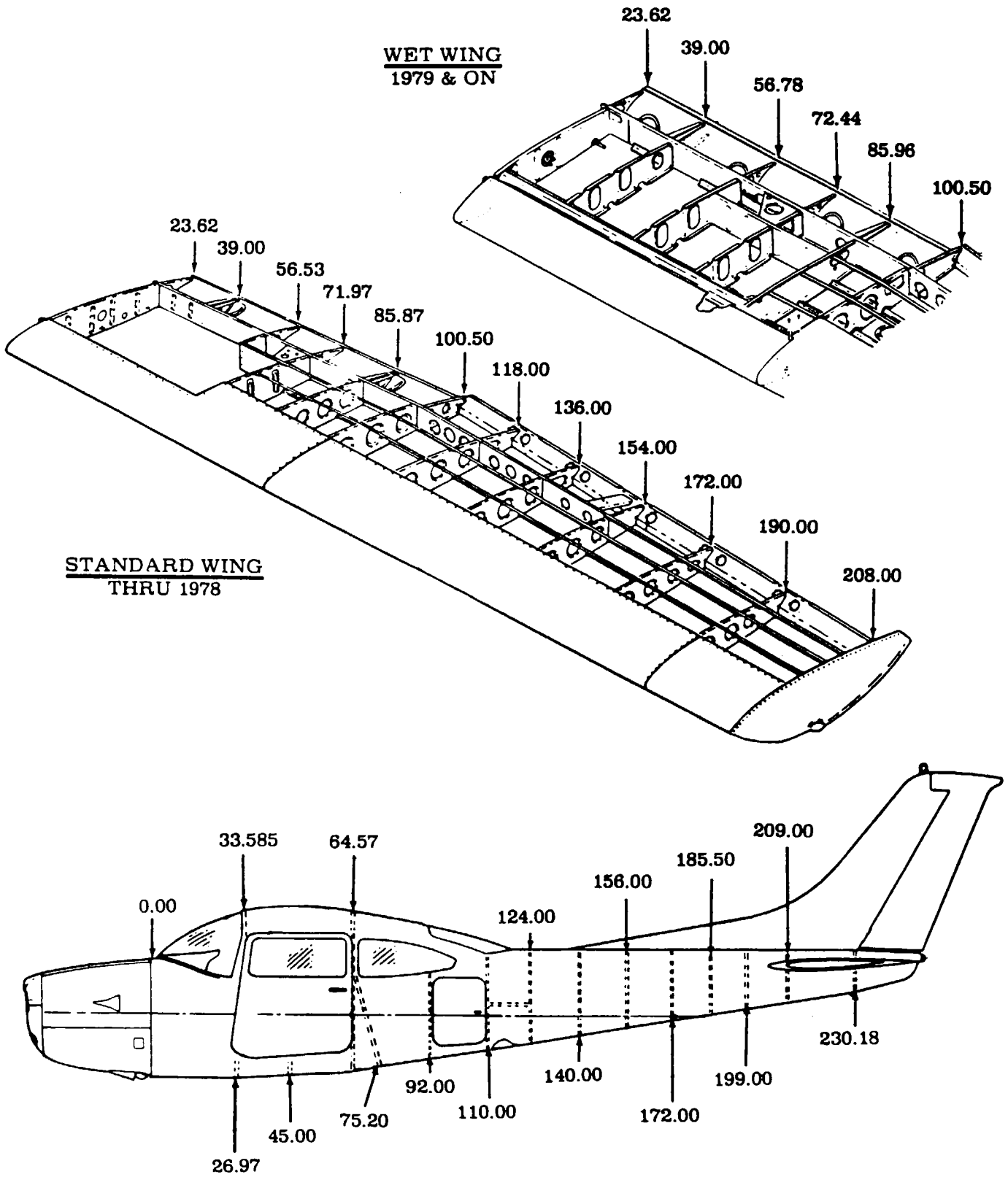


Figure 1-2. Reference Stations

## MODEL R182 & TR182 SERIES SERVICE MANUAL

1-6. **GENERAL AIRFRAME PRACTICES.** the following paragraphs deal with general torque and safetying practices used to ensure security of installation and prevent overstressing of components. Special torque values, when required, are specified with the specific component maintenance and installation instructions.

1-7. **TORQUEING PROCEDURES.** The importance of correct application cannot be overemphasized. Undertorque can result in unnecessary wear of nuts and bolts as well as parts they are holding together. When insufficient pressures are applied, uneven loads will be transmitted throughout assembly, which may result in excessive wear or premature failure due to fatigue. Overtorque can be equally damaging because of failure of a bolt or nut from overstressing threaded areas.

a. **Calculating Torque.** There are a few simple, but very important, procedures that should be followed to assure that correct torque is applied:

1. Calibrate torque wrench periodically to assure accuracy; and recheck frequently.
2. When using a torque wrench adapter which changes distance from torque wrench drive to adapter drive, the indicated reading must be adjusted for desired torque reading. (See Figure 20-1.)
3. Be sure that bolt and nut threads are clean and dry unless otherwise specified.
4. Determine friction drag torque and add to specified dry torque value to ensure proper bolt utilization.
  - (a) Hand-turn nut onto bolt until it stops.
  - (b) Using a torque wrench, measure running torque (torque required to turn nut on bolt).
  - (c) This running torque must be added to specified dry torque value to ensure proper bolt utilization.

### EXAMPLE

Average running torque for a nut	= 15 in.-lbs.
<u>Dry torque required</u>	<u>= 125 ± 5 in.-lbs.</u>
Final torque wrench reading	= 140 ± 5 in.-lbs.

- (d) Since running torque will become less due to nut/bolt re-use (in accepted applications), this procedure must be repeated each time.
- (e) When necessary to tighten from bolt head, increase torque value by an amount equal to shank torque (torque required to turn bolt when installed). Measure with a torque wrench.

### EXAMPLE

Average running torque for a nut	= 15 in.-lbs.
Average running shank torque for installed bolt	= 10 in.-lbs.
<u>Dry torque required</u>	<u>= 125 ± 5 in.-lbs.</u>
Final torque wrench reading	= 150 ± 5 in.-lbs.

b. **Torque Values - Bolts and Nuts.** (See Table 1-1.)

1. Tables included in this section do not apply to the following exceptions:
  - (a) Sheet metal screws should be tightened firmly, but with no specific torque value.
  - (b) Screws attached to nutplates should be tightened firmly, but with no specific torque value.
  - (c) Bolts, nuts, and screws used in control systems and installations where required torque would cause binding or interfere with proper operation of parts.
  - (d) Screws used with dimpled washers should not be drawn tight enough to eliminate washer crown.
  - (e) Fasteners that have a specified torque in a specific installation.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## NOTE

When using a torque wrench adapter which changes the distance from torque wrench drive to adapter drive, apply following formula to obtain corrected torque reading.

### FORMULA

$$\frac{T \times L}{L + E} = Y$$

### LEGEND

T = Desired Torque  
 Y = Indicated Torque  
 L = Effective Length Lever  
 E = Effective Length of Extension

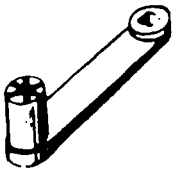
SHORT OPEN END ADAPTER



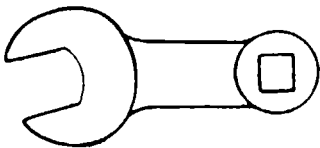
SETSCREW ADAPTER



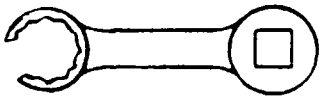
HOSE CLAMP ADAPTER



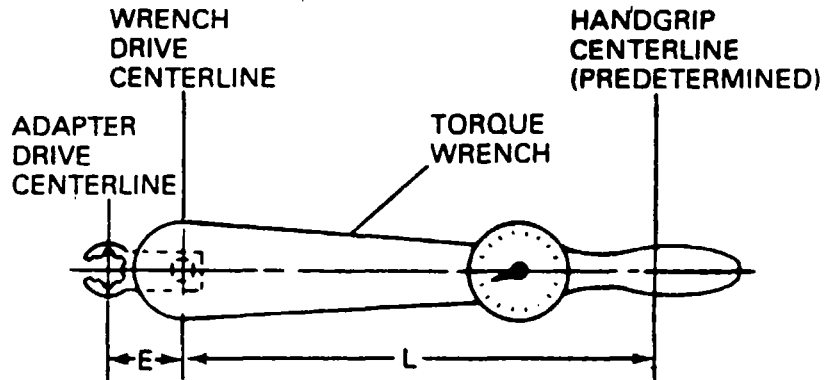
OPEN-END WRENCH ADAPTER



FLARE NUT WRENCH ADAPTER



SPANNER WRENCH ADAPTER

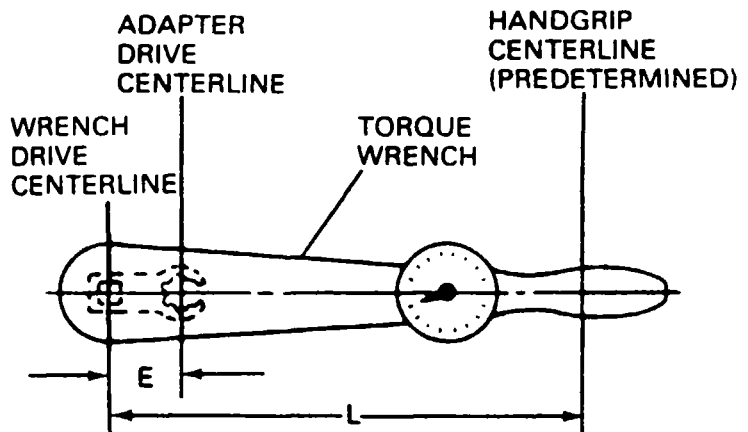


### EXAMPLE

T = 135 In.-Lbs  
 Y = Unknown  
 L = 10.0 In.-Lbs  
 E = 1.5 In.

$$Y = \frac{135 \times 10}{10 + 1.5} = \frac{1350}{11.5} = 117.39$$

Y = 117 In.-Lbs



### EXAMPLE

T = 135 In.-Lbs  
 Y = Unknown  
 L = 10.0 In.-Lbs  
 E = -1.5 In.

$$Y = \frac{135 \times 10}{10 - 1.5} = \frac{1350}{8.5} = 158.82$$

Y = 159 In.-Lbs

Figure 1-3. Torque Wrench Adapter Adjustment

## MODEL R182 & TR182 SERIES SERVICE MANUAL

BOLT TORQUE VALUES								
	Tension				Shear			
	BOLTS							
	AN3 thru AN20 AN42 thru AN49 AN73 thru AN81 AN173 thru AN186 AN509NK9 AN525NK525 MS20033 thru MS20046 MS20073 MS20074 MS24694 MS27039	NOTE: Bolts in tension column may be used with shear nuts. Bolts in shear column should not be used unless a minimum of two threads extend beyond nut after installation.						
NUTS								
AN310 AN315 AN363 AN365 MS20365 MS20500 MS21045 NAS679 NAS1021	AN320 AN364 MS20364 NAS1022							
Nut-bolt size	FINE THREAD SERIES							
	Torque Limits in.-lbs.				Torque Limits in.-lbs.			
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
8-36	12	15	7	9				
10-32	20	25	12	15				
1/4-28	50	70	30	40				
5/16-24	100	140	60	85				
3/8-24	160	190	95	110				
7/16-20	450	500	270	300				
1/2-20	480	690	290	410				
9/16-18	800	1000	480	600				
5/8-18	1100	1300	660	780				
3/4-16	2300	2500	1300	1500				
7/8-14	2500	3000	1500	1800				
1-14	3700	4500	2200	3300				
1-1/8-12	5000	7000	3000	4200				
1-1/4-12	9000	11000	5400	6600				
Nut-bolt size	FINE THREAD SERIES							
	Torque Limits in.-lbs.				Torque Limits in.-lbs.			
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
10-32	25	30	15	20				
1/4-28	80	100	50	60				
5/16-24	120	145	70	90				
3/8-24	200	250	120	150				
7/16-20	520	630	300	400				
1/2-20	770	950	450	550				
9/16-18	1100	1300	650	800				
5/8-18	1250	1550	750	950				
3/4-16	2650	3200	1600	1900				
7/8-14	3550	4350	2100	2600				
1-14	4500	5500	2700	3300				
1-1/8-12	6000	7300	3600	4400				
1-1/4-12	11000	13400	6600	8000				
Nut-bolt size	MS17825				MS17826			
	Torque Limits in.-lbs.				Torque Limits in.-lbs.			
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
10-32	28	35	16	20				
1/4-28	65	80	35	45				
5/16-24	180	225	70	90				
3/8-24	260	325	100	125				
7/16-20	460	575	180	225				
1/2-20	720	900	240	300				
9/16-18	880	1100	320	400				
5/8-18	1300	1600	480	600				
3/4-16	2200	2800	880	1100				
7/8-14	3700	4600	1500	1900				
1-14	5400	6800	2400	3000				
1-1/8-12	8000	10000	4000	5000				
1-1/4-12	11000	14000	5600	7000				
Nut-bolt size	COURSE THREAD SERIES							
	Torque Limits in.-lbs.				Torque Limits in.-lbs.			
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
8-32	12	15	7	9				
10-24	20	25	12	15				
1/4-20	40	50	25	30				
5/16-18	80	90	48	55				
3/8-16	160	185	95	110				
7/16-14	235	255	140	155				
1/2-13	400	480	240	290				
9/16-12	500	700	300	420				
5/8-11	700	900	420	540				
3/4-10	1150	1600	700	950				
7/8-9	2200	3000	1300	1800				
1-8	3700	5000	2200	3000				
1-1/8-8	5500	6500	3300	4000				
1-1/4-8	6500	8000	4000	5000				

Table 1-1. Torque Values - Bolts and Nuts



## MODEL R182 & TR182 SERIES SERVICE MANUAL

2. The values shown in Table 1-1 are based on parts being clean and dry with no lubricants added.
3. Castellated nuts requiring cotter pins should be tightened to low torque value. Torque can be increased to install cotter pin, but should never exceed maximum torque value.

### NOTE

Self-locking castellated nuts, MS17825 and MS17826, require a separate torque range. These values are shown separately in torque value tables.

- c. Torque Value - Threaded Straight Fittings.

### NOTE

Tables in this section are for general applications. Refer to specific installations for special torque values and procedures.

1. Connectors installed in bosses with no required orientation should be installed using torque values given in Table 1-2.
2. Connectors installed in bosses requiring a specific orientation do not use a torque value, but use the following steps:
  - (a) Place jam-nut on fitting along with retainer and packing.
  - (b) Turn nut down until packing is firmly against lower threaded section of fitting.
  - (c) Install fitting into boss and tighten until there is a sudden increase in torque.
  - (d) Tighten fitting 1-1/2 turns.
  - (e) Orientation is accomplished by tightening fitting, but not exceeding one turn.
  - (f) Tighten jam-nut to torque values in Table 1-2.

THREADED CONNECTOR					
TUBE OUTSIDE DIAMETER (Inches)	THREAD	JAM-NUT		CONNECTOR w/ PACKING w/o JAM-NUT	
		Torque-Limits (in.-lbs.)		Torque-Limits (in.-lbs.)	
		MIN.	MAX.	MIN.	MAX.
1/8	5/16-24	35	50	50	55
3/16	3/8-24	65	80	65	75
1/4	7/16-20	85	105	95	105
5/16	1/2-20	105	125	125	135
3/8	9/16-18	120	150	155	165
1/2	3/4-16	240	280	280	305
5/8	7/7-14	320	380	380	405
3/4	1/16-12	500	600	550	600
1	1-5/16-12	720	880	800	900
1-1/4	1-5/8-12	960	1200	900	1000
1-1/2	1-7/8-12	1200	1440	900	1000
2	2-1/2-12	1400	1500	900	1000

TORQUE VALUE - HOSE ASSEMBLIES				
HOSE INSIDE DIAMETER	Nipple or Nut			
	ALUMINUM Torque-Limits in.-lbs.		STEEL Torque-Limits in.-lbs.	
	MIN.	MAX.	MIN.	MAX.
1/8	20	30	75	85
3/16	25	35	95	105
1/4	50	65	135	150
5/16	70	90	170	200
3/8	110	130	270	300
1/2	230	260	450	500
5/8	330	360	650	700
3/4	460	500	900	1000
1	500	700	1200	1400
1-1/4	800	900	1520	1680
1-1/2	800	900	1900	2100
1-3/4	—	—	—	—
2	1800	2000	2660	2940

Table 1-2. Torque Values  
Jam-Nuts and Threaded Connector

Table 1-3. Torque Values  
Hose Assemblies

## MODEL R182 & TR182 SERIES SERVICE MANUAL

THREADED STRAIGHT FITTING TORQUE VALUE (RIGID TUBE)													
TUBE OUTSIDE DIAMETER	FLARED END						STRAIGHT END						
	ALUMINUM Torque-Limits in-lbs.		ALUMINUM On Oxygen Lines Torque-Limits in-lbs.		STEEL Torque-Limits in-lbs.		6061-0 ALUMINUM 5052-0 ALUMINUM Torque-Limits in-lbs.		STEEL Torque-Limits in-lbs.		6061-T(X) ALUMINUM w/ steel sleeve Torque-Limits in-lbs.		
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	TUBE WALL	MIN.	MAX.
1.8							20	30	45	55			
3.16					90	100	30	40	90	100	0.028	45	55
1.4	40	65			135	150	40	65	135	150	0.022	80	105
											0.028	80	105
											0.035	80	105
											0.049	90	115
5.16	60	80	100	125	180	200	60	80	180	200	0.028	80	105
											0.035	80	105
											0.042	125	175
3.8	75	125			270	300	75	125	270	300	0.028	125	175
											0.035	125	175
											0.049	125	175
1.2	150	250			450	500	150	250	450	500	0.028	135	180
											0.035	200	300
											0.049	400	500
											0.058	400	500
											0.065	400	500
5.8	200	350			700	800	200	350	700	800	All	500	600
3.4	300	500			1100	1150	300	500	1100	1150	All	600	700
1	500	700			1200	1400	500	700	1200	1400	All	1000	1300
1-1.4	600	900			1300	1450	600	900	1300	1450	All	1300	1500
1-1.2	600	900			1350	1500	600	900	1350	1500	All	1400	1700
2							600	900	1500	1700			

**Table 1-4. Torque Values - Straight Threaded Fittings (Line)**

3. Bulkhead fittings are installed with jam-nuts and should be torqued to values in Table 1-2.
4. Torque values for hose end fittings (nipple or nut) are given in Table 1-3.
5. Torque values for straight threaded fittings used with rigid lines are given in Table 1-4.

1-8. **SAFETYING PROCEDURES.** The use of safety wire, cotter pins, lockwashers, and self-locking nuts is to prevent relative movement of critical components subject to vibration, torque, tension, etc., which could cause attaching parts to be broken, loosened, and/or detached.

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### 1-9. SAFETY WIRE PROCEDURES.

- a. Identification. Lockwire comes in three types which are identified by size and color. The three types are classified by use.
  1. Inconel and Monel wire is used for general lockwiring and is identified by a natural wire color.
    - (a) Inconel can withstand temperatures up to 1500°F.
    - (b) Monel can withstand temperatures up to 800°F.
  2. Copper that is cadmium-plated and dyed yellow is used for shear and seal wiring applications.
    - (a) Shear applications are those where it is necessary to break or shear wire to permit operation or actuation of emergency devices.
    - (b) Seal applications are where wire is used with a lead seal to prevent tampering or use of a device without indication.
  3. Aluminum Alloy (Alclad 5056) is dyed blue and is used exclusively for safety-wiring magnesium parts.
  4. Size of wire is dependent on material and purpose of installation.
    - (a) 0.020-inch diameter copper wire should be used for shear and seal application.
    - (b) 0.020-inch diameter wire may be used to lockwire parts with tie holes smaller than 0.045 inches; or, on parts with tie hole diameters between 0.045 and 0.062 when spacing between ports is less than two inches; or, when bolts and screws of 0.25-inch diameter or less are closely spaced.
    - (c) 0.032-inch minimum diameter wire is used for general purpose lockwiring.

#### NOTE

When using single-wire method of locking, the largest wire that will fit tie holes should be used.

- b. Lockwire Installation. There are two basic forms of lockwiring. The single-wire method has limited application; the double-twist method is the common method of lockwiring.
  1. Use new wire for each application; do not try to re-use old wire.
  2. Single-wire method is accomplished by passing a single wire through tie holes and back with ends then twisted together. (See Figure 1-4.)
    - (a) Single-wire method is used for shear and seal wiring applications.
    - (b) Single-wire method can be used in closely spaced, closed geometric patterns. Closely spaced is defined as spacing two inches or less between centers of parts.

#### CAUTION

Screws in closely spaced geometric patterns which secure hydraulic or air seals, hold hydraulic pressure, or are used in critical areas should use double-twist method of lockwiring.

3. Lockwiring by the double-twist method is really one wire twisted on itself several times and is accomplished by the following steps (see Figure 1-4).
  - (a) Insert one end of wire through tie holes of bolt head and firmly loop around bolt head.

#### NOTE

This does not necessarily apply to castellated nuts when slot is close to top of nut. The wire will be more secure if it is made to pass along side of stud.

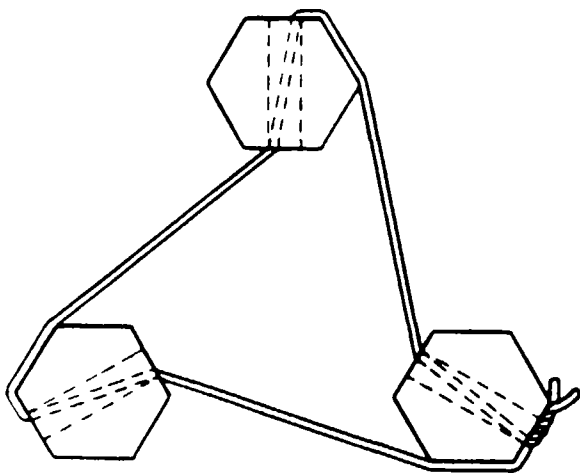
## MODEL R182 & TR182 SERIES SERVICE MANUAL

- (b) While taut, twist strands to within 1/8 inch of next part. The twisting keeps wire taut without overstressing and prevents wire from becoming nicked, kinked, or mutilated.
  - (c) Lockwiring multiple groups by double-twist method is accomplished in a similar manner except twists between parts are alternated between clockwise and counterclockwise.
  - (d) After last tie hole, wire is twisted three to five times to form a pigtail.
  - (e) Cut off any excess wire and bend pigtail towards part.
4. When lockwiring widely spaced multiple groups by double-twist method, three units shall be the maximum number in a series.

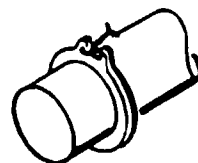
### NOTE

Widely spaced multiple groups shall mean those in which fasteners are from four to six inches apart. Lockwiring shall not be used to secure fasteners or fittings which are spaced more than six inches apart, unless tie points are provided on adjacent parts to shorten span of lockwire to less than six inches.

5. When lockwiring closely spaced multiple groups, the number of units that can be lockwired by a 24-inch length of wire shall be the maximum number in a series.
6. Parts should be lockwired so that wire is placed in tension (pulled on) if a part attempts to loosen.
- c. Required Lockwire Installation Applications.
1. Bolts and other fasteners securing critical parts that affect airplane safety and operation.
- (a) In blind-tapped hole applications or bolts or castellated nuts on studs, lockwiring is installed in same manner as described for bolt heads.
  - (b) Hollow head bolts are safetied in manner prescribed for regular bolts.
  - (c) Drain plugs and cocks may be safetied to a bolt, nut, or other part having a free tie hole in accordance with instructions described.
  - (d) External snap rings may be locked if necessary using general locking principles as described and illustrated. Internal snap rings should not be lockwired.
  - (e) When locking is required on electrical connectors which use threaded coupling rings, or on plugs which employ screws or rings to fasten individual parts of plug together, they shall be lockwired with 0.020-inch diameter wire in accordance with locking principles as described and illustrated. It is preferable to lockwire all electrical connectors individually. Do not lockwire one connector to another unless it is necessary to do so.
  - (f) Drilled head bolts and screws need not be lockwired if installed into self-locking nuts or installed with lockwashers. Castellated nuts with cotter pins or lockwire are preferred on bolts or studs with drilled shanks, but self-locking nuts are permissible within limitations described in Paragraph 1-13.
2. For new design, lockwire shall not be used to secure nor shall lockwire be dependent upon fracture as basis for operation of emergency devices such as handles, switches, and guard-covering handles that operate emergency mechanisms such as emergency exits, fire extinguishers, emergency cabin pressure release, emergency landing gear release, and the like. However, where existing structural equipment or safety of flight emergency devices requires shear wire to secure equipment while not in use, but which are dependent upon shearing or breaking of lockwire for successful emergency operation of equipment, particular care exercised to assure that wiring under these circumstances shall not prevent emergency operations of these devices.



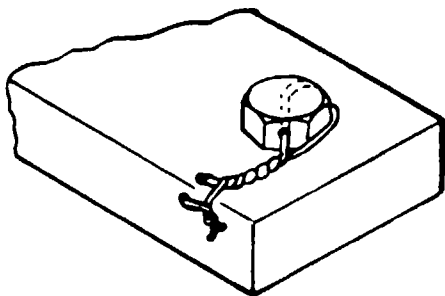
BOLTS IN CLOSELY SPACED, CLOSED GEOMETRICAL PATTERN. SINGLE- WIRE METHOD.



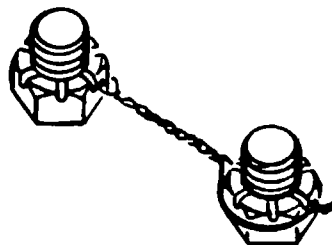
EXTERNAL SNAP RING SINGLE-WIRE METHOD

NOTE

RIGHT-HAND THREADED PARTS SHOWN. REVERSE DIRECTION FOR LEFT-HAND THREADS.



SINGLE FASTENER APPLICATION DOUBLE-TWIST METHOD



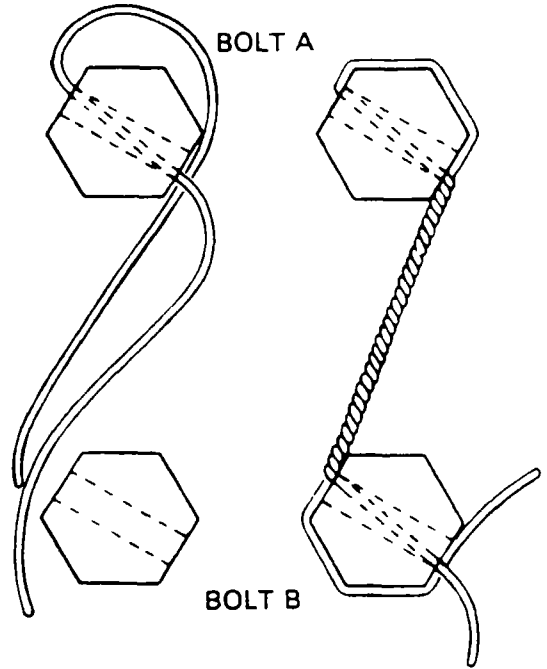
CASTELLATED NUTS ON DRILLED STUDS DOUBLE-TWIST METHOD

Figure 1-4. Lockwire Safetying (Sheet 1 of 2)

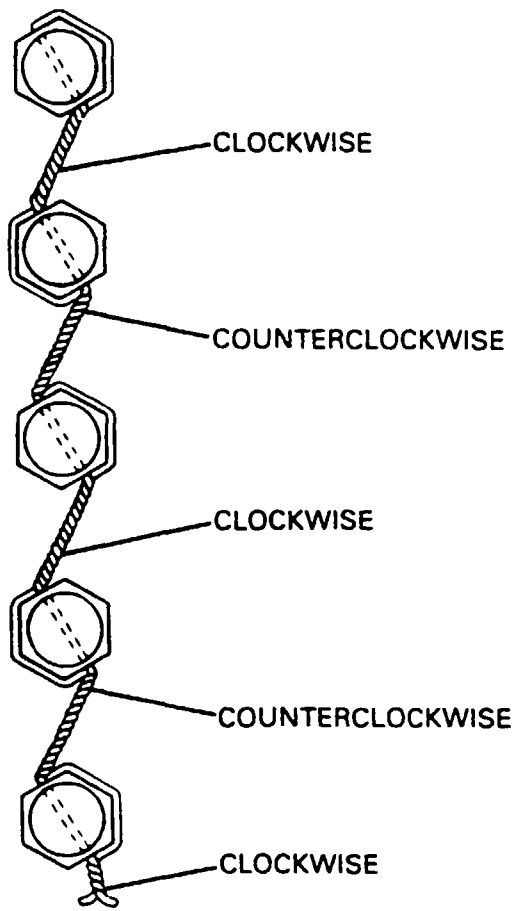
# MODEL R182 & TR182 SERIES SERVICE MANUAL

## DOUBLE-TWIST METHOD

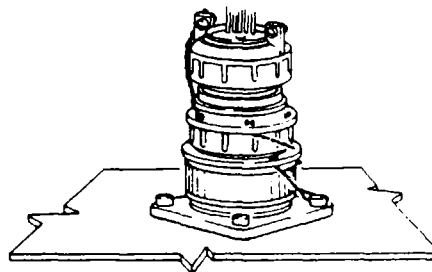
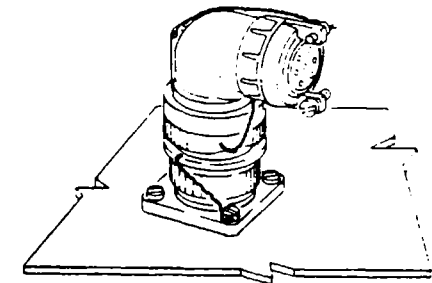
- STEP 1. Insert wire through bolt A and bend around bolt (if necessary, bend wire across bolt head). Twist wires clockwise until they reach bolt B.
- STEP 2. Insert one end of wire through bolt B. Bend other end around bolt (if necessary, bend wire across head of bolt). Twist wires counterclockwise 1/2 inch or six twists. Clip ends. Bend pigtail back against part.



DOUBLE-TWIST METHOD



MULTIPLE FASTENER APPLICATION  
DOUBLE-TWIST METHOD



ELECTRICAL CONNECTION

Figure 1-4. Lockwire Safelying (Sheet 2 of 2)

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## 1-10. USE OF COTTER PINS.

- a. **Cotter Pin Installation.** Castellated nuts and pins may be safetied with cotter pins or lockwire. The preferred method is to use cotter pins.
  1. Select cotter pin material in accordance with temperature, atmosphere, and service limitations (see Table 1-5).
  2. Cotter pins shall be new upon each application.
  3. When nuts are to be secured to fastener with cotter pins, tighten nut to low side (minimum) of applicable specified or selected torque range, unless otherwise specified, and if necessary, continue tightening until slot aligns with hole. In no case shall you exceed high side (maximum) torque range.
  4. If more than 50 percent of cotter pin diameter is above nut castellation, a washer should be used under nut or a shorter fastener should be used. A maximum of two washers may be permitted under a nut.
  5. The largest diameter cotter pin which hole and slots will accommodate should be used, but in no application to a nut, bolt, or screw shall pin size be less than sizes described in Table 1-8.
  6. Install cotter pin with head firmly in slot of nut with axis of eye at right angles to bolt shank. Bend prongs so that head and upper prong are firmly seated against bolt (see figure 1-5).
  7. In pin applications, install cotter pin with axis of eye parallel to shank of clevis pin or rod end. Bend prongs around shank of pin or rod end (see Figure 1-5).

### CAUTION

Cadium-plated cotter pins should not be used in applications bringing them in contact with fuel, hydraulic fluid, or synthetic lubricants.

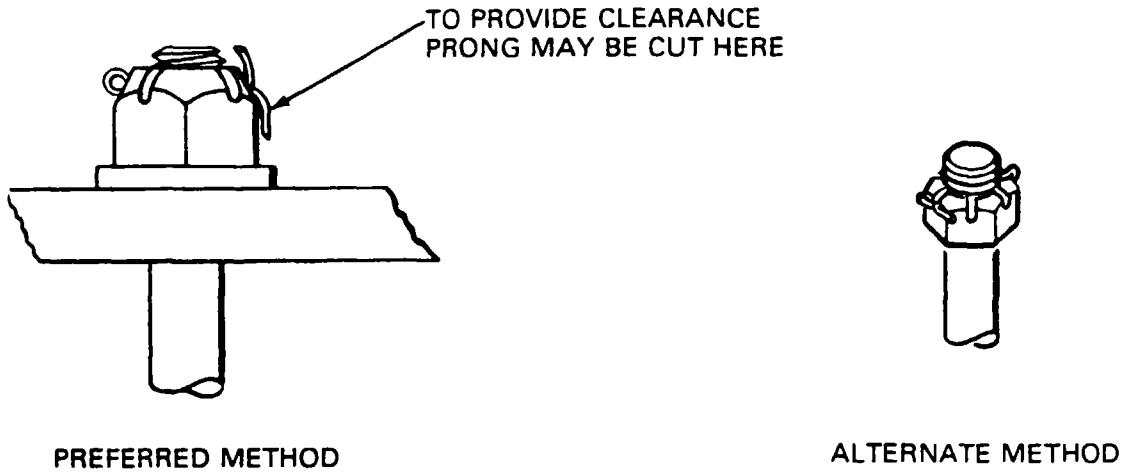
COTTER PINS (MS24665)		
MATERIAL	TEMPERATURE	USE
Carbon Steel	Up to 450°F	Pins that contact cadmium-plated surfaces.  General Applications  Normal Atmospheres
Corrosion-Resistant	Up to 800°F	Pins that contact corrosion-resistant steel.  Corrosive atmospheres

Table 1-5. Cotter Pin Temperature and Use

COTTER PIN - MINIMUM SIZE	
THREAD SIZE	MINIMUM PIN SIZE
6	0.028
8	0.044
10	0.044
1/4	0.044
5/16	0.044
3/8	0.072
7/16	0.072
1/2	0.072
9/16	0.086
5/8	0.086
3/4	0.086
7/8	0.086
1	0.086
1-1/8	0.116
1-1/4	0.116
1-3/8	0.116
1-1/2	0.116

Table 1-6. Cotter Pin Minimum Size

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CASTELLATED NUT ON BOLT

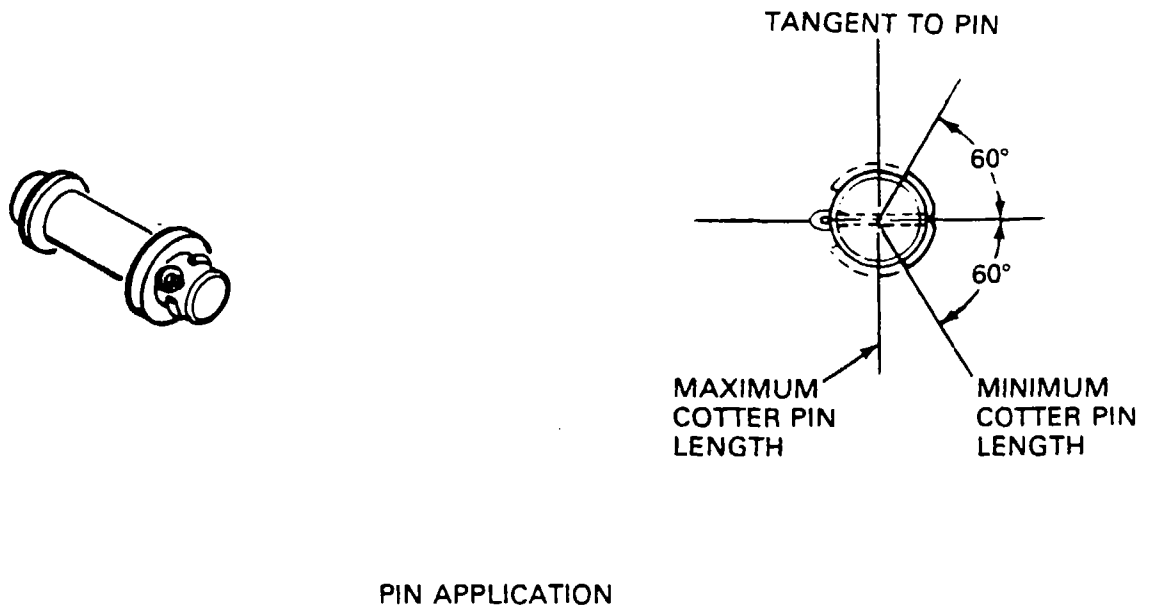


Figure 1-5. Installation of Cotter Pins



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### 1-11. USE OF LOCKING CLIPS.

#### a. Safetying Turnbuckles. (See Figure 1-6.)

1. Prior to safetying, both threaded terminals shall be screwed an equal distance into turnbuckle body and shall be screwed in at least so far that not more than three threads of any terminal are exposed outside body.
2. After turnbuckle has been adjusted to its locking position, with slot indicator groove on terminals and slot indicator notch on body aligned, insert end of locking clip into terminal and body (refer to Figure 1-6) until U-curved end of locking clip is over hole in center of body.
  - (a) Press locking clip into hold to its full extent.
  - (b) Curved end of locking clip will expand and latch in body slot.
  - (c) To check proper seating of locking clip, attempt to remove pressed "U" end from body hole with fingers only.

#### NOTE

Do not use tool as locking clip could be distorted.

3. Locking clips are for one time use only and shall not be re-used.
4. Both locking clips may be inserted in same hole of turnbuckle body or in opposite holes of turnbuckle body.

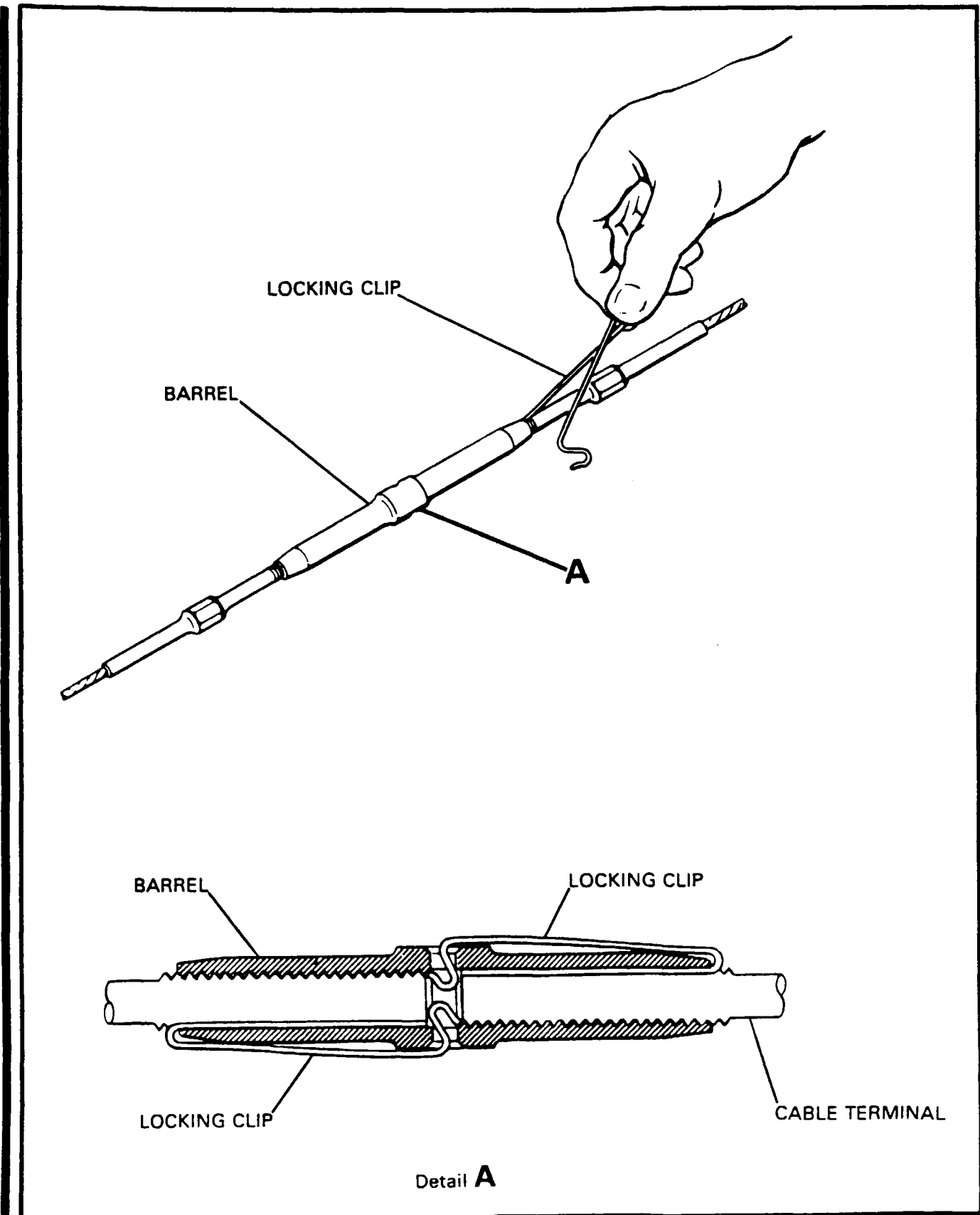


Figure 1-6. Safetying Turnbuckle Assemblies

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### -12. USE OF LOCKWASHERS.

- a. Lockwashers can be used only under the following conditions.
  1. When self-locking feature cannot be provided in externally or internally threaded part.
  2. When a cotter pin cannot be used to prevent rotation of internal threads with respect to external threads.
  3. When lockwire cannot be used to prevent loosening of threaded parts.
  4. When fastening is not used for fabrication of primary structure.
  5. When loosening of threaded parts would not endanger safety of airplane or people.
  6. When corrosion encouraged by gouging aluminum or magnesium alloys by edges of teeth on tooth-locked washers would not cause malfunctioning of parts being fastened together.

### -13. USE OF SELF-LOCKING NUTS.

- a. Restrictions.
  1. Self-locking nuts cannot be used under certain conditions.
    - (a) Used, reworked, or reprocessed nuts should not be installed for any application.
    - (b) Do not use if at joints in control systems for singular attach points.
    - (c) Do not use on externally threaded parts that serve as an axle of rotation for another part where tensional (torque) loads can cause nut to loosen and/or become separated. Examples are pulleys, levers, linkages, and cam followers.

#### NOTE

Self-locking nuts can be used when threaded parts are held by a positive locking device that requires shearing or rupture before torsional loads can act on threaded parts.

- (d) Do not use where a loose nut, bolt, or screw could fall or be drawn into an area that would impede or damage or otherwise distort operation.
  - (e) Do not use to attach access panels and doors or to assemble components that are routinely disassembled or removed for access and servicing.
  - (f) In general, do not use self-locking nuts where loss of bolt affects safety of flight.
2. Bolts, studs, or screws, excluding Hi-Locks, must extend through self-locking nut for a length equivalent of two threaded pitches. This length includes chamfer.
  3. Self-locking nuts which are attached to structure shall be attached in a positive manner to eliminate possibility of their rotation or misalignment when tightening is to be accomplished by rotating bolts to structure, and permit replacement of nuts.

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 2

### GROUND HANDLING, SERVICING, CLEANING, LUBRICATION AND INSPECTION

#### WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

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- 2-1. GROUND HANDLING.
- 2-2. TOWING. Moving the aircraft by hand is accomplished by using the wing struts and landing gear struts as push points. A tow bar attached to the nose gear should be used for steering and maneuvering the aircraft on the ground.

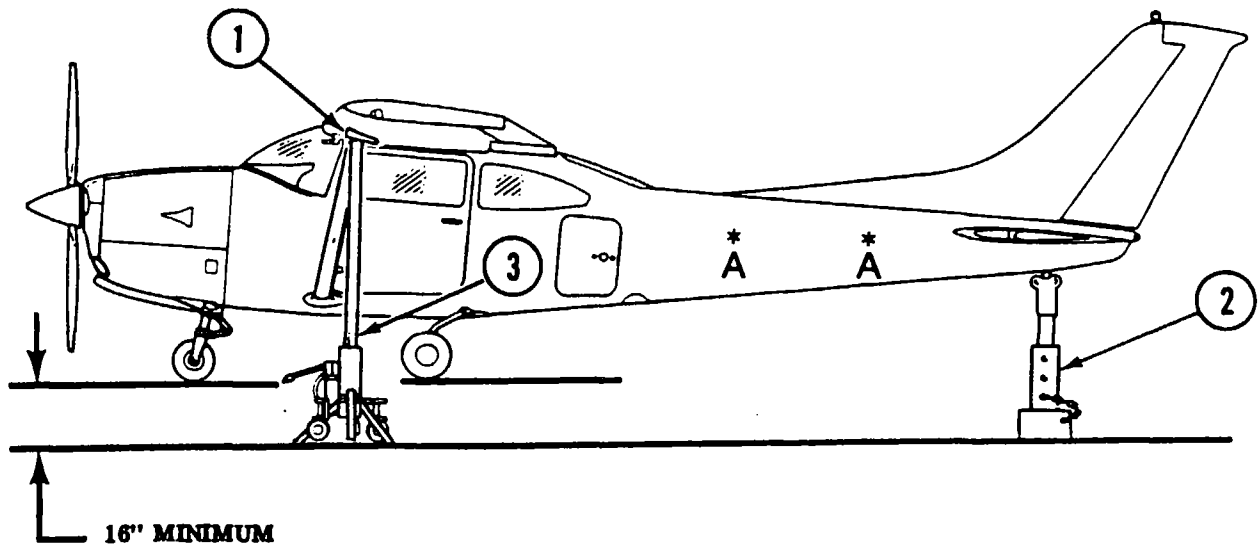
### NOTE

Tow bar Part No. 0501019-1, is available from the Cessna Supply Division.

### CAUTION

When towing the aircraft, never turn the nose wheel more than 29 degrees either side of center or the nose gear will be damaged. Do not push on control surfaces or outboard empennage surfaces. When pushing on the tailcone, always apply pressure at a bulkhead to avoid buckling the skin.

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## NOTE

Corresponding points on both upper door sills may be used to level the aircraft laterally.

Reference points for longitudinal leveling of aircraft are two screws on left side of tailcone. These are indicated in illustration by A.

(Also refer to paragraph 2-5)

Figure 2-1. Jacking and Leveling (Sheet 1 of 2)

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## JACKING INFORMATION

ITEM	TYPE AND NUMBER	REMARKS
①	Block (Jack points are available)	1x4x4 padded with 1 4" rubber
②	Cessna No. 2-168	Tail tie-down stand
③	No. 2-170 Basic jack (includes No. 2-71 Side tube: Liftstroke 22-1/2") No. 2-70 Slide tube: Liftstroke 22-1.2" No. 2-591 Extension cap No. 2-109 Leg extension	Min. closed height: 34" Max. extension height: 56-1/2" Min. closed height: 57-1.2" Max. extension height: 80" Adds 4" Adds 12"

1. Wing jacks are placed under front spar of wing just outboard of wing strut, must extend far enough to raise wheels a minimum of 16 inches off the ground, and must be of adequate strength.
2. Attach Cessna tail tie-down stand (SE2-168) to the tie-down ring. Be sure tail stand weighs enough to keep tail down and under all conditions and that it is strong enough to support any weight that might be placed on it (place shot bags or sand bags on tail stand). In addition, the base of adjustable tail stand is to be filled with concrete for additional weight as a safety factor.
3. Operate jacks evenly until desired height is reached (16-inch minimum).
4. Items (1), (2), and (3) are available from the Cessna Supply Division.

Figure 2-1. Jacking and Leveling (Sheet 2 of 2)

- 2-3. **HOISTING.** The aircraft may be lifted with a hoist of two-ton capacity by using hoisting rings, which are optional equipment, or by means of suitable slings. The front sling should be hooked to each upper engine mount at the firewall, and the aft sling should be positioned around the fuselage at the first bulkhead forward of the leading edge of the stabilizer. If the optional hoisting rings are used, a minimum cable length of 60 inches for each cable is required to prevent bending of the eyebolt-type hoisting rings. If desired, a spreader jig may be fabricated to apply vertical force to the eyebolts.
- 2-4. **JACKING.** See figure 2-1 for jacking procedures.
- 2-5. **LEVELING.** Corresponding points on both upper door sills may be used to level the aircraft laterally. Leveling point nutplates are provided on the left side of the tailcone at Sta. 139.65 and 171.65. Use these points for leveling the aircraft by removing NAS221-7 screws and installing suitable studs to support a level.
- 2-6. **WEIGHING .** Refer to Pilot's Operating Handbook.

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- 2-7. **PARKING.** Parking precautions depend principally on local conditions. As a general precaution, set parking brake or chock the wheels and install the controls lock. In severe weather and high wind conditions, tie down the aircraft as outlined in paragraph 2-8 if a hangar is not available.
- 2-8. **TIE-DOWN.** When mooring the aircraft in the open, head into the wind if possible. Secure control surfaces with the internal control lock and set brakes.

### CAUTION

Do not set parking brakes when they are overheated or during cold weather when accumulated moisture may freeze them.

If brake ice freeze-up occurs, operate the brakes several times using maximum pressure.

- a. Tie ropes, cables, or chains to the wing tie-down fittings located at the upper end of each wing strut. Secure the opposite ends of ropes, cables, or chains to ground anchors.
  - b. Secure a tie-down rope (no chains or cables) to the nose gear strut, and secure opposite end of rope to ground anchor.
  - c. Secure the middle of a rope to the tail tie-down ring. Pull each end of rope away at a 45 degree angle and secure to ground anchors at each side of tail.
  - d. Secure control lock on pilot control column. If control lock is not available, tie pilot control wheel back with front seat belt.
  - e. These aircraft are equipped with a spring-loaded steering bungee which affords protection against normal wind gusts. However, if extremely high wind gusts are anticipated, additional external locks may be installed.
- 2-9. **FLYABLE STORAGE.** Flyable storage is defined as a maximum of 30 days nonoperational storage and/or the first 25 hours of intermittent engine operation.

### NOTE

The aircraft is delivered from Cessna with MIL-L-6082 Aviation Grade Mineral Oil. This oil is to be used to replenish the oil supply during the first 25 hours of operation, at the first 25-hour oil change and until a total of 50 hours have accumulated or oil consumption has stabilized. Then use Ashless Dispersant Oil conforming to MIL-L-22851 in accordance with the oil chart in figure 2-5.



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During the 30-day nonoperational storage or the first 25 hours of intermittent engine operation, every seventh day the propeller shall be rotated by hand without running the engine. After rotating the engine five revolutions, stop the propeller 45° to 90° from the position it was in. If the aircraft is stored outside, tie-down in accordance with paragraph 2-8. In addition, the pitot tube, static air vents, air vents, openings in the engine cowling, and other similar openings shall have protective covers installed to prevent entry of foreign material. If at the end of thirty (30) days aircraft will not be removed from storage, the engine shall be started and run. The preferred method would be to fly the aircraft for thirty (30) minutes, and up to but not exceeding normal oil and cylinder temperatures.

### CAUTION

Excessive ground operation shall be avoided.

- 2-10. **RETURNING AIRCRAFT TO SERVICE.** After flyable storage, returning the aircraft to service is accomplished by performing a thorough preflight inspection. At the end of the first 25 hours of engine operation, drain engine oil, change external oil filter element, and service engine with correct grade and quantity of engine oil. See figure 2-4 and paragraph 2-23 for correct grade of engine oil.
- 2-11. **TEMPORARY STORAGE.** Temporary storage is defined as aircraft in a nonoperational status for a maximum of 90 days. The aircraft is constructed of corrosion resistant alclad aluminum, which will last indefinitely under normal conditions if kept clean, however, these alloys are subject to oxidation. The first indication of corrosion on unpainted surfaces is in the form of white deposits or spots. On painted surfaces, the paint is discolored or blistered. Storage in a dry hangar is essential to good preservation and should be procured, if possible. Varying conditions will alter the measures of preservation, but under normal conditions in a dry hangar, and for storage periods not to exceed 90 days, the following methods of treatment are suggested.
- a. Fill fuel tanks or bays with correct grade of gasoline.

### WARNING

**DURING ALL FUELING PROCEDURES, FIRE FIGHTING EQUIPMENT MUST BE AVAILABLE. TWO GROUND WIRES FROM DIFFERENT POINTS ON THE AIRPLANE TO SEPARATE APPROVED GROUND STAKES SHALL BE USED TO PREVENT ACCIDENTAL DISCONNECTION OF ONE GROUND WIRE. ENSURE THAT FUELING NOZZLE IS GROUNDED TO THE AIRPLANE.**

### NOTE

Tie down rings should be used as grounding points for all ground wires during refueling procedures.

- b. Clean and wax aircraft thoroughly.
- c. Clean any oil or grease from tires and coat tires with a tire preservative. Cover tires to protect against grease and oil.
- d. Either block up fuselage to relieve pressure on tires or rotate wheels every 30 days to prevent flat spotting the tires.
- e. Lubricate all airframe items and seal or cover all openings which could allow moisture and/or dust to enter.

## MODEL R182 AND TR182 SERVICE MANUAL

### NOTE

The aircraft battery serial number is recorded in the aircraft equipment list. To assure accurate warranty records, the battery should be reinstalled in the same aircraft from which it was removed. If the battery is returned to service in a different aircraft, appropriate record changes must be made and notification sent to the Cessna Claims Department.

- f. Remove battery and store in a cool, dry place; service battery periodically and charge as required.

### NOTE

An engine treated in accordance with the following may be considered being protected against normal atmospheric corrosion for a period not to exceed 90 days.

- g. Disconnect spark plug leads and remove upper and lower spark plugs from each cylinder.

### NOTE

The preservative oil must conform to specification MIL-C-6529, Type 1. Oil must be heated to 200°/220°F spray nozzle temperature.

- h. Using a portable pressure sprayer, spray preservative oil through the upper spark plug hole of each cylinder with the piston in a down position. Rotate crankshaft as each pair of cylinders is sprayed.
- i. After completing step "h," rotate crankshaft so that no piston is at a top position. If the aircraft is to be stored outside, stop two-bladed propeller so that blades are as near horizontal as possible to provide maximum clearance with passing aircraft.
- j. Again, spray each cylinder without moving the crankshaft, to thoroughly cover all interior surfaces of the cylinder above the piston.
- k. Install spark plugs and connect spark plug leads.
- l. Apply preservative oil to the engine interior by spraying approximately two ounces of the preservative oil through the oil filler tube.
- m. Seal all engine openings exposed to the atmosphere, using suitable plugs or non-hygroscopic tape. Attach a red streamer at each point that a plug or tape is installed.
- n. If the aircraft is to be stored outside, perform the procedures outlined in paragraph 2-8. In addition, the pitot tube, static source vents, air vents, openings in the engine cowling, and other similar openings should have protective covers installed to prevent entry of foreign material.
- o. Attach a warning placard to the propeller to the effect that the propeller shall not be moved while the engine is in storage.

### 2-12. INSPECTION DURING STORAGE.

- a. Inspect airframe for corrosion at least once a month. Remove dust collections as frequently as possible. Clean and wax aircraft as required.
- b. Inspect the interior of at least one cylinder through the spark plug hole for corrosion at least once each month.

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## NOTE

Do not move crankshaft when inspecting interior of cylinder for corrosion.

- c. If at the end of the 90 day period, the aircraft is to be continued in non-operational storage, repeat the procedural steps "g" thru "o" of paragraph 2-11.
- 2-13. RETURNING AIRCRAFT TO SERVICE. After temporary storage, use the following procedures to return the aircraft to service.
- a. Remove aircraft from blocks. Check tires for proper inflation.
  - b. Check and install battery.
  - c. Check that oil sump has proper grade and quantity of engine oil.
  - d. Service induction air filter and remove warning placard from propeller.
  - e. Remove materials used to cover openings.
  - f. Remove, clean and gap spark plugs.
  - g. While spark plugs are removed, rotate propeller several revolutions to clear excess rust preventive oil from cylinders.
  - h. Install spark plugs and torque to value specified in Section 11 or 11A. Connect spark plug leads.
  - i. Check fuel strainer. Remove and clean filter screen, if necessary. Check fuel cells and fuel lines for moisture and sediment. Drain enough fuel to eliminate moisture and sediment.
  - j. Perform a thorough preflight inspection, then start and warmup engine.
- 2-14. INDEFINITE STORAGE. Indefinite storage is defined as aircraft in a nonoperational status for an indefinite period of time. Engines treated in accordance with the following may be considered protected against normal atmosphere corrosion, provided the procedures outlined in paragraph 2-15 are performed at the intervals specified.
- a. Operate engine until oil temperature reaches normal operating range. Drain engine oil sump in accordance with procedures outlined in paragraph 2-23. Close drain valve.
  - b. Fill oil sump to normal operating capacity with corrosion preventive mixture which has been thoroughly mixed.

## NOTE

Corrosion-preventive mixture consists of one part compound (by volume) MIL-C-6529, Type 1, mixed with three parts (by volume) MIL-C-6082 aviation grade straight mineral oil.

- c. Immediately after filling the oil sump with a corrosion preventive mixture, fly the aircraft for a period of time not to exceed a maximum of 30 minutes.
- d. After flight, with engine operating at 1200 to 1500 RPM, and induction air filter removed, spray corrosion preventive mixture into induction airbox, at the rate of one-half gallon per minute. Spray until heavy black smoke comes from exhaust stack. Then increase the spray until engine is stopped.

## CAUTION

Spraying the mixture too fast can cause a hydrostatic lock.

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- e. Do not rotate propeller after completing step "d."
- f. Remove all spark plugs and spray corrosion preventive mixture, which has been preheated (221°F to 250°F) into all spark plug holes to thoroughly cover interior surfaces of cylinders.
- g. Install spark plugs or solid plugs into the lower spark plug holes and install dehydrator plugs in the upper spark plug holes. Be sure that dehydrator plugs are blue in color when installed.

### NOTE

To thoroughly cover all surfaces of the cylinder interior, move the nozzle of the spray gun from the top to the bottom of the cylinder. If by accident the propeller is rotated following this spraying, respray the cylinders to insure an unbroken coverage on all surfaces.

- h. Cover spark plug lead terminals with shipping plugs (AN4060-1), or other suitable covers.
- i. With throttle in full open position, place a bag of desiccant in the induction air intake and seal opening with moisture resistant paper and tape.
- j. Place a bag of desiccant in the exhaust tailpipe and seal openings with moisture resistant tape.
- k. Seal cold air inlet to the heater muff with moisture resistant tape.
- l. Seal engine breather hose and clamping in place.
- m. Seal all other engine openings exposed to atmosphere, using suitable plugs or non-hygroscopic tape.

### NOTE

Attach a red streamer to each location where plugs or tapes are installed. Either attach red streamers outside the sealed area with tape or to the inside of the sealed area with safety wire to prevent wicking of moisture into the sealed area.

- n. Drain corrosion preventive mixture from engine sump in accordance with the procedures outlined in paragraph 2-23. The corrosion preventive mixture is harmful to paint and should be wiped from painted surfaces immediately.
- o. Attach a warning placard on the throttle control knob to the effect that the engine contains no lubricating oil. Placard the propeller to the effect that it should not be moved while the engine is in storage.
- p. Prepare airframe for storage as outlined in paragraph 2-11 thru step "f".

### NOTE

As an alternate method of indefinite storage, the aircraft may be serviced in accordance with paragraph 2-11, providing the aircraft is run up at maximum intervals of 90 days and then reserviced per paragraph 2-11.

2-15. **INSPECTION DURING STORAGE.** Aircraft in indefinite storage shall be inspected as follows:

- a. Inspect cylinder protex plugs each seven days.

## MODEL R182 AND TR182 SERVICE MANUAL

- b. Change protex plugs if their color indicates an unsafe condition.
- c. If the protex plugs have changed color in one half of the cylinders, all desiccant material in the engine should be replaced with new material.
- d. Respray the cylinder interiors with corrosion preventive mixture every six months and replace all desiccant and Protex plugs.

### NOTE

Before spraying, inspect the interior of one cylinder for corrosion through the spark plug hole and remove at least one rocker box cover and inspect the valve mechanism.

- 2-16. **RETURNING AIRCRAFT TO SERVICE.** After indefinite storage, use the following procedure to return the aircraft to service.
- a. Remove aircraft from blocks. Check tires for correct inflation.
  - b. Check and install battery.
  - c. Remove all materials used to seal and cover openings.
  - d. Remove warning placards posted at throttle and propeller.
  - e. Change engine oil filter and close oil quick-drain valve by pulling down on stem or twisting a screwdriver inserted between clip and body as shown in figure 2-4. Remove hose from stem. Service engine with oil in accordance with figure 2-4 of this manual.
  - f. Service and install the induction air filter.

### NOTE

The corrosion preventive mixture will mix with the engine lubricating oil, so flushing the oil system is not necessary. Draining the oil sump will remove enough of the corrosion preventive mixture.

- g. Remove protex plugs and spark plugs or plugs installed in spark plugs holes. Rotate propeller several revolutions by hand to clear corrosion preventive mixture from cylinders.
- h. Clean, gap and install spark plugs. Torque spark plugs to value specified in Section 11 or 11A. Connect leads.
- i. Check fuel strainer. Remove and clean filter screen. Check fuel cells and fuel lines for moisture and sediment, and drain enough fuel to eliminate.
- j. Perform a thorough preflight inspection, then start and warm-up engine.
- k. Thoroughly clean aircraft and flight test aircraft.

- 2-17. **SERVICING.**

- 2-18. **GENERAL DESCRIPTION.** Servicing requirements are shown in figure 2-4. The following paragraphs supplement this figure by adding details not included in the figure.

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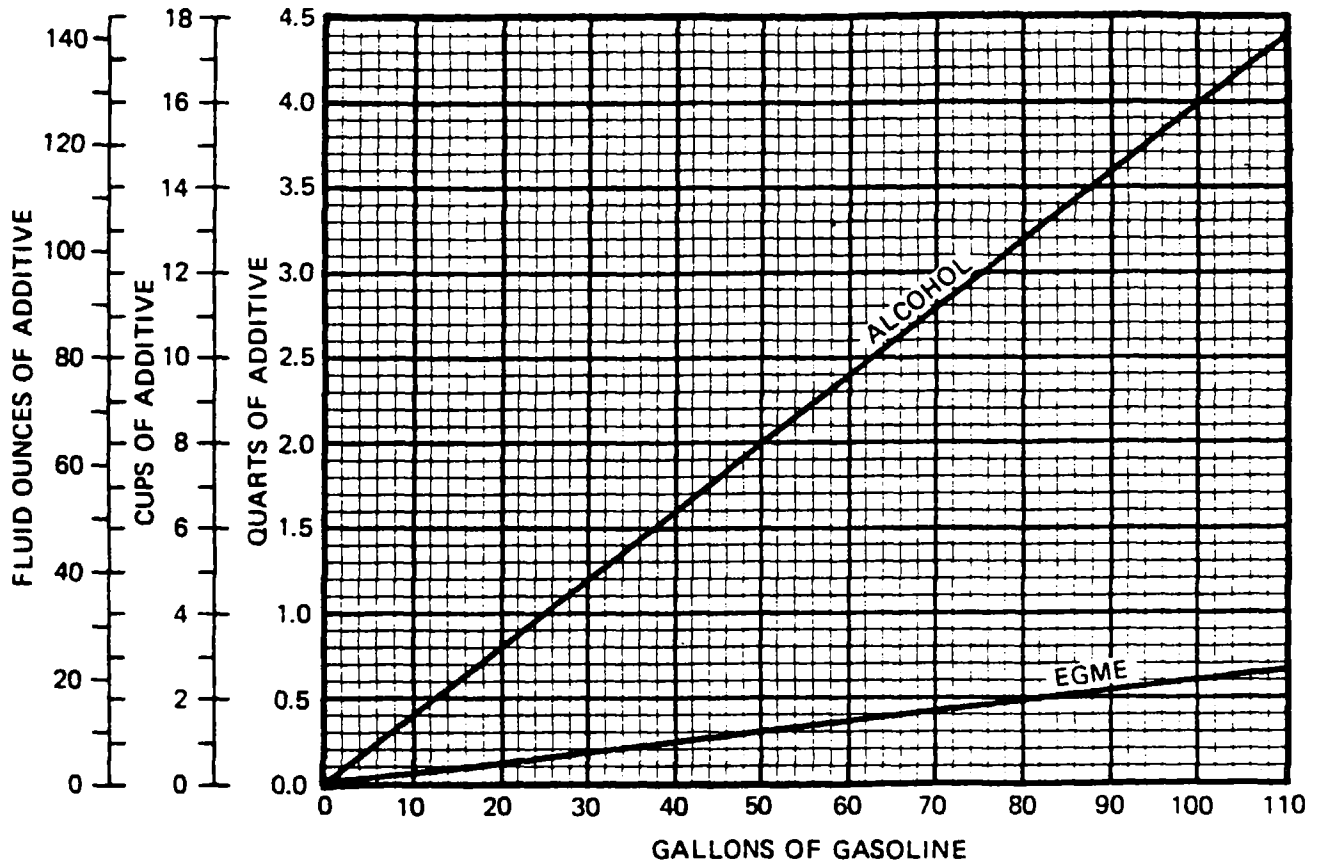


Figure 2-2. Fuel Additives Mixing Ratio Chart

- 2-19. **FUEL.** Fuel tanks should be filled immediately after flight to lessen moisture condensation. Tank capacities are listed in Section 1. The recommended fuel grade to be used is given in figure 2-4.

### WARNING

**DURING ALL FUELING PROCEDURES, FIRE FIGHTING EQUIPMENT MUST BE AVAILABLE. TWO GROUND WIRES FROM DIFFERENT POINTS ON THE AIRPLANE TO SEPARATE APPROVED GROUND STAKES SHALL BE USED TO PREVENT ACCIDENTAL DISCONNECTION OF ONE GROUND WIRE. ENSURE THAT FUELING NOZZLE IS GROUNDED TO THE AIRPLANE.**

### NOTE

Tie down rings should be used as grounding points for all ground wires during refueling procedures.

- 2-20. **USE OF FUEL ADDITIVES FOR COLD WEATHER OPERATION.** Strict adherence to recommended preflight draining instructions will eliminate any free water accumulations from the tank sumps. While small amounts of water may still remain in solution in the gasoline, it will normally be consumed and go unnoticed in the operation of the engine.

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One exception to this can be encountered when operating under the combined effect of: (1) use of certain fuels, with (2) high humidity conditions on the ground (3) followed by flight at high altitude and low temperature. Under these unusual conditions small amounts of water in solution can precipitate from the fuel stream and freeze in sufficient quantities to induce partial icing of the engine fuel system.

While these conditions are quite rare and will not normally pose a problem to owners and operators, they do exist in certain areas of the world and consequently must be dealt with, when encountered.

Therefore, to alleviate the possibility of fuel icing occurring under these unusual conditions it is permissible to add isopropyl alcohol or ethylene glycol monomethyl ether (EGME) compound to the fuel supply. See Figure 2-2 for fuel additive mixing ratio.

The introduction of alcohol or EGME compound into the fuel provides two distinct effects: (1) it absorbs the dissolved water from the gasoline and (2) alcohol has a freezing temperature depressant effect.

Alcohol, if used, is to be blended with the fuel in a concentration of 1% by volume. Concentrations greater than 1% are not recommended since they can be detrimental to fuel tank materials.

The manner in which the alcohol is added to the fuel is significant because alcohol is most effective when it is completely dissolved in the fuel. To insure proper mixing the following is recommended:

1. For best results the alcohol should be added during the fueling operation by pouring the alcohol directly on the fuel stream issuing from the fueling nozzle.
2. An alternate method that may be used is to premix the complete alcohol dosage with some fuel in a separate clean container (approximately 2-3 gallon capacity) and then transfer this mixture to the tank prior to the fuel operation.

Any high quality isopropyl alcohol may be used, such as:

Anti-icing fluid (MIL-F-5566) or  
Isopropyl alcohol (Federal Specification TT-I-735a).

Ethylene glycol monomethyl ether (EGME) compound in compliance with MIL-I-27686 or Phillips PFA-55MB, if used, must be carefully mixed with the fuel in concentrations not to exceed 0.15% by volume.

### CAUTION

Mixing of the EGME compound with the fuel is extremely important because concentration in excess of that recommended (0.15 percent by volume maximum) will result in detrimental affects to the fuel tanks, such as deterioration of protective primer and sealants and damage to O-rings and seals in the fuel system and engine components. Use only blending equipment that is recommended by the manufacturer to obtain proper proportioning.

Do not allow the concentrated EGME compound to come in contact with the airplane finish or fuel cell as damage can result.

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Prolonged storage of the airplane will result in a water build-up in the fuel which "leeches out" the additive. An indication of this is when an excessive amount of water accumulates in the fuel tank sumps. The concentration can be checked using a differential refractometer. It is imperative that the technical manual for the differential refractometer be followed explicitly when checking the additive concentration.

- 2-21. **FUEL DRAINS.** Fuel drains are located in the fuel selector valve, fuel tanks, fuel line, fuel strainer and carburetor. The fuel tanks and fuel strainer have drain valves. To activate the tank drain valve for fuel sampling, place cup up to valve and depress valve with rod protruding from cup. See Section 12 for illustration of fuel tank drain valve. The strainer drain valve is an integral part of the fuel strainer assembly. The strainer drain is equipped with a control which is located adjacent to the oil dipstick. Access to the control is through the oil dipstick access door. Open drains and remove drain plugs at intervals specified in figure 2-4. Also, during daily inspection of the fuel strainer and tanks, if water is found in the system, all fuel drain plugs should be removed and all water drained from the system.
- 2-22. **CARBURETOR DRAIN PLUG INSPECTION.** In order to prevent the possibility of thread sealant contamination in the carburetor float chamber, cleaning and inspection of the carburetor should be accomplished at each 100-hour inspection and any time water in the fuel is suspected.
- a. With the fuel selector valve OFF, remove carburetor drain plug and clean off any sealant present on the end of the plug or in the threads on the plug.
  - b. Inspect drain plug hole in the carburetor and remove any sealant remaining in the hole.
  - c. Turn fuel selector valve to ON to flush float chamber and drain plug chamber while probing drain plug hole to ascertain that all residue of sealant material is dislodged and washed out of the chamber. Flushing operation should last 15 to 30 seconds.
  - d. A second flushing should then be accomplished and the drained fuel retained for inspection to insure that no sealant particles are present.
  - e. Install drain plug as follows:
    1. Install drain plug in carburetor 1-1/2 to 2 turns.
    2. Apply sealant to drain plug threads (use NS-40 (RAS-4) or equivalent).
    3. Tighten and safety drain plug.
  - f. Turn fuel selector valve ON and inspect for evidence of fuel leakage.
- 2-23. **ENGINE OIL.** Check engine lubricating oil with the dipstick five to ten minutes after the engine has been stopped. The airplane should be in as near a level position as possible when checking the engine oil, so that a true reading is obtained. Engine oil should be drained while the engine is still hot, and the nose of the airplane should be raised slightly for more positive draining of any sludge which may have collected in the engine oil sump. Oil change may be extended to 100 hours, providing the oil filter is changed each 50 hours. Change engine oil and filter at least every six months, even though less than the specified hours have accumulated. Reduce these intervals for prolonged operations in dusty areas, in cold cli-



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mates where sludging conditions exist, or where short flights and long idle periods are encountered, which cause sludging conditions. Always change oil and oil filter whenever oil on the dipstick appears dirty. Aviation grade oil conforming to AVCO Lycoming Service Instruction No. 1014, and any revisions or supplements thereto, shall be used in the "Blue Streak" (Lycoming) engine.

### WARNING

The U.S. Environmental Protection Agency advises that mechanics and other workers who handle engine oil are advised to minimize skin contact with used oil and promptly remove used oil from the skin. In a laboratory study, mice developed skin cancer after skin was exposed to used engine oil twice a week without being washed off, for most of their life span. Substances found to cause cancer in laboratory animals may also cause cancer in humans.

### NOTE

New or newly-overhauled engines should be operated on aviation grade straight mineral oil until the first oil change. If an ashless dispersant oil is used in a new or newly-overhauled engine, high oil consumption may be experienced. The anti-friction additives in detergent and dispersant oils will retard "break-in" of the pistons, rings and cylinder walls. This condition can be avoided by the use of straight mineral oil. If oil must be added during the first 25 hours, use only aviation grade straight mineral oil (non-detergent) conforming to Specification No. MIL-L-6082. After the first 25 hours of operation, drain engine oil sump and change the oil filter. Refill sump with straight mineral oil (non-detergent) and use until a total of 50 hours have accumulated or oil consumption has stabilized, then change to ashless dispersant oil in accordance with the oil charts in figure 2-4.

## MODEL R182 AND TR182 SERVICE MANUAL

When changing engine oil, install a new oil filter. An oil quick-drain valve is installed. This valve provides a quicker and cleaner method of draining the engine oil. This valve is installed in the oil drain port of the oil sump and allows oil to be drained by attaching a hose over the stem and pushing up, causing the oil to drain through the hose into a container. To drain the engine oil, proceed as follows:

- a. Operate engine until oil temperature is at normal operating temperature.
- b. Attach a hose to the stem of the quick-drain valve located in the engine oil sump. Push up on stem until clip locks on body, holding valve in the open position. (See figure 2-3.) Allow oil to drain through hose into container.
- c. Close oil quick-drain valve by pulling down on stem or twisting a screwdriver inserted between valve body and clip as shown in figure 2-3. Remove hose from stem.
- d. Change engine oil filter and service engine with oil in accordance with figure 2-4 of this manual.

### NOTE

Refer to figure 2-4 for intervals for changing oil and filters.

Valve shown open. To close, twist screwdriver until valve unlocks and snaps down to closed position.

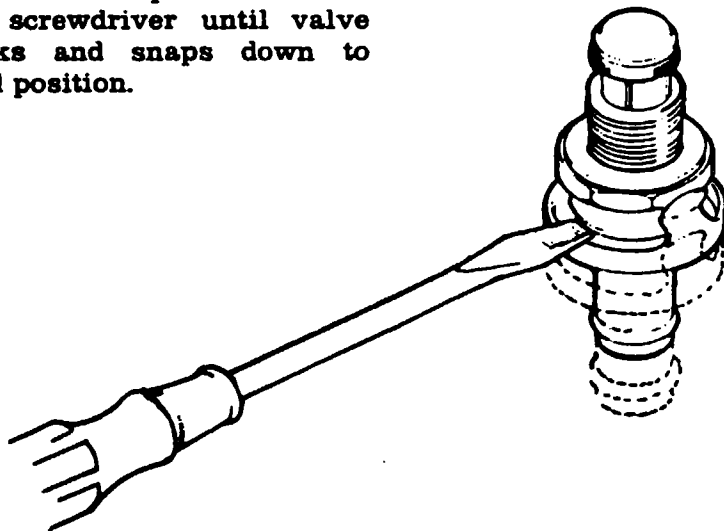


Figure 2-3. Quick-Drain Valve

## MODEL R182 AND TR182 SERVICE MANUAL

- 2-24. **ENGINE OIL COOLER.** Oil coolers can be a cause of internal engine damage if not properly serviced. Trapped air in the lines and cooler, as a result of draining oil from the oil cooler, can cause oil aeration, which gives insufficient valve train lubrication resulting in premature engine wear. Therefore, anytime oil is drained, for changing or flushing, the following procedures should be used to eliminate trapped air.
- a. Prior to starting, remove lower spark plugs. If available, the use of an Auxiliary Power Cart is recommended.
  - b. With mixture in idle cut off, and magneto switch on "START", rotate engine with the starter. Rotate engine to stabilize oil pressure, but **DO NOT CRANK LONGER THAN THIRTY (30) SECONDS EACH TIME. ALLOW AT LEAST ONE (1) FULL MINUTE BETWEEN CYCLES FOR STARTER MOTOR COOLING.** After oil pressure gage stabilizes, crank an additional ten (10) seconds, **IF WITHIN THE THIRTY SECONDS LIMIT.**
  - c. Repeat this procedure at least four (4) times, but **DO NOT EXCEED THIRTY (30) SECONDS "ON" nor ONE (1) MINUTE "OFF" Limitation.**
  - d. Reinstall the lower spark plugs.
  - e. Start engine and run at 900 - 1,000 RPM for approximately five (5) minutes. Shut engine down, and check oil level. Add oil as necessary to fill crankcase to full mark on dipstick. Ensure that oil filter is safety wired.
- 2-25. **ENGINE INDUCTION AIR FILTER.** The induction air filter keeps dust and dirt from entering the induction system. The value of maintaining the air filter in a good clean condition can never be overstressed. More engine wear is caused through the use of a dirty or damaged air filter than is generally believed. The frequency with which the filter should be removed, inspected, and cleaned will be determined primarily by aircraft operating conditions. A good general rule, however, is to remove, inspect and clean the filter at least every 100 hours of engine operating time and more frequently if warranted by operating conditions. Under extremely dusty conditions, daily servicing of the filter is recommended. To service the induction air filter, proceed as follows:

- a. Remove filter from aircraft.

### NOTE

Use care to prevent damage to filter element when cleaning filter with compressed air.

- b. Clean filter by blowing with compressed air (not over 100 psi) from direction opposite of normal air flow. Arrows on filter case indicate direction of normal air flow.

### CAUTION

Do not use solvent or cleaning fluids to wash filter. Use only a water and household detergent solution when washing the filter.

- c. After cleaning as outlined in step "b", the filter may be washed, if necessary, in a solution of warm water and a mild household detergent. A cold water solution may be used.

## MODEL R182 AND TR182 SERVICE MANUAL

### NOTE

The filter assembly may be cleaned with compressed air a maximum of 30 times or it may be washed a maximum of 20 times. A new filter should be installed after 500 hours of engine operating time or one year, whichever should occur first. However, a new filter should be installed at anytime the existing filter is damaged. A damaged filter may have sharp or broken edges in the filtering panels which would allow unfiltered air to enter the induction system. Any filter that appears doubtful, shall have a new filter installed in its place.

- d. After washing, rinse filter with clear water until rinse water draining from filter is clear. Allow water to drain from filter and dry with compressed air (not over 100 psi).

### NOTE

The filtering panels of the filter may become distorted when wet, but they will return to their original shape when dry.

- e. Ensure that the air box is clean and the filter and filter gasket are undamaged and serviceable.
- f. Install filter at entrance to air box with gasket on aft face of filter frame pointed in the correct direction.

- 2-26. **VACUUM SYSTEM CENTRAL AIR FILTER.** The vacuum system central air filter keeps dust and dirt from entering the vacuum operated instruments. Inspect the filter every 100 hours for damage and cleanliness. Change central air filter element whenever damaged, every 500 hours of operating time, or annually, whichever comes occurs first; and whenever it becomes sufficiently clogged to cause suction gage readings to drop below 4.6 inches of mercury. Also, do not operate the vacuum system with the filter removed, or a vacuum line disconnected as particles of dust or other foreign matter may enter the system and damage the vacuum-operated instruments.

### CAUTION

Smoking will cause premature filter clogging.

- 2-27. **BATTERY.** Battery servicing involves adding distilled water to maintain the electrolyte even with the horizontal baffle plate at the bottom of the filler holes, checking the battery cable connections, and neutralizing and cleaning spilled electrolyte or corrosion. Use bicarbonate of soda (baking soda) and water to neutralize electrolyte or corrosion. Follow with a thorough flushing with water. Brighten cables and terminals with a wire brush, then coat with petroleum jelly before connecting. The battery box also should be checked and cleaned if any corrosion is noted (when applicable). Distilled water, not acid or "rejuvenators", should be used to maintain electrolyte level. Check the battery every 100 hours (or at least every 90 days), more often in hot weather. See Section 16 for detailed battery removal, installation and testing.
- 2-28. **TIRES.** Maintain tire pressure at the pressure specified in figure 1-1. When checking tire pressure, examine tires for wear, cuts, bruises, and slippage. Remove oil, grease, and mud from tires with soap and water.

## MODEL R182 AND TR182 SERVICE MANUAL

### NOTE

Recommended tire pressures should be maintained. Especially in cold weather, remember that any drop in temperature of the air inside a tire causes a corresponding drop in air pressure.

- 2-29. **NOSE GEAR SHOCK STRUT.** The nose gear shock strut requires periodic checking to ensure that the strut is filled with hydraulic fluid and is inflated to the correct air pressure. To service the nose gear shock strut, proceed as follows:
- a. Remove valve core and fully compress strut. (Fork and outer barrel in contact.)
  - b. Remove upper filler plug.
  - c. Extend strut one inch, fill to overflow with MIL-H-5606 Hydraulic fluid and replace filler plug.
  - d. Compress strut. If strut compresses fully, repeat operation "c" and "d" until strut will no longer compress fully.
  - e. Remove filler plug, compress strut fully and allow fluid to overflow.
  - f. Replace filler plug and valve core.
  - g. With no load on strut inflate to 55 PSI.

### NOTE

The nose landing gear shock strut will normally require only a minimum amount of service. Maintain the strut extension air pressure shown in figure 1-1. Lubricate landing gear as shown in figure 2-5. Check landing gear daily for general cleanliness, security of mounting, and for hydraulic fluid leakage. Keep machined surface of strut barrel wiped free of dirt and dust, using a clean, lint-free cloth moistened with hydraulic fluid or kerosene. All surfaces should be wiped free of excess hydraulic fluid or kerosene. Leave a light film of fluid on the machine surface of the strut barrel.

- 2-30. **SHIMMY DAMPENER.** The shimmy dampener contains a compensating mechanism within the hollow piston rod for thermal expansion and contraction of the hydraulic fluid. The shimmy dampener must be filled completely with fluid, free of entrapped air, to serve its purpose. In addition, the piston rod must also be partially full of fluid before the temperature compensating mechanism will function properly. It should be noted that the fluid is under pressure exerted against the floating piston by a spring, and that loosening or removing the filler plug will cause loss of fluid and necessitate removal and refilling of the shimmy dampener and piston rod.

### NOTE

The shimmy dampener should be checked at each 50-hour inspection to see if it should be serviced.

Use the following procedure to fill the shimmy dampener.

- a. Using the tow bar, turn the nose wheel strut to the extreme left position (thru serial R18200710), to the extreme right position (beginning with serial R18200711), against the stop. This will place the shimmy dampener piston to the rear of the cylinder and eliminate the possibility of trapping air in the cylinder.

## MODEL R182 AND TR182 SERVICE MANUAL

- b. Remove the filler plug and fill with hydraulic fluid.
- c. Replace filler plug and turn nose wheel strut through its entire travel several times.
- d. Return strut to the extreme left position (thru serial R18200710), to the extreme right position (beginning with R18200711) against the stop.
- e. Remove filler plug and add whatever fluid is needed to fill the cylinder.
- f. Replace and safety the filler plug.

### NOTE

Keep shimmy dampener, especially the exposed portions of the dampener piston shaft, clean to prevent collection of dust and grit which could cut the seals in the dampener barrel. Keep machined surfaces wiped free of dirt and dust, using a clean lint-free cloth saturated with hydraulic fluid (MIL-H-5606) or kerosene. All surfaces should be wiped free of excessive hydraulic fluid.

- 2-31. **HYDRAULIC FLUID SAMPLING AND CONTAMINATION CHECK.** At the first 50 and first 100-hour inspection and thereafter at each 500-hour inspection or one year, whichever should occur first, a sample of fluid should be taken and examined for sediment and discoloration. This may be done as follows:
- a. Place aircraft master switch in OFF position and place aircraft on jacks as shown in figure 2-1. Bleed pressure from system by moving landing gear selector valve to gear UP position.

### CAUTION

Do not turn master switch ON while hydraulic system is open to atmosphere. The pump will automatically start, causing hydraulic fluid to spray from any open line.

- b. Remove cap plug from tee fitting on left side of power pack and place a non-metal container below opening.
  - c. Place landing gear selector valve in down position and operate emergency hand pump to pump fluid into container.
  - d. If the drain fluid is clear and is not appreciably darker in color than new fluid, continue to use the present fluid.
  - e. If the fluid color is doubtful, place fluid sample in a non-metallic container and insert a strip of polished copper in the fluid.
  - f. Keep copper in the fluid for six hours at a temperature of 70°F or more. A slight darkening of the copper is permissible, but there should be no pitting or etching visible up to 20X magnification. If pitting or etching is evident, drain fluid from power pack reservoir. Fill power pack with MIL-H-5606 hydraulic fluid and bleed air from system.
- 2-32. **LANDING GEAR HYDRAULIC RETRACTION SYSTEM.** Draining, filling and bleeding of the landing gear hydraulic retraction system can be accomplished by the following method.
- a. Place aircraft master switch in OFF position and place aircraft on jacks as shown in figure 2-1. Bleed pressure from system by moving landing gear selector valve to gear UP position.

## MODEL R182 AND TR182 SERVICE MANUAL

### CAUTION

Do not turn master switch ON while hydraulic system is open to atmosphere. The pump will automatically start, causing hydraulic fluid to spray from any open line.

- b. Drain system by removing cap plug from tee fitting on left side of power pack and attaching a drain hose to opening. Place end of hose in a container of at least one gallon capacity and using emergency hand pump, pump fluid into container. When power pack reservoir is empty, replace cap plug on tee fitting.
  - c. Fill power pack reservoir full with MIL-H-5606 hydraulic fluid by inserting funnel or filler hose in dipstick opening on top of power pack body.
  - d. Bleed system by cycling landing gear through several cycles. Refill power pack reservoir with MIL-H-5606 hydraulic fluid and remove aircraft from jacks.
- 2-33. **HYDRAULIC BRAKE SYSTEM.** Check brake master cylinders and refill with hydraulic fluid (MIL-H-5606) as specified in the inspection charts. Bleed the brake system of entrapped air whenever there is a spongy response to the brake pedals. Refer to Section 5 for filling and bleeding of the brake system.
- 2-34. **CLEANING.**
- 2-35. **GENERAL DESCRIPTION.** Keeping the aircraft clean is important. Besides maintaining the trim appearance of the aircraft, cleaning lessens the possibility of corrosion and makes inspection and maintenance easier.

## MODEL R182 & TR182 SERIES SERVICE MANUAL

2-36. CLEANING WINDSHIELD AND WINDOWS.

2-37. MATERIALS REQUIRED.

NAME	MANUFACTURER	USE
Mild soap or detergent (hand dishwashing type without abrasives).	Commercially available.	Cleaning windshields and windows.
Aliphatic Naphtha Type II conforming to Federal Specification TT-N-95.	Commercially available.	Removing deposits which cannot be removed with mild soap solution on acrylic windshields and windows.
*Polishing wax.		Waxing acrylic windshields and windows
Turtle Wax (paste).	Turtle Wax, Inc. Chicago, IL. 60638	
Great Reflections Paste Wax	E.I. duPont de Nemours and Co. (Inc.) Wilmington, DE 19898	
Slip-Stream Wax (paste)	Classic Chemical Grand Prairie, TX 75050	
Acrylic polish conforming to Federal Specification P-P-560 such as:		Cleaning and polishing acrylic windshields and windows.
Permatex plastic cleaner No. 403D	Permatex Company, Inc. Kansas City, KS 66115	
Cotton flannel or cotton terry cloth material.	Commercially available.	

\* These are the only polishing waxes tested and approved for use by Cessna Aircraft Company.

### CAUTION

Windshields and windows are easily damaged by improper handling and cleaning techniques.

- a. Place airplane inside hangar or in shaded area and allow to cool from heat of sun's direct rays.
- b. Using clean (preferably running) water, flood surface. Use bare hands with no jewelry to feel and dislodge any dirt or abrasive materials.
- c. Using a mild soap or detergent (such as dishwashing liquid) in water, wash surface. Again use only bare hands to provide rubbing force. (A clean cloth may be used to transfer soap solution to surface, but extreme care must be exercised to prevent scratching surface.)



## MODEL R182 & TR182 SERIES SERVICE MANUAL

- d. On acrylic windshields and windows only, if soils which cannot be removed by a mild detergent remain, Type II aliphatic naphtha applied with a soft clean cloth may be used as a cleaning solvent. Be sure to frequently refold cloth to avoid redepositing soil and/or scratching windshield with any abrasive particles.
- e. Rinse surface thoroughly with clean fresh water and dry with a clean cloth.

### CAUTION

DO NOT use any of the following on or for cleaning windshields and windows: methanol, denatured alcohol, gasoline, benzene, xylene, MEK, acetone, carbon tetrachloride, lacquer thinners, commercial or household window cleaning sprays.

### 2-38. WAXING.

- a. Hand polishing wax should be applied to acrylic surfaces. (The wax has an index of refraction nearly the same as transparent acrylic and tend to mask any shallow scratches on windshield surface).
- b. Acrylic surfaces may be polished using a polish meeting Federal Specification P-P-560 applied per manufacturer's instructions.

### CAUTION

DO NOT use rain repellent on acrylic surfaces.

### NOTE

When applying and removing wax and polish, use a clean soft cloth.

### 2-39. PREVENTIVE MAINTENANCE.

### NOTE

Utilization of the following techniques will help minimize windshield and window crazing.

- a. Keep all surfaces of windshields and windows clean.
- b. If desired, wax acrylic surfaces.
- c. Carefully cover all surfaces during any painting, powerplant cleaning or other procedure that calls for use of any type of solvents or chemicals. The following coatings are approved for use in protecting surfaces from solvent attack.
  - 1. White Spary Lab, MIL-C-6799, Type I, Class II.
  - 2. WPL-3 Masking Paper - St. Regis, Newton, MA.
  - 3. 5 X N - Poly-Spotstick - St. Regis, Newton, MA.
  - 4. Protex 40 - Mask Off Company, Monrovia, CA, and Southwest Paper Co., Wichita, KS.
  - 5. Protex 10VS - Mask Off Company, Monrovia, CA, and Southwest Paper Co., Wichita, KS.
  - 6. Scotch 344 Black Tape - 3M Company.
- d. Do not park or store airplane where it might be subjected to direct contact with or vapors from: methanol, denatured alcohol, gasoline, benzene, xylene, MEK, acetone, carbon tetrachloride, lacquer thinners, commercial or household window cleaning sprays, paint strippers, or other types of solvents.

## MODEL R182 & TR182 SERIES SERVICE MANUAL

- e. Do not use solar screens or shields installed on inside of airplane or leave sun visors up against windshield. The reflected heat from these items causes elevated temperatures which accelerate crazing and may cause formation of bubbles in the inner ply of multiple-ply windshields.
- f. Do not use a power drill motor or other powered device to clean, polish, or wax surfaces.

**2-40. INTERIOR TRIM.** The instrument panel, interior plastic trim, and control knobs need only be wiped with a damp cloth. Oil and grease on the control wheels and control knobs can be removed with a cloth moistened with Stoddard solvent. Volatile solvents, mentioned in the caution note of paragraph 2-36, must never be used since they soften and craze the plastic trim.

**2-41. PAINTED SURFACES.** The painted exterior surfaces of your new Cessna have a durable, long-lasting finish. Approximately 10 days are required for the paint to cure completely; in most cases, the curing period will have been completed prior to delivery of the airplane. In the event that polishing or buffing is required within the curing period, it is recommended that the work be done by someone experienced in handling uncured paint. Any Cessna Dealer can accomplish this work.

Generally, the painted surfaces can be kept bright by washing with water and mild soap, followed by a rinse with water and drying with cloths or a chamois. Harsh or abrasive soaps or detergents which cause corrosion or scratches should never be used. Remove stubborn oil and grease with a cloth moistened with Stoddard solvent.

To seal any minor surface chips or scratches and protect against corrosion, the airplane should be waxed regularly with a good automotive wax applied in accordance with the manufacturer's instructions. If the airplane is operated in a seacoast or other salt water environment, it must be washed and waxed more frequently to assure adequate protection. Special care should be taken to seal around rivet heads and skin laps, which are the areas most susceptible to corrosion. A heavier coating of wax on the leading edges of the wings and tail, and on the cowl nose cap and propeller spinner will help reduce the abrasion encountered in these areas. Reapplication of wax will generally be necessary after cleaning with soap solutions or after chemical de-icing operations.

**2-42. ALUMINUM SURFACES.** The aluminum surfaces require a minimum of care, but should never be neglected. The aircraft may be washed with clean water to remove dirt and may be washed with nonalkaline grease solvents to remove oil and/or grease. Household type detergent soap powders are effective cleaners, but should be used cautiously since some of them are strongly alkaline. Many good aluminum cleaners, polishes and waxes are available from commercial suppliers of aircraft products.

**2-43. ENGINE AND ENGINE COMPARTMENT.** An engine and accessories wash-down should be accomplished during each 100-hour inspection to remove oil, grease, salt corrosion or other residue that might conceal component defect during inspection. Also, periodic cleaning can be very effective in preventive maintenance.

Precautions should be taken when working with cleaning agents such as wearing of rubber gloves, an apron or coveralls and a face shield or goggles. Use the least toxic of available cleaning agents that will satisfactorily accomplish the work. These cleaning agents include: (1) Stoddard solvent (Specification P-D-680, Type II), (2) A water base alkaline detergent cleaner (MIL-C-25769J) mixed 1 part cleaner, 2 to 3 parts water and 8 to 12 parts Stoddard solvent or (3) A solvent base emulsion cleaner (MIL-C-4361B) mixed 1 part cleaner and 3 parts Stoddard solvent.

# MODEL R182 AND TR182 SERVICE MANUAL

## CAUTION

Do not use gasoline or other highly flammable substances for wash-down.

Perform all cleaning operations in well ventilated work areas, and ensure that adequate fire-fighting and safety equipment is available. Do not smoke or expose a flame within 100 feet of the cleaning area. Compressed air, used for cleaning agent application or drying, should be regulated to the lowest practical pressure. Use of a stiff bristle brush rather than a steel brush is recommended if cleaning agents do not remove excess grease and grime during spraying.

A recommended procedure for cleaning an engine and accessories is as follows.

## CAUTION

Do not attempt to wash an engine which is still hot or running. Allow the engine to cool before cleaning.

- a. Remove engine cowling in accordance with paragraph 11-3.
- b. Carefully cover the coupling area between the vacuum pump and the engine drive shaft so that no cleaning solvent can reach the coupling or seal.
- c. Cover the open end of the vacuum discharge tube.
- d. Cover the vacuum relief valve filter, if installed in the engine compartment.
- e. Use fresh water for wash-down when the engine is contaminated with salt or corrosive chemicals. A cleaning agent such as described previously may then be used to remove oil and grime.

## CAUTION

Care should be exercised to not direct cleaning agents or water streams at openings on the starter, magnetos, alternator, vacuum pump, or turbocharger relief valve.

- f. Thoroughly rinse with clean, warm water to remove all traces of cleaning agents.

## CAUTION

Cleaning agents should never be left on engine components for an extended period of time. Failure to remove them may cause damage to components such as neoprene seals and silicone fire sleeves, and could cause additional corrosion.

- g. Completely dry the engine and accessories using clean, dry compressed air.
- h. Remove the cover over the coupling area.
- i. Remove the cover from the vacuum discharge tube.
- j. Remove the cover from the vacuum relief valve filter, if installed.
- k. If desired, the engine cowling may be washed with the same cleaning agents, then rinsed thoroughly and wiped dry.
- l. Reinstall engine cowling.

# MODEL R182 AND TR182 SERVICE MANUAL

## WARNING

For maximum safety, check that the magneto switches are OFF, the throttle is closed, the mixture control is in the idle cut-off position, and the airplane is secured before rotating the propeller by hand. Do not stand within the arc of the propeller blades while turning the propeller.

- m. Before starting the engine, rotate the propeller by hand no less than four complete revolutions.
- 2-44. **UPHOLSTERY AND INTERIOR** cleaning prolongs the life of upholstery fabrics and interior trim. To clean the interior, proceed as follows:
- a. Empty all ash trays and refuse containers.
  - b. Brush or vacuum clean the upholstery and carpet to remove dust and dirt.
  - c. Wipe leather and plastic trim with a damp cloth.
  - d. Soiled upholstery fabrics and carpet may be cleaned with a foam-type detergent used according to manufacturer's instructions.
  - e. Oil spots and stains may be cleaned with household spot removers, used sparingly. Before using any solvent, read the instructions on the container and test it on an obscure place in the fabric to be cleaned. Never saturate the fabric with volatile solvent; it may damage the padding and backing material.
  - f. Scrape sticky material from fabric with a dull knife, then spot clean the area.
- 2-45. **PROPELLER.** The propeller should be wiped occasionally with an oily cloth to remove grass and bug stains. In salt water areas this will assist in corrosion proofing the propeller.
- 2-46. **WHEELS.** The wheels should be washed periodically and examined for corrosion, chipped paint, and cracks or dents in the wheel halves or in the flanges or hubs. If defects are found, remove and repair in accordance with Section 5. Discard cracked wheel halves, flanges or hubs and install new parts.
- 2-47. **LUBRICATION.**
- 2-48. **GENERAL DESCRIPTION.** Lubrication requirements are shown in figure 2-5. Before adding lubricant to a fitting, wipe fitting free of dirt. Lubricate until grease appears around part being lubricated, and wipe excess grease from parts. The following paragraphs supplement figure 2-5 by adding details not shown in the figure.
- 2-49. **TACHOMETER DRIVE SHAFT.** Refer to Section 15.
- 2-50. **WHEEL BEARINGS.** Clean and repack the wheel bearings at the first 100-hour inspection and at each 500-hour inspection thereafter. If more than the usual number of takeoffs and landings are made, extensive taxiing is required, or the aircraft is operated in dusty areas or under seacoast conditions, cleaning and lubrication of the wheel bearings shall be accomplished at each 100-hour inspection.
- 2-51. **NOSE GEAR TORQUE LINKS.** Lubricate nose gear torque links every 50 hours. When operating from a dirt strip or in extremely dusty areas, more frequent lubrication of the torque links is required.

## MODEL R182 AND TR182 SERVICE MANUAL

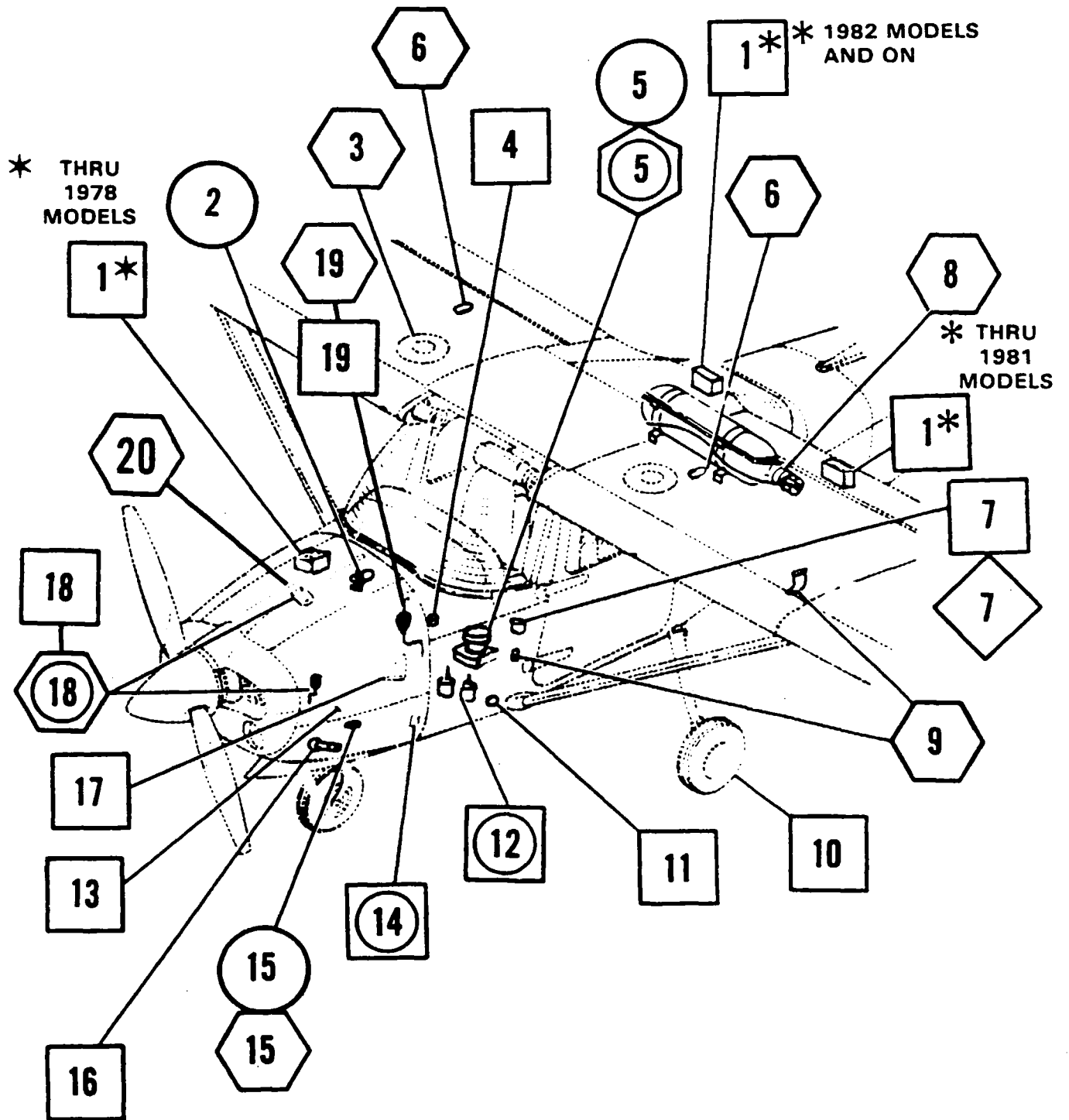
- 2-52. **WING FLAP ACTUATOR.** Clean and lubricate wing flap actuator jack screw each 100 hours as follows:
- a. Expose jack screw by operating flaps to full down position.
  - b. Clean jack screw threads with solvent rag and dry with compressed air.

### NOTE

It is not necessary to remove actuator from aircraft to clean or lubricate threads.

- c. With oil can, apply light coat of No. 10 weight non-detergent oil to threads of jack screw.
- 2-53. **ROD END BEARINGS.** Periodic inspection and lubrication is required to prevent corrosion of the bearing in the rod end. At each 100-hour inspection, disconnect the control rods at the aileron, flap and nose gear steering bungee, and inspect each rod end for corrosion. If no corrosion is found, wipe the surface of the rod end balls with general purpose oil and rotate ball freely to distribute the oil over its entire surface and connect the control rods to their respective units. If corrosion is detected during the inspection, install new rod ends.
- 2-54. **NOSE GEAR STEERING COLLAR.** Lubricate nose gear steering collar spindle links at each 100-hour inspection.
- 2-55. **NOSE GEAR PIVOTS.** Lubricate all nose gear pivot points at each 100-hour inspection, including the drag link pivot points. More frequent lubrication may be required when operating in dusty areas.
- 2-56. **MAIN GEAR PIVOT POINTS.** Lubricate main landing gear pivot assembly at each 500-hour inspection. If more than the usual number of takeoffs and landings are made, lubrication of the pivot assembly should be accomplished at each 100-hour inspection.

# MODEL R182 AND TR182 SERVICE MANUAL



## NOTE

Refer to Sheet 2 for specified Hydraulic Fluid, Oxygen, Fuel and Oil.

Figure 2-4. Servicing (Sheet 1 of 5)

# MODEL R182 AND TR182 SERVICE MANUAL

HYDRAULIC FLUID:  
SPEC. NO. MIL-H-5606

OXYGEN:  
SPEC. NO. MIL-O-27210

SPECIFIED AVIATION GRADE FUELS:

### WARNING

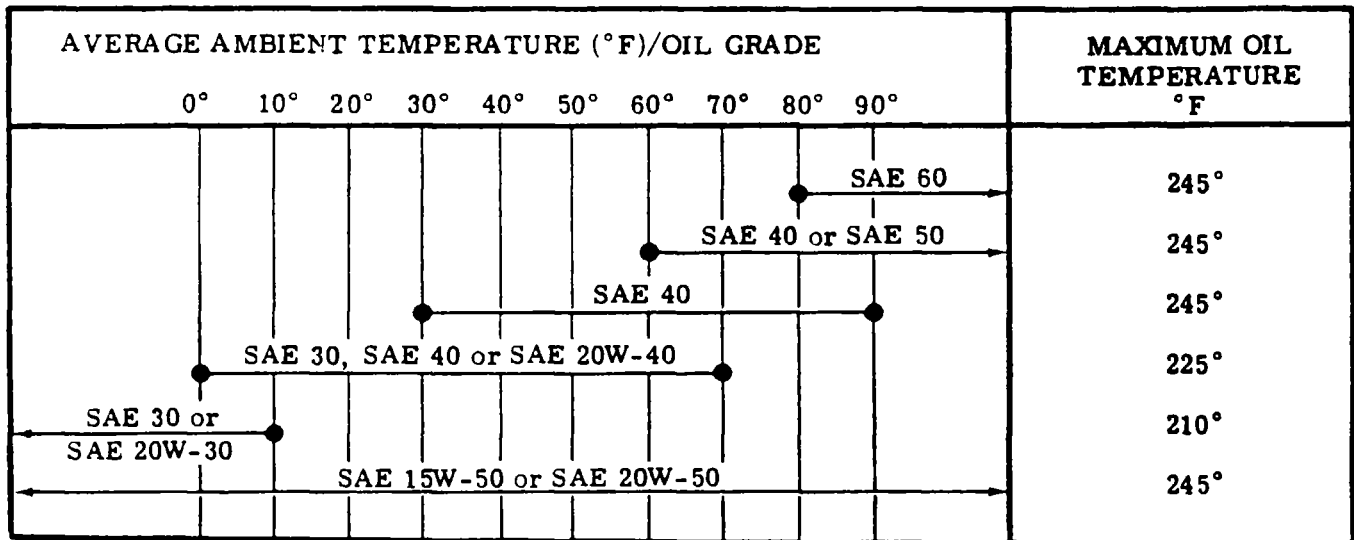
**ONLY AVIATION GRADE FUELS ARE APPROVED FOR USE.**

ENGINE MODEL	APPROVED FUEL GRADES	NOTE
LYCOMING O-540-J or O-540-L	100LL (blue)	1
	100 (green) (formerly 100/130)	1

### NOTE

1. Compliance with Avco Lycoming Service Instruction No. 1070, and all revisions thereto, must be accomplished.

SPECIFIED AVIATION GRADE OIL:



### NOTE

The overlap of oil grades is based on a mid-range of ambient ground temperatures vs. maximum oil inlet temperature. Aviation Grade ashless dispersant oil conforming to Avco Lycoming Service Instruction No. 1014 and all revisions and supplements thereto, **MUST BE USED** except as noted in paragraph 2-23.

CAPACITY (TOTAL)	CAPACITY (TOTAL WITH FILTER)	NORMAL OPERATION	MINIMUM FOR FLIGHT
8	9	6	5

Figure 2-4. Servicing (Sheet 2 of 5)

# MODEL R182 AND TR182 SERVICE MANUAL



DAILY

3

## FUEL CELLS:

Service after each flight. Keep full to retard condensation. Refer to paragraph 2-21.

6

## FUEL CELL SUMP DRAINS:

Drain off any water and sediment before first flight of the day.

19

## FUEL STRAINER:

Drain off any water and sediment before first flight of the day.

20

## OIL DIPSTICK:

Check on preflight. Add oil as necessary. Refer to paragraph 2-23 for details. Check that filler cap is tight and oil filler is secure.

9

## PITOT AND STATIC PORTS:

Check for obstructions before first flight of the day.

8

## OXYGEN CYLINDER:

Check for anticipated requirements before each flight. Refer to Section 14.

15

## NOSE GEAR SHOCK STRUT:

Check on preflight. Check inner barrel showing below outer barrel to be approximately two inches. Deviation from these dimensions is cause to check and service strut per paragraph 2-29.



25 HOURS

18

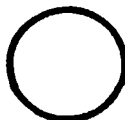
## ENGINE OIL SYSTEM: FIRST 25 HOURS

Refill with straight mineral oil, non-detergent, and use until a total of 50 hours have accumulated or oil consumption has stabilized, then change to ashless dispersant oil. Refer to paragraph 2-23.

5

## HYDRAULIC POWER PACK:

Check fluid level, and after a gear extension which uses the hydraulic hand pump.



50 HOURS

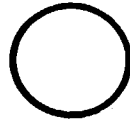
2

## ENGINE OIL FILTER:

Change filter every 50 hours.



# MODEL R182 AND TR182 SERVICE MANUAL



50 HOURS (Cont.)

**15** NOSE GEAR SHOCK STRUT:  
Keep strut filled and inflated to correct pressure. Refer to paragraph 2-29.

**5** HYDRAULIC FLUID RESERVOIR:  
At first 50 and first 100 hours, thereafter at each 500 hours or one year, whichever comes first, a sample of hydraulic fluid should be examined for sediment and discoloration as outlined in paragraph 2-31.



100 HOURS

**10** TIRES:  
Maintain correct tire inflation as listed in figure 1-1. Refer to paragraph 2-28.

**16** SHIMMY DAMPENER:  
Check fluid level and refill as required in accordance with paragraph 2-30.

**13** CARBURETOR DRAIN PLUG:  
Check for thread sealant residue in float chamber. Refer to paragraph 2-22.

**17** INDUCTION AIR FILTER:  
Clean filter per paragraph 2-25. Replace as required.

**19** FUEL STRAINER:  
Disassemble and clean strainer bowl and screen.

**18** ENGINE OIL:  
Change oil at least every 100 hours or every six months.

**4** VACUUM RELIEF VALVE FILTER:  
Replace each 100 hours.

**1** BATTERY:  
Check electrolyte level and clean battery compartment each 100 hours or each 90 days.

**12** BRAKE MASTER CYLINDERS:  
Check fluid level and fill as required with hydraulic fluid.

**7** VACUUM SYSTEM CENTRAL AIR FILTER:  
Inspect for damage. Refer to paragraph 2-26.

**11** SELECTOR VALVE DRAIN:  
Remove plug and drain off any water or sediment. Refer to paragraph 2-21.

Figure 2-4. Servicing (Sheet 4 of 5)

# MODEL R182 AND TR182 SERVICE MANUAL

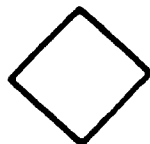


200 HOURS

**14**

**GROUND SERVICE RECEPTACLE:**

Connect to 24-volt DC, negative-ground power unit. Refer to Section 16.



500 HOURS

**7**

**VACUUM SYSTEM CENTRAL AIR FILTER:**

Replace every 500 hours or annually. Refer to paragraph 2-26.

# MODEL R182 AND TR182 SERVICE MANUAL

FREQUENCY (HOURS)



WHERE NO INTERVAL IS SPECIFIED, LUBRICATE AS REQUIRED AND WHEN ASSEMBLED OR INSTALLED.

## NOTE

The military specifications listed are not mandatory, but are intended as guides in choosing satisfactory materials. Products of most reputable manufacturers meet or exceed these specifications.

## LUBRICANTS

PG	SS-G-659	POWDERED GRAPHITE
GR	MIL-G-81322A	GENERAL PURPOSE GREASE
GH	MIL-G-23827A	AIRCRAFT AND INSTRUMENT GREASE
GL	MIL-G-21164C	HIGH AND LOW TEMPERATURE GREASE
OG	MIL-L-7870A	GENERAL PURPOSE OIL
PL	VV-P-236	PETROLATUM
GP		NO. 10-WEIGHT, NON-DETERGENT OIL
OL	VV-L-800A	LIGHT OIL

Figure 2-5. Lubrication (Sheet 1 of 6)

# MODEL R182 AND TR182 SERVICE MANUAL

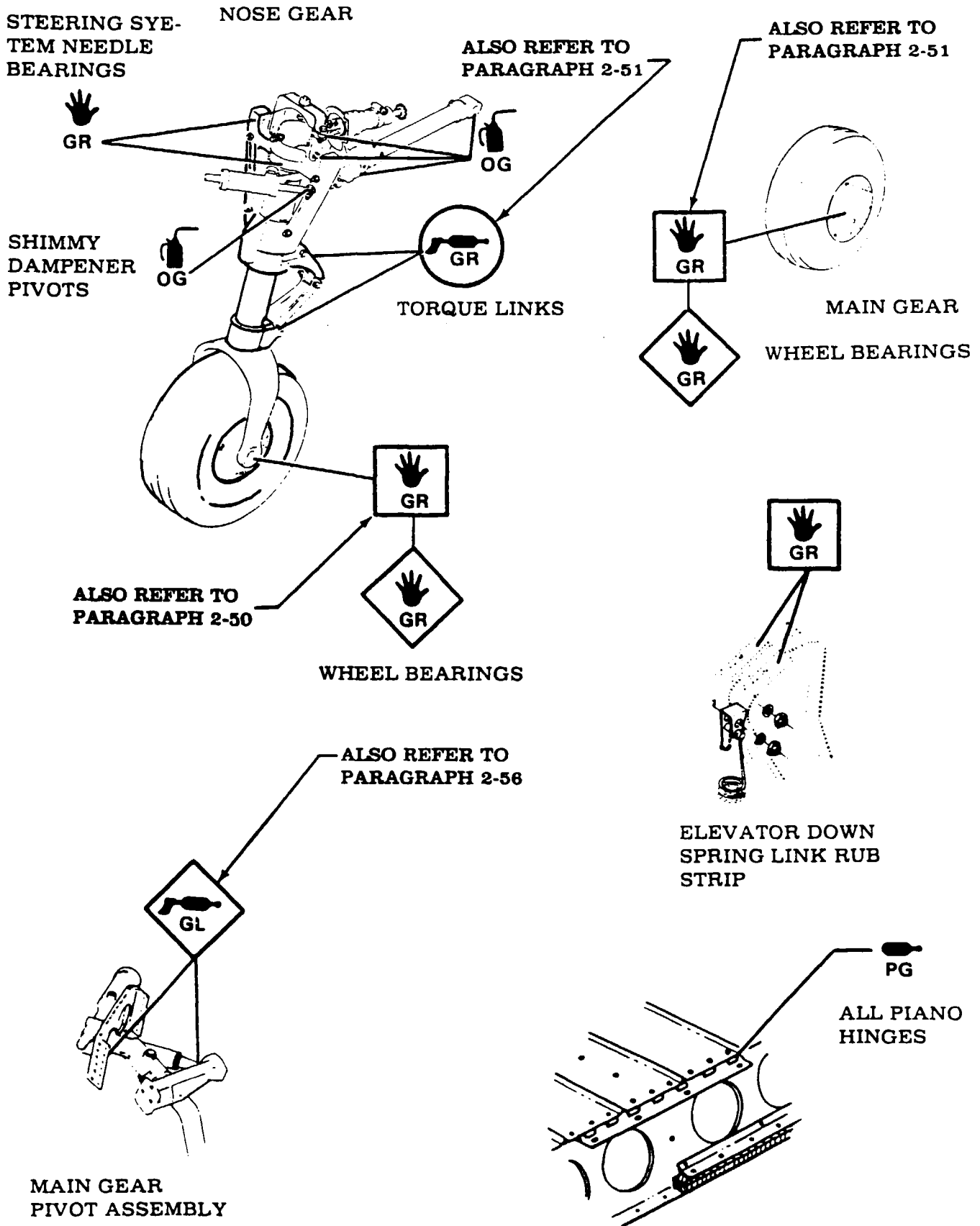
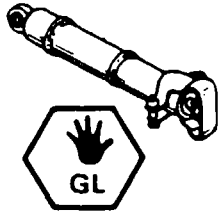


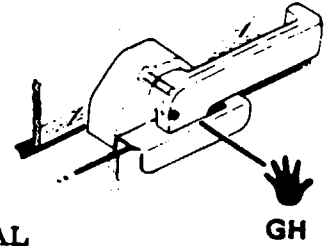
Figure 2-5. Lubrication (Sheet 2 of 6)

**MODEL R182 AND TR182 SERVICE MANUAL**



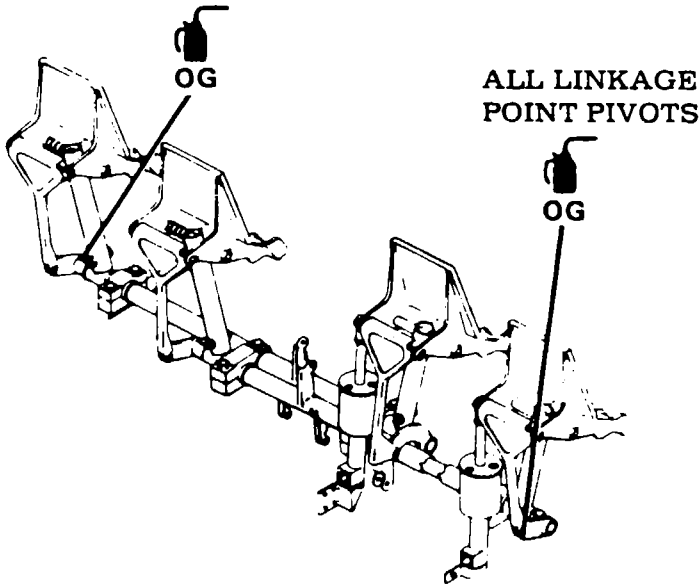
ALSO REFER TO INSPECTION CHART IN THIS SECTION AND TO SECTION 9 OF THIS MANUAL.

**ELEVATOR TRIM TAB ACTUATOR**

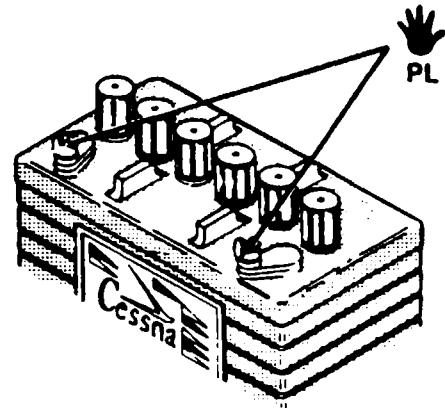


**TYPICAL CABIN DOOR WINDOW INSERT GROOVES**

**OILITE BEARINGS (RUDDER BAR ENDS)**

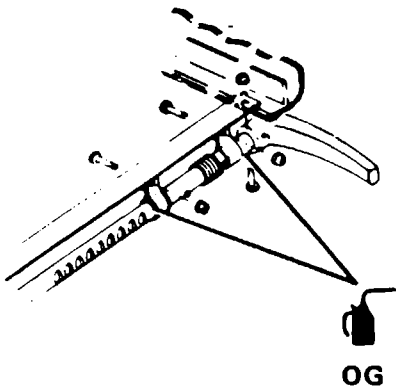


**RUDDER BARS AND PEDALS**

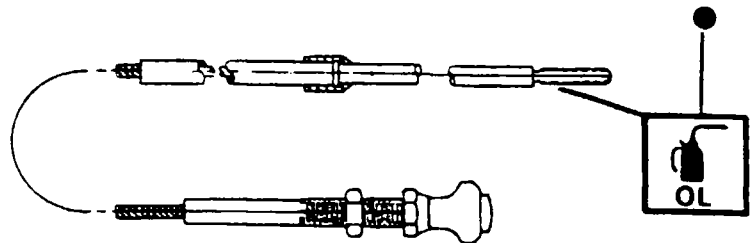


**BATTERY TERMINALS**

● DO NOT OIL IF OPERATING IN EXTREMELY DUSTY CONDITIONS



**PARKING BRAKE HANDLE SHAFT**

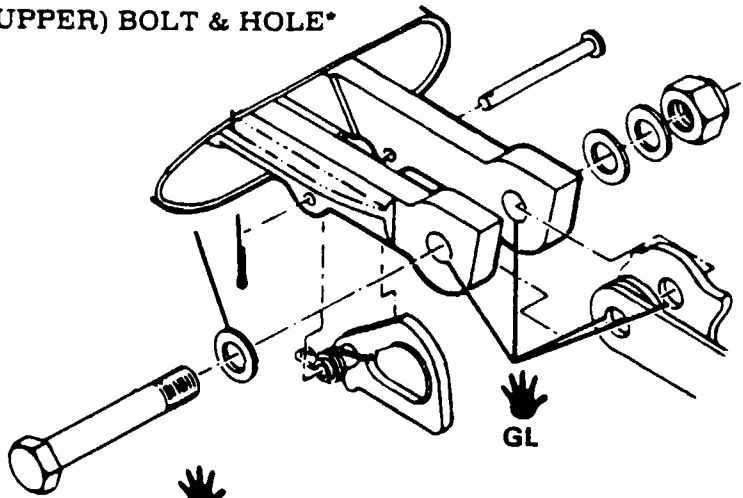


**ENGINE CONTROLS**

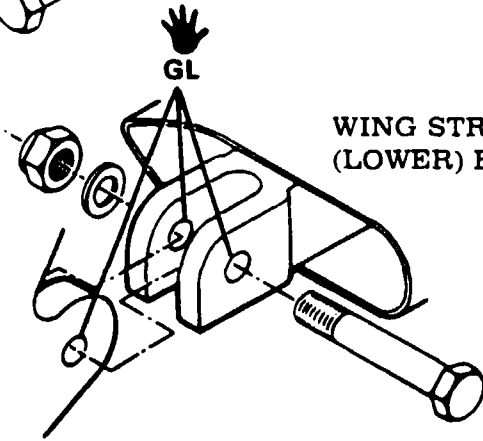
**Figure 2-5. Lubrication (Sheet 3 of 6)**

MODEL R182 AND TR182 SERVICE MANUAL

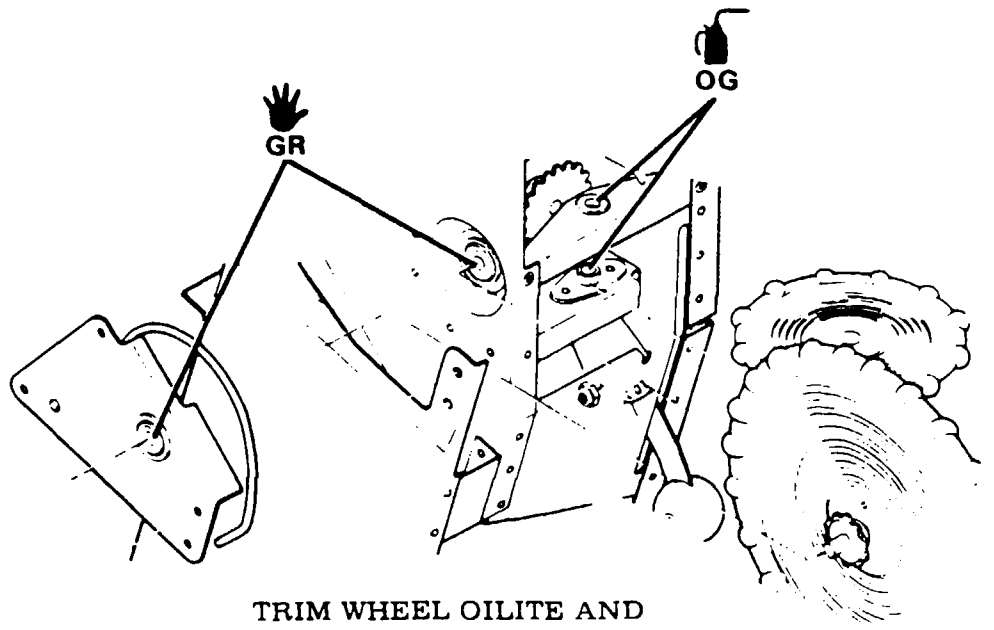
WING STRUT-ATTACH  
(UPPER) BOLT & HOLE\*



WING STRUT-ATTACH  
(LOWER) BOLT & HOLE\*



\*UPON INSTALLATION



TRIM WHEEL OILITE AND  
NEEDLE BEARINGS

Figure 2-5. Lubrication (Sheet 4 of 6)

MODEL R182 AND TR182 SERVICE MANUAL

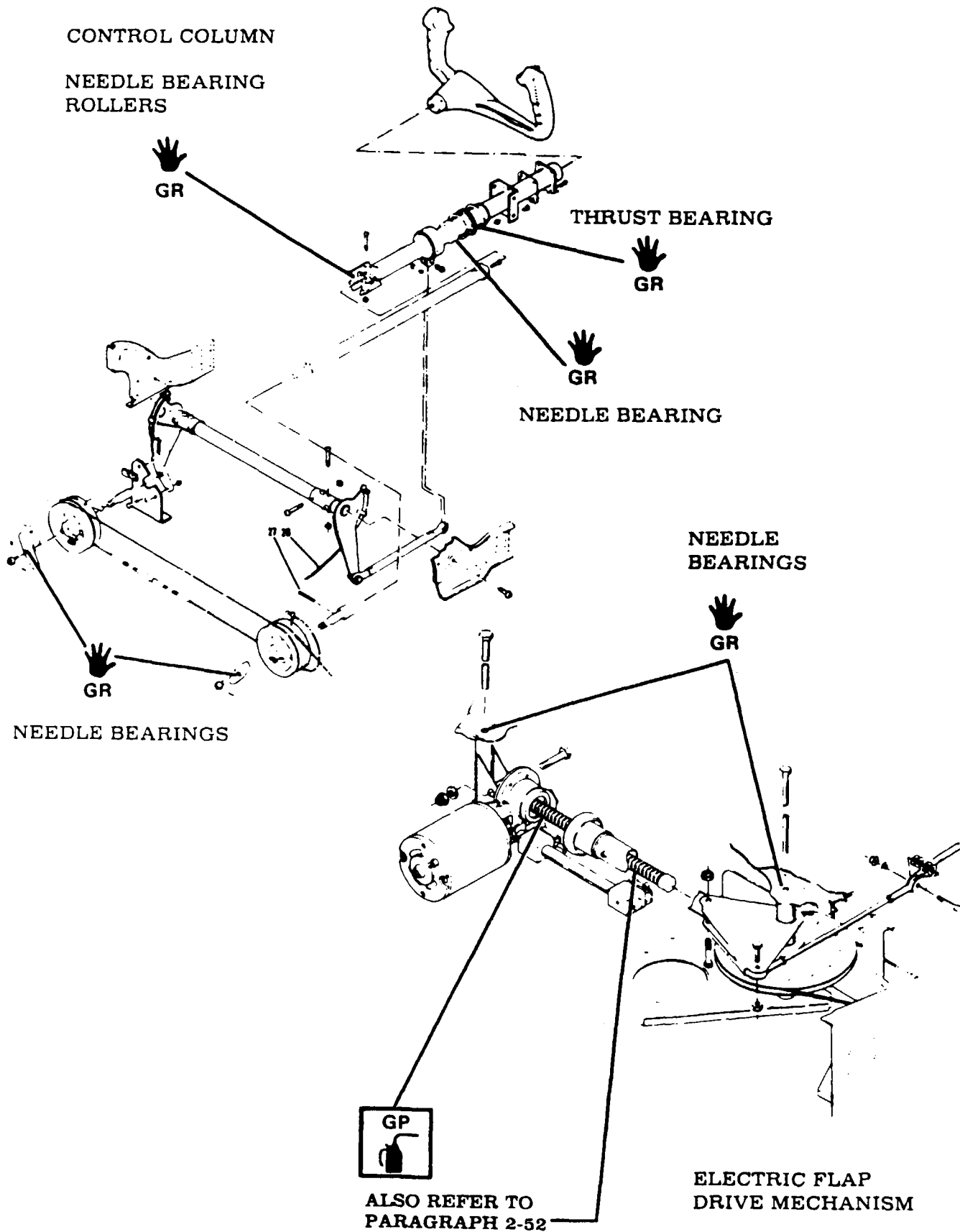
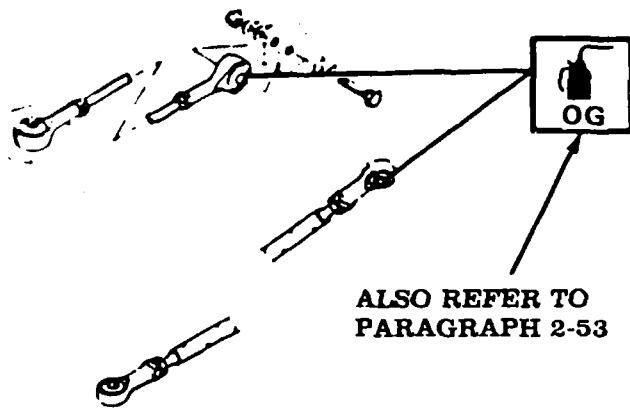
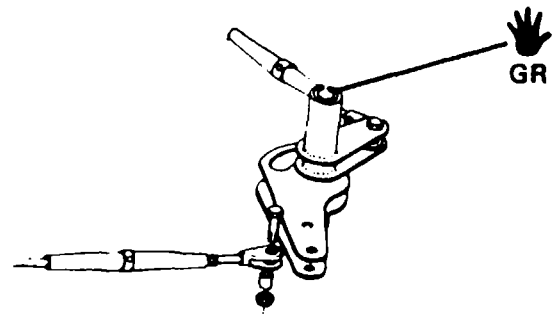


Figure 2-5. Lubrication (Sheet 5 of 6)

# MODEL R182 AND TR182 SERVICE MANUAL

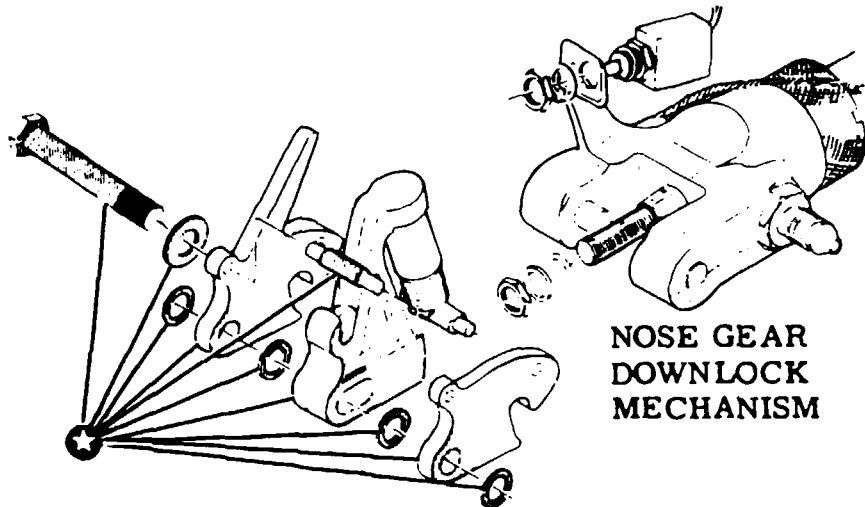


ROD END BEARINGS



AILERON BELLCRANK NEEDLE BEARINGS

★ SPRAY BOTH SIDES OF SHADED AREAS WITH ELECTROFILM LUBRI-BOND "A" WHICH IS AVAILABLE IN AEROSOL SPRAY CANS, OR AN EQUIVALENT LUBRICANT. TORQUE ATTACHING BOLT TO 10-20 LB-IN.



NOSE GEAR DOWNLOCK MECHANISM

## NOTES

Sealed bearings require no lubrication.

Do not lubricate roller chains or cables except under seacoast conditions. Wipe with a clean, dry cloth.

Lubricate unsealed pulley bearings, rod ends, Oilite bearings, pivot and hinge points, and any other friction point obviously needing lubrication, with general purpose oil every 1000 hours or oftener if required.

Paraffin wax rubbed on seat rails will ease sliding the seats for and aft.

Lubricate door latching mechanism with MIL-G-81322A general purpose grease, applied sparingly to friction points, every 1000 hours or oftener, if binding occurs. No lubrication is recommended on the rotary clutch.

Figure 2-5. Lubrication (Sheet 6 of 6)



# MODEL R182 & TR182 SERIES SERVICE MANUAL

## 2-57. GENERAL INSPECTION (MODEL R182 AND TR182 AIRPLANES).

### NOTE

Cessna Aircraft Company recommends PROGRESSIVE CARE for airplanes flown 200 hours or more per year, and 100-HOUR INSPECTION for airplanes flown less than 200 hours per year.

#### A. Inspection Requirements.

(1) Two basic types of inspections are available as defined below:

- (a) As required by Federal Aviation Regulation Part 91.409(a), all civil airplanes of U.S. registry must undergo an annual inspection each 12 calendar months. In addition airplanes operated commercially (for hire) must also have an annual 100 hour inspection each 100 hours of operation as required by Federal Aviation Regulation Part 91.409(b).
- (b) In lieu of the above requirements, an airplane may be inspected in accordance with a progressive inspection program in accordance with Federal Aviation Regulation Part 91.409(d), which allows the work load to be divided into smaller operations that can be accomplished in a shorter time period. The CESSNA PROGRESSIVE CARE PROGRAM has been developed to satisfy the requirements of Part 91 409 (d).

#### B. Inspection Program Selection.

(1) As a guide for selecting the inspection program that best suits the operation of the airplane, the following is provided:

- (a) If the airplane is flown less than 200 hours annually, the following conditions apply:
  1. If flown for hire.
    - a. An airplane operating in this category must be inspected each 100 hours of operation (100-HOUR) and each 12 calendar months of operation (ANNUAL).
  2. If not flown for hire.
    - a. An airplane operating in this category must be inspected each 12 calendar months of operation (ANNUAL). It is recommended that between annual inspections, all items be inspected at the intervals specified in the Inspection Time Limits Charts and Component Time Limits Charts.
- (b) If the airplane is flown more than 200 hours annually, the following condition applies:
  1. Whether flown for hire or not, it is recommended that airplanes operating in this category be placed on the CESSNA PROGRESSIVE CARE PROGRAM. However, if not placed on the CESSNA PROGRESSIVE CARE PROGRAM, the inspection requirements for airplanes in this category are the same as those defined under Paragraph B. (1)(a)1.a. or 2.a. CESSNA PROGRESSIVE CARE PROGRAM may be utilized as a total concept program which ensures that the inspection intervals in the inspection charts are not exceeded. Manuals and forms which are required for conducting the CESSNA PROGRESSIVE CARE PROGRAM inspections are available from the Cessna Supply Division.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## C. Inspection Charts.

### NOTE

Cessna has prepared these Inspection Charts to assist the owner or operator in meeting the foregoing responsibilities and to meet the intent of Federal Aviation Regulation Part 91.409(d). The Inspection Charts are not intended to be all-inclusive, for no such charts can replace the good judgment of a certified airframe and powerplant mechanic in performance of his duties. As the one primarily responsible for this airworthiness of the airplane, the owner or operator should select only qualified personnel to maintain the airplane.

- (1) The following Inspection Charts (Inspection Time Limits, Component Time Limits, Progressive Care Inspection, and Expanded Inspection) show the recommended intervals at which items are to be inspected based on normal usage under average environmental conditions. Airplanes operated in extremely humid tropics, or in exceptionally cold, damp climates, etc., may need more frequent inspections for wear, corrosion, and lubrication. Under these adverse conditions, perform periodic inspections in compliance with this chart at more frequent intervals until the operator can set his own inspection periods based on field experience. The operator's inspection intervals shall not deviate from the inspection time limits shown in this manual except as provided below:
  - (a) Each inspection interval can be exceeded by 10 hours or can be performed early at any time prior to the regular interval as provided below:
    1. In the event of late compliance of any operation scheduled, the next operation in sequence retains a due point from the time the late operation was originally scheduled.
    2. In the event of early compliance of any operation scheduled, that occurs 10 hours or less ahead of schedule, the next phase due point may remain where originally set.
    3. In the event of early compliance of any operation scheduled, that occurs more than 10 hours ahead of schedule, the next phase due point must be rescheduled to establish a new due point from the time of early accomplishment.
- (2) As shown in the charts, there are items to be checked at 50 hours, 100 hours, 200 hours, or at Special or Yearly inspection. Special or Yearly inspection items require servicing or inspection at intervals other than 50, 100, or 200 hours. If two inspection time requirements are listed for one inspection item, one hourly and the yearly, both apply and whichever requirement occurs first determines the time limit.
  - (a) When conducting a 50-hour inspection, check all items listed under EACH 50 HOURS. A 100-hour inspection includes all items listed under EACH 50 HOURS and EACH 100 HOURS. The 200-hour inspection includes all items listed under EACH 50 HOURS, EACH 100 HOURS, and EACH 200 HOURS. All of the items listed would be inspected, serviced, or otherwise performed as necessary to ensure compliance with the inspection requirements.
  - (b) A COMPLETE AIRPLANE INSPECTION includes all 50-, 100-, and 200-hour items plus those Special and Yearly Inspection Items which are due at the specified time.
  - (c) Component Time Limits Charts should be checked at each inspection interval to ensure proper overhaul and replacement requirements are accomplished at the specified times.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## D. Inspection Guidelines.

- (1) The Inspection Charts are to be used as a recommended inspection outline. Detailed information of systems and components in the airplane will be found in various chapters of this Maintenance Manual and the pertinent vendor publications. It is recommended that reference be made to the applicable portion of this manual for service instructions, installation instructions, and to the vendor's data or publications specifications for torque values, clearances, settings, tolerances, and other requirements.
- (2) For the purpose of this inspection, the term on condition is defined as follows: The necessary inspections and/or checks to determine that a malfunction or failure will not occur prior to the next scheduled inspection.
- (3) **MOVABLE PARTS:** Inspect for lubrication, servicing, security of attachment, binding, excessive wear, safetying, proper operation, proper adjustment, correct travel, cracked fittings, security of hinges, defective bearings, cleanliness, corrosion, deformation, sealing, and tension.
- (4) **FLUID LINES AND HOSES:** Inspect for leaks, cracks, bulging, collapsed, twisted, dents, kinks, chafing, proper radius, security, discoloration, bleaching, deterioration, and proper routing; rubber hoses for stiffness and metal lines for corrosion.
- (5) **METAL PARTS:** Inspect for security of attachment, cracks, metal distortion, broken spotwelds, condition of paint (especially chips at seams and around fasteners for onset of corrosion) and any other apparent damage.
- (6) **WIRING:** Inspect for security, chafing, burning, arcing, defective insulation, loose or broken terminals, heat deterioration, and corroded terminals.
- (7) **STRUCTURAL FASTENERS:** Inspect for correct torque in accordance with applicable torque values. Refer to Bolt Torque Data during installation or when visual inspection indicates the need for a torque check.

### NOTE

Torque values listed are not to be used for checking tightness of installed parts during service.

- (8) **FILTERS, SCREENS, AND FLUIDS:** Inspect for cleanliness and the need for replacement at specified intervals.
- (9) System check (operation or function) requiring electrical power must be performed using 28.5  $\pm$  0.25 volts bus voltage. This will ensure all components are operating at their designed requirements.
  - (a) Airplane file.
    1. Miscellaneous data, information, and licenses are a part of the airplane file. Check that the following documents are up-to-date and in accordance with current Federal Aviation Regulations. Most of the items listed are required by the Federal Aviation Regulations. Since the regulations of other nations may require other documents and data, owners of exported airplanes should check with their own aviation officials to determine their individual requirements.
      - a. To be displayed in the airplane at all times:
        - 1) Standard Airworthiness Certificate (FAA Form 8100-2).
        - 2) Aircraft Registration Certificate (FAA Form 8050-3).
        - 3) Aircraft Radio Station License (Federal Communication Commission Form 556 if transmitter is installed).
        - 4) Radio Telephone Station License (Federal Communication Commission Form 409 if Flitephone Radio Telephone is installed).
      - b. To be carried in the airplane at all times:
        - 1) Weight and Balance Data Sheets and associated papers (all copies of the Repair and Alteration Form, FAA Form 337, are applicable).
        - 2) Equipment List.
        - 3) Pilot's Operating Handbook and FAA-Approved Airplane Flight Manual.
      - c. To be made available upon request:
        - 1) Airframe, Engine, Propeller, and Avionics Maintenance Records.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## 2-58. PREINSPECTION CHECKS. (MODEL R182 AND TR182 AIRPLANES.)

### A. Preinspection Operational Checks.

- (1) Before beginning the step-by-step inspection, start and run up the engine and upon completion, shut down the engine in accordance with instructions in the Pilot's Operating Handbook and FAA-Approved Airplane Flight Manual. During the run-up, observe the following, making note of any discrepancies or abnormalities:
  - (a) Engine temperatures and pressures.
  - (b) Static RPM. (Also refer to Section 11 of this manual.)
  - (c) Magneto drop. (Also refer to Section 11 of this manual.)
  - (d) Engine response to changes in power.
  - (e) Any unusual engine noises.
  - (f) Fuel selector and/or shutoff valve; operate engine on each tank (or cell) position and OFF position long enough to ensure shutoff and/or selector valve functions properly.
  - (g) Idling speed and mixture; proper idle cut-off.
  - (h) Alternator and ammeter.
  - (i) Suction gage.
  - (j) Fuel flow indicator.
- (2) After the inspection has been completed, an engine run-up should again be performed to determine that any discrepancies or abnormalities have been corrected.
- (3) Some of the items in the Inspection Time Limits paragraph are optional, therefore not applicable to all airplanes.

#### Mechanic's Preinspection Discrepancies or Abnormalities to be Checked:

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#### Mechanic's Post-inspection Corrective Action Taken:

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# MODEL R182 & TR182 SERIES SERVICE MANUAL

**2-59. INSPECTION TIME LIMITS. (MODEL R182 & TR182 AIRPLANES.)**

EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTIONS	
HOURS	HOURS	HOURS	HOURS	YEARS

A	Placards (Refer to Pilot's Operating Handbook).					
A	1 Placards and Decals - Inspect presence, legibility and security. Consult Pilot's Operating Handbook and FAA-Approved Airplane Flight Manual for required placards.			•		
B	Fuselage (Section 3).					
B	1 Fuselage Surface - Inspect for skin damage, loose rivets, condition of paint and check pitot-static ports and drain holes for obstruction. Inspect covers and fairings for security.		•			
B	2 Internal Fuselage Structure - Inspect bulkheads, doorposts, stringers, doublers and skins for corrosion, cracks, buckles and loose rivets, bolts and nuts.			•		
B	3 Control Wheel Lock - Check general condition and operation.			•		
B	4 Fuselage Mounted Equipment - Check for general condition and security of attachment.			•		
B	5 Antennas and Cables - Inspect for security of attachment, connection and condition.			•		
B	6 Emergency Locator Transmitter - Inspect for security of attachment and check operation by verifying transmitter output. Check cumulative time and useful life of batteries in accordance with FAR Part 91.207. Refer to Section 16 - Emergency Locator Transmitter - Checkout Interval.		•			
B	7 Instrument Panel Shock Mounts, Ground Straps and Covers - Inspect for deterioration, cracks and security of attachment.			•		
B	8 Pilot's and Copilot's Inertia Reels - Inspect for security of installation, proper operation and evidence of damage.		•			
B	9 Seats, Seat Belts, and Shoulder Harnesses - Check general condition and security. Check operation of seat stops and adjustment mechanism. Inspect belts for condition and security of fasteners.		•			
B	10 Windows, Windshield, Doors and Seals - Inspect general condition. Check latches, hinges and seals for condition, operation and security of attachment.		•			
B	11 Upholstery, Headliner, Trim and Carpeting - Check condition and clean as required.				EACH 400	EACH 1
B	12 Flight Controls - Check freedom of movement and proper operation through full travel with and without flaps extended. Check electric trim controls for operation (as applicable.)		•			
B	13 Aileron, Elevator and Rudder Stops - Check for damage and security. Compliance with Cessna Service Letter SE80-65 is required.		•			
B	14 Portable Hand Fire Extinguisher - Inspect for proper operating pressure, condition, security of installation and servicing date.		•			

# MODEL R182 & TR182 SERIES SERVICE MANUAL

2-59. INSPECTION TIME LIMITS. (MODEL R182 & TR182 AIRPLANES.)		EACH	EACH	EACH	SPECIAL	
		50	100	200	INSPECTIONS	INSPECTIONS
		HOURS	HOURS	HOURS	HOURS	YEARS
B	15 Seat Tracks and Stops - Inspect seat tracks for condition and security of installation. Check seat track stops for damage and correct location. Ensure inspection of seat rails for cracks EACH 50 HOURS. Refer to Section 3.	•				
B	16 Control Column - Inspect pulleys, cables, sprockets, bearings, chains, bungees and turnbuckles for condition and security.			•		
B	17 Fuel Line and Selector Valve Drain(s) - Remove plug and drain.		•			
C	Wings and Empennage (Section 4).					
C	1 Wing Surfaces and Tips - Inspect for skin damage, loose rivets and condition of paint.		•			
C	2 Wing Struts and Strut Fairings - Check for dents, cracks, loose screws and rivets and condition of paint.		•			
C	3 Wing Spar and Wing Strut Fittings - Check for evidence of wear. Check attach bolts for indications of looseness and retorque as required.			•		
C	4 Wing Structure - Inspect spars, ribs, skins and stringers for cracks, wrinkles, loose rivets, corrosion or other damage.			•		
C	5 Metal Lines, Hoses, Clamps and Fittings - Check for leaks, condition and security. Check for proper routing and support.			•		
C	6 Wing Access Plates - Check for damage and security of installation.			•		
C	7 Vertical and Horizontal Stabilizers, Tips and Tailcone - Inspect externally for skin damage and condition of paint.		•			
C	8 Vertical and Horizontal Stabilizers and Tailcone structure - Inspect bulkheads, spars, ribs and skins for cracks, wrinkles, loose rivets, corrosion or other damage. Inspect vertical and horizontal stabilizer attach bolts for looseness. Retorque as necessary. Check security of inspection covers, fairings and tips.		•			
D	Landing Gear and Brakes (Section 5).					
D	1 Brakes, Master Cylinders and Parking Brake - Check master cylinders and parking brake mechanism for condition and security. Check fluid level and test operation of toe and parking brake.		•			
D	2 Main Gear Tubular Struts - Inspect for cracks, dents, corrosion, condition of paint or other damage. Check axles for condition and security.		•			
D	3 Brake Lines, Wheel Cylinders, Hoses, Clamps and Fittings - Check for leaks, condition and security of hoses for bulges and deterioration. Check brake lines and hoses for proper routing and support.				EACH 400	EACH 1
D	4 Wheels, Brake Discs and Linings - Inspect for wear, cracks, warps, dents or other damage. Check wheel through-bolts and nuts for looseness.		•			
D	5 Tires - Check tread wear and general condition. Check for proper inflation.		•			

# MODEL R182 & TR182 SERIES SERVICE MANUAL

		SPECIAL				
		EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	INSPECTIONS HOURS	YEARS
2-59.	<b>INSPECTION TIME LIMITS. (MODEL R182 &amp; TR182 AIRPLANES.)</b>					
D	6 Main Landing Gear Strut-to-Pivot Attachment - Check for damage, cracks, loose rivets, bolts and nuts and security of attachment.		•			
D	7 Nose Gear Steering Mechanism - Check for wear, security and proper rigging.			•		
D	8 Nose Gear - Inspect torque links, steering rods and boots for condition and security of attachment. Check strut for evidence of leakage and proper extension. Check strut barrel for corrosion, pitting and cleanliness. Check shimmy damper and/or bungees for operation, leakage and attach points for wear and security.		•			
D	9 Nose Gear Fork - Inspect for cracks, general condition and security of attachment.			•		
D	10 Wheel Bearings - Clean, inspect and lube.				A	
D	11 Nose Gear Attachment Structure - Inspect for cracks, corrosion or other damage and security of attachment.		•			
D	12 Landing Gear - Perform five fault-free cycles.		•			
D	13 Main Landing Gear - Check downlock engagement.		•			
D	14 Landing Gear System - Check adjustment of main and nose gear up and down switches and operation of gear position indicator.		•			
D	15 Throttle-Operated Gear Warning System - Check condition of wiring and security of components. Perform rigging check (refer to Section 5-44).			•		
D	16 Nose Gear Doors and Linkage - Check for .25 inch minimum clearance throughout up and down cycles, and proper fit when closed. Check linkage for wear, damaged bearings, distortion and superficial damage.		•			
D	17 Hydraulic System - Check all components for leaks and external damage to components or mounting structure.		•			
D	18 Emergency Hand Pump - Check operation, check lines and components for damage and leaks.			•		
D	19 Powerpack - Clean self-relieving check valve filter.		•			
D	20 Powerpack - Hydraulic fluid contamination check.				B	
D	21 Powerpack - Check condition and wear of brushes in servo motor.				C	
D	22 Powerpack - Perform hydraulic pressure checks of primary relief valve, thermal relief valve and pressure switch.		•			
D	23 Landing Gear System - Overhaul main gear downlock actuators, main and nose gear actuators, landing gear selector valve, emergency hand pump and pressure switch. Replace all rubber goods.					D
D	24 Brake System - Overhaul brake discs, parking brake system, wheel cylinders and master cylinders. Replace brake pads and all rubber goods.					D
E	Aileron Control System (Section 6).					
E	1 Ailerons and Hinges - Check condition, security and operation.		•			
E	2 Aileron Structure, Control Rods, Hinges, Balance Weights, Bellcranks, Linkage, Bolts, Pulleys and Pulley Brackets - Check condition, operation and security of attachment.		•			

# MODEL R182 & TR182 SERIES SERVICE MANUAL

2-59. INSPECTION TIME LIMITS. (MODEL R182 & TR182 AIRPLANES.)		EACH	EACH	EACH	SPECIAL	
		50	100	200	INSPECTIONS	YEARS
		HOURS	HOURS	HOURS	HOURS	
E	3 Ailerons and Cables - Check operation and security of stops. Check cables for tension, routing, fraying, corrosion and turnbuckle safety. Check travel if cable tension requires adjustment or if stops are damaged. Check fairleads and rub strips for condition.			•		
E	4 Autopilot Rigging - Check per Avionics Installation Manual.				E	EACH 1
E	5 Aileron Controls - Check freedom of movement and proper operation through full travel with and without flaps extended.		•			
F	Wing Flap Control System (Section 7).					
F	1 Flaps - Check tracks, rollers and control rods for security of attachment. Check operation.		•			
F	2 Flap Actuator Threads - Clean and lubricate. Refer to paragraph 2-52 for detailed instructions.		•			
F	3 Flap Structure, Linkage, Bellcranks, Pulleys and Pulley Brackets - Check for condition, operation and security.			•		
F	4 Wing Flap Control - Check operation through full travel and observe Flap Position indicator for proper indication.			•		
F	5 Throttle-Operated Flap Warning System - Check condition of wiring and security of components. Perform rigging check (refer to Section 5).			•		
F	6 Flaps and Cables - Check cables for proper tension, routing, fraying, corrosion and turnbuckle safety. Check travel if cable tension requires adjustment.			•		
F	7 Flap Motor, Actuator and Limit Switches (electric flaps) - Check wiring and terminals for condition and security. Check actuator for condition and security.			•		
G	Elevator Control System (Section 8).					
G	1 Elevator Control - Check freedom of movement and proper operation through full travel with and without flaps extended.		•			
G	2 Elevator, Hinges and Cable Attachment - Check condition, security and operation.		•			
G	3 Elevator Control System - Inspect pulleys, cables, sprockets, bearings, chains and turnbuckles for condition, security and operation.			•		
G	4 Elevator/Rudder Downspring - Check structure, bolts, linkage, bellcrank and push-pull tube for condition, operation and security. Check cables for tension, routing, fraying, corrosion and turnbuckle safety. Check travels if cables require tension adjustment or if stops are damaged.		•			
H	Elevator Trim Tab Control System (Section 9).					
H	1 Elevator Trim Tab and Hinges - Check condition, security and operation.		•			
H	2 Elevator Trim System - Check cables, push-pull rods, bellcranks, pulleys, turnbuckles, fairleads, rub strips, etc. for proper routing, condition and security.		•			



# MODEL R182 & TR182 SERIES SERVICE MANUAL

		EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTIONS	
					HOURS	YEARS
<b>2-59.</b>	<b>INSPECTION TIME LIMITS. (MODEL R182 &amp; TR182 AIRPLANES.)</b>					
H	3 Trim Controls and Indicators - Check freedom of movement and proper operation through full travel. Check pulleys, cables, sprockets, bearings, chains, bungees and turnbuckles for condition and security. Check electric trim controls for operation as applicable.			•		
H	4 Elevator Trim Tab Stop Blocks - Inspect for damage and security.			•		
H	5 Elevator Trim Tab Actuator - Clean, lubricate and check free-play.				F	
H	6 Elevator Trim Tab Actuator - Free-Play limits inspection. Refer to Section 9 for cleaning, inspection and repair procedures.			•		
I	Rudder Control System. (Section 10).					
I	1 Rudder - Inspect the rudder skins for cracks and loose rivets, rudder hinges for condition, cracks and security; hinge bolts, hinge bearings, hinge attach fittings and bonding jumper for evidence of damage and wear, failed fasteners and security. Inspect the rudder hinge bolts for proper safetying of nuts with cotter pins. Inspect balance weight for looseness and the supporting structure for damage.		•			
I	2 Rudder Pedals and Linkage - Check for general condition, proper rigging, and operation. Check for security of attachment.			•		
I	3 Rudder, Tips, Hinges and Cable Attachment - Check condition, security and operation.		•			
I	4 Rudder - Check internal surfaces for corrosion, condition of fasteners and balance weight attachment.			•		
J	Normally Aspirated and Turbocharged Engines (Sections 11 and 11A).					
J	1 Cowling and Cowl Flaps - Inspect for cracks, dents and other damage, security of cowl fasteners and cowl mounted landing lights for attachment. Check cowl flaps for condition, security and operation.	•				
J	2 Engine - Inspect for evidence of oil and fuel leaks. Wash engine and check for security of accessories.	•				
J	3 Cowl Flap Controls - Check freedom of movement through full travel.	•				
J	4 Engine, Propeller Controls and Linkage - Check general condition, freedom of movement through full range. Check for proper travel, security of attachment and for evidence of wear. Check friction locks for proper operation.	•				G
J	5 Ignition Switch and Electrical Harness - Inspect for damage, condition and security.		•			
J	6 Firewall Structure - Inspect for wrinkles, damage, cracks, sheared rivets, etc. Check cowl shock mounts for condition and security.			•		
J	7 Engine Shock Mounts, Engine Mount Structure and Ground Straps - Check condition, security and alignment.			•		
J	8 Induction System - Check security of clamps, tubes and ducting. Inspect for evidence of leakage.	•				

# MODEL R182 & TR182 SERIES SERVICE MANUAL

2-59. INSPECTION TIME LIMITS. (MODEL R182 & TR182 AIRPLANES.)		SPECIAL INSPECTIONS				
		EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	HOURS	YEARS
J	9 Induction Airbox, Valves, Doors and Controls - Remove air filter and inspect hinges, doors, seals and attaching parts for wear and security. Check operation.		•			
J	10 Induction Air Filter - Remove and clean. Inspect for damage and service per paragraph 2-25.		•		H	
J	11 Alternate Induction Air System - Check for obstructions, operation and security.	•				
J	12 Alternator and Electrical Connections - Check condition and security. Check alternator belts for condition and proper adjustment.	•				
J	13 Alternator - Check brushes, leads, commutator or slip ring for wear.					I
J	14 Starter, Starter Solenoid and Electrical Connections - Check for condition of starter brushes, brush leads and commutator.		•			J
J	15 Oil Cooler - Check for obstructions, leaks and security of attachment.	•				
J	16 Exhaust System - Inspect for cracks and security. Air leak check exhaust system. Refer to Sections 11 and 11A, Paragraphs 11-98 and 11-75A, for inspection procedures.	•				
J	17 Exhaust System (turbocharged engine) - Inspect couplings, seals, clamps and expansion joints for cracks and security. Air leak check exhaust system. Refer to Sections 11 and 11A, Paragraphs 11-98 and 11-75A, for inspection procedures.	•				
J	18 Auxiliary (Electric) Fuel Pump - Check pump and fittings for condition, operation, security. Remove and clean filter (as applicable).		•			
J	19 Engine-Driven Fuel Pump - Check for evidence of leakage, security of attachment and general condition.		•			
J	20 Magnetos - Check external condition, security and electrical leads for condition. Check timing to engine and internal timing if engine timing requires adjustment. Compliance with Bendix Service Bulletin 599D is required.		•			
J	21 Magnetos - Timing Procedures and intervals, lubrication and overhaul procedures.				K	
J	22 Ignition Harness and Insulators - Check for proper routing, deterioration and condition of terminals.		•			
J	23 Spark Plugs - Remove, clean analyze, test, gap and rotate top plugs-to-bottom and bottom plugs-to-top.		•			
J	24 Cylinder Compression - Perform differential compression test.			•		
J	25 Carburetor - Drain and flush carburetor bowl, clean inlet strainer and drain plug. Check general condition and security.		•			
J	26 Engine Primer - Check for leakage, operation and security.		•			
J	27 Hoses, Metal Lines and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.	•				L
J	28 Cold and Hot Air Hoses - Check condition, routing and security.		•			

# MODEL R182 & TR182 SERIES SERVICE MANUAL

2-59. INSPECTION TIME LIMITS. (MODEL R182 & TR182 AIRPLANES.)		EACH	EACH	EACH	SPECIAL	
		50	100	200	HOURS	YEARS
		HOURS	HOURS	HOURS	HOURS	YEARS
J	29 Engine Cylinders, Rocker Box Covers and Pushrod Housings - Check for fin damage, cracks, oil leakage, security of attachment and general condition.		•			
J	30 Engine Baffles and Seals - Check condition and security of attachment.	•				
J	31 Crankcase, Oil Sump and Accessory Section - Inspect for cracks and evidence of oil leakage. Check bolts and nuts for looseness and retorque as necessary. Check crankcase breather lines for obstructions, security and general condition.		•			
J	32 Turbocharger (if applicable) - a. Inspect turbocharger mounting brackets, ducting, linkage and attaching parts for general condition, leakage or damage and security of attachment. b. Check waste gate, actuator, controller, oil and vent lines, overboost relief valve and compressor housing for leakage, apparent damage, security of attachment and evidence of wear. Check waste gate return spring for condition and security.	• •				
J	33 Turbocharger (if applicable) - a. Remove heat shields and inspect for burned areas, bulges or cracks. Remove tailpipe and ducting - inspect turbine for coking, carbonization, oil deposits and turbine impellers for damage.			•		
J	34 Engine Oil With Oil Filter - Replace filter. Add recommended grade aviation oil to replace oil lost in existing filter.	•			M	
J	35 Engine Oil Without Oil Filter - Drain oil sump and oil cooler, clean and inspect screens and refill with recommended grade aviation oil.	•			M	
J	36 Engine Oil With Oil Filter - Drain oil sump and refill with recommended grade aviation oil.		•		M	
K	Fuel System (Section 12).					
K	1 Integral Fuel Tanks - Check for evidence of leakage and condition of fuel caps, adapters and placards.		•			
K	2 Integral Fuel Tanks - Drain fuel and check tank interior and outlet screens.				N	
K	3 Fuel Bladders - Check for leaks and security, condition of fuel caps, adapters and placards.		•			
K	4 Fuel Bladders - Drain fuel and check for wrinkles that would retain contaminants or liquid, security of attachment and condition of outlet screens.				N	
K	5 Fuel System - Inspect plumbing and components for mounting and security.		•			
K	6 Fuel Tank or Bladder Drains - Drain water and sediment.	•				
K	7 Fuel Tank Vent Lines and Vent Valves - Check vents for obstruction and proper positioning. Check valves for operation.		•			
K	8 Fuel Selector Valve - Check controls for detent in each position, security of attachment and for proper placarding.		•			
K	9 Fuel Strainer, Drain Valve and Controls - Check freedom of movement, security and proper operation. Disassemble, flush and clean screen and bowl.		•			

## MODEL R182 & TR182 SERIES SERVICE MANUAL

### 2-59. INSPECTION TIME LIMITS (Model R182 & TR182 Airplanes)

		EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTIONS HOURS	YEARS
K	10 Fuel Quantity Indicators – Check for damage and security of installation.					EACH 1
K	11 Fuel quantity indicating system operational test is required every 12 months. Refer to Section 15 for detailed accomplishment instructions.					EACH 1
L	<b>Propeller and Propeller Governor (Section 13).</b>					
L	1 Propeller Governor and Control – Inspect for oil and grease leaks. If leakage is evident, refer to McCauley Service Manual.	•				
L	2 Proper Mounting – Check for security of installation.	•				
L	3 Propeller Blades – Inspect for cracks, dents, nicks, scratches, erosion, corrosion, or other damage.	•				
L	4 Spinner – Check general condition and attachment.	•				
L	5 Spinner and Spinner Bulkhead – Remove spinner, wash and inspect for cracks and fractures.		•			
L	6 Propeller Mounting Bolts – Inspect mounting bolts and safety-wire for signs of looseness. Retorque mounting bolts as required.			•		
L	7 Propeller Hub – Check general condition			•		
L	8 Propeller Governor and Control – Check for security and operation of controls.			•		
L	9 Propeller Assembly – Overhaul (See McCauley Service Manual; refer to list of publications).				O	
M	<b>Utility Systems (Section 14).</b>					
M	1 Ventilation System – Inspect clamps, hoses and valves for condition and security.				400	EACH 1
M	2 Heater Components, Inlets and Outlets – Inspect all lines, connections, ducts, clamps, seals and gaskets for condition, restriction and security.		•			
M	3 Cabin Heat and Ventilation Controls – Check freedom of movement through full travel. Check friction locks for proper operation.			•		
M	4 Pitot Tube and Stall warning Vane – Check for condition and obstructions.	•				
M	5 Pitot Tube Heater Element – Perform operational check.	•				
M	6 Propeller Anti-ice Slip Rings, Brushes and Boots – Inspect for condition and security. Perform operational check.	•				
M	7 Heated Windshield Panel – Check operation, security of installation, electrical wiring and condition of storage bag.			•		
M	8 Oxygen System – Inspect masks, hoses, lines and fittings for condition, routing and support. Test operation and check for leaks.			•		
M	9 Oxygen Cylinder – Inspect for condition, check hydrostatic test date and perform hydrostatic test, if due.					EACH 5
N	<b>Instruments and Instrument Systems (Section 15).</b>					
N	1 Vacuum System – Inspect for condition and security.		•			

## MODEL R182 & TR182 SERIES SERVICE MANUAL

### 2-59. INSPECTION TIME LIMITS.

(Model R182 & TR182 Airplanes)

		EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTIONS HOURS	YEARS
N	2 Vacuum System Hoses – Inspect for hardness, deterioration, looseness or collapsed hoses.		•			
N	3 Vacuum Pump – Check for condition and security. Check Vacuum system breather line for obstructions, condition and security.		•			
N	4 Vacuum System Air Filter – Inspect for damage, deterioration and contamination. Clean or replace, if required. NOTE: Smoking will cause premature filter clogging.		•		P	
N	5 Vacuum System Relief Valve – Inspect for condition and security.		•		Q	
N	6 Instruments – Check general condition and markings for legibility.		•			
N	7 Instrument Lines, Fittings, Ducting and Instrument Panel Wiring – Check for proper routing, support and security of attachment.			•		
N	8 Static System – Inspect for security of installation, cleanliness and evidence of damage.			•		
N	9 Navigation Indicators, Controls and components – Inspect for condition and security.			•		
N	10 Airspeed Indicator, Vertical Speed Indicator and Magnetic Compass – Calibrate.					EACH 2
N	11 Altimeter and Static System – Inspect in accordance with FAR Part 91.411.					EACH 2
N	12 Instrument Panel Mounted Avionics Units (Including Audio Panel, VHF Nav/Com(s), ADF, Transponder, DME and Compass System) – Inspect for deterioration, cracks and security of instrument panel mounts. Inspect for security of electrical connections, condition and security of wire routing.			•		
N	13 Avionics Operating Controls – Inspect for security and proper operation of controls and switches and ensure that all digital segments will illuminate properly.			•		
N	14 Remote Mounted Avionics – Inspect for security of units and electrical connectors, condition and security of wire routing. Also check for evidence of damage and cleanliness.			•		
N	15 Microphones, Headsets and Jacks – Inspect for cleanliness, security and evidence of damage.			•		
N	16 Magnetic Compass – Inspect for security of installation, cleanliness and evidence of damage.			•		
O	<b>Electrical Systems (Section 16).</b>					
O	1 General Airplane and System Wiring – Inspect for proper routing, chafing broken or loose terminals, general condition, broken or inadequate clamps or sharp bends in wiring.			•		
O	2 Instrument, Cabin, Navigation, Beacon, Strobe, and Landing Lights – Check operation, condition of lens and security of attachment.		•			
O	3 Circuit Breaker and Fuses – Check operation and condition. Check for required number of spare fuses.		•			
O	4 Battery – Check general condition and security. Check level of electrolyte.		•		R	
O	5 Battery Box and Cables – Clean and remove any corrosion. Check cables for routing, support and security of connections.		•			

# MODEL R182 & TR182 SERIES SERVICE MANUAL

2-59. INSPECTION TIME LIMITS. (MODEL R182 & TR182 AIRPLANES.)		EACH	EACH	EACH	SPECIAL	
		50	100	200	INSPECTIONS	
		HOURS	HOURS	HOURS	HOURS	YEARS
O	6 Switch and Circuit Breaker Panel, Terminal Blocks and Junction Boxes - Inspect wiring and terminals for condition and security.			•		
O	7 Alternator Control Unit - Inspect wiring, mounting, condition and wire routing.			•		
O	8 Switches - Check operation, terminals, wiring and mounting for conditions, security and interference.			•		
O	9 Instrument Panel and Control Pedestal - Inspect wiring, mounting and terminals for condition and security. Check resistance between stationary panel and instrument panel for proper ground.			•		
O	10 External Power Receptacle and Power Cables - Inspect for condition and security.			•		
P	Post Inspection.					
P	1 Replace all fairings, doors and access hole covers. Ground check engine, alternator charging rate, oil pressure, tachometer, oil temperature and pressure gages and general operation of components.					
Q	Perform the Following Operational Checks:					
Q	1 Brakes - Test toe brakes and parking brake for proper operation.		•			
R	Service Bulletins/Airworthiness Directives.					
R	1 Check that all applicable Cessna Service Bulletins and Supplier Service Bulletins are complied with.					
R	2 Check that all applicable Airworthiness Directives and Federal Aviation Regulations are complied with.					
R	3 Ensure all Maintenance Record Entries required by Federal Aviation Regulations are completed before returning the airplane to service.					

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## Special Inspections Legends:

- A. First 100 hours and each 500 hours thereafter. More often if operated under prevailing wet or dusty conditions.
- B. At first 50 hours, first 100 hours, and each 500 hours thereafter, or one year, whichever comes first.
- C. Each 500 hours, and whenever improper operation is suspected. Replace brushes when worn to .25 inch or less.
- D. Serial R18200001 thru R18200583 and FR18200001 thru FR18200025: Each 5 years. Serial R18200584 and On and FR18200026 thru FR18200070: Overhaul components and replace rubber goods on-condition basis.
- E. Each 600 hours or 1 year, whichever comes first.
- F. Lubrication of the actuator is required each 1000 hours or 3 years, whichever comes first. See figure 2-5 for grease specification.
- G. Lubricate each 100 hours (except in extreme dusty conditions). These controls are not repairable and should be replaced every 1500 hours or sooner if required.
- H. Clean filter per paragraph 2-25. Replace paper filters at least each 500 hours.
- I. Inspect each 500 hours.
- J. For Prestolite starters only, inspect the commutator and brushes every 1500 hours.
- K. At the first 25 hours, first 50 hours, first 100 hours and thereafter at each 100 hours, the contact breaker point compartment and magneto-to-engine timing should be inspected and checked. If magneto-to-engine timing is correct within plus zero degrees to minus two degrees, internal timing need not be checked. If timing is out of tolerance, remove magneto and set internal timing, then install and time to the engine. Refer to Section 11 or 11A and the magneto manufacturers service instructions for magneto timing procedures.
- L. Replace engine compartment rubber hoses (Cessna installed only) every five years or at engine overhaul, whichever comes first. This does not include drain hoses. Hoses which are beyond these limits and are in a serviceable condition, must be placed on order immediately and then be replaced within 120 days after receiving the new hose(s) from Cessna. Replace drain hoses on condition. Engine flexible hoses (Lycoming installed) (Refer to Lycoming Maintenance Manual and Lycoming Engine Service Bulletins).
- M. First 25 hours: Refill with straight grade mineral oil and use until a total of 50 hours have accumulated, or oil consumption has stabilized. Change oil, replace filter, and refill sump with recommended grade of ashless dispersant oil. Change oil and replace filter at least every six months, regardless of accumulated hours.
- N. Each 1000 hours.
- O. See McCauley Service Manual; refer to list of publication.
- P. Replace every 500 hours.
- Q. Replace filter each 100 hours.
- R. Check electrolyte level and clean battery box each 100 hours or 90 days.

## MODEL R182 & TR182 SERIES SERVICE MANUAL

### 2-60. COMPONENT TIME LIMITS

#### 1. General

- A. Most components listed throughout Section 2 should be inspected as detailed elsewhere in this section and repaired, overhauled or replaced as required. Some components, however, have a time or life limit, and must be overhauled or replaced on or before the specified time limit.

**NOTE:** Overhaul - Item may be overhauled as defined in FAR 43.2 or it can be replaced.

**NOTE:** Replacement - Item must be replaced with a new item or a serviceable item that is within its service life and time limits or has been rebuilt as defined in FAR 43.2.

- B. This section provides a list of items that must be overhauled or replaced at specific time limits. Table 1 lists those items that Cessna has mandated must be overhauled or replaced at specific time limits. Table 2 lists component time limits that have been established by a supplier to Cessna for the supplier's product.
- C. In addition to these time limits, the components listed herein are also inspected at regular time intervals set forth in the Inspection Charts, and may require overhaul/replacement before the time limit is reached based on service usage and inspection results.

#### 2. Cessna-Established Replacement Time Limits.

- A. The following component time limits have been established by Cessna Aircraft Company.

Table 1: Cessna-Established Replacement Time Limits

COMPONENT	REPLACEMENT TIME	OVERHAUL
Restraint Assembly Pilot, Copilot, and Passenger Seats	10 years	NO
Trim Tab Actuator	1,000 hours or 3 years, whichever occurs first	YES
Vacuum System Filter	500 hours	NO
Vacuum System Hoses	10 years	NO
Pitot and Static System Hoses	10 years	NO
Vacuum Relief/Regulator Valve Filter (If Installed)	500 hours	NO
Engine Compartment Flexible Fluid-Carrying Teflon Hoses (Cessna-Installed) Except Drain Hoses (Drain hoses are replaced on condition)	10 years or engine overhaul, whichever occurs first (Note 1)	NO
Engine Mixture, Throttle, and Propeller Controls	At engine TBO	NO
Engine Compartment Flexible Fluid-Carrying Rubber Hoses (Cessna-Installed) Except Drain Hoses (Drain hoses are replaced on condition)	5 years or engine overhaul, whichever occurs first (Note 1)	NO



## MODEL R182 & TR182 SERIES SERVICE MANUAL

COMPONENT	REPLACEMENT TIME	OVERHAUL
Engine Air Filter	500 hours or 36 months, whichever occurs first (Note 9)	NO
Check Valve (Turbocharger Oil Line Check Valve)	Every 1,000 hours of operation (Note 10)	NO
Oxygen Bottle - Lightweight Steel (ICC-3HT, DOT-3HT)	Every 24 years or 4380 cycles, whichever occurs first	NO
Oxygen Bottle - Composite (DOT-E8162)	Every 15 years	NO
Engine Driven Dry Vacuum Pump Drive Coupling (Not lubricated with engine oil)	6 years or at vacuum pump replacement, whichever occurs first	NO
Engine Driven Dry Vacuum Pump (Not lubricated with engine oil)	500 hours (Note 11)	NO
Standby Dry Vacuum Pump	500 hours or 10 years, whichever occurs first (Note 11)	NO

### 3. Supplier-Established Replacement Time Limits

- A. The following component time limits have been established by specific suppliers and are reproduced as follows:

Table 2: Supplier-Established Replacement Time Limits

COMPONENT	REPLACEMENT TIME	OVERHAUL
ELT Battery	(Note 3)	NO
Vacuum Manifold	(Note 4)	NO
Magnetos	(Note 5)	YES
Engine	(Note 6)	YES
Engine Flexible Hoses (Lycoming-Installed)	(Note 2)	NO
Auxiliary Electric Fuel Pump	(Note 7)	YES
Propeller	(Note 8)	YES

## MODEL R182 & TR182 SERIES SERVICE MANUAL

### NOTES:

Note 1: This life limit is not intended to allow flexible fluid-carrying Teflon or rubber hoses in a deteriorated or damaged condition to remain in service. Replace engine compartment flexible Teflon (AE3663819BXXXX series hose) fluid-carrying hoses (Cessna-installed only) every ten years or at engine overhaul, whichever occurs first. Replace engine compartment flexible rubber fluid-carrying hoses (Cessna-installed only) every five years or at engine overhaul, whichever occurs first (this does not include drain hoses). Hoses which are beyond these limits and are otherwise in a serviceable condition, must be placed on order immediately and then be replaced within 120 days after receiving the new hose from Cessna.

Note 2: For Textron Lycoming engines, refer to latest Textron Lycoming Engine Service Bulletins.

Note 3: Refer to FAR 91.207 for battery replacement time limits.

Note 4: Refer to Airborne Air & Fuel Product Reference Memo No. 39, or latest revision, for replacement time limits.

Note 5: For airplanes equipped with Slick magnetos, refer to Slick Service Bulletin SB2-80C, or latest revision, for time limits.

For airplanes equipped with TCM/Bendix magnetos, refer to Teledyne Continental Motors Service Bulletin No. 643, or latest revision, for time limits.

Note 6: For Textron Lycoming engines, refer to Textron/Lycoming Service Instruction S.I. 1009AJ, or latest revision, for time limits.

Note 7: Refer to Cessna Service Bulletin SEB94-7 Revision 1/Dukes Inc. Service Bulletin NO. 0003, or latest revision.

Note 8: Refer to the applicable McCauley Service Bulletins and Overhaul Manual for replacement and overhaul information.

Note 9: The air filter may be cleaned. Refer to Section 2 of this service manual and for airplanes equipped with an air filter manufactured by Donaldson, refer to Donaldson Aircraft Filters Service Instructions P46-9075 for detailed servicing instructions.  
The address for Donaldson Aircraft Filters is:

Customer Service  
115 E. Steels Corners RD  
Stow OH. 44224

Do not over-service the air filter. Over-servicing increases the risk of damage to the air filter from excessive handling. A damaged/worn air filter may expose the engine to unfiltered air and result in damage/excessive wear to the engine.

Note 10: Replace the turbocharger oil line check valve every 1,000 hours of operation (Refer to Cessna Service Bulletin SEB91-7 Revision 1, or latest revision).

Note 11: Replace engine driven dry vacuum pump not equipped with a wear indicator every 500 hours of operation, or replace according to the vacuum pump manufacturer's recommended inspection and replacement interval, whichever occurs first.

Replace standby vacuum pump not equipped with a wear indicator every 500 hours of operation or 10 years, whichever occurs first, or replace according to the vacuum pump manufacturer's recommended inspection and replacement interval, whichever occurs first.

For a vacuum pump equipped with a wear indicator, replace pump according to the vacuum pump manufacturer's recommended inspection and replacement intervals.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## 2-61. SCHEDULED MAINTENANCE CHECKS. (MODEL R182 & TR182 AIRPLANES)

## 2-62. PROGRESSIVE CARE PROGRAM. (MODEL R182 & TR182 AIRPLANES)

### A. Progressive Inspection Program.

#### (1) Purpose and Use.

- (a) As detailed in Federal Aviation Regulation Part 91.409, paragraph (d), airplanes that desire to use a Progressive Inspection Program must be inspected in accordance with an authorized progressive inspection program. This chapter presents the current progressive inspection program for the Cessna Model R182 and TR182, recommended by the Cessna Aircraft Company.

### B. Introduction.

- (1) Following is the recommended Progressive Care Program for Model R182 and TR182 airplanes.
- (2) This program is divided into four separate operations which are to be accomplished initially after 50 hours of operation and each 50 hours of operation thereafter. Additional special requirements indicated as Special Inspection, which are required at other intervals are specified separately.
- (3) Recommended progressive care inspection may be accomplished by one of the following.

#### NOTE

Some 100 HOUR items are covered in Operation 1 and 3, also some 200 HOUR items are covered in Operation 1, 2, 3 and 4. These items are placed here for convenience and expediency of the total inspection. After the first completion of all four Operations, these items will be at the proper intervals.

- (a) **NEW DELIVERED AIRCRAFT** - A new delivered aircraft must have less than 50 hours total time in service and enough calendar time remaining since the issuance date of the original Airworthiness Certificate to allow the owner/operator to complete a cycle of all four Operations before the first annual inspection becomes due. Operation 1 will be due at 50 hours time in service. Operation 2 will be due at 100 hours. Operation 3 will be due at 150 hours and Operation 4 will be due at 200 hours. There are additional inspection requirements for new aircraft at the FIRST 50 HOUR inspection point. In addition to performing Operation 1, the FIRST 50 HOUR ITEMS listed in the inspection Time Limits Charts in 2-59 must also be performed. After these FIRST 50 HOUR items have been accomplished, they have permanent inspection time limits which are covered in the Operations Schedules.
- (b) **ALL OTHER AIRCRAFT** - To qualify other aircraft which have more than 50 hours time in service for the Progressive Inspection Program, conduct a COMPLETE AIRPLANE INSPECTION. Operation 1 will become due 50 hours from the time the COMPLETE AIRPLANE INSPECTION was accomplished.
- (4) Performance of the inspections as listed herein at the specified points will assure compliance with the Inspection Time Limits detailed in 2-59. Special inspections shall be complied with at prescribed intervals and/or intervals coinciding with operations 1 through 4 as outlined in 2-62.
- (5) An operator may elect to perform the recommended inspections on a schedule other than that specified. Any inspection schedule requiring the various inspection items detailed in this chapter to be performed at a frequency equal to that specified herein or more frequently is acceptable. Any inspection item performed at a time period in excess of that specified herein must be approved by the appropriate regulating agency.
- (6) As defined in Federal Aviation Regulations Part 91.409,(d) the frequency and detail of the Progressive Inspection Program shall provide for the complete inspection of the airplane within each 12-calendar months. If the airplane is approaching the end of a 12-calendar month period, but the complete cycle of 4 operations has not been accomplished, it will be necessary to complete the remaining operations, regardless of airplane hours before the end of the 12-calendar month period. If the Progressive Inspection Program is to be discontinued, an annual inspection becomes due at the time when any item reaches a maximum of 12 calendar months from the last time it was inspected under the Progressive Inspection Program. Refer to Federal Aviation Regulation Part 91.409(d) for detailed information.

## MODEL R182 & TR182 SERIES SERVICE MANUAL

### C. Inspection Time Limitations.

- (1) Each inspection interval may be exceeded by 10 hours or can be performed early at any time prior to the regular interval as provided below:
  - (a) In the event of late compliance of any operation scheduled, the next operation in sequence retains a due point from the time the late operation was originally scheduled.
  - (b) In the event of early compliance of any operation scheduled, that occurs 10 hours or less ahead of schedule, the next phase due point may remain where originally set.
  - (c) In the event of early compliance of any operation scheduled, that occurs more than 10 hours ahead of schedule, the next phase due point must be rescheduled to establish a new due point from the time of early accomplishment.

### D. Procedures.

- (1) The following instructions are provided to aid in implementation of the Model R182 & TR182 Series Progressive Care Program Schedule.
  - (a) Use the Progressive Care Program Inspection Chart, provided herein, for each airplane. The chart is to be placed in the airplane flight log book for use as a quick reference for pilots and maintenance personnel in determining when inspections are due and that they are performed within prescribed flight time intervals.
  - (b) Use the Progressive Care Program Component Overhaul and Replacement Log, provided herein, for each airplane. This log is to be kept with the airplane maintenance records and serves as a periodic reminder to maintenance personnel when various components are due for overhaul or replacement.
  - (c) To start the Progressive Care Program, begin conducting the inspections defined herein and refer to Federal Aviation Regulations Part 91.409(d) for procedures to notify the Federal Aviation Administration of the intent to begin a progressive inspection program.
  - (d) Accomplish each inspection and maintenance item per the checklists on the operation sheets of the Progressive Care and Maintenance Schedule. Spaces have been provided for the mechanic's and inspector's signatures as required, as well as any remarks. These are to become part of the maintenance records for each airplane. Each inspection is to be logged in the airplane and/or engine log books. Refer to Federal Aviation Regulation Part 43 for the recommended entry statement.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## PROGRESSIVE CARE PROGRAM (MODEL R182 & TR 182 AIRPLANES) COMPONENT OVERHAUL AND REPLACEMENT RECORD

COMPONENT	DATE	REASON FOR REPLACEMENT	REPLACEMENT PART NUMBER SERIAL NUMBER	NEXT OVERHAUL AIRPLANE HOURS DATE
	X			
	X			
	X			
	X			
	X			
	X			
	X			
	X			
	X			
	X			

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## PROGRESSIVE CARE PROGRAM INSPECTION CHART

AIRPLANE MODEL: R182/TR182

REGISTRATION NUMBER:

INSPECTION POINTS	TIME		TIME	
	INSPECTION DUE	INSPECTION ACCOMPLISHED	INSPECTION DUE	INSPECTION ACCOMPLISHED
OPERATION 1				
OPERATION 2				
OPERATION 3				
OPERATION 4				

### EXAMPLE:

The airplane in this example was placed on the Progressive Care Program after flying a total of 110 hours. At that point, a complete initial inspection of the airplane was performed. The following steps indicate what will have taken place up through an hourmeter reading of 261 hours.

1. After the initial inspection at 110 hours, the first Inspection Due Column was filled out to show the total flying time at which each of the four (4) operation inspections would be due.
2. As each inspection was performed, the total flying time was recorded in the Inspection Accomplished column. The next Inspection Due space for that particular operation is also filled in at this time. These times will always be 200 hours from the last due point providing the operation was actually accomplished within the ten (10) hours limit.
3. The sample airplane now has a total flying time of 261 hours and the inspection chart shows that a Phase 4 will be due at 310 hours.

INSPECTION POINTS	TIME		TIME	
	INSPECTION DUE	INSPECTION ACCOMPLISHED	INSPECTION DUE	INSPECTION ACCOMPLISHED
OPERATION 1	160	162	360	
OPERATION 2	210	209	409	
OPERATION 3	260	261	460	
OPERATION 4	310			

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 1

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- B 15 Seat Tracks and Stops - Inspect seat tracks for condition and security of installation. Check seat track stops for damage and correct location. Ensure inspection of seat rails for cracks EACH 50 HOURS. Refer to Section 3.
- 
- C 1 Wing Surfaces and Tips - Inspect for skin damage, loose rivets and condition of paint.
- 
- C 2 Wing Struts and Strut Fairings - Check for dents, cracks, loose screws and rivets and condition of paint.
- 
- C 7 Vertical and Horizontal Stabilizers, Tips and Tailcone - Inspect externally for skin damage and condition of paint.
- 
- C 8 Vertical and Horizontal Stabilizers and Tailcone structure - Inspect bulkheads, spars, ribs and skins for cracks, wrinkles, loose rivets, corrosion or other damage. Inspect vertical and horizontal stabilizer attach bolts for looseness. Retorque as necessary. Check security of inspection covers, fairings and tips.
- 
- E 1 Ailerons and Hinges - Check condition, security and operation.
- 
- E 2 Aileron Structure, Control Rods, Hinges, Balance Weights, Bellcranks, Linkage, Bolts, Pulleys and Pulley Brackets - Check condition, operation and security of attachment.
- 
- E 5 Aileron Controls - Check freedom of movement and proper operation through full travel with and without flaps extended
- 
- F 1 Flaps - Check tracks, rollers and control rods for security of attachment. Check operation.
- 
- F 2 Flap Actuator Threads - Clean and lubricate. Refer to paragraph 2-52 for detailed instructions.
- 
- G 1 Elevator Control - Check freedom of movement and proper operation through full travel with and without flaps extended.
- 
- G 2 Elevator, Hinges and Cable Attachment - Check condition, security and operation.
- 
- G 4 Elevator/Rudder Downspring - Check structure, bolts, linkage, bellcrank and push-pull tube for condition, operation and security. Check cables for tension, routing, fraying, corrosion and turnbuckle safety. Check travels if cables require tension adjustment or if stops are damaged.
- 
- H 1 Elevator Trim Tab and Hinges - Check condition, security and operation.
- 
- H 2 Elevator Trim System - Check cables, push-pull rods, bellcranks, pulleys, turnbuckles, fairleads, rub strips, etc. for proper routing, condition and security.
- 
- I 1 Rudder - Inspect the rudder skins for cracks and loose rivets, rudder hinges for condition, cracks and security; hinge bolts, hinge bearings, hinge attach fittings and bonding jumper for evidence of damage and wear, failed fasteners and security. Inspect the rudder hinge bolts for proper safetying of nuts with cotter pins. Inspect balance weight for looseness and the supporting structure for damage.
- 
- I 3 Rudder, Tips, Hinges and Cable Attachment - Check condition, security and operation.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 1

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- |   |    |  |
|---|----|--|
| I | 4  | Rudder - Check internal surfaces for corrosion, condition of fasteners and balance weight attachment.  |
| J | 1  | Cowling and Cowl Flaps - Inspect for cracks, dents and other damage, security of cowl fasteners and cowl mounted landing lights for attachment. Check cowl flaps for condition, security and operation.                                    |
| J | 2  | Engine - Inspect for evidence of oil and fuel leaks. Wash engine and check for security of accessories.  |
| J | 3  | Cowl Flap Controls - Check freedom of movement through full travel.  |
| J | 4  | Engine, Propeller Controls and Linkage - Check general condition, freedom of movement through full range. Check for proper travel, security of attachment and for evidence of wear. Check friction locks for proper operation.             |
| J | 5  | Ignition Switch and Electrical Harness - Inspect for damage, condition and security.   |
| J | 6  | Firewall Structure - Inspect for wrinkles, damage, cracks, sheared rivets, etc. Check cowl shock mounts for condition and security.  |
| J | 7  | Engine Shock Mounts, Engine Mount Structure and Ground Straps - Check condition, security and alignment.   |
| J | 8  | Induction System - Check security of clamps, tubes and ducting. Inspect for evidence of leakage.   |
| J | 9  | Induction Airbox, Valves, Doors and Controls - Remove air filter and inspect hinges, doors, seals and attaching parts for wear and security. Check operation.  |
| J | 10 | Induction Air Filter - Remove and clean. Inspect for damage and service per paragraph 2-25.  |
| J | 11 | Alternate Induction Air System - Check for obstructions, operation and security.   |
| J | 12 | Alternator and Electrical Connections - Check condition and security. Check alternator belts for condition and proper adjustment.  |
| J | 14 | Starter, Starter Solenoid and Electrical Connections - Check for condition of starter brushes, brush leads and commutator.   |
| J | 15 | Oil Cooler - Check for obstructions, leaks and security of attachment.   |
| J | 16 | Exhaust System - Inspect for cracks and security. Air leak check exhaust system. Refer to Sections 11 and 11A, Paragraphs 11-98 and 11-75A, for inspection procedures.   |
| J | 17 | Exhaust System (turbocharged engine) - Inspect couplings, seals, clamps and expansion joints for cracks and security. Air leak check exhaust system. Refer to Sections 11 and 11A, Paragraphs 11-98 and 11-75A, for inspection procedures. |
| J | 18 | Auxiliary (Electric) Fuel Pump - Check pump and fittings for condition, operation, security. Remove and clean filter (as applicable).  |
| J | 19 | Engine-Driven Fuel Pump - Check for evidence of leakage, security of attachment and general condition.   |



# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 1

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- J 20 Magnetos - Check external condition, security and electrical leads for condition. Check timing to engine and internal timing if engine timing requires adjustment. Compliance with Bendix Service Bulletin 599D is required.
- 
- J 22 Ignition Harness and Insulators - Check for proper routing, deterioration and condition of terminals.
- 
- J 23 Spark Plugs - Remove, clean analyze, test, gap and rotate top plugs-to-bottom and bottom plugs-to-top.
- 
- J 24 Cylinder Compression - Perform differential compression test.
- 
- J 25 Carburetor - Drain and flush carburetor bowl, clean inlet strainer and drain plug. Check general condition and security.
- 
- J 26 Engine Primer - Check for leakage, operation and security.
- 
- J 27 Hoses, Metal Lines and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.
- 
- J 28 Cold and Hot Air Hoses - Check condition, routing and security.
- 
- J 29 Engine Cylinders, Rocker Box Covers and Pushrod Housings - Check for fin damage, cracks, oil leakage, security of attachment and general condition.
- 
- J 30 Engine Baffles and Seals - Check condition and security of attachment.
- 
- J 31 Crankcase, Oil Sump and Accessory Section - Inspect for cracks and evidence of oil leakage. Check bolts and nuts for looseness and retorquing as necessary. Check crankcase breather lines for obstructions, security and general condition.
- 
- J 32 Turbocharger (if applicable) -  
a. Inspect turbocharger mounting brackets, ducting, linkage and attaching parts for general condition, leakage or damage and security of attachment.  
b. Check waste gate, actuator, controller, oil and vent lines, overboost relief valve and compressor housing for leakage, apparent damage, security of attachment and evidence of wear. Check waste gate return spring for condition and security.
- 
- J 33 Turbocharger (if applicable) -  
a. Remove heat shields and inspect for burned areas, bulges or cracks. Remove tailpipe and ducting - inspect turbine for coking, carbonization, oil deposits and turbine impellers for damage.
- 
- J 34 Engine Oil With Oil Filter - Replace filter. Add recommended grade aviation oil to replace oil lost in existing filter.
- 
- J 35 Engine Oil Without Oil Filter - Drain oil sump and oil cooler, clean and inspect screens and refill with recommended grade aviation oil.
- 
- K 1 Integral Fuel Tanks - Check for evidence of leakage and condition of fuel caps, adapters and placards.
- 
- K 3 Fuel Bladders - Check for leaks and security, condition of fuel caps, adapters and placards.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 1

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- K 5 Fuel System - Inspect plumbing and components for mounting and security.
- 
- K 6 Fuel Tank or Bladder Drains - Drain water and sediment.
- 
- K 7 Fuel Tank Vent Lines and Vent Valves - Check vents for obstruction and proper positioning. Check valves for operation.
- 
- K 9 Fuel Strainer, Drain Valve and Controls - Check freedom of movement, security and proper operation. Disassemble, flush and clean screen and bowl.
- 
- L 1 Propeller Governor and Control - Inspect for oil and grease leaks. If leakage is evident, refer to McCauley Service Manual.
- 
- L 2 Propeller Mounting - Check for security of installation.
- 
- L 3 Propeller Blades - Inspect for cracks, dents, nicks, scratches, erosion, corrosion or other damage.
- 
- L 4 Spinner - Check general condition and attachment.
- 
- L 5 Spinner and Spinner Bulkhead - Remove spinner, wash and inspect for cracks and fractures.
- 
- L 6 Propeller Mounting Bolts - Inspect mounting bolts and safety-wire for signs of looseness. Retorque mounting bolts as required.
- 
- L 7 Propeller Hub - Check general condition.
- 
- L 8 Propeller Governor and Control - Check for security and operation of controls.
- 
- M 2 Heater Components, Inlets and Outlets - Inspect all lines, connections, ducts, clamps, seals and gaskets for condition, restriction and security.
- 
- M 4 Pitot Tube and Stall Warning Vane - Check for condition and obstructions.
- 
- M 5 Pitot Tube Heater Element - Perform operational check.
- 
- M 6 Propeller Anti-ice Slip Rings, Brushes and Boots - Inspect for condition and security. Perform operational check.
- 
- N 3 Vacuum Pump - Check for condition and security. Check vacuum system breather line for obstructions, condition and security.
- 
- O 4 Battery - Check general condition and security. Check level of electrolyte.
- 
- O 5 Battery Box and Cables - Clean and remove any corrosion. Check cables for routing, support and security of connections.
- 
- O 7 Alternator Control Unit - Inspect wiring, mounting, condition and wire routing.
- 
- O 10 External Power Receptacle and Power Cables - Inspect for condition and security.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 1

#### SPECIAL INSPECTION AND YEARLY ITEMS

HOURS YEARS

INSPECTION  
COMPLETED BY

Please review each of these items for required compliance

		HOURS	YEARS	INSPECTION COMPLETED BY
B	11 Upholstery, Headliner, Trim and Carpeting - Check condition and clean as required.	EACH 400	EACH 1	
D	3 Brake Lines, Wheel Cylinders, Hoses, Clamps and Fittings - Check for leaks, condition and security of hoses for bulges and deterioration. Check brake lines and hoses for proper routing and support.	EACH 400	EACH 1	
D	10 Wheel Bearings - Clean, inspect and lube.	A		
D	20 Powerpack - Hydraulic fluid contamination check.	B		
D	21 Powerpack - Check condition and wear of brushes in servo motor.	C		
D	23 Landing Gear System - Overhaul main gear downlock actuators, main and nose gear actuators, landing gear selector valve, emergency hand pump and pressure switch. Replace all rubber goods.		D	
D	24 Brake System - Overhaul brake discs, parking brake system, wheel cylinders and master cylinders. Replace brake pads and all rubber goods.		D	
E	4 Autopilot Rigging - Check per Avionics Installation Manual.	E	EACH 1	
H	5 Elevator Trim Tab Actuator - Clean, lubricate and check free-play.	F		
J	4 Engine, Propeller Controls and Linkage - Check general condition, freedom of movement through full range. Check for proper travel, security of attachment and for evidence of wear. Check friction locks for proper operation.		G	
J	10 Induction Air Filter - Remove and clean. Inspect for damage and service per paragraph 2-25.	H		
J	13 Alternator - Check brushes, leads, commutator or slip ring for wear.		I	
J	14 Starter, Starter Solenoid and Electrical Connections - Check for condition of starter brushes, brush leads and commutator.		J	
J	21 Magnetos - Timing Procedures and intervals, lubrication and overhaul procedures.	K		
J	27 Hoses, Metal Lines and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.		L	
J	34 Engine Oil With Oil Filter - Replace filter. Add recommended grade aviation oil to replace oil lost in existing filter.	M		
J	35 Engine Oil Without Oil Filter - Drain oil sump and oil cooler, clean and inspect screens and refill with recommended grade aviation oil.	M		
J	36 Engine Oil With Oil Filter - Drain oil sump and refill with recommended grade aviation oil.	M		
K	2 Integral Fuel Tanks - Drain fuel and check tank interior and outlet screens.	N		
K	4 Fuel Bladders - Drain fuel and check for wrinkles that would retain contaminants or liquid, security of attachment and condition of outlet screens.	N		
K	10 Fuel Quantity Indicators - Check for damage, security of installation and perform accuracy test.		EACH 1	
L	9 Propeller Assembly - Overhaul (See McCauley Service Manual; refer to list of publication).	O		

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 1

SPECIAL INSPECTION AND YEARLY ITEMS INSPECTION  
COMPLETED BY  
 HOURS YEARS  
 Please review each of these items for required compliance

M	1	Ventilation System - Inspect clamps, hoses and valves for condition and security.	400	EACH 1	
M	9	Oxygen Cylinder - Inspect for condition, check hydrostatic test date and perform hydrostatic test, if due.		EACH 5	
N	4	Vacuum System Air Filter - Inspect for damage, deterioration and contamination. Clean or replace, if required. NOTE: Smoking will cause premature filter clogging.	P		
N	5	Vacuum System relief Valve - Inspect for condition and security.	Q		
N	10	Airspeed Indicator, Vertical Speed Indicator and Magnetic Compass - Calibrate.		EACH 2	
N	11	Altimeter and Static System - Inspect in accordance with FAR Part 91.411.		EACH 2	
O	4	Battery - Check general condition and security. Check level of electrolyte.	R		

#### Special Inspections Legends:

- A. First 100 hours and each 500 hours thereafter. More often if operated under prevailing wet or dusty conditions.
- B. At first 50 hours, first 100 hours, and each 500 hours thereafter, or one year, whichever comes first.
- C. Each 500 hours, and whenever improper operation is suspected. Replace brushes when worn down to 0.25 inch or less.
- D. Serial R18200001 thru R18200583 and FR18200001 thru FR18200025: Each 5 years. Serial R18200584 and On and FR18200026 thru FR18200070: Overhaul components and replace rubber goods On-Condition basis.
- E. Each 600 hours or 1 year, whichever comes first.
- F. Lubrication of the actuator is required each 1000 hours or 3 years, whichever comes first. See figure 2-5 for grease specification.
- G. Lubricate each 100 hours (except in extreme dusty conditions). These controls are not repairable and should be replaced every 1500 hours or sooner if required.
- H. Clean filter per paragraph 2-25. Replace paper filters at least each 500 hours.
- I. Inspect each 500 hours.
- J. For Prestolite starters only, inspect the commutator and brushes every 1500 hours.
- K. At the first 25 hours, first 50 hours, first 100 hours and thereafter at each 100 hours, the contact breaker point compartment and magneto-to-engine timing is correct within plus zero degrees to minus two degrees, internal timing need not be checked. If timing is out of tolerance, remove magneto and set internal timing, then install and time to the engine. Refer to Section 11 or 11A and the magneto manufacturers service instructions for magneto timing procedures.
- L. Replace engine compartment rubber hoses (Cessna installed only) every five years or at engine overhaul, whichever occurs first. This does not include drain hoses. Hoses which are beyond these limits and are in a serviceable condition, must be placed on order immediately and then be replaced within 120 days after receiving the new hose(s) from Cessna. Replace drain hoses on condition. Engine flexible hoses (Lycoming installed) (Refer to Lycoming Maintenance Manual and Lycoming Engine Service Bulletins).
- M. First 25 hours: Refill with straight grade mineral oil and use until a total of 50 hours have accumulated, or oil consumption has stabilized. Change oil, replace filter, and refill sump with recommended grade of ashless dispersant oil. Change oil and replace filter at least every six months, regardless of accumulated hours.
- N. Each 1000 hours.
- O. See McCauley Service Manual; refer to list of publication.
- P. Replace every 500 hours.
- Q. Replace filter each 100 hours.
- R. Check electrolyte level and clean battery box each 100 hours or 90 days.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 2

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- B 1 Fuselage Surface - Inspect for skin damage, loose rivets, condition of paint and check pitot-static ports and drain holes for obstruction. Inspect covers and fairings for security.
- 
- B 6 Emergency Locator Transmitter - Inspect for security of attachment and check operation by verifying transmitter output. Check cumulative time and useful life of batteries in accordance with FAR Part 91.207. Refer to Section 16 Emergency Locator Transmitter - Checkout Interval.
- 
- B 8 Pilot's and Copilot's Inertia Reels - Inspect for security of installation, proper operation and evidence of damage.
- 
- B 9 Seats, Seat Belts, and Shoulder Harnesses - Check general condition and security. Check operation of seat stops and adjustment mechanism. Inspect belts for condition and security of fasteners.
- 
- B 10 Windows, Windshield, Doors and Seals - Inspect general condition. Check latches, hinges and seals for condition, operation and security of attachment.
- 
- B 12 Flight Controls - Check freedom of movement and proper operation through full travel with and without flaps extended. Check electric trim controls for operation (as applicable.)
- 
- B 13 Aileron, Elevator and Rudder Stops - Check for damage and security. Compliance with Cessna Service Letter SE80-65 is required.
- 
- B 14 Portable Hand Fire Extinguisher - Inspect for proper operating pressure, condition, security of installation and servicing date.
- 
- B 15 Seat Tracks and Stops - Inspect seat tracks for condition and security of installation. Check seat track stops for damage and correct location. Ensure inspection of seat rails for cracks EACH 50 HOURS. Refer to Section 3.
- 
- B 17 Fuel Line and Selector Valve Drain(s) - Remove plug and drain.
- 
- D 1 Brakes, Master Cylinders and Parking Brake - Check master cylinders and parking brake mechanism for condition and security. Check fluid level and test operation of toe and parking brake.
- 
- D 2 Main Gear Tubular Struts - Inspect for cracks, dents, corrosion, condition of paint or other damage. Check axles for condition and security.
- 
- D 4 Wheels, Brake Discs and Linings - Inspect for wear, cracks, warps, dents or other damage. Check wheel through-bolts and nuts for looseness.
- 
- D 5 Tires - Check tread wear and general condition. Check for proper inflation.
- 
- D 6 Main Landing Gear Strut-to-Pivot Attachment - Check for damage, cracks, loose rivets, bolts and nuts and security of attachment.
- 
- D 7 Nose Gear Steering Mechanism - Check for wear, security and proper rigging.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 2

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- D 8 Nose Gear - Inspect torque links, steering rods and boots for condition and security of attachment. Check strut for evidence of leakage and proper extension. Check strut barrel for corrosion, pitting, and cleanliness. Check shimmy damper and/or bungees for operation, leakage and attach points for wear and security.
- 
- D 9 Nose Gear Fork - Inspect for cracks, general condition and security of attachment.
- 
- D 11 Nose Gear Attachment Structure - Inspect for cracks, corrosion or other damage and security of attachment.
- 
- D 12 Landing Gear - Perform five fault-free cycles.
- 
- D 13 Main Landing Gear - Check downlock engagement.
- 
- D 14 Landing Gear System - Check adjustment of main and nose gear up and down switches and operation of gear position indicator.
- 
- D 15 Throttle-Operated Gear Warning System - Check condition of wiring and security of components. Perform rigging check (refer to Section 5).
- 
- D 16 Nose Gear Doors and Linkage - Check for .25 inch minimum clearance throughout up and down cycles, and proper fit when closed. Check linkage for wear, damaged bearings, distortion and superficial damage.
- 
- D 17 Hydraulic System - Check all components for leaks and external damage to components or mounting structure.
- 
- D 19 Powerpack - Clean self-relieving check valve filter.
- 
- D 22 Powerpack - Perform hydraulic pressure checks of primary relief valve, thermal relief valve and pressure switch.
- 
- J 1 Cowling and Cowl Flaps - Inspect for cracks, dents and other damage, security of cowl fasteners and cowl mounted landing lights for attachment. Check cowl flaps for condition, security and operation.
- 
- J 2 Engine - Inspect for evidence of oil and fuel leaks. Wash engine and check for security of accessories.
- 
- J 3 Cowl Flap Controls - Check freedom of movement through full travel.
- 
- J 4 Engine, Propeller Controls and Linkage - Check general condition, freedom of movement through full range. Check for proper travel, security of attachment and for evidence of wear. Check friction locks for proper operation.
- 
- J 8 Induction System - Check security of clamps, tubes and ducting. Inspect for evidence of leakage.
- 
- J 11 Alternate Induction Air System - Check for obstructions, operation and security.
- 
- J 12 Alternator and Electrical Connections - Check condition and security. Check alternator belts for condition and proper adjustment.
- 
- J 15 Oil Cooler - Check for obstructions, leaks and security of attachment.
- 
- J 16 Exhaust System - Inspect for cracks and security. Air leak check exhaust system. Refer to Sections 11 and 11A, Paragraphs 11-98 and 11-75A, for inspection procedures.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 2

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- J 17 Exhaust System (turbocharged engine) - Inspect couplings, seals, clamps and expansion joints for cracks and security. Air leak check exhaust system. Refer to Sections 11 and 11A, Paragraphs 11-98 and 11-75A, for inspection procedures.
- 
- J 27 Hoses, Metal Lines and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.
- 
- J 30 Engine Baffles and Seals - Check condition and security of attachment.
- 
- J 32 Turbocharger (if applicable) -  
a. Inspect turbocharger mounting brackets, ducting, linkage and attaching parts for general condition, leakage or damage and security of attachment.  
b. Check waste gate, actuator, controller, oil and vent lines, overboost relief valve and compressor housing for leakage, apparent damage, security of attachment and evidence of wear. Check waste gate return spring for condition and security.
- 
- J 34 Engine Oil With Oil Filter - Replace filter. Add recommended grade aviation oil to replace oil lost in existing filter.
- 
- J 35 Engine Oil Without Oil Filter - Drain oil sump and oil cooler, clean and inspect screens and refill with recommended grade aviation oil.
- 
- J 36 Engine Oil With Oil Filter - Drain oil sump and refill with recommended grade aviation oil.
- 
- K 6 Fuel Tank or Bladder Drains - Drain water and sediment.
- 
- K 8 Fuel Selector Valve - Check controls for detent in each position, security of attachment and for proper placarding.
- 
- L 1 Propeller Governor and Control - Inspect for oil and grease leaks. If leakage is evident, refer to McCauley Service Manual.
- 
- L 2 Propeller Mounting - Check for security of installation.
- 
- L 3 Propeller Blades - Inspect for cracks, dents, nicks, scratches, erosion, corrosion or other damage.
- 
- L 4 Spinner - Check general condition and attachment.
- 
- M 4 Pitot Tube and Stall Warning Vane - Check for condition and obstructions.
- 
- M 5 Pitot Tube Heater Element - Perform operational check.
- 
- M 6 Propeller Anti-ice Slip Rings, Brushes and Boots - Inspect for condition and security. Perform operational check.
- 
- N 1 Vacuum System - Inspect for condition and security.
- 
- N 2 Vacuum System Hoses - Inspect for hardness, deterioration, looseness or collapsed hoses.
- 
- N 4 Vacuum System Air Filter - Inspect for damage, deterioration and contamination. Clean or replace, if required.  
NOTE: Smoking will cause premature filter clogging.
- 
- N 5 Vacuum System relief Valve - Inspect for condition and security.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 2

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- N 6 Instruments - Check general condition and markings for legibility.
- 
- O 2 Instrument, Cabin, Navigation, Beacon, Strobe, and Landing Lights - Check operation, condition of lens and security of attachment.
- 
- O 3 Circuit Breakers and Fuses - Check operation and condition. Check for required number of spare fuses.
- 
- Q Perform the Following Operational Check:
- 
- Q 1 Brakes - Test toe brakes and parking brake for proper operation.



# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 2

#### SPECIAL INSPECTION AND YEARLY ITEMS

HOURS YEARS

INSPECTION  
COMPLETED BY

Please review each of these items for required compliance

		HOURS	YEARS	INSPECTION COMPLETED BY
B	11 Upholstery, Headliner, Trim and Carpeting - Check condition and clean as required.	EACH 400	EACH 1	
D	3 Brake Lines, Wheel Cylinders, Hoses, Clamps and Fittings - Check for leaks, condition and security of hoses for bulges and deterioration. Check brake lines and hoses for proper routing and support.	EACH 400	EACH 1	
D	10 Wheel Bearings - Clean, inspect and lube.	A		
D	20 Powerpack - Hydraulic fluid contamination check.	B		
D	21 Powerpack - Check condition and wear of brushes in servo motor.	C		
D	23 Landing Gear System - Overhaul main gear downlock actuators, main and nose gear actuators, landing gear selector valve, emergency hand pump and pressure switch. Replace all rubber goods.		D	
D	24 Brake System - Overhaul brake discs, parking brake system, wheel cylinders and master cylinders. Replace brake pads and all rubber goods.		D	
E	4 Autopilot Rigging - Check per Avionics Installation Manual.	E	EACH 1	
H	5 Elevator Trim Tab Actuator - Clean, lubricate and check free-play.	F		
J	4 Engine, Propeller Controls and Linkage - Check general condition, freedom of movement through full range. Check for proper travel, security of attachment and for evidence of wear. Check friction locks for proper operation.		G	
J	10 Induction Air Filter - Remove and clean. Inspect for damage and service per paragraph 2-25.	H		
J	13 Alternator - Check brushes, leads, commutator or slip ring for wear.		I	
J	14 Starter, Starter Solenoid and Electrical Connections - Check for condition of starter brushes, brush leads and commutator.		J	
J	21 Magnetos - Timing Procedures and intervals, lubrication and overhaul procedures.	K		
J	27 Hoses, Metal Lines and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.		L	
J	34 Engine Oil With Oil Filter - Replace filter. Add recommended grade aviation oil to replace oil lost in existing filter.	M		
J	35 Engine Oil Without Oil Filter - Drain oil sump and oil cooler, clean and inspect screens and refill with recommended grade aviation oil.	M		
J	36 Engine Oil With Oil Filter - Drain oil sump and refill with recommended grade aviation oil.	M		
K	2 Integral Fuel Tanks - Drain fuel and check tank interior and outlet screens.	N		
K	4 Fuel Bladders - Drain fuel and check for wrinkles that would retain contaminants or liquid, security of attachment and condition of outlet screens.	N		
K	10 Fuel Quantity Indicators - Check for damage, security of installation and perform accuracy test.		EACH 1	
L	9 Propeller Assembly - Overhaul (See McCauley Service Manual; refer to list of publication).	O		

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 2

SPECIAL INSPECTION AND YEARLY ITEMS INSPECTION  
COMPLETED BY  
 HOURS YEARS

Please review each of these items for required compliance

		HOURS	YEARS	INSPECTION COMPLETED BY
M	1 Ventilation System - Inspect clamps, hoses and valves for condition and security.	400	EACH 1	
M	9 Oxygen Cylinder - Inspect for condition, check hydrostatic test date and perform hydrostatic test, if due.		EACH 5	
N	4 Vacuum System Air Filter - Inspect for damage, deterioration and contamination. Clean or replace, if required. NOTE: Smoking will cause premature filter clogging.	P		
N	5 Vacuum System relief Valve - Inspect for condition and security.	Q		
N	10 Airspeed Indicator, Vertical Speed Indicator and Magnetic Compass - Calibrate.		EACH 2	
N	11 Altimeter and Static System - Inspect in accordance with FAR Part 91.411.		EACH 2	
O	4 Battery - Check general condition and security. Check level of electrolyte.	R		

#### Special Inspections Legends:

- A. First 100 hours and each 500 hours thereafter. More often if operated under prevailing wet or dusty conditions.
- B. At first 50 hours, first 100 hours, and each 500 hours thereafter, or one year, whichever comes first.
- C. Each 500 hours, and whenever improper operation is suspected. Replace brushes when worn down to 0.25 inch or less.
- D. Serial R18200001 thru R18200583 and FR18200001 thru FR18200025: Each 5 years. Serial R18200584 and On and FR18200026 thru FR18200070: Overhaul components and replace rubber goods On-Condition basis.
- E. Each 600 hours or 1 year, whichever comes first.
- F. Lubrication of the actuator is required each 1000 hours or 3 years, whichever comes first. See figure 2-5 for grease specification.
- G. Lubricate each 100 hours (except in extreme dusty conditions). These controls are not repairable and should be replaced every 1500 hours or sooner if required.
- H. Clean filter per paragraph 2-25. Replace paper filters at least each 500 hours.
- I. Inspect each 500 hours.
- J. For Prestolite starters only, inspect the commutator and brushes every 1500 hours.
- K. At the first 25 hours, first 50 hours, first 100 hours and thereafter at each 100 hours, the contact breaker point compartment and magneto-to-engine timing is correct within plus zero degrees to minus two degrees, internal timing need not be checked. If timing is out of tolerance, remove magneto and set internal timing, then install and time to the engine. Refer to Section 11 or 11A and the magneto manufacturers service instructions for magneto timing procedures.
- L. Replace engine compartment rubber hoses (Cessna installed only) every five years or at engine overhaul, whichever occurs first. This does not include drain hoses. Hoses which are beyond these limits and are in a serviceable condition, must be placed on order immediately and then be replaced within 120 days after receiving the new hose(s) from Cessna. Replace drain hoses on condition. Engine flexible hoses (Lycoming installed) (Refer to Lycoming Maintenance Manual and Lycoming Engine Service Bulletins).
- M. First 25 hours: Refill with straight grade mineral oil and use until a total of 50 hours have accumulated, or oil consumption has stabilized. Change oil, replace filter, and refill sump with recommended grade of ashless dispersant oil. Change oil and replace filter at least every six months, regardless of accumulated hours.
- N. Each 1000 hours.
- O. See McCauley Service Manual; refer to list of publication.
- P. Replace every 500 hours.
- Q. Replace filter each 100 hours.
- R. Check electrolyte level and clean battery box each 100 hours or 90 days.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 3

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- B 15 Seat Tracks and Stops - Inspect seat tracks for condition and security of installation. Check seat track stops for damage and correct location. Ensure inspection of seat rails for cracks EACH 50 HOURS. Refer to Section 3.
- 
- C 1 Wing Surfaces and Tips - Inspect for skin damage, loose rivets and condition of paint.
- 
- C 2 Wing Struts and Strut Fairings - Check for dents, cracks, loose screws and rivets and condition of paint.
- 
- C 3 Wing Spar and Wing Strut Fittings - Check for evidence of wear. Check attach bolts for indications of looseness and retorque as required.
- 
- C 4 Wing Structure - Inspect spars, ribs, skins and stringers for cracks, wrinkles, loose rivets, corrosion or other damage.
- 
- C 5 Metal Lines, Hoses, Clamps and Fittings - Check for leaks, condition and security. Check for proper routing and support.
- 
- C 6 Wing Access Plates - Check for damage and security of installation.
- 
- C 7 Vertical and Horizontal Stabilizers, Tips and Tailcone - Inspect externally for skin damage and condition of paint.
- 
- C 8 Vertical and Horizontal Stabilizers and Tailcone structure - Inspect bulkheads, spars, ribs and skins for cracks, wrinkles, loose rivets, corrosion or other damage. Inspect vertical and horizontal stabilizer attach bolts for looseness. Retorque as necessary. Check security of inspection covers, fairings and tips.
- 
- E 1 Ailerons and Hinges - Check condition, security and operation.
- 
- E 2 Aileron Structure, Control Rods, Hinges, Balance Weights, Bellcranks, Linkage, Bolts, Pulleys and Pulley Brackets - Check condition, operation and security of attachment.
- 
- E 3 Ailerons and Cables - Check operation and security of stops. Check cables for tension, routing, fraying, corrosion and turnbuckle safety. Check travel if cable tension requires adjustment or if stops are damaged. Check fairleads and rub strips for condition.
- 
- E 5 Aileron Controls - Check freedom of movement and proper operation through full travel with and without flaps extended.
- 
- F 1 Flaps - Check tracks, rollers and control rods for security of attachment. Check operation.
- 
- F 2 Flap Actuator Threads - Clean and lubricate. Refer to paragraph 2-52 for detailed instructions.
- 
- F 3 Flap Structure, Linkage, Bellcranks, Pulleys and Pulley Brackets - Check for condition, operation and security.
- 
- F 4 Wing Flap Control - Check operation through full travel and observe Flap Position indicator for proper indication.
- 
- F 5 Throttle-Operated Flap Warning System - Check condition of wiring and security of components. Perform rigging check (refer to Section 5).
- 
- F 6 Flaps and Cables - Check cables for proper tension, routing, fraying, corrosion and turnbuckle safety. Check travel if cable tension requires adjustment.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 3

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- F 7 Flap Motor, Actuator and Limit Switches (electric flaps) -  
Check wiring and terminals for condition and security.  
Check actuator for condition and security.
- 
- G 1 Elevator Control - Check freedom of movement and proper  
operation through full travel with and without flaps  
extended.
- 
- G 2 Elevator, Hinges and Cable Attachment - Check condition,  
security and operation.
- 
- G 4 Elevator/Rudder Downspring - Check structure, bolts,  
linkage, bellcrank and push-pull tube for condition,  
operation and security. Check cables for tension, routing,  
fraying, corrosion and turnbuckle safety. Check travels if  
cables require tension adjustment or if stops are damaged.
- 
- H 1 Elevator Trim Tab and Hinges - Check condition, security  
and operation.
- 
- H 2 Elevator Trim System - Check cables, push-pull rods,  
bellcranks, pulleys, turnbuckles, fairleads, rub strips, etc.  
for proper routing, condition and security.
- 
- H 4 Elevator Trim Tab Stop Blocks - Inspect for damage and  
security.
- 
- H 6 Elevator Trim Tab Actuator - Free-Play limits inspection.  
Refer to Section 9 for cleaning, inspection and repair  
procedures.
- 
- I 1 Rudder - Inspect the rudder skins for cracks and loose  
rivets, rudder hinges for condition, cracks and security;  
hinge bolts, hinge bearings, hinge attach fittings and  
bonding jumper for evidence of damage and wear, failed  
fasteners and security. Inspect the rudder hinge bolts for  
proper safetying of nuts with cotter pins. Inspect balance  
weight for looseness and the supporting structure for  
damage.
- 
- I 3 Rudder, Tips, Hinges and Cable Attachment - Check  
condition, security and operation.
- 
- I 4 Rudder - Check internal surfaces for corrosion, condition of  
fasteners and balance weight attachment.
- 
- J 1 Cowling and Cowl Flaps - Inspect for cracks, dents and  
other damage, security of cowl fasteners and cowl mounted  
landing lights for attachment. Check cowl flaps for  
condition, security and operation.
- 
- J 2 Engine - Inspect for evidence of oil and fuel leaks. Wash  
engine and check for security of accessories.
- 
- J 3 Cowl Flap Controls - Check freedom of movement through  
full travel.
- 
- J 4 Engine, Propeller Controls and Linkage - Check general  
condition, freedom of movement through full range. Check  
for proper travel, security of attachment and for evidence of  
wear. Check friction locks for proper operation.
- 
- J 5 Ignition Switch and Electrical Harness - Inspect for damage,  
condition and security.
- 
- J 8 Induction System - Check security of clamps, tubes and  
ducting. Inspect for evidence of leakage.
- 
- J 9 Induction Airbox, Valves, Doors and Controls - Remove air  
filter and inspect hinges, doors, seals and attaching parts  
for wear and security. Check operation.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 3

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- J 10 Induction Air Filter - Remove and clean. Inspect for damage and service per paragraph 2-25.
- J 11 Alternate Induction Air System - Check for obstructions, operation and security.
- J 12 Alternator and Electrical Connections - Check condition and security. Check alternator belts for condition and proper adjustment.
- J 14 Starter, Starter Solenoid and Electrical Connections - Check for condition of starter brushes, brush leads and commutator.
- J 15 Oil Cooler - Check for obstructions, leaks and security of attachment.
- J 16 Exhaust System - Inspect for cracks and security. Air leak check exhaust system. Refer to Sections 11 and 11A, Paragraphs 11-98 and 11-75A, for inspection procedures.
- J 17 Exhaust System (turbocharged engine) - Inspect couplings, seals, clamps and expansion joints for cracks and security. Air leak check exhaust system. Refer to Sections 11 and 11A, Paragraphs 11-98 and 11-75A, for inspection procedures.
- J 18 Auxiliary (Electric) Fuel Pump - Check pump and fittings for condition, operation, security. Remove and clean filter (as applicable).
- J 19 Engine-Driven Fuel Pump - Check for evidence of leakage, security of attachment and general condition.
- J 20 Magnetos - Check external condition, security and electrical leads for condition. Check timing to engine and internal timing if engine timing requires adjustment. Compliance with Bendix Service Bulletin 599D is required.
- J 22 Ignition Harness and Insulators - Check for proper routing, deterioration and condition of terminals.
- J 23 Spark Plugs - Remove, clean analyze, test, gap and rotate top plugs-to-bottom and bottom plugs-to-top.
- J 25 Carburetor - Drain and flush carburetor bowl, clean inlet strainer and drain plug. Check general condition and security.
- J 26 Engine Primer - Check for leakage, operation and security.
- J 27 Hoses, Metal Lines and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.
- J 28 Cold and Hot Air Hoses - Check condition, routing and security.
- J 29 Engine Cylinders, Rocker Box Covers and Pushrod Housings - Check for fin damage, cracks, oil leakage, security of attachment and general condition.
- J 30 Engine Baffles and Seals - Check condition and security of attachment.
- J 31 Crankcase, Oil Sump and Accessory Section - Inspect for cracks and evidence of oil leakage. Check bolts and nuts for looseness and retorque as necessary. Check crankcase breather lines for obstructions, security and general condition.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 3

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- J 32 Turbocharger (if applicable) -
- a. Inspect turbocharger mounting brackets, ducting, linkage and attaching parts for general condition, leakage or damage and security of attachment.
  - b. Check waste gate, actuator, controller, oil and vent lines, overboost relief valve and compressor housing for leakage, apparent damage, security of attachment and evidence of wear. Check waste gate return spring for condition and security.
- 
- J 34 Engine Oil With Oil Filter - Replace filter. Add recommended grade aviation oil to replace oil lost in existing filter.
- 
- J 35 Engine Oil Without Oil Filter - Drain oil sump and oil cooler, clean and inspect screens and refill with recommended grade aviation oil.
- 
- K 1 Integral Fuel Tanks - Check for evidence of leakage and condition of fuel caps, adapters and placards.
- 
- K 3 Fuel Bladders - Check for leaks and security, condition of fuel caps, adapters and placards.
- 
- K 5 Fuel System - Inspect plumbing and components for mounting and security.
- 
- K 6 Fuel Tank or Bladder Drains - Drain water and sediment.
- 
- K 7 Fuel Tank Vent Lines and Vent Valves - Check vents for obstruction and proper positioning. Check valves for operation.
- 
- K 9 Fuel Strainer, Drain Valve and Controls - Check freedom of movement, security and proper operation. Disassemble, flush and clean screen and bowl.
- 
- L 1 Propeller Governor and Control - Inspect for oil and grease leaks. If leakage is evident, refer to McCauley Service Manual.
- 
- L 2 Propeller Mounting - Check for security of installation.
- 
- L 3 Propeller Blades - Inspect for cracks, dents, nicks, scratches, erosion, corrosion or other damage.
- 
- L 4 Spinner - Check general condition and attachment.
- 
- L 5 Spinner and Spinner Bulkhead - Remove spinner, wash and inspect for cracks and fractures.
- 
- M 2 Heater Components, Inlets and Outlets - Inspect all lines, connections, ducts, clamps, seals and gaskets for condition, restriction and security.
- 
- M 4 Pitot Tube and Stall Warning Vane - Check for condition and obstructions.
- 
- M 5 Pitot Tube Heater Element - Perform operational check.
- 
- M 6 Propeller Anti-ice Slip Rings, Brushes and Boots - Inspect for condition and security. Perform operational check.
- 
- N 3 Vacuum Pump - Check for condition and security. Check vacuum system breather line for obstructions, condition and security.
- 
- O 4 Battery - Check general condition and security. Check level of electrolyte.
- 
- O 5 Battery Box and Cables - Clean and remove any corrosion. Check cables for routing, support and security of connections.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 3

#### SPECIAL INSPECTION AND YEARLY ITEMS

HOURS YEARS

INSPECTION  
COMPLETED BY

Please review each of these items for required compliance

		HOURS	YEARS	INSPECTION COMPLETED BY
B	11 Upholstery, Headliner, Trim and Carpeting - Check condition and clean as required.	EACH 400	EACH 1	
D	3 Brake Lines, Wheel Cylinders, Hoses, Clamps and Fittings - Check for leaks, condition and security of hoses for bulges and deterioration. Check brake lines and hoses for proper routing and support.	EACH 400	EACH 1	
D	10 Wheel Bearings - Clean, inspect and lube.	A		
D	20 Powerpack - Hydraulic fluid contamination check.	B		
D	21 Powerpack - Check condition and wear of brushes in servo motor.	C		
D	23 Landing Gear System - Overhaul main gear downlock actuators, main and nose gear actuators, landing gear selector valve, emergency hand pump and pressure switch. Replace all rubber goods.		D	
D	24 Brake System - Overhaul brake discs, parking brake system, wheel cylinders and master cylinders. Replace brake pads and all rubber goods.		D	
E	4 Autopilot Rigging - Check per Avionics Installation Manual.	E	EACH 1	
H	5 Elevator Trim Tab Actuator - Clean, lubricate and check free-play.	F		
J	4 Engine, Propeller Controls and Linkage - Check general condition, freedom of movement through full range. Check for proper travel, security of attachment and for evidence of wear. Check friction locks for proper operation.		G	
J	10 Induction Air Filter - Remove and clean. Inspect for damage and service per paragraph 2-25.	H		
J	13 Alternator - Check brushes, leads, commutator or slip ring for wear.		I	
J	14 Starter, Starter Solenoid and Electrical Connections - Check for condition of starter brushes, brush leads and commutator.		J	
J	21 Magnetos - Timing Procedures and intervals, lubrication and overhaul procedures.	K		
J	27 Hoses, Metal Lines and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.		L	
J	34 Engine Oil With Oil Filter - Replace filter. Add recommended grade aviation oil to replace oil lost in existing filter.	M		
J	35 Engine Oil Without Oil Filter - Drain oil sump and oil cooler, clean and inspect screens and refill with recommended grade aviation oil.	M		
J	36 Engine Oil With Oil Filter - Drain oil sump and refill with recommended grade aviation oil.	M		
K	2 Integral Fuel Tanks - Drain fuel and check tank interior and outlet screens.	N		
K	4 Fuel Bladders - Drain fuel and check for wrinkles that would retain contaminants or liquid, security of attachment and condition of outlet screens.	N		
K	10 Fuel Quantity Indicators - Check for damage, security of installation and perform accuracy test.		EACH 1	
L	9 Propeller Assembly - Overhaul (See McCauley Service Manual; refer to list of publication).	O		

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 3

#### SPECIAL INSPECTION AND YEARLY ITEMS

HOURS YEARS

INSPECTION  
COMPLETED BY

Please review each of these items for required compliance

		HOURS	YEARS	INSPECTION COMPLETED BY
M	1 Ventilation System - Inspect clamps, hoses and valves for condition and security.	400	EACH 1	
M	9 Oxygen Cylinder - Inspect for condition, check hydrostatic test date and perform hydrostatic test, if due.		EACH 5	
N	4 Vacuum System Air Filter - Inspect for damage, deterioration and contamination. Clean or replace, if required. NOTE: Smoking will cause premature filter clogging.	P		
N	5 Vacuum System relief Valve - Inspect for condition and security.	Q		
N	10 Airspeed Indicator, Vertical Speed Indicator and Magnetic Compass - Calibrate.		EACH 2	
N	11 Altimeter and Static System - Inspect in accordance with FAR Part 91.411.		EACH 2	
O	4 Battery - Check general condition and security. Check level of electrolyte.	R		

#### Special Inspections Legends:

- A. First 100 hours and each 500 hours thereafter. More often if operated under prevailing wet or dusty conditions.
- B. At first 50 hours, first 100 hours, and each 500 hours thereafter, or one year, whichever comes first.
- C. Each 500 hours, and whenever improper operation is suspected. Replace brushes when worn down to 0.25 inch or less.
- D. Serial R18200001 thru R18200583 and FR18200001 thru FR18200025: Each 5 years. Serial R18200584 and On and FR18200026 thru FR18200070: Overhaul components and replace rubber goods On-Condition basis.
- E. Each 600 hours or 1 year, whichever comes first.
- F. Lubrication of the actuator is required each 1000 hours or 3 years, whichever comes first. See figure 2-5 for grease specification.
- G. Lubricate each 100 hours (except in extreme dusty conditions). These controls are not repairable and should be replaced every 1500 hours or sooner if required.
- H. Clean filter per paragraph 2-25. Replace paper filters at least each 500 hours.
- I. Inspect each 500 hours.
- J. For Prestolite starters only, inspect the commutator and brushes every 1500 hours.
- K. At the first 25 hours, first 50 hours, first 100 hours and thereafter at each 100 hours, the contact breaker point compartment and magneto-to-engine timing is correct within plus zero degrees to minus two degrees, internal timing need not be checked. If timing is out of tolerance, remove magneto and set internal timing, then install and time to the engine. Refer to Section 11 or 11A and the magneto manufacturers service instructions for magneto timing procedures.
- L. Replace engine compartment rubber hoses (Cessna installed only) every five years or at engine overhaul, whichever occurs first. This does not include drain hoses. Hoses which are beyond these limits and are in a serviceable condition, must be placed on order immediately and then be replaced within 120 days after receiving the new hose(s) from Cessna. Replace drain hoses on condition. Engine flexible hoses (Lycoming installed) (Refer to Lycoming Maintenance Manual and Lycoming Engine Service Bulletins).
- M. First 25 hours: Refill with straight grade mineral oil and use until a total of 50 hours have accumulated, or oil consumption has stabilized. Change oil, replace filter, and refill sump with recommended grade of ashless dispersant oil. Change oil and replace filter at least every six months, regardless of accumulated hours.
- N. Each 1000 hours.
- O. See McCauley Service Manual; refer to list of publication.
- P. Replace every 500 hours.
- Q. Replace filter each 100 hours.
- R. Check electrolyte level and clean battery box each 100 hours or 90 days.



# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 4

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- A 1 Placards and Decals - Inspect presence, legibility and security. Consult Pilot's Operating Handbook and FAA-Approved Airplane Flight Manual for required placards.
- 
- B 1 Fuselage Surface - Inspect for skin damage, loose rivets, condition of paint and check pitot-static ports and drain holes for obstruction. Inspect covers and fairings for security.
- 
- B 2 Internal Fuselage Structure - Inspect bulkheads, doorposts, stringers, doublers and skins for corrosion, cracks, buckles and loose rivets, bolts and nuts.
- 
- B 3 Control Wheel Lock - Check general condition and operation.
- 
- B 4 Fuselage Mounted Equipment - Check for general condition and security of attachment.
- 
- B 5 Antennas and Cables - Inspect for security of attachment, connection and condition.
- 
- B 6 Emergency Locator Transmitter - Inspect for security of attachment and check operation by verifying transmitter output. Check cumulative time and useful life of batteries in accordance with FAR Part 91.207. Refer to Section 16 - Emergency Locator Transmitter - Checkout Interval.
- 
- B 7 Instrument Panel Shock Mounts, Ground Straps and Covers - Inspect for deterioration, cracks and security of attachment.
- 
- B 8 Pilot's and Copilot's Inertia Reels - Inspect for security of installation, proper operation and evidence of damage.
- 
- B 9 Seats, Seat Belts, and Shoulder Harnesses - Check general condition and security. Check operation of seat stops and adjustment mechanism. Inspect belts for condition and security of fasteners.
- 
- B 10 Windows, Windshield, Doors and Seals - Inspect general condition. Check latches, hinges and seals for condition, operation and security of attachment.
- 
- B 12 Flight Controls - Check freedom of movement and proper operation through full travel with and without flaps extended. Check electric trim controls for operation (as applicable.)
- 
- B 13 Aileron, Elevator and Rudder Stops - Check for damage and security. Compliance with Cessna Service Letter SE80-65 is required.
- 
- B 14 Portable Hand Fire Extinguisher - Inspect for proper operating pressure, condition, security of installation and servicing date.
- 
- B 15 Seat Tracks and Stops - Inspect seat tracks for condition and security of installation. Check seat track stops for damage and correct location. Ensure inspection of seat rails for cracks EACH 50 HOURS. Refer to Section 3.
- 
- B 16 Control Column - Inspect pulleys, cables, sprockets, bearings, chains, bungees and turnbuckles for condition and security.
- 
- B 17 Fuel Line and Selector Valve Drain(s) - Remove plug and drain.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 4

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- D 1 Brakes, Master Cylinders and Parking Brake - Check master cylinders and parking brake mechanism for condition and security. Check fluid level and test operation of toe and parking brake.
- 
- D 2 Main Gear Tubular Struts - Inspect for cracks, dents, corrosion, condition of paint or other damage. Check axles for condition and security.
- 
- D 4 Wheels, Brake Discs and Linings - Inspect for wear, cracks, warps, dents or other damage. Check wheel through-bolts and nuts for looseness.
- 
- D 5 Tires - Check tread wear and general condition. Check for proper inflation.
- 
- D 6 Main Landing Gear Strut-to-Pivot Attachment - Check for damage, cracks, loose rivets, bolts and nuts and security of attachment.
- 
- D 8 Nose Gear - Inspect torque links, steering rods and boots for condition and security of attachment. Check strut for evidence of leakage and proper extension. Check strut barrel for corrosion, pitting, and cleanliness. Check shimmy damper and/or bungees for operation, leakage and attach points for wear and security.
- 
- D 11 Nose Gear Attachment Structure - Inspect for cracks, corrosion or other damage and security of attachment.
- 
- D 12 Landing Gear - Perform five fault-free cycles.
- 
- D 13 Main Landing Gear - Check downlock engagement.
- 
- D 14 Landing Gear System - Check adjustment of main and nose gear up and down switches and operation of gear position indicator.
- 
- D 16 Nose Gear Doors and Linkage - Check for .25 inch minimum clearance throughout up and down cycles, and proper fit when closed. Check linkage for wear, damaged bearings, distortion and superficial damage.
- 
- D 17 Hydraulic System - Check all components for leaks and external damage to components or mounting structure.
- 
- D 18 Emergency Hand Pump - Check operation, check lines and components for damage and leaks.
- 
- D 19 Powerpack - Clean self-relieving check valve filter.
- 
- D 22 Powerpack - Perform hydraulic pressure checks of primary relief valve, thermal relief valve and pressure switch.
- 
- G 3 Elevator Control System - Inspect pulleys, cables, sprockets, bearings, chains and turnbuckles for condition, security and operation.
- 
- H 3 Trim Controls and Indicators - Check freedom of movement and proper operation through full travel. Check pulleys, cables, sprockets, bearings, chains, bungees and turnbuckles for condition and security. Check electric trim controls for operation as applicable.
- 
- I 2 Rudder Pedals and Linkage - Check for general condition, proper rigging, and operation. Check for security of attachment.
- 
- J 1 Cowling and Cowl Flaps - Inspect for cracks, dents and other damage, security of cowl fasteners and cowl mounted landing lights for attachment. Check cowl flaps for condition, security and operation.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 4

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- J 2 Engine - Inspect for evidence of oil and fuel leaks. Wash engine and check for security of accessories.
- 
- J 3 Cowl Flap Controls - Check freedom of movement through full travel.
- 
- J 4 Engine, Propeller Controls and Linkage - Check general condition, freedom of movement through full range. Check for proper travel, security of attachment and for evidence of wear. Check friction locks for proper operation.
- 
- J 8 Induction System - Check security of clamps, tubes and ducting. Inspect for evidence of leakage.
- 
- J 11 Alternate Induction Air System - Check for obstructions, operation and security.
- 
- J 12 Alternator and Electrical Connections - Check condition and security. Check alternator belts for condition and proper adjustment.
- 
- J 15 Oil Cooler - Check for obstructions, leaks and security of attachment.
- 
- J 16 Exhaust System - Inspect for cracks and security. Air leak check exhaust system. Refer to Sections 11 and 11A, Paragraphs 11-98 and 11-75A, for inspection procedures.
- 
- J 17 Exhaust System (turbocharged engine) - Inspect couplings, seals, clamps and expansion joints for cracks and security. Air leak check exhaust system. Refer to Sections 11 and 11A, Paragraphs 11-98 and 11-75A, for inspection procedures.
- 
- J 27 Hoses, Metal Lines and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.
- 
- J 30 Engine Baffles and Seals - Check condition and security of attachment.
- 
- J 32 Turbocharger (if applicable) -  
a. Inspect turbocharger mounting brackets, ducting, linkage and attaching parts for general condition, leakage or damage and security of attachment.  
b. Check waste gate, actuator, controller, oil and vent lines, overboost relief valve and compressor housing for leakage, apparent damage, security of attachment and evidence of wear. Check waste gate return spring for condition and security.
- 
- J 34 Engine Oil With Oil Filter - Replace filter. Add recommended grade aviation oil to replace oil lost in existing filter.
- 
- J 35 Engine Oil Without Oil Filter - Drain oil sump and oil cooler, clean and inspect screens and refill with recommended grade aviation oil.
- 
- J 36 Engine Oil With Oil Filter - Drain oil sump and refill with recommended grade aviation oil.
- 
- K 6 Fuel Tank or Bladder Drains - Drain water and sediment.
- 
- K 8 Fuel Selector Valve - Check controls for detent in each position, security of attachment and for proper placarding.
- 
- L 1 Propeller Governor and Control - Inspect for oil and grease leaks. If leakage is evident, refer to McCauley Service Manual.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 4

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- |   |    |  |
|---|----|--|
| L | 2  | Propeller Mounting - Check for security of installation.   |
| L | 3  | Propeller Blades - Inspect for cracks, dents, nicks, scratches, erosion, corrosion or other damage.  |
| L | 4  | Spinner - Check general condition and attachment.  |
| M | 3  | Cabin Heat and Ventilation Controls - Check freedom of movement through full travel. Check friction locks for proper operation.  |
| M | 4  | Pitot Tube and Stall Warning Vane - Check for condition and obstructions.  |
| M | 5  | Pitot Tube Heater Element - Perform operational check.   |
| M | 6  | Propeller Anti-ice Slip Rings, Brushes and Boots - Inspect for condition and security. Perform operational check.  |
| M | 7  | Heated Windshield Panel - Check operation, security of installation, electrical wiring and condition of storage bag.   |
| M | 8  | Oxygen System - Inspect masks, hoses, lines and fittings for condition, routing and support. Test operation and check for leaks.   |
| N | 1  | Vacuum System - Inspect for condition and security.  |
| N | 2  | Vacuum System Hoses - Inspect for hardness, deterioration, looseness or collapsed hoses.   |
| N | 4  | Vacuum System Air Filter - Inspect for damage, deterioration and contamination. Clean or replace, if required.<br>NOTE: Smoking will cause premature filter clogging.  |
| N | 5  | Vacuum System relief Valve - Inspect for condition and security.   |
| N | 6  | Instruments - Check general condition and markings for legibility.   |
| N | 7  | Instrument Lines, Fittings, Ducting and Instrument Panel Wiring - Check for proper routing, support and security of attachment.  |
| N | 8  | Static System - Inspect for security of installation, cleanliness and evidence of damage.  |
| N | 9  | Navigation Indicators, Controls and Components - Inspect for condition and security.   |
| N | 12 | Instrument Panel Mounted Avionics Units (Including Audio Panel, VHF Nav/Com(s), ADF, Transponder, DME and Compass System) - Inspect for deterioration, cracks and security of instrument panel mounts. Inspect for security of electrical connections, condition and security of wire routing. |
| N | 13 | Avionics Operating Controls - Inspect for security and proper operation of controls and switches and ensure that all digital segments will illuminate properly.  |
| N | 14 | Remote Mounted Avionics - Inspect for security of units and electrical connectors, condition and security of wire routing. Also check for evidence of damage and cleanliness.  |
| N | 15 | Microphones, Headsets and Jacks - Inspect for cleanliness, security and evidence of damage.  |

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 4

Registration No. \_\_\_\_\_ Aircraft Model and SN \_\_\_\_\_ Aircraft Time \_\_\_\_\_  
INSPECTION COMPLETED BY \_\_\_\_\_

- 
- O 1 General Airplane and System Wiring - Inspect for proper routing, chafing, broken or loose terminals, general condition, broken or inadequate clamps and sharp bends in wiring.
- 
- O 2 Instrument, Cabin, Navigation, Beacon, Strobe, and Landing Lights - Check operation, condition of lens and security of attachment.
- 
- O 3 Circuit Breakers and Fuses - Check operation and condition. Check for required number of spare fuses.
- 
- O 6 Switch and Circuit Breaker Panel, Terminal Blocks and Junction Boxes - Inspect wiring and terminals for condition and security.
- 
- O 8 Switches - Check operation, terminals, wiring and mounting for conditions, security and interference.
- 
- O 9 Instrument Panel and Control Pedestal - Inspect wiring, mounting and terminals for condition and security. Check resistance between stationary panel and instrument panel for proper ground.

---

Q Perform the Following Operational Checks:

- 
- Q 1 Brakes - Test toe brakes and parking brake for proper operation.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 4

#### SPECIAL INSPECTION AND YEARLY ITEMS

HOURS YEARS

INSPECTION  
COMPLETED BY

Please review each of these items for required compliance

B	11	Upholstery, Headliner, Trim and Carpeting - Check condition and clean as required.	EACH 400	EACH 1
D	3	Brake Lines, Wheel Cylinders, Hoses, Clamps and Fittings - Check for leaks, condition and security of hoses for bulges and deterioration. Check brake lines and hoses for proper routing and support.	EACH 400	EACH 1
D	10	Wheel Bearings - Clean, inspect and lube.	A	
D	20	Powerpack - Hydraulic fluid contamination check.	B	
D	21	Powerpack - Check condition and wear of brushes in servo motor.	C	
D	23	Landing Gear System - Overhaul main gear downlock actuators, main and nose gear actuators, landing gear selector valve, emergency hand pump and pressure switch. Replace all rubber goods.		D
D	24	Brake System - Overhaul brake discs, parking brake system, wheel cylinders and master cylinders. Replace brake pads and all rubber goods.		D
E	4	Autopilot Rigging - Check per Avionics Installation Manual.	E	EACH 1
H	5	Elevator Trim Tab Actuator - Clean, lubricate and check free-play.	F	
J	4	Engine, Propeller Controls and Linkage - Check general condition, freedom of movement through full range. Check for proper travel, security of attachment and for evidence of wear. Check friction locks for proper operation.		G
J	10	Induction Air Filter - Remove and clean. Inspect for damage and service per paragraph 2-25.	H	
J	13	Alternator - Check brushes, leads, commutator or slip ring for wear.		I
J	14	Starter, Starter Solenoid and Electrical Connections - Check for condition of starter brushes, brush leads and commutator.		J
J	21	Magnetos - Timing Procedures and intervals, lubrication and overhaul procedures.	K	
J	27	Hoses, Metal Lines and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.		L
J	34	Engine Oil With Oil Filter - Replace filter. Add recommended grade aviation oil to replace oil lost in existing filter.	M	
J	35	Engine Oil Without Oil Filter - Drain oil sump and oil cooler, clean and inspect screens and refill with recommended grade aviation oil.	M	
J	36	Engine Oil With Oil Filter - Drain oil sump and refill with recommended grade aviation oil.	M	
K	2	Integral Fuel Tanks - Drain fuel and check tank interior and outlet screens.	N	
K	4	Fuel Bladders - Drain fuel and check for wrinkles that would retain contaminants or liquid, security of attachment and condition of outlet screens.	N	
K	10	Fuel Quantity Indicators - Check for damage, security of installation and perform accuracy test.		EACH 1
L	9	Propeller Assembly - Overhaul (See McCauley Service Manual; refer to list of publication).	O	

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## CESSNA PROGRESSIVE CARE MODEL R182 & TR182

### OPERATION NO. 4

SPECIAL INSPECTION AND YEARLY ITEMS		HOURS	YEARS	INSPECTION COMPLETED BY
Please review each of these items for required compliance				
M	1 Ventilation System - Inspect clamps, hoses and valves for condition and security.	400	EACH 1	
M	9 Oxygen Cylinder - Inspect for condition, check hydrostatic test date and perform hydrostatic test, if due.		EACH 5	
N	4 Vacuum System Air Filter - Inspect for damage, deterioration and contamination. Clean or replace, if required. NOTE: Smoking will cause premature filter clogging.	P		
N	5 Vacuum System relief Valve - Inspect for condition and security.	Q		
N	10 Airspeed Indicator, Vertical Speed Indicator and Magnetic Compass - Calibrate.		EACH 2	
N	11 Altimeter and Static System - Inspect in accordance with FAR Part 91.411.		EACH 2	
O	4 Battery - Check general condition and security. Check level of electrolyte.	R		

#### Special Inspections Legends:

- A. First 100 hours and each 500 hours thereafter. More often if operated under prevailing wet or dusty conditions.
- B. At first 50 hours, first 100 hours, and each 500 hours thereafter, or one year, whichever comes first.
- C. Each 500 hours, and whenever improper operation is suspected. Replace brushes when worn down to 0.25 inch or less.
- D. Serial R18200001 thru R18200583 and FR18200001 thru FR18200025: Each 5 years.  
Serial R18200584 and On and FR18200026 thru FR18200070: Overhaul components and replace rubber goods On-Condition basis.
- E. Each 600 hours or 1 year, whichever comes first.
- F. Lubrication of the actuator is required each 1000 hours or 3 years, whichever comes first. See figure 2-5 for grease specification.
- G. Lubricate each 100 hours (except in extreme dusty conditions). These controls are not repairable and should be replaced every 1500 hours or sooner if required.
- H. Clean filter per paragraph 2-25. Replace paper filters at least each 500 hours.
- I. Inspect each 500 hours.
- J. For Prestolite starters only, inspect the commutator and brushes every 1500 hours.
- K. At the first 25 hours, first 50 hours, first 100 hours and thereafter at each 100 hours, the contact breaker point compartment and magneto-to-engine timing is correct within plus zero degrees to minus two degrees, internal timing need not be checked. If timing is out of tolerance, remove magneto and set internal timing, then install and time to the engine. Refer to Section 11 or 11A and the magneto manufacturers service instructions for magneto timing procedures.
- L. Replace engine compartment rubber hoses (Cessna installed only) every five years or at engine overhaul, whichever occurs first. This does not include drain hoses. Hoses which are beyond these limits and are in a serviceable condition, must be placed on order immediately and then be replaced within 120 days after receiving the new hose(s) from Cessna. Replace drain hoses on condition. Engine flexible hoses (Lycoming installed) (Refer to Lycoming Maintenance Manual and Lycoming Engine Service Bulletins).
- M. First 25 hours: Refill with straight grade mineral oil and use until a total of 50 hours have accumulated, or oil consumption has stabilized. Change oil, replace filter, and refill sump with recommended grade of ashless dispersant oil. Change oil and replace filter at least every six months, regardless of accumulated hours.
- N. Each 1000 hours.
- O. See McCauley Service Manual; refer to list of publication.
- P. Replace every 500 hours.
- Q. Replace filter each 100 hours.
- R. Check electrolyte level and clean battery box each 100 hours or 90 days.

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 3

### FUSELAGE

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## MODEL R182 AND TR182 SERVICE MANUAL

3-1. FUSELAGE.

3-2. WINDSHIELD AND WINDOWS.

3-3. DESCRIPTION. The windshield and windows are single-piece acrylic plastic panels set in sealing strips and held by formed retaining strips secured to the fuselage with screws and rivets. H.B. Fuller, FS-4291 sealant (TMK01 Kit, Supply Division, Cessna Aircraft Company, P.O. Box 949, Wichita, KS 67201, 316/685-9111, Telex 417-489) used in conjunction with a felt seal is applied to all edges of windshield and windows with exception of wing root area. The wing root fairing has a heavy felt strip which completes the windshield sealing.

3-4. CLEANING AND WAXING. (Refer to Section 2.)

3-5. WINDSHIELD AND WINDOW INSTALLATION TECHNIQUES:

Special drills must be used when drilling holes in acrylic. Standard drills will cause the hose to be oversized, distorted, or excessively chipped.

Whenever possible, a coolant such as a plastic drilling wax should be used to lubricate the drill bit. Cessna recommends "Reliance" drill wax or Johnson No. 140 Stick Wax.

Drilled hoses should be smooth with a finish of 125 rhr.

The feed and speed of the drill is critical. The following chart indicates drill speed for various thicknesses of acrylic.

Material Thickness	Drill Speed
1/16" to 3/16"	1500 to 4500 rpm
1/4" to 3/8"	1500 to 2000 rpm
7/16"	1000 to 1500 rpm
1/2"	500 to 1000
3/4"	500 to 800
1"	500 rpm

Specifications for the twist drill used to drill acrylics is as follows:

### NOTES

Shallow holes - when hole depth to hole diameter ratio is less than 1.5 to 1, the drill shall have an included tip angle of 55 degrees to 60 degrees and a lip clearance angle of 15 degrees to 20 degrees.

Medium deep holes - when hole depth to hole diameter ratio is from 1.5 to 1 up to 3 to 1, the drill shall have an included tip angle of 60 degrees to 140 degrees and a lip clearance angle of 15 degrees to 20 degrees.

Deep holes - when hole depth of hole diameter ratio is greater than 3.0 to 1, the drill shall have an included tip angle of 140 degrees and a lip clearance of 12 degrees to 15 degrees.

## MODEL R182 & TR182 SERIES SERVICE MANUAL

Parts which must have holes drilled shall be backed up with a drill fixture. Holes may be drilled through the part from one side. However, less chipping around holes will occur if holes are drilled by drilling the holes from both sides. This is accomplished by using a drill with an acrylic backup piece on the opposite side. Remove the drill from the hole and switch the backup plate and finish drilling from the opposite side.

- 3-6. **REPAIRS.** Replace extensively damaged transparent plastic, rather than repair whenever possible, since even a carefully patched part is not the equal of a new section, either optically or structurally. At the first sign of crack development, drill a small hole at the extreme end of the crack, as shown in figure 3-1. This serves to localize the cracks and to prevent further splitting by distributing the strain over a large area. If the cracks are small, stopping them with drilled holes will usually suffice until replacement or more permanent repair can be made. The following repairs are permissible; however, they are not to be located in the pilot's line of vision during landing or normal flight.
- a. **SURFACE PATCH.** If a surface patch is to be installed, trim away the damaged area and round all corners. Cut a piece of plastic of sufficient size to cover the damaged area, and extend at least 3/4-inch on each side of the crack or hole. Bevel the edges as shown in figure 3-1. If the section to be repaired is curved, shape the patch to the same contour by heating it in an oil bath at a temperature of 248° to 302°F., or it may be heated on a hot plate until soft. Boiling water should not be used for heating. Coat the patch evenly with plastic solvent adhesive, and place immediately over the hole. Maintain a uniform pressure of from 5 to 10 psi on the patch for a minimum of 3 hours. Allow the patch to dry 24 to 36 hours before sanding or polishing is attempted.
  - b. **PLUG PATCH.** In using inserted patches to repair holes in plastic structures, trim the holes to a perfect circle or oval, and bevel the edges slightly. Make the patch slightly thicker than the material being repaired, and similarly, bevel the edges. Install patches in accordance with procedures illustrated in figure 3-1. Heat the plug until soft, and press into the hole without cement, and allow to cool to make a perfect fit. Remove the plug, coat the edges with adhesive, and then reinsert the plug in the hole. Maintain a firm, light pressure until the cement has set, then sand or file the edges level with the surface; buff and polish.
- 3-7. **SCRATCHES.** Scratches on clear plastic surfaces can be removed by hand-sanding operations followed by buffing and polishing, if steps below are followed carefully.
- a. Wrap a piece of No. 320 (or finer) sandpaper or abrasive cloth around a rubber pad or wood block. Rub surface around scratch with a circular motion, keeping abrasive constantly wet with clean water to prevent scratching surface more. Use minimum pressure and cover an area large enough to prevent formation of "bull's-eyes" or other optical distortions.

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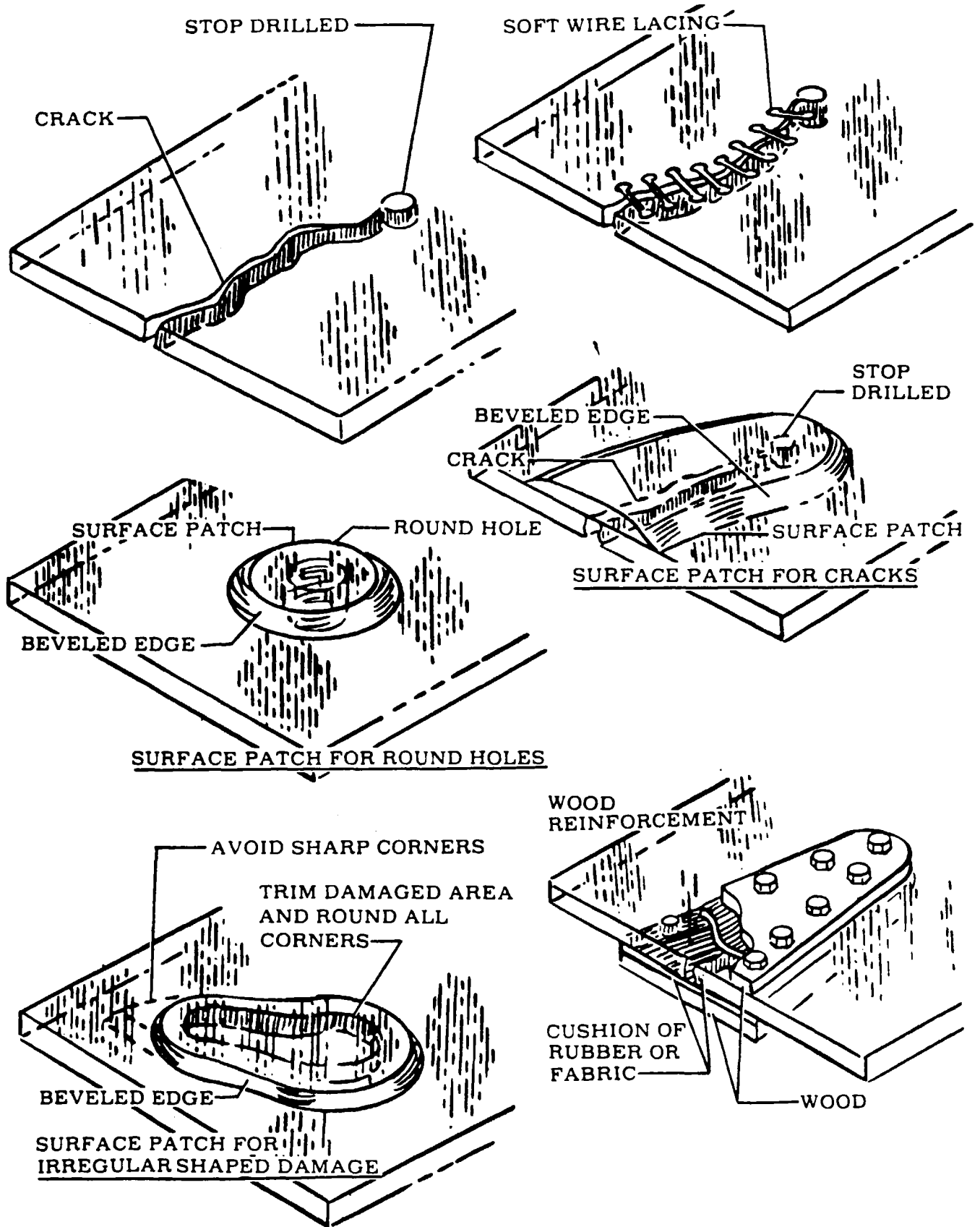


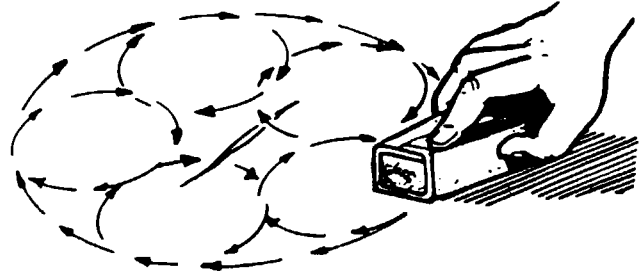
Figure 3-1. Repair of Windshield and Windows (Sheet 1 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

CORRECT

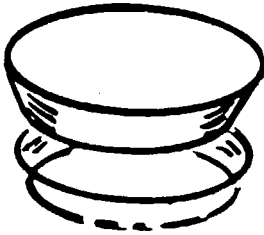


INCORRECT



## SANDING REPAIR

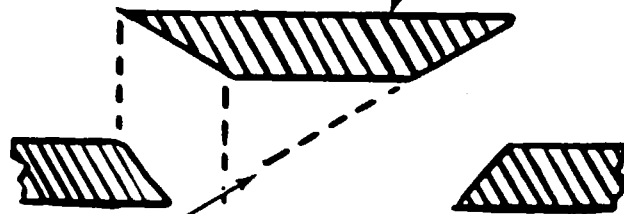
PATCHES



PATCH AND HOLE SHOULD BE TRIMMED WITH TAPERED EDGES.

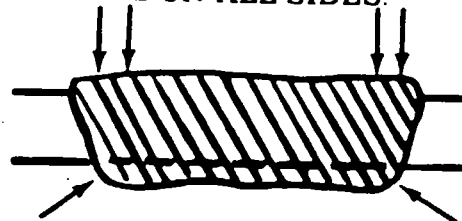
HEAT EDGES OF PATCH UNTIL SOFT AND FORCE IT INTO HOLE. HOLD IT IN PLACE UNTIL COOL AND HARD TO ASSURE PERFECT FIT. THEN REMOVE PATCH FOR CEMENTING BATH.

PATCH SHOULD BE THICKER



PATCH TAPERED ON SHARPER ANGLE THAN MATERIAL.

DURING CEMENTING, PRESSURE NEED BE APPLIED ONLY ON TOP SURFACE. TAPER ASSURES EQUAL PRESSURE ON ALL SIDES.



AFTER CEMENT HAS HARDENED. SAND OR FILE EDGES LEVEL WITH SURFACE.

Figure 3-1. Repair of Windshield and Windows (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

### CAUTION

Use fine grade abrasive, No. 320 grade or finer.

- b. Continue sanding operation, using progressively finer grade abrasives until scratches disappear.
- c. When scratches have been removed, wash area thoroughly with clean water to remove all gritty particles. The entire sanded area will be clouded with minute scratches which must be removed to restore transparency.
- d. Apply fresh tallow or buffing compound to a motor-driven buffing wheel. Hold wheel against plastic surface, moving it constantly over damaged area until cloudy appearance disappears. A 2000-foot-per-minute surface speed is recommended to prevent overheating and distortion. (Example: 750 rpm polishing machine with a 10 inch buffing bonnet.)

### NOTE

A power buffing wheel will expedite polishing considerably, however, hand buffing is acceptable if complete enough to produce a quality end result.

- e. When buffing is finished, wash area thoroughly and dry with a soft flannel cloth. Allow surface to cool and inspect area to determine if full transparency has been restored. Apply a thin coat of hard wax and polish surface lightly with a clean flannel cloth.

### NOTE

Rubbing plastic surface with a dry cloth will build up an electrostatic charge which attracts dirt particles and may eventually cause scratching of surface. After wax has hardened, dissipate this charge by rubbing surface with a slightly damp chamois. This will also remove dust particles which have collected while wax is hardening.

- f. Minute hairline scratches can often be removed by rubbing with commercial automobile body cleaner or fine-grade rubbing compound. Apply with a soft, clean, dry cloth or imitation chamois.

## MODEL R182 AND TR182 SERVICE MANUAL

### 3-8. CRACKS.

- a. When a crack appears, drill a hole at end of crack to prevent further spreading. Hole should be approximately 1/8 inch in diameter, depending on length of crack and thickness of material.
- b. Temporary repairs to flat surfaces can be accomplished by placing a thin strip of wood over each side of surface and inserting small bolts through the wood and plastic. A cushion of sheet rubber or aircraft fabric should be placed between wood and plastic on both sides.
- c. A temporary repair can be made on a curved surface by placing fabric patches over affected areas. Secure patches with aircraft dope, Specification No. MIL-D-5549; or lacquer, Specification No. MIL-L-7178. Lacquer thinner, Specification No. MIL-T-6094 can also be used to secure patch.
- d. A temporary repair can be made by drilling small holes along both sides of crack 1/4 to 1/8 inch apart and lacing edges together with soft wire. Small-stranded antenna wire makes a good temporary lacing material. This type of repair is used as a temporary measure ONLY, and as soon as facilities are available, panel should be replaced.

### 3-9. WINDSHIELD. (See figure 3-2.)

### 3-10. REMOVAL.

- a. Remove wing fairings.
- b. Remove air vent tubes.

#### NOTE

Remove and tape compass and outside air temperature gage clear of work area. Do not disconnect electrical wiring. (See Section 16.)

#### CAUTION

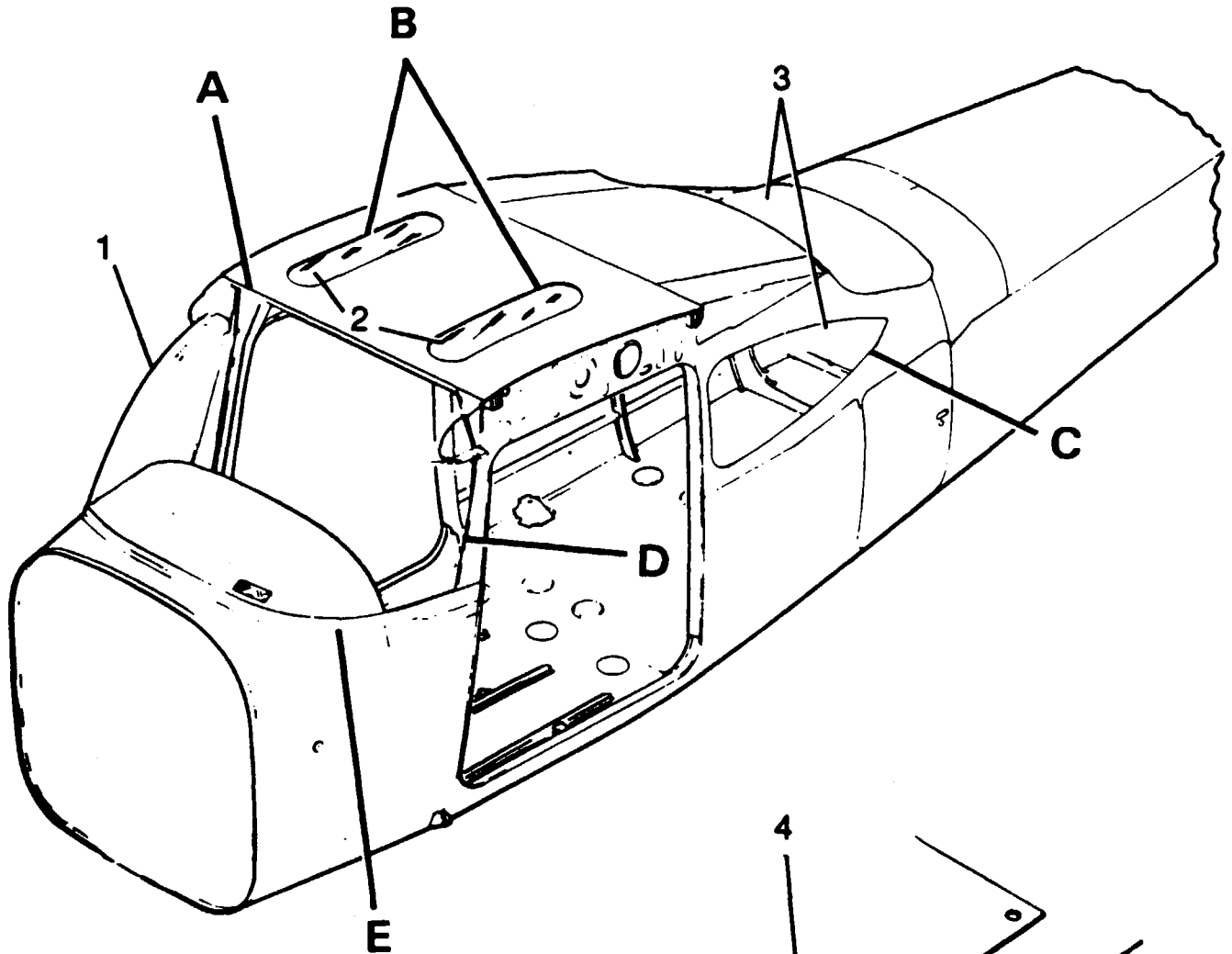
If windshield is to be reinstalled, be sure to protect windshield during removal.

- c. With two people sitting in the airplane placing their feet against the windshield, just above the centerline, press upward on windshield forcing it out of lower retainers.
- d. Clean sealer from inner sidewalls and bottom of retainers.

### 3-11. INSTALLATION.

- a. If windshield is to be reinstalled, clean off old sealer and felt, then install new felt around edges of windshield.
- b. If new windshield is to be installed, remove protective cover and clean, take care not to scratch windshield.
- c. Apply new felt to edges of windshield.
- d. Apply a strip of sealer (H.B. FULLER FS-4291) along the sides and bottom of felt.
- e. Position bottom edge of windshield into lower retainer.
- f. Using a piece of bent sheet metal (8 in. wide x length of top edge of windshield) placed under top edge of windshield into upper retainer using bent sheet metal in a shoe horn effect.
- g. Install air vent tubes.
- h. Install wing fairings.

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1. Windshield
2. Overhead Cabin Window
3. Fixed Window
4. Outer Retainer
5. Inner Retainer
6. Felt Seal

## NOTE

Apply H.B. Fuller FS-4291 to all edges of windshield and windows under outer retainer (4).

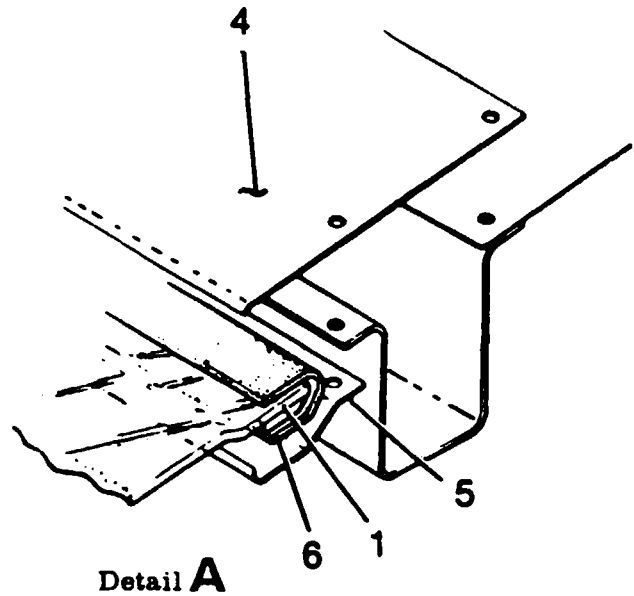
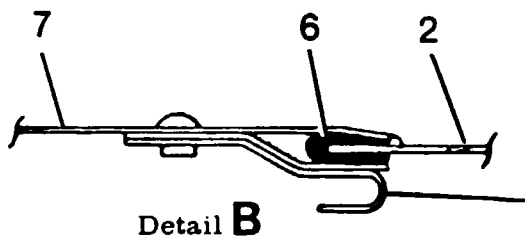


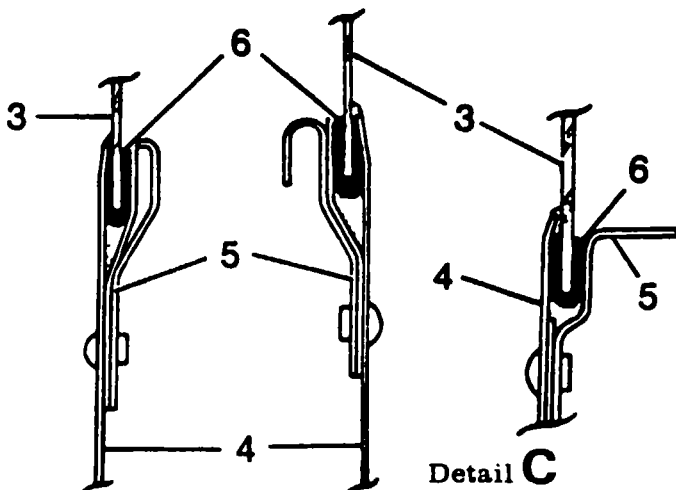
Figure 3-2. Windshield and Fixed Window Installation (Sheet 1 of 2)

MODEL R182 AND TR182 SERVICE MANUAL

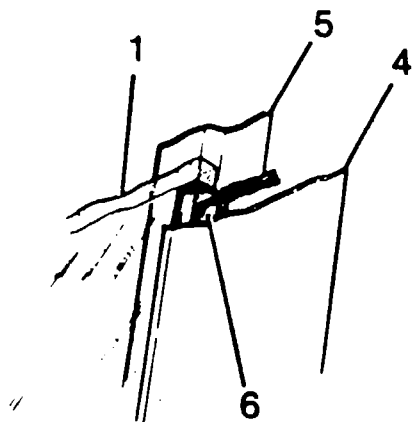


Detail B

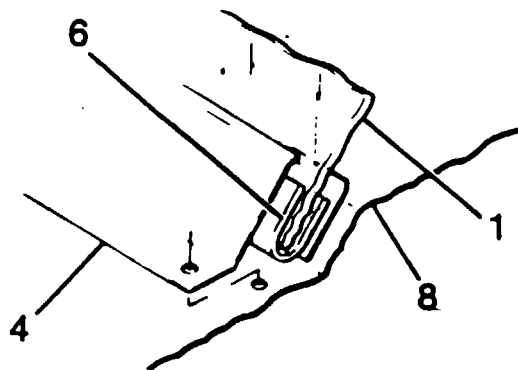
TYPICAL METHODS OF RETAINING FIXED WINDOWS



Detail C



Detail D



Detail E

1. Windshield
2. Overhead Cabin Window
3. Fixed Window
4. Outer Retiner
5. Inner Retainer
6. Felt Seal
7. Cabin Top Skin
8. Fuselage Structure

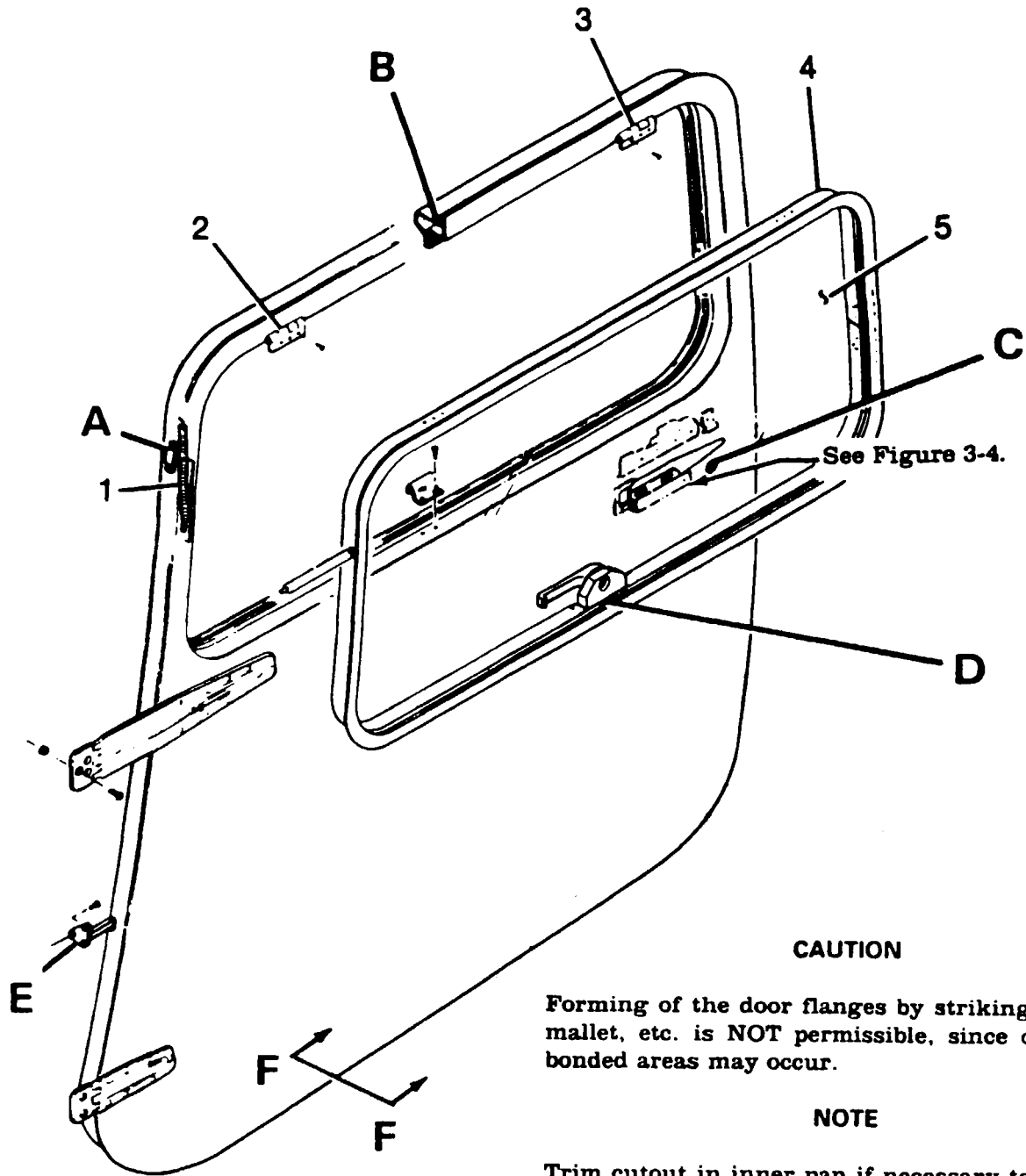
Figure 3-2. Windshield and Fixed Window Installation (Sheet 2 of 2)



## MODEL R182 AND TR182 SERVICE MANUAL

- 3-12. **WINDOWS.**
- 3-13. **MOVABLE.** (Refer to figure 3-3.) A movable window, hinged at the top, is installed in the left cabin door and may also be installed in the right cabin door as optional equipment. A rubber seal is cemented to the inside of the window frame using EC-880 adhesive (3-M Company) or equivalent.
- 3-14. **REMOVAL AND INSTALLATION.**
- Disconnect window stop.
  - Remove pins from window hinges (2 and 3).
  - Reverse preceding steps for reinstallation. To remove frame from plastic panel, drill out blind rivets at frame splice. When replacing plastic panel in frame, ensure sealing strip and an adequate coating of Presstite No. 579.6 sealing compound is used around all edges of panel.
- 3-15. **WRAP-AROUND REAR.** The rear window is a one-piece acrylic plastic panel set in sealing strips and held in place by retaining strips.
- 3-16. **REMOVAL AND INSTALLATION.**
- Remove upholstery as necessary to expose retainer strips inside cabin.
  - Drill out rivets as necessary to remove retainers on both sides and lower edge of window.
  - Remove window by starting at aft edge and pulling window into cabin area.
  - Reverse preceding steps for reinstallation. Apply sealing strips and an adequate coating of sealing compound to prevent leaks. When installing a new window, check fit, use care not to crack panel and file or grind away excess plastic.
- 3-17. **OVERHEAD.** (See figure 3-2.) Overhead cabin windows, located in the cabin top, may be installed. These windows are one-piece acrylic plastic panels set in sealing strips and held in place by retaining strips.
- 3-18. **REMOVAL AND INSTALLATION.**
- Remove headliner and trim panels.
  - Drill out rivets as necessary to remove retainer strips.
  - Reverse preceding steps for reinstallation. Apply felt strip and sealing compound to all edges of window to prevent leaks. Check fit and carefully file or grind away excess plastic. Use care not to crack plastic when installing.
- 3-19. **FIXED.** (See figure 3-2.) Fixed windows, mounted in sealing strips and sealing compound, are held in place by various retainer strips. To replace side windows, remove upholstery and trim panels as necessary and drill out rivets securing retainers. Apply felt strip and sealing compound to all edges of window to prevent leaks. Check fit and file or grind away excess plastic. Use care not to crack plastic when installing.
- 3-20. **CABIN DOORS.** (See figure 3-3.)
- 3-21. **REMOVAL AND INSTALLATION.** Removal of cabin doors is accomplished either by removing screws which attach hinges or stops, or by removing hinge pins, attaching hinges and door stops. If permanent hinge pins are removed, they may be replaced with clevis pins, secured with cotter pins, or new hinge pins may be installed by inserting pin through both hinge halves, and chucking a rivet set in a hand drill, hold one end of pin and form a head on opposite end. Reverse pin and repeat process. When fitting a new door that is not bonded, some trimming of door skin at edges, and some reforming with a soft mallet may be necessary to achieve a good fit. Re-forming of bonded door flange by striking with a soft mallet, etc. is NOT permissible, due to possible damage to bonded areas.

MODEL R182 AND TR182 SERVICE MANUAL



See Figure 3-4.

**CAUTION**

Forming of the door flanges by striking with soft mallet, etc. is NOT permissible, since damage to bonded areas may occur.

**NOTE**

Trim cutout in inner pan if necessary to maintain .10-inch minimum clearance with door stop arm.

Spray cabin door and window seals with MS-122 (Miller-Stephenson Chem Corp) or equivalent. Do not overspray; confine to seals.

Lubricate surface of spring (21) in contact with spacers (15) with hi-and lo-temp. grease (MIL-G-21164C).

After tightening screw (14), spacers (15) should turn freely.

- 1. Spring
- 2. Forward Window Hinge
- 3. Aft Window Hinge
- 4. Window Frame
- 5. Window

Figure 3-3. Cabin Door (Sheet 1 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

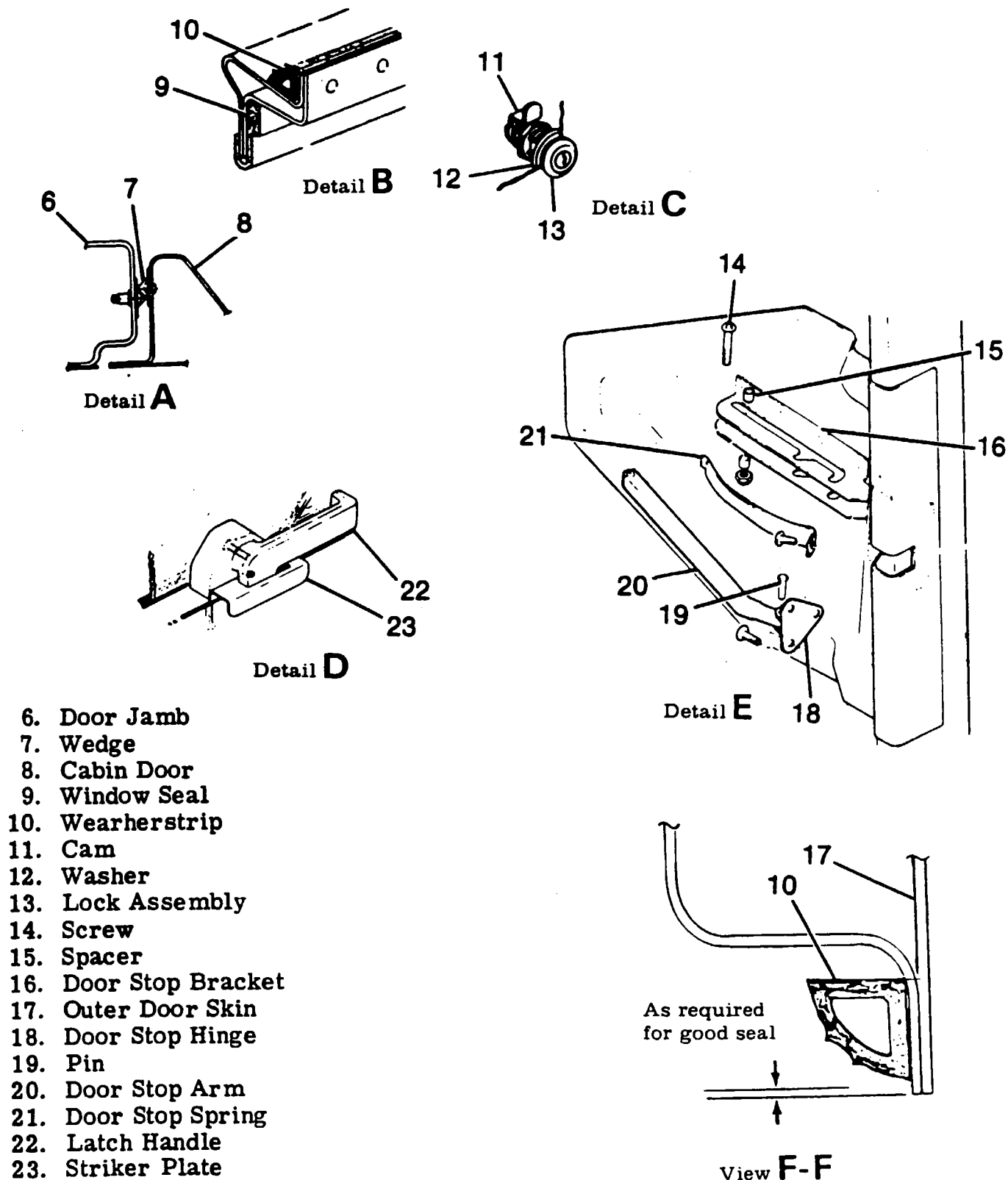


Figure 3-3. Cabin Door (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

- 3-22. **CABIN DOOR WEATHERSTRIP.** A hollow fluted-type, rubber weatherstrip is cemented around all edges of the cabin door. When replacing weatherstrip, ensure that contact surfaces are clean and dry. Cut new weatherstrip to length using old weatherstrip as a guide. Cut small notch in butt ends of new weatherstrip to allow for drainage. Position weatherstrip with notch at door low point and apply a thin, even coat of EC-1300L adhesive (3-M Company) or equivalent to both surfaces. Allow to dry until tacky before pressing into place on door. Do not stretch weatherstrip around door corners.
- 3-23. **WEDGES.** Thru 1980 Models, wedges are installed at the upper forward edge of the door to aid in preventing air leaks at this point. Several attaching holes are located in the wedges. Holes giving best results should be selected.
- 3-24. **DOOR LATCHES.** (Thru 1980 Models.) See figure 3-4.)
- 3-25. **DESCRIPTION.** The cabin door latch is a push-pull bolt type, utilizing a rotary clutch for positive bolt engagement. As the door is closed, teeth on underside of bolt engage gear teeth on clutch. The clutch gear rotates in one direction only and holds door until handle is moved to LOCK position, driving bolt into slot.
- 3-26. **ADJUSTMENT.** Vertical adjustment of the rotary clutch is afforded by slotted holes which ensure sufficient gear-to-bolt engagement and proper alignment. The extension or retraction of the bolt, item (15) is controlled by adjusting mounting bolts in the slotted holes. Loosen screws sufficiently to move latch base forward on the door to retract bolt, and aft to extend bolt.

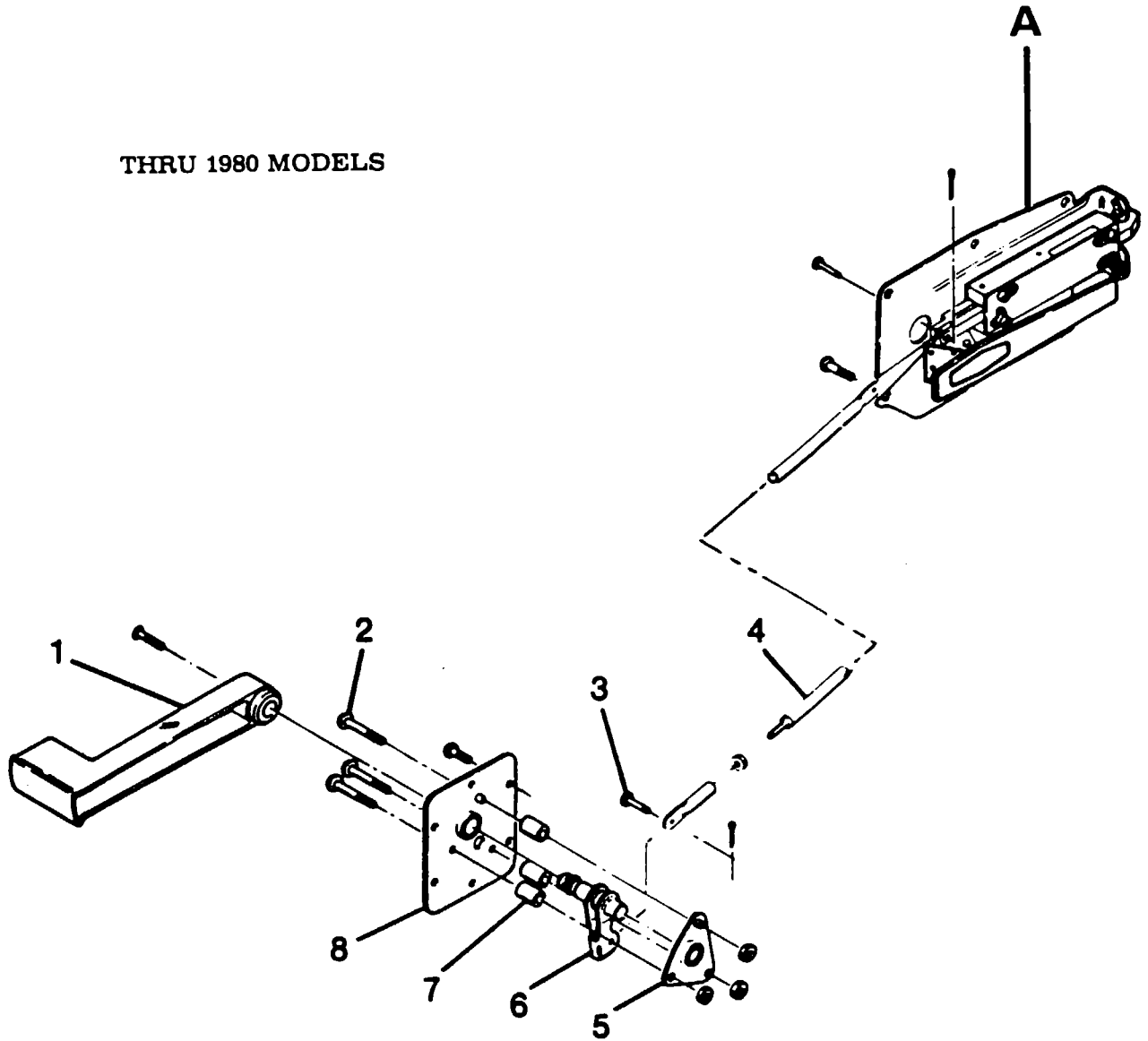
### CAUTION

Close door carefully after adjustment and check clearance between bolt and door jamb and clutch engagement.

- 3-27. **INDEXING INSIDE HANDLE.** (Thru 1980 Models.) (See figure 3-4.) When inside door handle is removed, reinstall in relation to position of bolt (15) which is spring-loaded to CLOSE position. Index inside handle in accordance with the following procedures.
- Temporarily install handle (1) on shaft assembly (6) approximately vertical.
  - Move handle (1) back and forth until handle centers in spring-loaded position.
  - Without rotating shaft assembly (6), remove handle and install door upholstery panel with door handle OPEN-CLOSE placard in place.
  - Ensure CLOSE index is at top.
  - Install handle (1) to align with CLOSE index on placard.
  - Ensure bolt (15) clears doorpost and teeth engage clutch gear when handle (1) is in CLOSE position. The inside door handle fits into the arm rest when it is moved to the locked position. Install the handle on the serrated shaft so that the forward end of the handle is 8° 15' above the centerline of the handle shaft when in the locked position. A small amount of adjustment can be accomplished by loosening the shaft mounting bolts, and moving screw (2) in the slot to raise or lower the forward end of the handle.
- 3-28. **DOOR LATCHES.** (Beginning with 1981 Models.) (See figure 3-5.)
- 3-29. **DESCRIPTION.** The cabin door latch consists of a two-piece nylon latch base, exterior handle, spring-loaded latch bolt/pull-bar assembly, and a spring-loaded catch/trigger pin assembly. The interior handle base plate assembly is directly connected to the cabin door latch by means of an adjustable push rod assembly. This push rod assembly has two clamps attached, 180° apart on the main rod. These clamps are used to operate a cable assembly that drives a cable pin from the upper aft end of the cabin door into the aft upper door sill. When

# MODEL R182 AND TR182 SERVICE MANUAL

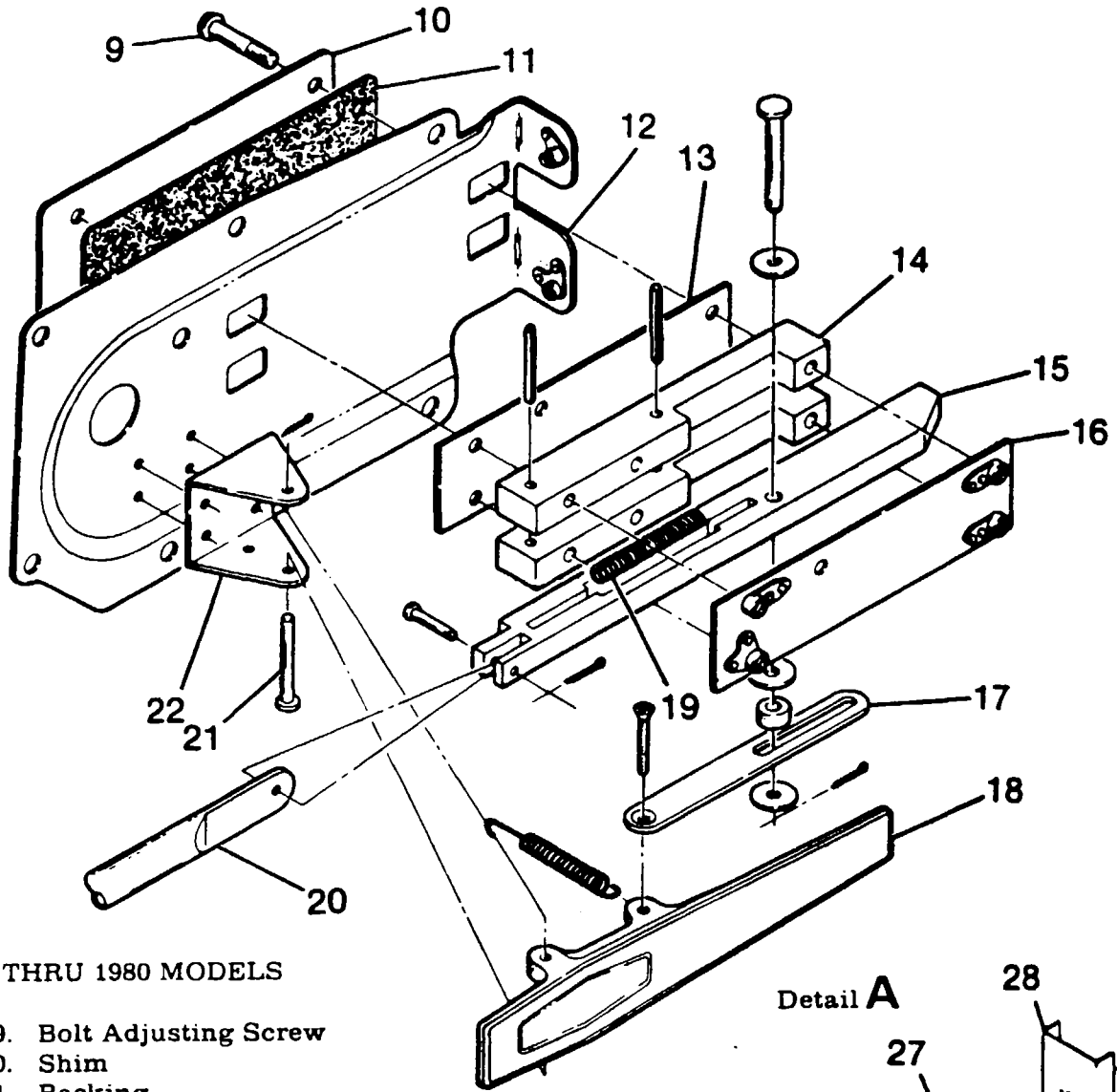
THRU 1980 MODELS



1. Inside Handle
2. Handle Adjusting Screw
3. Pin
4. Push Rod
5. Bearing Assembly
6. Shaft Assembly
7. Spacer
8. Plate Assembly

Figure 3-4. Door Latch and Rotary Clutch Components (Sheet 1 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL



THRU 1980 MODELS

- 9. Bolt Adjusting Screw
- 10. Shim
- 11. Backing
- 12. Latch Baseplate
- 13. Base Bolt Guide
- 14. Side Bolt Guide
- 15. Bolt
- 16. Top Bolt Guide
- 17. Pull Bar
- 18. Outside Handle
- 19. Spring
- 20. Push Rod
- 21. Pin
- 22. Bracket
- 23. Cover
- 24. Door Post
- 25. Guide
- 26. Rotary Clutch
- 27. Shim
- 28. Door Post Doubler

Detail A

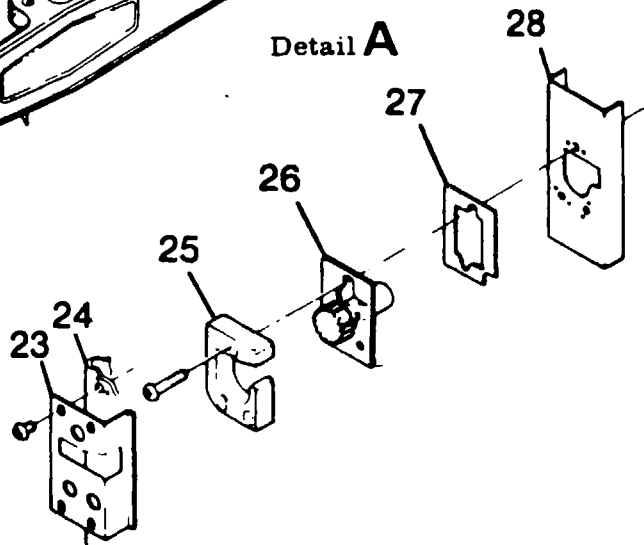


Figure 3-4. Door Latch and Rotary Clutch Components (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

the cabin door is open, the door latch exterior handle should be extended (out), held in this position by means of the spring-loaded latch catch engaged with the latch bolt through the beveled hole in the bolt. The push rod assembly will be moved forward, and the attached cable assembly will be retracted from the upper door will with the cable pin recessed in the pin guide, located in the upper aft corner of the door. The interior handle, being directly connected by means of the push rod, will be moved aft approximately 15° aft of the vertical position. Closing the cabin door drives the trigger pin over the nylon actuator attached to the cover plate, located on the rear doorpost. As the trigger pin is driven forward, it disengages the latch catch from the latch bolt. The extended extension springs, attached to the latch handle and bolt/pull bar assembly, compress, pulling the latch handle in, and driving the latch bolt over the latch striker, located on the rear doorpost. Pushing the exterior handle flush with the fuselage skin. The push rod assembly, attached to the latch bolt/pull bar assembly, moves aft, which also drive the cable pin from the pin guide in the door into the upper aft door sill receptacle. The interior door handle has now moved from approximately 15° aft of vertical to approximately 45° forward of vertical. Pushing the interior handle to the horizontal position, flush with the arm rest, will overcenter the door latch, securing the door for flight. The cabin door latch assembly also incorporates a locking arm and locking pin, used with a key lock to secure the aircraft after use. With the cabin door closed, and the exterior latch handle flush, actuating the key lock drives the locking pin into the exterior latch handle, locking the aircraft. It is important to note that since the cabin door latch assembly and the interior handle face plate assembly are directly connected by the push rod assembly, that any amount of force applied to the outside handle is subsequently applied to the inside handle. If the push rod assembly is not properly adjusted, it is possible to lock one's self out of the aircraft by applying too much force to the exterior handle when closing the cabin door. Therefore, it is important to adhere to all of the rigging and adjustment specifications pertaining to the preload forces of the interior door handle. Refer to the rigging and adjusting procedures in the following paragraphs.

- 3-30. **INSTALLATION, RIGGING AND ADJUSTMENT PROCEDURES.** (Beginning with 1981 Models.) See figure 3-5.)
- 3-31. **INSTALLATION OF LOCK ASSEMBLY ON LATCH ASSEMBLY.** (Beginning with 1981 Models.) (See figure 3-5.)
- Assemble locking arm (2) with pin assembly (5).
  - Place pin (5) in 1/8-inch hole of base assembly (22).
  - Align .099-inch hole of locking arm (2) with .094-inch hole in base assembly (22), and install pin (3).
  - Assemble cam assembly (24) to locking arm (2). Cam should be on latch side of locking arm (2).
  - Use washers (25) between cam (24) and locking arm (2), and install cotter pin on clevis bolt.
- 3-32. **INSTALLATION OF LATCH ASSEMBLY.** (Beginning with 1981 Models.) (See figure 3-5.)

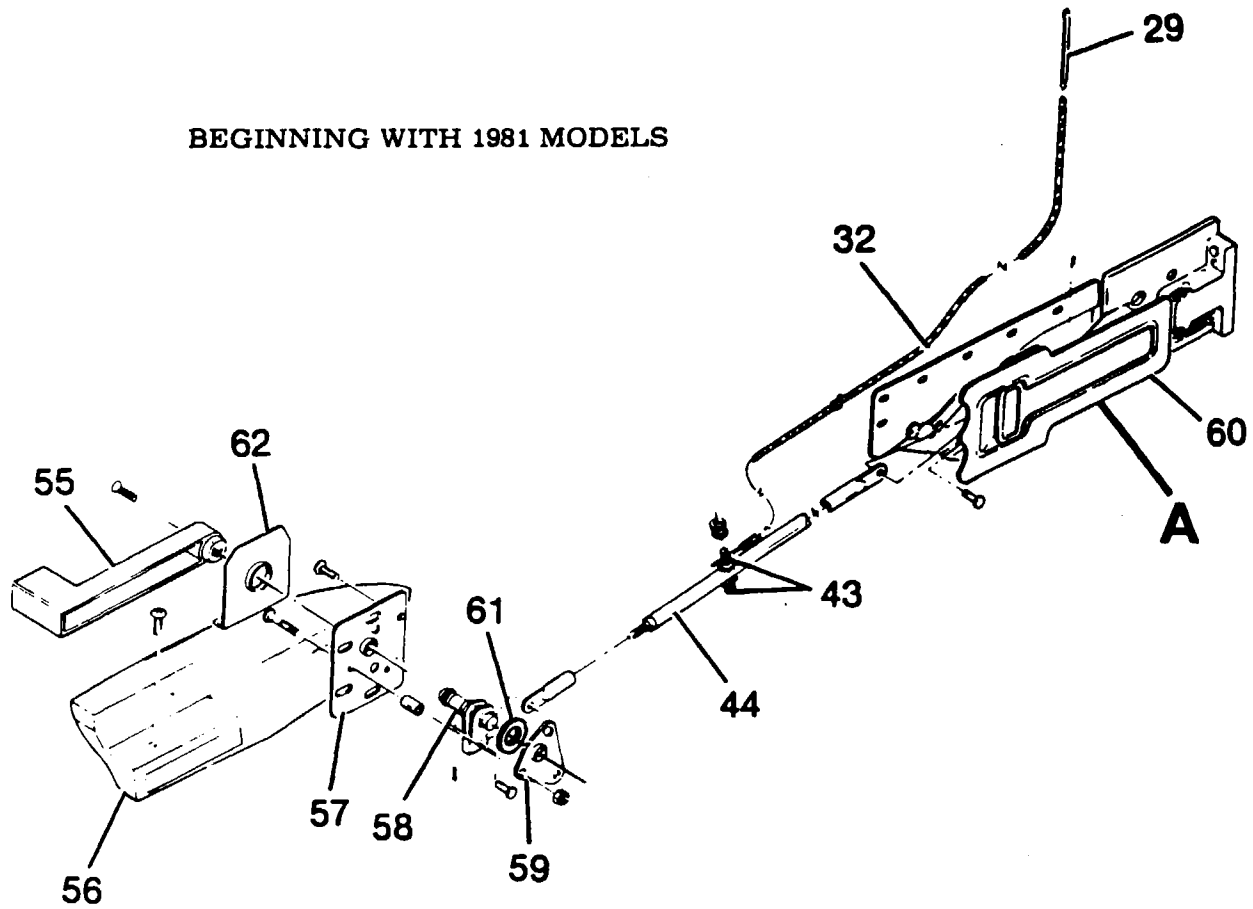
### NOTE

Install with latch in CLOSED position.

- Install latch assembly between door pan and door skin.
- Cable assembly (32) should be forward of latch base plate (45), and inboard of latch base cup.
- Extend latch handle through cutout in door skin. This will pull latch bolt back far enough to allow latch to fall into place.

# MODEL R182 AND TR182 SERVICE MANUAL

BEGINNING WITH 1981 MODELS



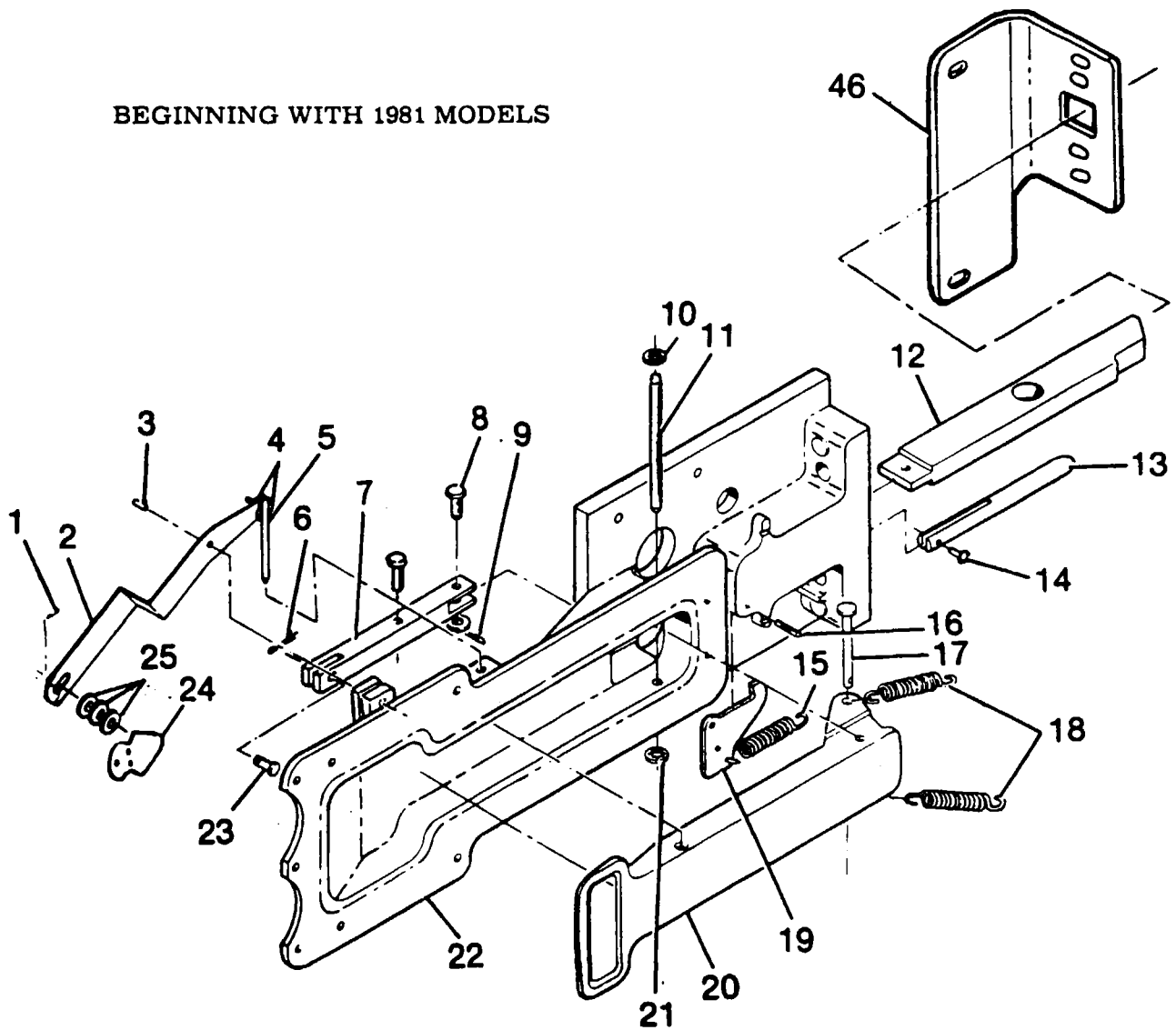
- 29. Pin
- 32. Cable Assembly
- 43. Clamp
- 44. Push Rod Assembly
- 55. Inside Handle
- 56. Arm Rest
- 57. Support
- 58. Shaft Assembly
- 59. Plate Assembly
- 60. Door Latch Assembly
- 61. Shim
- 62. Escutcheon

Figure 3-5. Cabin Door Latch Installation (Sheet 1 of 3)



# MODEL R182 AND TR182 SERVICE MANUAL

BEGINNING WITH 1981 MODELS



- |                 |                         |
|-----------------|-------------------------|
| 1. Cotter Pin   | 14. Rivet               |
| 2. Locking Arm  | 15. Spring              |
| 3. Pin          | 16. Pin                 |
| 4. Washer       | 17. Pin                 |
| 5. Pin          | 18. Spring              |
| 6. Cotter Pin   | 19. Catch               |
| 7. Pull Bar     | 20. Outside Handle      |
| 8. Pin          | 21. Lock Washer         |
| 9. Cotter Pin   | 22. Latch Base Assembly |
| 10. Lock Washer | 23. Pin                 |
| 11. Pin         | 24. Cam Assembly        |
| 12. Bolt        | 25. Washers             |
| 13. Push Rod    | 46. Latch Cover         |

Figure 3-5. Cabin Door Latch Installation (Sheet 2 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

- |                              |                         |                         |
|------------------------------|-------------------------|-------------------------|
| 24. Cam Assembly             | 42. Cover Assembly      | 48. #1212150-1 Shim     |
| 26. Plug Button              | 43. Clamp               | 49. Doorpost Jamb       |
| 27. Door Structure           | 44. Push Rod Assembly   | 50. Striker Plate Cover |
| 28. Pin Guide                | 45. Base Plate Assembly | 51. Channel             |
| 29. Pin                      | 47. Actuator            | 52. Striker Plate       |
| 30. 0.875-Inch Access Hole   |                         | 53. #1212147-1 Shim     |
| 31. Self-Locking Clip-On Nut |                         | 54. Channel             |
| 32. Cable Assembly           |                         |                         |
| 33. Clamp                    |                         |                         |
| 34. S1450-2A4-062 Washer     |                         |                         |
| 35. Screw                    |                         |                         |
| 36. Screw                    |                         |                         |
| 37. Washer                   |                         |                         |
| 38. Nut                      |                         |                         |
| 39. Door Skin                |                         |                         |
| 40. Casing                   |                         |                         |
| 41. Tumblers                 |                         |                         |

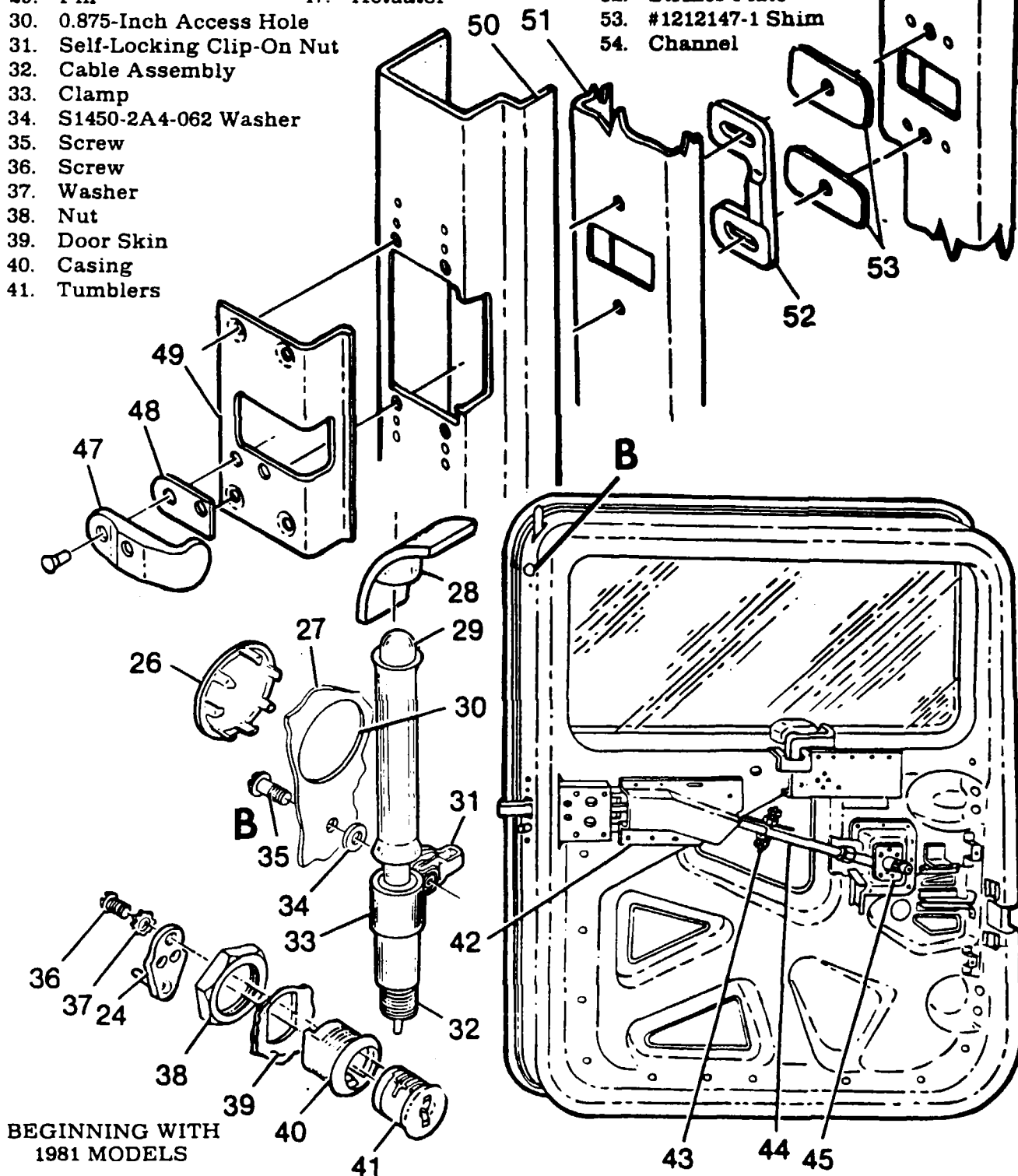


Figure 3-5. Cabin Door Latch Installation (Sheet 3 of 3)

## MODEL R182 AND TR182 SERVICE MANUAL

- d. Push latch assembly aft so that bolt (12) and push rod (13) extend through their respective holes.
- e. Trip push rod (13) so that bolt (12) is fully extended and handle (20) is flush.
- f. Secure latch to door pan with four NAS220-5 screws through base assembly (22) and two AN525-10R6 screws through aft flange of door pan.
- g. Drill eleven .128-inch holes to align with latch base (22).

### NOTE

Do not oversize holes in the latch base and do not rivet base to skin at this time.

### 3-33. INSTALLING CABLE ASSEMBLY. (Beginning with 1981 Models.) (See figure 3-5.)

### NOTE

Remove cover assembly (42).

- a. On pin end of cable assembly (32), attach clamp (33) and nut (31), one-inch from end of casing, as shown in Detail B.
- b. Insert pin end of cable between door pan and door skin at aft end of door. Push pin end of cable to top of door.
- c. Remove plug button (26) and align pin on cable with pin guide (28), and insert pin through guide. Access is gained through .875-inch hole (30).
- d. Align clamp on cable casing with hole located one-inch below .875-inch hole (30), and install screw.
- e. Check operation of cable. If sluggish operation of cable is encountered, add S-1450-24A-062 washers (34) to clip-on nut (31) to facilitate smoother cable operation.

### NOTE

Washers are to be bonded to clip-on nut with 579.6 sealer (Inmont Corp., St. Louis, Missouri), or equivalent.

### 3-34. RIGGING CABLE ASSEMBLY. (Beginning with 1981 Models.) (See figure 3-5.)

### NOTE

Make sure door latch is in OPEN position before proceeding.

- a. Cut casing of cable assembly approximately two inches from clamp (43) on push rod assembly (44).
- b. Insert core of cable through clamp (43).
- c. Pull core through clamp so that pin (29) extends approximately 1/8-inch from door pan contour.
- d. Cut core approximately one-inch forward of push rod clamp (43).
- e. Secure two nuts to push rod clamp.
- f. Operate latch several times to ensure latch works freely. If latch binds up and will not work freely, remove cable core from clamp (43) and operate latch. If latch operates easily without cable attachment, check cable for possible adjustments to facilitate ease of operation.
- g. After cable operates freely, install cover assembly (42) and recheck cable for operation.

## MODEL R182 AND TR182 SERVICE MANUAL

- 3-35. RIGGING INSIDE DOOR HANDLE. (Beginning with 1981 Models.) (See figure 3-5.)
- With latch secured to door pan, attach push rod assembly (44) to pull bar (7), and secure with pin (8). Do not install cotter pin (9).
  - Ensure that latch is in CLOSED position.
  - By removing pin (8) that connects push rod to latch base assembly, rotate rod in or out (180°) for adjustment. Adjust rod so that it takes a load of 6 pounds to 12 pounds at the end of the inner handle to move it from closed position to overcenter position.

### NOTE

Rod must be attached to latch assembly before rigging can be accomplished.

- For fine adjustment for overcentering latch assembly, proceed as follows:

### NOTE

Cabin door latch must be in OPEN position. Latch must operate smoothly and freely.

- Adjust striker plate (52) forward by installing 1212147-1 shims (53) as required so that there is a minimal clearance between bolt (12) and striker (52).

### NOTE

This adjustment will ensure that when the door is opened from the outside, the bolt will engage the latch catch, and the exterior handle will stay open until the door is closed again.

### NOTE

If cabin door is located too far forward such that the door latch will not operate, this will not allow latch assembly push rod (13) to ride up on actuator (47) and trigger the latch bolt (12), install 1212150-1 shims (48) as required beneath actuator (47), located on cover assembly (50).

- Close the cabin door from inside the aircraft. When latch is overcentered, the exterior handle should pull flush. If it does not pull flush, the connecting push rod from the door latch to the inside handle assembly should be adjusted "out" (lengthened).

### NOTE

When making this adjustment on the overcentering of the latch, it may be noticed that there is a sharp, loud canning noise when the inside handle is pushed down. It is preferred that the outside door handle be flush, even if the canning noise is noticeable.

- When adjusting push rod (44), it may need only be adjusted 1/2 turn. To accomplish this, base plate (45) should be removed.

## MODEL R182 AND TR182 SERVICE MANUAL

4. To make 1/2 turn adjustment, remove smaller end of push rod (44) and turn it over (180°). Then reinstall base plate assembly.
5. When closing cabin door from the outside, by using a large, sharp force on the outside handle, it is possible to overcenter the inside handle, thus locking one's self out. To prevent this from occurring when adjusting the push rod in step "4", adjust the push rod so there is sufficient force (6 to 12 pounds) against the inside handle to prevent it from overcentering when closing the door from the outside.
6. Do not file, grind or sand any portion of the bolt.
7. Recheck clamps that secure cable. There must not be any slippage between cable casing and clamp.
8. After overcenter adjustment has been made, install cotter pin (9) in clevis pin (8).
- e. Rivet latch base (22) to door skin with MS20426A4-3 rivets.
- f. Attach lock assembly casing (40) to door skin (39) with nut (38) provided.
- g. Install tumblers (40) and attach cam (24) to tumblers with screw and lock washer provided (36) and (37).

### NOTE

After installing cam (24), seal over head of screw (36) and washer (37) with RTV-102 (white) or RTV-103 (black) silicone rubber sealant (General Electric, Waterford, N. Y.).

- h. Operate lock several times to assure that all parts function properly.

### NOTE

Steps "f" and "h" apply to left-hand doors only.

3-36. **BAGGAGE DOOR.** (See figure 3-6.)

3-37. **REMOVAL AND INSTALLATION.**

- a. Disconnect door-stop chain (5).
- b. Remove inside door handle if installed.
- c. Remove screws securing upholstery panel and remove panel.
- d. Remove bolts securing door to hinges or remove clevis pins securing hinges to brackets.
- e. Reverse preceding steps for reinstallation.

3-38. **SEATS.** (See figure 3-7.)

3-39. **DESCRIPTION.** The seating arrangements consist of two individually adjustable four-way or six-way front seats for the pilot and copilot, and a split-backed fixed seat for the rear passengers. An auxiliary seat, if installed, is located at the aft cabin bulkhead behind the rear seat.

3-40. **REMOVAL AND INSTALLATION.**

- a. Remove seat stops from rails. (See figure 3-7, sheet 8.)
- b. Disengage seat belts by slipping buckle ends through seat belt retainer.
- c. With vertical adjust seats installed, remove cabin vent/carpet retainer.
- d. Crank vertical adjust seats to their maximum height.
- e. Slide seats forward to disengage front rollers from seat rails.
- f. Slide seats aft to disengage rear rollers from seat rails.
- g. Lift seat out.
- h. Reverse preceding steps for installation. Ensure all seat stops are properly installed.

# MODEL R182 AND TR182 SERVICE MANUAL

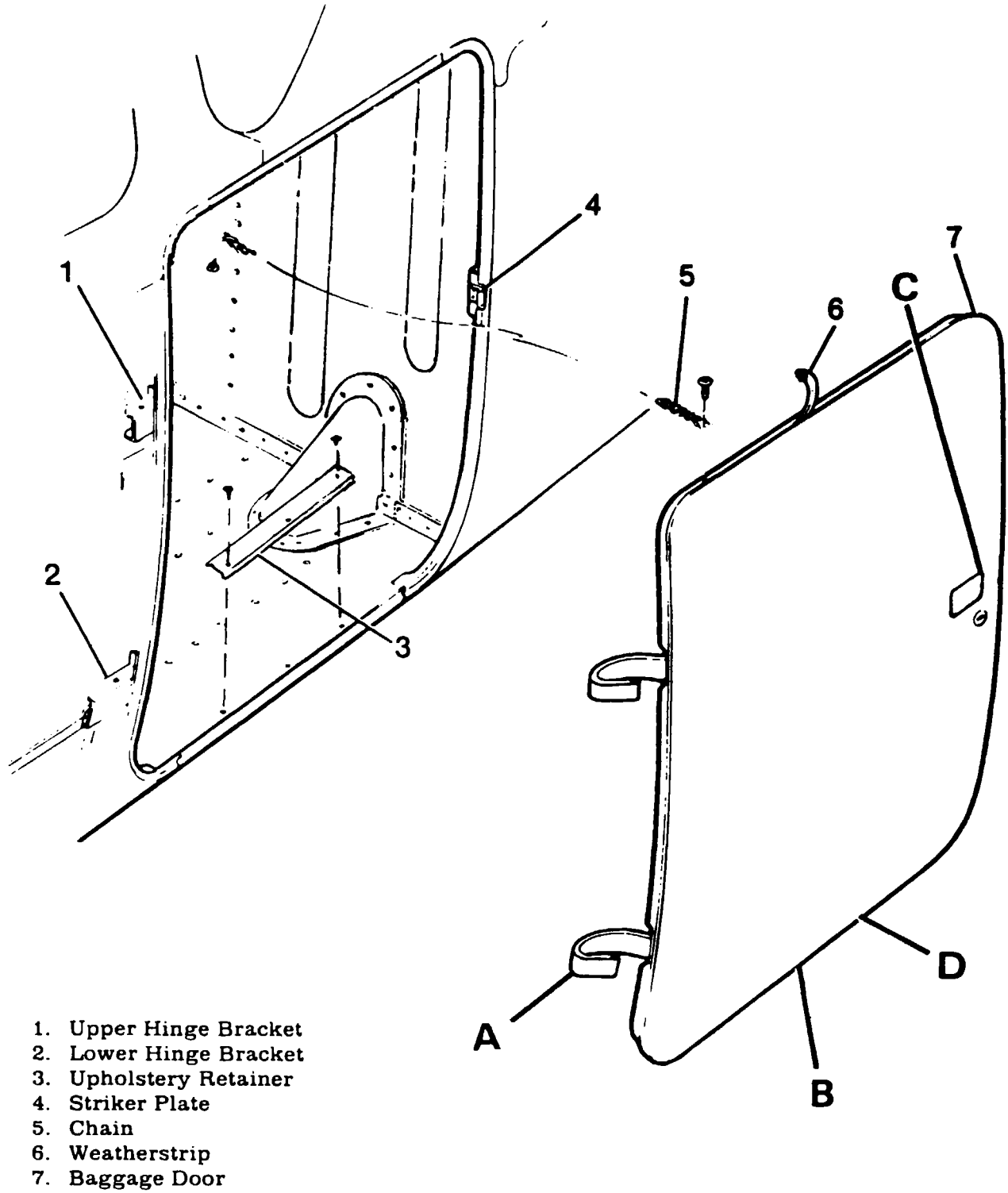
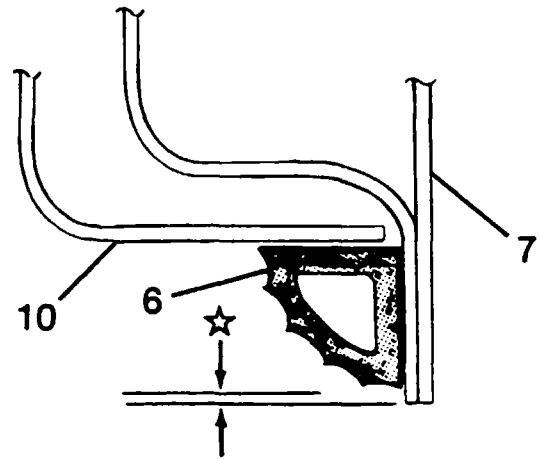
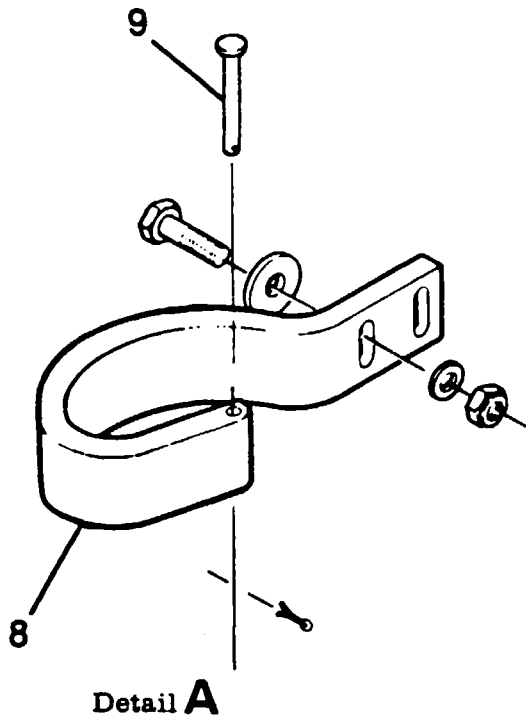


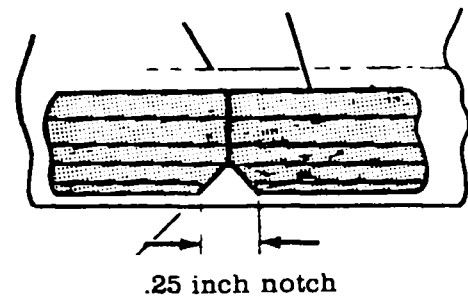
Figure 3-6. Baggage Door Installation (Sheet 1 of 2)

MODEL R182 AND TR182 SERVICE MANUAL

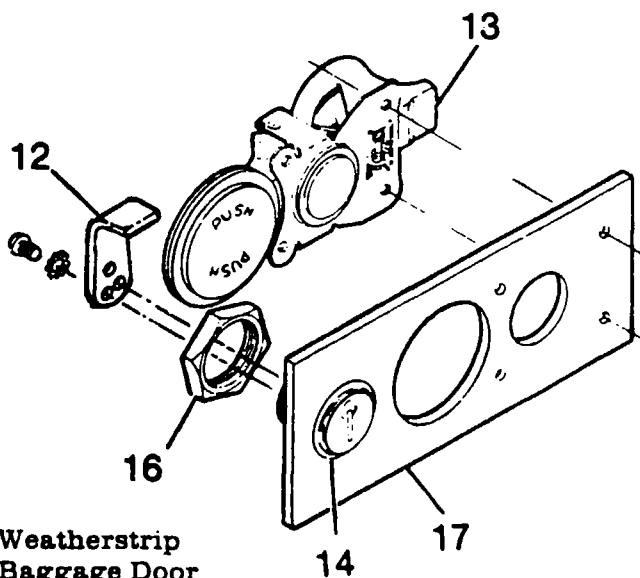


☆ As required for proper sealing of door  
(Typical entire perimeter)

Detail B



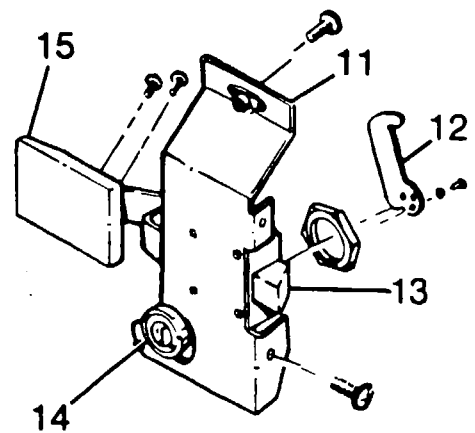
Detail D



- 6. Weatherstrip
- 7. Baggage Door
- 8. Hinge
- 9. Clevis Pin
- 10. Trim Panel
- 11. Support Assembly
- 12. Cam
- 13. Latch Assembly
- 14. Lock Assembly
- 15. Latch Handle
- 16. Nut
- 17. Mounting Pad

R18201358 & ON  
FR18200056 & ON

Detail C



R18200001 THRU R18201357  
FR18200001 THRU FR18200055

Figure 3-6. Baggage Door Installation (Sheet 2 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

## WARNING

It is extremely important that the pilot's seat stops are installed, since acceleration and deceleration could possibly permit seat to become disengaged from the seat rails and create a hazardous situation, especially during takeoff and landing.

- 3-41. **MECHANICAL LOCK CONTROL ASSEMBLY.** (See figure 3-7, sheets 2 and 5.)
- 3-42. **DESCRIPTION.** A mechanical lock control assembly is installed on pilot and copilot seats and on the rear seat assembly beginning with R18201314 and FR18200064. The front seat lock control is longer than the rear seat lock control. The lock control assembly facilitates seat lock control. The lock control assembly facilitates seat reclining adjustment. When the control is activated, an internal spring is released, enabling the occupant to recline the seat to the desired angle. When the control is released, the internal spring expands, locking the seat in the desired reclined position. When the control is reactivated, the seat returns to the original vertical position.
- 3-43. **ADJUSTMENT.** (See figure 3-7, sheet 2 and 5.) Rotate adjusting nut (2) to adjust control wire (4) output stroke after seat is installed.
- 3-44. **REAR PASSENGERS' SEAT.**
- 3-45. **DESCRIPTION.** The rear passengers' seat consists of a fixed, one-piece seat bottom with infinitely adjustable seat backs.
- 3-46. **REMOVAL AND INSTALLATION.**
- Remove bolts securing seat to cabin structure.
  - Lift seat out.
  - Reverse preceding steps for installation.
- 3-47. **AUXILIARY SEAT.** (See figure 3-7, sheet 7.)
- 3-48. **DESCRIPTION.** The auxiliary seat consists of a fixed, one-piece seat bottom and a fixed, one-piece seat back. The seat is secured to brackets mounted in the floorboard.
- 3-49. **CAM REPLACEMENT.** Be certain that replacement part conforms to dimensions shown in figure 3-8 before installing. Cam replacement consists of the following procedures:
- Remove seat from aircraft.
  - Remove plastic upholstery panels from aft side of seat back, loosen upholstery retaining rings and material as necessary to expose rivets retaining old cam assembly.
  - Drill out existing rivets, and insert new cam assembly. Position seat back so pawl engages first cam slot as illustrated.
  - Position cam so each slot bottom aligns with the 2.50" radius as illustrated.
  - Clamp securely in this position and check travel of cam. Pawl must contact bottom of each cam slot. Using existing holes in seat frame, drill through new cam and secure with MS20470AD6 rivets.
  - Reinstall upholstery, upholstery panels, and seat.
- 3-50. **REPAIR.** Replacement of defective parts is recommended in repair of seats. However, a cracked framework may be welded, provided the crack is not in an area of stress concentration (close to a hinge or bearing point). The square-type framework is 6061 aluminum, heat-

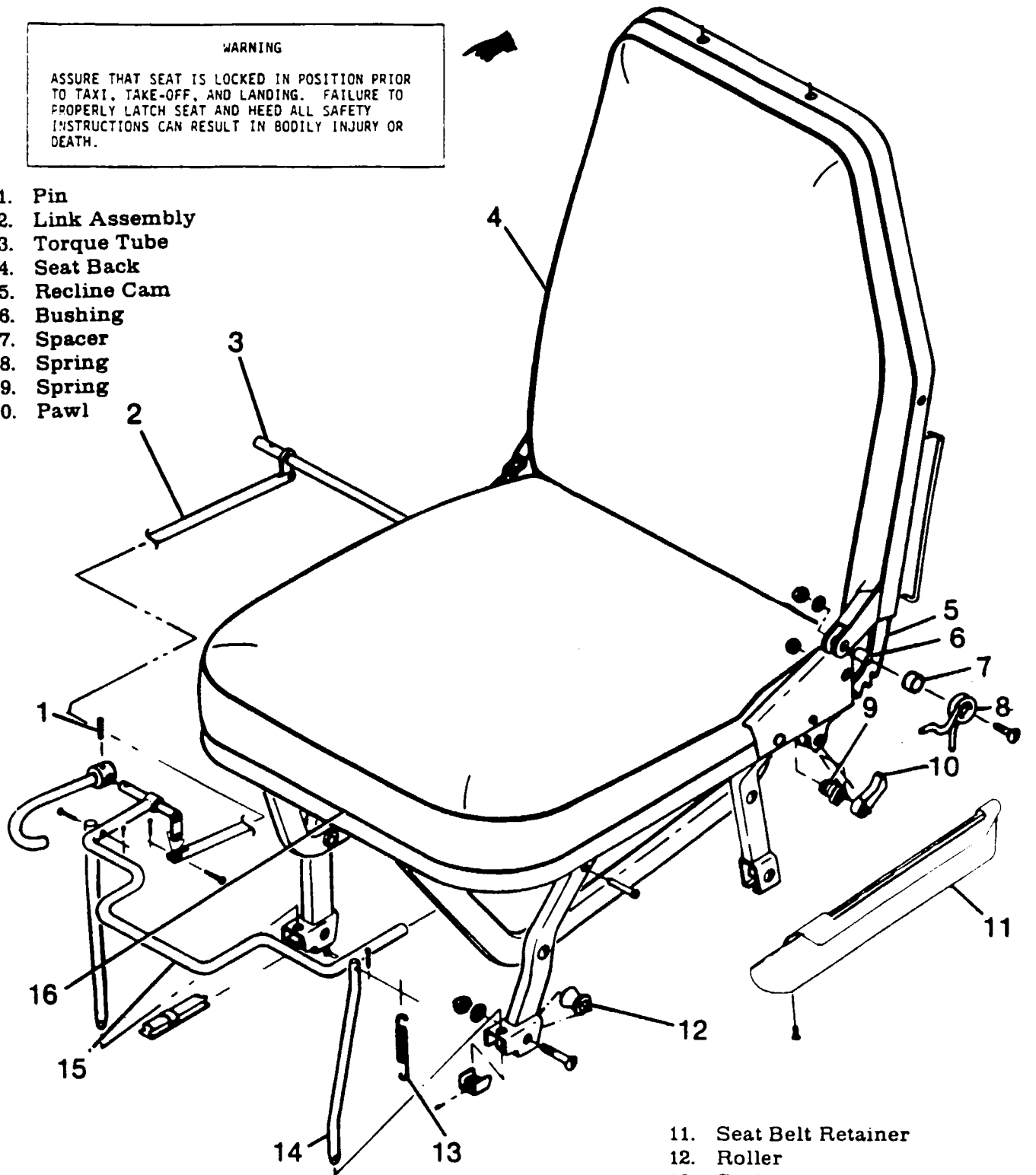


# MODEL R182 AND TR182 SERVICE MANUAL

## WARNING

ASSURE THAT SEAT IS LOCKED IN POSITION PRIOR TO TAXI, TAKE-OFF, AND LANDING. FAILURE TO PROPERLY LATCH SEAT AND HEED ALL SAFETY INSTRUCTIONS CAN RESULT IN BODILY INJURY OR DEATH.

1. Pin
2. Link Assembly
3. Torque Tube
4. Seat Back
5. Recline Cam
6. Bushing
7. Spacer
8. Spring
9. Spring
10. Pawl



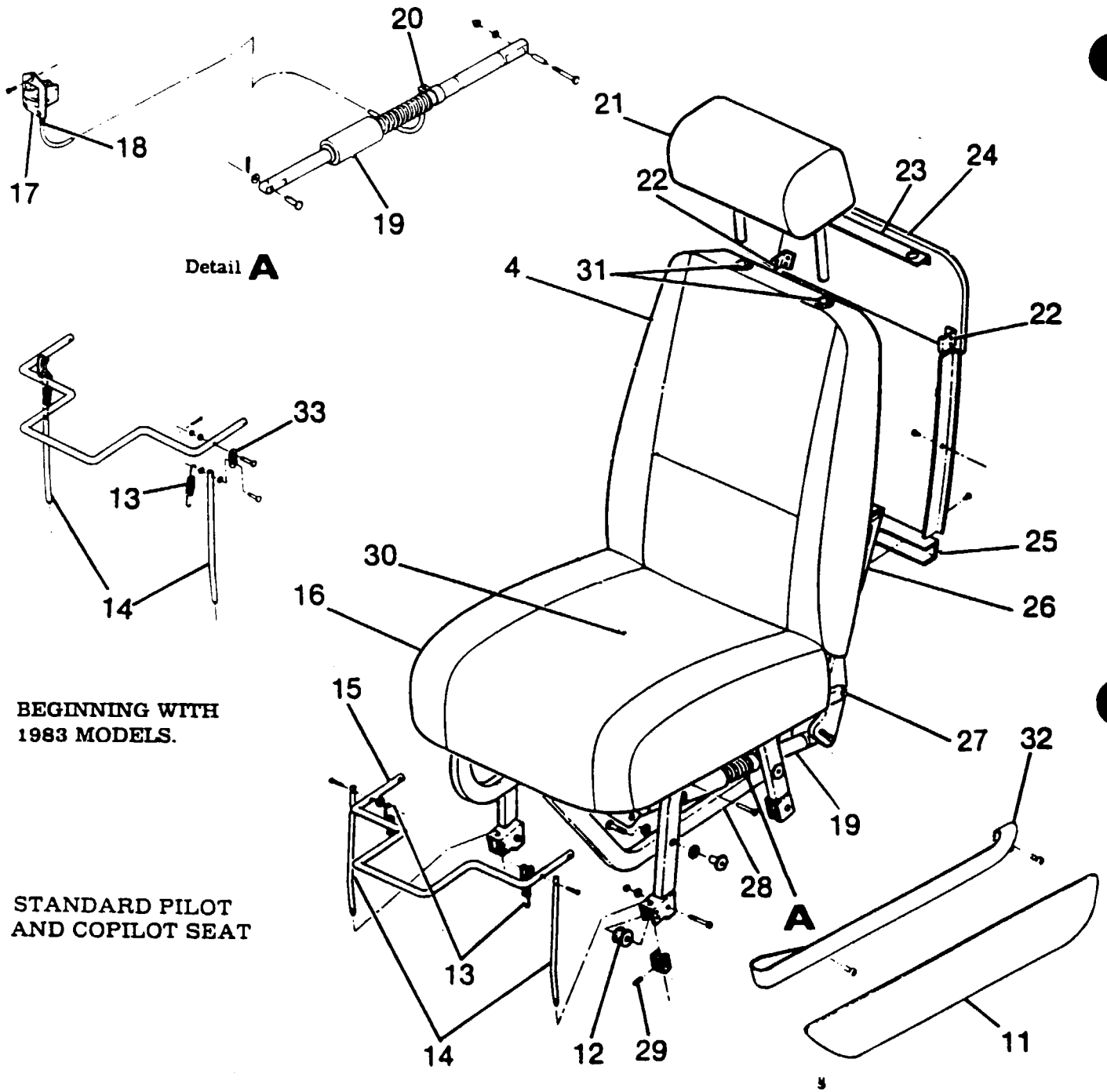
## STANDARD PILOT AND COPILOT SEAT

R18200001 thru R18201313  
FR1820001 thru FR18200045  
TR18200534 thru TR18201313

11. Seat Belt Retainer
12. Roller
13. Spring
14. Adjustment Pin
15. Fore/ Aft Adjustment Handle
16. Seat Bottom

Figure 3-7. Seat Installation (Sheet 1 of 8)

# MODEL R182 AND TR182 SERVICE MANUAL



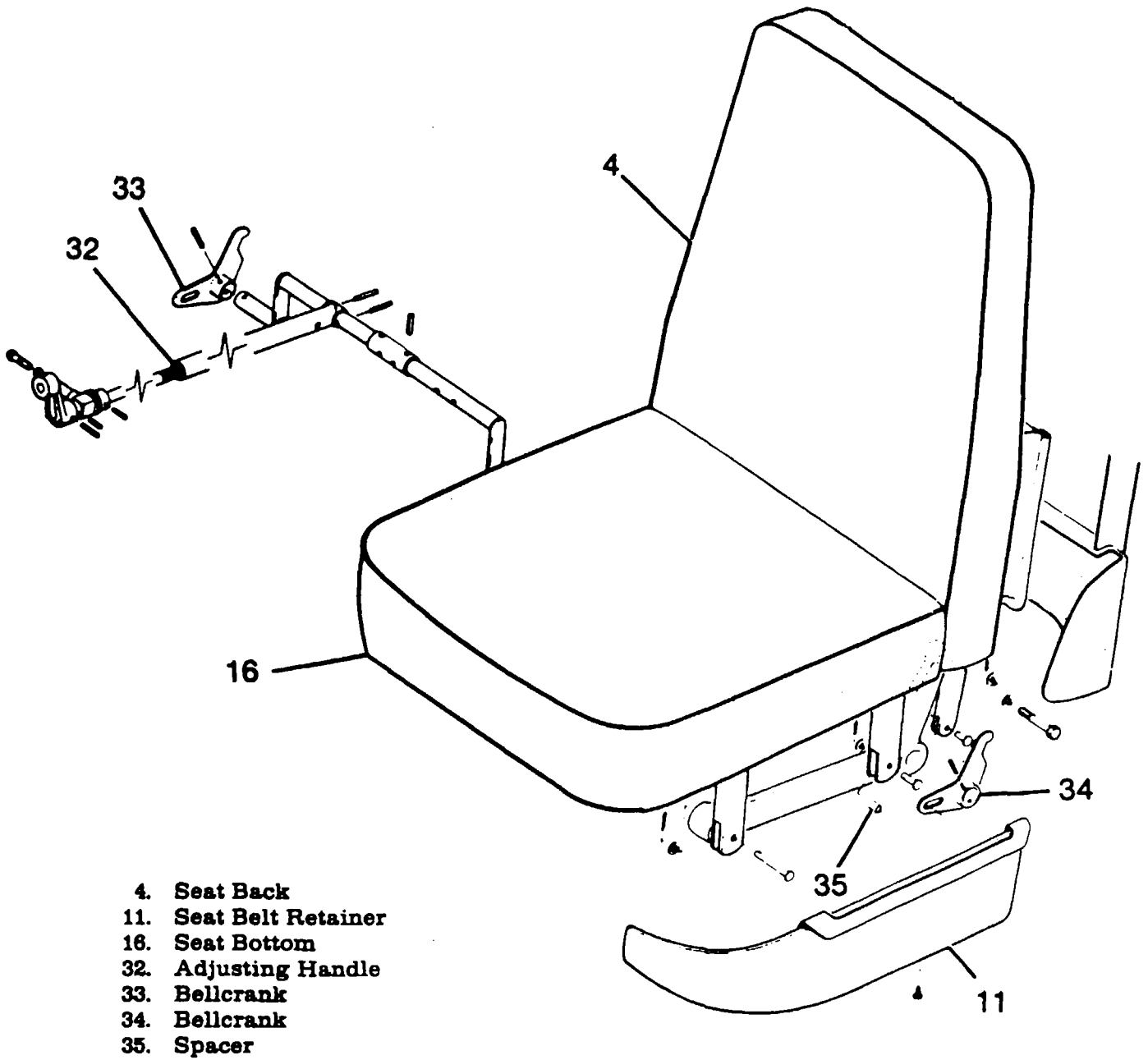
BEGINNING WITH 1983 MODELS.

STANDARD PILOT AND COPILOT SEAT

BEGINNING WITH 1980 MODELS

- |                                    |                      |                        |
|------------------------------------|----------------------|------------------------|
| 4. Seat Back                       | 21. Head Rest        | 27. Bolt               |
| 11. Seat Belt Retainer Trim        | 22. Bracket          | 28. Seat Frame         |
| 12. Roller                         | 23. Bracket          | 29. Roll Pin           |
| 13. Spring                         | 24. Former           | 30. Cushion            |
| 14. Adjustment Pin                 | 25. Seat Back Trim   | 31. Grommet            |
| 15. Fore-and-Aft Adjustment Handle | 26. Seat Back Pocket | 32. Seat Belt Retainer |
| 16. Seat Bottom                    |                      | 33. Link               |
| 17. Mechanical Control             |                      |                        |
| 18. Adjusting Nut                  |                      |                        |
| 19. Mechanical Lock                |                      |                        |
| 20. Control Wire                   |                      |                        |

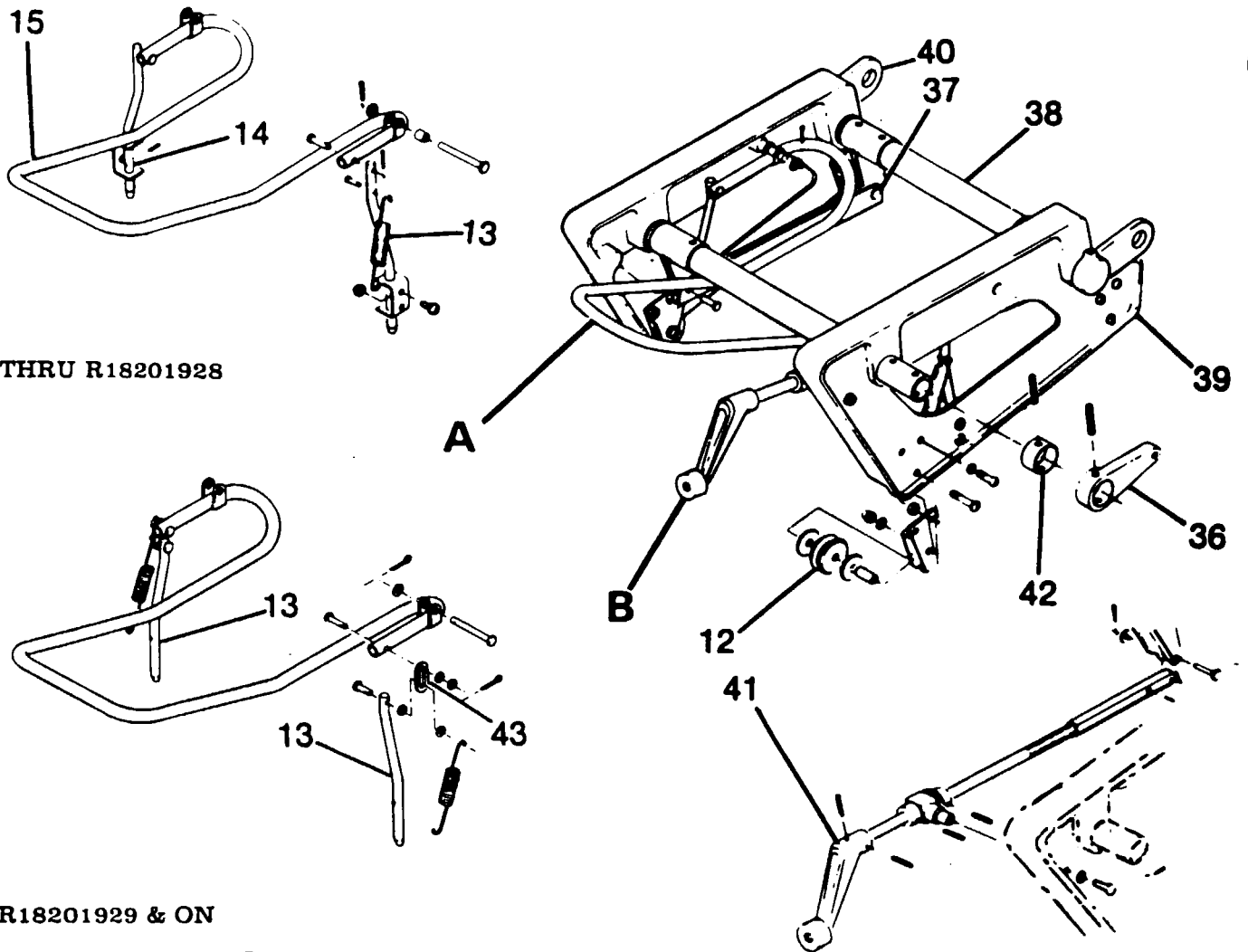
Figure 3-7. Seat Installation (Sheet 2 of 8)



INFINITE ADJUST FRONT SEAT

Figure 3-7. Seat Installation (Sheet 3 of 8)

# MODEL R182 AND TR182 SERVICE MANUAL



THRU R18201928

R18201929 & ON

Detail **A**

Detail **B**

- 12. Roller
- 13. Spring
- 14. Adjustment Pin
- 15. Fore-and-Aft Adjustment Handle
- 36. Bellcrank
- 37. Channel
- 38. Torque Tube
- 39. Seat Structure
- 40. Bellcrank
- 41. Vertical Adjustment Handle
- 42. Collar
- 43. Link

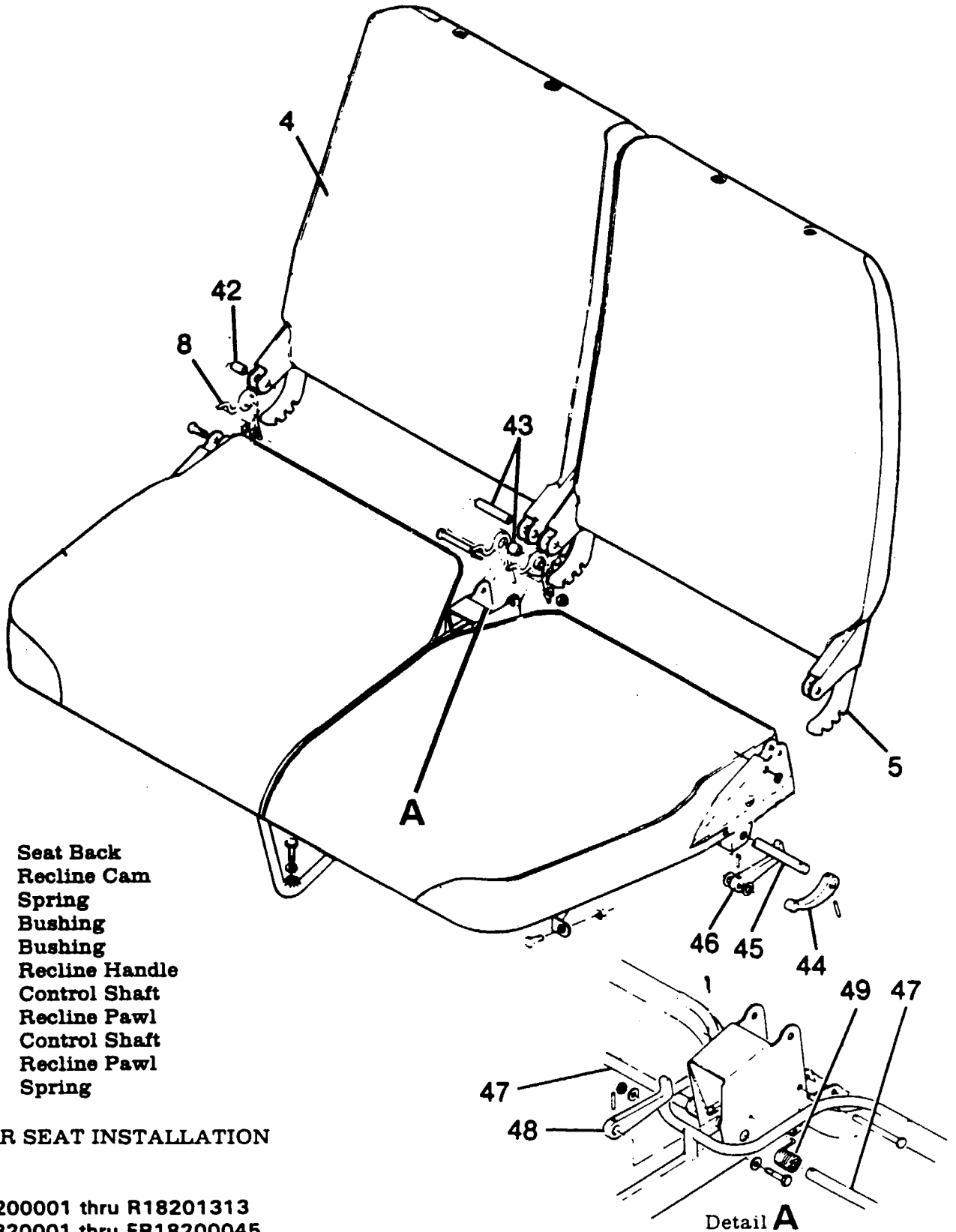
## NOTE

Beginning with TR182, R18200889 and FR18200035, bellcrank (36) with extended boss is used. Collar (42) is deleted (typical 2 places).

## INFINITE ADJUST FRONT SEAT DETAILS

Figure 3-7. Seat Installation (Sheet 4 of 8)

MODEL R182 AND TR182 SERVICE MANUAL



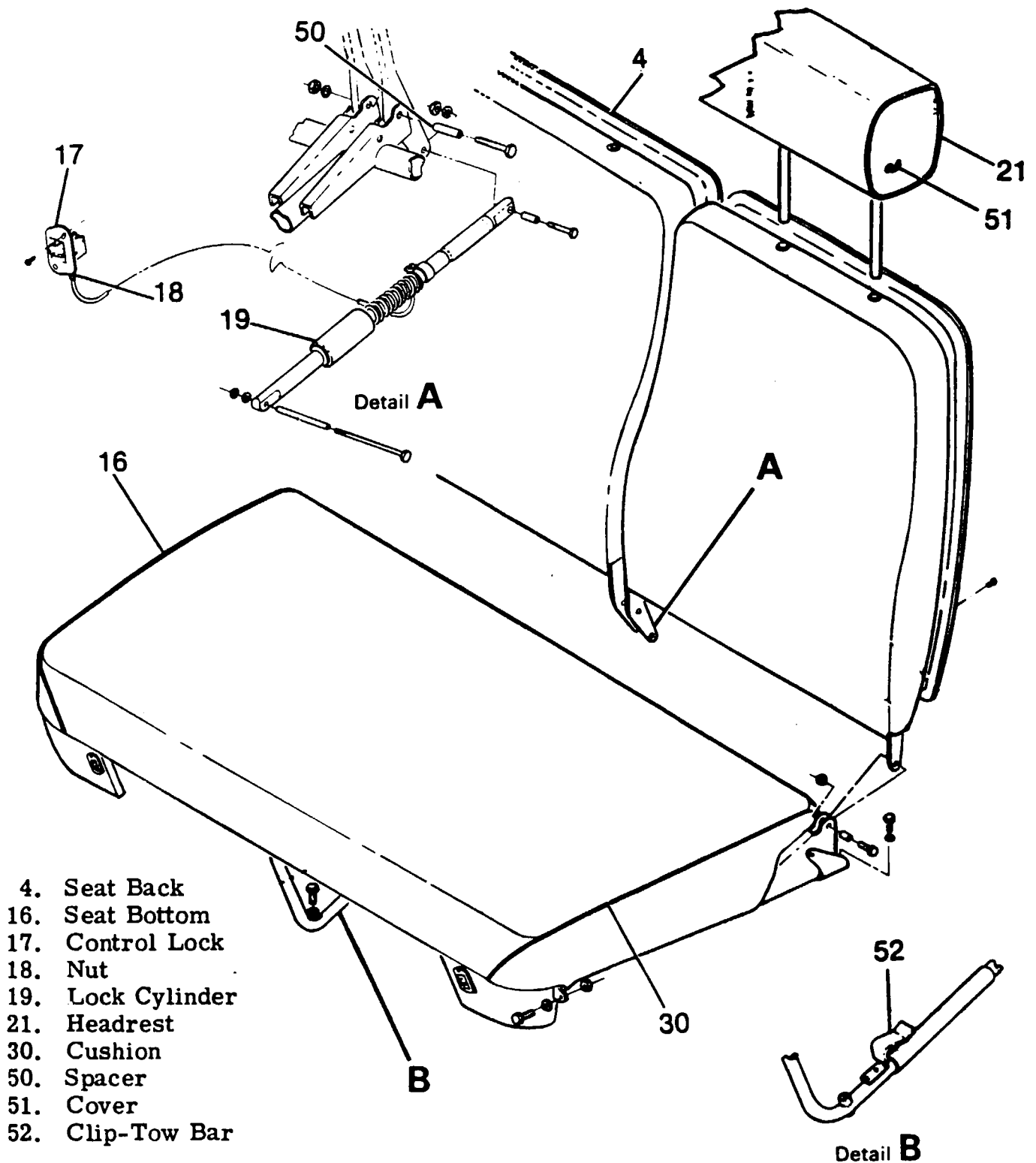
- 4. Seat Back
- 5. Recline Cam
- 8. Spring
- 42. Bushing
- 43. Bushing
- 44. Recline Handle
- 45. Control Shaft
- 46. Recline Pawl
- 47. Control Shaft
- 48. Recline Pawl
- 49. Spring

REAR SEAT INSTALLATION

R1820001 thru R18201313  
FR1820001 thru FR18200045  
TR18200534 thru TR18201313

Figure 3-7. Seat Installation (Sheet 5 of 8)

MODEL R182 AND TR182 SERVICE MANUAL



- 4. Seat Back
- 16. Seat Bottom
- 17. Control Lock
- 18. Nut
- 19. Lock Cylinder
- 21. Headrest
- 30. Cushion
- 50. Spacer
- 51. Cover
- 52. Clip-Tow Bar

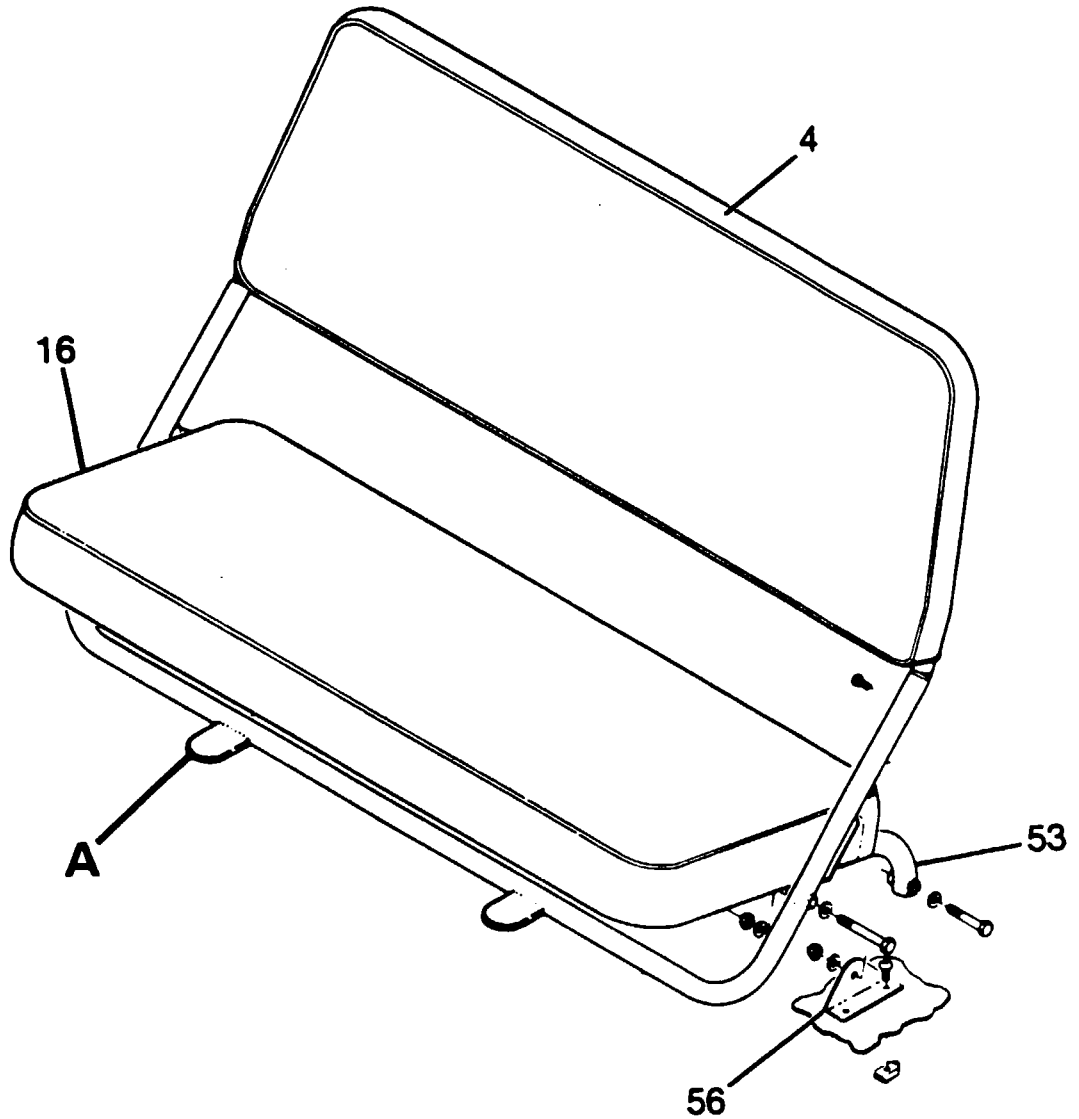
REAR SEAT INSTALLATION

BEGINNING WITH 1982 MODELS

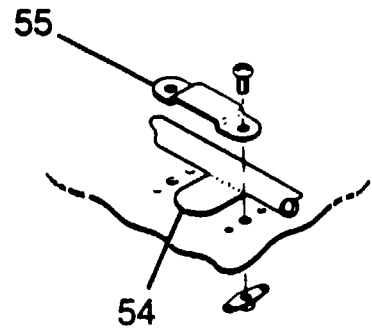
BEGINNING WITH R18201314  
& FR18200046

Figure 3-7. Seat Installation (Sheet 6 of 8)

MODEL R182 AND TR182 SERVICE MANUAL



- 4. Seat Back
- 16. Seat Bottom
- 53. Seat Bottom Structure
- 54. Tab
- 55. Retainer
- 56. Bracket



Detail A

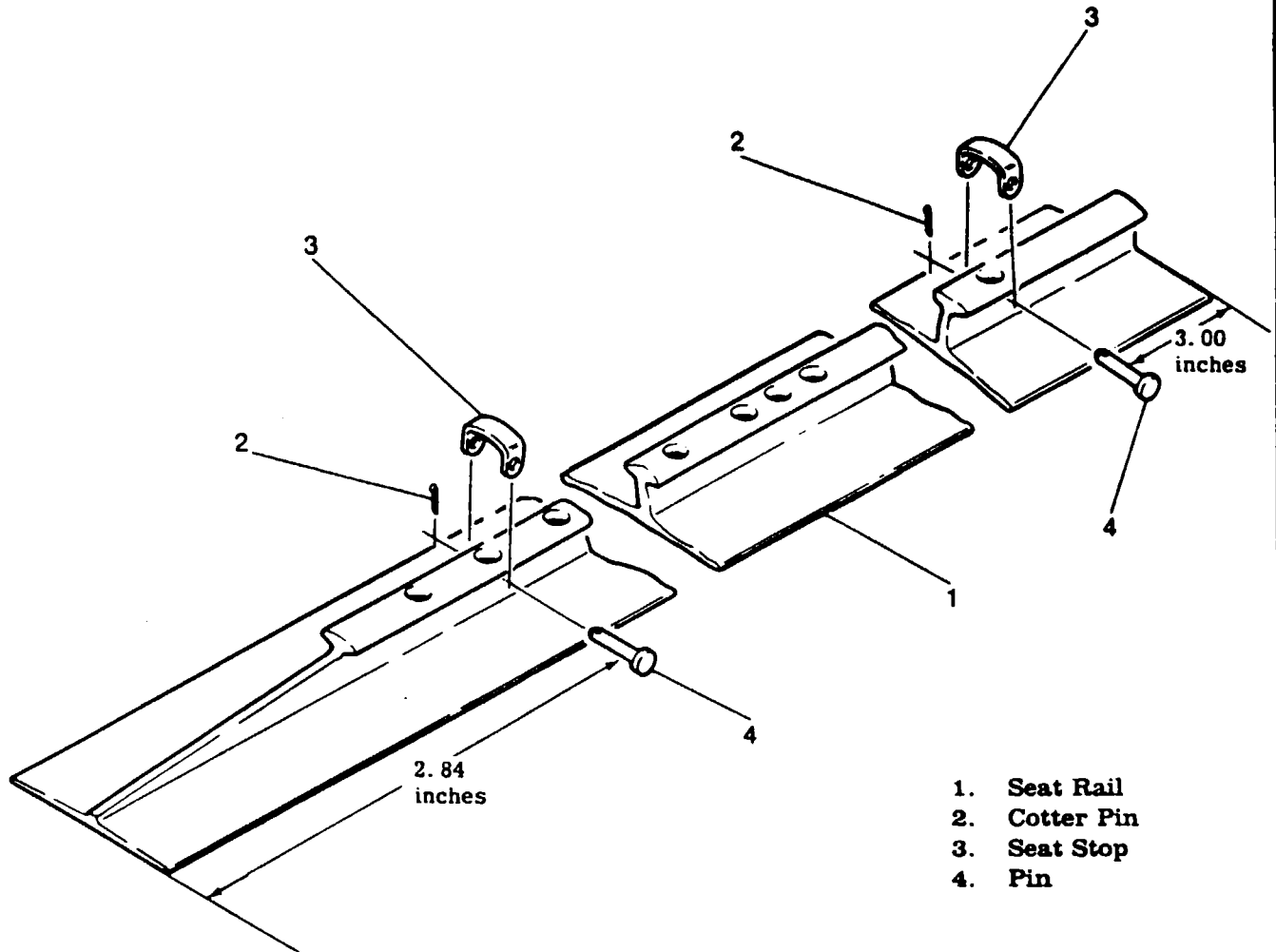
AUXILIARY SEAT INSTALLATION

Figure 3-7. Seat Installation (Sheet 7 of 8)

# MODEL 182 & T182 SERIES SERVICE MANUAL

## SEAT STOP INSTALLATION FOR MODEL R182 & TR182

**NOTE**  
INSTALL SEAT STOPS IN FORWARD AND  
AFT HOLES OF INBOARD SEAT RAILS



### **WARNING**

IT IS EXTREMELY IMPORTANT THAT PILOT'S SEAT STOPS ARE INSTALLED, SINCE ACCELERATION, AND DECELERATION COULD POSSIBLY PERMIT SEAT TO BECOME DISENGAGED FROM SEAT RAILS AND CREATE A HAZARDOUS SITUATION, ESPECIALLY DURING TAKEOFF AND LANDING.

Figure 3-7. Seat Installation (Sheet 8 of 8)



MODEL R182 AND TR182 SERVICE MANUAL

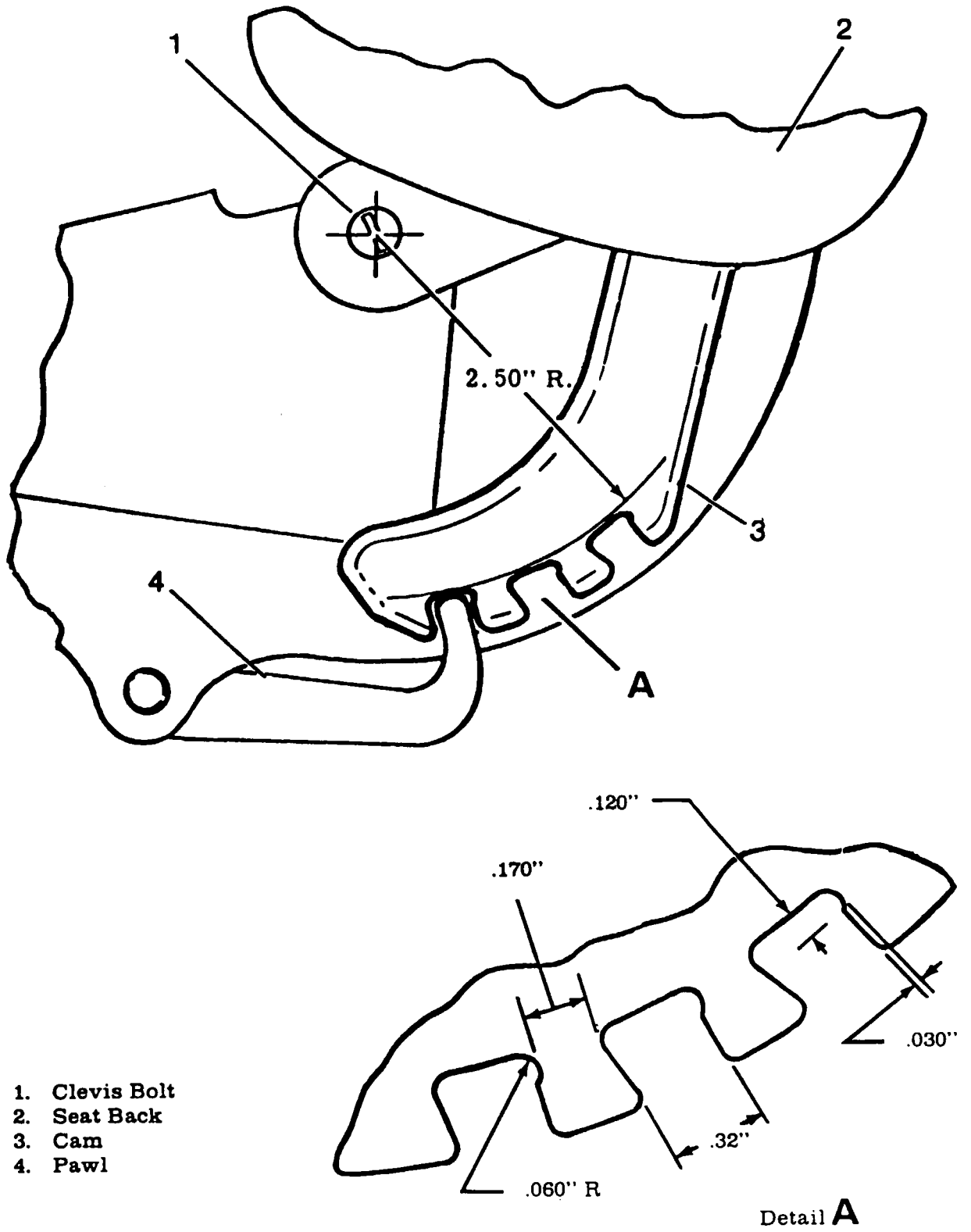


Figure 3-8. Seat Back Cam Replacement

## MODEL R182 AND TR182 SERVICE MANUAL

treated to a T-6 condition. Use a heliarc weld on these seats, as torch welds will destroy heat-treatment of frame structure. Figure 3-8 outlines instructions for replacing defective cams on reclining seat backs.

- 3-51. **CABIN UPHOLSTERY.** Due to the wide selection of fabrics, styles and colors, it is impossible to depict each particular type of upholstery. The following paragraphs describe general procedures which will serve as a guide in removal and replacement of upholstery. Major work if possible, should be done by an experienced mechanic. If the work must be done by a mechanic unfamiliar with upholstery practices, the mechanic should make careful notes during removal of each item to facilitate replacement later.

### NOTE

Repair kits are available for the repair of cracks in ABS, PBC, PVC, graphite and fiberglass material. (Cessna Supply Division, P.O. Box 949, Wichita, KS 67201, 316/685-9111, Telex 417-489.)

- 3-52. **MATERIALS AND TOOLS.** Materials and tools will vary with the job. Scissors for trimming upholstery to size and a dull-bladed putty knife for wedging material beneath retainer strips are the only tools required for most trim work. Use industrial rubber cement to hold soundproofing mats and fabric edges in place. Refer to Section 18 for thermo-plastic repairs.
- 3-53. **SOUNDPROOFING.** The aircraft is insulated with spun glass mat-type insulation and a sound proofing compound applied to inner surfaces of skin in most areas of cabin and baggage compartment. All soundproofing material should be replaced in its original position any time it is removed.
- 3-54. **CABIN HEADLINER.** (See figure 3-9.)

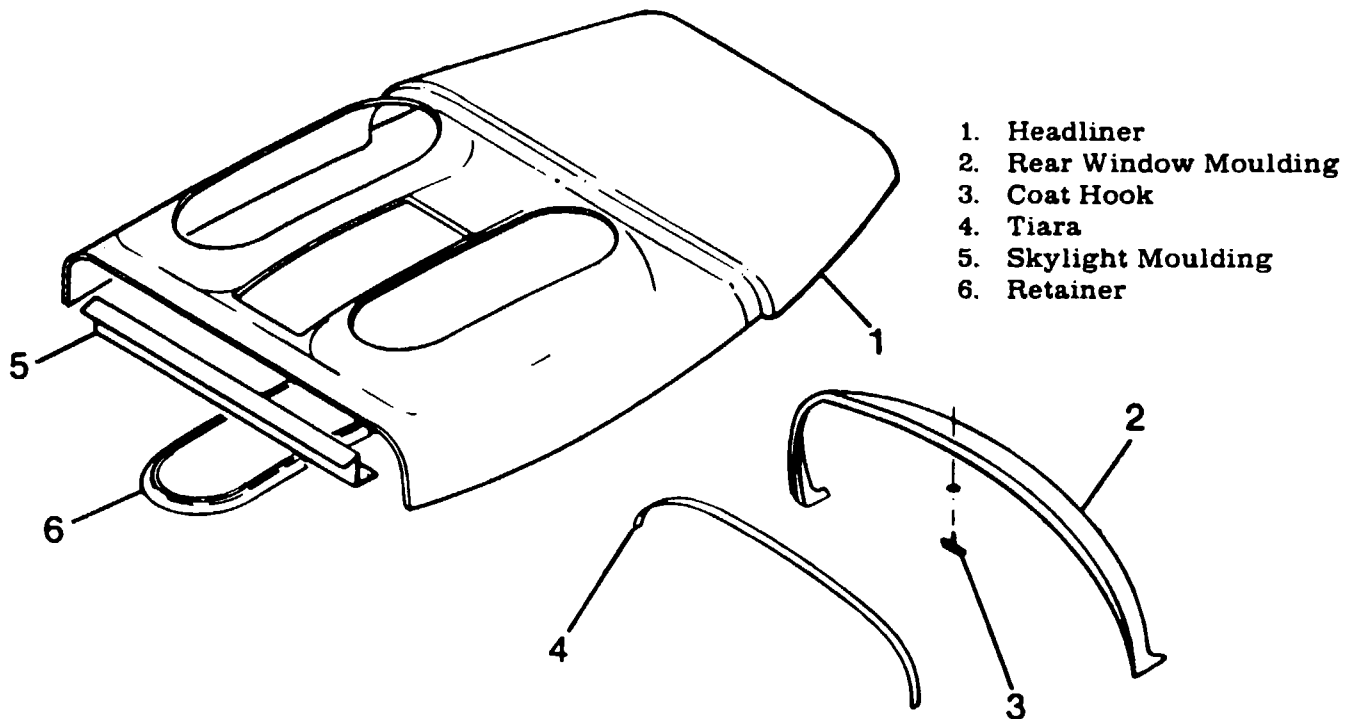


Figure 3-9. Cabin Headliner Installation

## MODEL R182 AND TR182 SERVICE MANUAL

- 3-55. **REMOVAL AND INSTALLATION.**
- a. Remove sun visors, all inside finish strips and plates, overhead console, upper doorpost shields and any other visible retainers securing headliner.
  - b. Remove molding from fixed windows.
  - c. Remove screws securing headliner and carefully take down headliner.
  - d. Remove spun glass soundproofing panels above headliner.

### NOTE

The lightweight soundproofing panels are held in place with industrial rubber cement.

- e. Reverse preceding steps for reinstallation. Before installation, check all items concealed by headliner for security. Use wide cloth tape to secure loose wires to fuselage and to seal openings in wing roots.
- 3-56. **UPHOLSTERY SIDE PANELS.** Removal of upholstery side panels is accomplished by removing seats for access. Remove screws, retaining strips, arm rests and ash trays as required to free panels. Automotive type spring clips attach most door panels. A dull putty knife makes an excellent tool for prying clips loose. When installing side panels, do not over-tighten screws. Larger screws may be used in enlarged holes as long as area behind hole is checked for electrical wiring, fuel lines and other components which might be damaged by using a longer screw.
- 3-57. **CARPETING.** Some cabin area and baggage compartment carpeting is held in place by rubber cement, small sheet metal screws and retaining strips, some carpeting is secured by Velcro fasteners for quick-removal and inspection. When fitting a new carpet, use the old one as a pattern for trimming.
- 3-58. **SAFETY PROVISIONS.**
- 3-59. **CARGO TIE-DOWNS.** Cargo tie-down eyebolts are used to retain baggage. Tie-downs are illustrated in figure 3-10. A baggage net can be used in conjunction with the tie-downs, as straps can hold luggage secured in baggage area. The eyebolt and nutplate can be located at various points.
- 3-60. **SAFETY BELTS.** Safety belts should be replaced if frayed or cut, latches are defective or stitching is broken. Attaching parts should be replaced if worn excessively or defective. The front seat safety belts are attached to brackets bolted to the cabin floor, and the center seat safety belts are attached to the seats themselves. The auxiliary seat is provided with only one safety belt, which is snapped into clips bolted to the aircraft structure. See figure 3-11. A seat belt shortener kit is available for aircraft serials R18200001 thru R18201798. (See SK172-76.)
- 3-61. **SHOULDER HARNESS.** An individual shoulder harness may be installed for each seat except the auxiliary seat. The pilot and copilot harnesses are bolted to the upper rear doorposts, and the center seat harnesses are bolted to the aft cabin structure. Component parts should be replaced as outlined in paragraph 3-60. An inertia reel type harness may be installed as optional equipment for the pilot and copilot seats. See figure 3-11
- 3-62. **REAR VIEW MIRROR.** A rear view mirror may be installed on the cowl deck above instrument panel. Figure 3-13 shows details for rear view mirror installation thru serial R18200583.
- 3-63. **SEAT RAIL INSPECTION.** A special inspection of seat rails should be conducted each 50 hours. See figure 3-14 for inspection procedures.

MODEL R182 AND TR182 SERVICE MANUAL

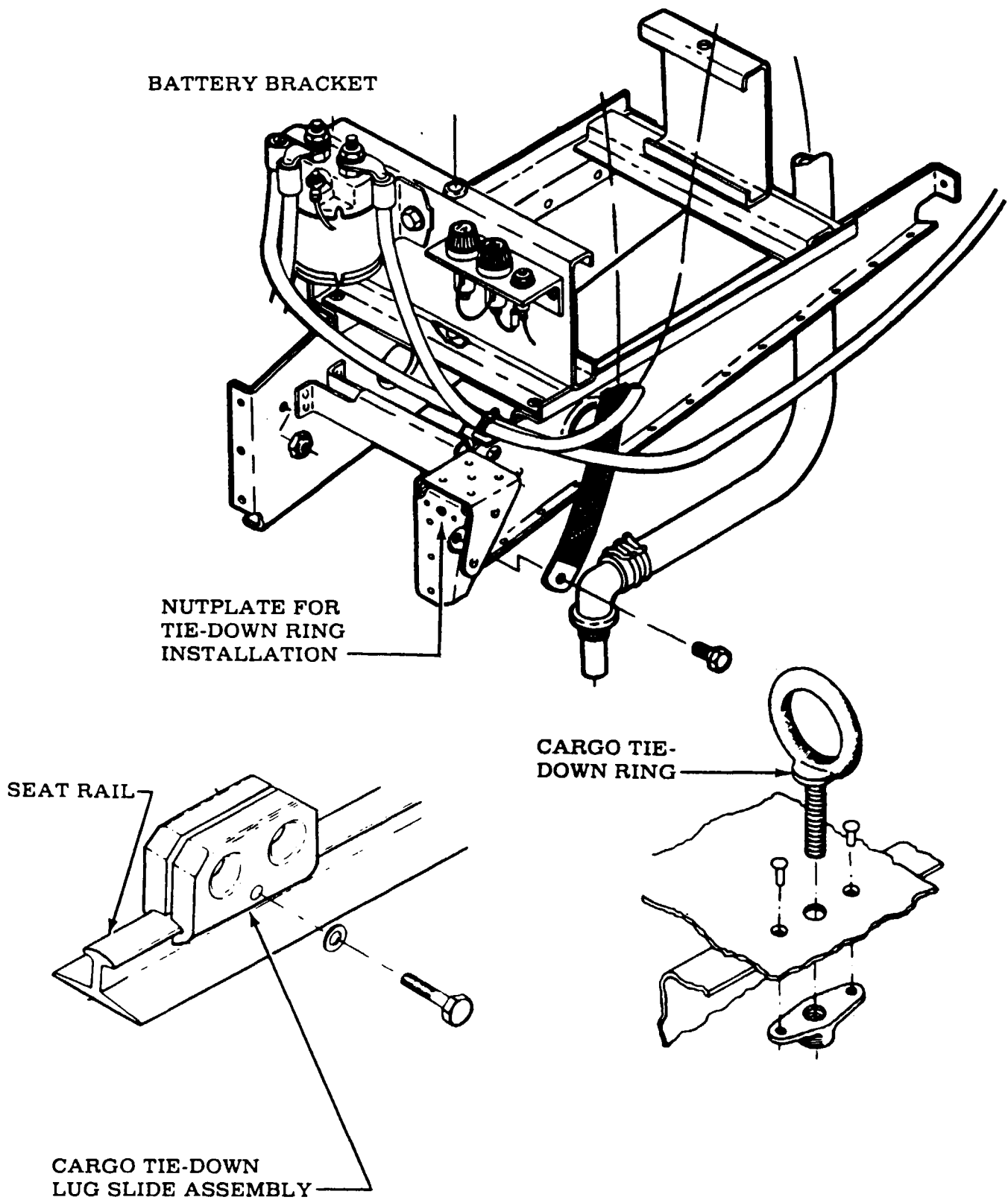
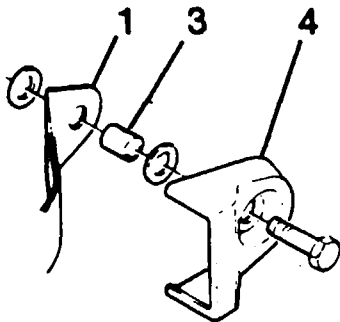
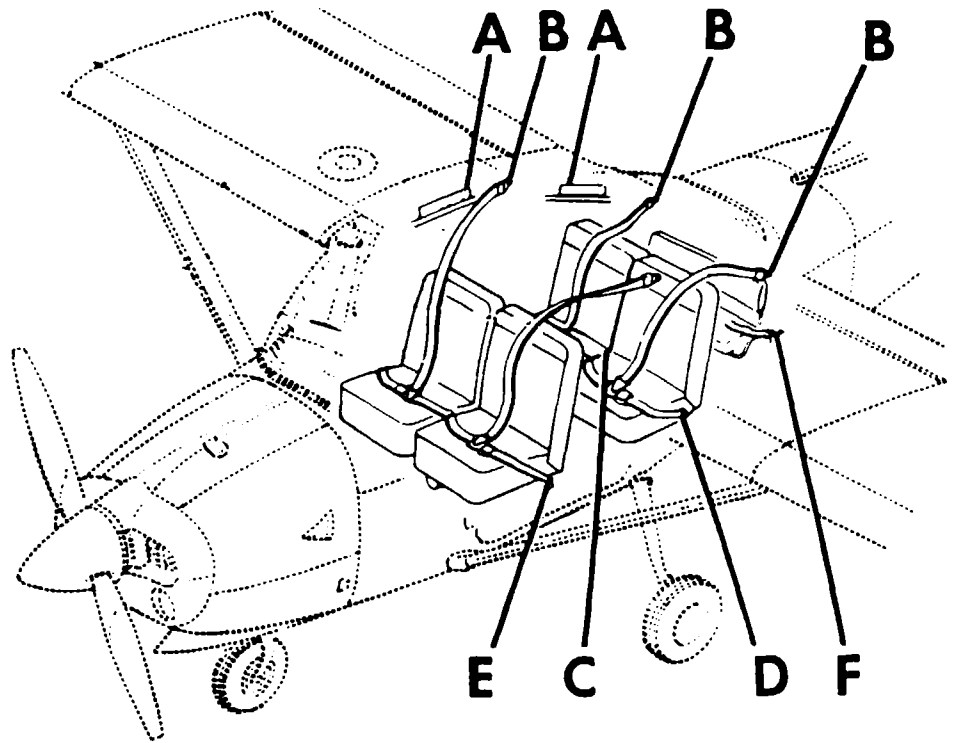
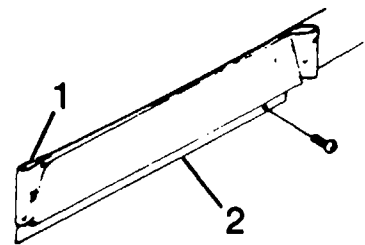


Figure 3-10. Cargo Tie-Downs

MODEL R182 AND TR182 SERVICE MANUAL



Detail B



Detail A

- 1. Shoulder Harness
- 2. Shoulder Harness Stowage Tray
- 3. Spacer
- 4. Shoulder Harness Fitting Cover

Figure 3-11. Seat Belts and Shoulder Harness Installation (Sheet 1 of 4)

# MODEL R182 AND TR182 SERVICE MANUAL

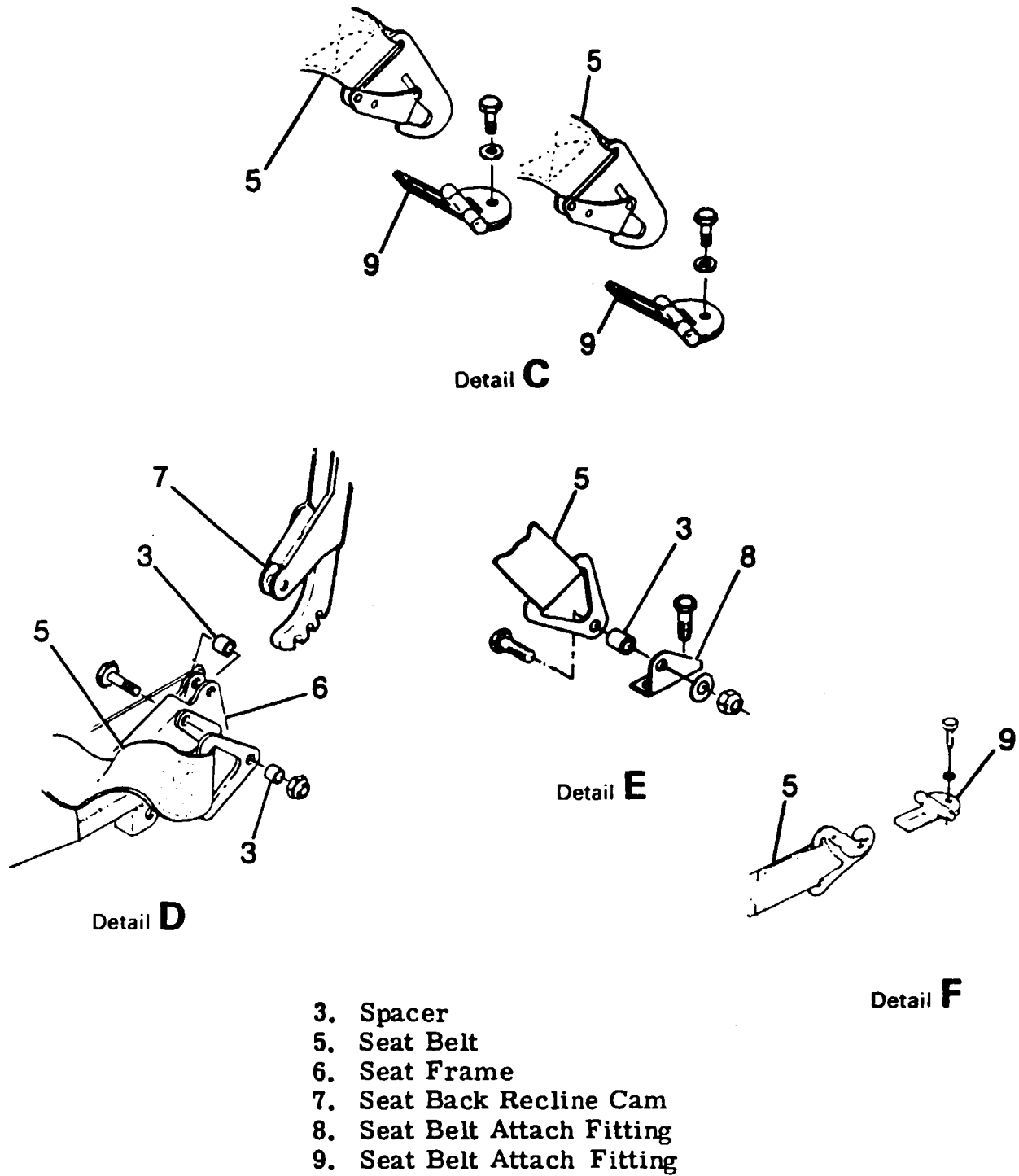
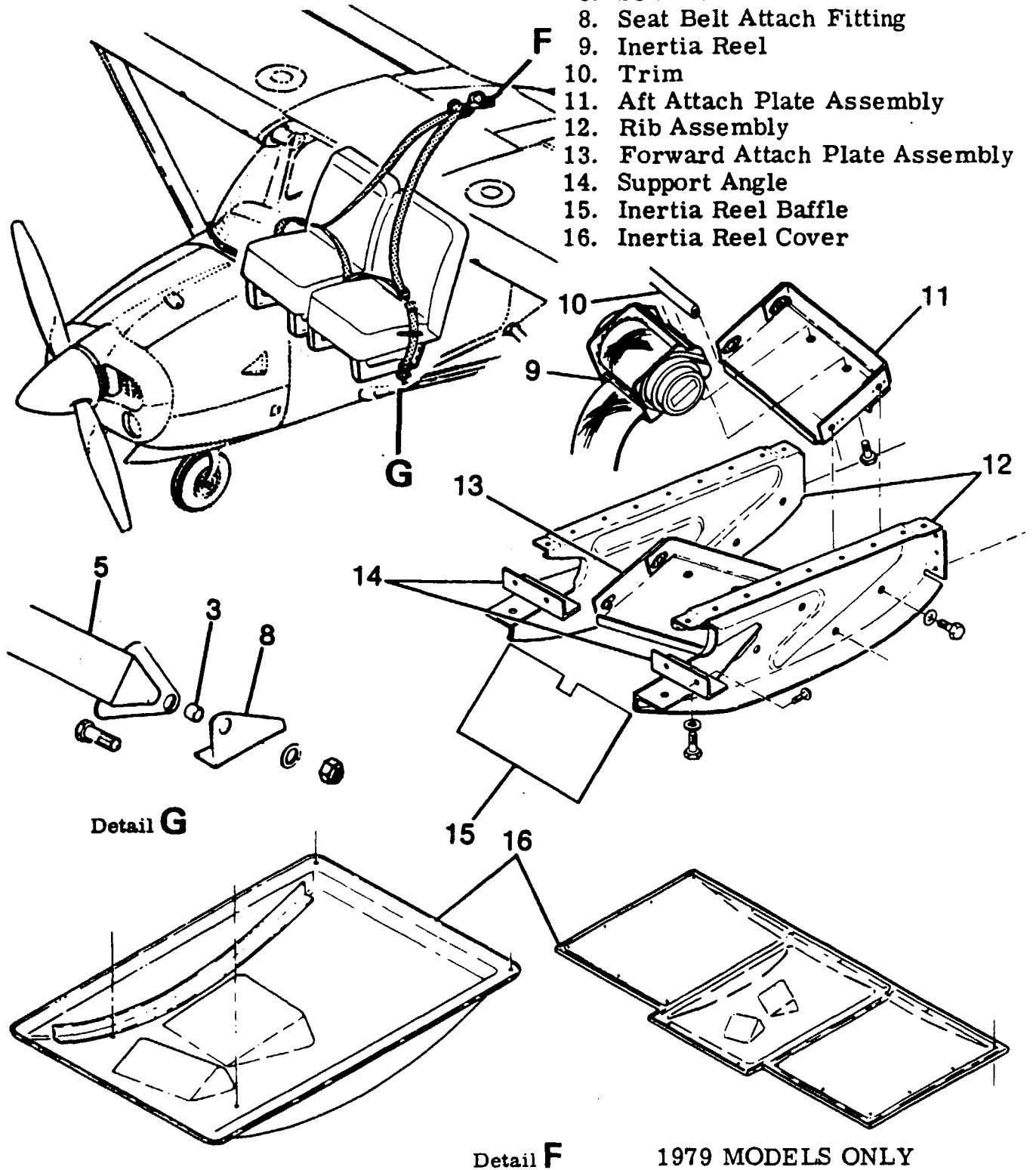


Figure 3-11. Seat Belts and Shoulder Harness Installation (Sheet 2 of 4)

MODEL R182 AND TR182 SERVICE MANUAL

1978 THRU 1982 MODELS

- 3. Spacer
- 5. Seat Belt
- 8. Seat Belt Attach Fitting
- 9. Inertia Reel
- 10. Trim
- 11. Aft Attach Plate Assembly
- 12. Rib Assembly
- 13. Forward Attach Plate Assembly
- 14. Support Angle
- 15. Inertia Reel Baffle
- 16. Inertia Reel Cover

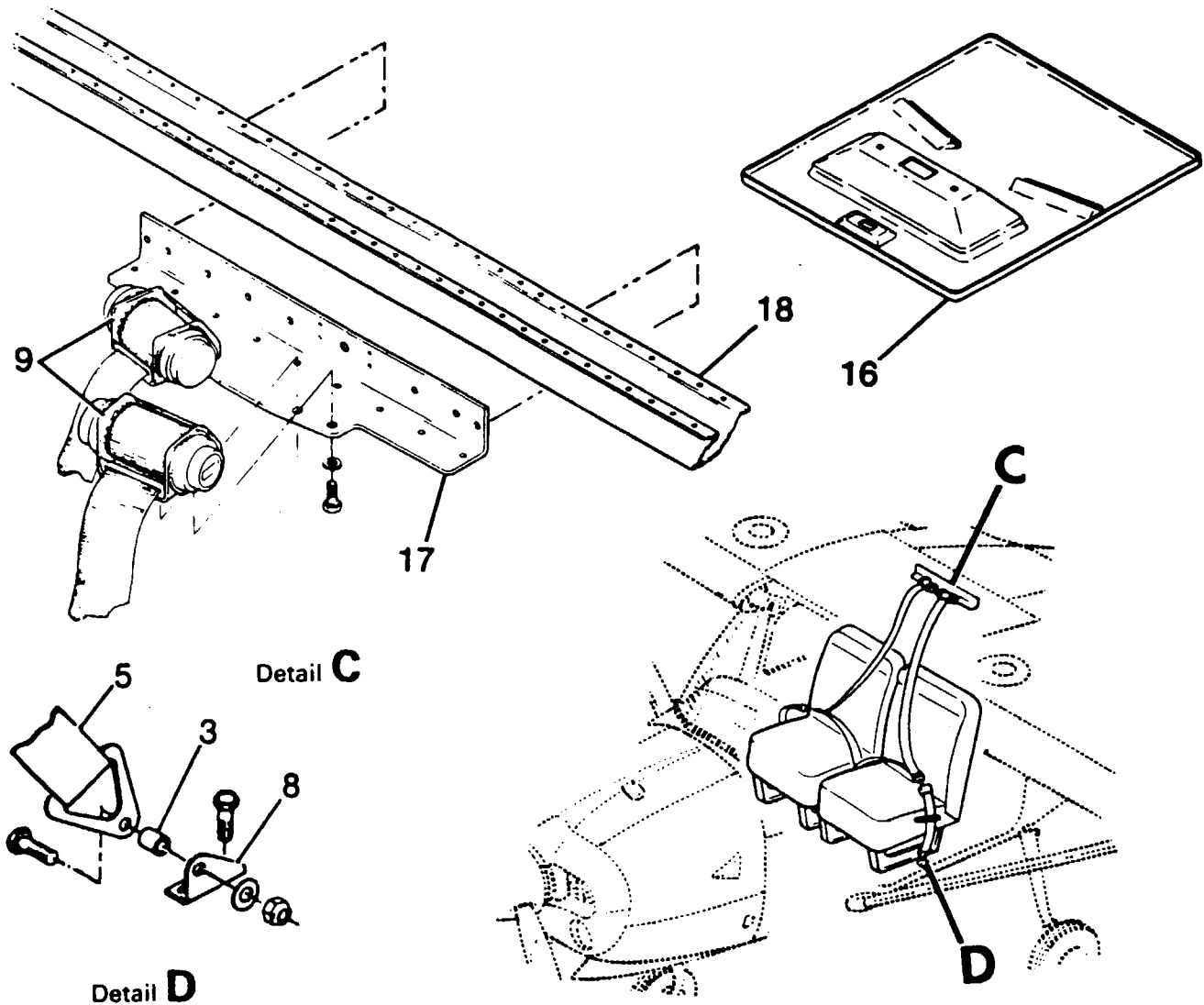


1979 MODELS ONLY

Figure 3-11. Seat Belts and Shoulder Harness Installation (Sheet 3 of 4)

# MODEL R182 AND TR182 SERVICE MANUAL

BEGINNING WITH 1983 MODELS

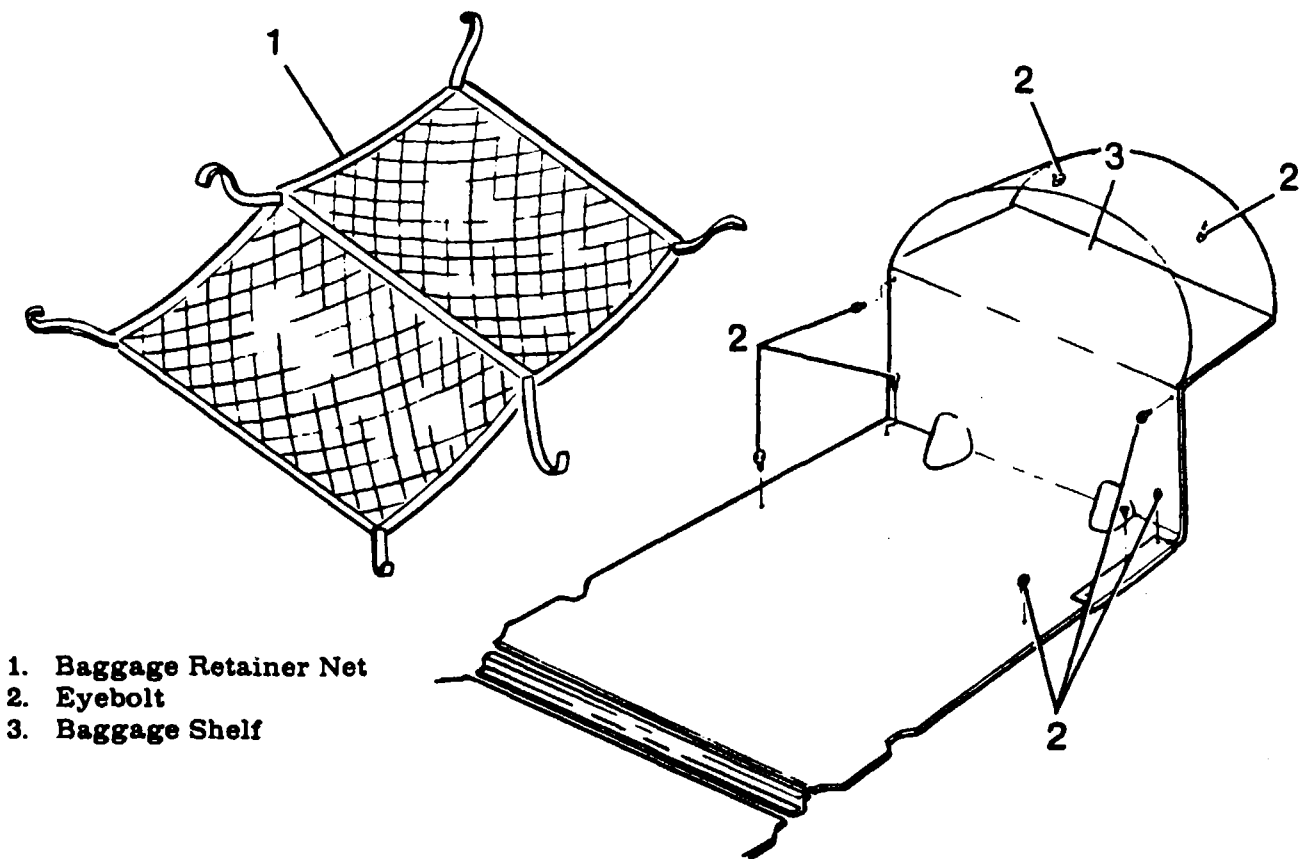


- 3. Spacer
- 5. Seat Belt
- 8. Seat Belt Attach Fitting
- 9. Inertia Reel
- 16. Inertia Reel Cover
- 17. Inertia Reel Support
- 18. Spar

Figure 3-11. Seat Belts and Shoulder Harness Installation (Sheet 4 of 4)

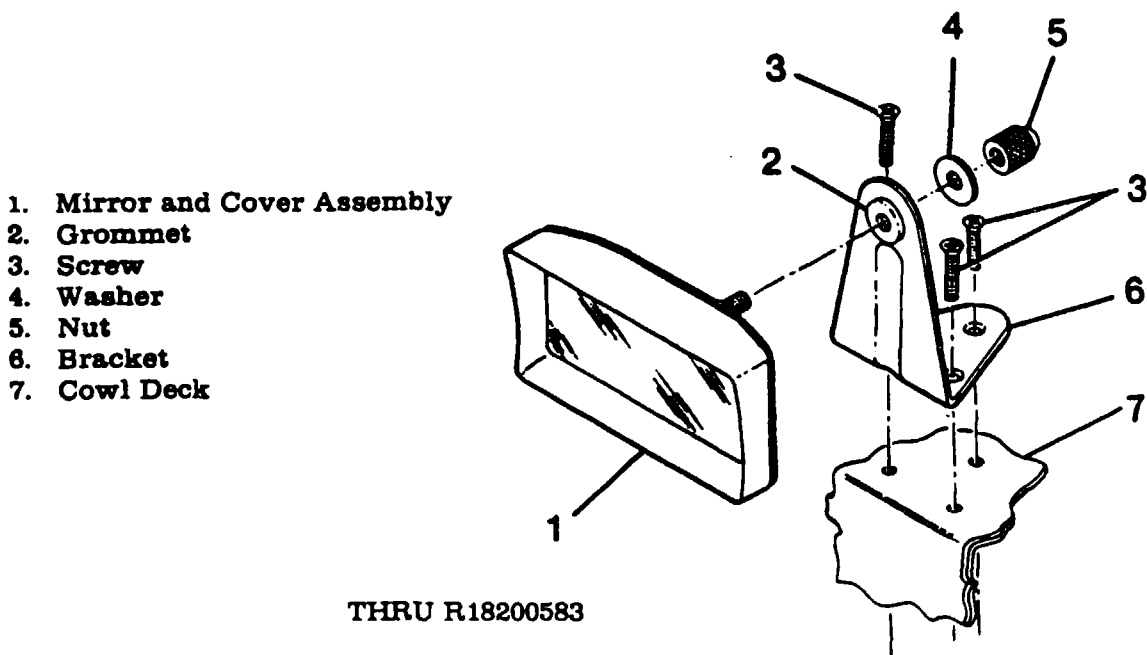


MODEL R182 AND TR182 SERVICE MANUAL



- 1. Baggage Retainer Net
- 2. Eyebolt
- 3. Baggage Shelf

Figure 3-12. Baggage Net and Eyebolt Installation

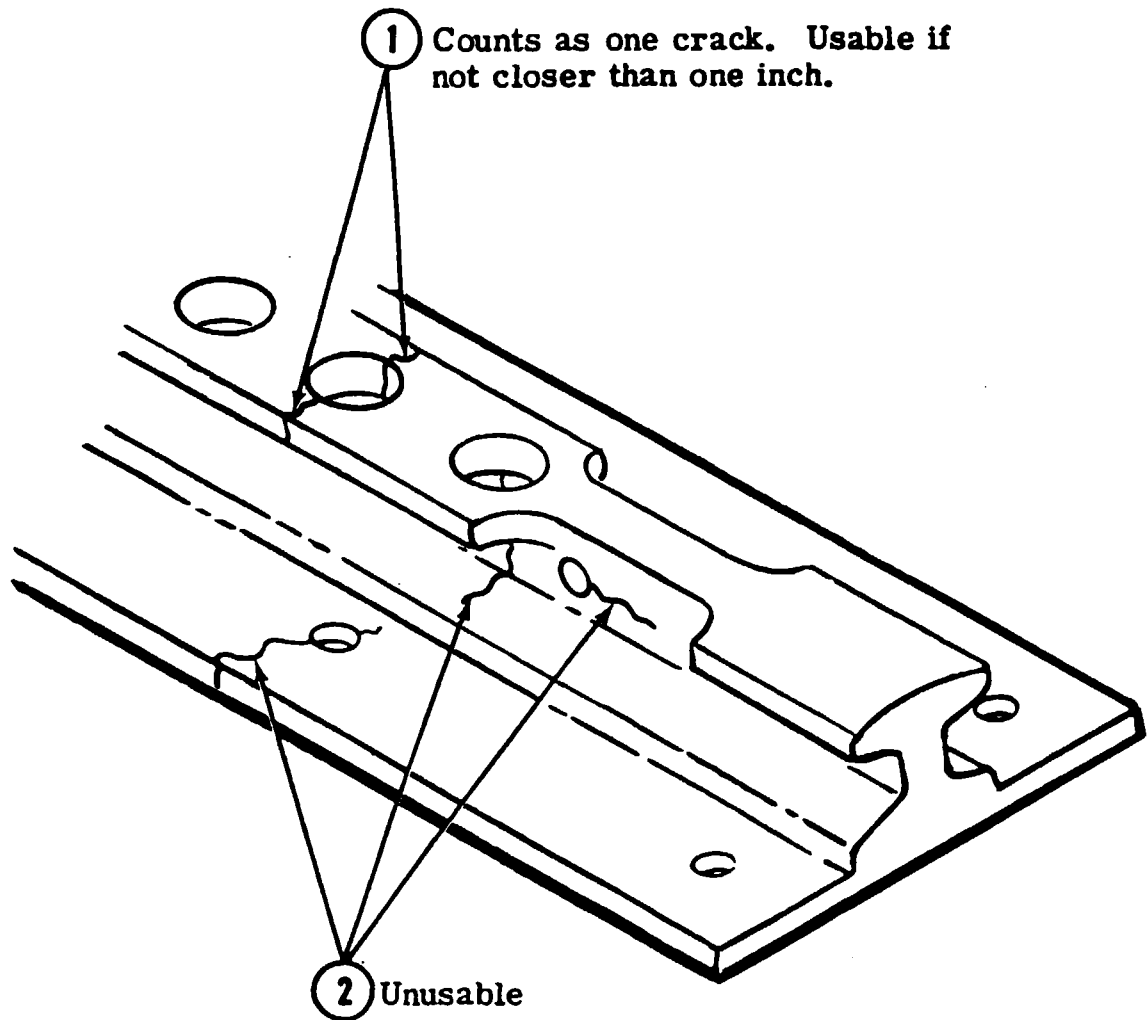


- 1. Mirror and Cover Assembly
- 2. Grommet
- 3. Screw
- 4. Washer
- 5. Nut
- 6. Bracket
- 7. Cowl Deck

THRU R18200583

Figure 3-13. Rear View Mirror Installation

## MODEL R182 AND TR182 SERVICE MANUAL



### REPLACE SEAT RAIL WHEN:

- Any portion of web or lower flange is cracked (index 2).
- Any crack in crown of rail is in any direction other than right angle to length of rail.
- Number of cracks in any one rail exceeds four, or any two cracks (index 1) are closer than one inch.

### NOTE

Use of seat rail cargo tie-downs is nor permissible on seat rail with cracks.

Figure 3-14. Seat Rail Inspection

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 4

### WINGS AND EMPENNAGE

TABLE OF CONTENTS	Page No. Aerofiche/ Manual		
WINGS AND EMPENNAGE . . . . .	1H17/4-1	Removal . . . . .	1I1 4-9
Wings . . . . .	1H17/4-1	Repair . . . . .	1I4 4-12
Description . . . . .	1H17/4-1	Installation . . . . .	1I4 4-12
Removal . . . . .	1H17/4-1	Horizontal Stabilizer . . . . .	1I4 4-12
Repair . . . . .	1H20/4-4	Description . . . . .	1I4 4-12
Installation . . . . .	1H20/4-4	Removal . . . . .	1I4 4-12
Adjustment . . . . .	1H22/4-6	Repair . . . . .	1I4 4-12
Wing Struts . . . . .	1H22/4-6	Installation . . . . .	1I4 4-12
Description . . . . .	1H22/4-6	Stabilizer Abrasion Boots . . . . .	1I4 4-12
Removal Installation . . . . .	1H22/4-6	Description . . . . .	1I4 4-12
Repair . . . . .	1I1/4-9	Removal . . . . .	1I4 4-12
Fin . . . . .	1I1/4-9	Installation . . . . .	1I5 4-13
Description . . . . .	1I1/4-9		

4-1. WINGS AND EMPENNAGE.

4-2. WINGS. (See figure 4-1.)

4-3. DESCRIPTION. Each all-metal wing panel is a semicantilever, semimonocoque type, with two main spars and suitable ribs for the attachment of the skin. Skin panels are riveted to ribs, spars and stringers to complete the structure. An all-metal, piano-hinged aileron, flap, and a detachable wing tip are mounted on each wing assembly. Navigation/strobe lights are mounted at each wing tip.

4-4. REMOVAL. Wing panel removal is most easily accomplished if four men are available to handle the wing. Otherwise, the wing should be supported with a sling or maintenance stand when the fastenings are loosened.

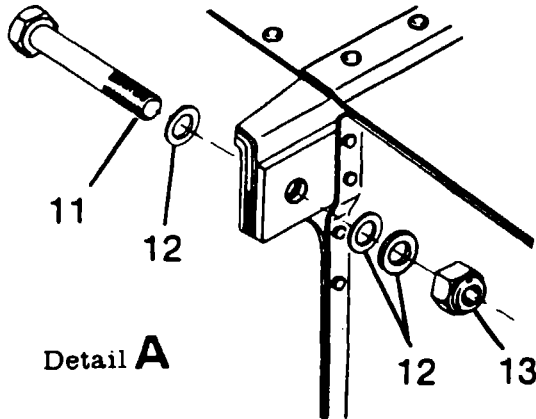
- a. Remove wing root fairings and fairing plates.
- b. Remove all wing inspection plates.
- c. Drain fuel from cell of wing being removed.
- d. Disconnect:
  1. Electrical wires at wing root disconnects.
  2. Fuel lines at wing root. (Observe precautions outlined in paragraph 12-3.)
- e. Reduce aileron cable tension by loosening turnbuckles and disconnect cables at aileron bellcranks. Disconnect flap cables at turnbuckles above headliner, and pull cables into wing root area.

#### NOTE

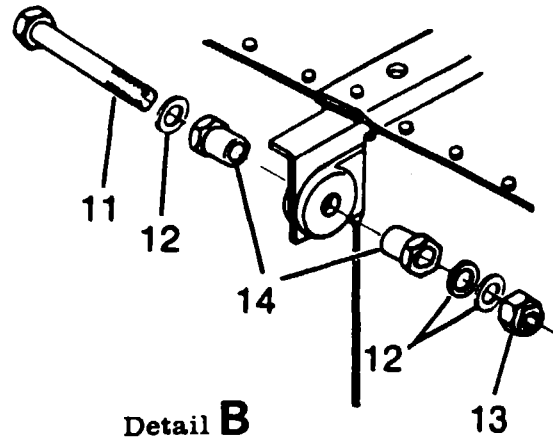
To simplify aileron and flap cable installation, attach an equal length piece of guide wire to each cable before removal. Leave the wire inside wing during maintenance operation. To install, simply attach cables to correct guide wire, and pull cables into wing as the guide wire is removed.

# MODEL R182 AND TR182 SERVICE MANUAL

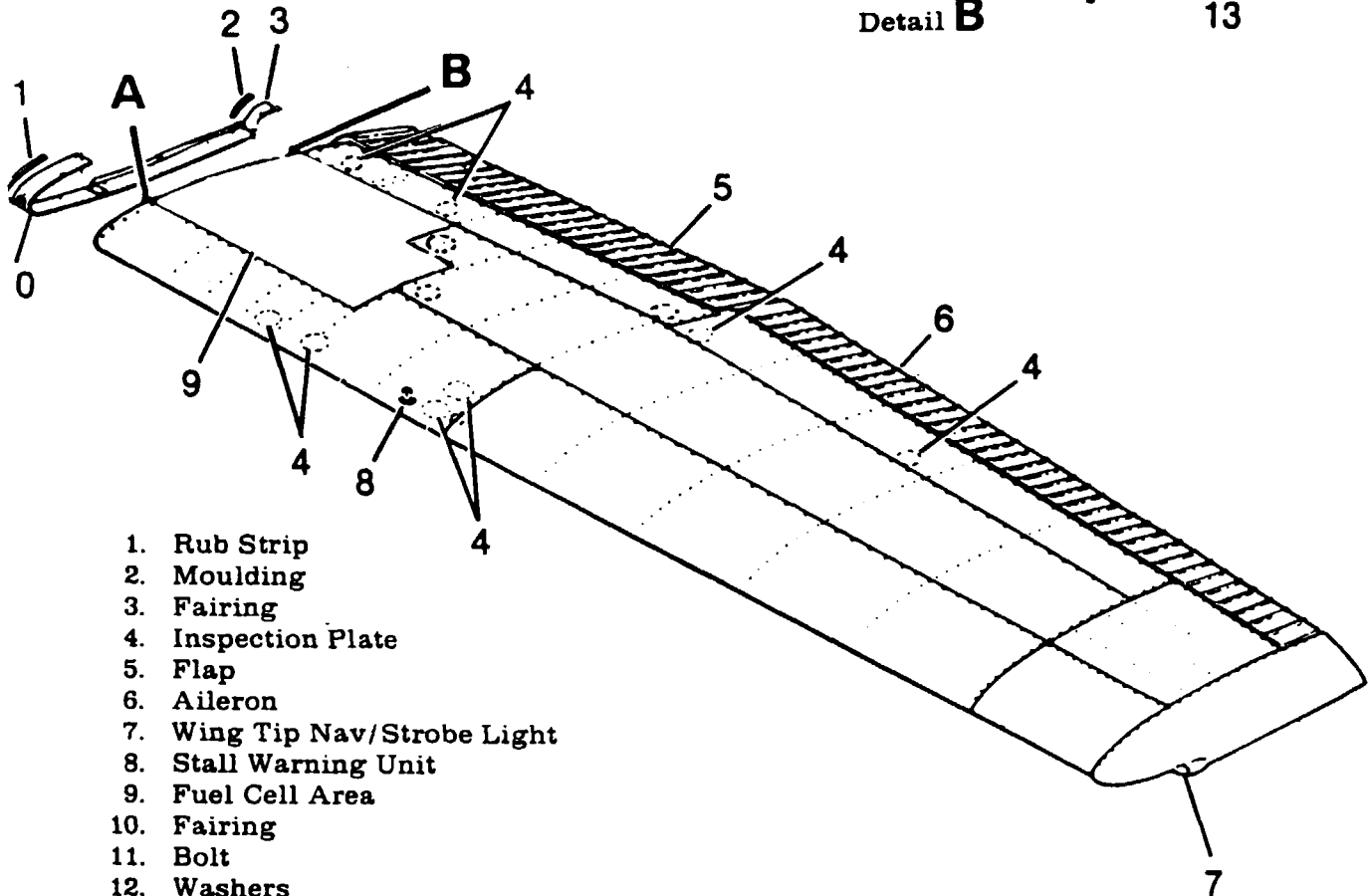
TORQUE:  
300 LB IN (MIN)  
500 LB IN (MAX)



Detail A



Detail B

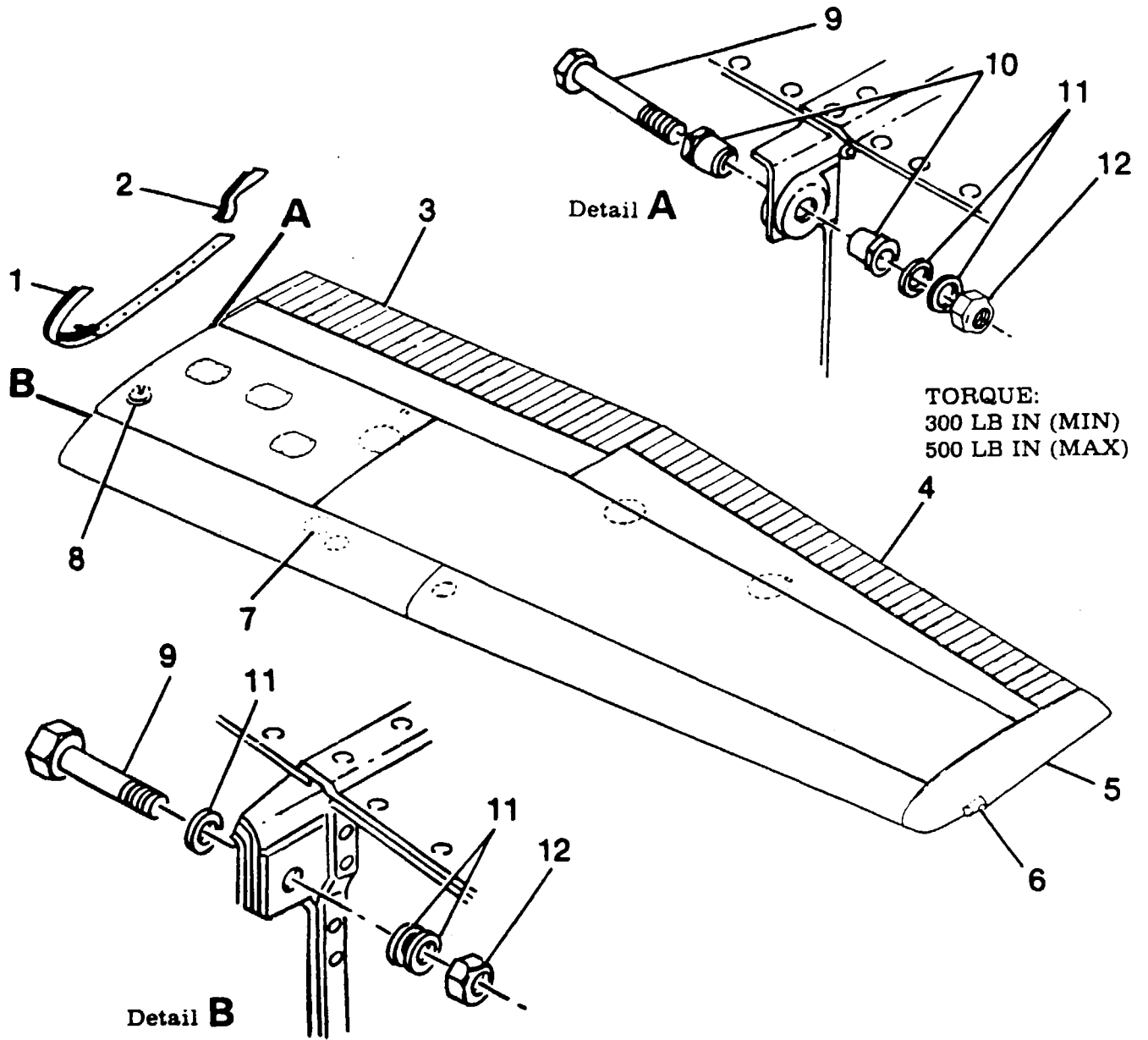


1. Rub Strip
2. Moulding
3. Fairing
4. Inspection Plate
5. Flap
6. Aileron
7. Wing Tip Nav/Strobe Light
8. Stall Warning Unit
9. Fuel Cell Area
10. Fairing
11. Bolt
12. Washers
13. Nut (Self Locking)
14. Bushing

STANDARD WING  
THRU R18200583

Figure 4-1. Wing Installation (Sheet 1 of 2)

MODEL R182 AND TR182 SERVICE MANUAL



TORQUE:  
300 LB IN (MIN)  
500 LB IN (MAX)

TORQUE:  
300 LB IN (MIN)  
690 LB IN (MAX)

- |                       |                                 |                        |
|-----------------------|---------------------------------|------------------------|
| 1. Fairing            | 5. Wing Tip                     | 9. Bolt                |
| 2. Lower Rear Fairing | 6. Navigation and Strobe Lights | 10. Eccentric Bushings |
| 3. Wing Flap          | 7. Courtesy Light               | 11. Washers            |
| 4. Aileron            | 8. Fuel Filler Cap              | 12. Nut                |

WET WING  
R18200584 & ON

Figure 4-1. Wing Installation (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

- f. Support wing at outboard end and disconnect strut at wing fitting. (Refer to paragraph 4-10.) Tie the strut up with wire to prevent it from swinging down and straining strut-to-fuselage fitting. Loosen lower strut fairing and slide fairing up the strut; the strut may then be lowered without damage.

### NOTE

Tape flaps in the streamlined position to prevent damage during removal.

- g. Mark position of wing attachment eccentric bushings (Refer to figure 4-1); these bushings are used to rig out "wing heaviness."
- h. Remove nuts, washers, bushings and bolts attaching wing spars to fuselage.

### NOTE

It may be necessary to rock the wings slightly while removing attaching bolts, or to use a long drift punch to drive them out.

- i. Remove wing, and place it on a padded stand.

4-5. **REPAIR.** A damaged wing panel may be repaired in accordance with instructions outlined in Section 17. Extensive repairs of wing skin or structure are best accomplished using the wing repair jig, which may be obtained from Cessna. The wing jig serves not only as a holding fixture, making work on the wing easier, but also assures the absolute alignment of the repaired wing.

4-6. **INSTALLATION.**

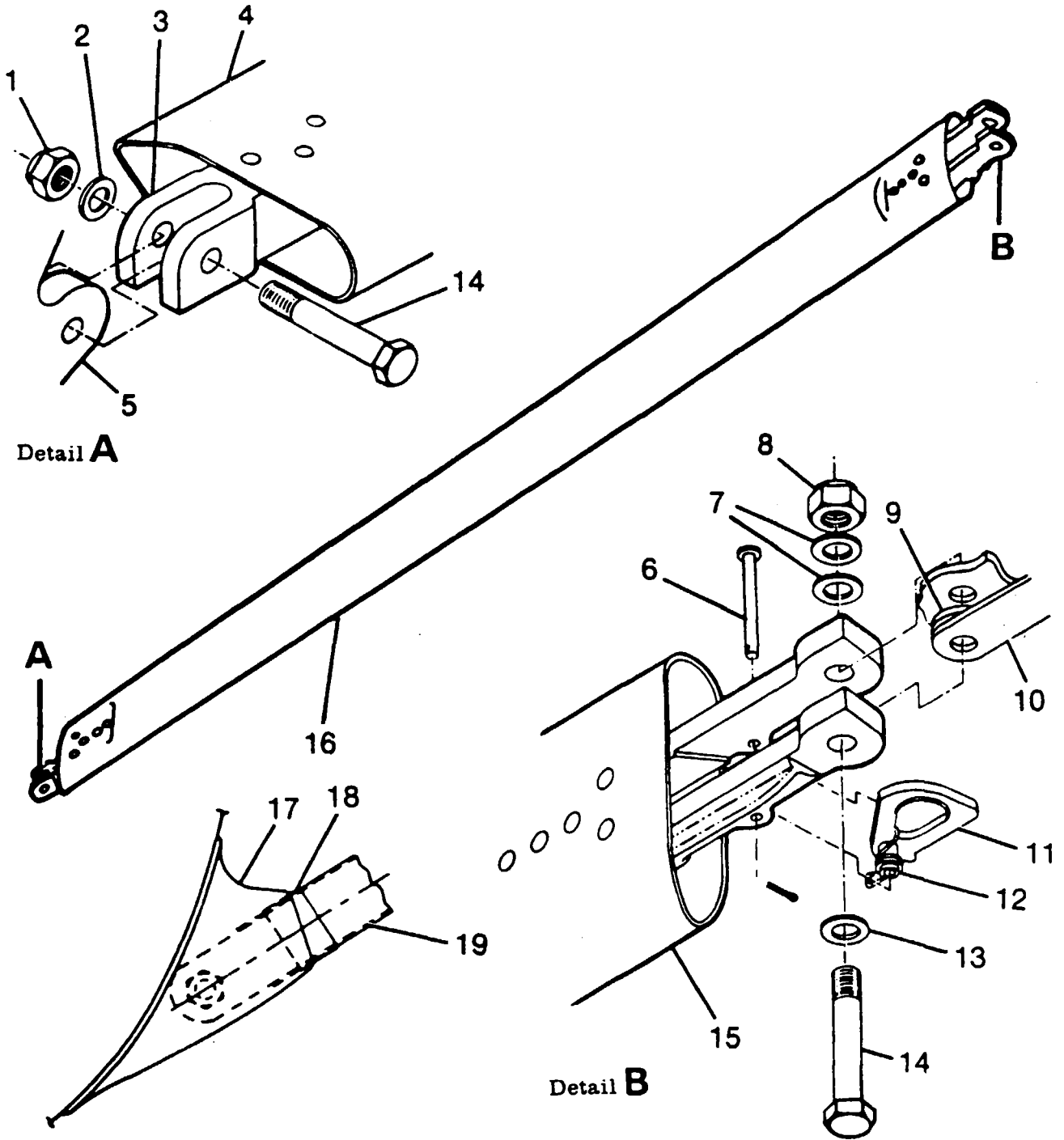
- a. Hold wing in position and install bolts, bushings, washers and nuts attaching wing spars to fuselage fittings. Be sure eccentric bushings are positioned as marked.

### NOTE

If aircraft was factory equipped with soundproofing panels in the wing gaps, be sure they are installed before replacing wing root fairings.

- b. Install bolts, spacers and nuts to secure upper and lower ends of wing strut to wing and fuselage fittings.
- c. Route flap and aileron cables, using guide wires. (Refer to note in paragraph 4-4.)
- d. Connect:
  - 1. Electric wires at wing root disconnects.
  - 2. Fuel lines at wing root. (Observe precautions outlined in Section 12).
  - 3. Pitot line (if left wing is being installed.)
  - 4. Cabin ventilator hose at wing root.
- e. Rig aileron system (Section 6).
- f. Rig flap system (Section 7).
- g. Refill wing fuel cell and check for leaks. (Observe precautions outlined in Section 12).
- h. Check operation of wing tip lights and landing and taxi lights.
- i. Check operation of fuel quantity indicator.
- j. Install wing root fairings.

MODEL R182 AND TR182 SERVICE MANUAL



Detail **A**

Detail **B**

- |                            |                               |               |
|----------------------------|-------------------------------|---------------|
| 1. Nut                     | 8. Nut                        | 14. Bolt      |
| 2. Washer                  | 9. Spacer                     | 15. Strut End |
| 3. Fuselage Attach Fitting | 10. Strut Attach Strap (Wing) | 16. Strut     |
| 4. Strut End               | 11. Mooring Ring              | 17. Fairing   |
| 5. Fuselage Fitting        | 12. Spring                    | 18. Tape      |
| 6. Pin                     | 12. Fairing                   | 19. strut End |
| 7. Washers                 | 13. Washer                    |               |

Figure 4-2. Wing Strut

## MODEL R182 AND TR182 SERVICE MANUAL

### NOTE

Be sure that the short bushing (14) is installed forward side of wing spars, and the long bushing (14) on the aft side. Apply Electro Moly No. 11 MIL-G-121164 grease to bolt (11) and bushing (14) lightly.

k. Install all wing inspection plates, interior panels and upholstery.

4-7. **ADJUSTMENT (Correcting "Wing-Heavy" Condition).** (Refer to figure 4-1.) If considerable control wheel pressure is required to keep the wings level in normal flight, a "wing-heavy" condition exists.

- a. Remove wing fairing strip on the "wing-heavy" side of the aircraft.
- b. Loosen nut (7) and rotate bushings (5) simultaneously until the bushings are positioned with the thick sides of the eccentrics up. This will lower the trailing edge of the wing, and decrease "wing-heaviness" by increasing the angle-of-incidence of the wing.

### CAUTION

Be sure to rotate the eccentric bushings simultaneously. Rotating them separately will destroy the alignment between the off-center bolt holes in the bushings, thus exerting a shearing force on the bolt, with possible damage to the hole in the wing spar fitting.

- c. Tighten nut and reinstall fairing strip.
- d. Test-fly the aircraft. If the "wing-heavy" condition still exists, remove fairing strip on the "lighter" wing, loosen nut, and rotate bushings simultaneously until the bushings are positioned with the thick side of the eccentrics down. This will raise the trailing edge of the wing, thus increasing "wing-heaviness" to balance heaviness in the opposite wing.
- e. Tighten nut, install fairing strip, and repeat test flight.

4-8. **WING STRUTS.** (See figure 4-2.)

4-9. **DESCRIPTION.** Each wing has a single lift strut which transmits a part of the wing load to the lower portion of the fuselage. The strut consists of a streamlined tube with fittings riveted on each end for attachment to two the fuselage and wing.

4-10. **REMOVAL AND INSTALLATION.**

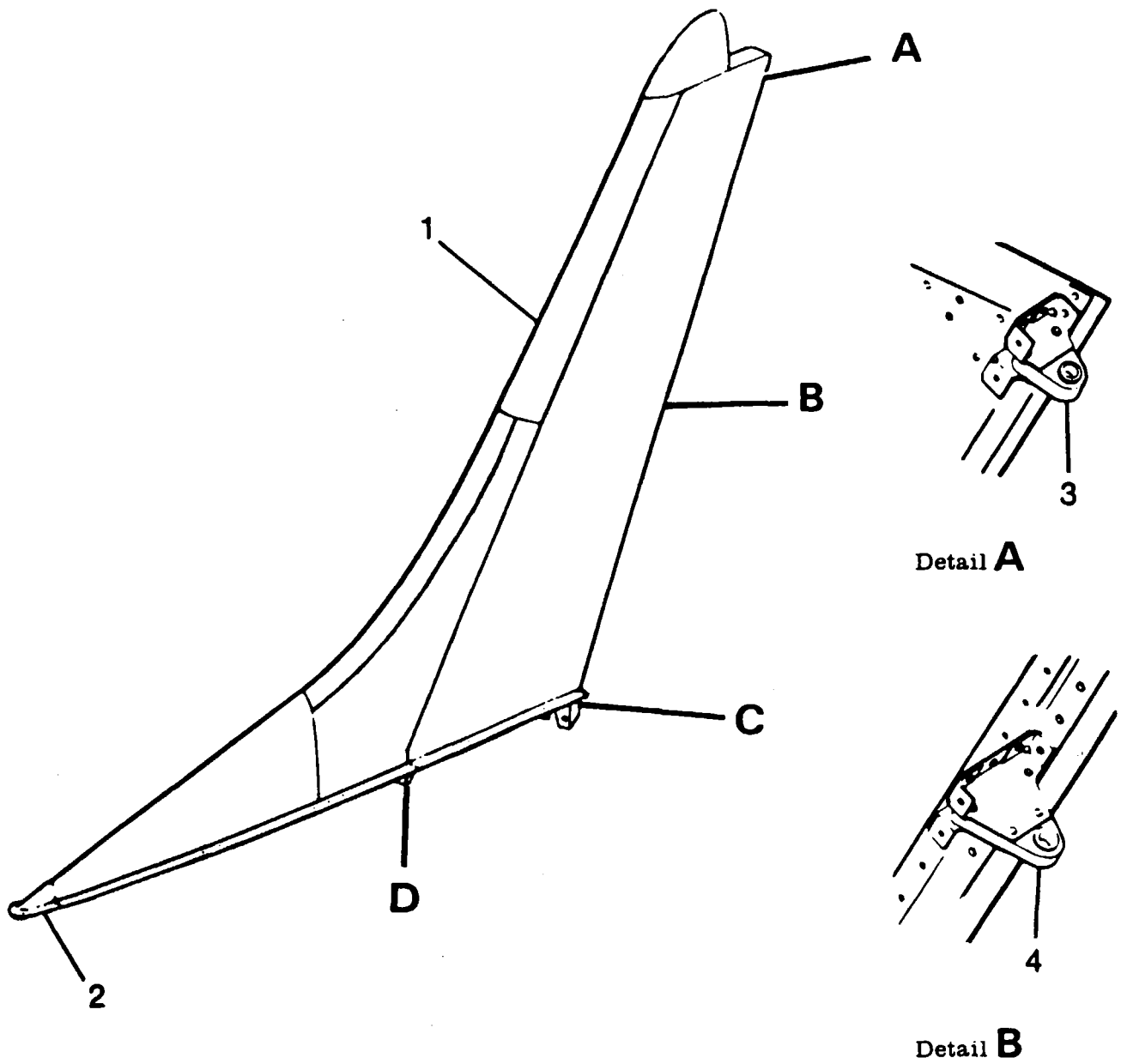
- a. Remove screws from strut fairings and slide fairings along strut.
- b. Remove fuselage and wing inspection plates at strut junction points.
- c. Support wing securely, then remove nut and bolt securing strut to fuselage.
- d. Remove nut, bolt and spacer used to attach strut to wing, then remove strut from aircraft.
- e. Reverse preceding steps to install strut.

### NOTE

Wrap strut with Y-8562 Polyurethane tape (3-M Co.), or equivalent in the areas where strut fairings (17) contact strut (4). Locate tape splice (seam) at trailing edge of strut (4).



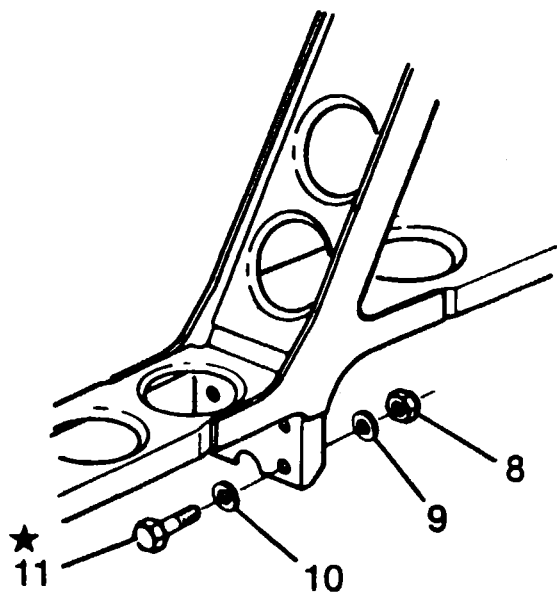
MODEL R182 AND TR182 SERVICE MANUAL



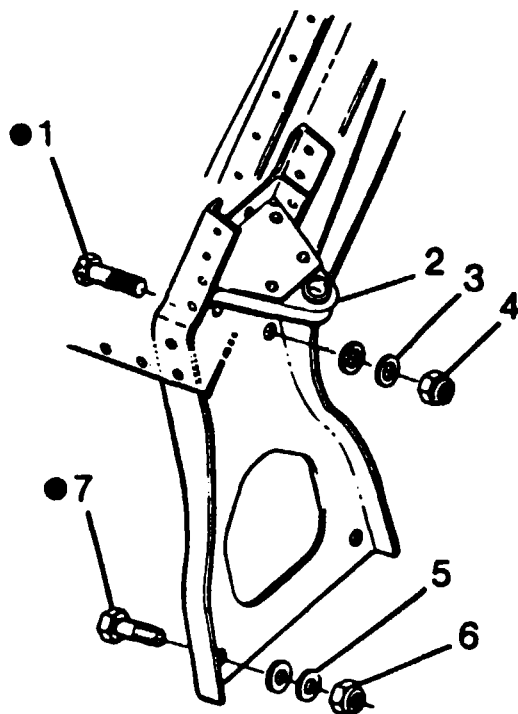
- 1. Fin Assembly
- 2. Fairing
- 3. Upper Rudder Hinge
- 4. Center Rudder Hinge

Figure 4-3. Vertical Fin (Sheet 1 of 2)

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Detail D



Detail C

1. Bolt
2. Lower Rudder Hinge
3. Washer
4. Nut
5. Washer
6. Nut
7. Bolt
8. Nut
9. Washer
10. Washer
11. Bolt

NOTE  
 Attach Bolt Torques:  
 ★ 70-100 Inch-Lbs  
 ● 140-225 Inch-Lbs

Figure 4-3. Vertical Fin (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

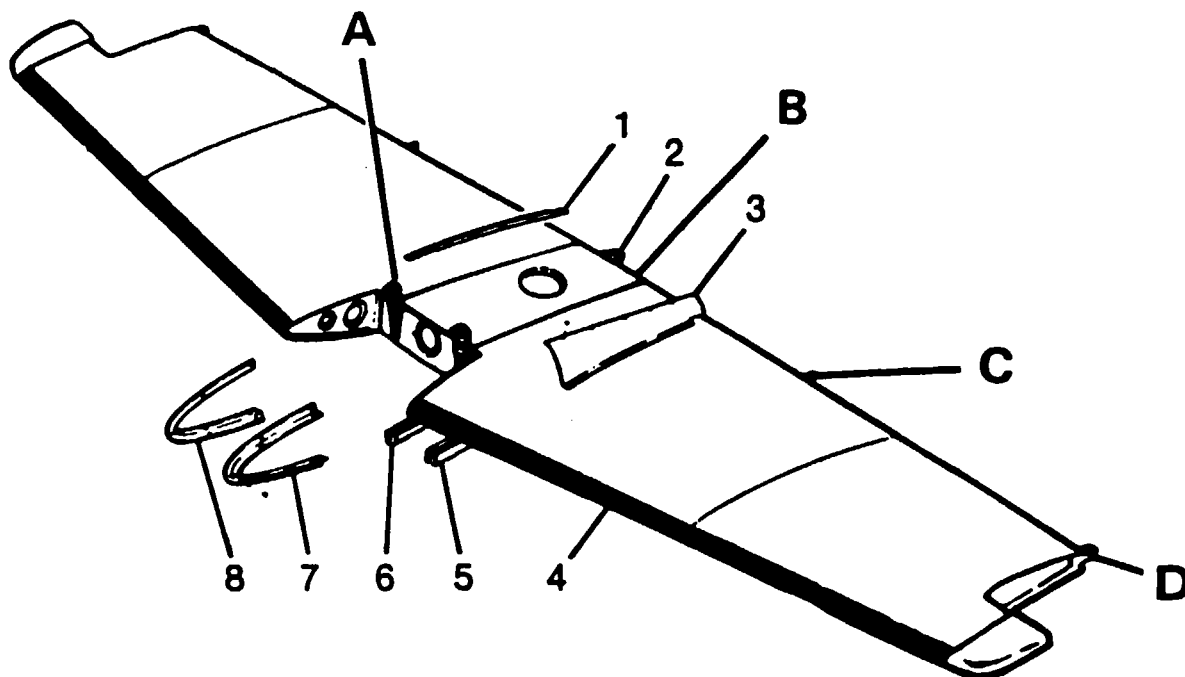
- 4-11. **REPAIR.** Wing strut repair is limited to replacement of tie-downs and attaching parts. Refer to Section 18.
- 4-12. **FIN.** (See figure 4-3.)
- 4-13. **DESCRIPTION.** The vertical fin is primarily of metal construction, consisting of ribs and spars covered with skin. Fin tips are of ABS construction. The rudder is attached at the fin rear spar with hinge brackets.
- 4-14. **REMOVAL.** The vertical fin may be removed without first removing the rudder. However, for access and ease of handling, the rudder may be removed by following procedures outlined in Section 10.
- a. Remove fairings on either side of fin.
  - b. Disconnect flashing beacon lead, tail navigation light lead, antennas and antenna leads, and rudder cables, if rudder has not been removed.

### NOTE

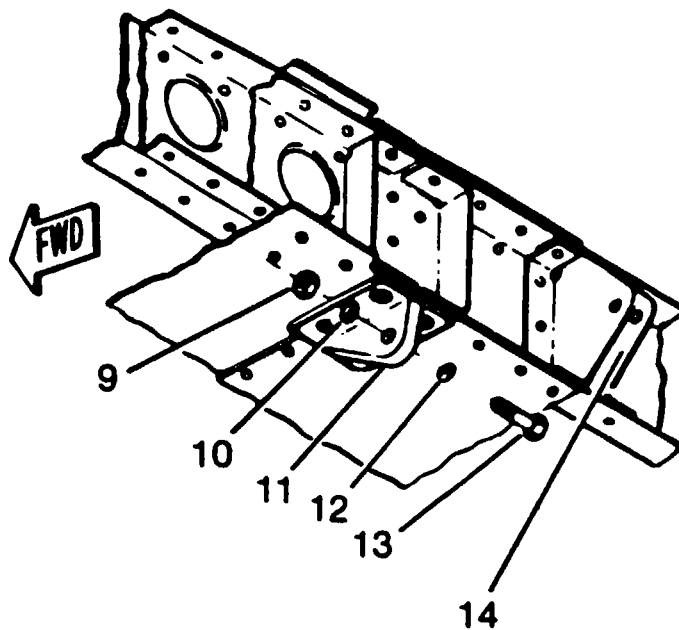
The flashing beacon power lead routed into the fuselage should be cut if no splice exists. Upon reassembly, install quick disconnects or suitable splice in this wire.

- c. Remove screws attaching dorsal to fuselage.
- d. Remove bolts attaching fin rear spar to fuselage fitting.
- e. Remove bolts attaching fin front spar to fuselage, and remove fin.

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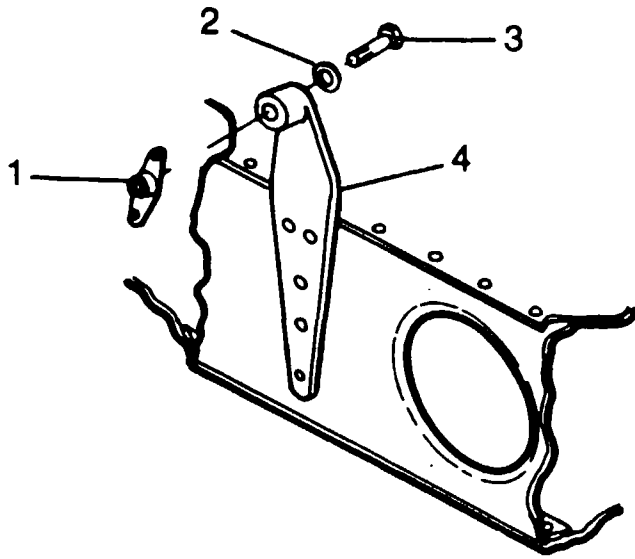
1. Upper Right Fairing
2. Elevator Pylon Bracket
3. Upper Left Fairing
4. Abrasion Boot
5. Lower Left Moulding
6. Lower Right Moulding
7. Forward Left Fairing
8. Forward Right Fairing
9. Nut
10. Washer
11. Bracket
12. Washer
13. Bolt
14. Elevator Pylon Bracket



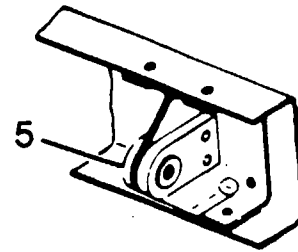
Detail B

Figure 4-4. Horizontal Stabilizer (Sheet 1 of 2)

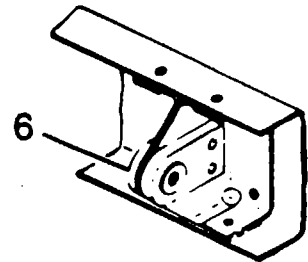
MODEL R182 AND TR182 SERVICE MANUAL



Detail A



Detail C



Detail D

1. Nutplate
2. Washer
3. Bolt
4. Bracket
5. Elevator Inboard Hinge
6. Elevator Outboard Hinge

Figure 4-4. Horizontal Stabilizer (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

- 4-15. **REPAIR.** Fin repair should be accomplished in accordance with applicable instructions outlined in Section 17.
- 4-16. **INSTALLATION.** Reverse the procedures outlined in paragraph 4-14 to install the vertical fin. Be sure to check and reset rudder and elevator travel. If any stop bolts were removed or settings disturbed, the systems will have to be rigged. Refer to applicable sections in this manual for rigging procedures.
- 4-17. **HORIZONTAL STABILIZER.** (See figure 4-4.)
- 4-18. **DESCRIPTION.** The horizontal stabilizer is primarily of all-metal construction, consisting of ribs and spars covered with skin. Stabilizer tips are of ABS construction. A formed metal leading edge is riveted to the assembly to complete the structure. The elevator trim tab actuator is contained within the horizontal stabilizer. The underside of the stabilizer contains a covered opening which provides access to the actuator. Hinges are located on the rear spar assembly to support the elevators.
- 4-19. **REMOVAL.**
- a. Remove elevators and rudder in accordance with procedures outlined in Sections 8 and 10.
  - b. Remove vertical fin in accordance with procedures outlined in paragraph 4-14.
  - c. Disconnect elevator trim control cables at cable ends and turnbuckle inside tailcone. Remove stop blocks, then remove pulleys which route the aft cables into horizontal stabilizer. Pull cables out of tailcone.
- 4-20. **REPAIR.** Horizontal stabilizer repair should be accomplished in accordance with applicable instructions outlined in Section 17.
- 4-21. **INSTALLATION.** Reverse procedures outlined in paragraph 4-19 to install the horizontal stabilizer. Rig elevator, elevator trim and rudder systems as outlined in Sections 8, 9 and 10 consecutively. Check operation of tail navigation light and flashing beacon.
- 4-22. **STABILIZER ABRASION BOOTS.**

### NOTE

An Accessory Kit (AK182-217) is available from the Cessna Service Parts Center for installation of abrasion boots on aircraft not so equipped.

- 4-23. **DESCRIPTION.** The aircraft may be equipped with two extruded rubber abrasion boots, one on the leading edge of each horizontal stabilizer. These boots are installed to protect the stabilizer leading edge from damage caused by rocks thrown back by the propeller.
- 4-24. **REMOVAL.** The abrasion boots can be removed by loosening one end of the boot and pulling it off the stabilizer with an even pressure. Excess adhesive or rubber can be removed with Methyl-Ethyl-Ketone.

## MODEL R182 AND TR182 SERVICE MANUAL

- 4-25. **INSTALLATION.** Install abrasion boots as outlined in the following procedures.
- a. Trim boots to desired length.
  - b. Mask off boot area on leading edge of stabilizer with 1-inch masking tape, allowing 1/4-inch margin.
  - c. Clean inside of abrasion boot with Methyl-Ethyl-Ketone and a Scotch brite pad to ensure complete removal of paraffin/talc. Then a normal wipedown with MEK on a cloth will leave surface suitable for bonding to the aluminum.

### NOTE

Boots may be applied over epoxy primer, but if the surface has been painted, the paint shall be removed from the bond area. This shall be done by wiping the surfaces with a clean, lint-free rag, soaked with solvent, and then wiping the surfaces dry, before the solvent has time to evaporate, with a clean, dry lint-free rag.

- e. Stir cement (EC-1300 Minnesota Mining and Manufacturing Co.) thoroughly.
- f. Apply one even brush coat to the metal and the inner surface of the boot. Allow cement to air-dry for a minimum of 30 minutes, and then apply a second coat to each surface. Allow at least 30 minutes (preferably one-hour) for drying.
- g. After the cement has thoroughly dried, reactivate the surface of the cement on the stabilizer and boot, using a clean, lint-free cloth, heavily moistened with toluol. Avoid excess rubbing which would remove the cement from the surfaces.
- h. Position boot against leading edge, exercising care not to trap air between boot and stabilizer.

### NOTE

Should boot be attached "off-course", pull it up immediately with a quick motion, and reposition properly.

- i. Press or roll entire surface of boot to assure positive contact between the two surfaces.
- j. Apply a coat of GACO N700A sealer, or equivalent, conforming to MIL-C-21067, along the trailing edges of the boots to the surface of the skin to form a neat, straight fillet.
- k. Remove masking tape and clean stabilizer of excess material.
- l. Mask to the edge of boot for painting stabilizer.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## SECTION 5

### LANDING GEAR, BRAKES AND HYDRAULIC SYSTEM

#### WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

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### 5-1. LANDING GEAR RETRACTION SYSTEM.

5-2. **DESCRIPTION.** Retraction and extension of the landing gear is accomplished by a hydraulically-powered system, integrated with electrical circuits which help control and indicate gear position. Retraction and extension of the landing gear incorporates a nose gear actuator and two main gear actuators which control the main gear struts through a sector gear arrangement. The nose gear doors are mechanically-operated. The doors are closed with the gear retracted and are open with the landing gear extended. The main gears have no doors. Hydraulic fluid is supplied to the landing gear actuating cylinders by an electrically-powered power pack assembly, located in the cabin, forward of the center console. The hydraulic reservoir is an integral part of the power pack assembly. Gear selection is accomplished manually by moving a gear selector handle, located immediately left of center, in the switch panel. It is necessary to pull out on the gear selector to move the handle up or down. For emergency extension of the gear, the selector handle must be in the DOWN position be-

## MODEL R182 AND TR182 SERVICE MANUAL

fore the hand pump will energize the system. A pressure switch is mounted on the pump body. This switch opens the electrical circuit to the pump solenoid when pressure in the system increases to approximately 1500 psi. The pressure switch will continue to hold the electrical circuit open until pressure in the system drops to approximately 1000 psi. This will occur whether the gear selector handle is in either the UP or DOWN position. During a normal cycle, landing gear extended and locked can be detected by illumination of the gear DOWN indicator (green) light, indication of gear retracted is provided by illumination of the UP indicator (amber) light. The nose gear squat switch, actuated by the nose gear, electrically averts inadvertent retraction whenever the nose gear strut is compressed by weight of the aircraft. Beginning with 1983 models, the UP indicator (amber) light is replaced with a GEAR UNSAFE indicator (red) light. The GEAR UNSAFE (red) light is on anytime the gear is in transit (retract or extend), or whenever system pressure drops below 1000 psi with the safety (squat) switch closed.

### NOTE

It is possible to have the red and green lights on momentarily at the same time after the completion of the extend cycle, or when rotating during takeoff. However, if both stay on after the completion of the extend cycle, or if the red light stays on longer than 5 to 7 seconds during retract cycle, a malfunction has occurred.

5-3. TROUBLE SHOOTING -- LANDING GEAR RETRACTION SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
LANDING GEAR FAILS TO RETRACT.	Gear pump circuit breaker open.	Reset, determine cause for opening. Repair or replace components as necessary.
	Landing gear circuit breaker open.	Reset circuit breaker. Determine cause of blown circuit breaker.
	Hydraulic pump motor circuit wires disconnected or broken.	Repair or replace wiring.
	Nose gear squat switch inoperative.	Install new switch.
	Pressure switch defective.	Install new switch.
	Hydraulic pump motor solenoid defective.	Install new solenoid.
	Hydraulic pump motor grounded.	Check for ground.
	Hydraulic pump motor defective.	Replace motor.
	Reservoir fluid level below operating level.	Fill reservoir with hydraulic fluid. (Refer to Section 2.)
GEAR RETRACTION OR EXTENSION EXTREMELY SLOW.	Battery low or dead.	Check battery condition. Install new battery.
	Reservoir fluid level below operating level.	Fill reservoir with hydraulic fluid. (Refer to Section 2.)
PUMP MOTOR STOPS BEFORE GEAR IS RETRACTED.	Restriction in hydraulic system.	Isolate and remove restrictions.
	Gear pump circuit breaker open.	Reset, determine cause for opening. Repair or replace components as necessary.
	Landing gear circuit breaker open.	Reset circuit breaker. Determine cause of blown circuit breaker.
	Pressure switch out of adjustment.	Remove, adjust, or install new switch.

## MODEL R182 AND TR182 SERVICE MANUAL

### 5-3. TROUBLE SHOOTING -- LANDING GEAR RETRACTION SYSTEM (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
PUMP MOTOR STOPS BEFORE GEAR IS RETRACTED (Cont).	Restriction in hydraulic system, allowing pressure to build up and shut off pump motor before gear is retracted.	Isolate and determine cause. Remove restriction.
	Gear pump circuit breaker open.	Reset, determine cause for opening. Repair or replace components as necessary.
PUMP MOTOR STOPS BEFORE GEAR IS EXTENDED.	Landing gear circuit breaker open.	Reset circuit breaker. Determine cause of blown circuit breaker.
	Pressure switch defective.	Install new switch.
PUMP MOTOR CONTINUES TO RUN AFTER GEAR IS FULLY RETRACTED OR EXTENDED.	Pressure switch out of adjustment.	Remove, adjust, or install new switch.
	Hydraulic pump motor solenoid defective.	Install new solenoid.
	Internal leakage in system.	Check gear actuators for internal leakage. Repair or install new actuators.
	External system leakage.	Check all lines and hose for leakage. Repair or install new parts.
	Power pack relief valve(s) out of adjustment.	Disassemble and repair or replace valve(s).
	Hydraulic motor solenoid defective.	Install new solenoid.
	Pressure switch out of adjustment.	Remove, adjust, or install new switch.
PUMP MOTOR CYCLES EXCESSIVELY AFTER GEAR IS RETRACTED.	Internal leakage in system.	Check gear actuators for internal leakage. Repair or install new actuators.
	External system leakage.	Check all lines and hose for leakage. Repair or install new parts.

## MODEL R182 AND TR182 SERVICE MANUAL

### 5-3. TROUBLE SHOOTING -- LANDING GEAR RETRACTION SYSTEM (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
GEAR DOES NOT FULLY RETRACT, BUT PUMP MOTOR CONTINUES TO RUN.	Internal leakage in system.	Check gear actuators for internal leakage. Repair or install new actuators.
	Reservoir fluid level below operating level.	Fill reservoir with hydraulic fluid. (Refer to Section 2.)
LANDING GEAR FAILS TO EXTEND.	Battery low or dead.	Check battery condition. Install new battery.
	Gear pump circuit breaker open.	Reset, determine cause for opening. Repair or replace components as necessary.
	Landing gear circuit breaker open.	Reset circuit breaker. Determine cause of blown circuit breaker.
	Hydraulic pump motor circuit wires disconnected or broken.	Repair or replace wiring.
	Hydraulic pump motor solenoid defective.	Install new solenoid.
	Hydraulic pump motor shorted to ground.	Check ground.
	Hydraulic pump motor defective.	Replace motor.
	Reservoir fluid level below operating level.	Fill reservoir with hydraulic fluid. (Refer to Section 2.)
Nose gear contacts stop bolts	Adjust stop bolts to obtain 0.050" clearance. (Refer to paragraphs 5-134 and 5-135.)	

# MODEL R182 AND TR182 SERVICE MANUAL

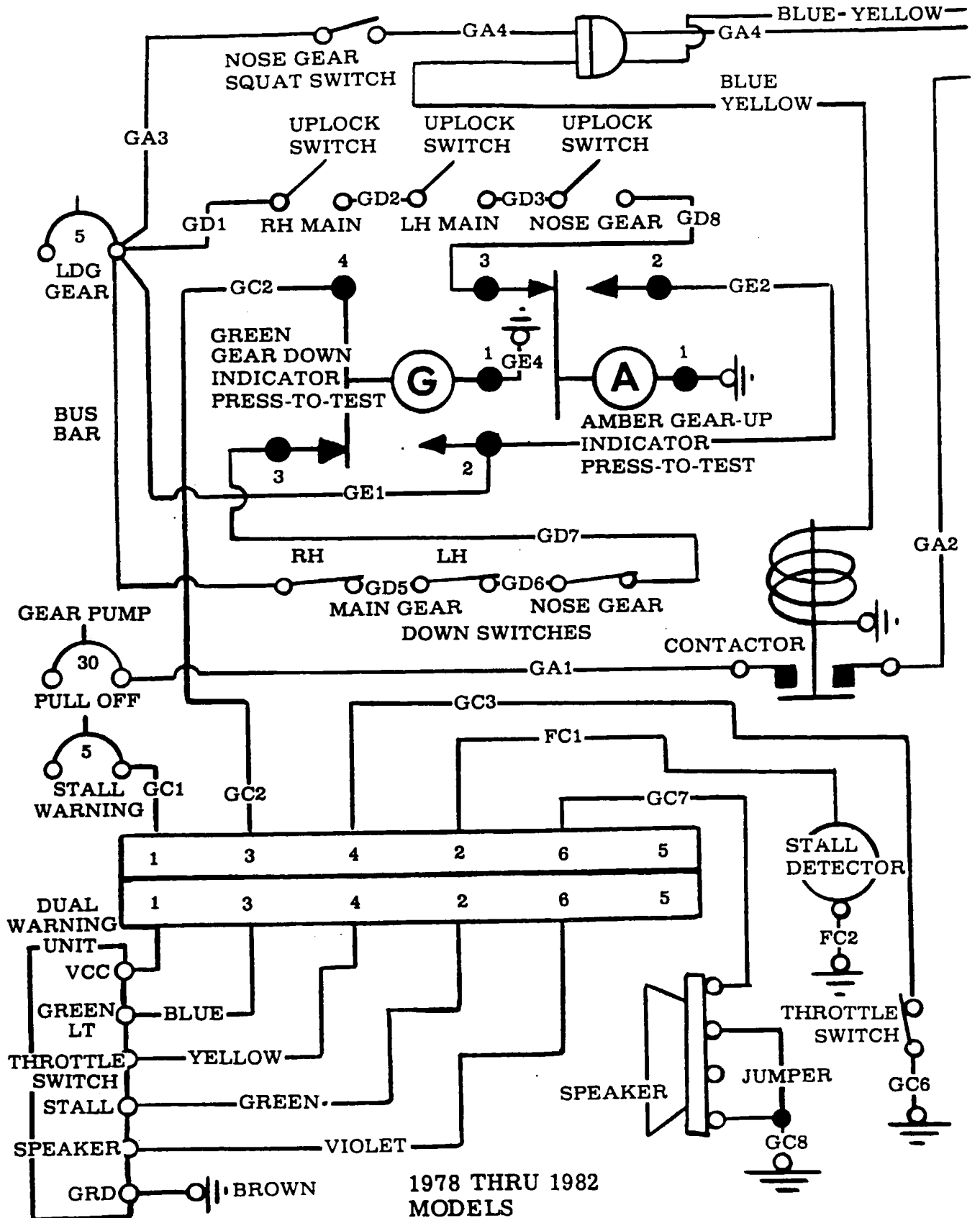


Figure 5-1. Landing Gear System Schematic (Sheet 1 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

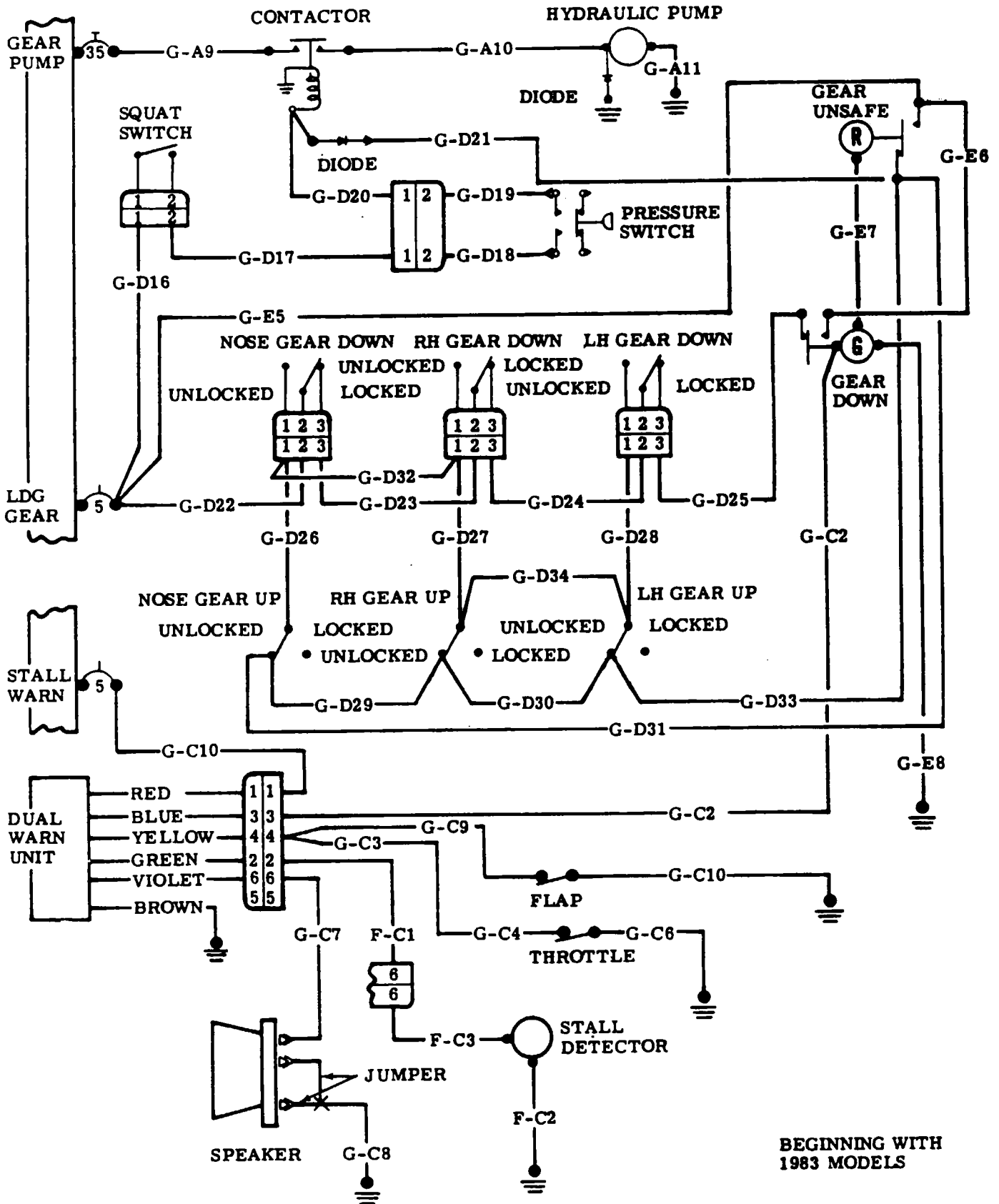


Figure 5-1. Landing Gear System Schematic (Sheet 2 of 3)



MODEL R182 AND TR182 SERVICE MANUAL

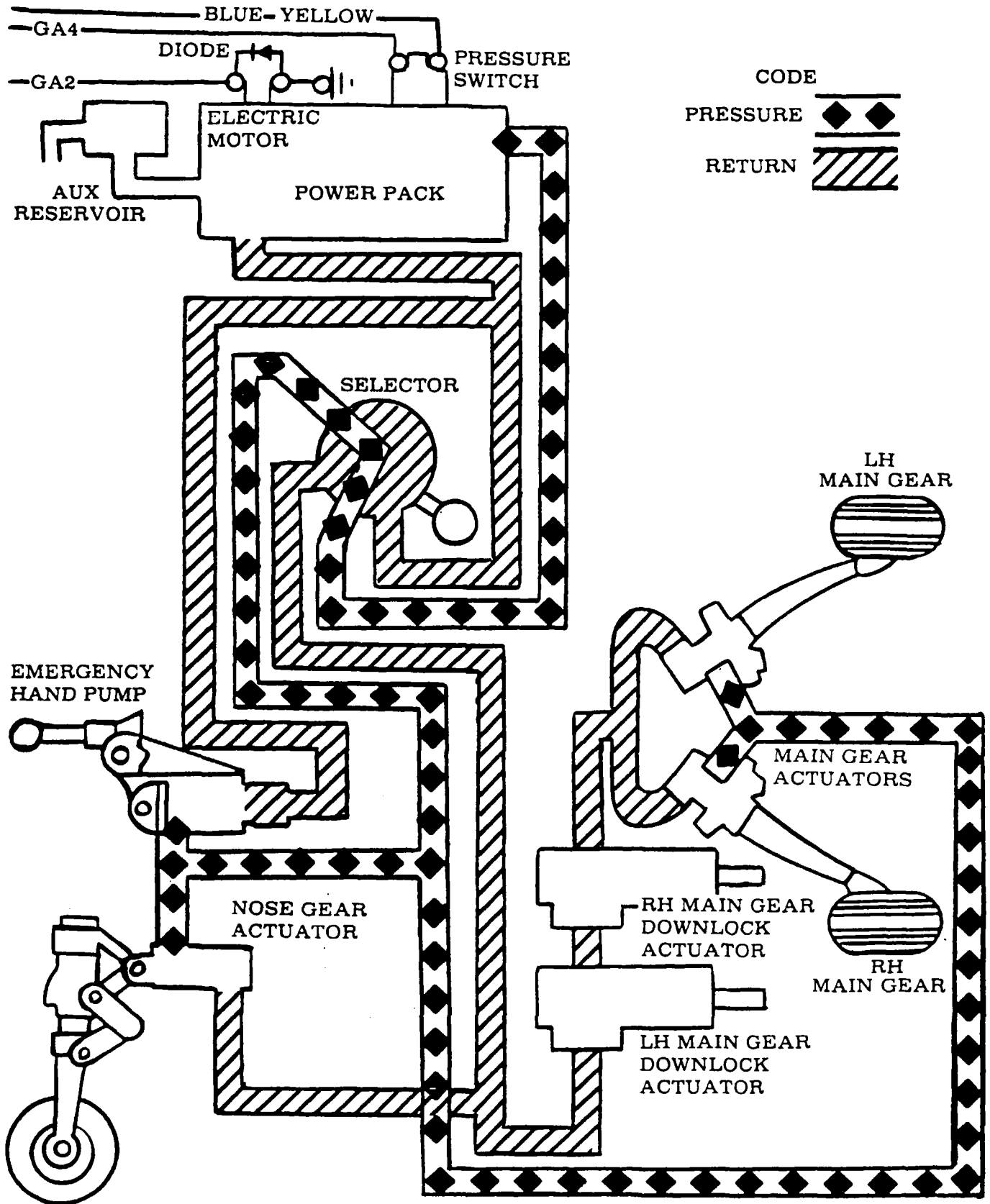
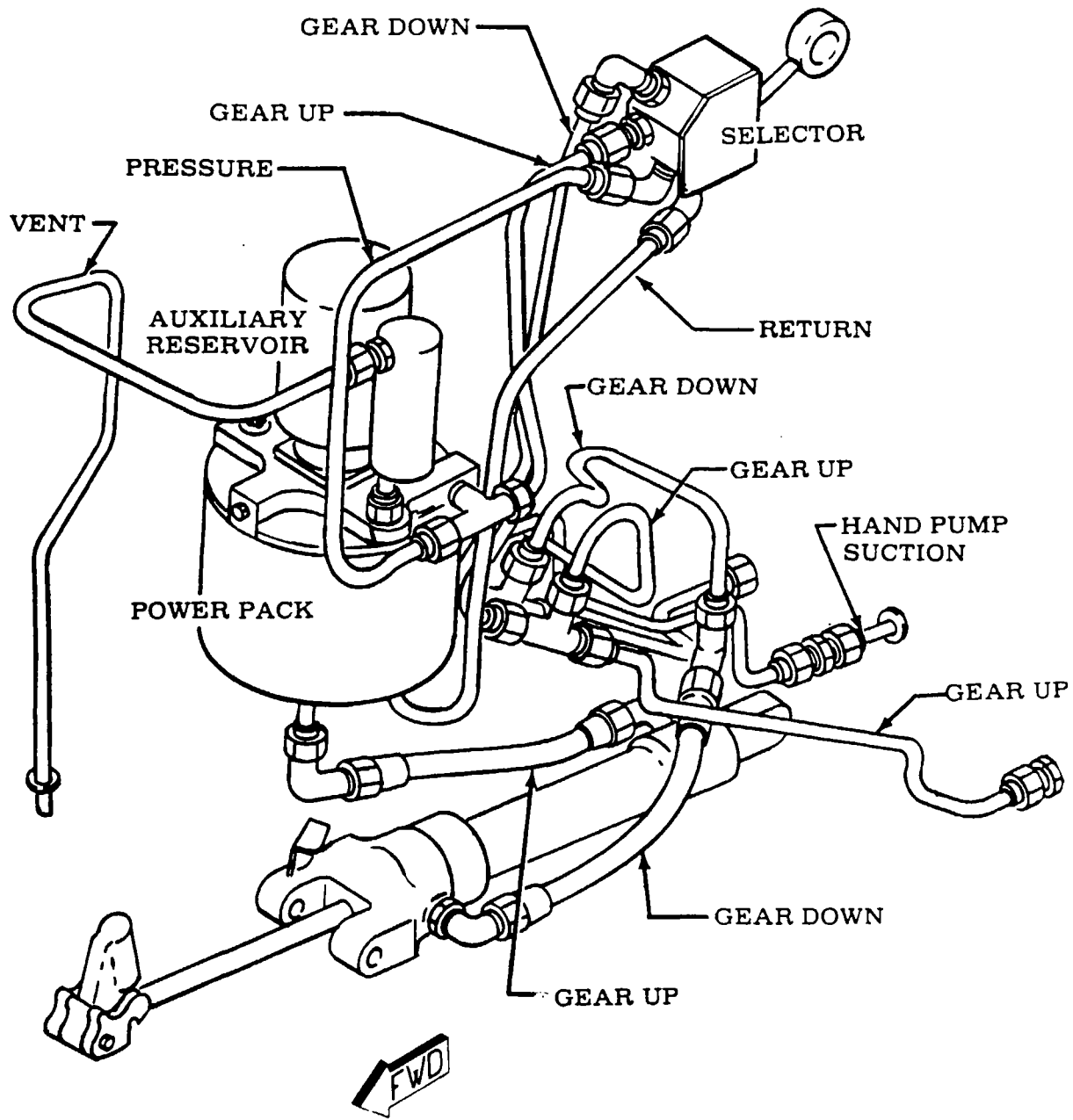


Figure 5-1. Landing Gear System Schematic (Sheet 3 of 3)

MODEL R182 AND TR182 SERVICE MANUAL



THRU 1978 MODELS

Figure 5-2. Landing Gear System Component Locator (Sheet 1 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

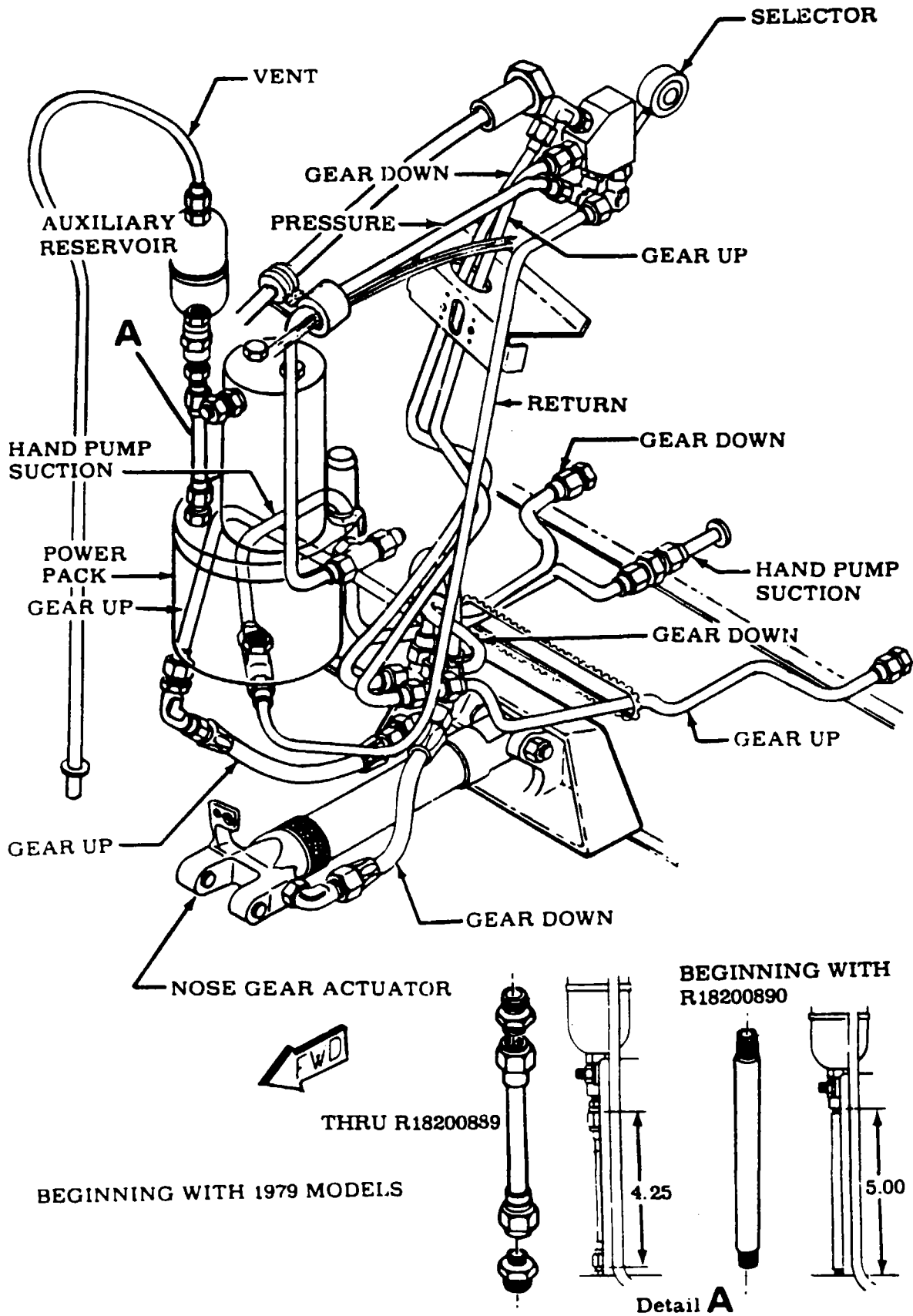


Figure 5-2. Landing Gear System Component Locator (Sheet 2 of 3)

MODEL R182 AND TR182 SERVICE MANUAL

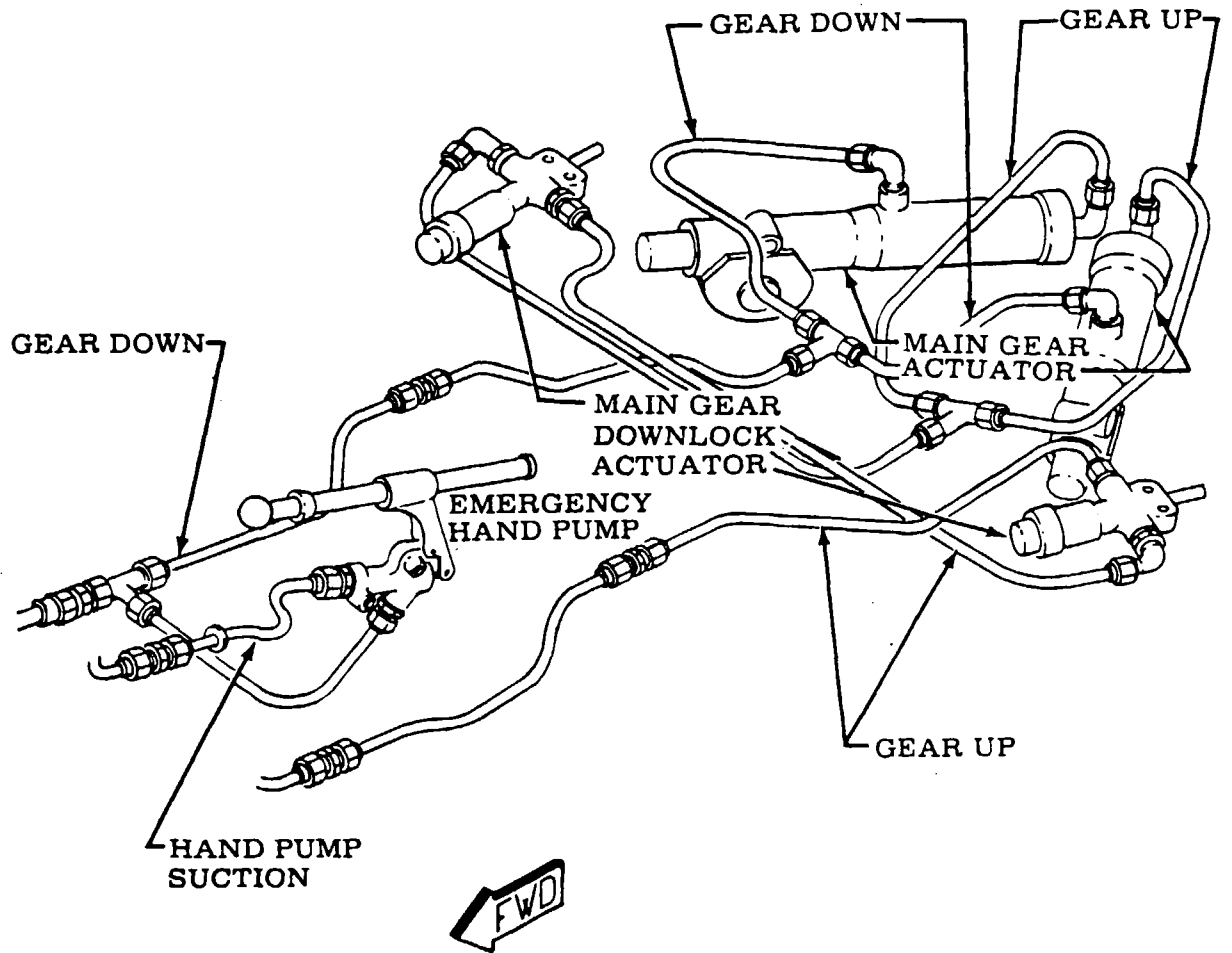


Figure 5-2. Landing Gear System Component Locator (Sheet 3 of 3)

## MODEL R182 AND TR182 SERVICE MANUAL

- 5-4. **POWER PACK.** (See figure 5-3.)
- 5-5. **DESCRIPTION.** The power pack assembly, located in the cabin, forward of the center console, is a multi-purpose unit. It contains a hydraulic reservoir, valves, an electrically driven motor and the pump. An emergency hand pump, located between the pilot and copilot seats, uses reservoir fluid to permit extension of the landing gear.
- 5-6. **REMOVAL.** (See figure 5-2.)
- a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.
  - b. Relieve pressure in system by moving gear position selector handle to up position and back to down position.

### NOTE

As hydraulic lines are disconnected or removed, plug or cap all openings to prevent entry of foreign material into the lines or fittings.

### CAUTION

The power pack reservoir must be drained to prevent any large amount of hydraulic fluid from spilling into the cabin area. To accomplish this, peel carpeting back from work area and spread a large absorbent drip cloth below power pack. Remove the cap from the tee fitting located on the side of the power pack body. Attach a flexible line to the tee fitting and place the other end of the line in a container of at least 1 gallon capacity. Pump fluid from reservoir using emergency hand pump. Remove line and replace cap.

### NOTE

Ensure that the master switch is in the OFF position before disconnecting electrical leads.

### CAUTION

A small diode assembly wire spans across the positive and negative posts on the motor. It is very important that this diode assembly, if removed or being replaced, be installed on the motor with the marking band of the diode toward the positive post. (See figure 5-3.)

- c. Pull control wheel all the way aft and secure in this position.
- d. Move left seat to full aft position and spread a drip cloth beneath the power pack.
- e. Disconnect ground wire and solenoid wire from top of motor. Disconnect two pressure switch wires at splice connector. Tag all wires so they may be installed in the same location.
- f. Disconnect vent line from top of reservoir. Disconnect pressure line from tee fitting on power pack body. Disconnect two return lines from tee fitting in bottom of reservoir. Cap or plug all openings and lines.

# MODEL R182 AND TR182 SERVICE MANUAL

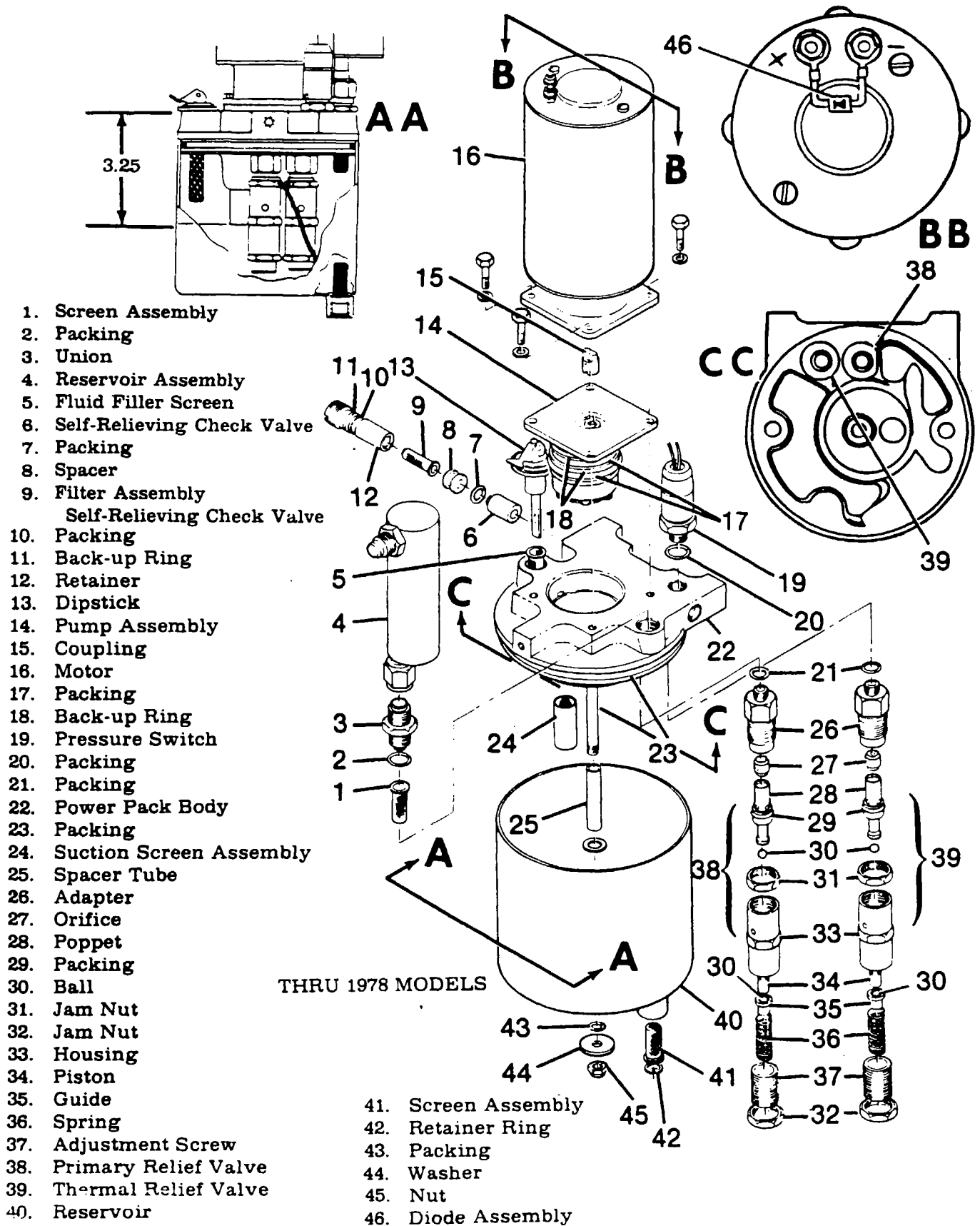


Figure 5-3. Hydraulic Power Pack Assembly (Sheet 1 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

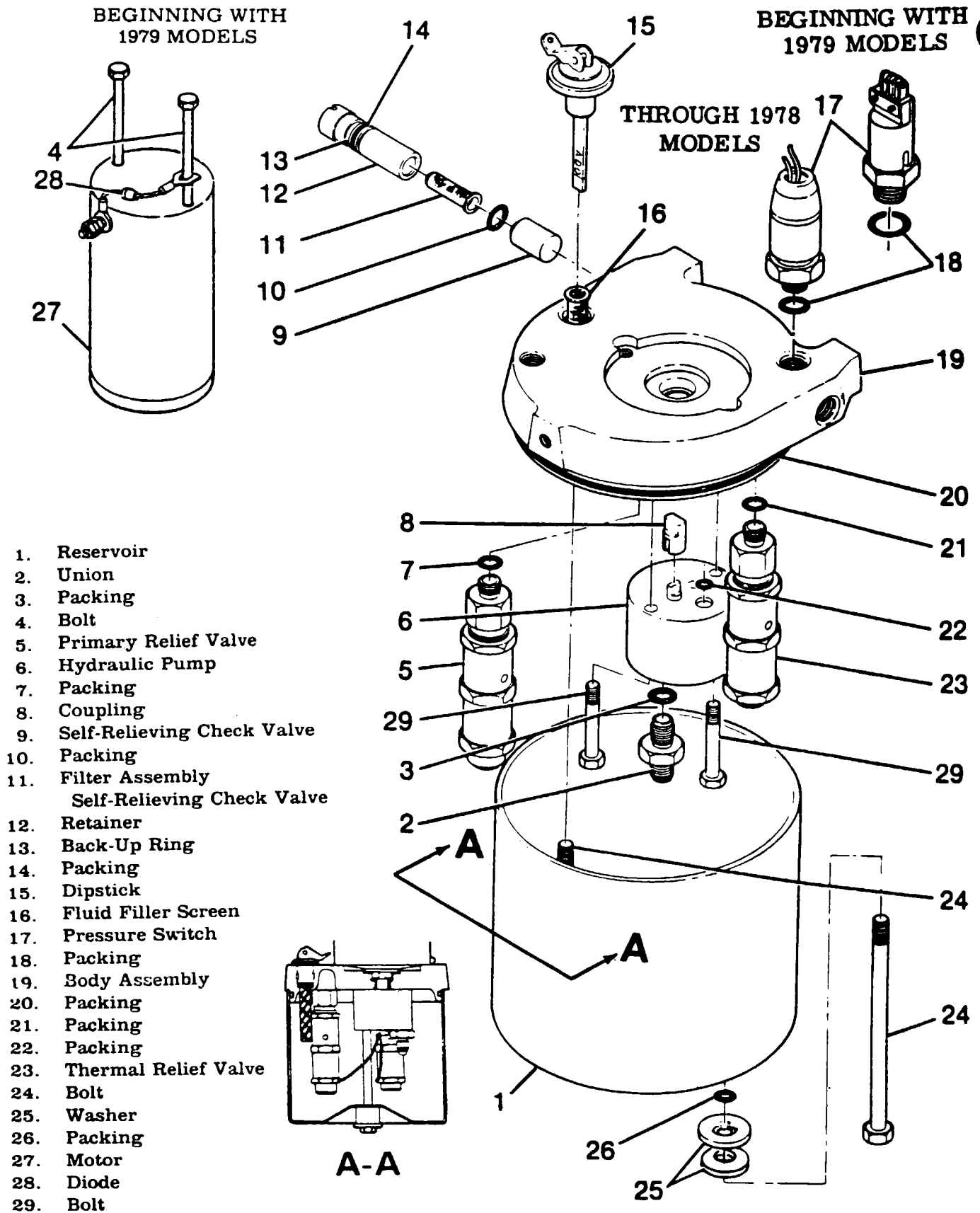


Figure 5-3. Hydraulic Power Pack Assembly (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

- g. Remove two bolts, attaching power pack to console assembly, from aft side of power pack body. Remove four screws, attaching forward power pack support to firewall, and remove power pack, with support attached. Work over left-hand rudder pedals.

### 5-7. DISASSEMBLY (THRU 1978 MODELS.) (See figure 5-3, sheet 1 of 2.)

- a. Remove retaining ring (42) and screen assembly (41) from reservoir assembly (40).
- b. Remove nut (45), washer (44) and packing (43) from attaching stud and remove reservoir (40) from power pack body (22).

#### NOTE

If reservoir will not disengage from power pack body, install a capped fitting in the pressure and return openings of the power pack assembly and attach air hose to vent fitting at top of reservoir assembly (4). Apply air pressure (not to exceed 15 psi, reservoir proof pressure), and remove reservoir. A strap clamp is not recommended, as clamp may damage reservoir.

- c. Remove packing (23) from power pack body (22).

#### NOTE

Disassembly of primary and thermal relief valve assemblies (38) & (39) is normally not required. Refer to paragraphs for specific instructions regarding relief valves. Before removal, tag each relief valve "primary" or "thermal" to insure correct installation. Refer to view C-C.

- d. Cut safety wire and remove relief valve assemblies and spacer tube (25) from power pack body (22).
- e. Remove reservoir assembly (4), union (3), packing (2) and screen assembly (1) from power pack body (22).
- f. Remove dipstick (13) and fluid filler screen (5) from power pack body (22).
- g. Remove retainer (12), filter assembly (9), packing (7), self-relieving check valve (6) and spacer (8) from power pack body (22).

#### NOTE

If spacer (8) and/or self-relieving check valve (6) will not fall from hole in power pack, place a drift or punch made of soft material into the pressure opening of the power pack body and tap spacer from power pack body.

- h. Remove pressure switch (19) and packing (20) from power pack body (22).
- i. Remove three bolts holding motor and pump assembly to body and remove motor (16), coupling (15), and pump assembly (14) from power pack body (22).



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### NOTE

The suction screen assembly (24) need not be removed from power pack body (22) for cleaning or inspection. However, if suction screen is damaged or permanently clogged, it should be removed as outlined in step "j" of this paragraph, observing the following caution.

### CAUTION

Use extreme caution in removing suction screen assembly (24). Damage to screen assembly or clearance between screen assembly and power pack body (22) will cause slow gear retraction.

- j. Working through center hole in top of power pack body (22), use a drift or punch made of soft material to tap suction screen assembly (24) from power pack body (22).

- 5-8. **INSPECTION. (THRU 1978 MODELS.) (See figure 5-3, sheet 1 of 2.)**
  - a. Wash all parts in cleaning solvent (Federal Specification P-S-611, or equivalent) and dry with filtered air.
  - b. Inspect all threaded surfaces for serviceable condition and cleanliness.
  - c. Inspect all parts for scratches, scores, chips, cracks and indications of excessive wear.
  - d. Check to ensure that all screens are completely clean and undamaged. Refer to Note and Caution preceding step "j" of the preceding paragraph for important information regarding removal of suction screen assembly (24).
- 5-9. **REASSEMBLY. (THRU 1978 MODELS.) (See figure 5-3, sheet 1 of 2.)**

### NOTE

Use all new packings and back up rings when reassembling power pack. Assemble parts, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow Corning DC-7. Do not use DC-7 on surfaces to be painted.

- a. If suction screen assembly (24) was removed, press a new suction screen assembly into power pack body (22), observing the following caution.

### CAUTION

Use extreme caution when installing suction screen assembly (24) power pack into body (22). Damage to screen assembly or clearance between screen assembly and body will result in slow gear retraction. Refer to view A-A for correct pressed height dimension of suction screen assembly.

- b. Using new packings (17) and back-up rings (18), install pump assembly (14) into power pack body (22) being careful to match the painted alignment marks on pump and body.

## MODEL R182 AND TR182 SERVICE MANUAL

- c. Install coupling (15) on pump shaft and position motor (16) on pump assembly being careful to ensure that coupling (15) is properly engaged, and painted alignment mark matches with those on pump and body.
- d. Install and tighten three bolts and washers connecting motor (16), pump assembly (14) and power pack body (22).
- e. Using new packing (20) install and tighten pressure switch (19) onto power pack body (22).
- f. Using new packings (7) and (10) and back-up ring (11), install and tighten spacer (8), self-relieving check valve (6) and retainer (12) into power pack body (22).
- g. Install and tighten relief valve assemblies (38) and (39) onto power pack body (22) with packing (21).
- h. Install fluid filler screen (5) and dipstick (13) into power pack body (22).
- i. Using new packing (2), install screen assembly (1), union (3) and reservoir assembly (4) onto power pack body (22).
- j. Slide spacer tube (25), then washer onto body center stud. Loop safety wire through jam-nuts on relief valves as shown, then tie off to spacer tube (25). Refer to view AA.
- k. Install screen assembly (41) and retaining ring (42) into reservoir (40).

### CAUTION

It is very important that the relief valve safety wire does not get between spacer tube (25) and power pack body (22) during installation of reservoir (40). Refer to view A-A.

- l. Using new packings (23) & (43) install and tighten reservoir (40), washer (44) and nut (45) onto power pack body (22).

- 5-10. **DISASSEMBLY.** (Beginning with 1979 MODELS.) (See figure 5-3, sheet 2 of 2.)
- a. Remove bolts (24), washers (25) and packing (26) from reservoir (1).
  - b. Remove reservoir (1) from body assembly (19).

### NOTE

If reservoir will not disengage from body, install a capped fitting in the pressure and return openings of the power pack assembly and attach an air hose to vent fitting at top of body assembly (19). Apply air pressure (not to exceed 15 psi, reservoir proof pressure), and remove reservoir. A strap clamp is not recommended as clamp may damage reservoir.

- c. Remove packing (20) from body assembly (19).

### NOTE

Disassembly of primary and thermal relief valves (5) and (23) is normally not required. Refer to applicable paragraphs for specific instructions regarding relief valves. Before removal, tag each relief valve (primary) or (thermal) to ensure correct reinstallation.

- d. Cut safety wire and remove primary and thermal relief valve assemblies (5) and (23) from body assembly (19). Remove packings (7) and (21) from relief valves.
- e. Remove dipstick (15) and screen (16) from body assembly (19).

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- f. Remove retainer (12), filter assembly self-relieving check valve (11), back-up ring (13), packing (14), packing (10) and self-relieving check valve (9) from body assembly (19).

### NOTE

If self-relieving check valve (9) will not fall from hole in body assembly, place a drift or punch made of soft material into the pressure opening of body assembly and tap spacer from body.

- g. Remove pressure switch (17) and packing (18) from body assembly (19).
  - h. Remove bolts (29) attaching hydraulic pump (6) to body assembly (19), and remove pump and coupling (8) from body assembly. Remove union (2) from pump, and remove packings (3) and (22).
  - \* i. Cut safety wire and remove bolts (29) attaching hydraulic pump (6) to body assembly (19), remove pump and coupling (8) from body assembly, and remove packing (22).
  - j. Cut safety wire and remove bolts (4) from motor (27); remove motor from body assembly (19).
- 5-11. INSPECTION. (Beginning with 1979 MODELS.) (See figure 5-3, sheet 2 of 2.)
- a. Wash all parts in cleaning solvent (Federal Specification P-S-611, or equivalent) and dry with filtered air.
  - b. Inspect all threaded surfaces for serviceable condition and cleanliness.
  - c. Inspect all parts for scratches, scores, chips, cracks and indications of excessive wear.
  - d. Clean to ensure that all screens and filters are completely clean and undamaged.
- 5-12. REASSEMBLY. (Beginning with 1979 MODELS.) (See figure 5-3, sheet 2 of 2.)

### NOTE

Use all new packings and back-up rings when reassembling power pack. Assemble parts, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow Corning DC-7. Do not use DC-7 on surfaces to be painted.

- a. Using new packings (22), install hydraulic pump (6) and coupling (8) into body assembly (19) with bolts (29). Install union (2) and packing (3) in pump. Torque bolts (29) evenly to 30 pound-inches.
- \* b. Using new packing (22), install hydraulic pump (6) and coupling (8) into body assembly (19) with bolts (29). Torque bolts (29) evenly to 30 pound-inches and safety-wire bolts.
- c. Install motor (27) on top of body assembly (19) after aligning coupling (8) to match mating connection in motor (27). Secure motor to body with bolts. Safety-wire bolts.

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- d. Install new packing (18), install and tighten pressure switch (17) onto body assembly (19).
- e. Using new back-up ring (13) and packings (14) and (10), install and tighten self-relieving check valve (9), filter assembly self-relieving check valve (11), and retainer (12) into body (19).
- f. Install primary and thermal relief valve assemblies (5) and (23), along with packings (7) and (21) onto body assembly (19). Safety-wire relief valves as shown in View A-A.

### CAUTION

Ensure that relief valves are installed in their correct location.

- g. Install fluid filler screen (16) and dipstick (15) into body assembly (19).

● SERIAL R182 R18200001 THRU R18201816  
TR182 R18200584 THRU R18201816

\* SERIAL R182 & TR182 R18201817 & ON

## MODEL R182 AND TR182 SERVICE MANUAL

- h. Using new packing (20), washers (25), and packing (26), install and tighten reservoir (1) onto body assembly (19). Torque bolts (24) evenly to 30-35 inch-pounds.

### 5-13. INSTALLATION.

- a. Place power pack, with forward support attached, in aircraft. Attach forward support to firewall with four screws.
- b. Attach power pack to center console with two bolts at aft side of power pack.

#### NOTE

Ensure that master switch is in OFF position before connecting electrical leads to power pack assembly.

#### CAUTION

A small diode assembly wire spans across the positive and negative posts on the motor. It is very important that this diode assembly, if removed or being replaced, be installed on the motor with the marking band of the diode toward the positive post. Refer to view B-B on sheet 1.

- c. Ensure that diode assembly wire is correctly installed on motor and connect ground wire and solenoid wire to motor.
- d. Connect two pressure switch wires at splice connectors, being careful to match tags on wires.
- e. Remove caps or plugs, and connect two return lines to tee fitting at bottom of reservoir. Connect pressure line to tee fitting on left-hand side of power pack body. Connect vent line to fitting at top of reservoir.

### 5-14. PRIMARY AND THERMAL RELIEF VALVE ASSEMBLIES. (See figure 5-3.)

5-15. DESCRIPTION. The primary relief valve, located between the check valve and pump, serves to limit the amount of pressure which can be generated by the pump. The thermal relief valve, located on the system side of the check valve, serves to limit the system pressure. System pressure can increase due to thermal expansion. Both valves are identical, the only difference being the pressure setting.

### 5-16. REMOVAL. (See figure 5-3, sheet 2 of 2.)

- a. Cut safety wire and remove relief valve assemblies from body assembly (19).

### 5-17. DISASSEMBLY. (See figure 5-3, sheet 1 of 2.)

#### NOTE

Relief valve assemblies are preset by the factory and normally will not require disassembly. Refer to note following step (g) in paragraph 5-19 to determine if disassembly or adjustment is necessary.

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- a. Remove jam nut (32) and adjustment screw (37) from housing (33).
- b. Remove spring (36), guide (35), balls (30) and piston (34) from housing (33).
- c. Loosen jam nut (31) and remove adapter (26) from housing (33).
- d. Remove poppet (28) and orifice (27) from adapter (26).

### 5-18. INSPECTION. (See figure 5-3, sheet 1 of 2.)

- a. Wash all parts in cleaning solvent (Federal Specification P-S-611 or equivalent) and dry with filtered air.
- b. Inspect all threaded surfaces for serviceable condition and cleanliness.
- c. Inspect all parts for scratches, scores, chips, cracks and indications of excessive wear.

### 5-19. ASSEMBLY AND ADJUSTMENT. (See figure 5-3, sheet 1 of 2.)

#### NOTE

Use all new packings and back up rings during reassembly. Assemble parts, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow Corning DC-7.

- a. Install orifice (27) and poppet (28) into adapter (26). (New packing (29) must be installed on poppet.)
- b. Install jam nut (31) and housing (33) on adapter (26).
- c. Tighten adapter (26) into housing (33) and torque to 100-150 lb-in.
- d. Tighten jam nut (31) against housing (33) and torque to 100-150 lb-in.
- e. Install one ball (30) into housing (33), so that it rests on poppet (28). Install piston (34) into housing (33), then install remaining ball (30) into end of piston (34).
- f. Insert guide (35) and spring (36) into housing (33) making sure that balls (30) and piston (34) remain in correct position.
- g. Turn adjustment screw (37) into housing (33) until it just contacts spring (36), then turn in one additional turn. Start jam nut (32) onto adjustment screw (37) and snug against housing (33).

#### THERMAL RELIEF VALVE

Open ..... 2250 PSI Maximum  
Reset ..... 1500 PSI Minimum  
(no leakage)

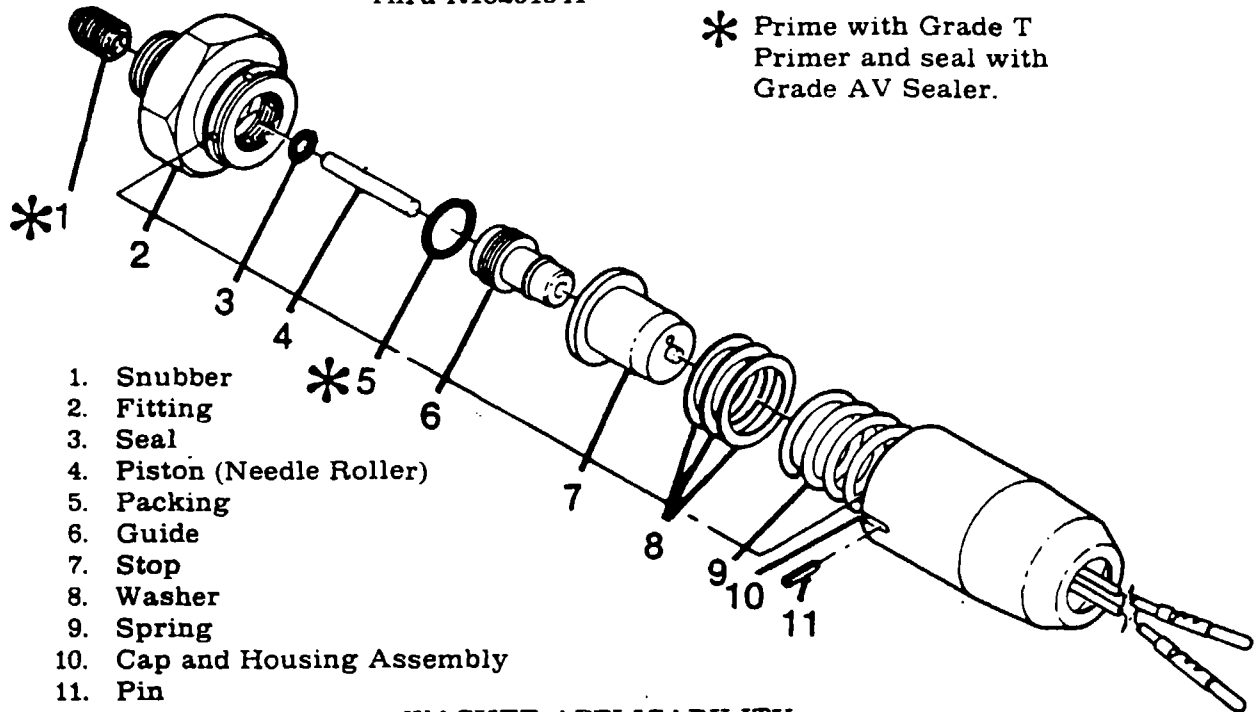
#### PRIMARY RELIEF VALVE

Open ..... 1800 +00 -50 PSI  
Reset ..... 1300 PSI Minimum  
(no leakage)

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Thru R18201541

\* Prime with Grade T Primer and seal with Grade AV Sealer.



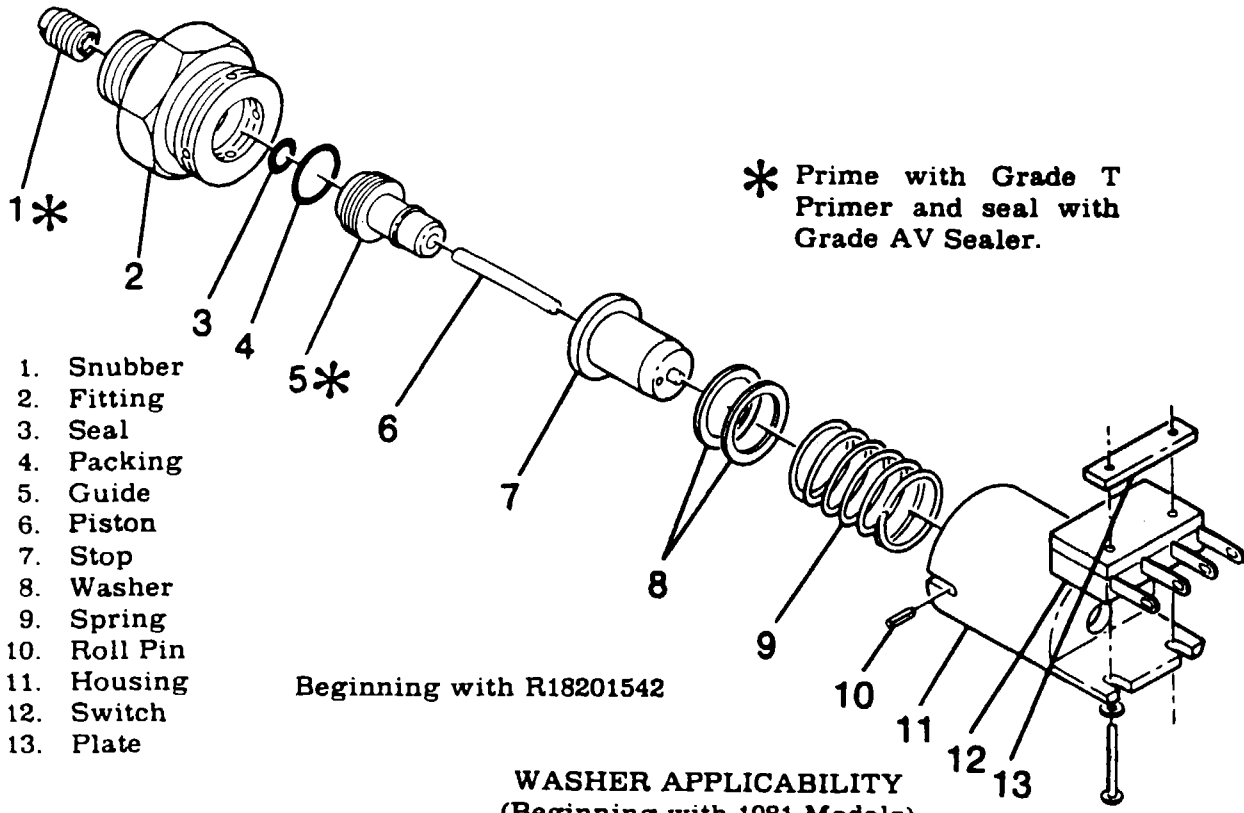
- 1. Snubber
- 2. Fitting
- 3. Seal
- 4. Piston (Needle Roller)
- \* 5. Packing
- 6. Guide
- 7. Stop
- 8. Washer
- 9. Spring
- 10. Cap and Housing Assembly
- 11. Pin

### WASHER APPLICABILITY

WASHER PART NO.	THICKNESS	MATERIAL	EFFECT IN PRESSURE (PSI)
S1358-3	.014	"MYLAR" POLYESTER FILM (TYPE A)	55
S1358-5	.005	"MYLAR" POLYESTER FILM (TYPE A)	20

Figure 5-4. Pressure Switch (Sheet 1 of 2)

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- 1. Snubber
- 2. Fitting
- 3. Seal
- 4. Packing
- 5. Guide
- 6. Piston
- 7. Stop
- 8. Washer
- 9. Spring
- 10. Roll Pin
- 11. Housing
- 12. Switch
- 13. Plate

### WASHER APPLICABILITY (Beginning with 1981 Models)

WASHER PART NO.	THICKNESS	MATERIAL	EFFECT IN PRESSURE (PSI)
S1358-7	.014-inch	"MYLAR" POLYESTER FILM TYPE A	55
S1358-8	.005-inch	"MYLAR" POLYESTER FILM TYPE A	20

Figure 5-4 . Pressure Switch (Sheet 2 of 2)



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### NOTE

To determine if disassembly or adjustment is necessary, the relief valves can be bench-tested. The thermal relief valve can be tested with a hand pump, connected to a hydraulic reservoir, a pressure gage with 2500 psi capacity and a hose with appropriate fittings, connected from the hand pump to the fitting on the thermal relief valve. The thermal relief valve shall be set not to open in excess of 2250 psi. If adjustment of thermal relief valve is necessary, loosen jam-nut (32) and turn adjustment screw (37) in to increase pressure; back adjustment screw out to decrease pressure. Tighten jam-nut (32) against housing (33) and torque jam-nut from 100 to 150 lb. in. Recheck pressure adjustments. Testing the primary relief valve will require a hydraulic pump with a flow rate of 0.5 to 0.7 gal.-per-min., connected to a hydraulic reservoir, a pressure gage with 2500 psi capacity and a hose with appropriate fittings, connected from the hydraulic pump to the fitting on the primary relief valve. Adequate precautions should be taken to recover hydraulic fluid which will be expelled from the primary relief valve while under pressure. The primary relief valve shall be set to open at 1800, + 0, -50 psi. If adjustment of primary relief valve is necessary, loosen jam-nut (32) and turn adjustment screw (37) in to increase pressure; back adjustment screw out to decrease pressure. Tighten jam-nut (32) against housing (33) and torque jam-nut from 100 to 150 lb. in. Recheck pressure adjustments.

#### 5-20. INSTALLATION. (See figure 5-3.)

- a. Install primary and thermal relief valve assemblies along with packings onto body assembly

### CAUTION

Ensure that primary and thermal relief valves are installed in their correct locations and that valves are properly safetied. Refer to view A-A in appropriate illustration. Make sure applicable illustration is used for power pack being installed

#### 5-21. PRESSURE SWITCH.

- 5-22. DESCRIPTION. A pressure switch is located in the cover of the power pack. The switch opens the electrical circuit to the pump solenoid when the pressure in the system increases to approximately 1500 psi. The pressure switch will continue to hold the electrical circuit open until pressure in the system drops to approximately 1000 psi, at which time the pump will again operate to build up pressure to approximately 1500 psi, regardless of gear selector handle position.

## MODEL R182 AND TR182 SERVICE MANUAL

- 5-23. **REMOVAL AND INSTALLATION.**
- a. Move left seat to full aft position and spread a drip cloth beneath the power pack.
  - b. Assure that master switch is off, and disconnect wires from pressure switch.
  - c. Disconnect pressure switch from power pack.
  - d. Reverse the preceding steps to install pressure switch.
- 5-24. **DISASSEMBLY.** (Thru R18201541.) (See figure 5-4, sheet 1 of 2.)
- a. Remove pin (11).
  - b. Unscrew cap and housing assembly (10) from fitting (2).
  - c. Remove spring (9).
  - d. Remove washers (8) from flange of stop (7).

### NOTE

Chart in figure 5-4, sheet 1 of 2, lists washers (8) by part number, thickness and effect on operating pressure (psi).

- e. Unscrew guide (6) from fitting (2).

### CAUTION

Do not damage lip of guide (6). Guide threads and threads of fitting (2) are primed with Loctite Grade T Primer and sealed with Loctite Grade AV Sealer.

- f. Remove piston (4).
- g. Remove seal (3) and packing (5).
- h. Remove snubber (1) from fitting (2).

### CAUTION

Threads of snubber (1) and fitting (2) are primed with Loctite Grade T Primer and sealed with Loctite Grade AV Sealer.

- 5-25. **INSPECTION AND REPAIR.** (Thru R18201541.) (See figure 5-4, sheet 1 of 2.)
- a. Clean sealant from threads of snubber (1), fitting (2) and guide (6) with wire brush.
  - b. Clean all parts with cleaning solvent (Federal Specification P-S-661, or equivalent) and dry thoroughly.
  - c. Discard seal (3) and packing (5) and replace with new parts.
  - d. Inspect all pressure switch parts for scratches, scores, chips, cracks and indications of wear.
  - e. All damaged parts shall be replaced with new parts.

### NOTE

Thorough cleaning is important. Dirt and chips are the greatest single cause of malfunctions in hydraulic systems. Carefulness and proper handling of parts to prevent damage must be observed at all times.

- f. Snubber (1) can be cleaned with solvent, then blown out with high pressure compressed air.
- g. Assure that .062 vent hole is open in stop (7).

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- 5-26. REASSEMBLY. (Thru R18201541.) (See figure 5-4, sheet 1 of 2.)
- a. Prime threads of snubber (1) and internal threads of fitting (2) with Loctite Grade T Primer and apply Loctite Grade AV Sealer to threads of snubber (1). Install snubber (1) into fitting (2) and tighten with slotted screwdriver.

### NOTE

Lubricate new seals and packing, guide (excluding threads), piston, stop and spring with Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7. Do not use DC-7 on surfaces to be painted.

- b. Install packing (5) in fitting (2).
- c. Lubricate packing seal (3) and install in guide (6)
- d. Lubricate guide (6) (excluding threads). Prime threads of guide and internal threads of fitting (2) with Loctite Grade T Primer and apply Loctite Grade AV Sealer to threads of guide (6). Install guide (6) into fitting (2) and finger-tighten.

### NOTE

It is possible to assemble, fill and test the pressure switch in the aircraft. This can be accomplished by the installation of test gage in the test fitting located on the side of the power pack and pumping the emergency hand pump. Master switch MUST be OFF and selector handle in down position.

- e. After installing test fitting and assuring that sealant in fitting (2) is dry, screw fitting assembly into power pack body.
- f. Pump emergency hand pump just enough for fluid to seep from top of guide (6). (Refer to Section 2.)
- g. Lubricate piston (4) and insert piston (4) into hole in guide (6).
- h. Lubricate stop (7) and install over guide (6).
- i. Install exact number and thickness of washers removed.

### NOTE

If same number of washers (8) are installed as were removed, pressure should not require readjustment. If readjustment is necessary, a chart of washer part numbers, thickness and effect in pressure adjustment is shown in figure 5-4, sheet 1 of 2.

- j. Lubricate spring (9) and install over washers (8).
- k. Screw cap and housing assembly (10) on fitting (2).
- l. Check fluid level in power pack reservoir. (Refer to Section 2 of this manual.)

## MODEL R182 AND TR182 SERVICE MANUAL

- 5-27. ADJUSTMENT. (Thru R18201541.) (See figure 5-4, sheet 1 of 2.)
- a. Jack aircraft.
  - b. Screw cap and housing assembly (10) on fitting (2) enough to bottom piston (4) out in stop (7).
  - c. Turn cap and piston assembly (10) back from full thread engagement one turn, plus 0, minus one-fourth turn to locate hole in fitting (2) in slot in skirt of cap and housing assembly (10).
  - d. Attach electrical connections to pressure switch and attach external power source.
  - e. Turn on master switch.
  - f. Pump hand pump to obtain 1500 psi on test gage.
  - g. The switch should open the electrical circuit to the pump solenoid when pressure in the system increases to approximately 1500 psi.
  - h. If switch opens electrical circuit to solenoid prematurely, disassemble pressure switch down to washers (8) and add washers (8) shims as necessary to obtain desired pressure; repeat steps (b) and (c).

### NOTE

The chart in the figure 5-4, sheet 1 of 2, lists washers by part number, thickness and the effect in psi each washer will have on switch operation.

If switch opens electrical circuit to solenoid later than 1500±50 psi, disassemble pressure switch down to washers (8) and remove washers (8) as necessary to obtain desired pressure; repeat steps (b) and (c).

- i. If switch opens electrical circuit to solenoid later than 1500±50 psi, disassemble pressure switch down to washers (8) and remove washers (8) as necessary to obtain desired pressure; repeat steps (b) and (c).
  - j. After final pressure adjustment, install pin (11) in slot of cap and housing assembly (10).
  - k. Turn off master switch.
- 5-28. DISASSEMBLY. (Beginning with R18201542.) (See figure 5-4, sheet 2 of 2.)
- a. Remove roll pin (10).
  - b. Unscrew housing (11) from fitting (2).
  - c. Remove spring (9).
  - d. Remove washers (8) from flange of stop (7).

### NOTE

Chart in figure 5-4, sheet 2 of 2, lists washers by part number, thickness and effect on operating pressure (psi).

- e. Unscrew guide (5) from fitting (2).

### NOTE

Do not damage lip of guide (5). Guide threads and threads of fitting (2) are primed with Loctite Grade T Primer and sealed with Loctite Grade AV Sealer.

## MODEL R182 AND TR182 SERVICE MANUAL

- f. Remove piston (6).
- g. Remove seal (3) and packing (4).
- h. Remove snubber (1) from fitting (2).

### NOTE

Threads of snubber (1) and fitting (2) are primed with Loctite Grade T Primer and sealed with Loctite Grade AV Sealer.

- 5-29. **INSPECTION AND REPAIR.** (Beginning with R18201542.) (See figure 5-4, sheet 2 of 2.)
- a. Clean sealant from threads of snubber (1), fitting (2) and guide (5) with wire brush.
  - b. Clean all parts with cleaning solvent (Federal Specification P-S-661, or equivalent, and dry thoroughly.
  - c. Discard seal (3) and packing (4), and replace with new parts.
  - d. Inspect all pressure switch parts for scratches, scores, chips, cracks and indications of wear.
  - e. All damaged parts will be replaced with new parts.

### NOTE

Thorough cleaning is important. Dirt and chips are the greatest single cause of malfunctions in hydraulic systems. Carefulness and proper handling of parts to prevent damage must be observed at all times.

- f. Snubber (1) can be cleaned with solvent, then blown out with high pressure compressed air.
  - g. Assure that 0.062-inch vent hole is open in stop (7).
- 5-30. **REASSEMBLY.** (Beginning with R18201542.) (See figure 5-4, sheet 2 of 2.)
- a. Prime threads of snubber (1) and internal threads of fitting (2) with Loctite Grade T Primer and apply Grade AV Sealer to threads of snubber (1). Install snubber (1) into fitting (2) and tighten with slotted screwdriver.

### NOTE

Lubricate new seals and packing, guide (excluding threads), piston, stop and spring with Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow Corning DC-7. Do not use DC-7 on surfaces to be painted.

- b. Install packing (4) in fitting (2).
- c. Lubricate seal (3) and install in guide (5).
- d. Lubricate guide (5) (excluding threads). Prime threads of guide and internal threads of fitting (2) with Loctite Grade T Primer and apply Loctite Grade AV Sealer to threads of guide (5). Install guide (5) into fitting (2), and finger-tighten.

# MODEL R182 AND TR182 SERVICE MANUAL

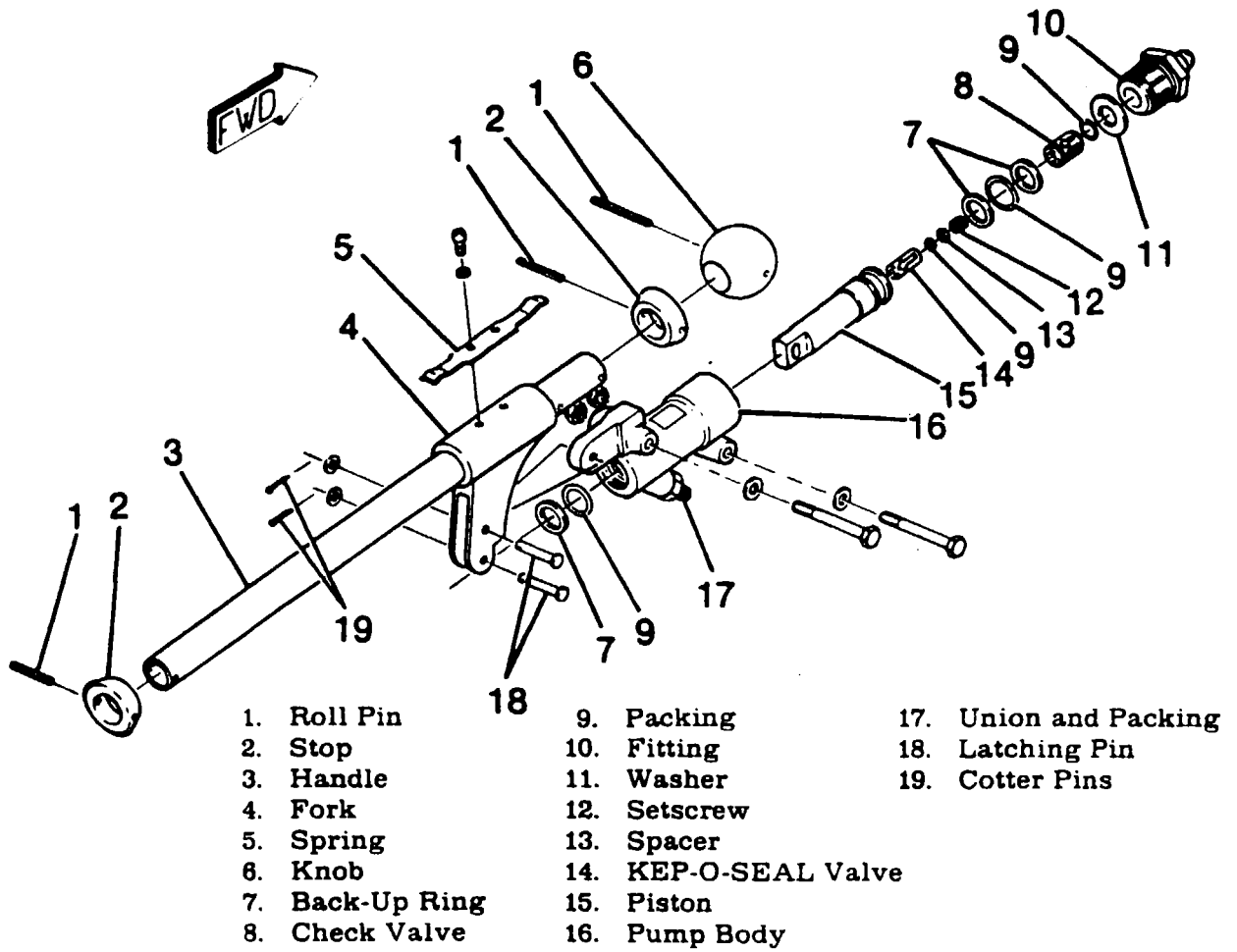


Figure 5-5. Emergency Hand Pump Disassembly

## MODEL R182 & TR182 SERIES SERVICE MANUAL

### NOTE

It is possible to assemble, fill and test the pressure switch in the aircraft. This can be accomplished by the installation of a test gage in the capped port of the tee fitting on the right-hand side of the power pack and pumping the emergency hand pump, Master switch MUST be OFF and gear selector handle must be in DOWN position.

- e. After installing test fitting and assuring that sealant in fitting (2) is dry, screw fitting and assembly into power pack body.
- f. Pump emergency hand pump just enough for fluid to seep from top of guide (5). (Refer to Section 2 of this manual.)
- g. Lubricate and insert piston (6) into hole in guide (5).
- h. Lubricate stop (7) and install over guide (5).
- i. Install exact number and thickness of washers (8) removed.

### NOTE

If same number of washers (8) are installed as were removed, pressure should not require readjustment. If readjustment is necessary, a chart of washer part numbers, thickness and effect in pressure adjustment is shown in the figure 5-4, sheet 2 of 2.

- j. Lubricate spring (9) and install over washers (8).
- k. Screw housing (11) on fitting (2).
- l. Check fluid level in power pack reservoir. (Refer to Section 2 of this manual.)
- m. Refer to paragraph 5-31A for Inspection/Check of Pressure Switch.

- 5-31. ADJUSTMENT. (Beginning with R18201542.) (See figure 5-4, sheet 2 of 2.)
- a. Jack aircraft as outlined in Section 2 of this manual.
  - b. Screw housing (11) on fitting (2), enough to bottom piston (6) out in stop (7).
  - c. Turn housing (11) back from full thread engagement one turn, plus 0, minus one-fourth turn to locate hole in fitting (2) in slot in skirt of housing assembly (11).
  - d. Attach electrical connections to pressure switch and attach external power source.
  - e. Turn master switch ON.
  - f. Pump emergency hand pump to obtain 1500 psi,  $\pm 50$  psi.
  - g. The switch should open the electrical circuit to the pump solenoid when pressure in the system increases to approximately 1500 psi,  $\pm 50$  psi.
  - h. If switch opens electrical circuit prematurely, disassemble pressure switch down to washers (8) and add washers (8) as necessary to obtain desired pressure; repeat steps "b" and "c".
  - i. If switch opens electrical circuit later than 1500 psi,  $\pm 50$  psi, disassemble pressure switch down to washers (8) and remove washers (8) as necessary to obtain desired pressure; repeat steps "b" and "c".
  - j. After final pressure adjustment, install (10) in slot of housing (11).
  - k. Turn master switch OFF.

### NOTE

The chart in the figure 5-4, sheet 2 of 2, lists washers by part number, thickness and the effect in psi each washer will have on switch operation.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## 5-31A. INSPECTION/CHECK OF POWERPACK

### NOTE

Checks are to be performed with external power set at 28.5 volts.

### NOTE

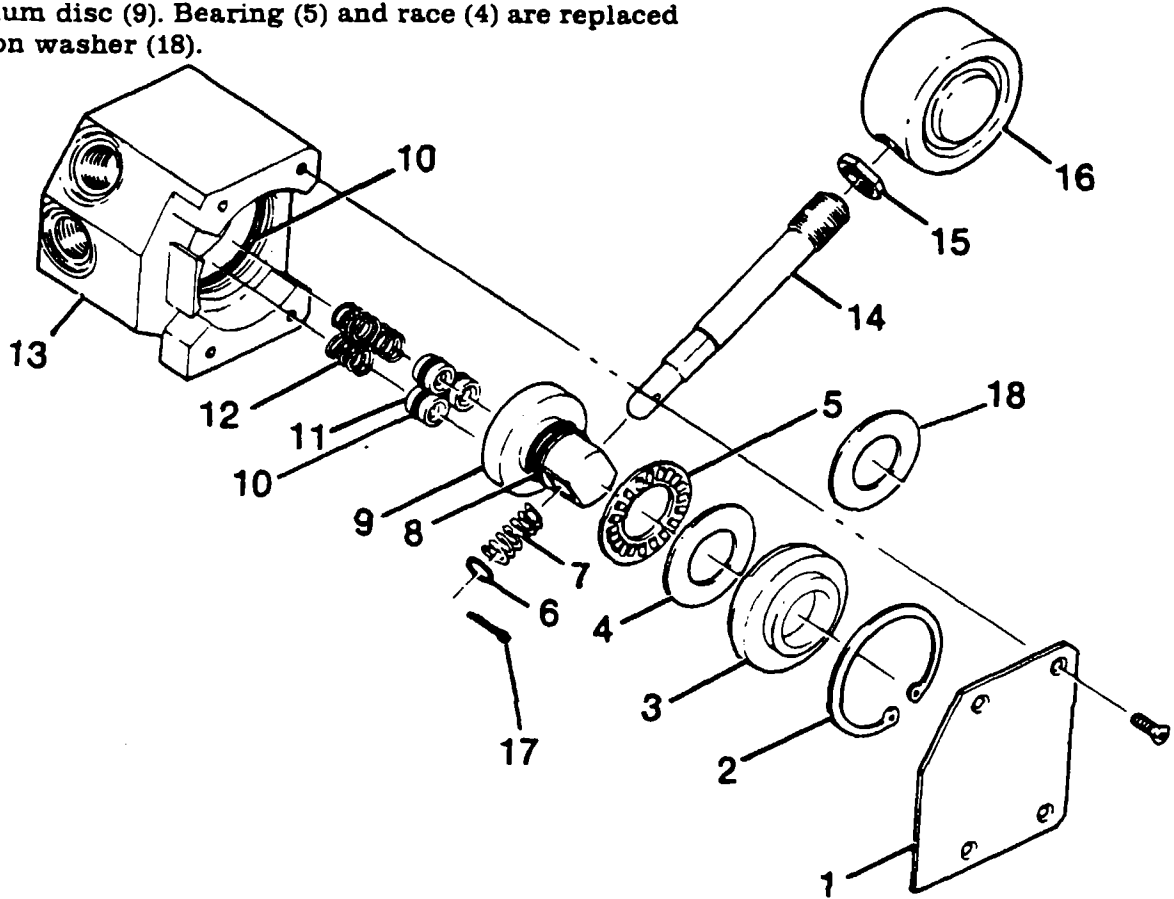
The first three steps in the following inspections are typical.

- a. Inspection of Primary Relief Valve.
  1. Jack aircraft in accordance with the procedures in Section 2 of this manual.
  2. Install a pressure gage at tee fitting on the right side of powerpack.
  3. Disengage landing gear circuit breaker.
  4. Select landing gear handle to the down position.
  5. Install an 18 gauge jumper wire on bus side of primary relief valve contactor to the small terminal on pump motor contactor.
  6. Engage landing gear circuit breaker.
  7. Verify powerpack operates.
  8. Monitor pressure; primary relief valve should open at 1800 psi,  $\pm 50$  psi.
  9. Disengage landing gear circuit breaker.
  10. Remove jumper wire.
  11. Remove pressure from system.
  12. Remove pressure gage.
  13. Engage landing gear circuit breaker.
  14. Return system to original configuration.
- b. Inspection of Thermal Relief Valve.
  1. Jack aircraft in accordance with the procedures in Section 2 of this manual.
  2. Install a pressure gage at tee fitting on the right side of powerpack.
  3. Disengage landing gear circuit breaker.
  4. Select landing gear handle to the down position.
  5. Extend emergency gear pump handle.
  6. Pump emergency handle.
  7. Monitor pressure; thermal relief valve should open at 2200 psi,  $\pm 50$  psi.
  8. Remove pressure from system.
  9. Remove pressure gage.
  10. Engage landing gear circuit breaker.
  11. Return system to original configuration.
- c. Inspection of the Pressure Switch.
  1. Jack aircraft in accordance with the procedures in Section 2 of this manual.
  2. Install a pressure gage at tee fitting on the right side of powerpack.
  3. Disengage landing gear circuit breaker.
  4. Select landing gear up and down several times to relieve pressure in landing gear system.
  5. Select landing gear handle to the up position.
  6. Engage the landing gear circuit breaker.
  7. AFTER cycle is complete, check pressure. Pressure should be 1500 psi.



# MODEL R182 AND TR182 SERVICE MANUAL

Beginning with R18201468, steel disc (9) is replaced by aluminum disc (9). Bearing (5) and race (4) are replaced by teflon washer (18).



- |                   |                   |
|-------------------|-------------------|
| 1. Cover          | 10. Packing       |
| 2. Retaining Ring | 11. Pucks         |
| 3. Cap            | 12. Spring        |
| 4. Bearing Race   | 13. Body Assembly |
| 5. Thrust Bearing | 14. Rod           |
| 6. Washer         | 15. Nut           |
| 7. Spring         | 16. Knob          |
| 8. Packing        | 17. Cotter Pin    |
| 9. Disc           | 18. Teflon Washer |

Figure 5-6. Landing Gear Position Selector Valve

# MODEL R182 AND TR182 SERVICE MANUAL

LOOKING INBOARD AND FORWARD  
FROM LEFT SIDE OF FIREWALL

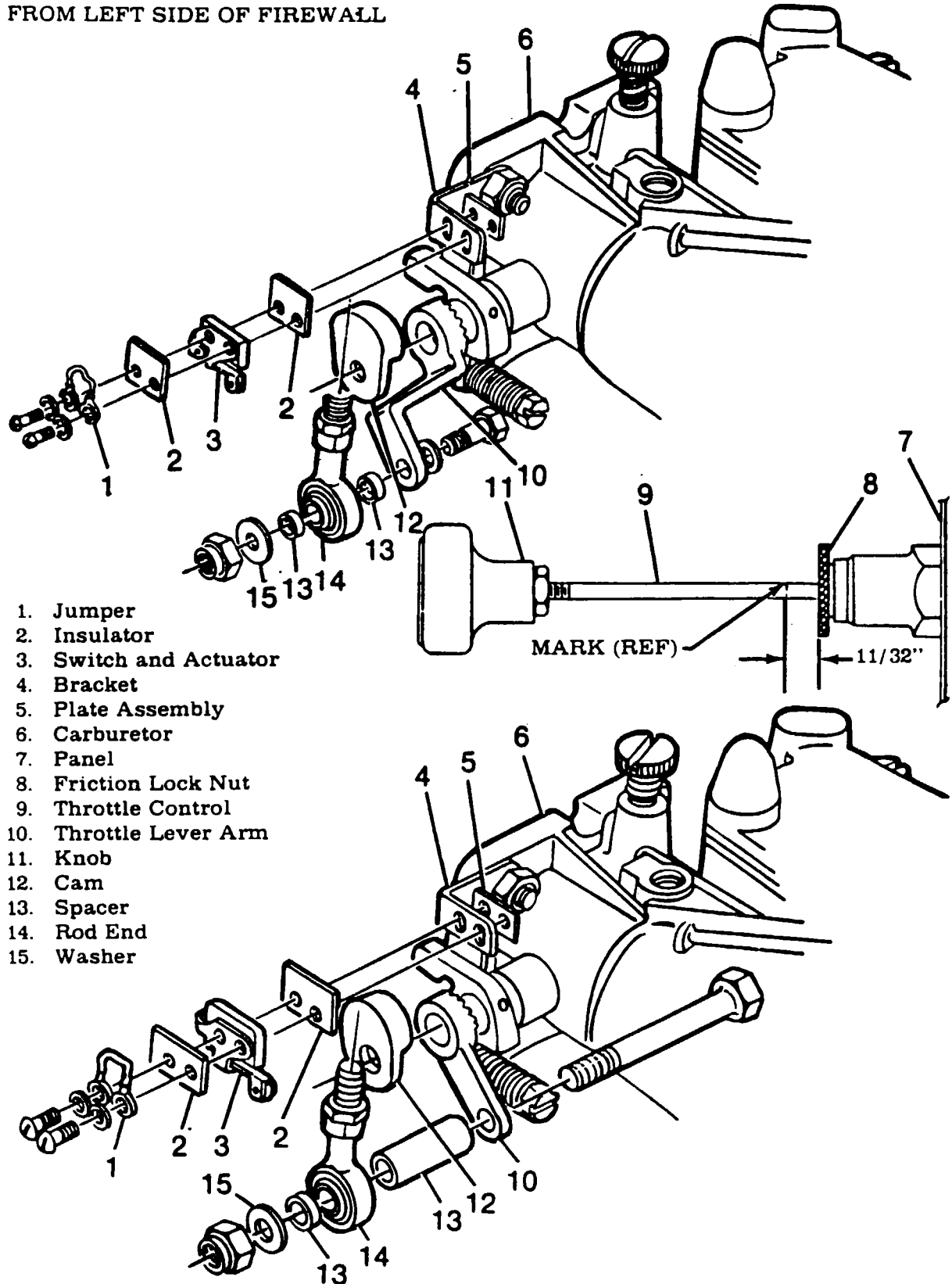


Figure 5-7. Rigging Throttle-Operated Gear Warning Horn Microswitch

## MODEL R182 & TR182 SERIES SERVICE MANUAL

8. Select landing gear handle to the down position.
9. AFTER cycle is complete, check pressure. Pressure should be 1500 psi.
10. Remove pressure from system.
11. Remove pressure gage.
12. Return system to original configuration.

### 5-32. HYDRAULIC SYSTEM LEAK CHECK.

- a. Jack aircraft in accordance with the procedures in Section 2 of this manual.
- b. To relieve system pressure pull the GEAR PUMP circuit breaker to OFF and move the gear selector handle to UP and back to the DOWN position.
- c. Install a 0-2000 PSI gage at the service tee on the right-hand side of the power pack.
- d. Push the GEAR PUMP circuit breaker to the ON position, turn ON the master switch and move the gear selector handle to the UP position.
- e. Monitor pressure gage after retraction cycle is complete for pressure bleed down.
- f. If bleed down occurs, it can be an internal or external leak anywhere in the system.

### NOTE

When any line is disconnected be prepared for fluid leakage.

- g. Disconnect the return line from the gear selector. If fluid comes from the selector, the internal leak is in the system.
- h. If no leak-by is found, it can be assumed there is an internal leak in the powerpack. If leak is found, proceed to step "j". Reconnect the return line.
- i. Powerpack internal leakage can only be attributed to a bad thermal relief valve, check valve or check valve O-ring. There isn't any way to isolate part that is leaking, so first replace the check valve O-ring, check valve and then thermal relief valve. Repeat leak test after replacement of each part to ensure leak correction.
- j. Remove gear DOWN line from the selector. If fluid comes from the line, one or more of the gear actuators is leaking. To locate the leaking actuator, disconnect the return line from each actuator, the leaking actuator will have fluid draining from the actuator port. Following the appropriate paragraphs in this section remove, overhaul and reinstall the actuator.
- k. Reconnect gear down line to the selector.
- l. Recheck all lines that were disconnected for security.
- m. Lower the landing gear. Following the procedures in step "b", relieve the system pressure.
- n. Remove the pressure gage from the service tee.
- o. In accordance with the procedures in Section 2 of this manual, replenish the power pack reservoir with MIL-H-5606 hydraulic fluid and bleed the system.
- p. Remove aircraft from jacks.

## MODEL R182 AND TR182 SERVICE MANUAL

- 5-33. EMERGENCY HAND PUMP. (See figure 5-5.)
- 5-34. DESCRIPTION. The emergency hand pump is mounted below the floor between the pilot and copilot seats. The pump handle extends into the cabin and is enclosed by a hinged cover. The pump supplies a flow of pressurized hydraulic fluid to extend the landing gear in the event of normal hydraulic pump failure.
- 5-35. REMOVAL AND INSTALLATION.
- a. Remove seats as required for access.
  - b. Remove screws attaching cover over hand pump and remove cover.
  - c. Peel back carpet as required for access to pump mounting bolts.
  - d. Wedge cloth under hydraulic fittings to absorb fluid, then disconnect the two hydraulic lines and plug or cap open fittings to prevent entry of foreign material.
  - e. Remove two bolts, washers and nuts securing pump to mounting bracket.
  - f. Work pump from aircraft.
  - g. Install hand pump by reversing the preceding steps, bleeding lines and pump as lines are connected.
  - h. Fill reservoir as required.
- 5-36. DISASSEMBLY. (See figure 5-5.)

### NOTE

After emergency hand pump has been removed from aircraft and ports are capped or plugged, spray with cleaning solvent (Federal Specification P-S-611, or equivalent) to remove all accumulated dust or dirt. Dry with filtered compressed air.

- a. Remove handle (3) by removing latching pins (18) after removing cotter pins (19).
- b. Remove fitting (10) from pump body (16).
- c. Push piston (15) from pump body (16).
- d. Remove retaining ring from end fitting (10) to remove valve assemblies (8) and (14).
- e. Remove and discard all packings and back-up rings.

## MODEL R182 AND TR182 SERVICE MANUAL

### 5-37. INSPECTION AND REPAIR.

- a. Inspect seating surfaces of valves.
- b. Inspect piston for scores, burrs or scratches which could cut packings. This is a major cause of external and internal leakage. The piston may be polished with extremely fine emery paper. Never use paper coarser than No. 600 to remove scratches or burns. If defects do not polish out, replace piston.

#### NOTE

Lubricate new seals and packings with Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7. Do not use DC-7 on surfaces to be painted.

5-38. REASSEMBLY. (See figure 5-5.) Assemble the emergency hand pump, using the figure as a guide. Also, for detailed instructions, reverse the procedures outlined in paragraph 5-35. During assembly prime parts with Primer T. Fill first three threads of fitting (10) with Loctite Hydraulic Sealant. Install fitting in pump body (16), and allow parts to set up for one hour at 72°F. Pump should be held vertically, with fitting (10) at top during setting up of sealant.

5-39. LANDING GEAR SELECTOR VALVE. (See figure 5-6.)

5-40. DESCRIPTION. A mechanical gear position selector valve is located in the switch panel. The pilot shuttles the valve mechanically when he changes gear handle position. The handle must be pulled out prior to selecting gear position. Moving the selector rod opens and closes ports in the valve, enabling fluid under pressure to flow to the various system components to retract or extend the landing gear.

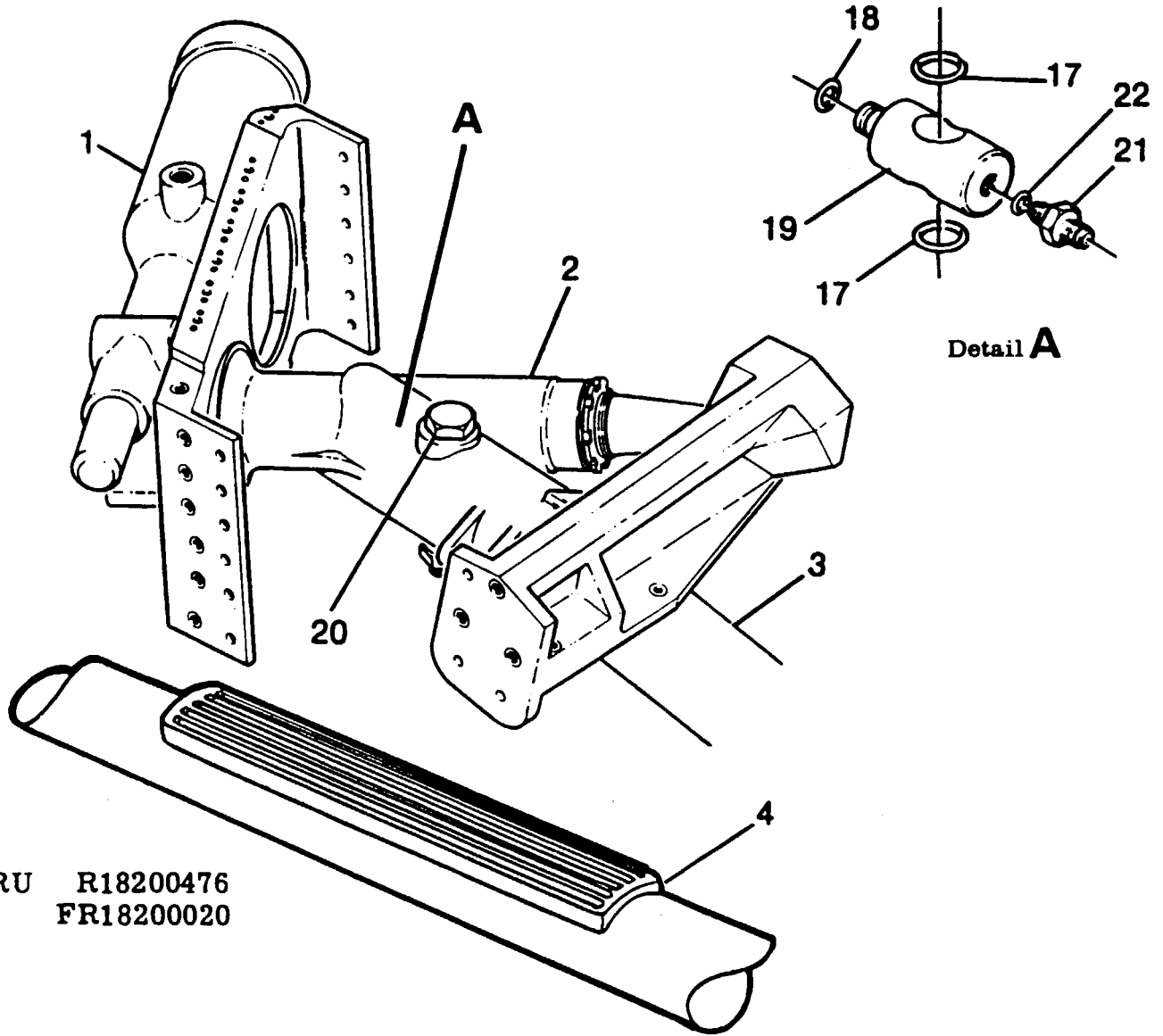
5-41. REMOVAL AND INSTALLATION. (See figure 5-6.)

- a. Loosen nut (15) and remove knob (16).

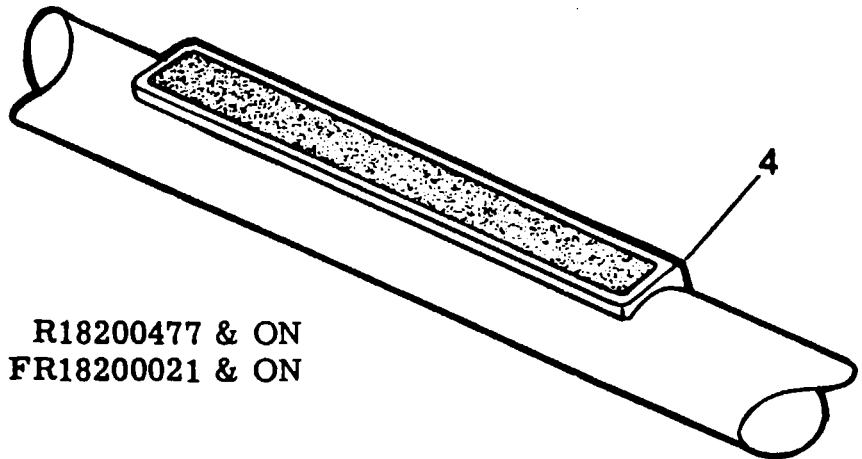
#### CAUTION

As hydraulic lines are disconnected, fluid will leak. Precautions must be taken to prevent excessive leakage, such as spreading drip cloths under fittings and capping lines and fittings.

MODEL R182 AND TR182 SERVICE MANUAL



THRU R18200476  
FR18200020



R18200477 & ON  
FR18200021 & ON

- 1. Main Gear Actuator
- 2. Pivot Assembly
- 3. Landing Gear Spring
- 4. Step
- 17. O-ring
- 18. O-ring
- 19. Plug
- 20. Attach Bolt
- 21. Union
- 22. O-ring

Figure 5-8. Main Landing Gear (Sheet 1 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

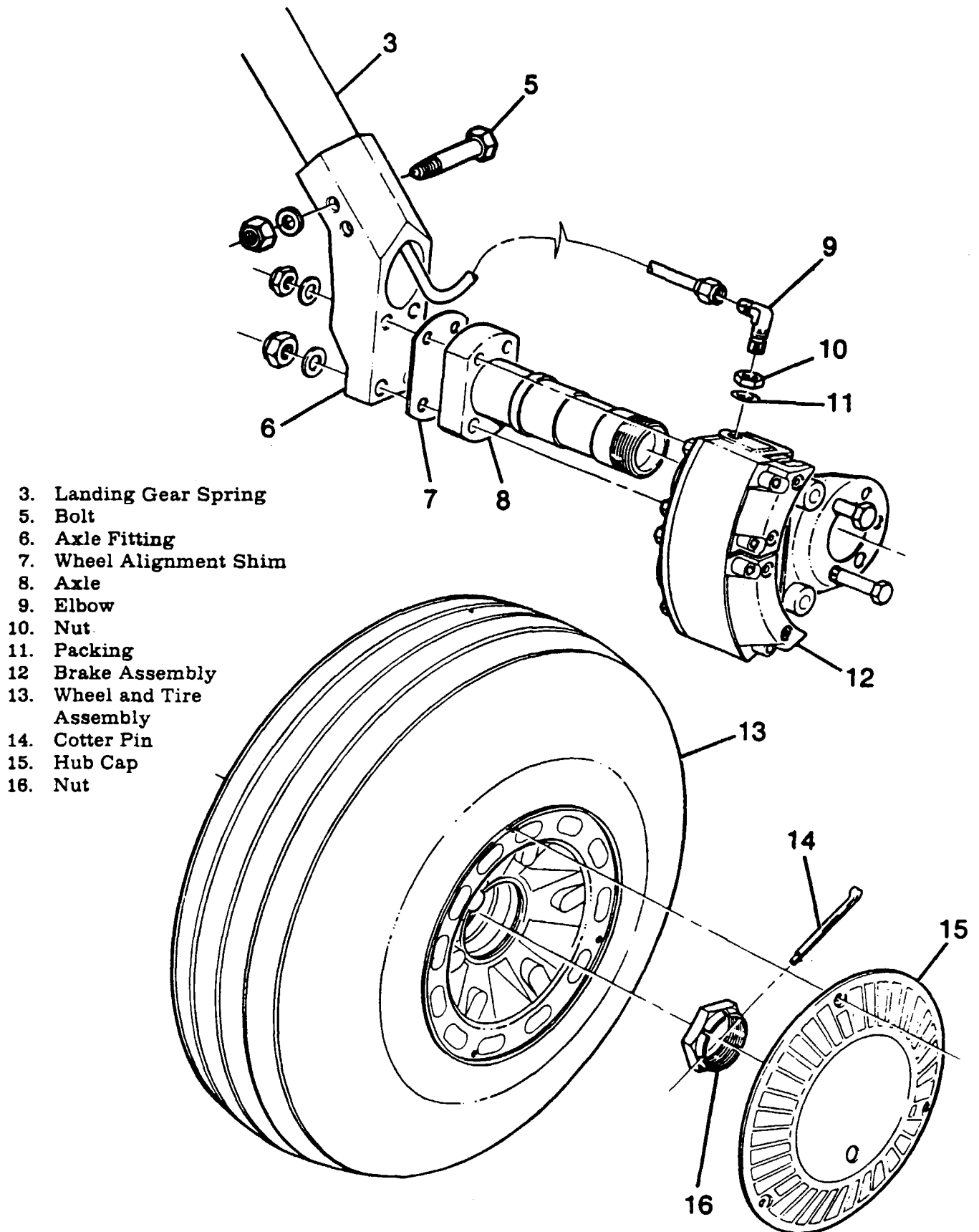


Figure 5-8. Main Landing Gear (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

- b. Disconnect four hydraulic lines routed to valve.
  - c. Remove screws attaching valve to instrument panel.
  - d. Remove selector valve.
  - e. Reverse preceding steps to install gear selector valve.
- 5-42. **DISASSEMBLY AND REASSEMBLY.** (See figure 5-6.)
- a. Remove cover (1), retaining ring (2), cap (3), bearing race (4) and thrust bearing (5).
  - b. Remove cotter pin, (17), washer (6) and spring (7).
  - c. Pull rod (14) from disc (9); remove disc (9).
  - d. Remove pucks (11) and springs (12).
  - e. Reverse preceding steps for reassembly.
- 5-43. **INSPECTION AND REPAIR.** (See figure 5-6.) Replace packing (8) and (10). Check valve for wear, foreign or abrasive materials. Thru Serial R18201460, disc (9) may be refaced (lapped) if worn or abraded. Beginning with Serial R18201461, disc (9) is aluminum and should not be refaced. Check rollers in thrust bearings (5).
- 5-44. **RIGGING THROTTLE-OPERATED GEAR WARNING HORN MICROSWITCH.** (See figure 5-7.)
- a. Jack aircraft in accordance with procedures outlined in Section 2.
  - b. Remove upper left engine cowling.
  - c. Turn master switch ON and retract landing gear; turn master switch OFF.
  - d. Close throttle control at panel (PULL FULL OUT.)

### NOTE

Assure that throttle friction locknut is snug but still will allow throttle to move.

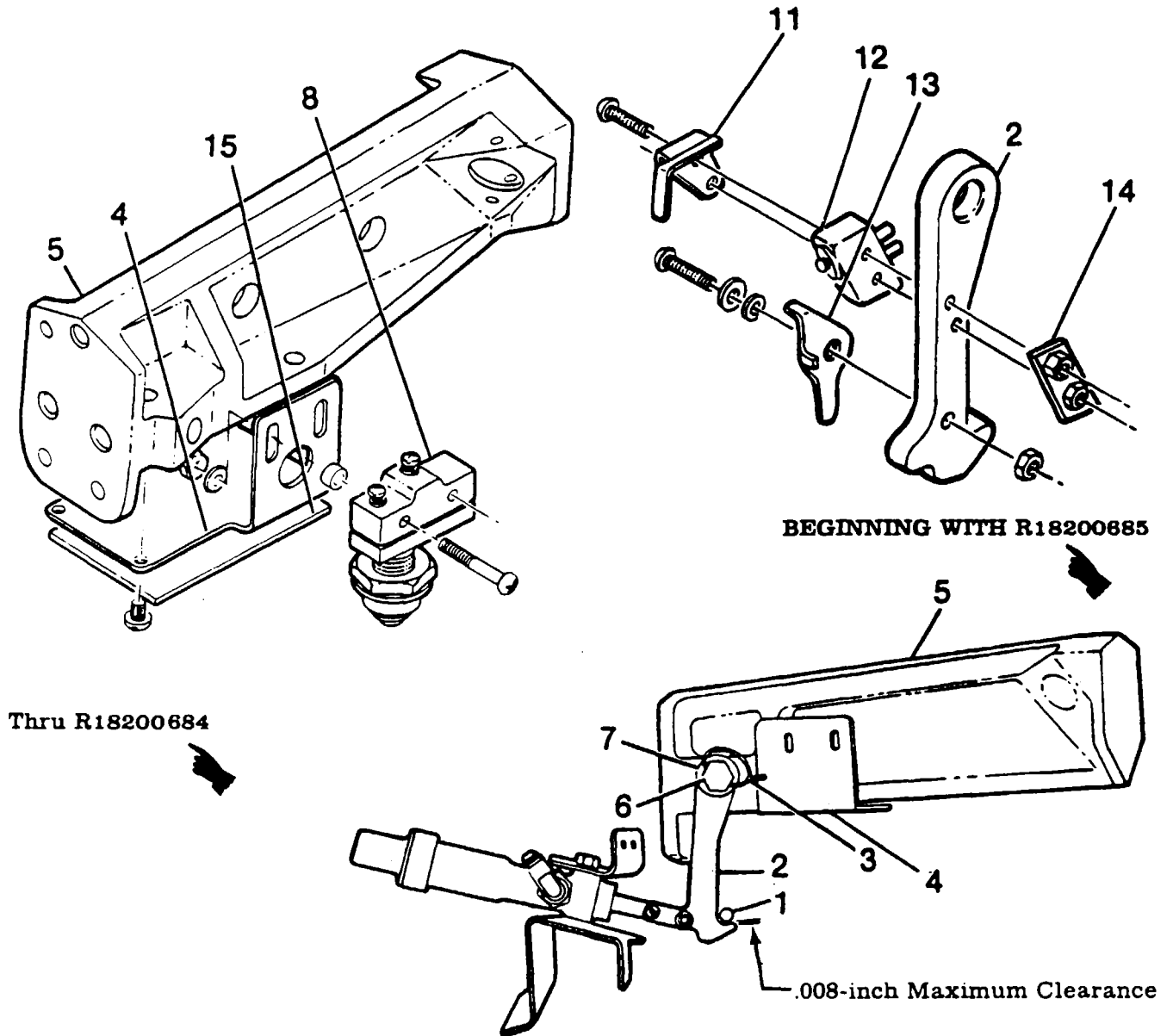
- e. Mark throttle control (9) 11/32-inch aft of friction locknut (8).
- f. At engine, loosen screws attaching switch (3) to bracket. Raise switch to approximate middle of slots in bracket; tighten screws.
- g. Loosen nut attaching cam (12). Rotate cam to cause switch to actuate just as switch roller breaks over peak of cam. Tighten cam-attach nut.
- h. Open throttle (PUSH FULL-IN) and turn master switch ON.
- i. Pull throttle OUT to mark; gear warning horn should sound.
- j. Readjust if necessary.
- k. Extend landing gear, turn master switch OFF and lower aircraft; install engine cowling.
- l. Test fly aircraft. At approximately 2500 feet pressure altitude, close throttle to mark on control. Warning horn should sound and manifold pressure gage should indicate 11.5 to 12.5 inches of mercury.

### NOTE

If manifold pressure gage does not indicate 11.5 to 12.5 inches of mercury at mark on throttle control (9), erase mark and mark correctly upon closing throttle at 11.5 to 12.5 inches of mercury in flight. Upon landing readjust microswitch in bracket slots or rotate cam as necessary to cause switch to actuate as roller breaks over peak of cam.



# MODEL R182 AND TR182 SERVICE MANUAL

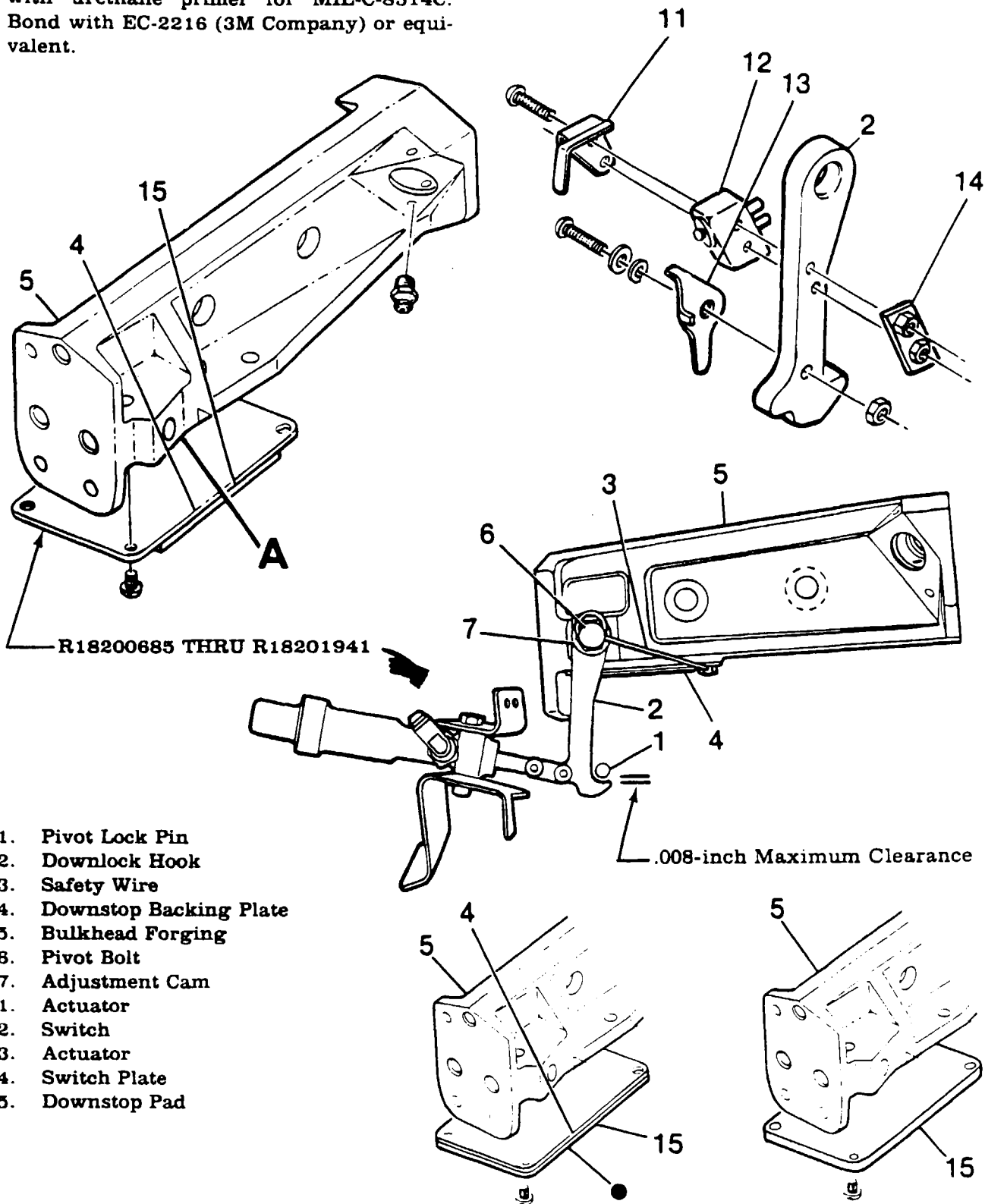


1. Pivot Lock Pin
2. Downlock Hook
3. Safety Wire
4. Downstop Backing Plate
5. Bulkhead Forging
6. Pivot Bolt
7. Adjustment Cam
11. Actuator
12. Switch
13. Actuator
14. Switch Plate
15. Downstop Pad

Figure 5-9. Main Landing Gear Rigging (Sheet 1 of 4)

# MODEL R182 AND TR182 SERVICE MANUAL

- Solvent wipe both surfaces, prime metal with urethane primer for MIL-C-8514C. Bond with EC-2216 (3M Company) or equivalent.



1. Pivot Lock Pin
2. Downlock Hook
3. Safety Wire
4. Downstop Backing Plate
5. Bulkhead Forging
6. Pivot Bolt
7. Adjustment Cam
11. Actuator
12. Switch
13. Actuator
14. Switch Plate
15. Downstop Pad

R18201942 THRU R18202032      BEGINNING WITH R18202033

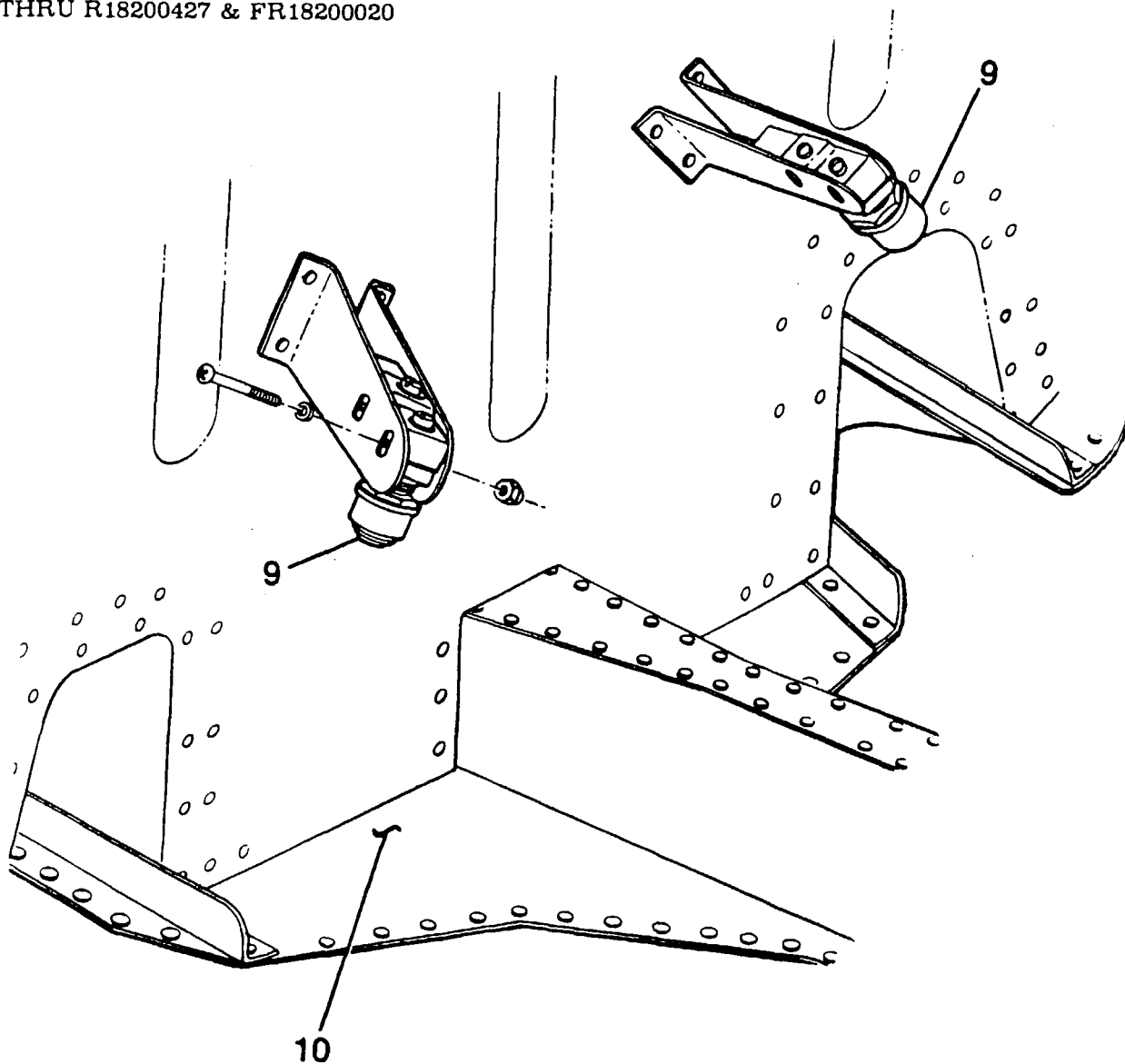
Detail A

Detail A

Figure 5-9. Main Landing Gear Rigging (Sheet 2 of 4)

# MODEL R182 AND TR182 SERVICE MANUAL

THRU R18200427 & FR18200020

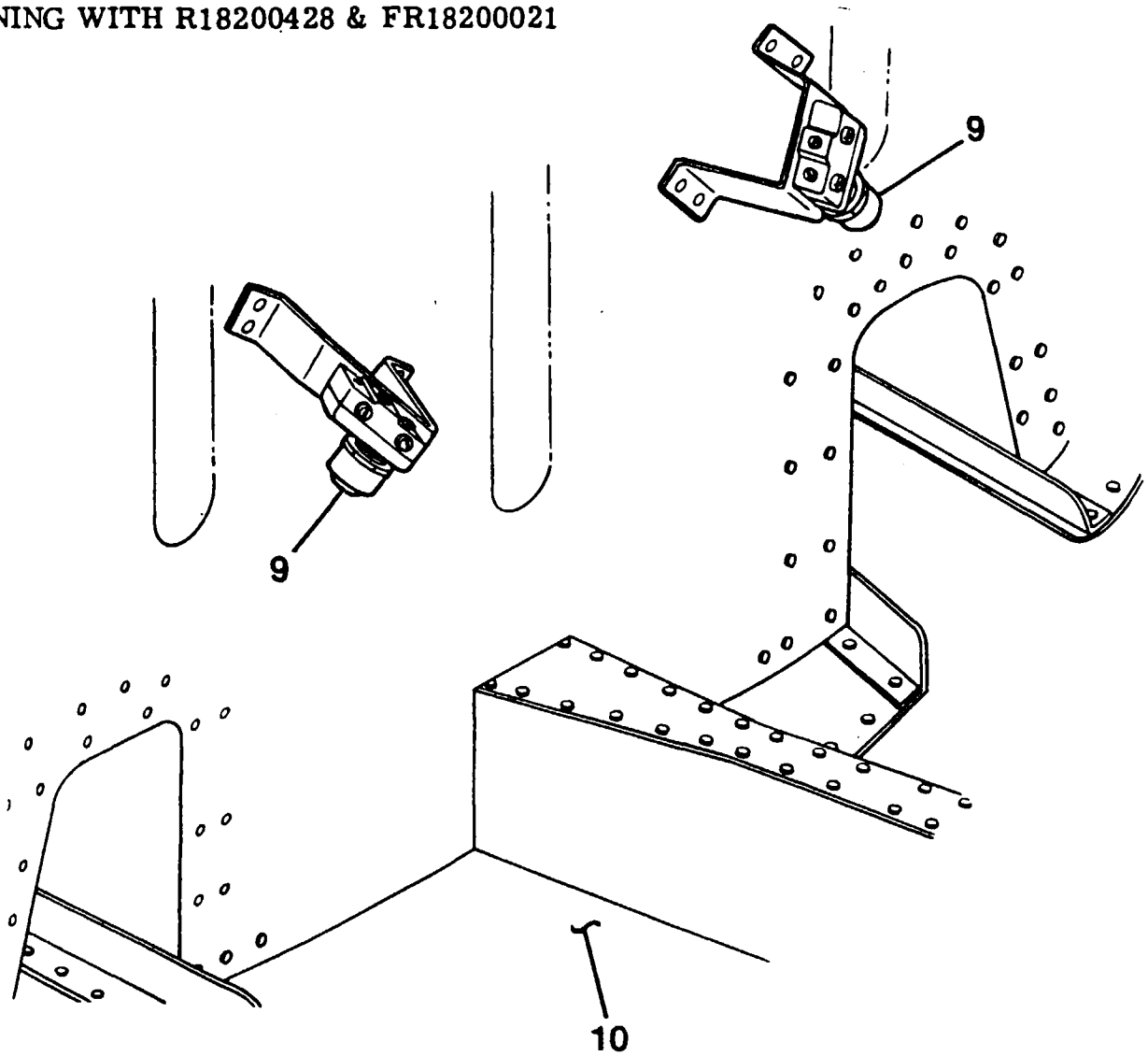


- 9. Uplock Indicator Switch
- 10. Aft Main Wheel Well

Figure 5-9. Main Landing Gear Rigging (Sheet 3 of 4)

# MODEL R182 AND TR182 SERVICE MANUAL

BEGINNING WITH R18200428 & FR18200021



- 9. Uplock Indicator Switch
- 10. Aft Main Wheel Well

Figure 5-9. Main Landing Gear Rigging (Sheet 4 of 4)

# MODEL R182 AND TR182 SERVICE MANUAL

m. Test fly aircraft and recheck adjustment.

## 5-45. RIGGING FLAP OPERATED GEAR WARNING SYSTEM.

### NOTE

Throttle operated gear warning system, flap control system and flap follow-up system must be rigged in accordance with procedures outlined in Sections 5 and 7 before rigging of flap warning system can be accomplished.

- a. The gear warning switch is located forward of the flap control lever behind the instrument panel.
- b. Loosen screws attaching gear warning microswitch in slots of mounting bracket.
- c. Mount an inclinometer on one flap and set to 0° (flaps full UP). Turn master switch ON and move flap selector lever to obtain 23° flap deflection.

### NOTE

An inclinometer for measuring control surfaces travel is available from the Cessna Supply Division.

- d. Rotate microswitch in slots of mounting bracket until switch contacts are just closed, and tighten switch mounting screws.
- e. Move flap selector lever to 0° position (flaps full UP).
- f. Move flap lever to 30° position and horn should not sound. Move flap selector handle back to 0° position.
- g. With throttle full FORWARD, push landing gear DOWN press-to-test button, and move flap selector handle to 30° position; horn should sound as flaps extend past 23°. Move flap selector handle back to 20° position, and horn should not sound.
- h. Readjust switch as necessary to cause horn to sound when flaps reach 23° when press-to-test button is pushed.
- i. Turn master switch OFF, remove inclinometer, reinstall headliner.

## 5-46. MAIN LANDING GEAR.

5-47. DESCRIPTION. The tubular main gear struts rotate aft and inboard to stow the main wheels beneath the baggage compartment. The main gear utilizes hydraulic pressure for positive uplock and mechanical downlocks. Main gear uplock pressure is maintained automatically by the pump assembly. Rotation of the gear to extend or retract the struts is achieved through pivot assemblies which are in turn bolted through a splined shaft, to the hydraulic rotary actuators.

### CAUTION

Use of recapped tires or new tires not listed on the airplane equipment list are not authorized due to possible interference between the tire and structure when landing gear is in the retracted position.

# MODEL R182 AND TR182 SERVICE MANUAL

## McCAULEY WHEEL AND BRAKE

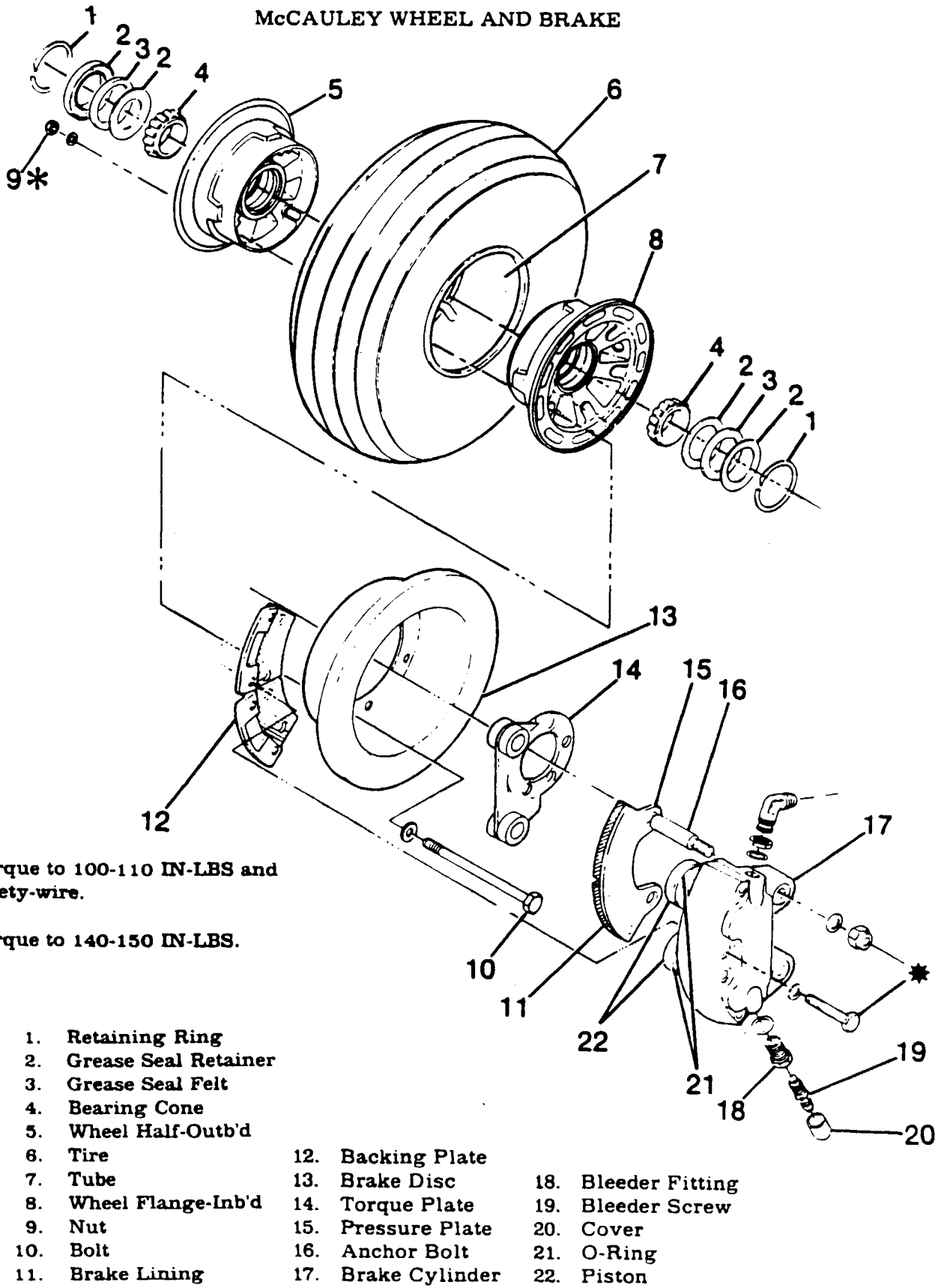


Figure 5-10. Main Wheel and Brake

## MODEL R182 AND TR182 SERVICE MANUAL

### 5-48. TROUBLE SHOOTING -- MAIN LANDING GEAR.

TROUBLE	PROBABLE CAUSE	REMEDY
AIRCRAFT LEANS TO ONE SIDE.	Incorrect tire inflation.	Inflate to correct pressure.
	Sprung main gear strut.	Remove and replace strut.
	Bent axle.	Install new axle.
UNEVEN OR EXCESSIVE TIRE WEAR.	Incorrect tire inflation.	Inflate to correct pressure.
	Wheels out of alignment.	Align wheels.
	Wheels out of balance.	Balance wheels.
	Sprung main gear strut.	Replace strut.
	Bent axle.	Replace axle.
	Dragging brakes.	Jack wheel and check brake.
	Wheel bearings not adjusted properly.	Tighten axle nut properly.

### 5-49. REMOVAL. (See figure 5-8.)

- a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.
- b. Bleed fluid from brake line at wheel brake cylinder.
- c. Turn master switch off; move gear position selector valve to up position then turn master switch on until main gear down locks disengage. Turn master switch off and pull gear pump circuit breaker to ensure that pump cannot be actuated accidentally. Place gear position selector handle in a neutral position so that gear rotates freely.

#### NOTE

If the pump motor cannot be used to unlock the main gear because of an opening in the hydraulic system, the spring-loaded main gear down locks can be manually unlocked by pushing them forward until the main gear is rotated past.

#### WARNING

It is advisable to have an assistant hold the gear strut up while the locks are pushed forward to prevent the strut from rotating suddenly, possibly causing personal injury. Ensure that master switch is "off" and pump motor circuit breaker is pulled.

## MODEL R182 AND TR182 SERVICE MANUAL

- d. Remove strut-attaching bolt (20) and work strut (3) and plug (19) from pivot.
- e. Disconnect brake line from union (21) and cap plug (19), union (21), and brake line.
- f. Remove O-rings (17), (18), and (22) from plug (19) and union (21), and clean plug (19) and strut (3).

### 5-50. MAIN GEAR STRUT INSTALLATION. (See figure 5-8.)

- a. Lubricate new O-rings (17), (18), and (22), plug (19), and end of strut (3) with Petroleum VV-P-236, hydraulic fluid MIL-L-5606, or Dow Corning DC-7 (keep DC-7 away from areas to be painted) before installation.
- b. Remove cap and plug from union (21) and brake line, attach brake line to union, and work plug (19) and strut (3) into pivot (2).

#### NOTE

When installing a new pivot (2), burnishing the 2.100-inch I.D. bore may be required to facilitate assembly of the landing gear strut (3).

- c. Align hole in plug (19) and holes in pivot (2) using special tool No. SE 934.

#### NOTE

Special tool No. SE 934 is available from the Cessna Supply Division. This tool is designed to install the strut attaching bolt (20) without damaging the O-rings (17).

- d. Install strut-attaching bolt (20) by pushing SE 934 tool through aligned holes of strut (3) and plug (19) with threaded end of strut-attaching bolt (20). Install washer and nut and tighten nut on strut-attaching bolt.
- e. Fill and bleed brake system in accordance with paragraph 5-159 of this section.
- f. Rig landing gear in accordance with paragraph 5-51 of this section.

### 5-51. MAIN GEAR RIGGING. (Thru R18200655.) (See figure 5-9.)

- a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.
- b. Move seats to forward position and peel back carpet as necessary to uncover access panels above main gear pivot assemblies.

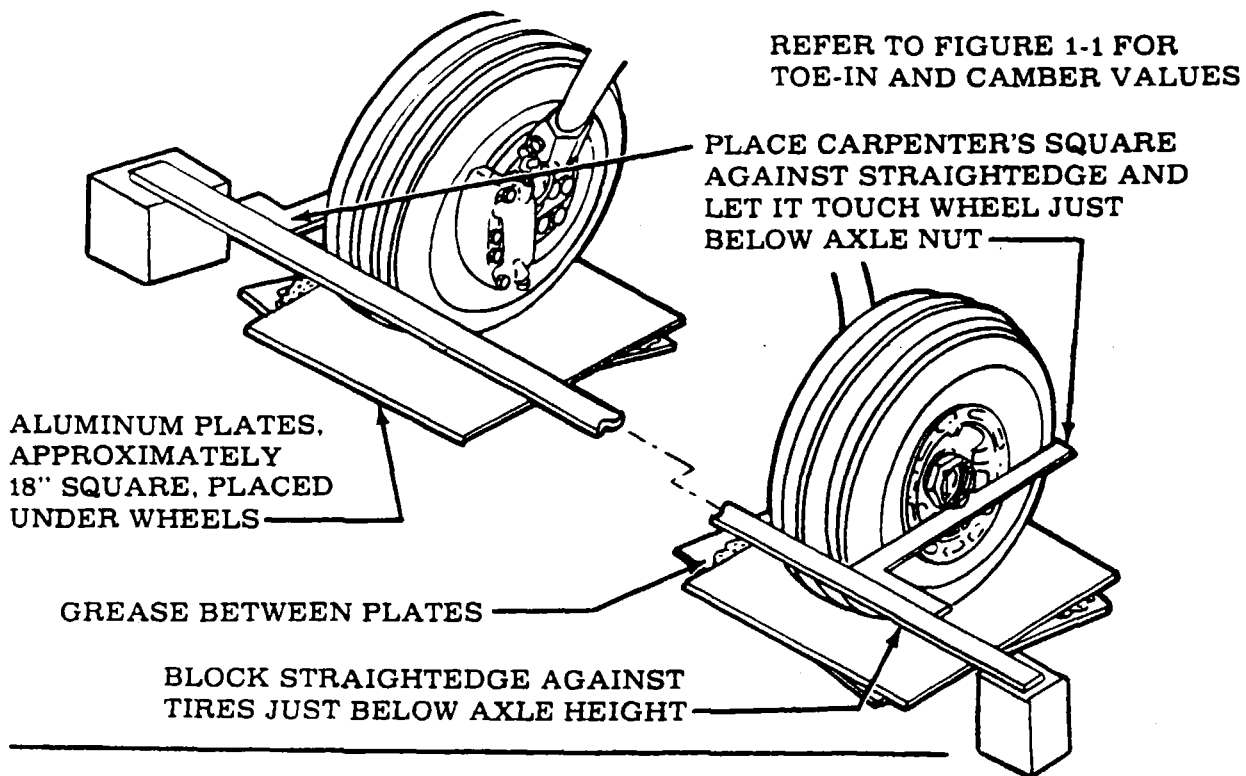
#### WARNING

Turn master switch OFF and pull gear pump circuit breaker to prevent accidental extension or retraction of the landing gear whenever work is being performed in the wheel well or pivot area.

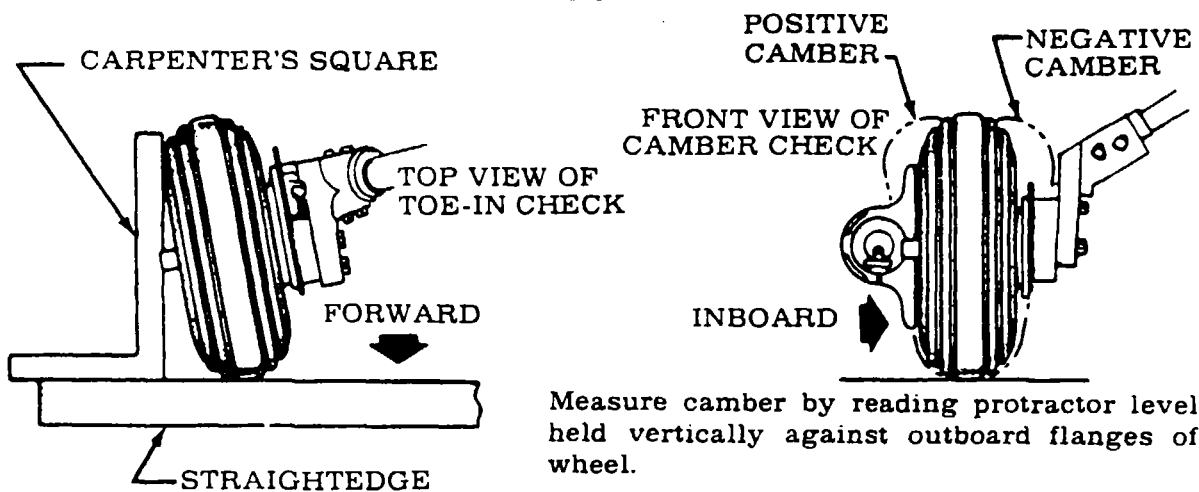
- c. Check clearance between latch (2) and pivot lock pin (1) with gear in down and locked position. Clearance must not exceed .008-inch.
- d. If adjustment of latch is necessary, work through access opening and remove safety wire (3). Loosen latch pivot bolt (6) and turn cam (7) until clearance is within tolerance, tighten bolt (6).
- e. Insert a .025-inch shim between pivot and support pad (4).



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Measure toe-in at edges of wheel flange. Difference in measurements is toe-in for one wheel.

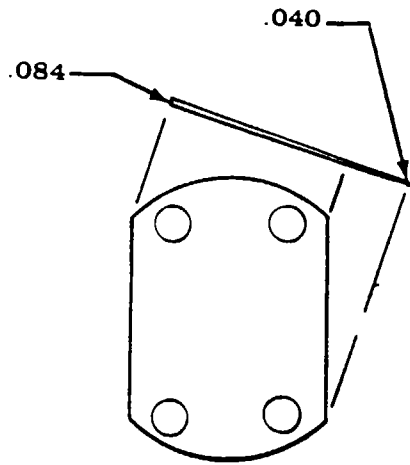


NOTE

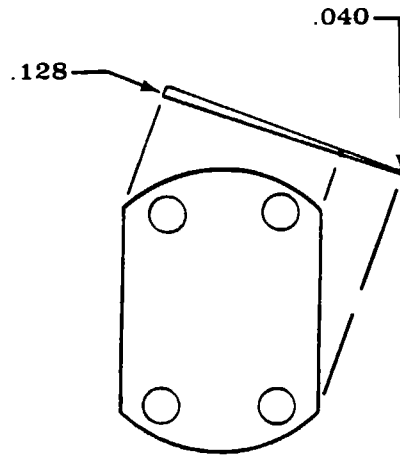
Refer to Section 1 for toe-in and camber tolerances. Setting toe-in and camber within these tolerances while the cabin and fuel tanks are empty will give approximately zero toe-in camber at gross weight. Ideal setting is zero toe-in and zero camber at normal operating weight. Therefore, if normally operated at less than gross weight and abnormal tire wear occurs, realign the wheels to attain the ideal setting for the load conditions under which the airplane normally operates. Refer to the following page for shims available and their usage. Always use the least number of shims possible to obtain the desired result.

Figure 5-11. Main Wheel Alignment (Sheet 1 of 2)

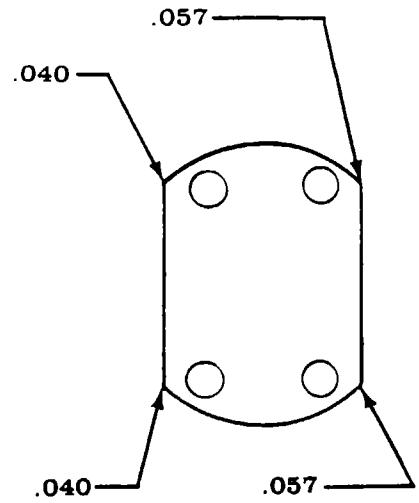
# MODEL R182 AND TR182 SERVICE MANUAL



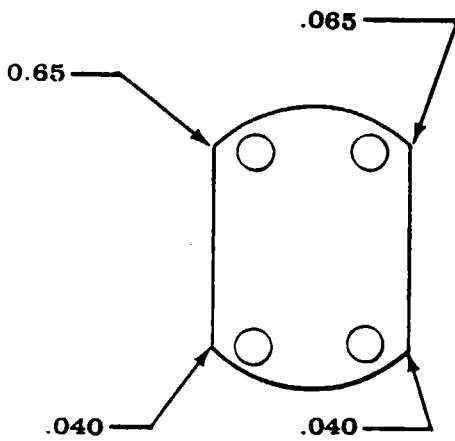
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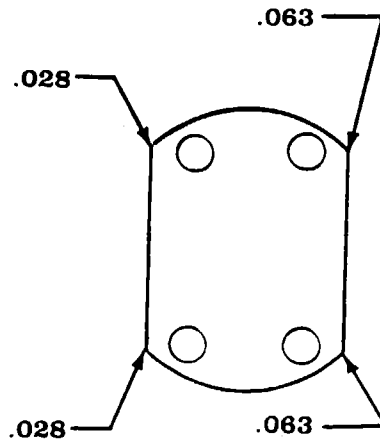
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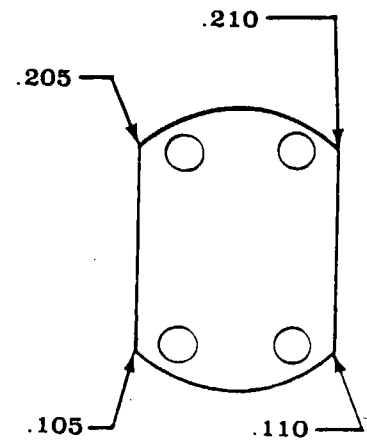
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0541157-2



0541157-3



1241061-1

Figure 5-11. Main Wheel Alignment (Sheet 2 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

## WARNING

Stay clear of main gear when making the following checks.

- f. Place gear position selector handle in DOWN position and reset gear pump circuit breaker. Turn master switch ON and allow gear to rotate to full down position, leaving master switch ON.
  - g. With shim in place, latch (2) should not engage pin (1) and switch (8) should be open (light off).
  - h. With gear in DOWN and locked position with no shim, indicator switch (8) should be closed (light on). Adjustment can be made by moving the switch up or down in the slotted holes in the mounting bracket.
  - i. Place gear position selector handle in UP position and allow gear to retract to UP position.
  - j. Check that gear up indicator switches are closed (light on), and some free-travel exists on switch plunger (plunger not bottomed out). Adjust switch position as necessary.
  - k. Lower gear, turn master switch OFF, replace panels, carpeting and items removed for access. Move seats back to original positions.
  - l. Remove aircraft from jacks.
- 5-52. MAIN GEAR RIGGING. (See figure 5-9, sheet 2.) (Beginning with R18200685.)
- a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.
  - b. Move seats to forward position and peel back carpet as necessary to uncover access panels above main gear pivot assemblies.

## WARNING

Turn master switch OFF and pull gear pump circuit breaker to prevent accidental extension or retraction of the landing gear whenever work is being performed in the wheel well or pivot area.

## MODEL R182 AND TR182 SERVICE MANUAL

- c. Check clearance between downlock hook (2) and pivot lock pin (1) with gear in down and locked position. Clearance must not exceed .008-inch.
- d. If adjustment of hook is necessary, work through access opening and remove safety wire (3). Loosen hook pivot bolt (6) and turn cam (7) until clearance is within tolerance; tighten bolt (6).
- e. Insert a .025-inch (SE997-1 or -2) shim between pivot (33), Figure 5-12, sheet 2) and support pad (4).

### WARNING

Stay clear of main gear when making the following checks.

- f. Place gear position selector handle in DOWN position and reset gear pump circuit breaker. Turn master switch ON and allow gear to rotate to full down position, leaving master switch ON.
- g. With SE997-1 or -2 shim in place, hook (2) should not engage pin (1) and light should be OFF.
- h. With gear in DOWN and locked position with no shim, light should be ON.

### NOTE

No switch adjustment is necessary.

- i. Place gear position selector handle in UP position and allow gear to retract to UP position.
- j. Check that gear up indicator switches are closed (light on thru 1982 Models) or (light off 1983 and on Models), and some free-travel exists on switch plunger (plunger not bottomed out). Adjust position as necessary.
- k. Lower gear, turn master switch OFF, replace panels, carpeting and items removed for access. Move seats to original positions.
- l. Remove aircraft from jacks.

#### 5-53. MAIN WHEEL AND TIRE ASSEMBLY.

5-54. DESCRIPTION. This airplane is equipped with two-piece McCauley wheel and tire assemblies.

#### 5-55. REMOVAL.

### NOTE

It is not necessary to remove the main wheel to reline the brakes or remove brake parts, other than the brake disc of the torque plate.

- a. Using an individual jack pad, jack the wheel as outlined in Section 2.
- b. Remove hub cap.
- c. Remove cotter pin and axle nut.
- d. Remove bolts and washers attaching back plate to brake assembly and remove back plate.
- e. Pull wheel assembly from axle.

## MODEL R182 AND TR182 SERVICE MANUAL

- 5-56. **DISASSEMBLY.** (With hub and capscrews.) (See figure 5-10.)
- a. Remove valve core and deflate tire and tube. Breaker tire beads loose from wheel flanges.

### WARNING

Injury can result from attempting to remove wheel flanges with the tire and tube inflated. Avoid damaging wheel flanges when breaking tire beads loose. A scratch, gouge or nick in wheel flanges could cause wheel failure.

- b. Remove capscrews and washers.
- c. Separate wheel flanges from wheel hub. Retain spacers between wheel flanges and wheel hub.
- d. Remove wheel hub from tire and tube.
- e. Remove retainer rings, grease seal retainers, grease seal felts and bearing cones from wheel hub.

### NOTE

The bearing cups are a press fit in the wheel hub and should not be removed unless a new part is to be installed. To remove the bearing cup, heat wheel hub in boiling water for 30 minutes, or in an oven not to exceed 121°C (250°F). Using an arbor press, if available, press out bearing cup and press in new bearing cup while wheel hub is still hot.

- 5-57. **INSPECTION AND REPAIR.** (With hub and capscrews.) (See figure 5-10.)
- a. Clean all metal parts, grease seal felts and spacers in cleaning solvent and dry thoroughly.
  - b. Inspect wheel flanges and wheel hub for cracks. Discard cracked wheel flanges or hub and install new parts. Sand out nicks, gouges and corroded areas. When protective coating has been removed, clean the area thoroughly; prime with zinc chromate, and paint with aluminum lacquer.
  - c. Inspect brakes and discs per paragraph 5-154.
  - d. Carefully inspect bearing cones and cups for damage and discoloration. After cleaning, pack bearing cones with clean aircraft wheel bearing grease (refer to Section 2) before installing in wheel hub.

- 5-58. **REASSEMBLY.** (With hub and capscrews.) (See figure 5-10.)
- a. Place wheel hub in tire and tube with tube inflation stem in cutout of wheel hub.
  - b. Place spacer and wheel flange on inboard side of wheel hub (opposite of tube inflation stem), then place washer under head of each capscrew and start capscrews into wheel hub threads.
  - c. Place spacer and wheel flange on other side and align valve stem in cutout in wheel flange.
  - d. Place washer under head of each capscrew and start capscrews into wheel hub threads.

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### CAUTION

Be sure that spacers and wheel flanges are seated on flange of wheel hub. Uneven or improper torque of capscrews can cause failure of capscrews, with resultant wheel failure.

- e. Tighten capscrews evenly and torque to 190-200 lb. in.
- f. Clean and pack bearing cones with clean aircraft wheel bearing grease. (Refer to Section 2 for grease type.)
- g. Assemble bearing cones, grease seal felts and retainers into wheel hub.

### CAUTION

Grease seal retainer (outboard) and grease seal retainers (inboard) are not interchangeable. The wheel hub will not mount on the axle if these parts are reversed.

Grease seal retainer (outboard), grease seal felt (outboard) and grease seal retainer (outboard) are to be assembled in the hub on the side of the valve stem seat.

- h. Inflate tire to seat tire beads, then adjust to correct tire pressure specified in figure 1-1 of this manual.

5-59. **BALANCING.** Since uneven tire wear is usually caused by wheel unbalance, replacing the tire will probably correct this condition. Tire and tube manufacturing tolerances permit a specified amount of static unbalance. The light-weight point of the tire is marked with a red dot on the tire sidewall and the heavy-weight point of the tube is marked with a contrasting color line (usually near the inflation valve stem). When installing a new tire, place these marks adjacent to each other. If a wheel becomes unbalanced during service, it may be statically balanced. Wheel balancing equipment is available from Cessna Supply Division.

5-60. **INSTALLATION.**

- a. Position wheel assembly on axle.
- b. Install axle nut and tighten until a slight bearing drag is obvious when the wheel is rotated. Back off nut to nearest castellation and install cotter pin.
- c. Place brake back plate in position and secure with washers and bolts. Torque brake back plate bolts to 100-110 inch-pounds and safety-wire.
- d. Install hub cap.

5-61. **ALIGNMENT.** Correct main wheel alignment is obtained through the use of tapered shims between the gear strut fitting and the flange of the axle. See figure 5-11 for procedures to be used in checking wheel alignment. Wheel shims and the corrections imposed on the wheel by various shims are listed in the illustrations.

### NOTE

Failure to obtain acceptable wheel alignment through the use of the shims, indicates a deformed main gear strut or a bent axle.

## MODEL R182 AND TR182 SERVICE MANUAL

### 5-62. MAIN WHEEL AND AXLE.

#### 5-63. REMOVAL. (See figure 5-8.)

- a. Using an individual jack pad, jack the wheel as outlined in Section 2.
- b. Remove wheel assembly in accordance with procedures outlined in paragraph 5-55.
- c. Drain brake line at brake assembly (12). Cap or plug open fittings to prevent entry of foreign material.
- d. Disconnect brake line from elbow (9) in brake assembly. Cap or plug line and elbow (9).
- e. Remove nuts, washers and bolts securing axle, brake torque plate, brake line bracket and wheel alignment shims.

#### NOTE

When removing axle from strut fitting, note number and position of the wheel alignment shims. Mark these shims or tape them together carefully so they can be reinstalled in exactly the same position to ensure that wheel alignment is not disturbed.

### 5-64. INSTALLATION.

- a. Place axle, alignment shims, brake line bracket and brake torque plate in position. Make sure wheel alignment shims and brake line bracket are in their original positions. Insert bushings in brake torque plate and install bolts, washers and nuts securing components to strut fitting.
- b. Connect hydraulic brake line to fitting at brake line bracket.

#### CAUTION

Correct clocking of the brake line elbow on the wheel brake cylinder is very important in order to avoid interference with aircraft structure during retraction of the gear.

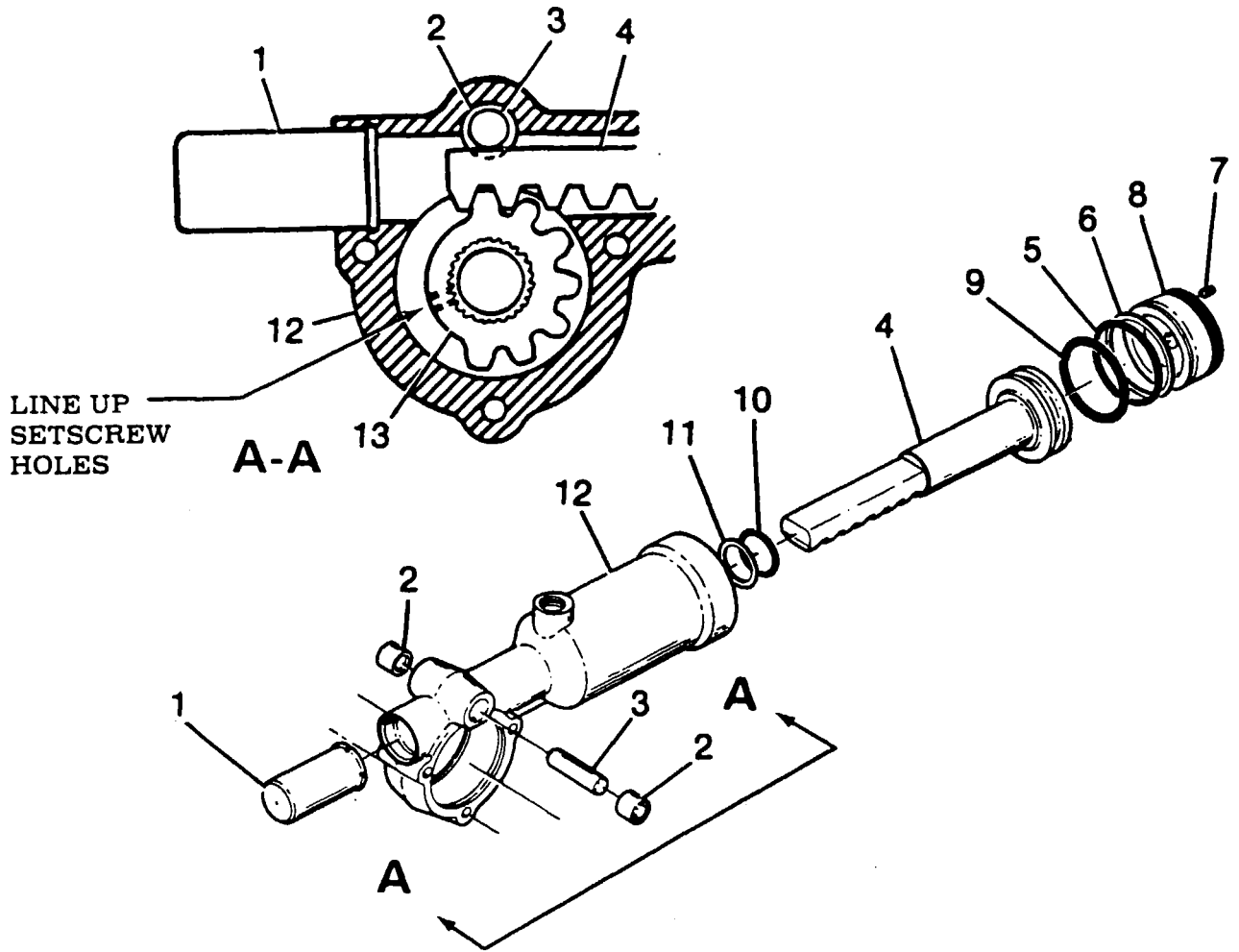
- c. Install wheel assembly in accordance with procedures outlined in paragraph 5-60.
- d. Connect hydraulic brake line to elbow on brake cylinder.
- e. Fill and bleed affected brake system in accordance with procedures outlined in paragraph 5-170.
- f. Lower aircraft and check main wheel alignment.

### 5-65. MAIN GEAR ACTUATOR.

#### 5-66. REMOVAL. (See figure 5-12.)

- a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.
- b. Remove seats and peel back carpet as necessary to gain access to center access plate above actuators; remove access plate.
- c. Pull gear pump circuit breaker.
- d. Disconnect and drain hydraulic brake line at wheel brake cylinder.
- e. Disconnect and cap or plug all hydraulic lines at actuator.

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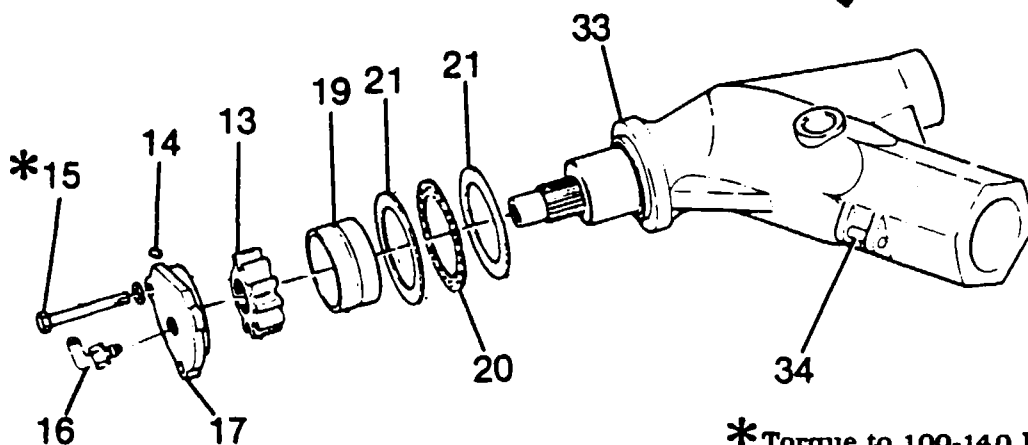
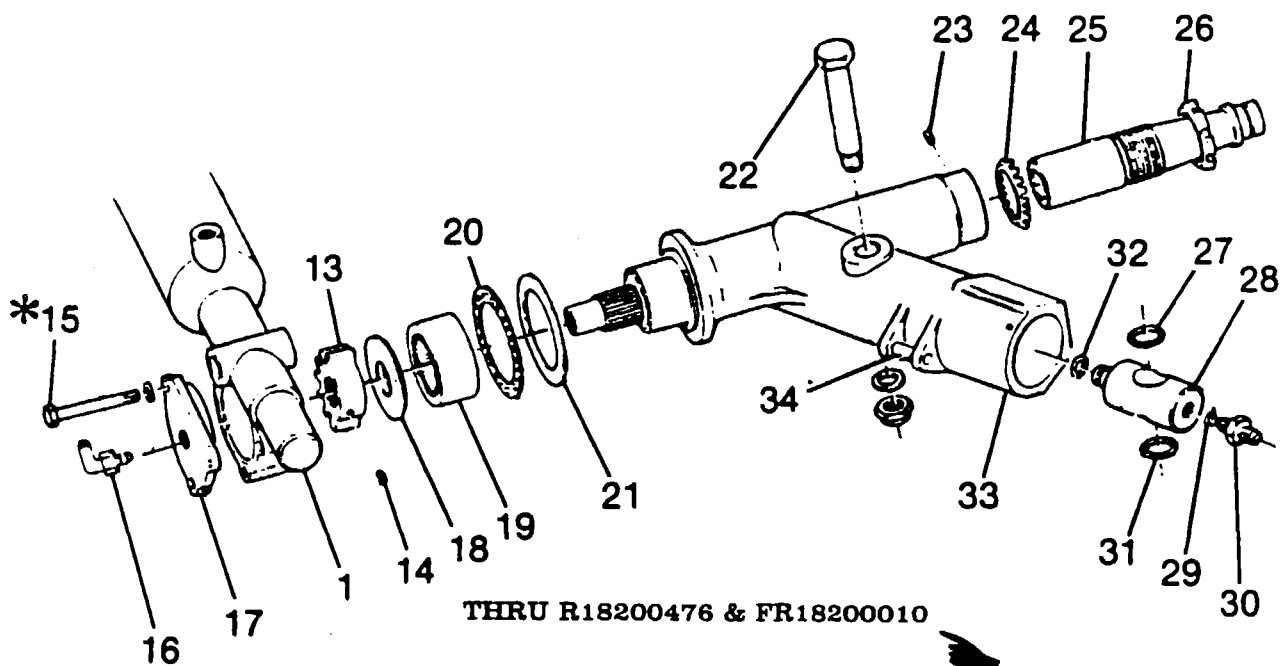


1. End Cap
2. Bearing
3. Roller
4. Piston/Rack
5. Packing
6. Back-up Ring
7. Setscrew
8. End Gland
9. Packing
10. Packing
11. Back-up Ring
12. Actuator
13. Sector Gear

Figure 5-12. Main Gear Actuator and Pivot Assembly (Sheet 1 of 3)



# MODEL R182 AND TR182 SERVICE MANUAL



**\*Torque to 100-140 IN-LBS and safety-wire.**

**BEGINNING WITH R18200477 & FR18200011**

- |                    |                    |                  |
|--------------------|--------------------|------------------|
| 1. End Cap         | 20. Thrust Bearing | 27. Packing      |
| 13. Sector Gear    | 21. Race           | 28. Plug         |
| 14. Setscrew       | 22. Strut Bolt     | 29. Packing      |
| 15. Actuator Bolt  | 23. Setscrew       | 30. Union        |
| 16. Swivel Fitting | 24. Lockwasher     | 31. Packing      |
| 17. Cap            | 25. Shaft          | 32. Packing      |
| 18. Seal           | 26. Jam Nut        | 33. Pivot        |
| 19. Bearing        |                    | 34. Downlock Pin |

Figure 5-12. Main Gear Actuator and Pivot Assembly (Sheet 2 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

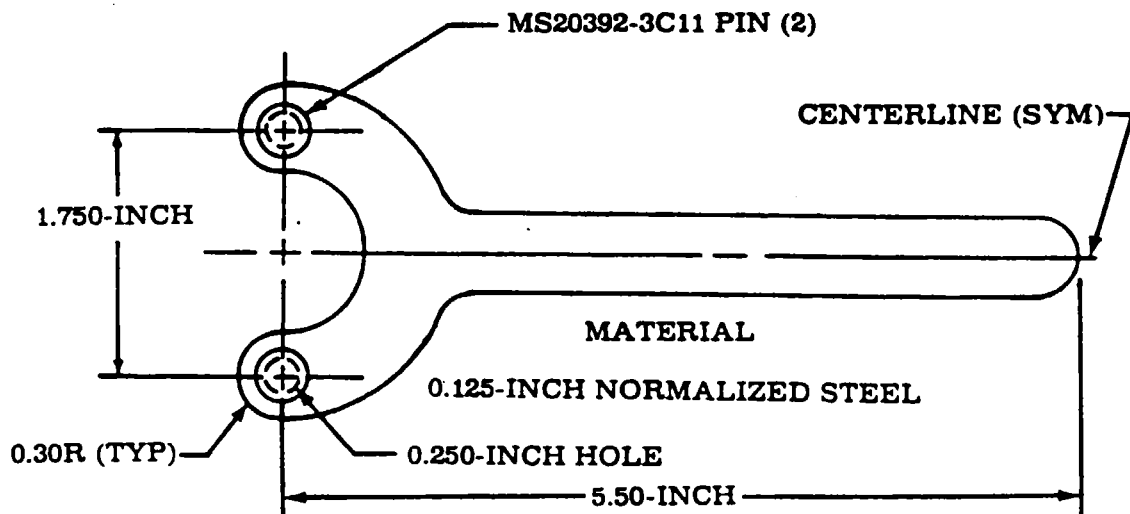
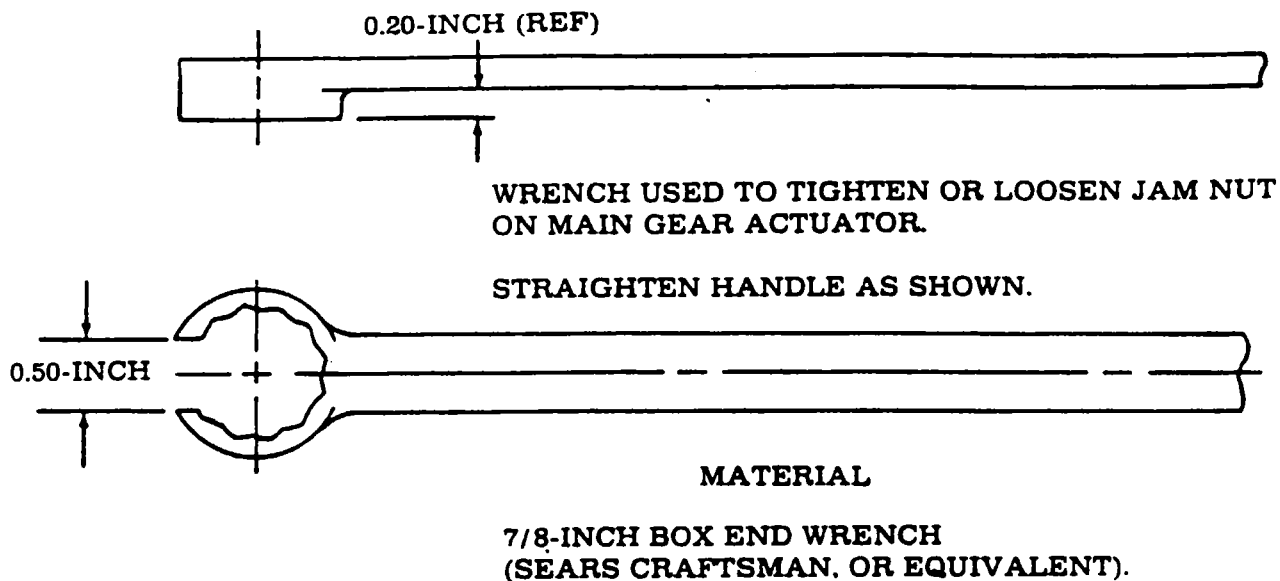


Figure 5-12. Main Gear Actuator and Pivot Assembly (Sheet 3 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

## NOTE

On airplane serials R18200001 thru R18202039 should looseness of the actuator be detected, AN175H22A bolts may be installed.

- f. Remove bolts attaching cap (17) and actuator (12) to bulkhead forging. Remove actuator from aircraft.

### 5-67. DISASSEMBLY. (See figure 5-12.)

Leading particulars of the actuator are as follows:

Cylinder Bore Diameter . . . 2.250 in.  
Piston Rod Diameter . . . . . .998 in.  
Piston Stroke . . . . . . . . . . . 2.970 in.

- a. Remove setscrew (7) and remove end gland (8) by unscrewing from actuator body (12).
- b. Remove end cap (1) from end of actuator.
- c. Using a small rod, push piston/rack (4) from actuator body. Unless defective, do not remove nameplate, bearing (2) or roller (3).
- d. Remove packing (10) and back-up ring (11) from actuator body (12). Discard packing (10).
- e. Remove packing (5) and back-ring (6) from end gland (8). Discard packing (5).
- f. Remove and discard packing (9) from piston/rack (4).

### 5-68. INSPECTION.

- a. Thoroughly clean all parts in cleaning solvent (Federal Specification PS-661, or equivalent).
- b. Inspect all threaded surfaces for cleanliness, cracks and wear.
- c. Inspect end cap (1) and cap (17), swivel fitting (16), piston/rack (4), roller (3), if removed, and actuator body (12) for cracks, chips, scratches, scoring, wear or surface irregularities which may affect their function or the overall operation of the actuator.
- d. Inspect bearings (2), if removed, for freedom of motion, scores, scratches or Brinell marks.

### 5-69. PARTS REPAIR/REPLACEMENT. Repair of small parts of the main landing gear actuator is impractical. Replace all defective parts. Minor scratches or score marks may be removed by polishing with abrasive crocus cloth (Federal Specification P-C-458), providing their removal does not affect operation of the unit. during assembly, install all new packings.

### 5-70. REASSEMBLY. (See figure 5-12.)

## NOTE

Use MIL-G-21164C lubricant on roller (3) and bearings (2), if removed.

- a. If bearings (2) and roller (3) were removed, press one bearing into actuator body until it is flush. Install roller and press second bearing in place to hold roller. Use care to prevent damage to bearings or roller.
- b. Install back-up ring (11) and packing (10) in actuator body bore. Install new packing (9) on piston/rack (4). (See figure 5-12 Section A-A.)

## MODEL R182 AND TR182 SERVICE MANUAL

### NOTE

Assemble new packings, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

- c. Slide piston/rack (4) into cylinder body.

### NOTE

Lubricate piston/rack gears with MIL-G-21164C lubricant. Apply lubricant sparingly. Over-greasing might cause contamination of hydraulic cylinder assembly with grease which might work past packing.

- d. Install back-up ring (6) and new packing (5) on end gland (8).
- e. Install end gland (8) in actuator body (12), and tighten until end of gland is flush with end of actuator body. Install and tighten setscrew (7).
- f. Install end cap (1) at end of actuator assembly.

#### 5-71. INSTALLATION. (See figure 5-12.)

- a. With main landing gear in the down and locked position, install actuator and onto bulkhead forging so that piston rack gear and sector gear engage as shown in Section A-A of the figure.
- b. Lubricate swivel fitting (16) with MIL-G-21164C lubricant and bolt actuator and cap (17) to bulkhead forging. Torque actuator bolts (15) 100 to 140 lb-in. and safety-wire.
- c. Connect all hydraulic lines to their source location. Lubricate threads with Petrolatum. Install new safety wire on swivel fitting at actuator.
- d. Connect brake line at wheel cylinder. Fill and bleed brake system in accordance with instructions in applicable paragraph in this section.
- e. Rig landing gear in accordance with procedures outlined in applicable paragraph in this section.
- f. Remove aircraft from jacks and install access covers, carpeting and seats removed for access.

#### 5-72. MAIN PIVOT ASSEMBLY.

#### 5-73. REMOVAL. (Refer to figure 5-12.)

- a. Remove strut from pivot assembly in accordance with procedures outlined in applicable paragraph of this section.
- c. Remove setscrew (14) from sector gear (13).
- d. Bend tangs of lockwasher (24) from notches in jam nut (26) and completely unscrew jam nut from threaded area of shaft (25).
- e. Push shaft (25) into pivot (33) and pull pivot (33) free of bearing (19).

#### 5-74. INSPECTION AND REPAIR. (See figure 5-12.)

- a. Thoroughly clean all parts in cleaning solvent (Federal Specification PS-661 or equivalent.)
- b. Inspect all parts for indications of damage, cracks, or excessive wear and replace as necessary.
- c. Inspect outboard pivot bushing and bearing (19) (pressed into bulkhead of forgings in aircraft) for damage and excessive wear. Replace bushing or bearing as required.

### NOTE

The outboard pivot bushing is locked into the bulkhead forging by a setscrew located above the bushing. This

## MODEL R182 AND TR182 SERVICE MANUAL

setscrew must be turned out several turns before the bushing can be removed.

- 5-75. **INSTALLATION.** (See figure 5-12.)
- Lubricate all bushings and bearings with MIL-G-21164C grease. Slide shaft (25) into pivot (33).
  - Install pivot, with thrust bearing (20) and race (21) installed, into inboard bearing in bulkhead forging. Pull shaft (25) from pivot (33) and install lockwasher (24) and jam nut (26) on shaft (25).
  - Insert end of shaft (25) into outboard bushing in bulkhead forging. Hand tighten nut to remove all end play and safety in place by bending corresponding tang of lockwasher (24) washer into notch of nut (26). Pivot must rotate freely.
  - Install seal (18) and sector gear (13) on inboard end of pivot (33) so that the alignment marks on pivot (33) and sector gear (13) are matched as shown in figure 5-12 Section View A-A.
  - Install setscrew (14) into sector gear (13) with Loctite 242 locking compound. Ensure that setscrew (14) enters keyway on pivot (33) and tighten screw.
- 5-76. **GEAR POSITION INDICATOR SWITCHES.**
- 5-77. **DESCRIPTION.** (See figure 5-9.) (Thru R18200655.) The gear down indicator switches are located on the inboard side of the outboard pivot support bulkhead forgings and are accessible through access panels in the floorboard. Beginning with R18200656, the switches are attached to the downlock hooks, which are attached to the outboard pivot support bulkhead forgings. The gear up indicator switches are located on the forward bulkhead of the main gear wheelwell and are accessible through the wheelwell openings. See "Main Gear Rigging" paragraph for adjustment instructions. The switches attached to the downlock hooks are non-adjustable.
- 5-78. **MAIN GEAR DOWNLOCK ACTUATOR.** (See figure 5-13.)
- 5-79. **DESCRIPTION.** The main gear downlock actuator consists of a piston/rod and a ball and seat priority valve. The body has two separate hydraulic chambers. Internal springs hold the piston/rod in the extended position (locked) at all times except when the gear position handle is placed in the up position and the system is pressurized, fluid, entering the actuator during the gear up cycle, is blocked by the ball and seat and forced to flow into the piston chamber, causing the piston to move, pulling the rod into the actuator body. As the rod moves, it draws the latch away from the downlock pin, unlocking the gear. When the rod is retracted into the actuator body, a raised portion of the rod forces a small ball to push the larger valve ball away from the seat and allows fluid to flow through the downlock actuator to the main landing gear actuator. When the landing gear position selector handle is placed in the down position, fluid flow is reversed and unaffected by the ball and seat. Internal spring pressure forces the piston to move causing the rod to extend, placing the latch or hook in the locked position. As the landing gear pivot assembly rotates to the down position, the lock pin strikes the angled bottom of the latch or hook, forcing the latch or hook to move away until the lock pin clears the latch or hook. Internal spring pressure on the piston/rod causes the latch to snap back to the locked position as the pin clears the latch.

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1. Actuator Body
2. Packing
3. Back-up Ring
4. Fitting
5. Packing
6. Spring
7. Ball
8. Ball
9. Piston/Rod
10. Back-up Ring
11. Packing
12. Packing
13. Spring
14. Spring
15. Plug

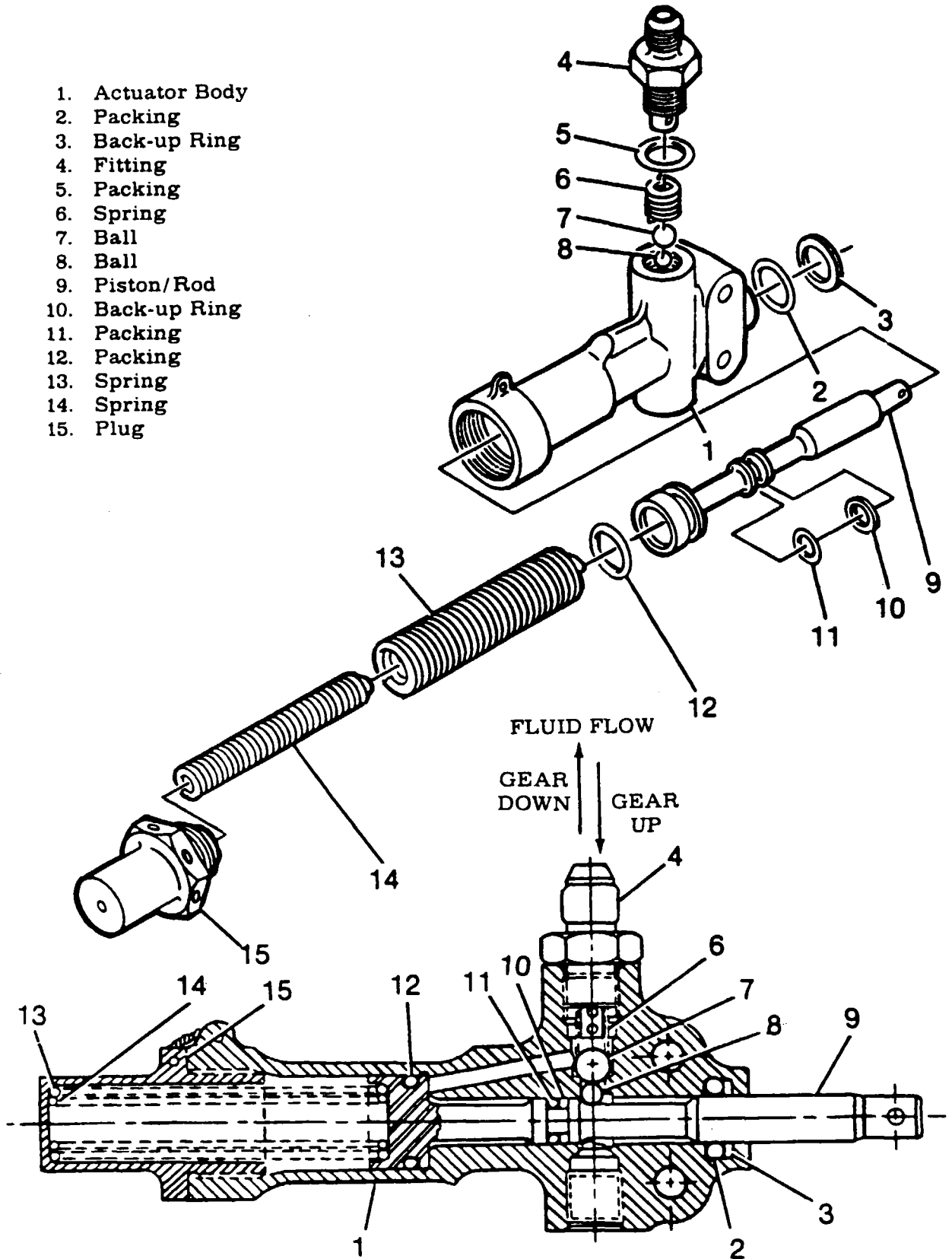
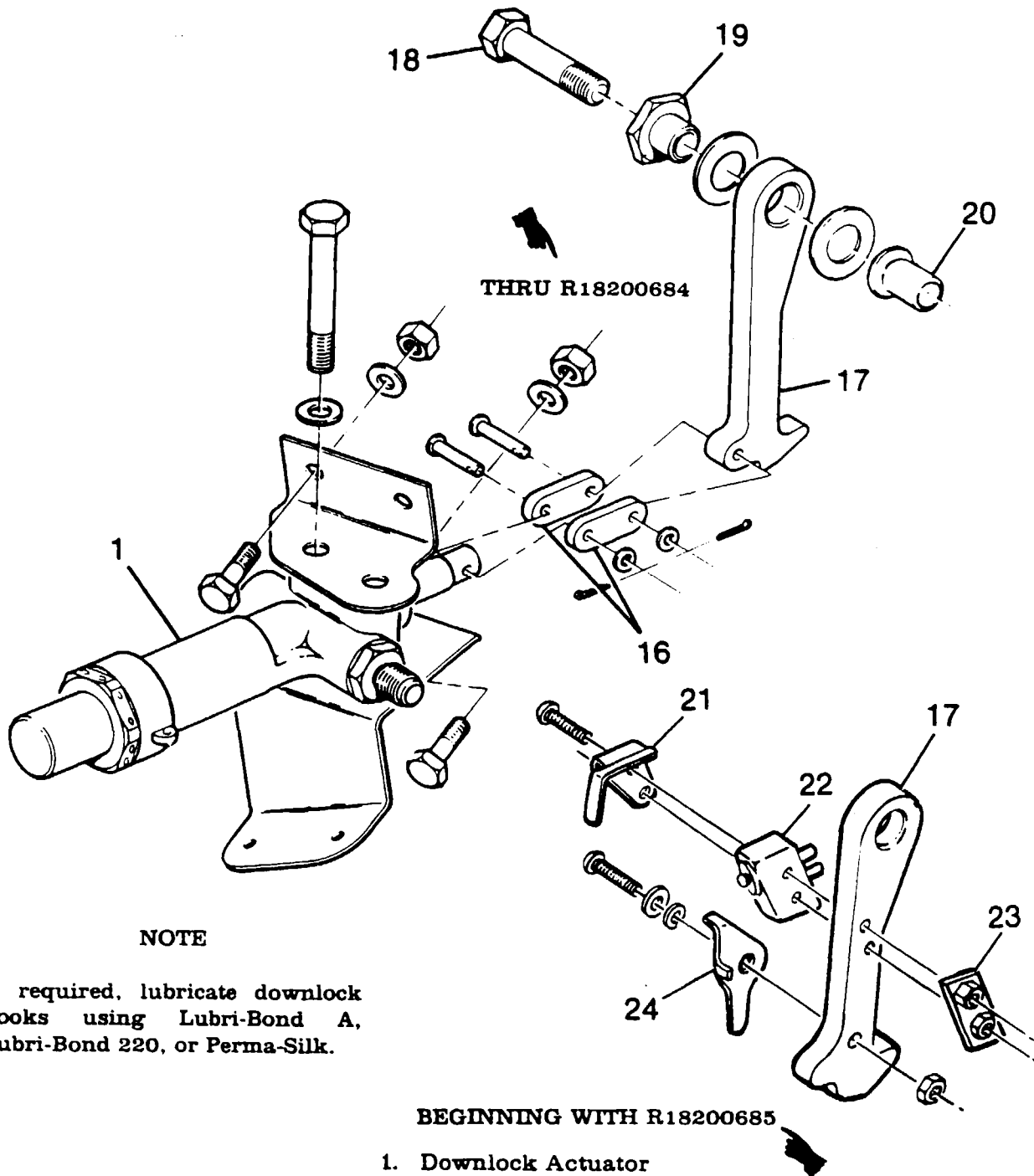


Figure 5-13. Main Gear Downlock Actuator (Sheet 1 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL



**NOTE**

If required, lubricate downlock hooks using Lubri-Bond A, Lubri-Bond 220, or Perma-Silk.

**BEGINNING WITH R18200685**

- 1. Downlock Actuator
- 16. Hook Link
- 17. Downlock Hook
- 18. Bolt
- 19. Bushing
- 20. Bushing
- 21. Actuator
- 22. Switch
- 23. Plate
- 24. Actuator

Figure 5-13. Main Gear Downlock Actuator (Sheet 2 of 2)

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### 5-80. REMOVAL. (See figure 5-13.)

- a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.
- b. Place master switch in OFF position and move gear position handle to UP position.
- c. Turn master switch on and allow gear to retract halfway. Turn master switch off and pull gear pump circuit breaker to prevent accidental activation of the pump.
- d. Move seat to forward position and peel back carpet as necessary to uncover access panel above actuator; remove panel.
- e. Remove cotter pin and clevis pin from downlock hook (17).
- f. Remove two bolts attaching actuator to mounting brackets.
- g. Remove and cap or plug hydraulic lines from actuator.
- h. Reverse procedure to install actuator.

### 5-81. DISASSEMBLY. (See figure 5-13.)

#### NOTE

Leading particulars of the actuators are as follows:

Cylinder Bore Diameter .....	0.749+0.002,-.000 in.
Piston Diameter .....	0.747+0.000,-.001 in.
Stroke (to unseat valve) .....	0.719±.031 in.

- a. Remove fitting (4), spring (6) and balls (7) and (8).
- b. Cut safety wire and unscrew end plug (15) from actuator body (1).
- c. Remove springs (13) and (14) and push piston/rod (9) from actuator body (1).
- d. Remove and discard all packings and back-up rings.

### 5-82. INSPECTION. (See figure 5-13.)

- a. Inspect all threaded surfaces for cleanliness and for freedom of cracks and excessive wear.
- b. Inspect spring (6) for evidence of breaks and distortion.
- c. Inspect inner and outer springs (13) and (14) for evidence of breaks and distortion.
- d. Inspect fitting (4), piston rod (9), actuator body (1), balls (7) and (8) ball seats for cracks, scratches, scoring, wear or surface irregularities which might affect their function or the overall function of the unit.
- e. Repair of most parts of the downlock actuator is impractical. Replace defective parts. Minor scratches and scores may be removed by polishing with fine abrasive crocus cloth (Federal Specification PC-458), providing their removal does not affect operation of the unit.

### 5-83. REASSEMBLY. (See figure 5-13.)

#### NOTE

Install all new packings and (12) back-up rings during reassembly of the actuator.

- a. Install new packings (11) and (12) back-up ring (10) in grooves of piston/ rod (9).
- b. Install new packing (2), back-up ring (3) in grooves of actuator body (1).
- c. Slide piston rod into actuator body (1). Use care to prevent damage to packing (2) and back-up ring (3).
- d. Insert springs (13) and (14), then install and safety wire end plug(15) to actuator body.
- e. Insert balls (8) and (7) and spring (6) in actuator body (1).
- f. Install new packing (5) on fitting (4). Install and tighten fitting.



## MODEL R182 AND TR182 SERVICE MANUAL

- e. Insert balls (8) and (7) and spring (6) in barrel and valve body.
- f. Install new packing (5) on fitting (4). Install and tighten fitting.

5-84. MAIN GEAR STRUT STEP.

5-85. DESCRIPTION. Thru Serials R18200476 and FR18200020, the step is constructed of Uralite 3121 polyurethane casting, with treads cast into the step. Beginning with Serials R18200477 and FR18200021, the step is constructed of Uralite 3121 polyurethane casting, with a molded depression area, located in the top of the step containing a replaceable tread. To replace a step tread, remove old tread with a sharp knife, clean pad with a 50-50 mixture of toluene and methylene chloride, and cement new tread to pad with EC-776 or EC-847 cement (3M Company).

5-86. REMOVAL. (See figure 5-8.)

### NOTE

The step is bonded to the landing gear strut with Uralite 3121 bonding material.

- a. Using a heat gun, heat step at a temperature of 200° to 250°F, until step material becomes pliable.
- b. Using a sharp knife, remove step material down to the metal strut.
- c. Clean off remaining step material with a wire wheel and sandpaper. Leave surface slightly rough or abraded. Clean oil and grease from strut with solvent, wipe off excess solvent with a dry cloth and let surface dry.
- d. Apply Zinc Chromate Primer - green or yellow to cleaned area on strut. Dry film thickness to be .0003 to .0005 inch.

5-87. INSTALLATION. (Refer to figure 5-8.)

- a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.
- b. Mark position of removed step so new step will be installed in approximately the same position on the strut.
- c. Check that bonding surfaces are clean and dry.
- d. Mix adhesive (Uralite 3121), in accordance with manufacturer's direction. Note pot life.
- e. Spread a coat of mixed adhesive on bonding surfaces of strut and step; install step on strut.

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## NOTE

Top of strut should be parallel to the ground ( $\pm 5^\circ$ ) when gear is in down position.

- f. Cycle landing gear to check clearance of step in tunnel.
- g. Form a small fillet of adhesive at all edges of bonding surfaces. Remove excess adhesive.
- h. Remove aircraft from jacks.
- i. Allow adhesive to thoroughly cure according to manufacturer's recommendations before flexing gear spring or applying loads to step.
- j. Paint gear spring strut and step after curing is completed.

### 5-88. NOSE GEAR SYSTEM.

5-89. DESCRIPTION. The nose gear consists of a pneudraulic shock assembly, mounted in a trunnion assembly, a steering arm and bungee, shimmy dampener, nose wheel, tire and tube, hub cap, bearings, seals and a double-acting hydraulic actuator for extension and retraction. A claw-like hook on the actuator serves as a downlock for the nose gear. Stop bolts, located in the lower aft well, prevent inadvertent nose gear collapse.

5-90. OPERATION. The nose gear shock strut is pivoted just forward of the firewall. Retraction and extension of the nose gear is accomplished by a double-acting hydraulic cylinder, the forward edge of which contains the nose gear downlock. Initial action of the cylinder disengages the downlock before retraction begins. As the strut moves into the gear well, the forward side of the nose gear fork boss contacts the door close mechanism and pulls the nose door closed. The nose gear is held in the up position by hydraulic pressure.

### 5-91. TROUBLE SHOOTING - NOSE GEAR SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
FLUID LEAKAGE FROM STRUT.	Defective strut seals.	Install new seals.
STRUT LOSES AIR PRESSURE.	Defective strut seals.	Install new seals.
	Defective or loose air filler valve.	Check gasket; tighten or replace valve.
EXCESSIVE TIRE WEAR.	Loose torque links.	Add shim washers; replace links.
NOSE WHEEL SHIMMY (Also refer to Service Information Letter SE84-21.)	Loose or worn nose wheel steering linkage.	Tighten loose linkage or replace defective parts.
	Shimmy damper need fluid.	Service in accordance with Section 2.
	Defective shimmy damper.	Repair or replace shimmy damper.

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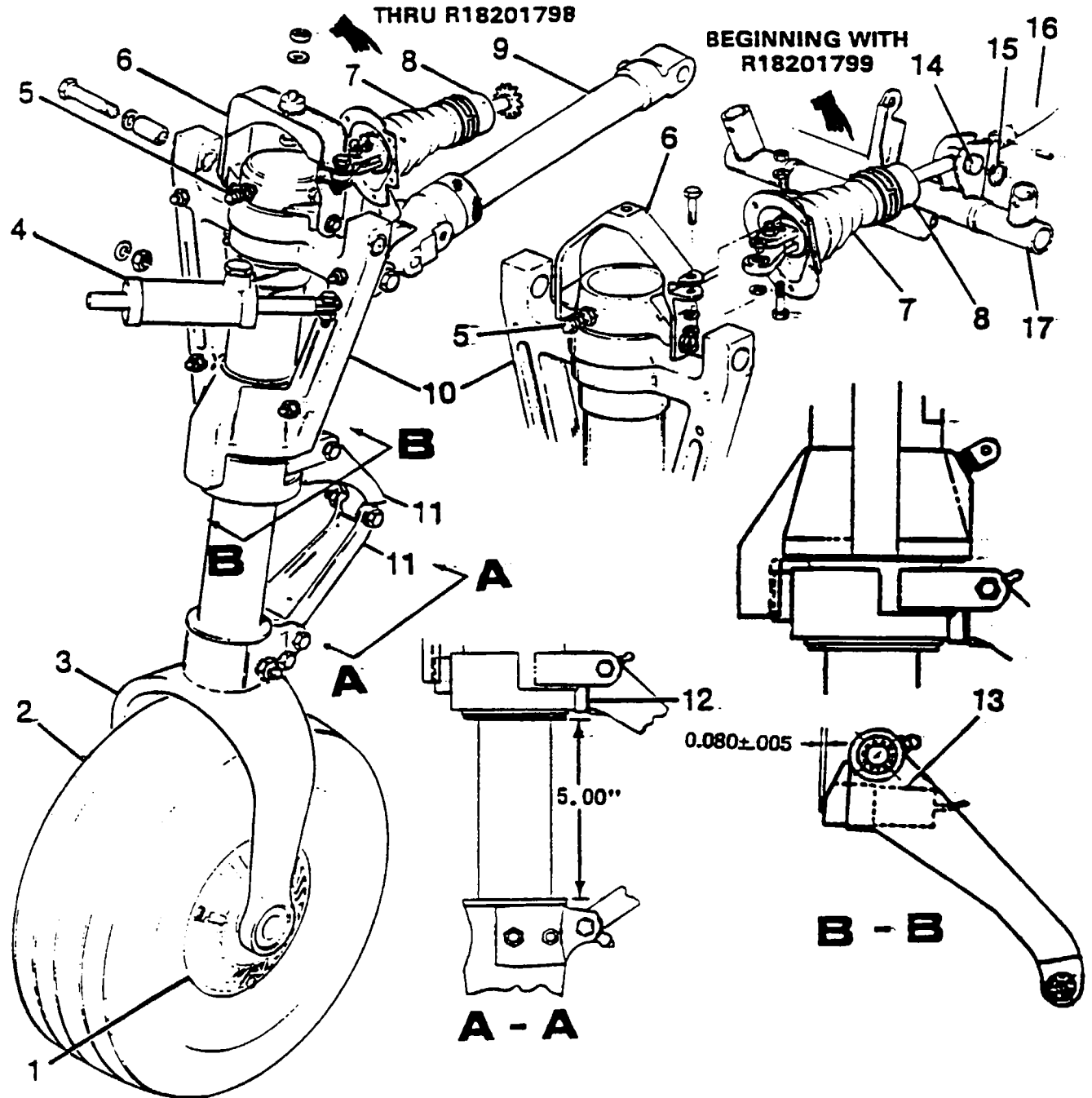
- 5-92. **REMOVAL AND INSTALLATION OF NOSE GEAR STRUT ASSEMBLY.** (See figure 5-14.)
- a. Jack aircraft or weight down tail in accordance with procedures outlined in Section 2 of this manual.

### WARNING

Turn master switch off and pull gear pump circuit breaker when working in wheel well area.

- b. Disconnect electrical leads from squat switch on upper torque link and tag for identification.
  - c. Remove access panel aft of gear well to provide access to actuator.
  - d. Remove bolt attaching actuator to trunnion, being careful to contain the washers and other downlock components normally held by the attaching bolt.
  - e. Remove steering rod attach bolt and bellcrank pivot bolt.
  - f. Remove trunnion pivot bolts and remove strut from aircraft.
  - g. Reverse procedure to install strut assembly.
- 5-93. **DISASSEMBLY OF NOSE GEAR STRUT.** (See figure 5-15.)
- a. Bleed pressure from strut through valve (9).
  - b. Remove shimmy damper (4, figure 5-14) from strut.
  - c. Remove torque links (29).
  - d. Remove steering bellcrank (11), collar (10) and valve (9) from top of strut assembly.
  - e. Remove flat lock ring (15) and collar (10) from lower end of barrel (14).
  - f. Remove wire lock ring (15) from inside groove at lower end of barrel (14). A small hole is drilled through the outer barrel to aid in the removal of the lock ring.

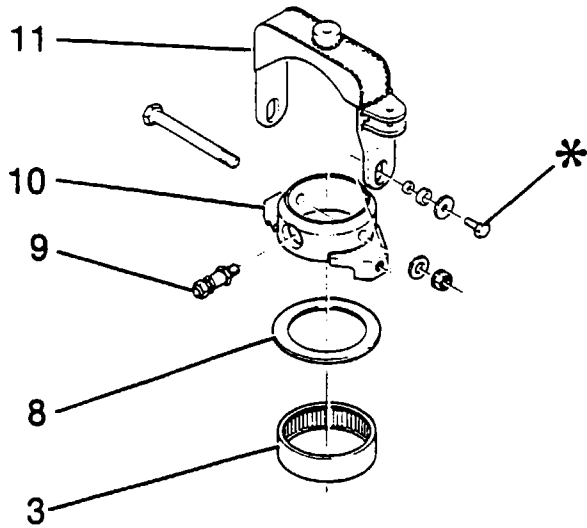
MODEL R182 AND TR182 SERVICE MANUAL



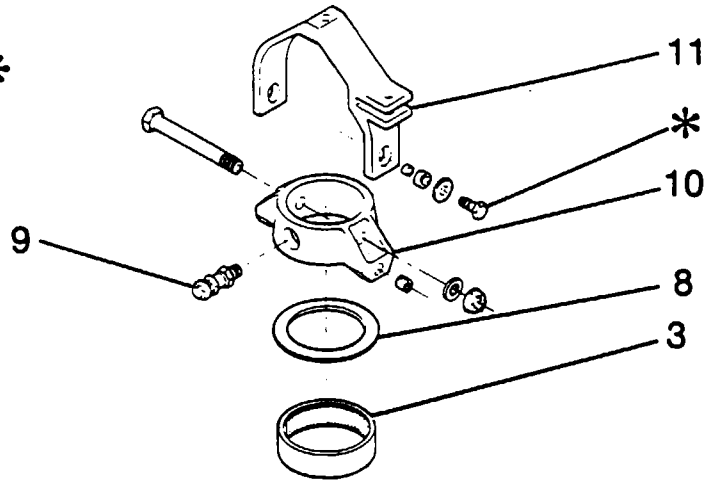
- |                                       |                         |
|---------------------------------------|-------------------------|
| 1. Hub Cap                            | 10. Trunnion            |
| 2. Wheel and Tire                     | 11. Torque Links        |
| 3. Fork                               | 12. Shim                |
| 4. Shimmy Damper                      | 13. Squat Switch        |
| 5. Air Valve                          | 14. Barrel Nut          |
| 6. Nose Gear Steering Bellcrank       | 15. Snap Ring           |
| 7. Boot                               | 16. Flex Shaft          |
| 8. Nose Gear Steering Bungee Assembly | 17. Rudder Bar Assembly |
| 9. Nose Gear Actuator                 |                         |

Figure 5-14. Nose Gear Assembly

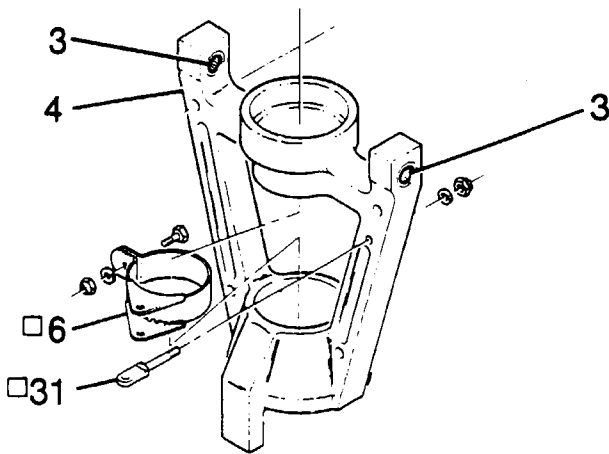
# MODEL R182 AND TR182 SERVICE MANUAL



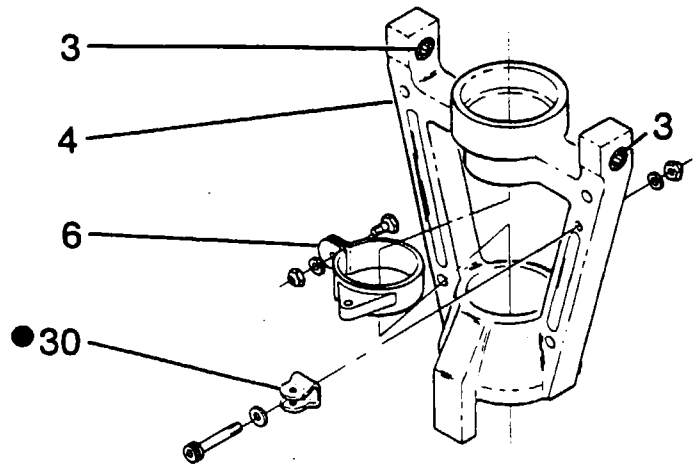
R1820001 THRU R18201798  
FR1820001 THRU FR18200070



R18201799 & ON



□ R1820001 THRU R18200710  
FR1820001 THRU FR18200045



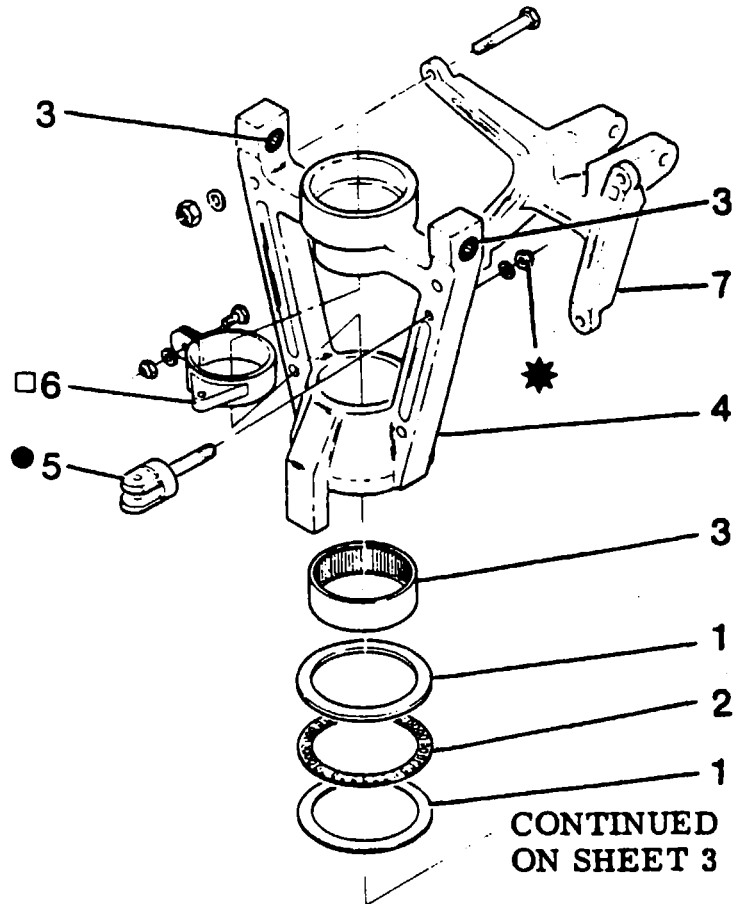
● R18200711 THRU R18201276  
FR18200046 THRU FR18200055

\* Seal bolt thread with Loctite 271, Loctite Catalog No. 87, or STA-LOK Catalog No. 800. Beginning with Serial R18200001 and FR18200001.

- |                                  |                                     |
|----------------------------------|-------------------------------------|
| 3. Bearing                       | 10. Collar                          |
| 4. Trunnion                      | 11. Steering Bellcrank              |
| 6. Shimmy Damper Attach<br>Clamp | 30. Shimmy Damper Bracket           |
| 8. Washer                        | 31. Shimmy Damper Attach<br>Eyebolt |
| 9. Valve                         |                                     |

Figure 5-15. Nose Gear Strut (Sheet 1 of 3)

MODEL R182 AND TR182 SERVICE MANUAL



\* TORQUE TO  
90-150 LB. IN.

□ R18200711 & ON  
FR18200046 THRU FR18200070

● R18201277 & ON  
FR18200056 THRU FR18200070

1. Race
2. Thrust Bearing
3. Bearing
4. Trunnion
5. Shimmy Damper Attach  
Clevis
6. Shimmy Damper Attach  
Clamp
7. Actuator Attach Fitting

Figure 5-15. Nose Gear Strut (Sheet 2 of 3)

MODEL R182 AND TR182 SERVICE MANUAL

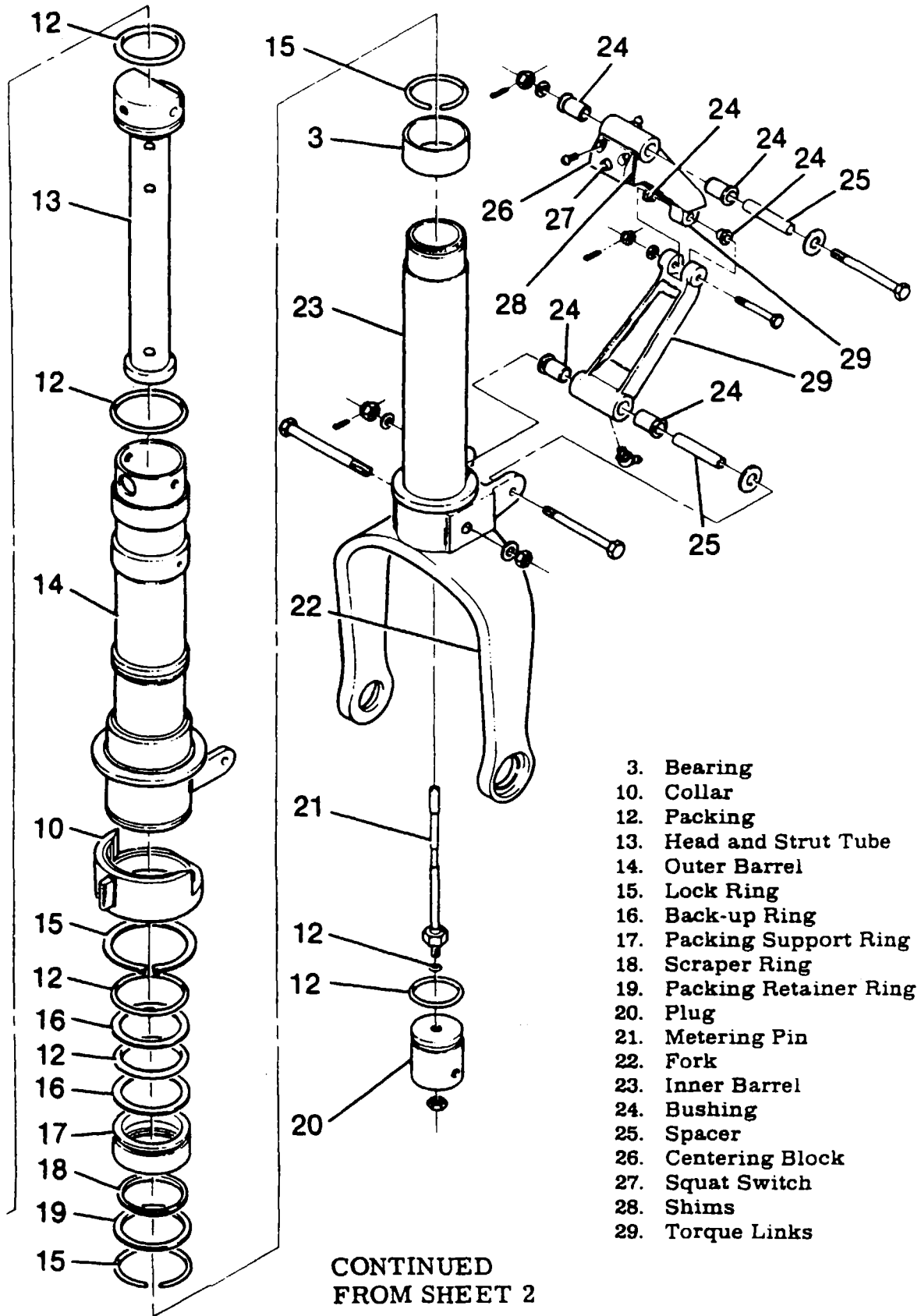


Figure 5-15. Nose Gear Strut (Sheet 3 of 3)

## MODEL R182 AND TR182 SERVICE MANUAL

- g. Pull inner barrel (23) from outer barrel (14) and drain hydraulic fluid from inner barrel.
- h. Remove wire lock ring (15) from groove at upper end of inner barrel (23) and remove bearing (3) and packing support ring (17) from inner barrel (23).
- i. Remove plug (20) and metering pin (21) from inner barrel (23) by removing bolt through fork (22) inner barrel (23) and plug (20). Remove metering pin (21) from plug (20).

### 5-94. INSPECTION AND REPAIR. (See figure 5-15.)

- a. Thoroughly clean all parts in cleaning solvent, and examine parts carefully.
- b. Install all new packings and back-up rings.
- c. Sharp metal edges should be smoothed with No. 400 emery paper, then thoroughly cleaned with solvent.
- d. If outer barrel (14) was removed from trunnion (4), lubricate needle bearings in accordance with the lubrication chart in Section 2 of this manual.
- e. Lubricate all packings and back-up rings, and all other internal parts with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7 during reassembly.

### 5-95. REASSEMBLY. (See figure 5-15.)

- a. Lubricate and install all new packings and back-up rings.
- b. Lubricate bearings as required with MIL-G-23827A grease or equivalent.
- c. Reassemble strut using reverse procedure of disassembly instructions outlined in paragraph 5-93.

### NOTE

Do not overtighten nut at clamp (6) to cause excessive bending of clamp ears. Lubricate outer surface of strut tube (13), packing (12) and lock ring (15) with a protective film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7. Tighten nut on bolt attaching upper and lower torque links (29) snug, plus one additional castellation.

### 5-96. SHIMMY DAMPER. (See figure 5-16.)

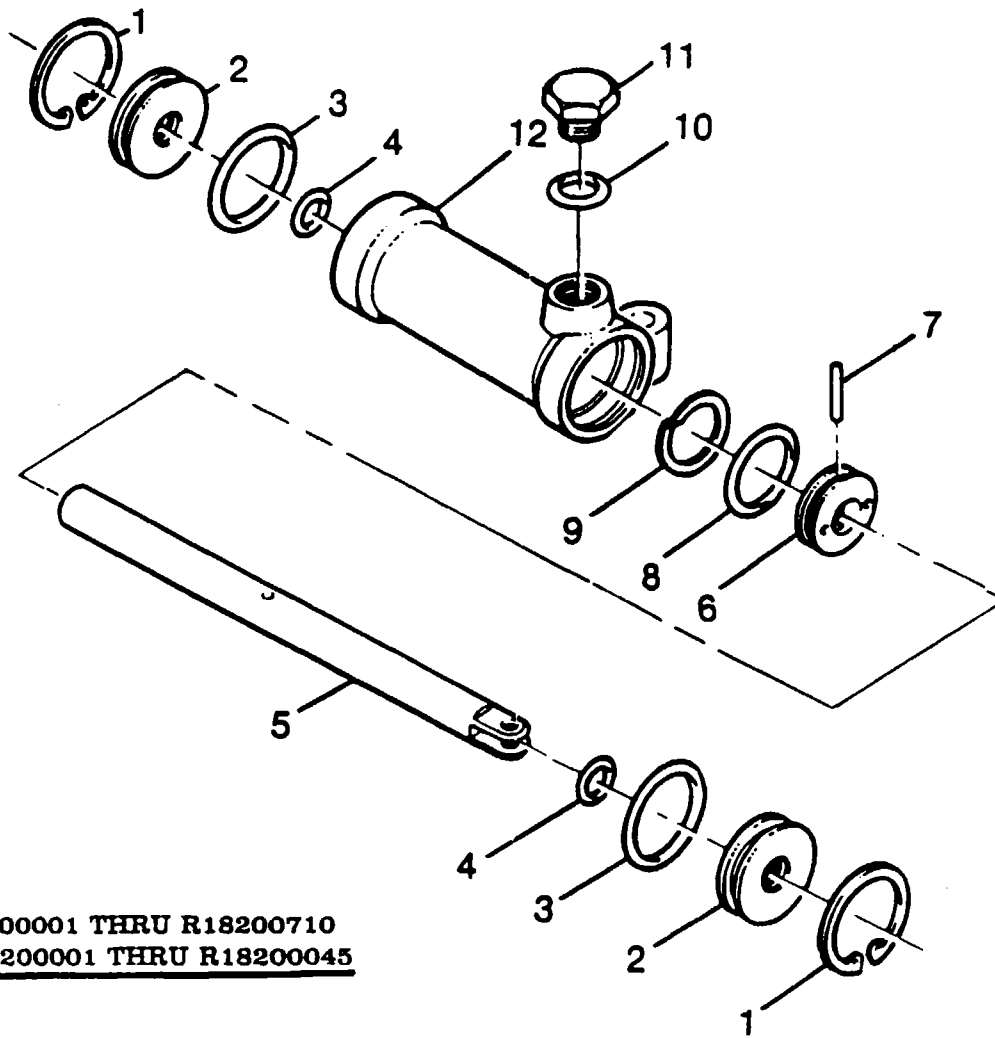
5-97. DESCRIPTION. The shimmy damper is a self-contained hydraulic cylinder which acts as a restrictor. When the steering system reacts too rapidly, the shimmy damper maintains pressure against the steering arm by means of a piston which permits a restricted flow of hydraulic fluid from either end of the cylinder to the other through an orifice in the piston.

### 5-98. REMOVAL. (See figure 5-14.)

- a. Remove setscrew and bracket, eyebolt or clevis bolt securing shimmy damper to trunnion.
- b. Remove bolt attaching damper to bracket on nose gear strut.
- c. Remove shimmy damper from aircraft.



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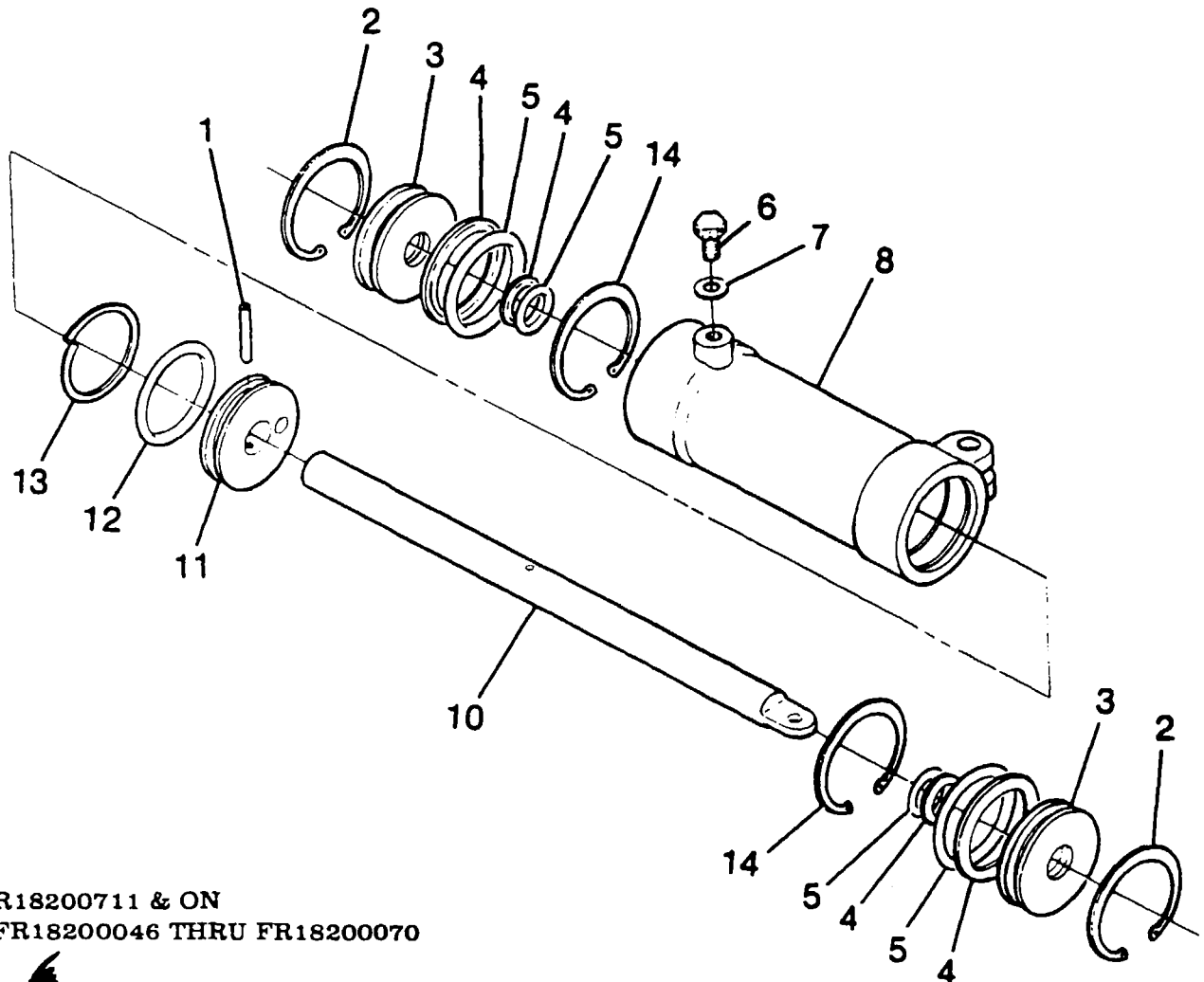


R18200001 THRU R18200710  
FR18200001 THRU R18200045

1. Lock Ring
2. Bearing Head
3. Packing
4. Packing
5. Rod
6. Piston
7. Roll Pin
8. Packing
9. Back-up Ring
10. Packing
11. Plug
12. Body

Figure 5-16. Shimmy Damper (Sheet 1 of 2)

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R18200711 & ON  
FR18200046 THRU FR18200070



- 1. Roll Pin
- 2. Outer Retainer
- 3. Bearing Head
- 4. Back-Up Ring
- 5. Packing
- 6. Filler Plug
- 7. Stat-O-Seal
- 8. Barrel
- 9. Bushing
- 10. Piston Rod
- 11. Piston
- 12. O-Ring
- 13. Retainer
- 14. Inner Retainer

Figure 5-16. Shimmy Damper (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

- 5-99. **DISASSEMBLY.** (See figure 5-16, sheet 1.)
- Remove lock rings (1).
  - Remove bearing heads (2).
  - Remove packings (3) from bearing heads (2).
  - Remove rod (5).
  - Remove packing (8), and back-up ring (9) from piston (6). (Do not remove piston (6) from rod (5) unless new part is needed.)
  - Remove plug (11) and packing (10).
- 5-99A. **DISASSEMBLY.** (See figure 5-6, sheet 2.)
- Remove outer retainers (2) from each end of barrel (8) and remove bearing heads (3). Discard packings (5) and back-up rings (4) from bearing heads.
  - Remove inner retainers (14) from barrel (8).
  - Withdraw piston rod (10) from barrel (8) and discard O-ring (12). Piston (11) need not be removed from piston rod (10) unless replacement is required.
  - Remove plug (6) and stat-o-seal (7).
- 5-100. **INSPECTION AND REPAIR.** (See figure 5-16.)
- Thoroughly clean all parts in solvent and inspect carefully.
  - Minor scratches and scores may be removed by polishing with fine abrasive crocus cloth (Federal Specification PC-458), providing their removal does not affect the operation of the unit.
  - Replace all worn or defective parts.
- 5-101. **REASSEMBLY.** (See figure 5-16.)

### NOTE

Install all new O-rings, packings, and back-up rings, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7 before assembly.

- Reassemble using reverse procedure of directions outlined in paragraph 5-99 or 5-99A.
- 5-102. **TORQUE LINKS.** Torque links are illustrated in figure 5-15. Removal and installation procedures for torque links are discussed in paragraphs 5-105 and 5-106 along with removal and installation of the nose gear squat switch. Lubricator fittings and bushings should not be removed except for replacement of parts. Excessively worn parts should be replaced with new parts.
- 5-103. **SQUAT SWITCH.** (See figure 5-14.)
- 5-104. **DESCRIPTION.** The squat (or safety) switch interrupts the landing gear circuit, preventing landing gear retraction while the aircraft is resting on the ground also, while airborne the switch prevents the nose gear from retracting into the well, except when the nose wheel is in alignment. The squat switch is installed through a hole in the upper torque link, and is threaded into a centering block, attached to the forward side of the torque link. A portion of the squat switch plunger protrudes from the aft side of the centering block  $.080 \pm .005$ -inch. The threaded portion of the switch is sealed in the threads of the centering block with Grade B Loctite Sealant.

## MODEL R182 AND TR182 SERVICE MANUAL

### 5-105. REMOVAL. (See figures 5-14 and 5-15.)

- a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.
- b. Mark positions of sta-straps along routing of wires from squat switch at upper torque link to splices. Mark wires to facilitate correct installation of replacement leads; cut sta-straps.
- c. Disconnect or cut wires at splices and remove wires from routing down to squat switch at upper torque link.
- d. Deflate shock strut completely.
- e. Disconnect upper torque link from lower torque link, noting positions of washers and spacers.
- f. Disconnect upper torque link from upper strut lugs; remove upper torque link.
- g. Remove (2) screws attaching centering block to torque link.
- h. Retain any shims removed from between centering blocks and torque link for replacement.
- i. Break loose sealant in threads and remove squat switch from centering block.
- j. Remove all sealant from threads in centering block.

### 5-106. INSTALLATION. (See figures 5-14 and 5-15.)

- a. Install two leads from replacement squat switch through hole in centering block.
- b. Apply Loctite Grade B, or equivalent sealant, to threads in centering block.

#### NOTE

Cure time of Grade B sealant is 2 to 6 hours (unprimed) or 5 to 20 minutes (primed). Excessive sealant may be wiped off with a rag moistened with trichlorethylene.

- c. Screw replacement squat switch into centering block, ensuring that leads remain untwisted.
- d. Adjust squat switch by screwing or unscrewing into centering block to allow switch plunger to protrude  $.080 \pm .005$ -inch, as shown in view B-B, figure 5-14.
- e. After sealant has cured (refer to note following step "b"), attach centering block to upper torque link with (2) screws, and insert leads and squat switch through hole in torque link.
- f. Attach torque link to upper strut lugs, installing washers and spacers in positions from which they were removed.
- g. Attach upper torque link to lower torque link.

#### NOTE

Tighten bolt snug, then tighten one more castellation and install cotter pin.

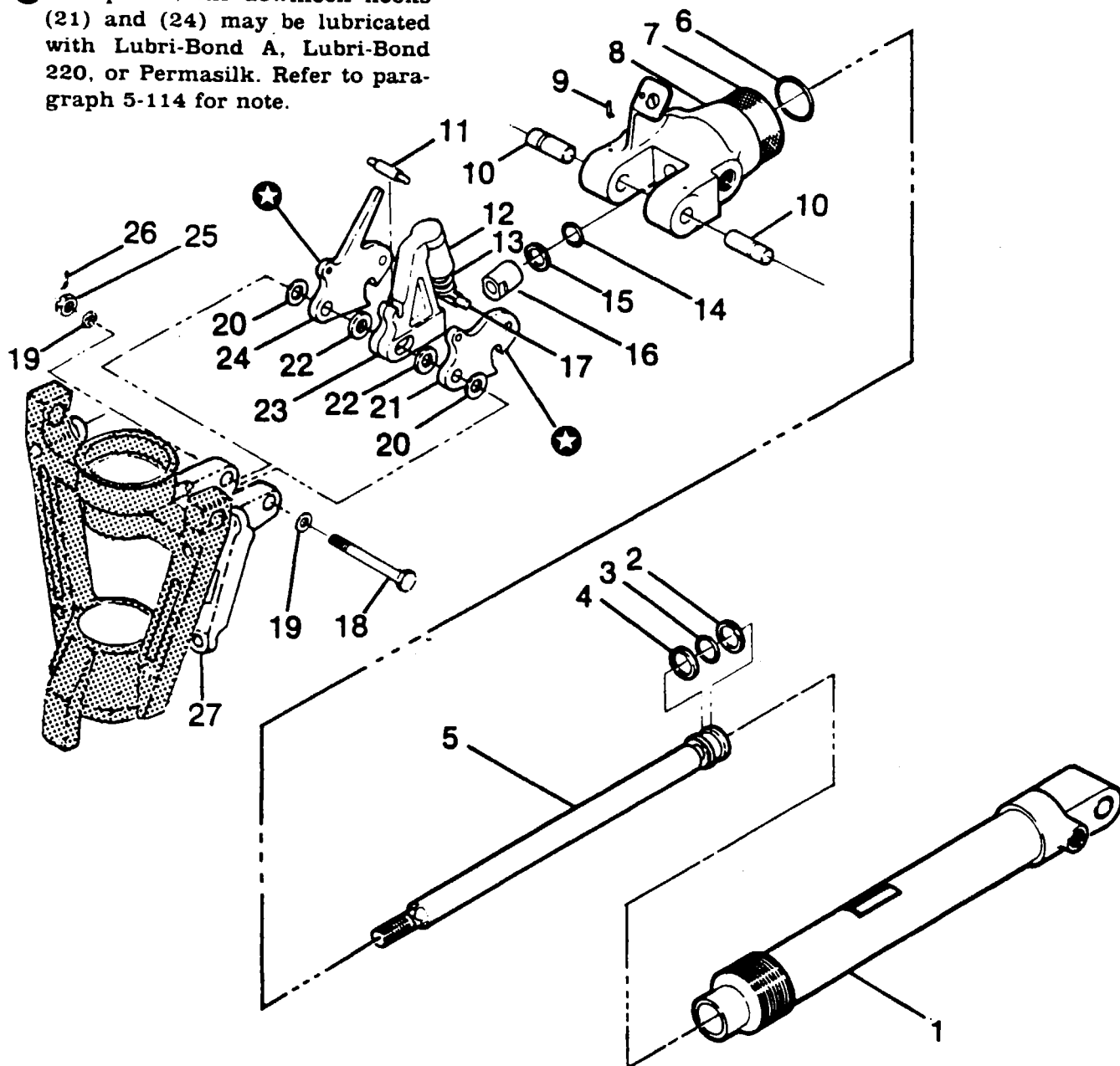
- h. With strut fully extended, check amount of extension. Add or delete shims (28) (figure 5-15), as necessary until strut extends 5.00 in. as shown in view A-A, figure 5-14.
- i. Inflate shock strut as outlined in Section 2.
- j. Route squat switch leads to match routing of removed wires.
- k. Install sta-straps in locations marked during removal.
- l. Splice squat switch leads, or connect at quick-disconnects to existing wires which were tagged during removal of old leads.

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- 5-107. **NOSE GEAR DOWNLOCK MECHANISM.** (See figure 5-17.)
- 5-108. **DESCRIPTION.** The downlock mechanism consists of downlock hooks (21) and (24) on either side of the rod end (23). The downlock hooks are spring-loaded in the locked position. As the gear moves to the full-down position, the downlock hooks engage lock pins (10) on the bearing end (8), preventing retraction of the gear. As the gear-up cycle begins, the slotted hole in the actuator rod end (23) allows the rod end to move forward slightly, pushing against the cross bar (11) connecting the downlock hooks (21) and (24), causing the hooks to rotate up from the lock pins (10). As the rod end (23) continues to move forward, the free travel afforded by the slotted hole is taken up, and retraction of the gear begins.
- 5-109. **REMOVAL, INSTALLATION AND RIGGING.**
- See figure 5-17 and paragraph 5-112, which outlines procedures for removing the nose gear actuator. Components of the downlock mechanism will be freed as the actuator is removed.
  - Refer to paragraph for rigging instructions.
- 5-110. **NOSE GEAR ACTUATOR.** (See figure 5-17.)
- 5-111. **DESCRIPTION.** The nose gear actuator extends and retracts the nose gear and serves as a rigid drag strut in the gear-down position.
- 5-112. **REMOVAL.**
- Jack aircraft or weight down tail to raise nose wheel off the ground as outlined in Section 2 of this manual.
  - Tag for identification and disconnect electrical wires at the gear-down switch, located at the forward end of the actuator.
  - Disconnect hydraulic hoses from actuator. Cap or plug hose and fitting openings to prevent entry of foreign material.
  - Disconnect actuator from actuator attach fitting (7, figure 5-15) by removing cotter pin, castellated nut, washers and bolt.
  - Retain components of downlock mechanism which will be freed by removing bolt.
  - Disconnect actuator from airframe by removing cotter pin, castellated nut, washers and bolt from aft mounting bracket.
- 5-113. **DISASSEMBLY.** (See figure 5-17.)
- Loosen lock nut at end of piston rod and remove rod end assembly as a unit; remove lock nut from piston rod.
  - Remove safety wire from knurled nut, and loosen knurled nut.
  - Remove bearing end from cylinder, and remove nut from cylinder.
  - Pull piston from cylinder.
  - Remove packings and back-up rings from bearing end and piston.
  - Disassemble hook assembly.
- 5-114. **INSPECTION AND REPAIR.**
- Inspect all threaded surfaces for cleanliness and for cracks or excessive wear.
  - Inspect downlock hook spring for evidence of breaks and distortion. Free length of spring must be  $2.406 \pm 0.080$ -inches, and compressed to 2.00-inches under  $19.80 \pm 2.0$  pound load.

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★ If required, the downlock hooks (21) and (24) may be lubricated with Lubri-Bond A, Lubri-Bond 220, or Permasilk. Refer to paragraph 5-114 for note.



- |                 |                  |                             |
|-----------------|------------------|-----------------------------|
| 1. Body         | 10. Lock Pin     | 19. Washer                  |
| 2. Back-up Ring | 11. Cross Bar    | 20. Washer                  |
| 3. Packing      | 12. Shield       | 21. Downlock Hook           |
| 4. Back-up Ring | 13. Spring       | 22. Washer                  |
| 5. Piston/Rod   | 14. Packing      | 23. Red End                 |
| 6. Packing      | 15. Back-up Ring | 24. Downlock Hook           |
| 7. Knurled Nut  | 16. Nut          | 25. Nut                     |
| 8. Bearing End  | 17. Spring Guide | 26. Cotter Pin              |
| 9. Pin          | 18. Bolt         | 27. Actuator Attach Fitting |

Figure 5-17. Nose Gear Actuator/Downlock Assembly

## MODEL R182 AND TR182 SERVICE MANUAL

- c. Inspect hooks, spring guide, bearing end, piston, cylinder and bushing for cracks, chips, scratches, scoring, wear or surface irregularities which may affect their function or the overall function of the nose gear actuator.
- d. Repair of most parts of the actuator assembly is impractical. Replace defective parts with serviceable parts.
- e. Minor scratches and scores may be removed by polishing with fine abrasive crocus cloth (Federal Specification PC-458), providing their removal does not affect operation of the unit.

### NOTE

The downlock hooks may be field lubricated with Lubri-Bond A, Lubri-Bond 220, or Permasilk. These products may be secured from the following companies.

Lubri-Bond A, and Lubri-Bond 220:

Electro-Film Inc.  
7116 Laurel Canyon Blvd.  
Hollywood, CA. 91605

Permasilk:

Everlube Corp. P.O. Box 2200  
Hi-Way 52 N.W.  
West Lafayette, IND. 47906

After application of either lubricant, allow parts to air dry for six hours, or dry for one hour at 120°F.

5-115. ASSEMBLY. (See figure 5-17.)

### NOTE

When reassembling actuator, install new packings lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

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- a. Install packing (6) in bearing end (8).
- b. Install packing (3), and back-up rings (2) and (4) on piston/rod (5).
- c. Insert piston/rod (5) rod into body (1). Do not damage back-up rings and packing when inserting piston rod.
- d. With knurled nut (7) on body (1), install bearing end (8) on body (1). Use care to avoid damage to packing and back-up rings when installing bearing end on body (1).

### NOTE

Centerlines of lock pins (10) and bushing hole in body (1) must be parallel within 0.005-inch with actuator assembled to a length of 13.58" + 0.03-inches, measured from centerline of pins to centerline of bushing in cylinder at cylinder anchor end.

- e. Tighten and safety wire knurled nut (7).
- f. Install nut (16) on end of piston/rod (5).
- g. Assemble and install hook assembly on actuator attach fitting (27).

### 5-116. INSTALLATION.

### NOTE

Before installing nose gear actuator, check condition of fit and attaching bolts and bushings. Replace any defective parts. Fill actuator with hydraulic fluid.

- a. Attach aft end of actuator to fuselage structure with bolt, washer and nut. Safety nut with cotter pin.
- b. Assemble and attach nose gear downlock mechanism to actuator attach fitting as shown in figure 5-17.
- c. Connect hydraulic lines to actuator and connect electrical leads to gear-down switch.
- d. See "Nose Gear Rigging" paragraph for adjustment and checking of downlock.

### 5-117. NOSE GEAR DOORS. (Thru R18201798.) (See figure 5-18.)



## MODEL R182 AND TR182 SERVICE MANUAL

- 5-118. **DESCRIPTION.** The nose gear door system consists of a left and right hand door, interconnected by a crossover actuator assembly. As the gear is retracted, the forward side of the nose gear fork boss contacts the actuator crossover, causing the doors to close. Overcentering springs, attached to the actuator, serve to hold the doors in the full-open or closed position.
- 5-119. **REMOVAL AND INSTALLATION.** (Thru R18201798.) (See to figure 5-18.)
- Remove hinge bolts and related nuts washers and bushings (6).
  - Disconnect adjusting rod (9) from center hinge and remove door.
  - Disconnect springs (7) and remove actuator pivot bolts and related nuts, washers and bushings (5); remove actuator.
  - Reverse procedure to install doors.
- 5-120. **NOSE GEAR DOORS.** (Beginning with R18201799.) (See figure 5-19.)
- 5-121. **DESCRIPTION.** The nose gear door system is comprised of a left and right-hand door, interconnected by a crossover actuator assembly. As the gear is retracted, the forward side of the nose gear fork boss contacts the actuator crossover, causing the doors to close. Overcentering springs, attached to the actuator crossover, serve to hold the doors in the full open or closed position.
- 5-122. **REMOVAL.** (Beginning with R18201799.) (See figure 5-19.)
- Remove hinge bolts and related nuts, washers (8), (9) and bushings (10).
  - Disconnect adjusting rod assemblies (11) from center hinges and remove doors.
  - Disconnect springs (7), and remove actuator pivot bolts and related nuts, washers and bushings (6).
- 5-123. **INSTALLATION.** (Beginning with R18201799.) (See figure 5-19.) Reverse procedures outlined in paragraph 5-122 to install doors.

### NOTE

Thru serial R18201899, check clearance between nose gear doors and lower cowl skin to be  $.10 \pm .06/00$  inch. Safety wire rod assemblies to fair nose gear doors in closed position. Adjust stop bolts (14) on brackets (13) to contact bushings (5) when nose gear doors are in full open position.

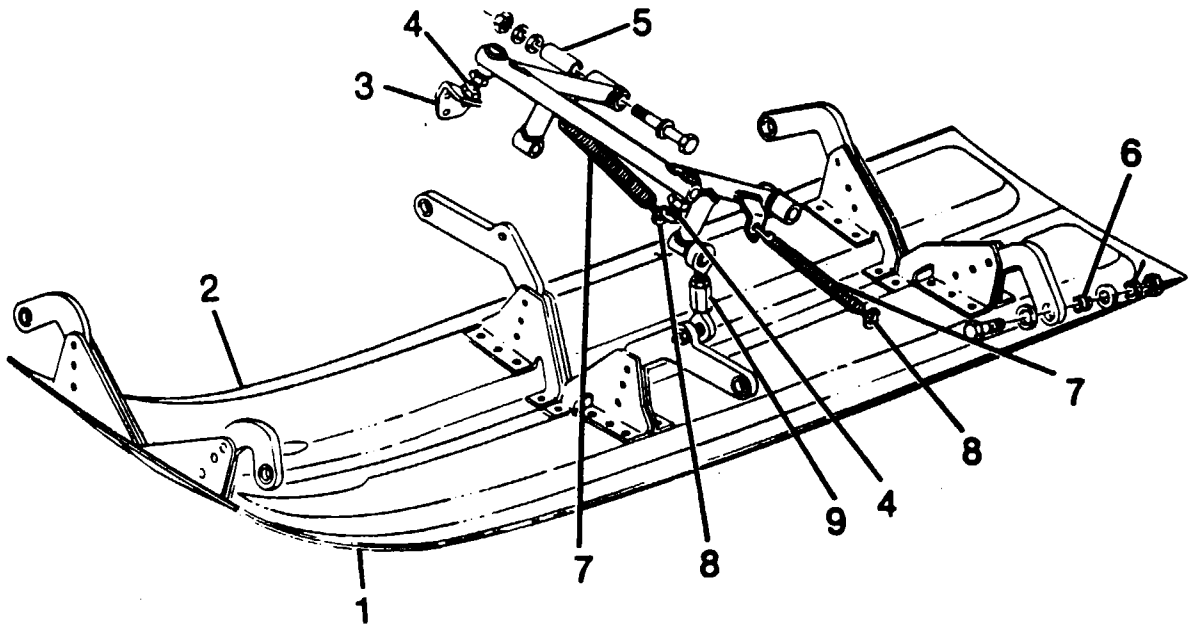
- 5-124. **DELETED.**

## MODEL R182 AND TR182 SERVICE MANUAL

- 5-125. NOSE WHEEL STEERING SYSTEM. (See figure 5-19.)
- 5-125. DESCRIPTION. The nose wheel steering system links the rudder pedals to the nose wheel fork, affording steering control through use of the rudder pedals. Kinematics of the system automatically straighten the nose wheel as the landing gear is retracted. During retraction the centering block on the upper torque link aligns and locks the nose wheel in the neutral position. Continued free movement of the rudder pedals is assured by the steering bungee. (See figure 5-14.)
- 5-126. STEERING BUNGEE ASSEMBLY. (See figure 5-19.)
- 5-127. DESCRIPTION. The steering bungee assembly is spring-loaded, and should not be disassembled internally. The steering bungee is connected to the steering bellcrank on the nose gear strut by a bearing end assembly, and to the rudder bar assembly by a rod assembly thru R18201798. Beginning with R18201799, the steering bungee assembly is connected to the steering bellcrank on the nose gear strut by a bearing end assembly, and to the rudder bar assembly by a barrel nut and two snap rings.
- 5-128. REMOVAL. (Thru R18201798.) (See figure 5-19.)
- Disconnect bearing end assembly from steering bellcrank (8) on nose gear strut.
  - Disconnect rod end assembly from rudder bar assembly (2).
  - Remove sprocket (4) from chain assembly (3); remove steering bungee assembly (5).
- 5-129. INSTALLATION. (Thru R18201798.) (See figure 5-19.)
- Install chain assembly (3) on sprocket (4).
  - Connect rod end assembly to rudder bar assembly (2).
  - Connect bearing end assembly to steering bellcrank (8) on nose gear strut.
- 5-130. REMOVAL. (Beginning with R18201799.) (See figure 5-19.)
- Disconnect bearing end assembly from steering bellcrank (8) on nose gear strut.
  - Remove pin (14) and flex shaft (11) from shaft of steering bungee assembly (5).
  - Remove snap rings (13) and barrel nut (12) securing steering bungee (5) to ears of rudder bar assembly (2).
  - Disconnect bearing end assembly from steering bungee assembly (5).

# MODEL R182 AND TR182 SERVICE MANUAL

THRU R18201798

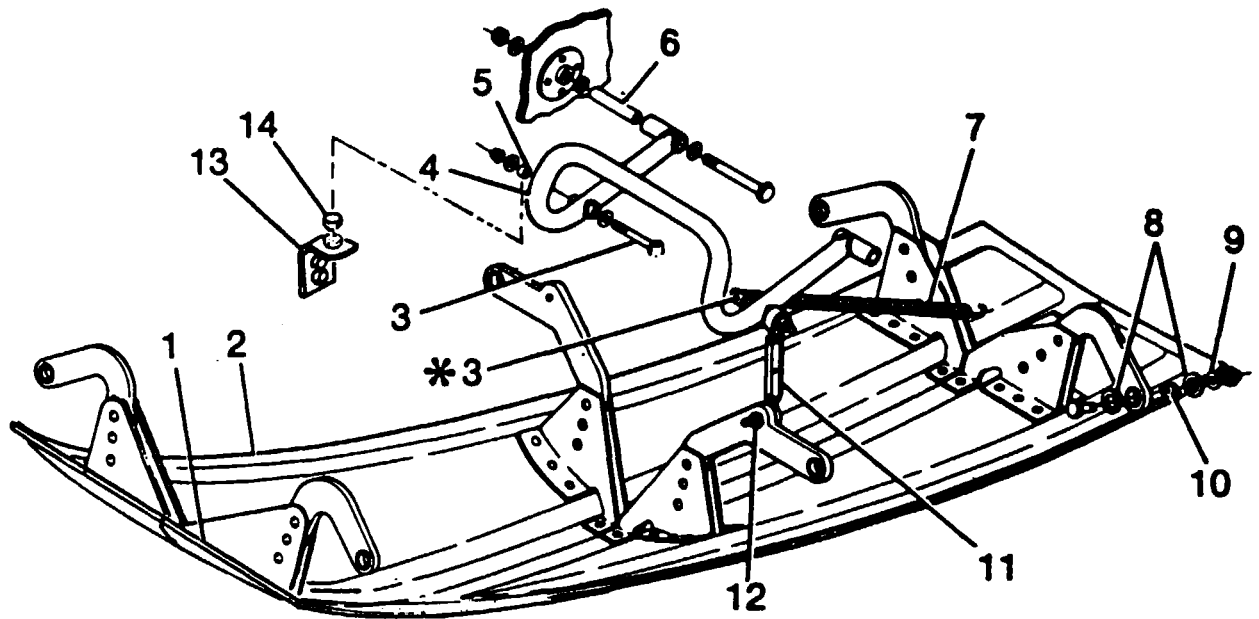


1. Left-Hand Door Assembly
2. Right - Hand Door Assembly
3. Bracket
4. Stop Bolt and Jam Nut Adjustment
5. Bushing (2)
6. Bushing (6)
7. Spring
8. Washer
9. Adjusting Rod

Figure 5-18. Nose Gear Doors (Sheet 1 of 2.)

# MODEL R182 AND TR182 SERVICE MANUAL

BEGINNING WITH R18201799



1. Left-Hand Door Assembly
2. Right-Hand Door Assembly
3. Bolt
4. Actuator Assembly
5. Bushing
6. Bushing
7. Spring
8. AN 960-616L Washer
9. AN 960-10L Washer
10. Bushing
11. Rod Assembly
12. Nut
13. Bracket
14. Stop Bolt and Adjusting Nut

\* Bolt is replaced with an eyebolt beginning with R18201949

Figure 5-18. Nose Gear Doors (Sheet 2 of 2)

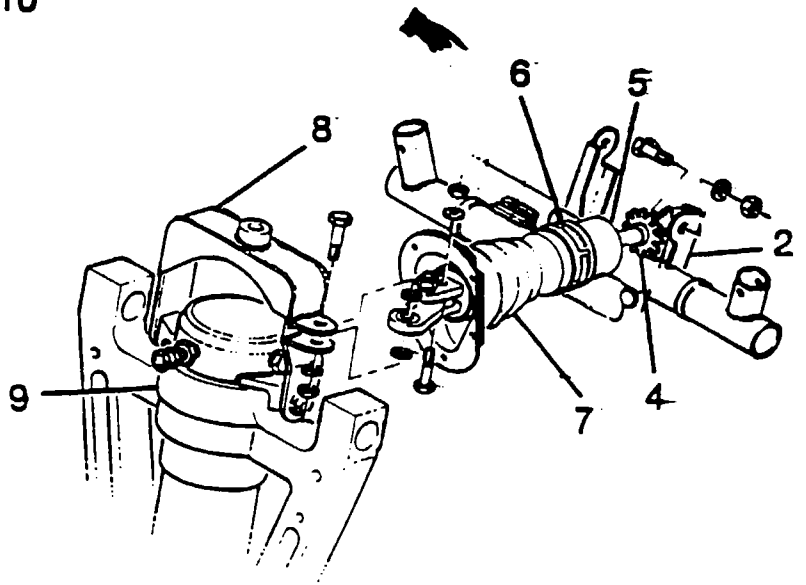
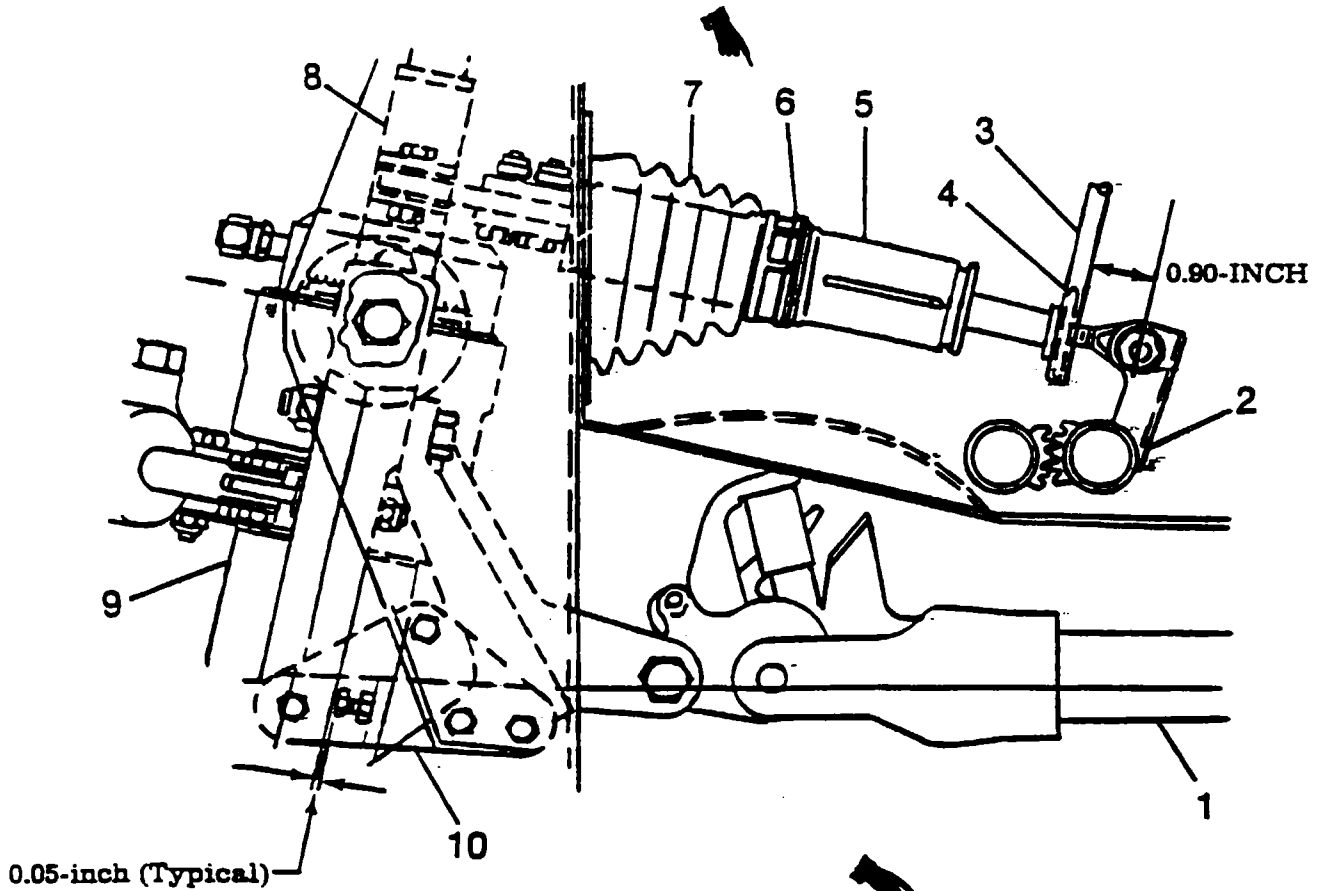
## MODEL R182 AND TR182 SERVICE MANUAL

- 5-131. **INSTALLATION.** Beginning with R18201799.) (See figure 5-19).
- Install steering bungee (5) such that shaft is positioned between ears of rudder bar assembly (2).
  - Install barrel nut (12) and two snap rings (13).
  - Connect bearing end assembly to steering bellcrank (8) on nose gear strut.
  - Install flex shaft (11) over shaft of steering bungee assembly (5); install pin (14).
- 5-132. **REMOVAL AND INSTALLATION OF NOSE WHEEL STEERING SYSTEM COMPONENTS.** (See figure 5-19.) Use the figure as a guide in determining system component relationship and for removal and installation of system components.
- 5-133. **RIGGING NOSE WHEEL STEERING SYSTEM.** Since the nose wheel steering system is connected with the rudder control system, adjustment to one system would directly affect the other. Refer to Section 10 of this manual for rigging procedures for the rudder system and the nose wheel steering system.
- 5-134. **NOSE WHEEL AND TIRE ASSEMBLY.**
- 5-135. **DESCRIPTION.** The aircraft may be equipped with either Cleveland or McCauley wheel assemblies. Separate disassembly, inspection and re-assembly instructions are provided for each type. Basic difference of the two types are shown in figure 5-20.

### CAUTION

Use of recapped tires or new tires not listed on the aircraft equipment list are not recommended due to possible interference between the tire and structure when landing gear is in the retracted position.

MODEL R182 AND TR182 SERVICE MANUAL

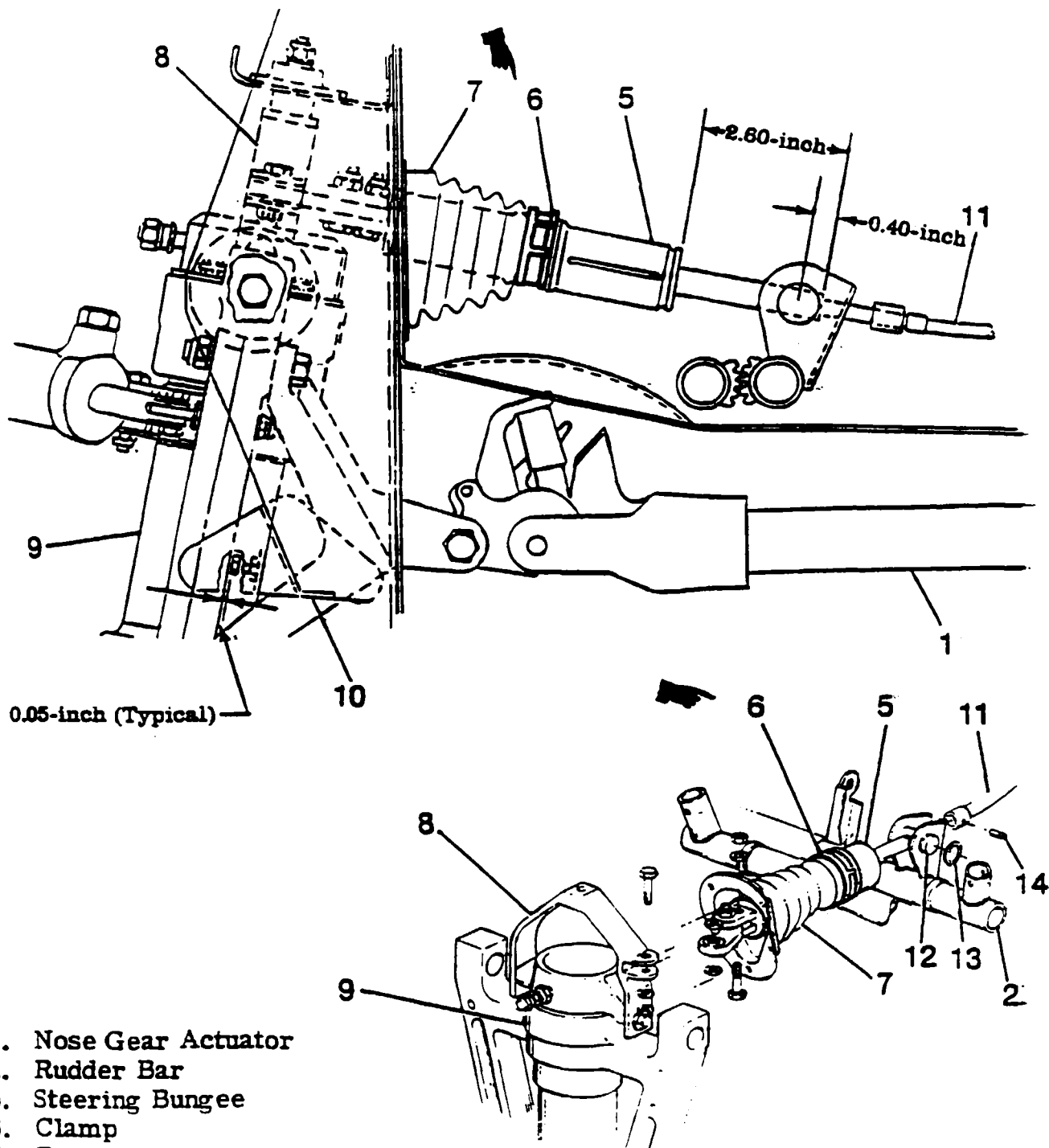


1. Nose Gear Actuator
2. Rudder Bar Assembly
3. Trim Drive Chain
4. Sprocket
5. Steering Bungee Assembly
6. Clamp
7. Boot
8. Nose Gear Steering Bellcrank
9. Nose Gear Strut Assembly
10. Stop Support

THRU R18201798  
AND FR18200070

Figure 5-19. Nose Gear Steering (Sheet 1 of 2)

MODEL R182 AND TR182 SERVICE MANUAL



- 1. Nose Gear Actuator
- 2. Rudder Bar
- 5. Steering Bungee
- 6. Clamp
- 7. Boot
- 8. Nose Gear Steering Bellcrank
- 9. Trunnion
- 10. Stop Support
- 11. Flex Shaft
- 12. Barrel Nut
- 13. Snap Ring
- 14. Pin

BEGINNING WITH R18201799

Figure 5-19. Nose Gear Steering (Sheet 2 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

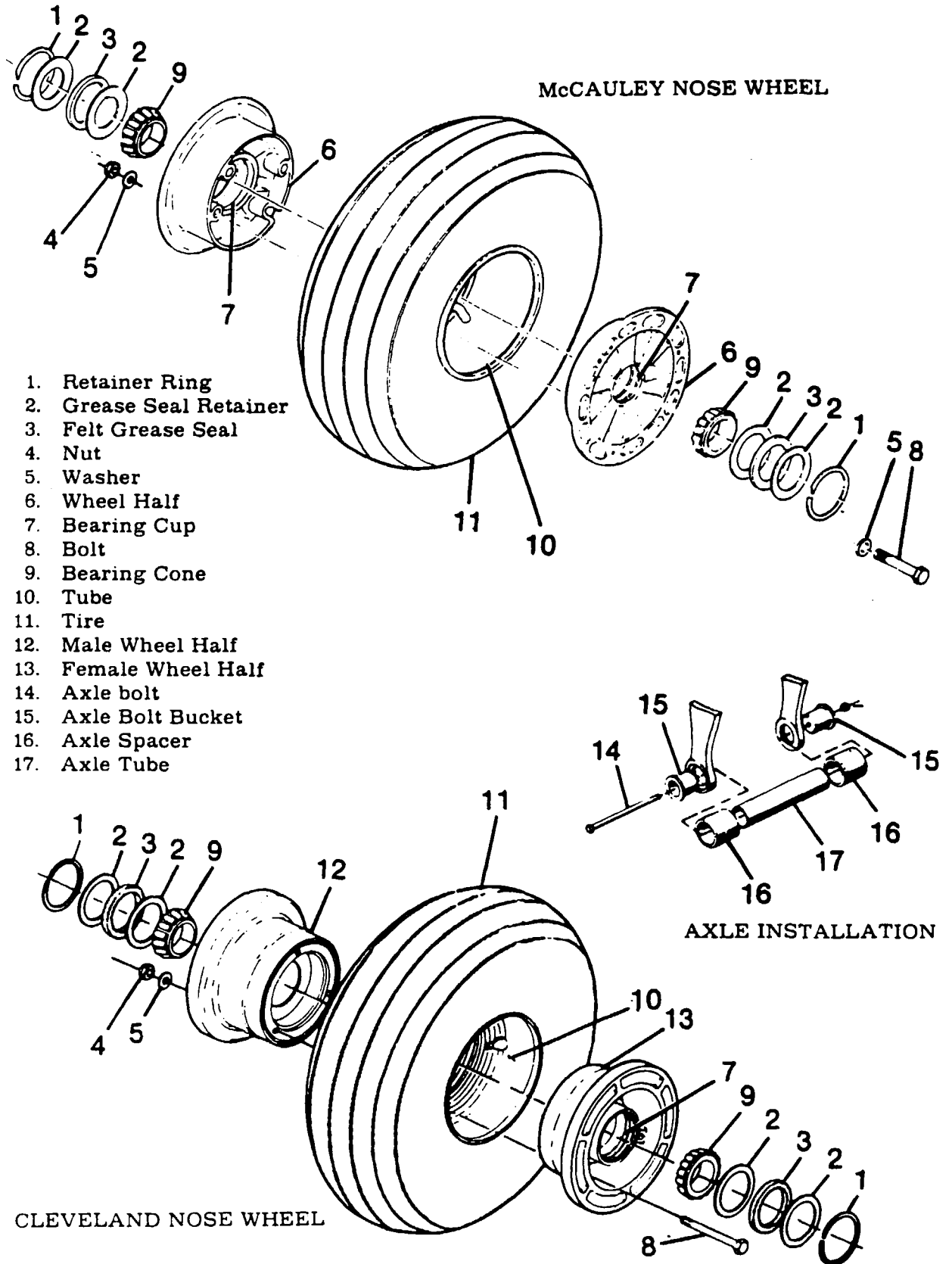


Figure 5-20. Nose Gear Wheel and Tire Assembly



## MODEL R182 AND TR182 SERVICE MANUAL

### 5-136. REMOVAL AND INSTALLATION.

- a. Weight or tie-down tail of aircraft to raise the nose wheel off the floor.
- b. Remove nose wheel axle bolt.
- c. Use a rod or long punch inserted through one axle bolt ferrule to tap the opposite ferrule out of the fork. Remove both ferrules and pull the nose wheel from the fork.
- d. Remove spacers and axle tube from the nose wheel.
- e. Reverse the preceding steps to install the nose wheel. Tighten axle bolt until a slight bearing drag is obvious when the wheel is turned. Back the nut off to the nearest castellation and install cotter pin.

### 5-137. DISASSEMBLY OF CLEVELAND NOSE WHEEL AND TIRE ASSEMBLY. (See figure 5-20.)

- a. Remove hub cap, completely deflate tire and break tire beads loose from wheel rims.

#### WARNING

Injury can result from attempting to separate wheel halves with the tire inflated. Avoid damaging wheel flanges when breaking tire beads loose. Do not use impact wrenches on thru-bolts or nuts.

- b. Remove thru-bolts and separate wheel halves.
- c. Remove tire and tube from wheel halves.
- d. Remove bearing retaining rings, grease seals, and bearing cones.

#### NOTE

The bearing cups are a press fit in the wheel halves and should not be removed unless installation of new cups is necessary. To remove, heat wheel half in boiling water for 15 minutes. Using an arbor press if available, press out the bearing cup and press in the new one while the wheel is still hot.

### 5-138. INSPECTION AND REPAIR OF CLEVELAND WHEEL AND TIRE ASSEMBLY.

- a. Clean all metal parts and the grease seal felts in cleaning solvent and dry thoroughly.
- b. Inspect wheel halves for cracks. Cracked wheel halves must be rejected and new parts installed. Sand out nicks, gouges, and corroded areas. When the protective coating has been removed, the area should be cleaned thoroughly, primed with zinc chromate and painted with aluminum lacquer.
- c. Bearing cups and cones must be inspected carefully for damage and discoloration. After cleaning, repack cones with clean aircraft wheel bearing grease before installation in the wheel half.

### 5-139. REASSEMBLY OF CLEVELAND NOSE WHEEL AND TIRE ASSEMBLY. (See figure 5-20.)

- a. Insert tube in tire, aligning index marks on tire and tube.
- b. Place tire and tube on wheel half and position valve stem through hole in wheel half.
- c. Insert thru-bolts, position other wheel half, and secure with washers and nuts. Take care and avoid pinching tube between wheel halves. Torque thru-bolts evenly to 140-150 lb in.

#### CAUTION

Uneven or improper torque on thru-bolt nuts may cause bolt failure with resultant wheel failure.

## MODEL R182 AND TR182 SERVICE MANUAL

- d. Clean and repack bearing cones with clean aircraft wheel bearing grease.
- e. Assemble bearing cones, seals, and retainers into wheel halves.
- f. Inflate tire to seat tire beads, then adjust to correct pressure.
- g. Install hub caps and install wheel in accordance with paragraph 5-125.

### 5-140. DISASSEMBLY OF McCAULEY NOSE WHEEL AND TIRE ASSEMBLY.

#### NOTE

Serious damage can result from attempting to separate wheel halves with tire and tube inflated.

- a. Completely deflate tire and tube and break loose tire beads. Extreme care must be exercised to prevent tire tool damage when removing tire from wheel halves.
- b. Remove nuts and washers.
- c. Remove thru-bolts and washers.
- d. Separate and remove wheel halves from tire and tube.
- e. Remove retaining ring, grease seal retainer felt grease seal, grease retainer and bearing cone from each wheel half.

#### NOTE

Bearing cups (races) are a press fit in the wheel halves and should not be removed unless a new part is to be installed. To remove bearing cups, heat wheel half in boiling water for 30 minutes or in an oven not to exceed 121°C (250°F). Using an arbor press, if available, press out bearing cup and press in new bearing cup while wheel half is still hot.

### 5-141. INSPECTION AND REPAIR OF McCAULEY NOSE WHEEL AND TIRE ASSEMBLY.

- a. Clean all metal parts and felt grease seals in Stoddard solvent, or equivalent, and dry thoroughly.

#### NOTE

A soft bristle brush may be used to remove hardened grease, dust or dirt.

- b. Inspect wheel halves for cracks or damage.
- c. Inspect bearing cones, cups, retaining rings and seals for wear or damage.
- d. Inspect thru-bolts and nuts for cracks in threads or cracks in radius under bolt head.
- e. Replace cracked or damaged wheel halves.
- f. Replace damaged retaining rings and seals.
- g. Replace any worn or cracked thru-bolts or nuts.
- h. Replace any worn or damaged bearing cups or cones.
- i. Remove any corrosion or small nicks.
- j. Repair reworked areas of wheel by cleaning thoroughly, then applying one coat of clear lacquer.
- k. Pack bearings with grease specified in Section 2 of this manual.

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- 5-142. REASSEMBLY OF McCAULEY NOSE WHEEL AND TIRE ASSEMBLY.
- Assemble bearing cone, grease seal retainer, felt grease seal, grease seal retainer and retaining rings into both wheel halves.
  - Insert tube in tire, aligning index marks on tire and tube.
  - Place wheel half into tire and tube (side opposite valve stem), aligning base of valve stem in valve slot. With washer under head of thru-bolt, insert bolt through wheel half.
  - Place wheel half into other side of tire and tube, aligning valve stem in valve slot.
  - Install washers and nuts on thru-bolts and pre-torque to 10-50 lb. in.

### CAUTION

Uneven or improper torque of the nuts can cause failure of the bolts with resultant wheel failure.

- Prior to torquing nuts, inflate tube with approximately 10-15 psi air pressure to seat tire.

### CAUTION

Do not use impact wrenches on thru-bolts or nuts.

- Dry torque all nuts evenly to a torque value of 140-150 lb. in.
- Inflate tire to correct pressure specified in Section 1 of this manual.

- 5-143. WHEEL BALANCING. Since uneven tire wear is usually the cause of wheel unbalance, installing a new tire probably will correct this condition. Tire and tube manufacturing tolerances permit a specified amount of static unbalance. The light-weight point of the tire is marked with a red dot on the tire sidewall and the heavy-weight point of the tube is marked with a contrasting color line usually near the valve stem. When installing a new tire, place these marks adjacent to each other. If a wheel becomes unbalanced during service, it may be statically rebalanced. Wheel balancing equipment is available from the Cessna Supply Division.

- 5-144. NOSE GEAR RIGGING. (Thru R18201798.) (See figure 5-21.)
- Jack aircraft in accordance with procedures outlined in Section 2 of this manual.
  - Place gear position selector handle in "down" position, turn master switch on and allow system to pressurized. Turn master switch off and pull gear pump circuit breaker.
  - See figure 5-14, view A-A, for correct amount of strut extension. Add or delete shims between centering block and upper torque link as required until specified extension is obtained with strut fully extended.

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## WARNING

Completely deflate nose gear strut before disconnecting torque links.

- d. Check that downlock hooks (19) fully engage lock pins (18) as shown and that gear down switch (23) is properly positioned. If hooks (19) fail to engage pins (18), place gear position selector handle in a neutral position and pull the gear forward by hand until nut (25) is accessible. Loosen nut and, using wrench on flats of piston, screw piston (26) several turns into rod end (22); tighten nut (25). Place gear position selector handle in "down" position, turn master switch on and allow gear to extend to the down and locked position. Recheck downlock hook (19) and gear down switch (23) positions; adjust as necessary.
- e. Disconnect adjusting rods (14) from gear doors and secure doors in full open position with tape.
- f. Turn master switch on and place landing gear position selector handle in "up" position and allow gear to rotate until downlocks disengage. Place gear position selector handle in a neutral position.
- g. Adjust stop bolts (3) on door actuator assembly (4) to provide simultaneous contact with brackets (16) on each side with minimum stop bolt extension. Start with stop bolts turned all the way in. Linkage must be overcenter when doors are fully open.
- h. Install hooks of springs (13) on door actuator assembly (4) with hooks turned inward. Washers (12) are installed on wheel well side.
- i. Turn master switch on and place gear position selector handle in the up position. Allow gear to rotate to full up position, then turn master switch off.
- j. Centerline of axle (1) should be aligned with top edge of gear well ( $\pm 0.10$ -inch). Adjust upstop bumper (6) as necessary to position axle correctly.
- k. Check that switch (7) is closed and plunger has small amount of free travel remaining. (Plunger should not be bottomed out.)
- l. Close gear doors, one at a time, and attach adjusting rods (14). Adjust length of rod (14) until door fairs with cowling. Remove rods (14) from doors and secure doors in full open position with tape.
- m. Turn master switch on, engage gear pump circuit breaker and run gear down to midway position; turn master switch off, pull gear pump circuit breaker and place gear position selector handle in a neutral position.
- n. Attach adjusting rods (14) to doors and swing gear by hand to ensure that doors clear strut and tire by 0.25-inch minimum clearance.
- o. Turn master switch on, engage gear pump circuit breaker and run gear to full up position and check that doors fair. Thru R18201899 trim outboard edges of door assemblies on 45° angle (inside corner), if necessary, to clear cowl skins with 0.10 + .06, -.00-inch in closed position. Make final adjustments to adjusting rod assemblies.
- p. Run gear to full down position. Adjust stop bolts (3) on stop supports (27) to obtain 0.050-inch clearance between stop bolt head and nose gear trunnion.
- q. Turn master switch off and remove aircraft from jacks.

## CAUTION

Be sure that stop bolts on stop supports are adjusted

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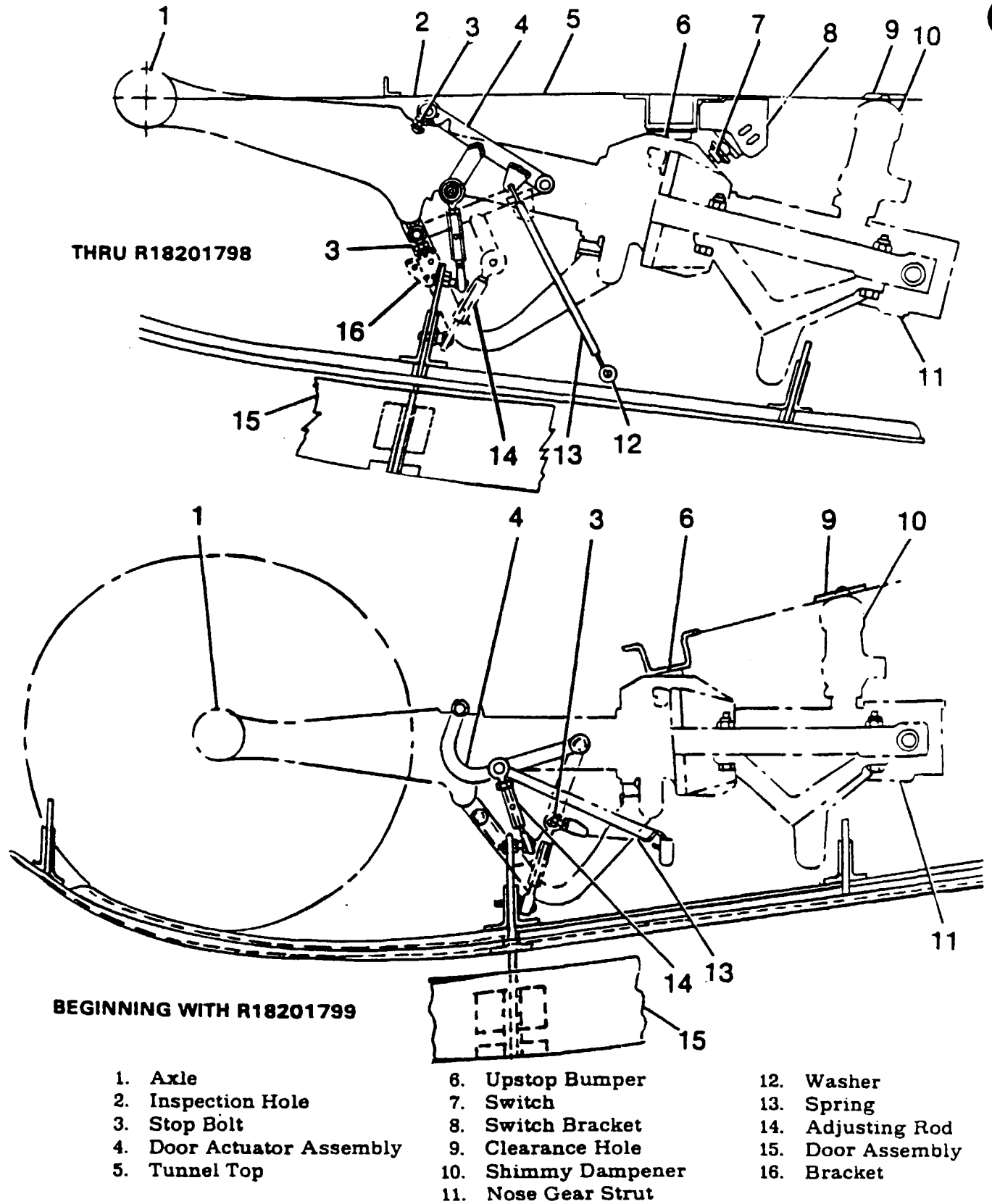


Figure 5-21. Nose Gear Rigging (Sheet 1 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

LOOKING UP AND AFT  
INTO NOSE WHEEL WELL

- 6. Upstop Bumper
- 7. Switch
- 8. Switch Bracket
- 17. Actuator
- 18. Lock Pin
- 19. Downlock Hook
- 20. Trunnion
- 21. Cross Bar
- 22. Rod End
- 23. Gear Down Switch

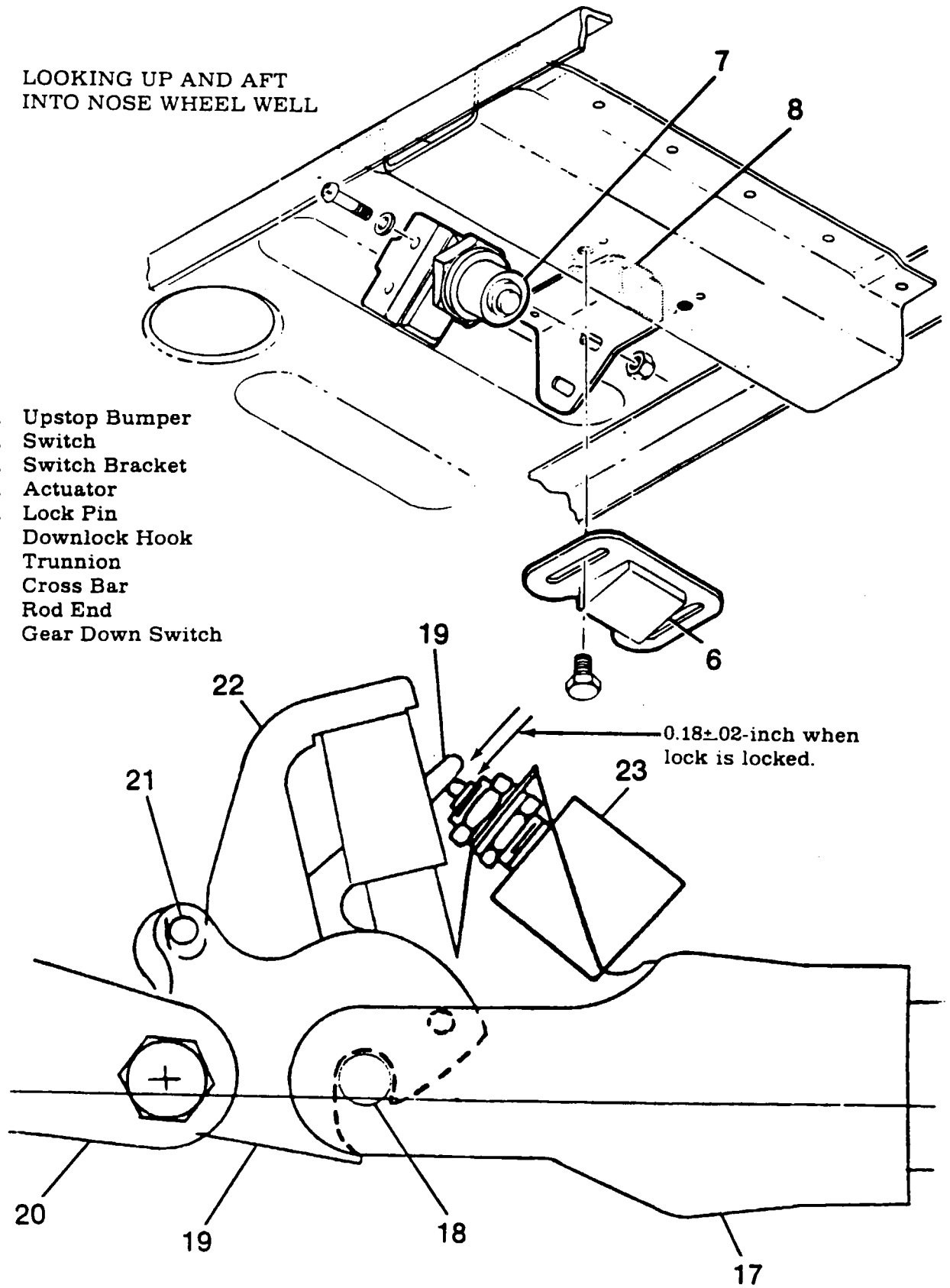
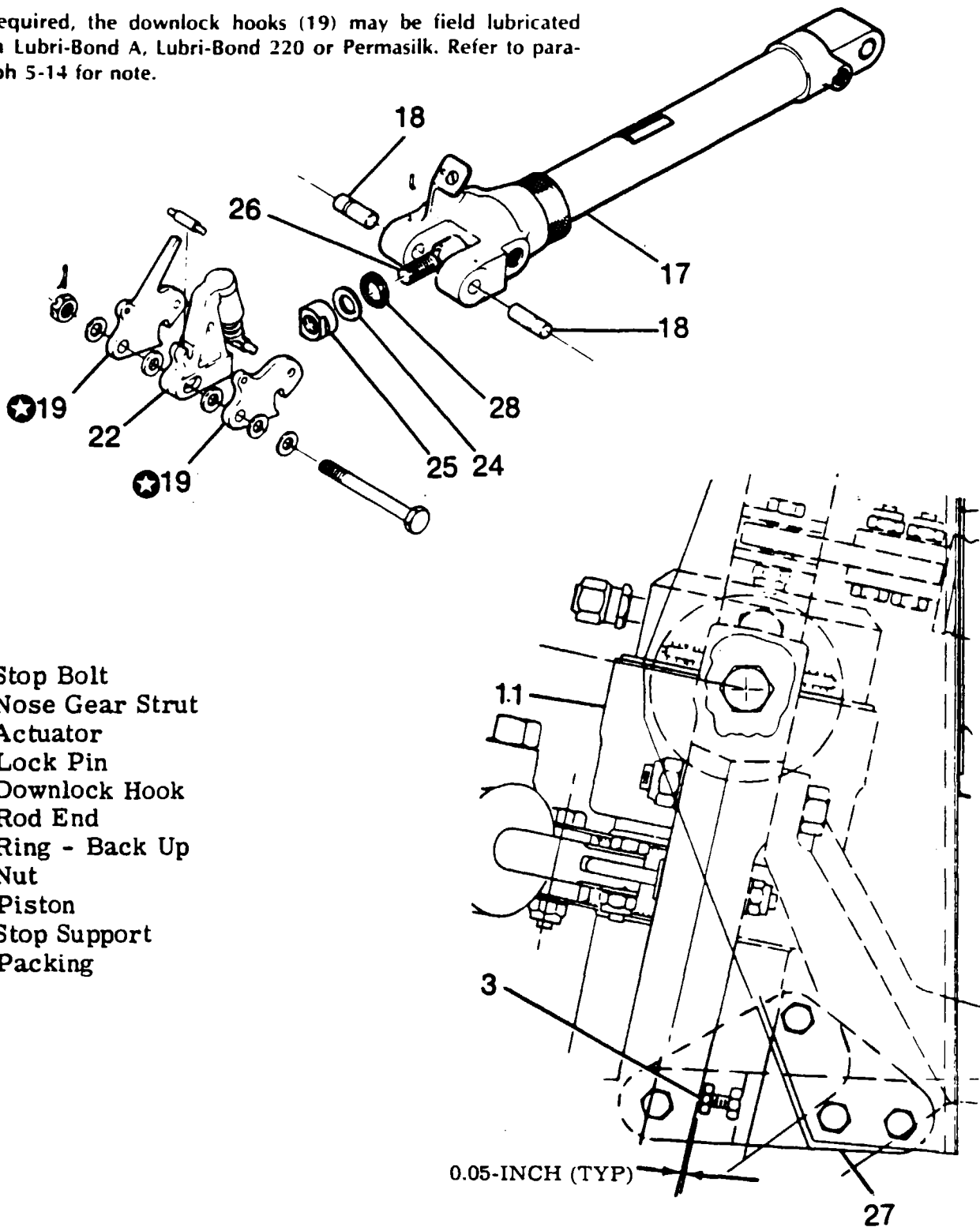


Figure 5-21. Nose Gear Rigging (Sheet 2 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

★ If required, the downlock hooks (19) may be field lubricated with Lubri-Bond A, Lubri-Bond 220 or Permasilk. Refer to paragraph 5-14 for note.



- 3. Stop Bolt
- 11. Nose Gear Strut
- 17. Actuator
- 18. Lock Pin
- 19. Downlock Hook
- 22. Rod End
- 24. Ring - Back Up
- 25. Nut
- 26. Piston
- 27. Stop Support
- 28. Packing

Figure 5-21. Nose Gear Rigging (Sheet 3 of 3)

## MODEL R182 AND TR182 SERVICE MANUAL

correctly. If stop bolts are not properly adjusted, nose gear will not extend fully and lock.

- 5-145. NOSE GEAR RIGGING. (Beginning with R18201799.) (See figure 5-21.)
- Jack aircraft in accordance with procedures outlined in Section 2 of this manual.
  - Place gear selector handle in "down" position, turn master switch on, and allow system to pressurize. Turn master switch off and pull gear pump circuit breaker.
  - See figure 5-14, view A-A, for correct amount of strut extension.

### WARNING

Completely deflate nose gear strut before disconnecting torque links.

- Check that downlock hooks (19) fully engage lock pins (18) as shown and that gear down switch (23) is properly positioned. If hooks (19) fail to engage pins (18), place gear position selector handle in a neutral position and pull the gear forward by hand until nut (25) is accessible. Loosen nut and, using wrench on flats of piston, screw piston (26) several turns into rod end (22); tighten nut (25). Place gear position selector handle in "down" position, turn master switch on and allow gear to extend to the down and locked position. Recheck downlock hook (19) and gear down switch (23) positions; adjust as necessary.
  - Disconnect adjusting rods (11) from gear doors, and secure doors in full open position with tape.
  - Turn master switch "on" and place landing gear selector handle in "up" position.
  - Close gear doors, one at a time, and attach adjusting rods (11). Adjust length of rods until doors fair with cowling. Remove rods from doors, and secure doors in full open position with tape.
  - Run gear down to midway position. Turn master switch off.
  - Attach adjusting rods (14) to doors and swing gear by hand to ensure that doors clear any part of the nose gear assembly by a minimum of 0.25-inch clearance. Check clearance between nose gear door and lower cowl skin to be  $.10 + .06, -.00$  inch.
  - Run gear to full "up" position and check that doors fair. If necessary, make final adjustments to adjusting rods (14). Tighten nuts on rods. Safety wire rod assemblies. Check that gear up indicator actuates and up light illuminates.
  - Run gear to full "down" position and turn master switch "off". Adjust stop bolts (3) to provide simultaneous contact with door actuator (4) on each side with minimum stop bolt extension. Start with stop bolts turned all the way in. Linkage must be overcenter when doors are fully open.
  - Cycle gear several times, using ship's power pack, and at least twice, using the system's emergency hand pump. A 28-volt DC, 60-amp electrical power supply may be used.
  - Run gear to full "down" position and remove aircraft from jacks.
- 5-146. BRAKE SYSTEM. (See figure 5-24.)
- 5-147. DESCRIPTION. The hydraulic brake system is comprised of two master cylinders, located immediately forward of the rudder pedals, brake lines connecting each master cylinder to its wheel brake cylinder, and the single-disc, floating cylinder-type brake assembly, located at each main landing gear wheel.



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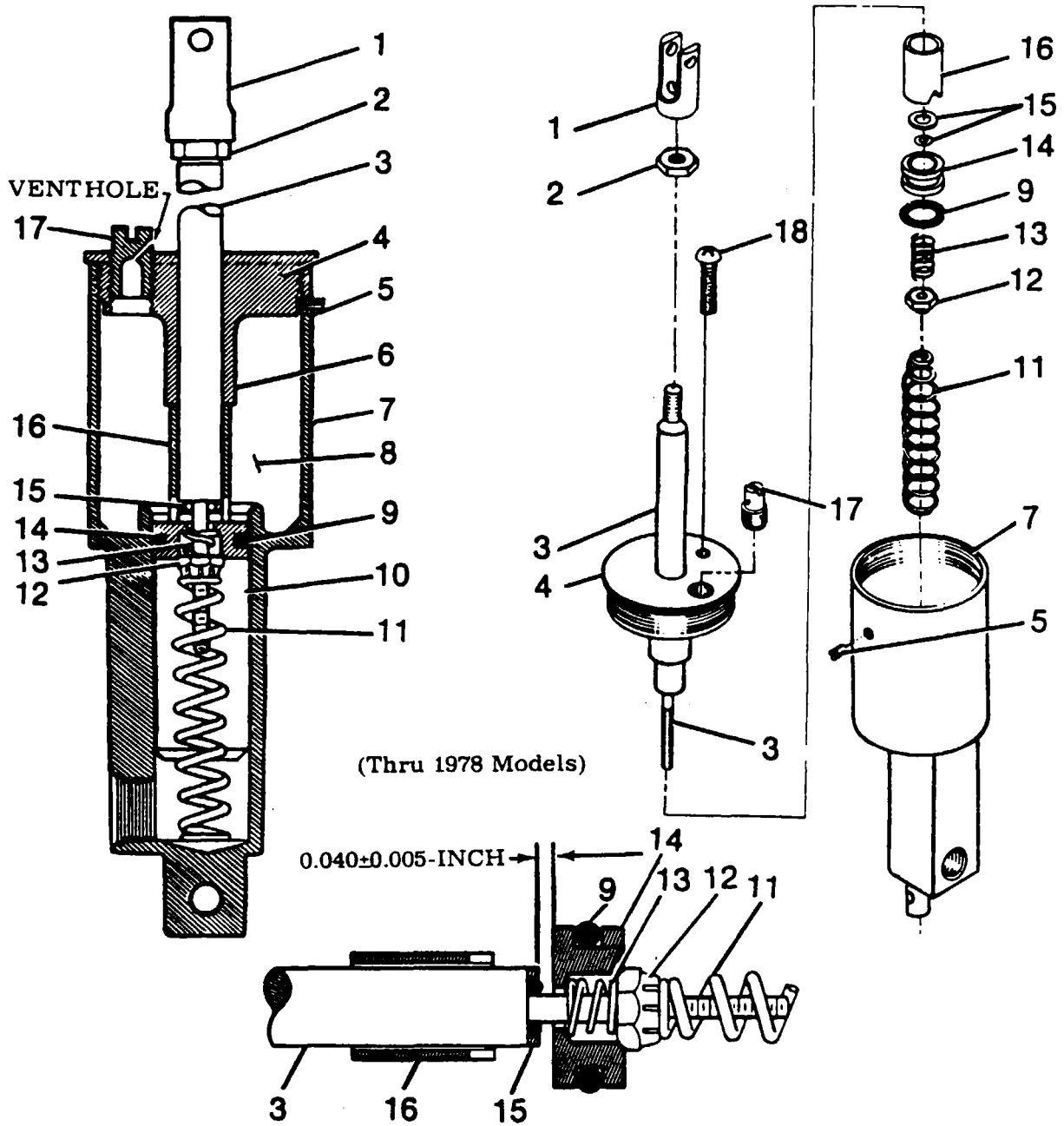
### 5-148. TROUBLE SHOOTING - BRAKE SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
DRAGGING BRAKES.	Brake pedal binding.	Lubricate pivot points; replace or repair defective parts.
	Weak or broken piston return spring in master cylinder.	Repair or replace master cylinder.
	Parking brake control improperly adjusted.	Adjust properly.
	Insufficient clearance between lock-O-seal and piston in master cylinder.	Adjust clearance per paragraph 5-142.
	Restriction in hydraulic lines or in passage in master cylinder compensating sleeve.	Remove restrictions; flush brake system with hydraulic fluid. Repair or replace master cylinder.
	Warped or badly scored brake disc.	Replace disc and linings.
	Damage or accumulated dirt restricting free movement of wheel brakes.	Clean and repair or replace brake parts.
	Fluid low in master cylinder or wheel cylinder.	Fill system and bleed brake parts.
	Faulty O-rings in master cylinder or wheel cylinder.	Replace O-rings.
	Faulty lock-O-seal in master cylinder.	Replace lock-O-seal.
BRAKES FAIL TO OPERATE.	Excessive clearance between lock-O-seal and piston.	Adjust clearance per paragraph 5-143.
	Internal damage to hose and O-rings due to use of wrong type of hydraulic fluid.	Replace damaged parts. Flush system with denatured alcohol. Fill and bleed brake system.
	Pressure leak in system.	Tighten connection; repair or replace faulty parts.
	Brake linings worn out.	Replace linings.
	Oil or grease on brake linings or new linings just installed.	Clean linings with carbon tetrachloride.

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- 5-149. BRAKE MASTER CYLINDER. (See figure 5-22.)
- 5-150. DESCRIPTION. The brake master cylinders, located immediately forward of the pilot's rudder pedals, are actuated by applying pressure at the top of the rudder pedals. A small reservoir is incorporated into each master cylinder for the fluid supply. When dual brakes are installed, mechanical linkage permits the copilot pedals to operate the master cylinders.
- 5-151. REMOVAL.
- Remove bleeder screw at wheel brake assembly and drain hydraulic fluid from brake cylinders.
  - Remove front seats and rudder bar shield for access to brake master cylinders.
  - Disconnect parking brake linkage and disconnect brake-master cylinders from rudder pedals.
  - Disconnect hydraulic hose from brake master cylinders and remove cylinders.
- 5-152. DISASSEMBLY. (Thru 1978 Models.) (See figure 5-22, Sheet 1 of 2.)
- Unscrew clevis (1) and jamb nut (2).
  - Remove screw (18).
  - Remove filler plug (17) and setscrew (5).
  - Unscrew cover (4) and remove up over piston rod (3).
  - Remove piston rod (3) and compensating sleeve (16).
  - Slide sleeve (16) up over rod (3).
  - Unscrew nut (12) from threads of piston rod (3).
  - Remove piston spring (13) and O-ring (9) from piston (14).
  - Remove Lock-O-Seal (15).
- 5-153. INSPECTION AND REPAIR. (Thru 1978 Models.) (See figure 5-122, Sheet 2 of 2.) Repair is limited to installation of new parts, cleaning and adjusting. (Refer to assembly paragraph for adjustment.) Use clean hydraulic fluid (MIL-H-5606) as a lubricant during reassembly of the cylinders. Inspect Lock-O-Seal (Parker Seal Co. (P/N 800-001-6) and replace if damaged. Replace all O-rings. Filler plug must be vented so pressure cannot build up in the reservoir during brake operation. Remove plug and drill 1/16-inch hole, 30° from vertical, if plug is not vented.
- 5-154. REASSEMBLY. (Thru 1978 Models.) (See figure 5-22, Sheet 1 of 2.)
- Install Lock-O-Seal (15) at bottom of piston rod (3).
  - Install O-ring (9) in groove in piston (14); insert piston spring (13) into piston, and slide assembly up on bottom threaded portion of piston rod (3).
  - Run nut (12) up threads to spring (13). Tighten nut enough to obtain  $0.040 \pm 0.005$ -inch clearance between top of piston and bottom of Lock-O-Seal, as shown in the figure.
  - Install piston return spring (11) into cylinder (10) portion of body (7).
  - Install piston rod (3) through spring (11).
  - Slide compensating sleeve (16) over rod (3).
  - Install cover (4) and screw (18).
  - Install jam nut (2) and clevis (1).
  - Install filler plug (17), making sure vent hole is open.
  - Install setscrew (5).

MODEL R182 AND TR182 SERVICE MANUAL



- |               |                          |                         |
|---------------|--------------------------|-------------------------|
| 1. Clevis     | 7. Body                  | 13. Piston Spring       |
| 2. Jam Nut    | 8. Reservoir             | 14. Piston              |
| 3. Piston Rod | 9. O-Ring                | 15. Lock-O-Seal         |
| 4. Cover      | 10. Cylinder             | 16. Compensating Sleeve |
| 5. Setscrew   | 11. Piston Return Spring | 17. Filler Plug         |
| 6. Cover Boss | 12. Nut                  | 18. Screw               |

Figure 5-22. Brake Master Cylinder (Sheet 1 of 2)

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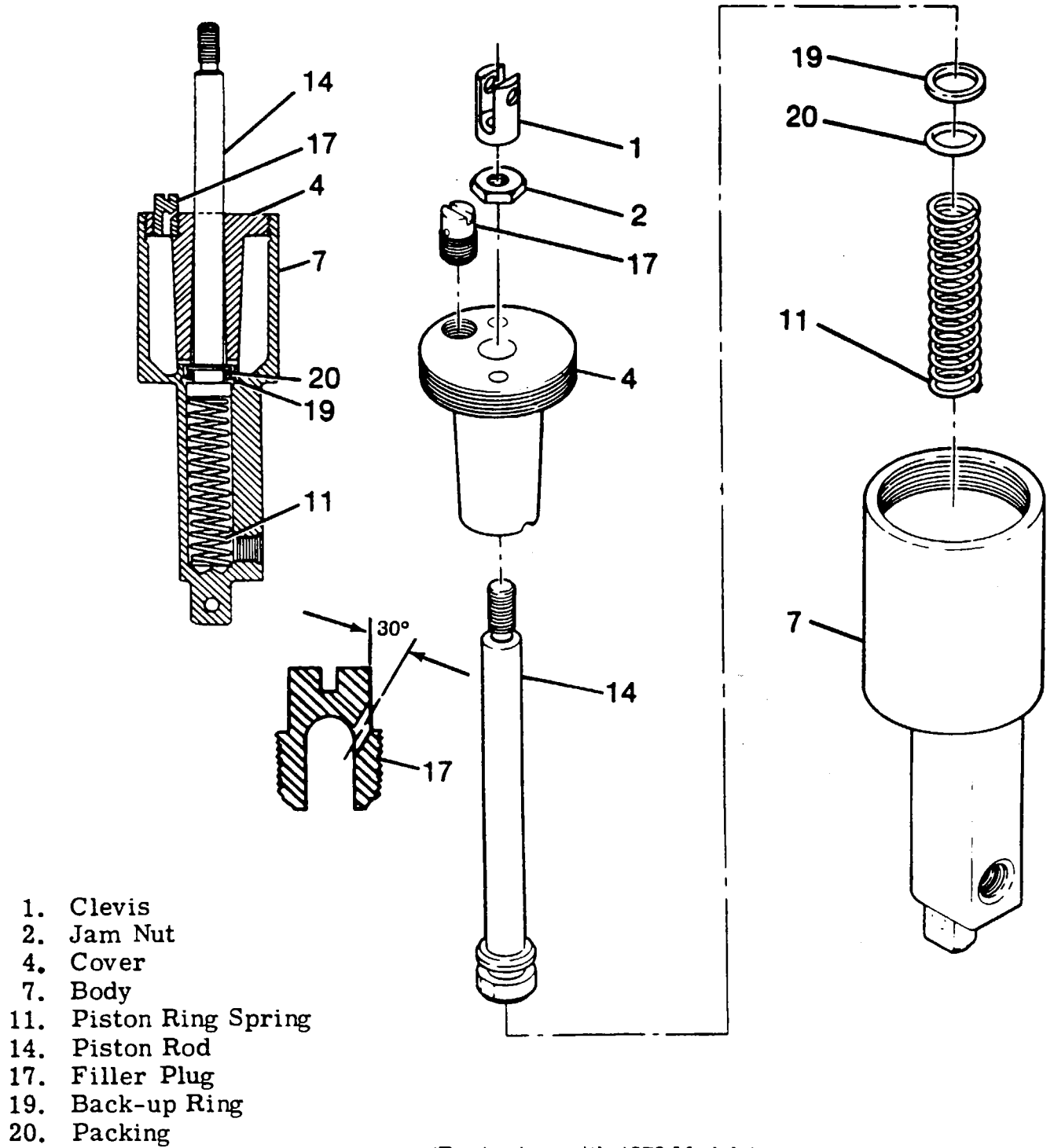


Figure 5-22. Brake Master cylinder (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

- 5-155. **DISASSEMBLY.** (Beginning with 1979 Models.) (See figure 5-22, sheet 2.)
- a. Unscrew clevis (1) and jam nut (2).
  - b. Remove filler plug (17).

### NOTE

A special tool, brake master cylinder wrench No. 34-101 is available from the Cessna Supply Division to accomplish the following step.

- c. Unscrew cover (4) and remove up over piston (14).
  - d. Remove piston (14) and spring (11).
  - e. Remove packing (20) and back-up ring (19) from piston (14).
- 5-156. **INSPECTION AND REPAIR.** (Beginning with 1979 Models.) (See figure 5-22, Sheet 2 of 2.) Repair is limited to installation of new parts and cleaning. Use clean hydraulic fluid (MIL-H-5606) as a lubricant during reassembly of the cylinder. Replace packing and back-up ring. Filler plug (17) must be vented so pressure cannot build up during brake operation. Remove plug and drill 1/16-inch hole 30° from vertical, if plug is not vented. Refer to view A-A for location of hole.
- 5-157. **REASSEMBLY.** (Beginning with 1979 Models.) (See figure 5-22, Sheet 2 of 2.)
- a. Install spring (11) into cylinder body (7).
  - b. Install back-up ring (19) and packing (20) in groove of piston (14).
  - c. Install piston (14) in cylinder body (7).
  - d. Install cover (4) over piston (14) and screw cover into cylinder body (7).
  - e. Install nut (2) and clevis (1).
  - f. Install filler plug (17), making sure vent hole is open.
- 5-158. **INSTALLATION.**
- a. connect hydraulic hoses to brake master cylinders and install cylinders.
  - b. Connect brake master cylinders to rudder pedals and connect parking brake linkage.
  - c. Install rudder bar shield and install front seats.
  - d. Install bleeder screw at wheel brake assembly and fill and bleed brake system in accordance with applicable paragraph in this section.
- 5-159. **HYDRAULIC BRAKE LINES.**
- 5-160. **DESCRIPTION.** The brake lines are of rigid tubing, except for flexible hose used at the brake master cylinders. A separate line is used to connect each brake master cylinder to its corresponding wheel brake cylinder.
- 5-161. **WHEEL BRAKE ASSEMBLIES.** (See figure 5-10.)
- 5-162. **DESCRIPTION.** The wheel brake assemblies employ a floating brake assembly and a disc which is attached to the main wheel.
- 5-163. **REMOVAL.** (See figure 5-8.) Disconnect and drain brake line and remove brake back plate. The brake disc is removed after the wheel is removed and disassembled. To remove torque plate, remove wheels and axles.
- 5-164. **DISASSEMBLY.** See figure 5-10 for a breakdown of wheel brake parts. This figure may be used as a guide for disassembling the wheel brakes.

## MODEL R182 AND TR182 SERVICE MANUAL

### 5-165. INSPECTION AND REPAIR.

- a. Clean all parts except brake linings and packings in dry cleaning solvent and dry thoroughly.
- b. Install all new packings. If packing reuse is necessary, wipe with a clean cloth saturated in hydraulic fluid and inspect for damage.

#### NOTE

Thorough cleaning is important. Dirt and chips are the greatest single cause of malfunctions in the hydraulic brake system.

- c. Check brake lining for deterioration and wear.
- d. Inspect brake cylinder bore for scoring. A scored cylinder will leak or cause rapid packing wear. Install a new brake cylinder if the bore is scored.
- e. If the anchor bolts on the brake assembly are nicked or gouged, they should be sanded smooth to prevent binding with the pressure plate or torque plate. When new anchor bolts are to be installed, press out old bolts and install new bolts with a soft mallet.
- f. Inspect wheel brake disc for a minimum thickness of .33 inch. If brake disc is below minimum thickness, install a new disc.

### 5-166. REASSEMBLY. (See figure 5-8.)

#### NOTE

Assemble parts, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

- a. See figure 5-8 as a guide while reassembling wheel brakes.

### 5-167. INSTALLATION.

- a. Place brake assembly in position with pressure plate in place.

#### NOTE

If torque plate was removed, install as the axle is installed, or install on axle. If the brake disc was removed, install as wheel is assembled.

#### CAUTION

Correct clocking of the brake line elbow on the wheel brake cylinder is very important in order to avoid interference with aircraft structure during retraction of the gear.

- 5-168. CHECKING BRAKE LINING WEAR. New brake lining should be installed when the existing lining has worn to a thickness of 3/32-inch. A 3/32-inch thick strip of material held adjacent to each lining can be used to determine amount of wear. The shank end of a drill bit of the correct size can also be used to determine wear of brake linings.

## MODEL R182 & TR182 SERIES SERVICE MANUAL

- 5-169. BRAKE INSTALLATION. (Refer to figure 5-10.)
- Remove bolts securing back plate and remove back plate.
  - Pull brake cylinder out of torque plate and slide pressure plate off anchor bolts.
  - Place back plate on a table with lining side down flat. Center a 9/64-inch (or slightly smaller) punch in the rolled rivet and hit the punch sharply with a hammer. Punch out all rivets securing the linings to the back plate and the pressure plate in the same manner.

### NOTE

A rivet setting kit, Part No. 199-00100, is available from the Cessna Parts Distribution (CPD 2). This kit consists of an anvil and punch.

- Clamp the flat side of the anvil in a vise.
- Align new lining on back plate and place brake rivet in hole with rivet head in the lining. Place the head against the anvil.
- Center rivet setting punch on lips of rivet. While holding back plate down firmly against lining, hit punch with hammer to set rivet. Repeat blows on punch until lining is firmly against back plate.
- Realign the lining on the back plate and install and set rivets in the remaining holes.
- Install a new lining on pressure plate in the same manner.
- Position pressure plate on anchor bolts and place cylinder in position so that anchor bolts slide into the torque plate.
- Install back plate with bolts and washers, torque bolts to 110-120 in.-lbs.

- 5-170. BRAKE SYSTEM BLEEDING.

### NOTE

Bleeding with a clean hydraulic pressure source connected to the wheel cylinder bleeder is recommended.

- Remove brake master cylinder filler plug and screw flexible hose with appropriate fitting into the filler hole at the top of the brake master cylinder.
- Immerse opposite end of flexible hose into a container with enough hydraulic fluid to cover end of the hose.
- Connect a clean hydraulic pressure source, such as a hydraulic hand pump or Hydro-Fill unit to the bleeder valve in the wheel cylinder.
- As fluid is pumped into the system, observe the immersed end of the hose at the master brake cylinder for evidence of air bubbles being forced from the brake system. When bubbling has ceased, remove bleeder source from wheel cylinder and tighten the bleeder valve.

- 5-171. BRAKE LINING BURN-IN.

- 5-172. DESCRIPTION. The brake pads are equipped with either a non-asbestos organic lining or an iron based metallic lining. These materials must be properly conditioned (glazed) in order to provide maximum performance and service life. This is accomplished by a brake burn-in.
- Non-asbestos organic lining.
    - Taxi airplane for 1500 feet with engine at 1700 RPM applying brake pedal force as needed to develop a 5 to 9 knots taxi speed.
    - Allow brakes to cool for 10 to 15 minutes.

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3. Apply brakes and check to see if a high throttle static run up may be held with normal pedal force. If so, burn-in is complete.
  4. If static run up cannot be held, repeat steps 1. thru 3. as needed to successfully hold.
- b. Iron based metallic lining.
1. Perform two consecutive full stop braking applications from 30 to 35 knots. Do not allow the brake discs to cool substantially between stops.
  2. Apply brakes and check to see if a high throttle static run up may be held with normal pedal force. If so, burn-in is complete.
  3. If static run up cannot be held, repeat step 1. as needed to successfully hold.

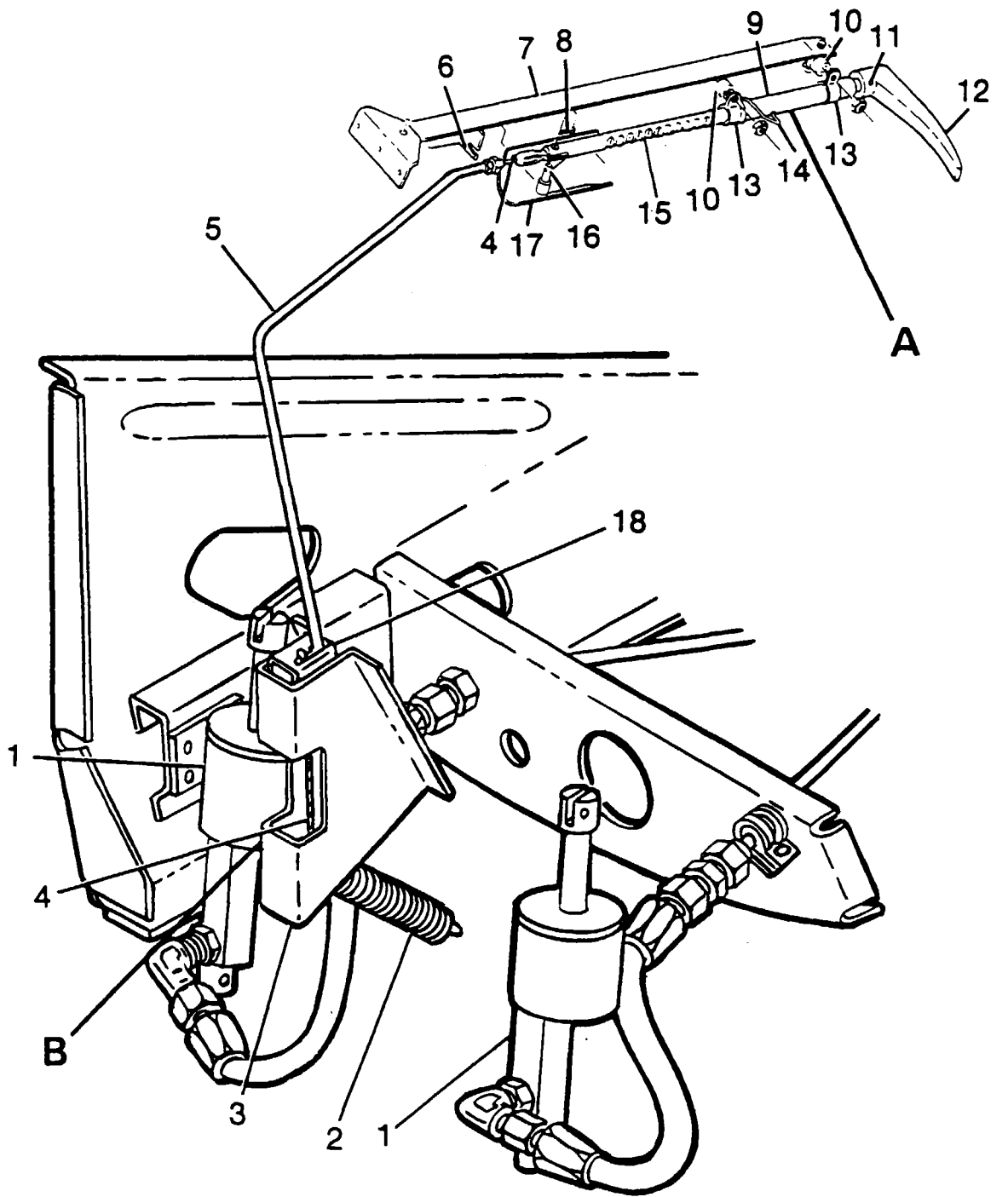
### NOTE

Light brake usage can cause the glaze to wear off, resulting in reduced brake performance. In such cases, the lining may be conditioned again following the instructions set forth in this burn-in procedure.

- 5-173. **PARKING BRAKE SYSTEM.** (Refer to figure 5-23.)
- 5-174. **DESCRIPTION.** The parking brake system consists of a handle and ratchet mechanism, connected by a cable to linkage at the brake master cylinders. Pulling out on the handle depresses both brake master cylinder piston rods and the handle ratchet locks the handle in this position until the handle is turned and released.
- 5-175. **REMOVAL AND INSTALLATION.** Refer to figure 5-23 for relative location of system components. The illustration may be used as a guide during removal and installation of components.
- 5-176. **INSPECTION AND REPAIR OF SYSTEM COMPONENTS.** Inspect lines for leaks, cracks, dents, chafing, improper radius, security, corrosion, deterioration, obstructions and foreign matter. Check brake master cylinders and repair as outlined in applicable paragraph in this Section. Check parking brake handle and ratchet for proper operation and release. Replace worn or damaged parts.



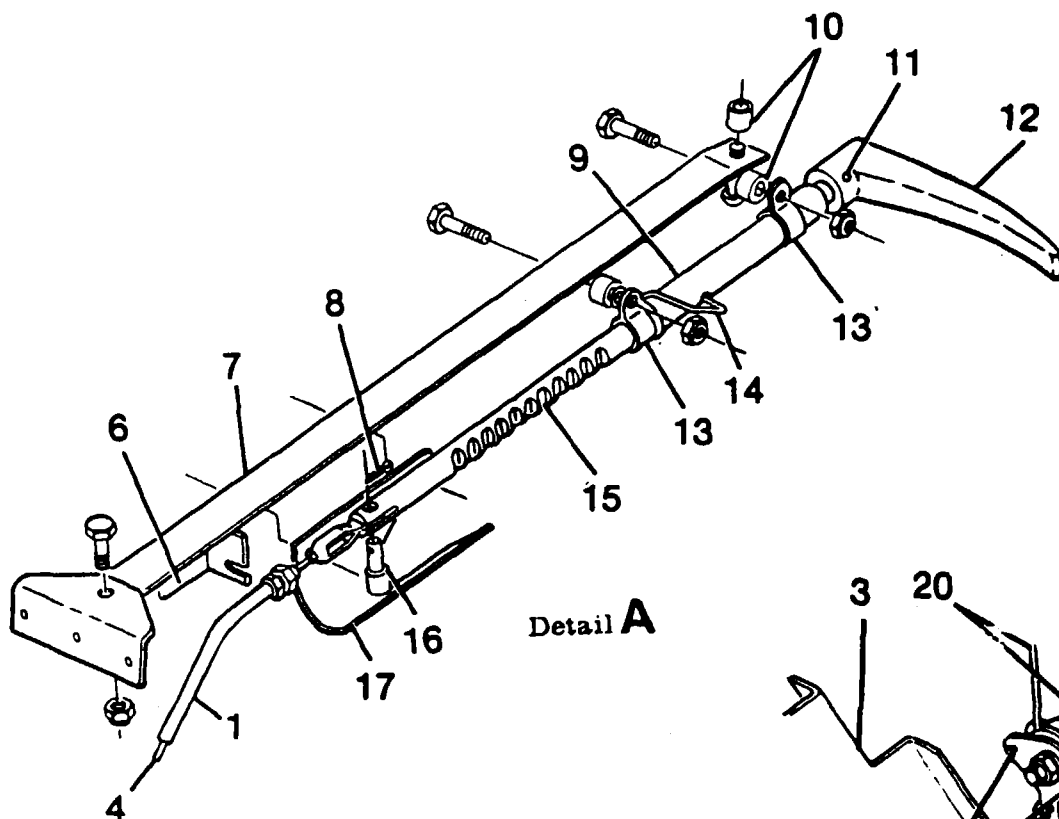
# MODEL R182 AND TR182 SERVICE MANUAL



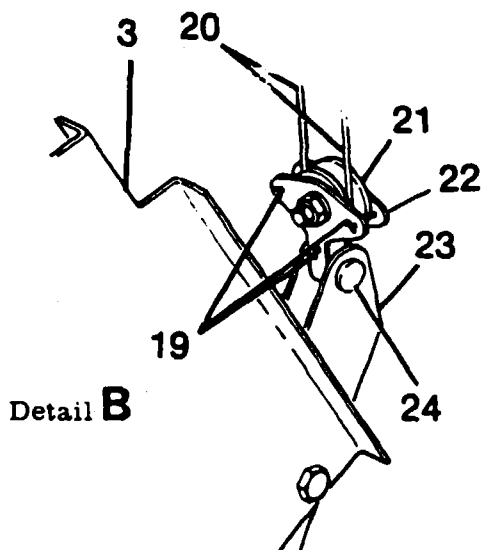
- |                    |                     |                      |
|--------------------|---------------------|----------------------|
| 1. Master Cylinder | 7. Angle            | 13. Clamp            |
| 2. Spring          | 8. Cotter Pin       | 14. Catch            |
| 3. Bracket         | 9. Housing Assembly | 15. Handle Assembly  |
| 4. Cable Assembly  | 10. Spacer          | 16. Positioning Pin  |
| 5. Tube            | 11. Pin             | 17. Positioning Rack |
| 6. Angle           | 12. Handle          | 18. Support          |

Figure 5-23. Parking Brake System (Sheet 1 of 2)

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Detail A



Detail B

1. Tube
3. Bracket
4. Cable Assembly
6. Angle
7. Angle
8. Cotter Pin
9. Housing Assembly
10. Spacer
11. Pin
12. Handle
13. Clamp
14. Catch
15. Handle Assembly
16. Positioning Pin
17. Positioning Rack
19. Cotter Pin
20. Cable Assembly
21. Pulley
22. Bracket Assembly
23. Bellcrank
24. Pin

# MODEL R182 AND TR182 SERVICE MANUAL

1. RH Master Cylinder
2. Hose
3. LH Master Cylinder
4. RH Brake Line
5. LH Brake Line
6. Clamp

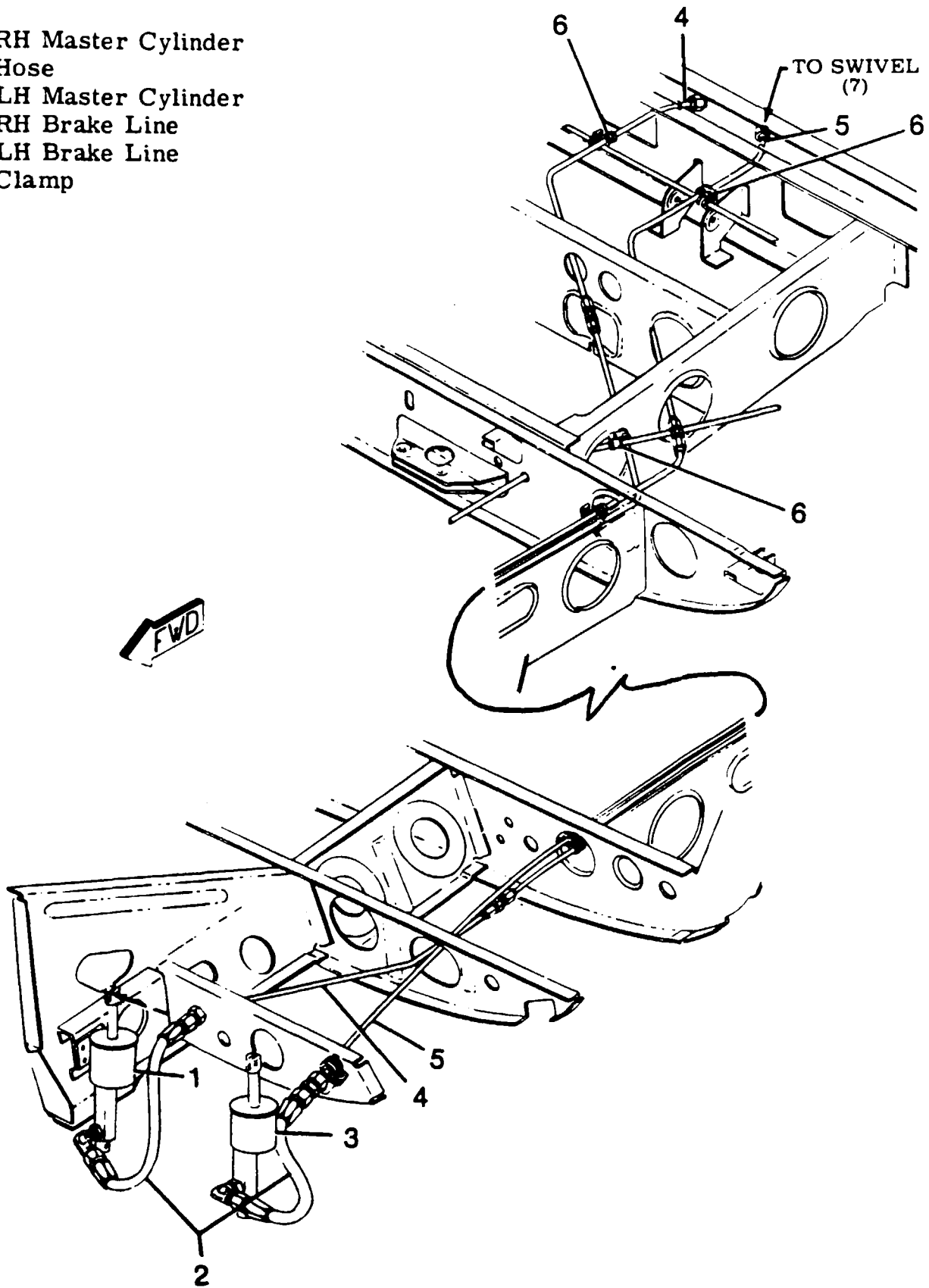


Figure 5-24. Brake System (Sheet 1 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

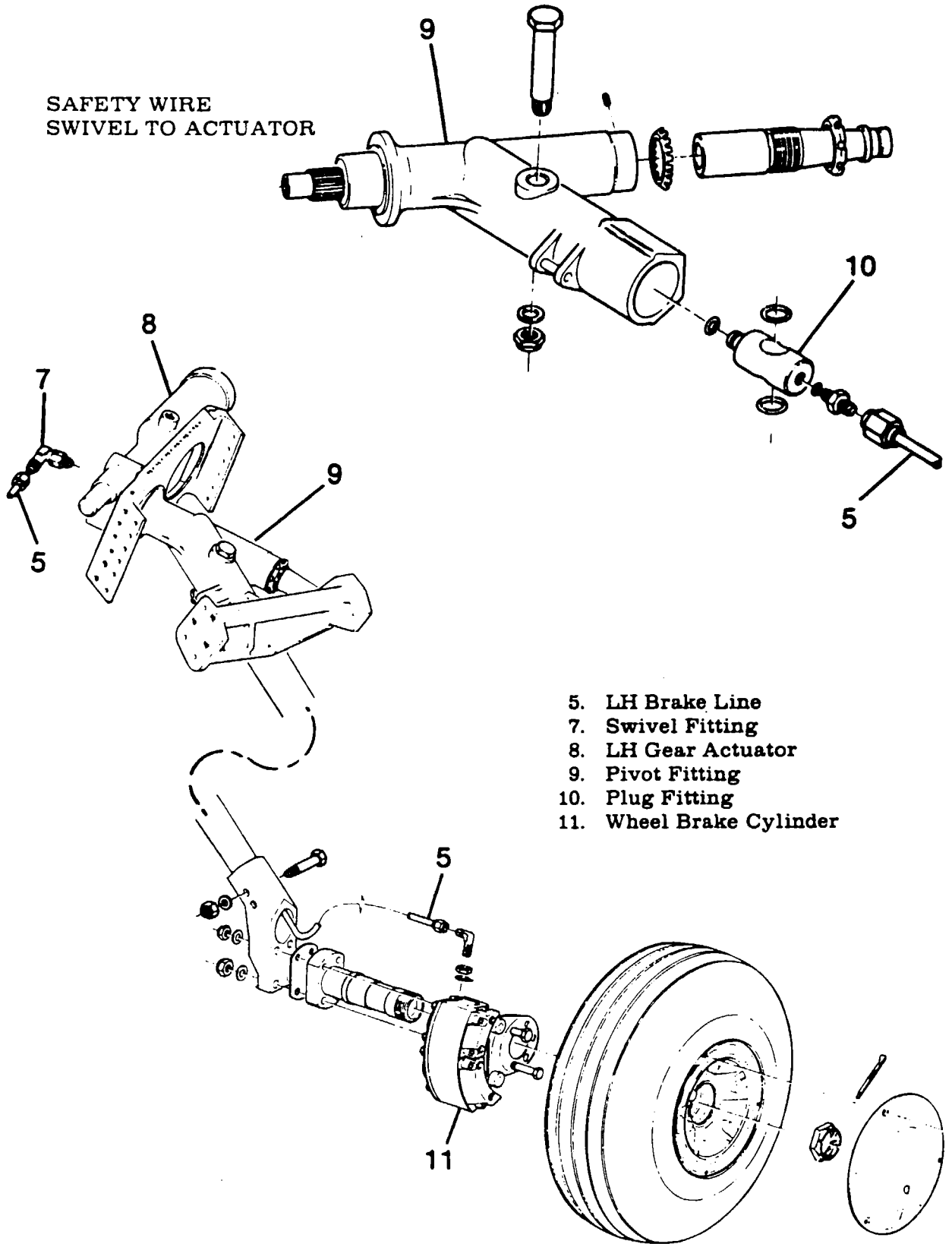


Figure 5-24. Brake System (Sheet 2 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 6

### AILERON CONTROL SYSTEM

TABLE OF CONTENTS	Page No. Aerofiche/ Manual		
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Trouble Shooting . . . . .	2F5/6-1	Installation . . . . .	2F12/6-8
Control Column . . . . .	2F6/6-2	Cables and Pulleys . . . . .	2F14/6-10
Description . . . . .	2F6/6-2	Removal/Installation . . . . .	2F14/6-10
Removal Installation . . . . .	2F6/6-2	Ailerons . . . . .	2F14/6-10
Pilot's Control Column . . . . .	2F6/6-2	Removal . . . . .	2F14/6-10
Copilot's Control Column . . . . .	2F9/6-5	Installation . . . . .	2F14/6-10
Repair . . . . .	2F9/6-5	Repair . . . . .	2F15/6-11
Aileron Bellcrank . . . . .	2F10/6-6	Rigging . . . . .	2F15/6-11

- 6-1. **AILERON CONTROL SYSTEM.** (See figure 6-1.)
- 6-2. **DESCRIPTION.** The aileron control system is comprised of push-pull rods, bellcranks, cables, pulleys, cable drums and components forward of the instrument panel, all of which link the control wheels to the ailerons.
- 6-3. **TROUBLE SHOOTING.**

#### NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to re-rig system, refer to paragraph 6-18.

TROUBLE	PROBABLE CAUSE	REMEDY
LOST MOTION IN CONTROL WHEEL.	Loose control cables.	Check cable tension. Adjust cables to proper tension.
	Broken pulley or bracket, cable off pulley or worn rod end bearings.	Check visually. Replace worn or broken parts. install cables correctly.
RESISTANCE TO CONTROL WHEEL MOVEMENT.	Cables too tight.	Check cable tension. Adjust cables to proper tension.
	Pulleys binding or cable off.	Observe motion of the pulleys. Check cables visually. Replace defective pulleys. Install cables correctly.
	Bellcrank distorted or damaged.	Check visually. Replace defective bellcrank.
	Defective quadrant assembly.	Check visually. Replace defective quadrant.

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### 6-3. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
RESISTANCE TO CONTROL WHEEL MOVEMENT (CONT).	Clevis bolts in system too tight	Check connections where used. Loosen, then tighten properly and safety.
CONTROL WHEELS NOT LEVEL WITH AILERONS NEUTRAL.	Improper adjustment of cables.	Refer to paragraph 6-18.
	Improper adjustment of aileron push-pull rods.	Adjust push-pull rods to obtain proper alignment.
DUAL CONTROL WHEELS NOT COORDINATED.	Cables improperly adjusted.	Refer to paragraph 6-18.
INCORRECT AILERON TRAVEL.	Push-pull rods not adjusted properly.	Refer to paragraph 6-18.
	Incorrect adjustment of travel stop bolts.	Refer to paragraph 6-18.

### 6-4. CONTROL COLUMN. (See figures 6-2 and 6-3.)

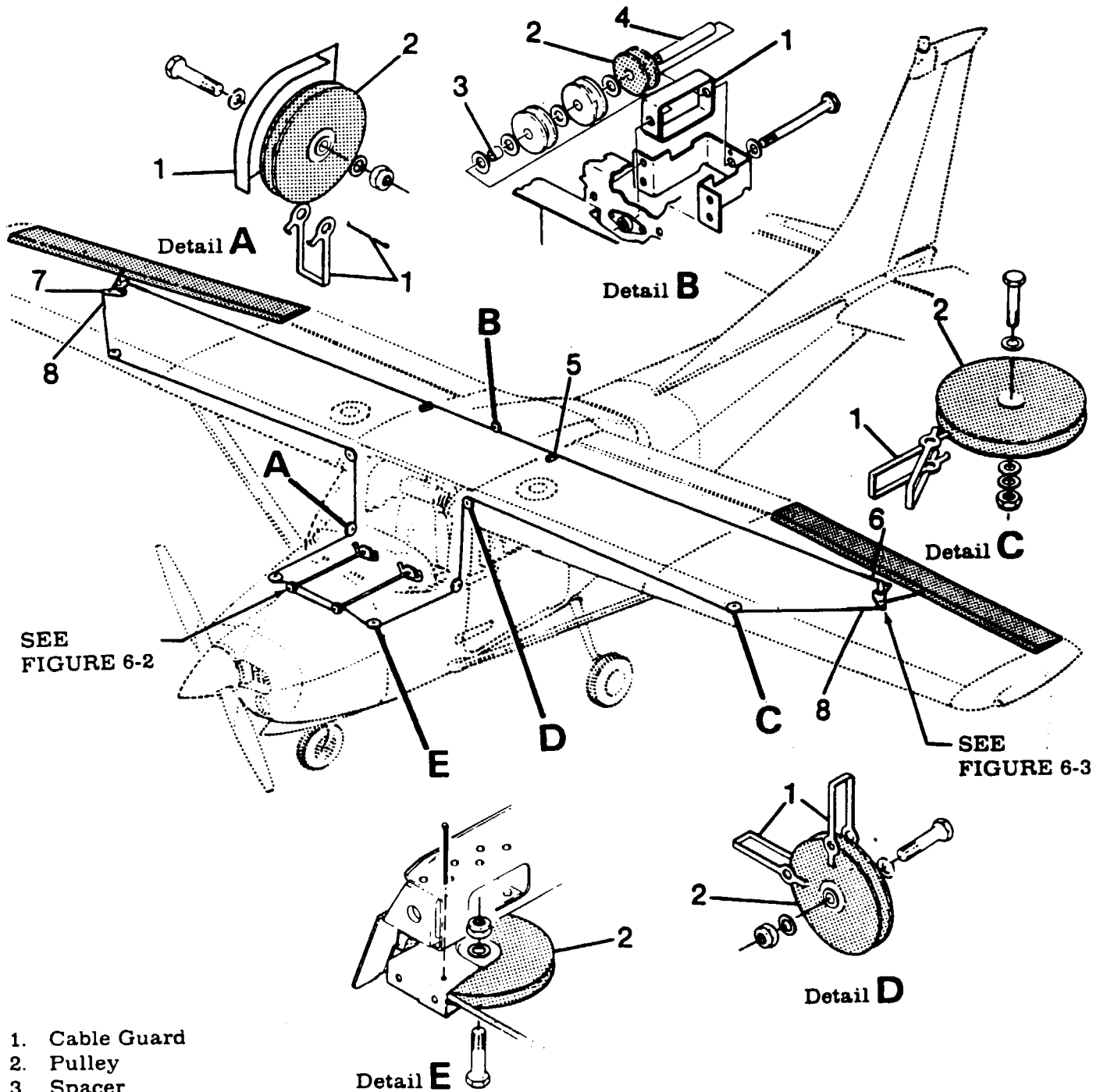
6-5. **DESCRIPTION.** Rotation of the control wheel rotates four bearing roller assemblies (3) on the end of the control wheel tube (12), which in turn, rotates a square control tube assembly (14) inside and extending from the control wheel tube (12). Attached to this square tube (14) is a quadrant (23) which operates the aileron system. This same arrangement is provided for both control wheels. Synchronization of the control wheels is obtained by the interconnect cable (28), turnbuckle (29) and adjustment terminals (26). The forward end of the square control tube (14) is mounted in a bearing block (20) on firewall (30) and does not move fore-and-aft, but rotates with the control wheel. The four bearing roller assemblies (3) on the end of the control wheel tube reduce friction as the control wheel is moved fore-and-aft for elevator system operation. A sleeve weld assembly (5), containing bearings which permit the control wheel tube to rotate within it, is secured to the control wheel tube by a sleeve and retaining ring in such a manner it moves fore-and-aft with the control wheel tube. This movement allows the push-pull tube (15) attached to the sleeve weld assembly (5) to operate an elevator arm assembly (17), to which one elevator cable (19) is attached. A torque tube (18) connects this arm assembly (17) to the one on the opposite end of the torque tube (18), to which the other elevator cable is attached. When dual controls are installed, the copilot's control wheel is linked to the aileron and elevator control systems in the same manner as the pilot's control wheel.

### 6-6. REMOVAL AND INSTALLATION

#### a. PILOT'S CONTROL COLUMN. (See figures 6-2 and 6-3.)

1. Remove bolts securing adapter to control tube assembly (1) and remove control wheel assembly (4).
2. Disconnect electrical wiring to maplight (11) and mike switch (7) at connector if installed.
3. Remove decorative cover from instrument panel.
4. Remove screw securing adjustable glide plug (13) to control tube assembly (14) and remove plug and glide assembly.

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1. Cable Guard
2. Pulley
3. Spacer
4. Bushing
5. Rub Strip
6. Turnbuckle (Carry-Thru)
7. Bellcrank
8. Turnbuckles (Direct)

**CAUTION**

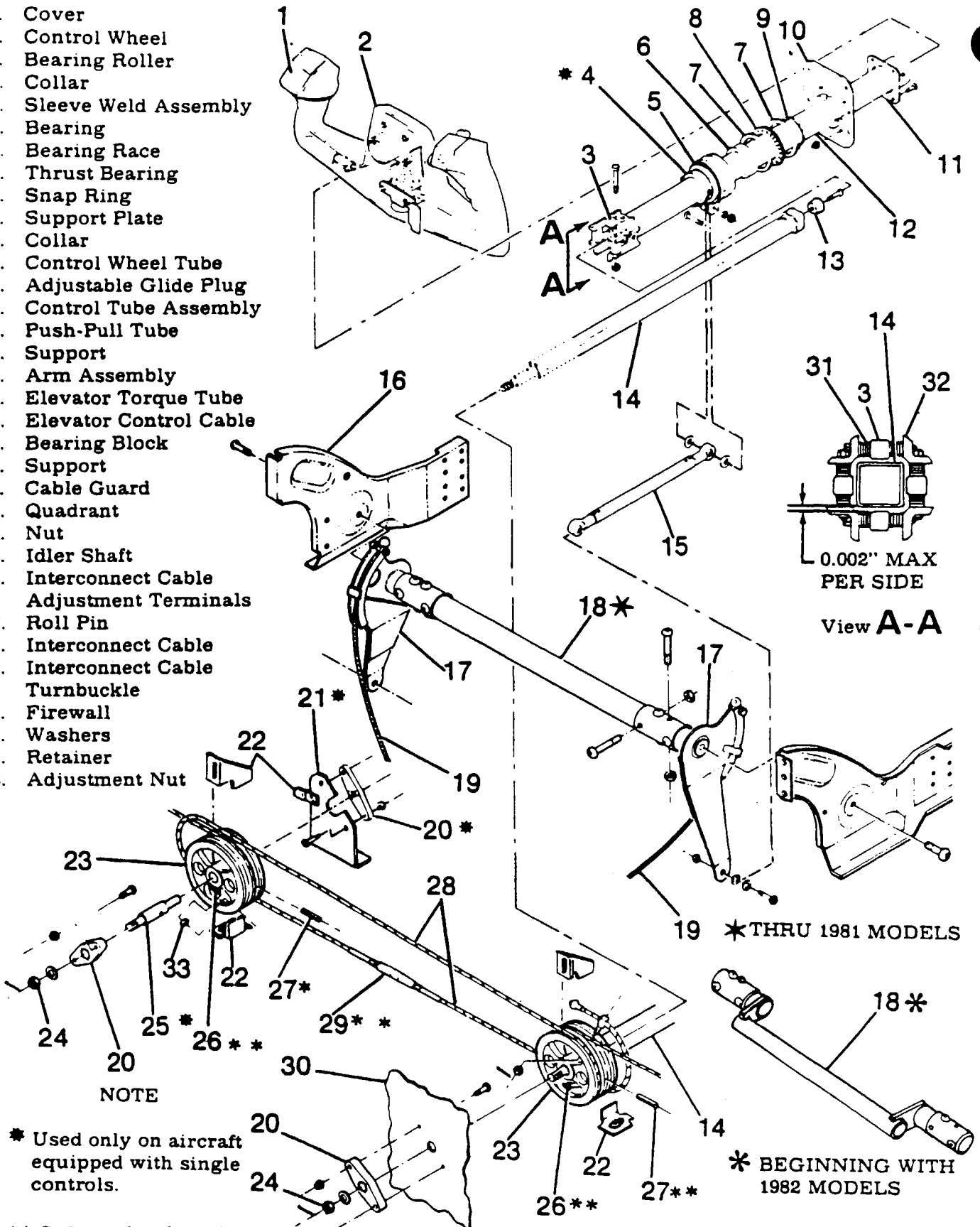
MAINTAIN SPECIFIED CONTROL CABLE TENSION.

CABLE TENSION:  
 40 LBS ± 10 LBS ON AILERON CARRY-THRU CABLE (AT AVERAGE TEMPERATURE FOR THE AREA.)  
 SEE FIGURE 1-1 FOR TRAVEL

Figure 6-1. Aileron Control System

# MODEL R182 AND TR182 SERVICE MANUAL

1. Cover
2. Control Wheel
3. Bearing Roller
4. Collar
5. Sleeve Weld Assembly
6. Bearing
7. Bearing Race
8. Thrust Bearing
9. Snap Ring
10. Support Plate
11. Collar
12. Control Wheel Tube
13. Adjustable Glide Plug
14. Control Tube Assembly
15. Push-Pull Tube
16. Support
17. Arm Assembly
18. Elevator Torque Tube
19. Elevator Control Cable
20. Bearing Block
21. Support
22. Cable Guard
23. Quadrant
24. Nut
25. Idler Shaft
26. Interconnect Cable Adjustment Terminals
27. Roll Pin
28. Interconnect Cable
29. Interconnect Cable Turnbuckle
30. Firewall
31. Washers
32. Retainer
33. Adjustment Nut



NOTE

\* Used only on aircraft equipped with single controls.

\*\* Safety wire these items.

Figure 6-2. Control Column Installation



## MODEL R182 AND TR182 SERVICE MANUAL

5. Disconnect push-pull tube (15) at sleeve weld assembly (5).
6. Remove screws securing support plate (10) at instrument panel.

### NOTE

To ease removal of control wheel tube assembly (12), snap ring (9) may be removed from its locking groove to allow sleeve weld assembly (5) additional movement.

7. Using care, pull control wheel tube assembly (12) aft and work assembly out through instrument panel.

### NOTE

If removal of control tube assembly (14) or quadrant (23) is necessary, proceed to step 8.

8. Remove safety wire and relieve direct cable tension at turnbuckles (index 8, figure 6-1).
9. Remove safety wire and relieve interconnect cable tension at turnbuckle (30).
10. Remove safety wire and remove roll pin (27) through quadrant (23) and control tube assembly (14).
11. Remove pin, nut (24) and washer from control tube assembly (14) protruding through bearing block (21) on forward side of firewall (30).
12. Using care, pull control tube assembly (14) aft and remove quadrant (23).
13. Reverse the preceding steps for reinstallation. Safety wire all items previously safetied, check rigging of aileron and elevator control systems and rig, if necessary, in accordance with paragraph 6-18 and Section 8, respectively. Use figure 6-2 as a guide for reassembly and observe the following notes.

### NOTES

Referring to figure 6-2, allow 0.030" minimum clearance between bearing block (20) and nut (24) after tightening. Adjust interconnect cables (28) to 40 LBS  $\pm$  10 LBS. Washers (31) are of various thicknesses and are used to obtain dimension shown in VIEW A-A.

Referring to figure 6-3, torque bolt (12) to 30 inch-pounds.

- b. COPILOT'S CONTROL COLUMN.
    1. Complete steps 1, 2, 3, 4, 5, 6, 8, 9, 10 and 11 of subparagraph "a".
    2. Using care, pull control tube assemblies (12 and 14) aft and remove quadrant (23).
    3. Remove radios, radio dust covers, cooling pans and associated equipment as necessary to work control wheel tube assembly (12) out from under instrument panel.
    4. Complete step 13 of subparagraph "a".
- 6-7. REPAIR. Worn, damaged or defective shafts, bearings, drums, cables or other components should be replaced. Refer to Section 2 for lubrication requirements.

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1. Control Tube Assembly
2. Adapter
3. Rheostat
4. Control Wheel
5. Cover
6. Setscrew
7. Mike Switch
8. Not Used
9. Not Used
10. Trim Switch
11. Maplight Assembly
12. Knob
13. Bolt

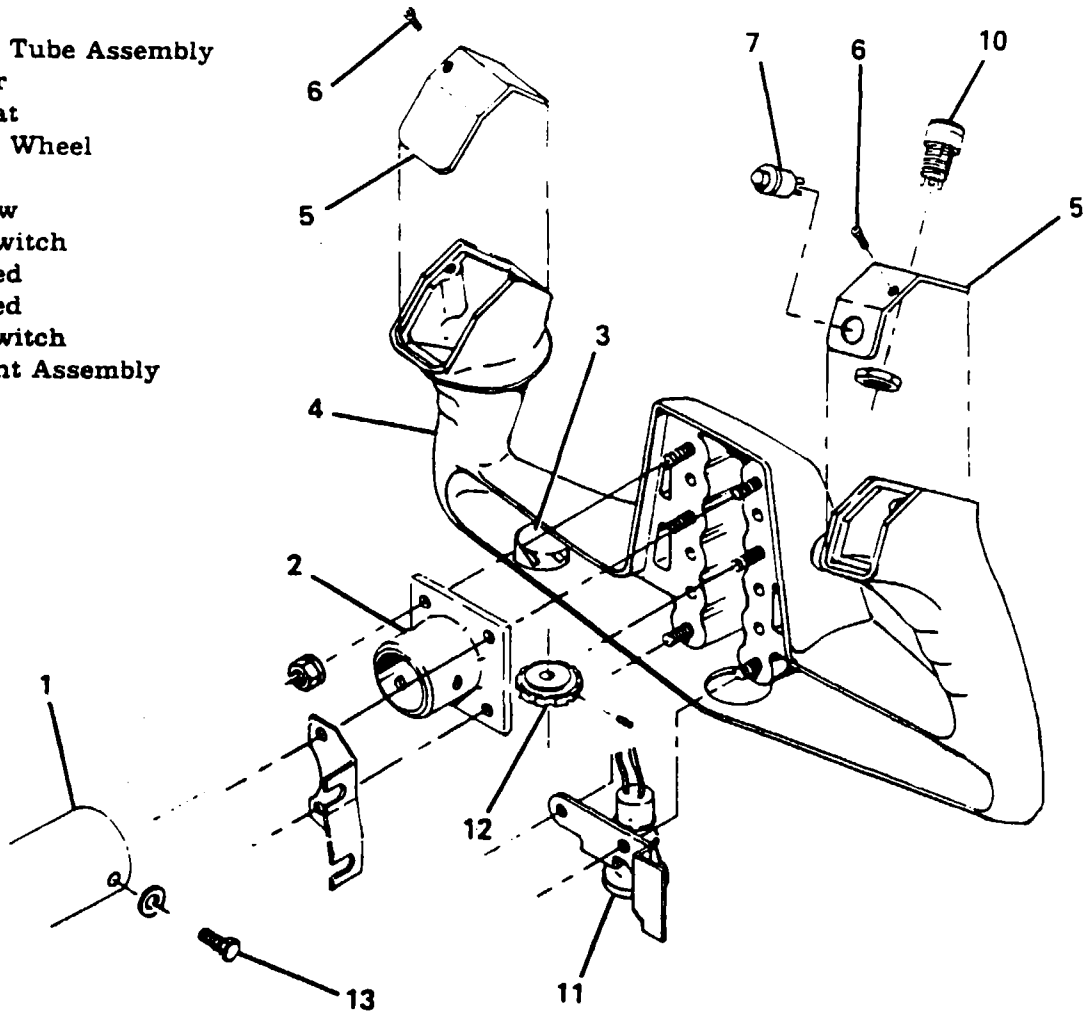


Figure 6-3. Control Wheel Installation (Sheet 1 of 2)

6-8. AILERON BELLCRANK. (See figure 6-4.)

### 6-9. REMOVAL.

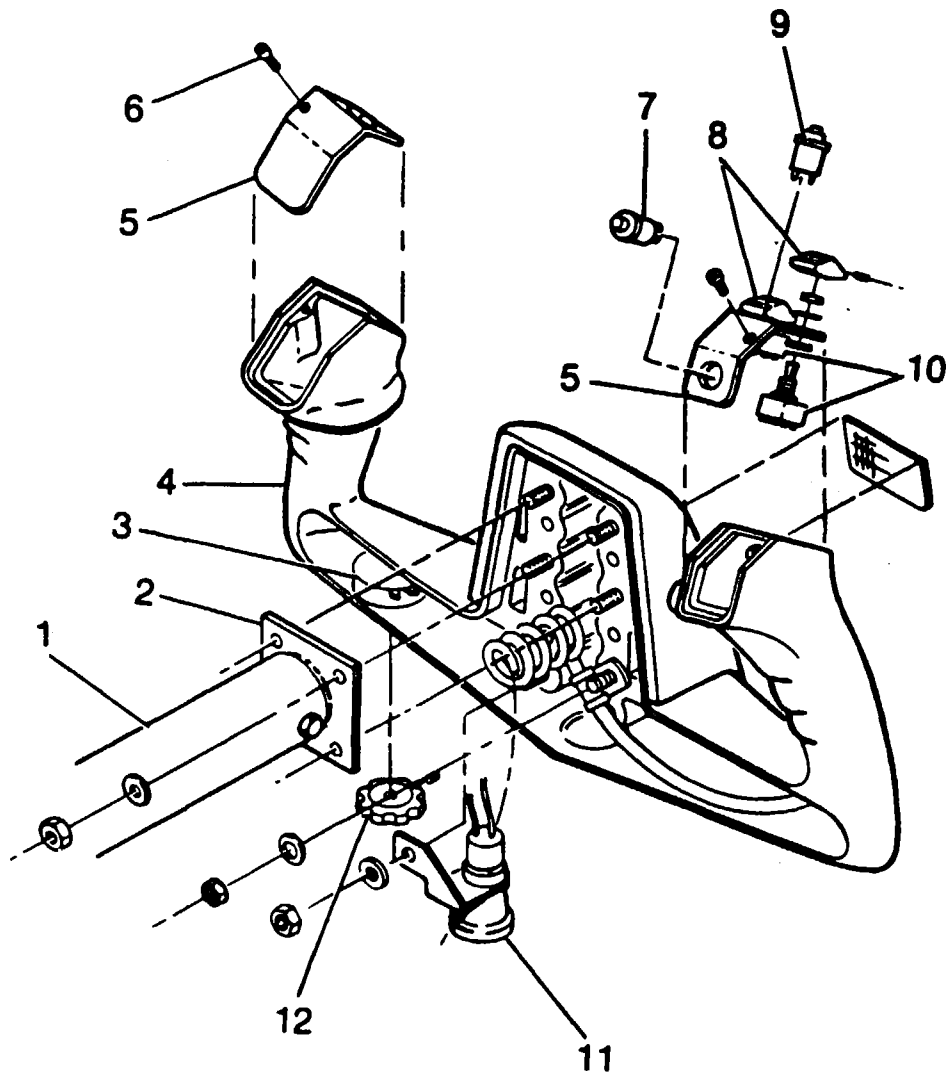
- a. Remove access plate inboard of each bellcrank (8) on underside of wing.
- b. Remove safety wire and relieve cable tension at turnbuckle (5).

### NOTE

Carry-thru cable turnbuckle (5) may be located at either the right or left aileron bellcrank.

- c. Disconnect control cables from bellcrank (8). Retain all spacers and bushings.
- d. Disconnect push-pull rod (12) at bellcrank.
- e. Remove nuts, washers and bolts securing bellcrank stop bushing (7) and bellcrank (8) to wing structure.
- f. Remove bellcrank through access opening, using care that bushing (14) is not dropped from bellcrank.

# MODEL R182 AND TR182 SERVICE MANUAL

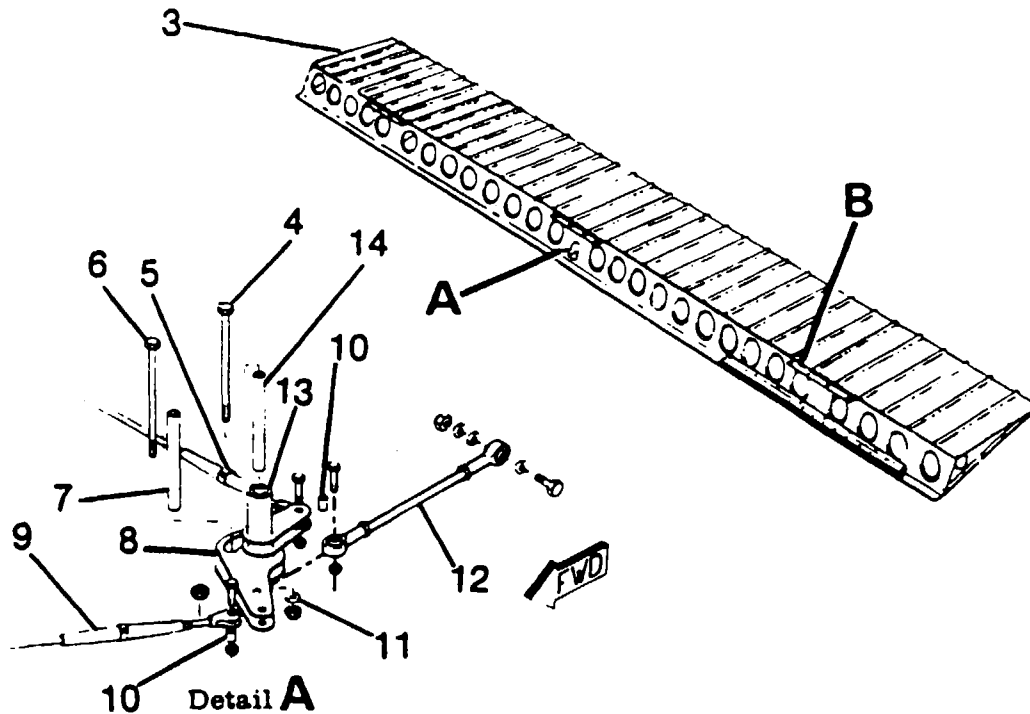


## BEGINNING WITH 1981 MODELS

1. Control Tube Assembly
2. Adapter
3. Rheostat
4. Control Wheel
5. Cover
6. Setscrew
7. Mike Switch
8. Trim Controls
9. Trim Disengage Switch
10. Trim Switches
11. Maplight Assembly
12. Knob

Figure 6-3. Control Wheel Installation (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL



- |                            |                        |
|----------------------------|------------------------|
| 1. Hinge                   | 8. Bellcrank           |
| 2. Balance Weight          | 9. Turnbuckle (Direct) |
| 3. Aileron                 | 10. Bushing            |
| 4. Pivot Bolt              | 11. Brass Washer       |
| 5. Turnbuckle (Carry-Thru) | 12. Push-Pull Rod      |
| 6. Bolt                    | 13. Needle Bearing     |
| 7. Stop Bushing            | 14. Bushing            |

Figure 6-4. Aileron Installation (Sheet 1 of 2)

### NOTE

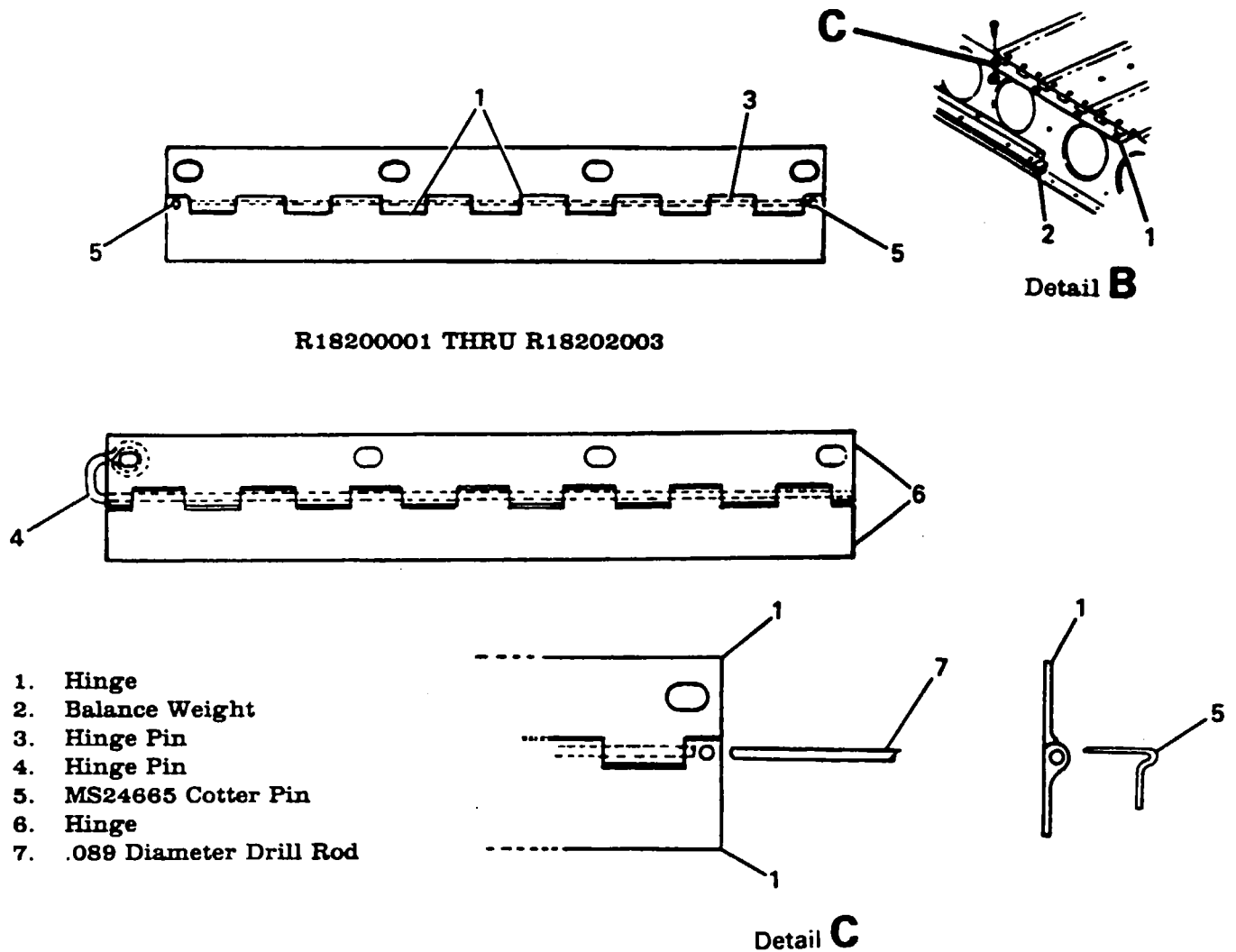
Brass washers (11) may be used as shims between lower end of bellcrank and wing structure. Retain these shims. Tape open ends of bellcrank to prevent dust and dirt from entering bellcrank needle bearings (13).

- 6-10. REPAIR. Repair of bellcranks consists of replacement of defective parts. If needle bearings are dirty or in need of lubrication, clean thoroughly and lubricate as outlined in Section 2.
- 6-11. INSTALLATION.
- Place bushing (14) and stop bushing (7) in bellcrank (8) and position bellcrank in wing.
  - Install brass washers (11) between lower end of bellcrank (8) and wing structure to shim out excess clearance.

### NOTE

Brass washers (11) may be used as required between lower end of bellcrank and wing channel to shim out excess clearance.

# MODEL R182 & TR182 SERIES SERVICE MANUAL



R18200001 THRU R18202003

1. Hinge
2. Balance Weight
3. Hinge Pin
4. Hinge Pin
5. MS24665 Cotter Pin
6. Hinge
7. .089 Diameter Drill Rod

## NOTES

Install loop of hinge pin (4) on outboard end of hinge.

The following method may be utilized to check wear on aileron hinges used prior to R18202004. Refer to Service Letter SE83-18 for specific serials affected.

1. Remove cotter pins (5) from both ends of hinge (1).
2. Push drill rod (7) or number 43 drill bit into hinge pin hole beyond holes from which cotter pins (5) were removed.
3. Bend one leg of cotter pin (5) back and attempt to install the other leg past drill rod (7) or number 43 drill bit. If leg of cotter pin (5) GOES, replace hinge (7). If NO GO condition exists, hinges are not worn sufficiently to require replacement.
4. Remove drill rod (7) and replace new cotter pins (5) in hinges (1).

Figure 6-4. Aileron Installation (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

- c. Install bellcrank pivot bolt (4).
- d. Position bellcrank stop-bushing (7) and install attaching bolt (6).

### NOTE

Stop bushing (7) should be centered in slots of aileron bellcrank (8) in each wing when control wheels are neutral, with correct tension on aileron carry-thru cable (5). Push-pull rods (12) are then adjusted to rig the ailerons neutral.

- e. Connect control cables to bellcrank.
- f. Connect push-pull rod (12) to bellcrank.
- g. Re-rig aileron system in accordance with paragraph 6-18, safety turnbuckle (5) and reinstall all items removed for access.

### 6-12. CABLES AND PULLEYS. (See figure 6-1.)

### 6-13. REMOVAL AND INSTALLATION.

- a. Remove access plates, wing root fairings and upholstery as required.
- b. Remove safety wire and relieve cable tension at turnbuckles (8).
- c. Disconnect cables from aileron bellcranks (7) and quadrants (index 23, figure 6-2.)
- d. Remove cable guards and pulleys as necessary to work cables free of aircraft.

### NOTE

To ease routing of cables, a length of wire may be attached to end of cable before being withdrawn from aircraft. Leave wire in place, routed through structure; then attach cable being installed and use to pull cable into position.

- e. After cable is routed in position, install pulleys and cable guards. Ensure cable is positioned in pulley groove before installing guard.
- f. Re-rig aileron system in accordance with paragraph 6-18, safety turnbuckles and install access plates, fairings and upholstery removed in step "a".

### 6-14. AILERONS. (See figure 6-4.)

### 6-15. REMOVAL.

- a. Disconnect push-pull rod (12) at aileron.
- b. Remove screws and nuts attaching aileron hinges (1) to trailing edge of wing.
- c. Using care, pull aileron out and down to slide hinges from under wing skin and auxiliary spar reinforcements.

### 6-16. INSTALLATION.

- a. Position aileron hinges between skin and auxiliary spar reinforcements and install screws and nuts attaching hinges to trailing edge of wing.
- b. Attach push-pull rod (12) to aileron.

### NOTE

If rigging was correct and push-pull rod adjustment was not disturbed, it should not be necessary to re-rig system.

## MODEL R182 AND TR182 SERVICE MANUAL

AVAILABLE FROM CESSNA SUPPLY  
DIVISION (TOOL NO. SE 716).

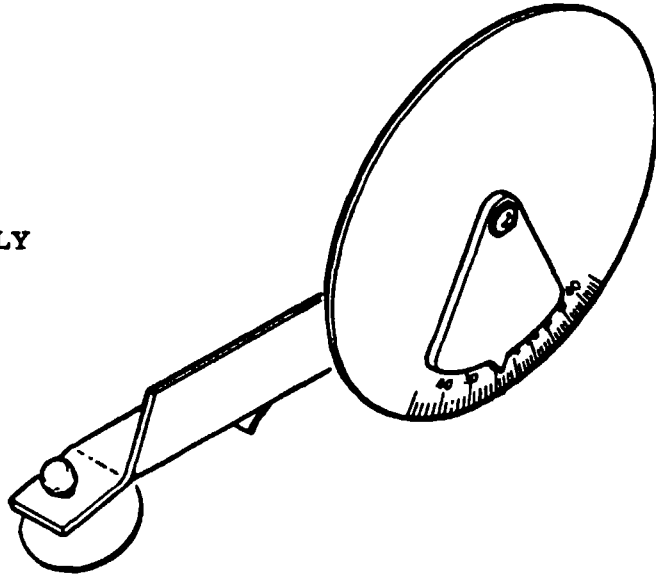


Figure 6-5. Inclinometer for Measuring Control Surface Travel

- c. Check aileron travel and alignment, re-rig if necessary, in accordance with paragraph 6-18.
- 6-17. REPAIR. Aileron repair may be accomplished in accordance with instructions outlined in Section 18. Before installation, ensure balance weights and hinges are securely attached.
- 6-18. RIGGING. (See figure 6-1.)
- a. Remove safety wire and relieve cable tension at turnbuckles (6 and 8).
  - b. Disconnect push-pull rods at bellcranks (7).
  - c. Adjust interconnect cable turnbuckle (index 29, figure 6-2) and adjustment terminals (index 26, figure 6-2) to remove cable slack, acquire proper tension ( $40 \pm 10$  pounds) and position control wheels level (synchronized).
  - d. Tape a bar across both control wheels to hold them in neutral position.
  - e. Adjust direct cable turnbuckles (8) and carry-thru cable turnbuckle (6) so bellcrank stop-bushings (index 7, figure 6-4) are centered in both bellcrank slots with  $40 \pm 10$  pounds tension on carry-thru cable. Disregard tension on direct cables.
  - f. Adjust push-pull rods (index 12, figure 6-4) at each aileron until ailerons are neutral with reference to trailing edge of wing flaps. Be sure wing flaps are full UP when making this adjustment.
  - g. With ailerons in neutral position (streamlined), mount an inclinometer on trailing edge of one aileron and set to  $0^\circ$ . (See figure 6-5 for inclinometer.)
  - h. Remove bar from control wheels and check degree of travel as specified in figure 1-1. If travel is not within specified limits, readjust push-pull rods and cables as necessary.
  - i. Ensure all turnbuckles are safetied, all cables and cable guards are properly installed, all jam nuts are tight and replace all items removed for access.

### WARNING

Be sure ailerons move in the correct direction when operated by the control wheel and check for freedom of movement.

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 7

### WING FLAP CONTROL SYSTEM

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Operational Check . . . . .	2F23/7-1	<b>Flaps</b> . . . . .	<b>2G3/7-5</b>
Trouble Shooting . . . . .	2F24/7-2	<b>Removal/Installation</b> . . . . .	<b>2G3/7-5</b>
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Removal/Installation . . . . .	2G3/7-5	<b>and Follow-up</b> . . . . .	<b>2G10/7-12</b>

7-1. WING FLAP CONTROL SYSTEM. (See figure 7-1.)

7-2. DESCRIPTION. The wing flap control system consists of the following: an electric drive motor and transmission assembly, drive pulleys and cables, push-pull rods, a follow-up control cable and a flap control lever/switch assembly mounted on the instrument panel. The drive motor and transmission assembly mounts directly to the right hand flap in the right wing and is connected to the left hand flap via cables. Switches mounted on the flap control lever assembly (refer to figure 7-3) control electric power to the motor and hence determine flap position and direction of travel. The switch assembly is linked to flap motion using the follow-up control, thus ensuring that the switches interrupt flap travel at the selected position. In addition, limit switches mounted on the motor/transmission assembly prevent over-travel at the full UP or DOWN positions. A final switch connect into the landing gear/stall warning circuit is set to actuate and warn the pilot when the flaps reach 25° with the landing gear still retracted.

7-3. OPERATIONAL CHECK.

- a. Operate flaps through their full range of travel observing for uneven travel, jumpy motion, binding or lost motion. Ensure flaps are moving together through their full range of travel.
- b. Check for positive shut-off of motor at flap travel extremes to prevent damage to actuator assembly.
- c. With flaps full UP, mount an inclinometer on one flap and set to 0°. Lower flaps to full DOWN position and check flap angle as specified in figure 1-1. Check approximate mid-range percentage setting against degrees as indicated on inclinometer. Repeat the same procedure for opposite flap.

#### NOTE

An inclinometer for measuring control surface travel is available from the Cessna Supply Division. Refer to Section 6.

- e. Remove access plates adjacent to flap drive pulleys and attempt to rock pulleys to check for bearing wear.
- f. Inspect flap rollers and tracks for evidence of binding or defective parts.



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## 7-4. TROUBLE SHOOTING.

### NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to re-rig system, refer to paragraphs 7-18 and 7-19.

TROUBLE	PROBABLE CAUSE	REMEDY
BOTH FLAPS FAIL TO MOVE.	Open circuit breaker.	Reset and check continuity. Replace breaker if defective.
	Defective switch.	Place jumper across switch. Replace switch if defective.
	Defective motor.	Remove and bench test. Replace motor if defective.
	Broken or disconnected wires.	Run continuity check of wiring. Connect or repair wiring as necessary.
	Disconnected or defective transmission.	Connect transmission. Remove, bench test and replace transmission if defective.
	Defective limit switch.	Check continuity of switches. Replace switches found defective.
	Follow-up control disconnected or slipping.	Secure control or replace if defective.
BINDING IN SYSTEM AS FLAPS ARE RAISED AND LOWERED.	Cables not riding on pulleys.	Open access plates and observe pulleys. Route cables correctly over pulleys.
	Bind in drive pulleys.	Check drive pulleys in motion. Replace drive pulleys found defective.
	Broken or binding pulleys.	Check pulleys for free rotation or breaks. Replace defective pulleys.
	Frayed cable.	Check condition of cables. Replace defective cables.
	Flaps binding on tracks.	Observe flap tracks and rollers. Replace defective parts.

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### 7-4. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
LEFT FLAP FAILS TO MOVE.	Disconnected or broken cable.	Check cable tension. Connect or replace cable.
	Disconnected push-pull rod.	Attach push-pull rod.
FLAPS FAIL TO RETRACT.	Disconnected or defective flaps UP operating switch.	Check continuity of switch. Connect or replace switch.
FLAPS FAIL TO EXTEND.	Disconnected or defective flaps DOWN operating switch.	Check continuity of switch. Connect or replace switch.
INCORRECT FLAP TRAVEL.	Incorrect rigging.	Refer to paragraph 7-18.

### 7-5. FLAP MOTOR AND TRANSMISSION ASSEMBLY.

### 7-6. REMOVAL AND INSTALLATION. (See figure 7-2.)

- a. Run flaps to full DOWN position.
- b. Disconnect battery ground cable and insulate terminal as a safety precaution.
- c. Remove access plates beneath flap motor and transmission assembly in right wing.

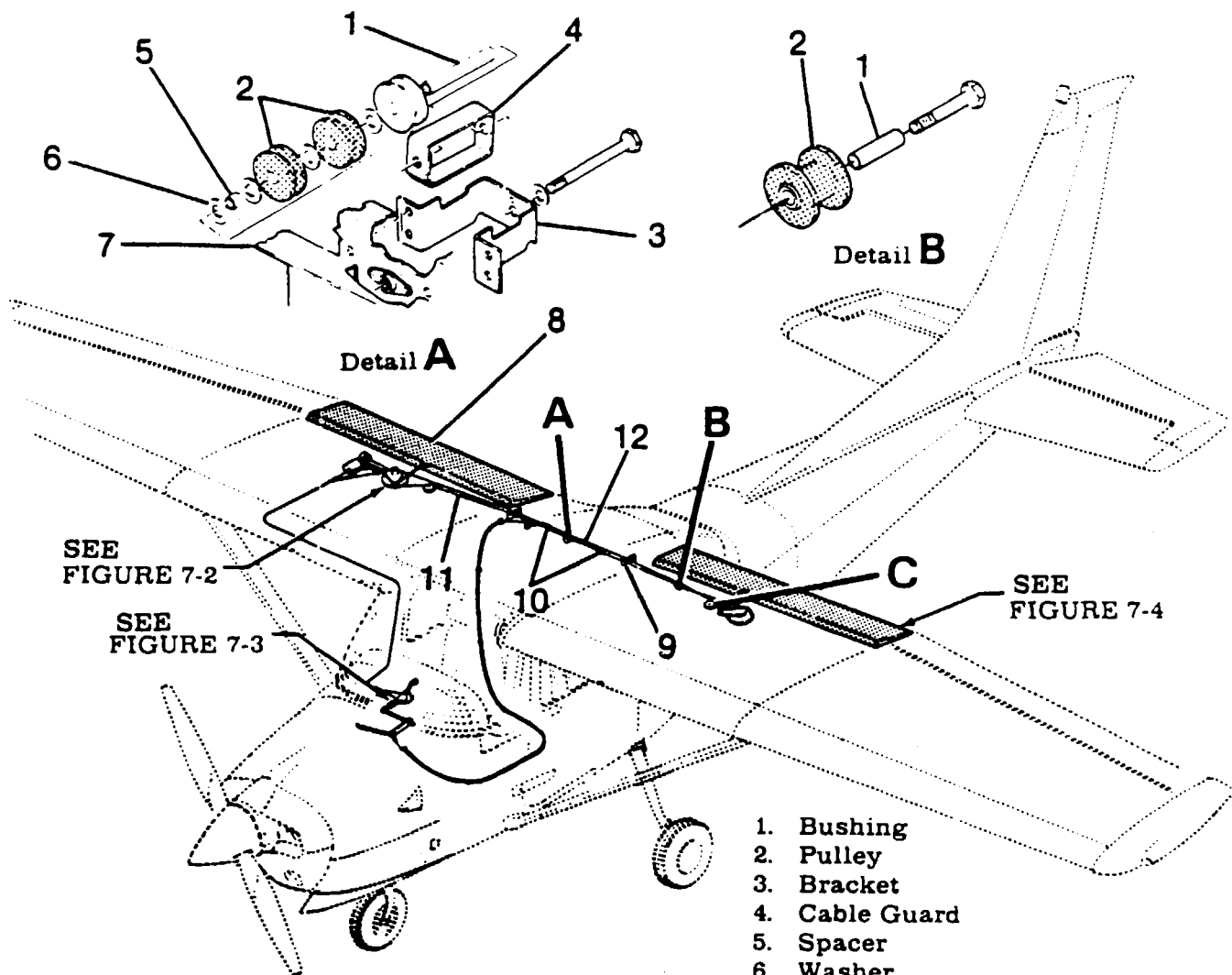
#### NOTE

Flap motor (9), transmission (7), hinge assembly (10) and actuating tube (5) are removed from the aircraft as a unit. On aircraft equipped with long range fuel tank, it may be easier to detach motor and transmission assembly from other components before removal from wing.

- d. Remove bolt (20) securing actuating tube (5) to drive pulley (13).
- e. Screw actuating tube (5) in toward transmission (7) as far as possible by hand.
- f. Remove bolt securing flap motor hinge (10) to wing. Retain brass washer between hinge and wing structure for use on reinstallation.
- g. Disconnect motor electrical leads at quick-disconnects.
- h. Disconnect wiring at limit switches (23 and 26).
- i. Carefully work assembly from wing through access opening.
- j. Reverse preceding steps for reinstallation. If hinge assembly (10) was removed from the transmission (7) for any reason, ensure that short end of hinge is reinstalled toward the top.
- k. Use Loctite grade CV adhesive on threads of setscrew (6) and collar (24) whenever actuating tube (5) is removed. Torque setscrew to 40 inch-pounds.
- l. Complete operational check as outlined in paragraph 7-3 and rerig system in accordance with paragraph 7-18 and 7-19.

### 7-7. REPAIR. Repair consists of replacement of motor, transmission, actuating tube and associated hardware. Bearings in hinge assembly may also be replaced. Lubricate as outlined in Section 2.

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1. Bushing
2. Pulley
3. Bracket
4. Cable Guard
5. Spacer
6. Washer
7. Rear Spar
8. Flap
9. Rub Strip
10. Turnbuckle
11. Retract Cable
12. Direct Cable

**CAUTION**

**MAINTAIN SPECIFIED CONTROL CABLE TENSION**

**CABLE TENSION**

**THRU R18201384 & FR18200070**

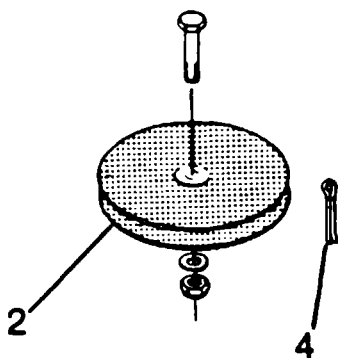
**70 LBS ± 10 LBS**

**BEGINNING WITH R18201385**

**35 LBS ± 5 LBS**

**AT AVERAGE TEMPERATURE FOR THE AREA**

**SEE FIGURE 1-1 FOR TRAVEL.**



Detail C

Figure 7-1. Wing Flap Control System

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- 7-8. **FLAP CONTROL LEVER.** (See figure 7-3.)
- 7-9. **REMOVAL AND INSTALLATION.**
- Remove follow-up control torque tube (17) from switch mounting arm (23).
  - Remove flap operating switches (22 and 24) from switch mounting arm (23). **DO NOT** disconnect electrical wiring at switches.
  - Remove knob (15) from control lever (14).
  - Remove remaining items by removing bolt (27). Use care not to drop parts into tunnel area.
  - Reverse the preceding steps for reinstallation. Do not overtighten bolt (27) causing lever (14) to bind. Rig system in accordance with paragraphs 7-18 and 7-19.

### NOTE

Ensure that insulators (21) are installed between switches (22 and 24) and switch mounting arm (23). Apply Loctite grade "c" sealant to threads of knob (15) on installation. Torque clamp nut (8) to 40-50 inch pounds and lock with second nut.

- Rig system in accordance with paragraphs 7-18 and 7-19.
- 7-10. **DRIVE PULLEYS.** (See figure 7-2.)
- 7-11. **REMOVAL AND INSTALLATION.**
- Remove access plate adjacent to drive pulley (13) in right wing.
  - Unzip or remove headliner as necessary for access to turnbuckles (index 6, figure 7-1), remove safety wire and loosen turnbuckles.
  - Remove bolt (19) securing flap push-pull rod (14) to drive pulley (13) and lower RIGHT flap gently.
  - Remove Bolt (20) securing actuating tube (5) to drive pulley (13) lower flap gently. Retain bushing.
  - Remove cable locks (12) securing control cables to drive pulley (13). Tag cables for reference on reinstallation.
  - Remove bolt (11) attaching drive pulley (13) to wing structure.
  - Using care, remove drive pulley through access opening, being careful not to drop bushing. Retain brass washer between drive pulley and wing structure for use on reinstallation. Tape open ends of drive pulley after removal to protect bearings.
  - To remove left wing drive pulley, use this same procedure omitting step "d".
  - Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 7-18. Safety turnbuckles and reinstall all items removed for access.
- 7-12. **REPAIR.** Repair is limited to replacement of bearings. Cracked, bent or excessively worn drive pulleys must be replaced. Lubricate bearings as outlined Section 2.
- 7-13. **FLAPS.** (See figure 7-4.)
- 7-14. **REMOVAL AND INSTALLATION.**
- Run flaps to full DOWN position.
  - Remove access plates (1) from top leading edge of flap.
  - Disconnect push-pull rod (6) at flap bracket (7).

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## NOTES

Clean threads on screw (6) and tube (5) and apply Loctite CU adhesive, or equivalent, before installing tube (5) on jackscrew (3). Torque screw (6) to 40 in-lbs.

Clean threads on nut (27) and support (25) and apply Loctite 601, or equivalent, before installing support (25) on transmission (7).

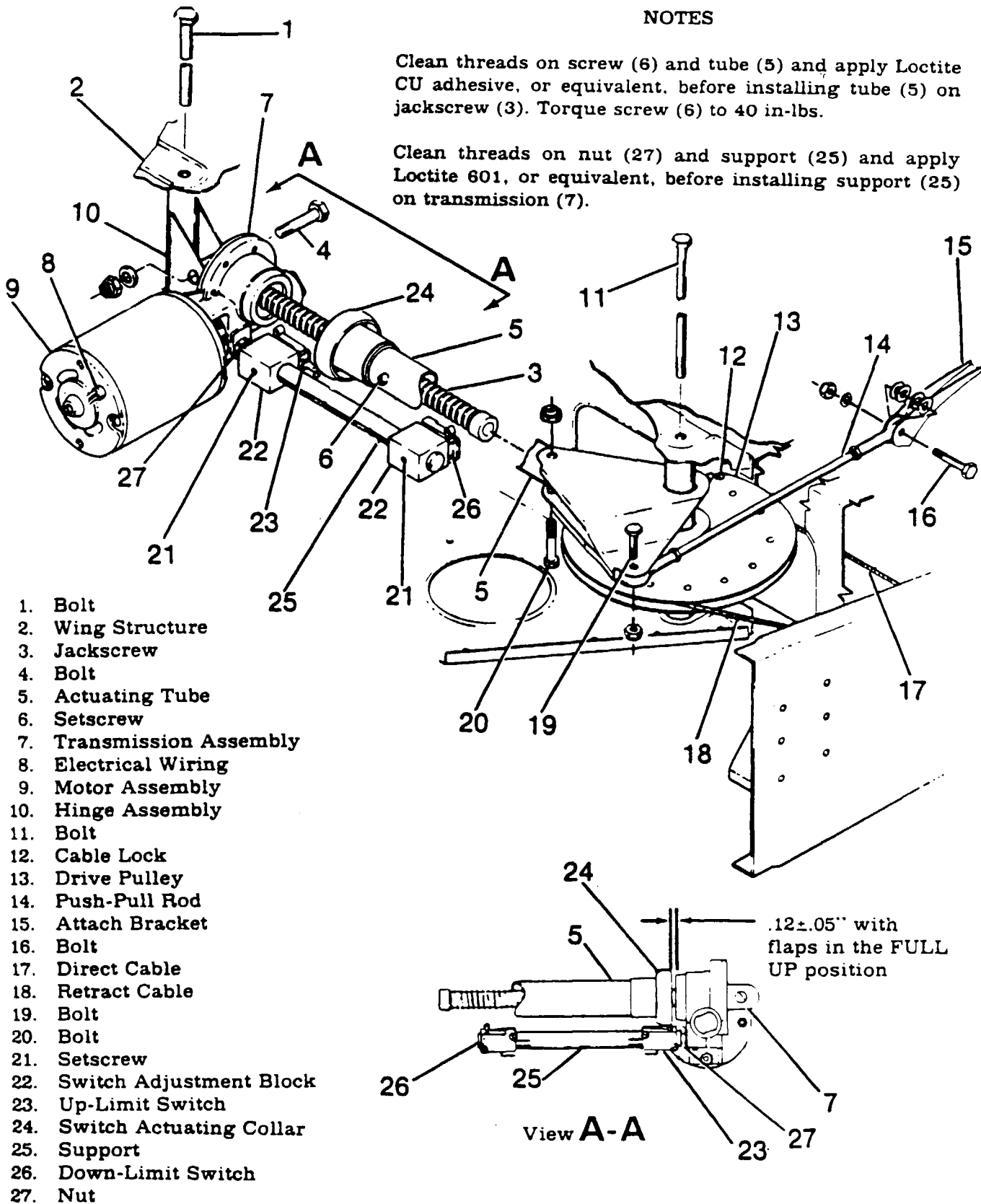


Figure 7-2. Flap Motor and Transmission Installation

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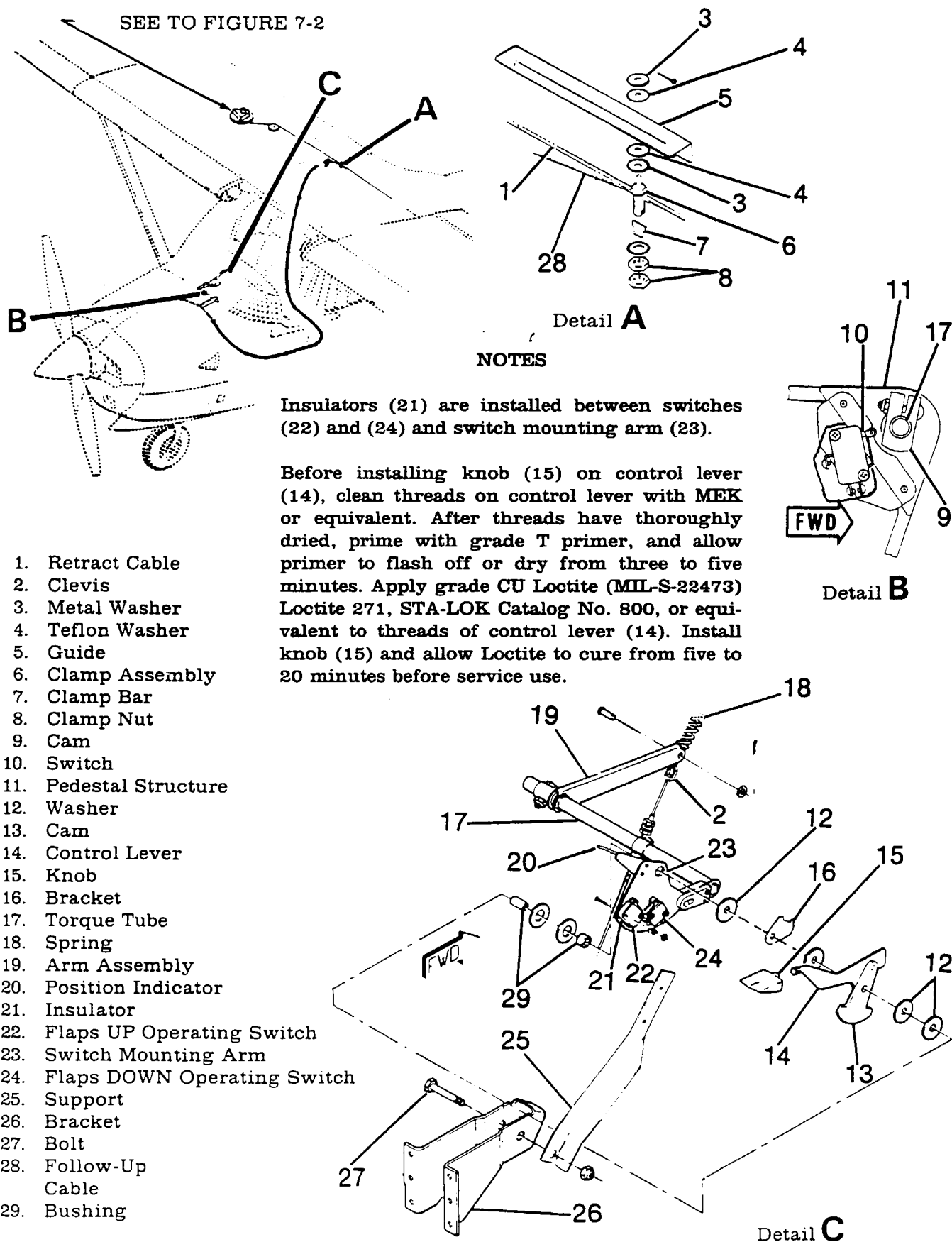
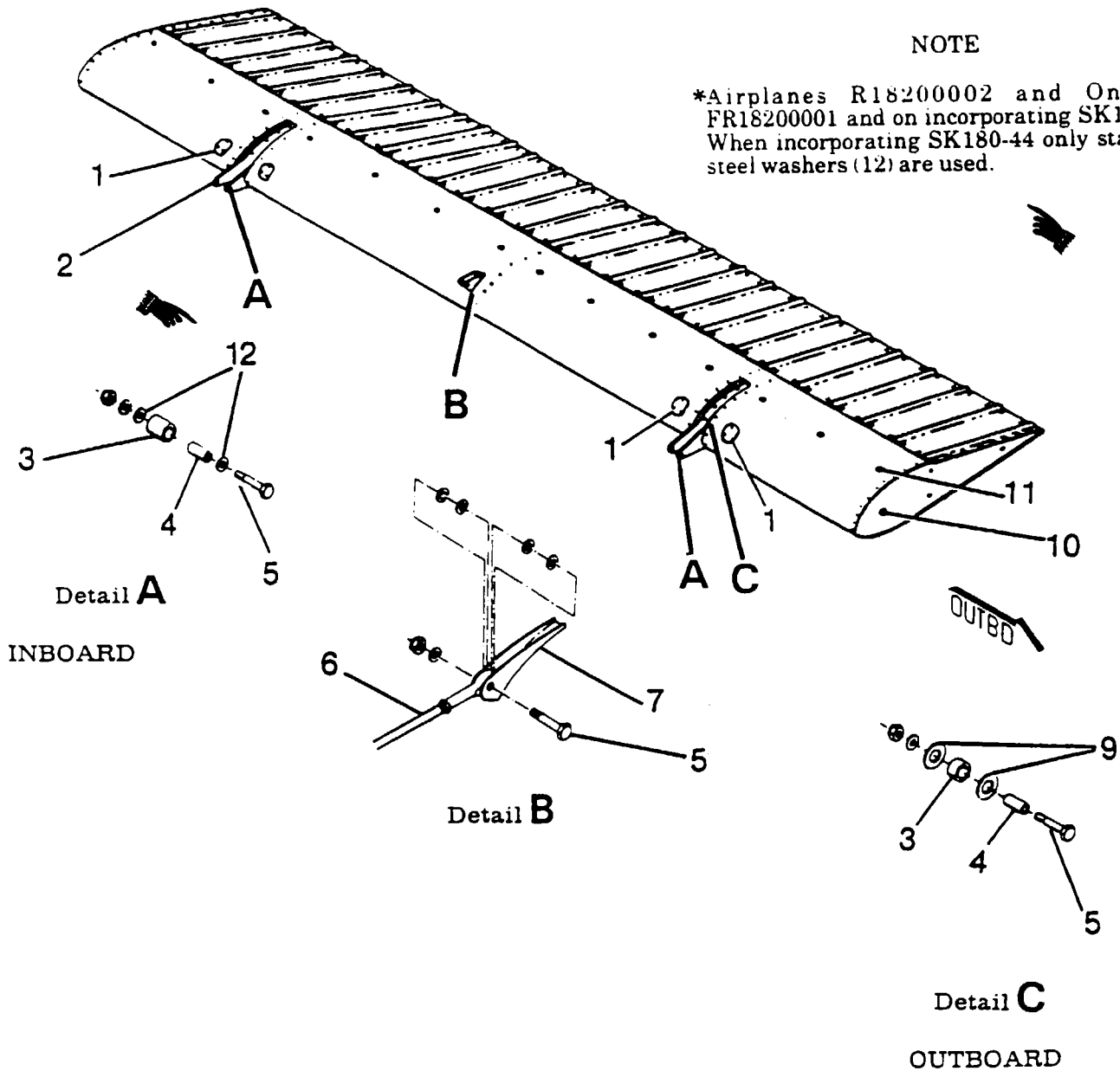


Figure 7-3. Flap Control Lever and Follow-Up Installation

# MODEL R182 AND TR182 SERVICE MANUAL



## NOTE

\*Airplanes R18200002 and On and FR18200001 and on incorporating SK180-44. When incorporating SK180-44 only stainless steel washers (12) are used.

1. Access Plate
2. Flap Support
3. Roller Assembly
4. Bushing
5. Bolt
6. Push-Pull Rod
7. Flap Bracket
8. Bolt
9. Spacer
10. Plug Button
11. Nylon Plug Button
12. Stainless Steel Washer \*

## NOTE

Beginning with serial R18202012 access plates (1) are enlarged and attached with recessed head screws in place of truss head screws.

Figure 7-4. Flap Installation

## MODEL R182 AND TR182 SERVICE MANUAL

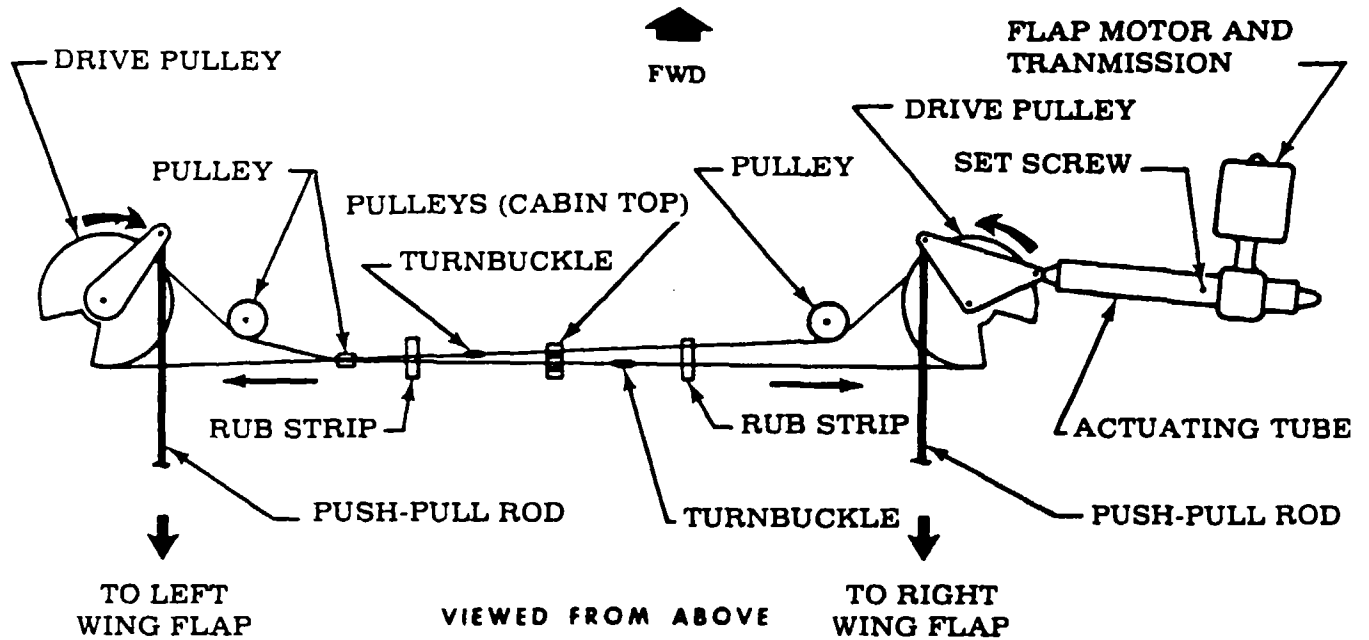


Figure 7-5. Flap System Schematic

- d. Remove bolts (5) at each flap track. As flap is removed from wing, all washers, rollers and bushings will fall free. Retain these for reinstallation.
- e. Reverse the preceding steps for reinstallation. If push-pull rod (6) adjustment is not disturbed, re-rigging of system should not be necessary. Check flap travel and rig in accordance with paragraph 7-18, if necessary.

### NOTE

Bushings (4), rollers (3) and spacers (9) are first positioned through slots in flap tracks, then are secured to the flap roller supports (2) with attaching bolts, washers and nuts. Nylon plug buttons (11) prevent wing flap from chafing with trailing edge. Position spacers (9) and direction of bolts (5) as required to provide adequate flap clearance at wing root, flap well skin and aileron. Some lateral movement of flap is inherent due to the width of rollers. This movement should be considered when positioning spacers and direction of bolts.

7-15. REPAIR. (Refer to Section 17.)

7-16. CABLES AND PULLEYS. (See figure 7-1.)

7-17. REMOVAL AND INSTALLATION.

- a. Remove access plates, fairings, headliner and upholstery as necessary for access.
- b. If retract cable (11) is to be removed, disconnect follow-up cable at clamp (index 6, figure 7-3).
- c. Remove safety wire, relieve cable tension, disconnect turnbuckles (6) and carefully lower LEFT flap.
- d. Disconnect cables at drive pulleys, remove cable guards and pulleys as necessary to work cables free of aircraft.



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## NOTE

To ease routing of cables, a length of wire may be attached to the end of cable being withdrawn from aircraft. Leave wire in place, routed through structure; then attach the cable being installed and use wire to pull cable into position.

- e. Reverse the preceding steps for reinstallation.
- f. After cables are routed in position, install pulleys and cable guards. Ensure cables are positioned in pulley grooves before installing guards.
- g. Re-rig flap system in accordance with paragraph 7-18 and safety turnbuckles.
- h. Re-rig follow-up system in accordance with paragraph 7-19 and reinstall all items removed in step "a".

### 7-18. RIGGING FLAPS. (See figure 7-2.)

- a. Unzip or remove headliner as necessary for access to turnbuckles (index 10, figure 7-1).
- b. Remove safety wire, relieve cable tension, disconnect turnbuckles and carefully lower LEFT flap.
- c. Disconnect push-pull rods (14) at drive pulleys (13) in both wings and lower RIGHT flap gently.
- d. Disconnect actuating tube (5) from drive pulley (13).

## NOTE

If control cables are not connected to left and right drive pulleys, actuating tube (5) and push-pull rods (14) must be disconnected before installing cables. If drive pulleys (13) are not installed, attach control cables before installing drive pulleys in the wings as illustrated in figure 7-5.

- e. The 3/32 inch retract cable connects to the forward side of the right drive pulley and to the aft side of the left drive pulley. The 1/8 inch direct cable connects to the aft side of the right drive pulley and to the forward side of the left drive pulley.
- f. Adjust both push-pull rods (14) to  $8.83 \pm .12$  inches between centers of rod end bearings and tighten locknuts on both ends. Connect push-pull rods to flaps and drive pulleys.

## NOTE

Temporarily connect cables at turnbuckles (index 10, figure 7-1) and test flaps by hand to ensure both flaps extend and retract together. If they will not, the cables are incorrectly attached to the drive pulleys. Ensure that the right drive pulley rotates clockwise, when viewed from below, as the flaps are extended. Tag cables for reference and disconnect turnbuckles again.

- g. Screw actuating tube (5) IN toward transmission (7) by hand to  $.12 \pm .05$  inches between switch actuating collar (24) and transmission as illustrated in VIEW A-A. Loosen setscrew (6) securing actuating tube (5) to switch actuating collar (24), hold actuating collar to maintain  $.12 \pm .05$  inches, hold RIGHT flap in the full UP position and adjust actuating tube (5) IN or OUT as necessary to align with attachment hole in drive pulley (13). Tighten setscrew (6) in accordance with procedures outlined in the following note and secure tube to drive pulley with bolt (20).

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### NOTE

Apply Loctite grade CV sealant to threads of setscrew (6) and torque to 40 inch-pounds.

If actuating tube (5) is too long to allow attachment to drive pulley after completion of step "g", proceed to step "h".

- h. Disconnect push-pull rod (14) at drive pulley (13), then connect actuating tube (5) to drive pulley.
- i. Manually hold RIGHT flap in full UP position and readjust push-pull rod (14) to align with attachment hole in drive pulley. Connect push-pull rod and tighten locknuts.

### NOTE

The right flap and actuator must be correctly rigged before cables and left flap can be rigged.

- j. Mount an inclinometer on trailing edge of RIGHT flap.

### NOTE

An inclinometer for measuring control surface travel is available from the Cessna Supply Division. Refer to Section 6.

- k. With RIGHT flap in full UP position, loosen setscrew (21) and slide UP limit switch (23) and adjustment block (22) on support (25) to activate switch and shut off electrical power to motor at this position. Tighten setscrew (21).
- l. Run RIGHT flap full DOWN position and adjust DOWN limit switch (26) to activate and shut off motor at degree of travel specified in figure 1-1. Tighten setscrew (21).
- m. Run RIGHT flap to full UP position, manually hold LEFT flap full UP and connect control cables at turnbuckles (index 10, figure 7-1). Remove reference tags previously installed in step "f" as turnbuckles are connected.
- n. With flaps full UP, adjust turnbuckles to obtain  $70 \pm 10$  pounds tension on cables thru R18201384 and FR18200070. Beginning with R18201385 and on, maintain  $35 \pm 5$  pounds cable tension.

### NOTE

Ensure cables are positioned in pulley grooves and cable ends are positioned correctly at drive pulleys before tightening turnbuckles.

- o. Disconnect push-pull rod at left drive pulley. Run motor to extend flaps approximately  $20^\circ$  and check tension on each flap cable. If necessary, readjust turnbuckles to maintain  $70 \pm 10$  pounds tension thru R18201384 and FR18200070. Beginning with R18201385 and on, maintain  $35 \pm 5$  pounds cable tension.
- p. Fully retract right flap. Manually hold left flap in full up position and readjust push-pull rod to align with attaching hole in drive pulley. Connect push-pull rod and tighten locknuts.
- q. After completion of steps "a" thru "p", operate flaps and check for positive shut off of flap motor through several cycles. Check for specified flap travel with inclinometer mounted on each flap separately.

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### NOTE

Since the flap rollers may not bottom in the flap tracks with flaps fully extended, some free play may be noticed in this position.

#### 7-19. RIGGING-FLAP CONTROL LEVER AND FOLLOW-UP. (See figure 7-3.)

### NOTE

Flaps must be rigged per paragraph 7-18 prior to rigging flap follow-up system.

- a. Run flaps to full UP position.
- b. Remove upholstery and headliner as necessary.
- c. Disconnect follow-up cable (28) from flap retract cable (1) at clamp (6).
- d. With position indicator (20) in full UP position, pull all slack from follow-up control cable (28) and secure follow-up cable (28) to retract cable (1) with clamp assembly (6). Torque clamp nut (26) to 40-50 inch-pounds and lock with second nut.
- e. With control lever (14) in full up position, adjust switches (22 and 24) in slotted holes until cam (13) is centered between switch rollers.
- f. Mount an inclinometer on trailing edge of one flap and set to 0°. Turn master switch ON and move control lever to 10° position. If flap travel is more than 10° ± 2°, adjust flaps DOWN operating switch (24) away from cam (13) and recycle flaps. If flap travel is less than 10° ± 2°, adjust flaps DOWN operating switch (24) closer to cam (13) and recycles.

### NOTE

An inclinometer for measuring control surface travel is available from the Cessna Supply Division. Refer to figure Section 6.

- g. Repeat step "f" for 20° flap position (flap travel: 20° ± 2°).
- h. Adjust flaps UP operating switch (22) in slotted holes for .062 inch clearance between switch roller and cam (13) when the flaps DOWN operating switch has just opened in the 10° and 20° position.

### NOTE

Flap travel on UP cycle may deviate a maximum of 4° from indicated position.

- i. Adjust flap/landing gear warning switch cam (9) on torque tube (17) to close switch (10) with flaps down 25°.
- j. Run flaps through several complete cycles and check indicator (20) for smoothness of operation.
- k. Reinstall all items removed for access.

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## SECTION 8

### ELEVATOR CONTROL SYSTEM

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Control Column . . . . .	2G18/8-2	Removal/Installation . . . . .	2G23/8-7
Elevators . . . . .	2G18/8-2	Cables and Pulleys . . . . .	2G23/8-7
Removal/Installation . . . . .	2G18/8-2	Removal/Installation . . . . .	2G23/8-7
Repair . . . . .	2G22/8-6	Rigging . . . . .	2G24/8-8

8-1. ELEVATOR CONTROL SYSTEM. (Refer to figure 8-1.)

8-2. DESCRIPTION. The elevators are operated by power transmitted through fore-and-aft movement of the pilot or copilot control wheels. The system is comprised of control columns, an elevator torque tube, cables and pulleys. The elevator control cables, at their aft ends, are attached to a bellcrank mounted on a bulkhead in the tailcone. A push-pull tube connects this bellcrank to the elevator arm assembly, installed between the elevators. An elevator trim tab is installed in the trailing edge of the right elevator and is described in Section 9.

8-3. TROUBLE SHOOTING.

#### NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to re-rig system, refer to paragraph 8-14.

TROUBLE	PROBABLE CAUSE	REMEDY
NO RESPONSE TO CONTROL WHEEL FORE-AND-AFT MOVEMENT.	Forward or aft end of push-pull tube disconnected.	Attach push-pull tube correctly.
	Cables disconnected.	Attach cables and rig system in accordance with paragraph 8-14.

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### 8-3. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
<b>BINDING OR JUMPY MOTION FELT IN MOVEMENT OF ELEVATOR SYSTEM.</b>	Defective bellcrank or arm assembly pivot bearings or push-pull tube attach bearings.	Replace defective parts.
	Cables slack.	Adjust to tension specified in figure 8-1.
	Cables not riding correctly on pulleys.	Route cables correctly over pulleys.
	Nylon grommet on instrument panel binding.	Replace grommet.
	Defective control column bearing rollers.	Replace defective rollers.
	Defective control column torque tube bearings.	Replace defective bearings.
	Control guide on aft end of control square tube adjusted too tightly.	Loosen screw and tapered plug in end of control tube enough to eliminate binding.
	Defective elevator hinges.	Replace defective hinges.
	Defective pulleys or cable guards.	Replace defective parts and install guards properly.
	<b>ELEVATORS FAIL TO ATTAIN PRESCRIBED TRAVEL.</b>	Stops incorrectly set.
Cables tightened unevenly.		Rig in accordance with paragraph 8-14.
Interference at instrument panel.		Rig in accordance with paragraph 8-14.

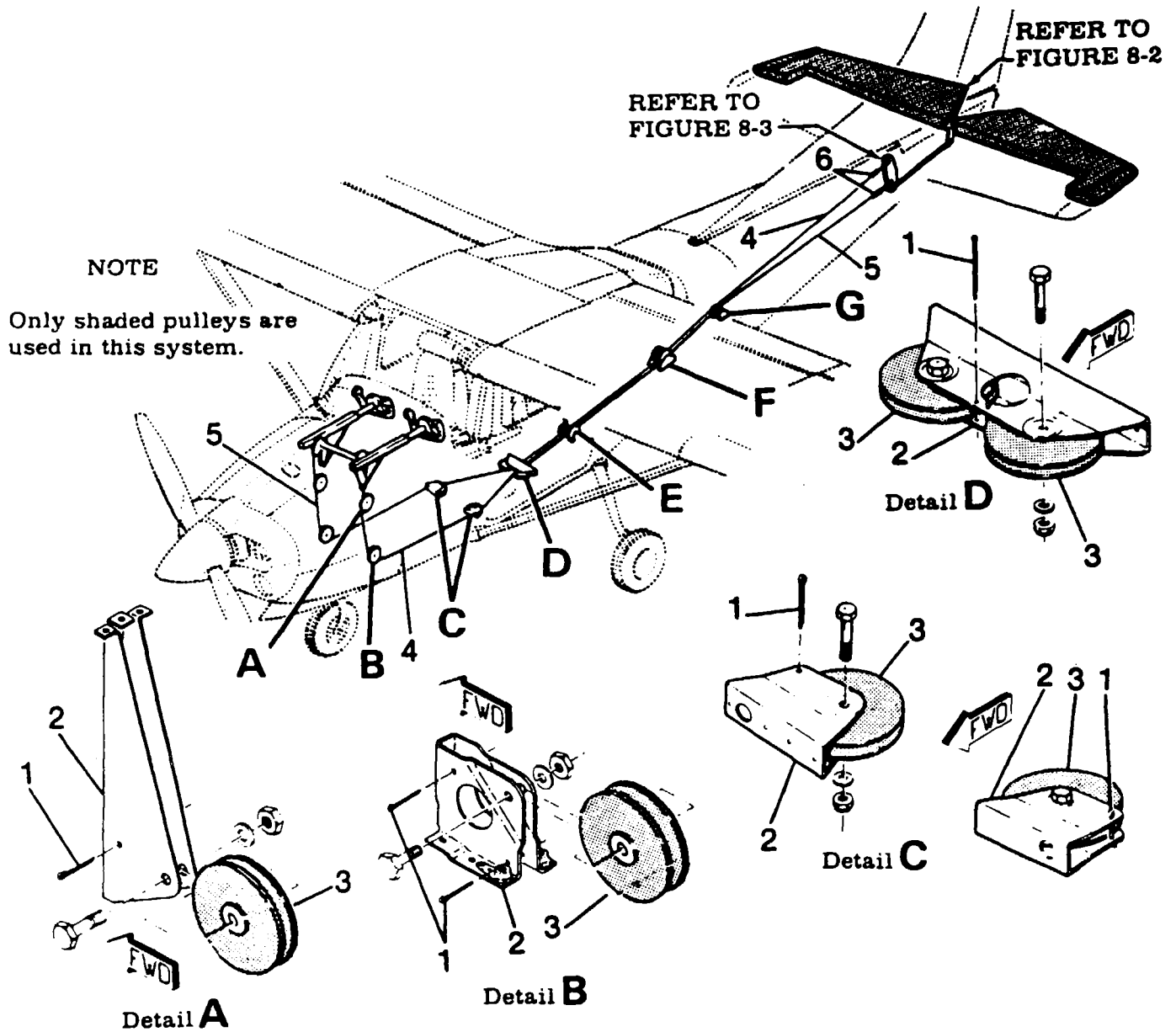
8-4. **CONTROL COLUMN.** (Refer to Section 6.) Section 6 outlines removal, installation and repair of control column.

8-5. **ELEVATORS.** (Refer to figure 8-2.)

8-6. **REMOVAL AND INSTALLATION.**

- a. Remove stinger.
- b. Disconnect trim tab push-pull tube (6) at tab actuator.

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1. Cable Guard
2. Pulley Bracket
3. Pulley
4. Elevator UP Cable
5. Elevator DOWN Cable
6. Turnbuckle
7. Spacer
8. Pin

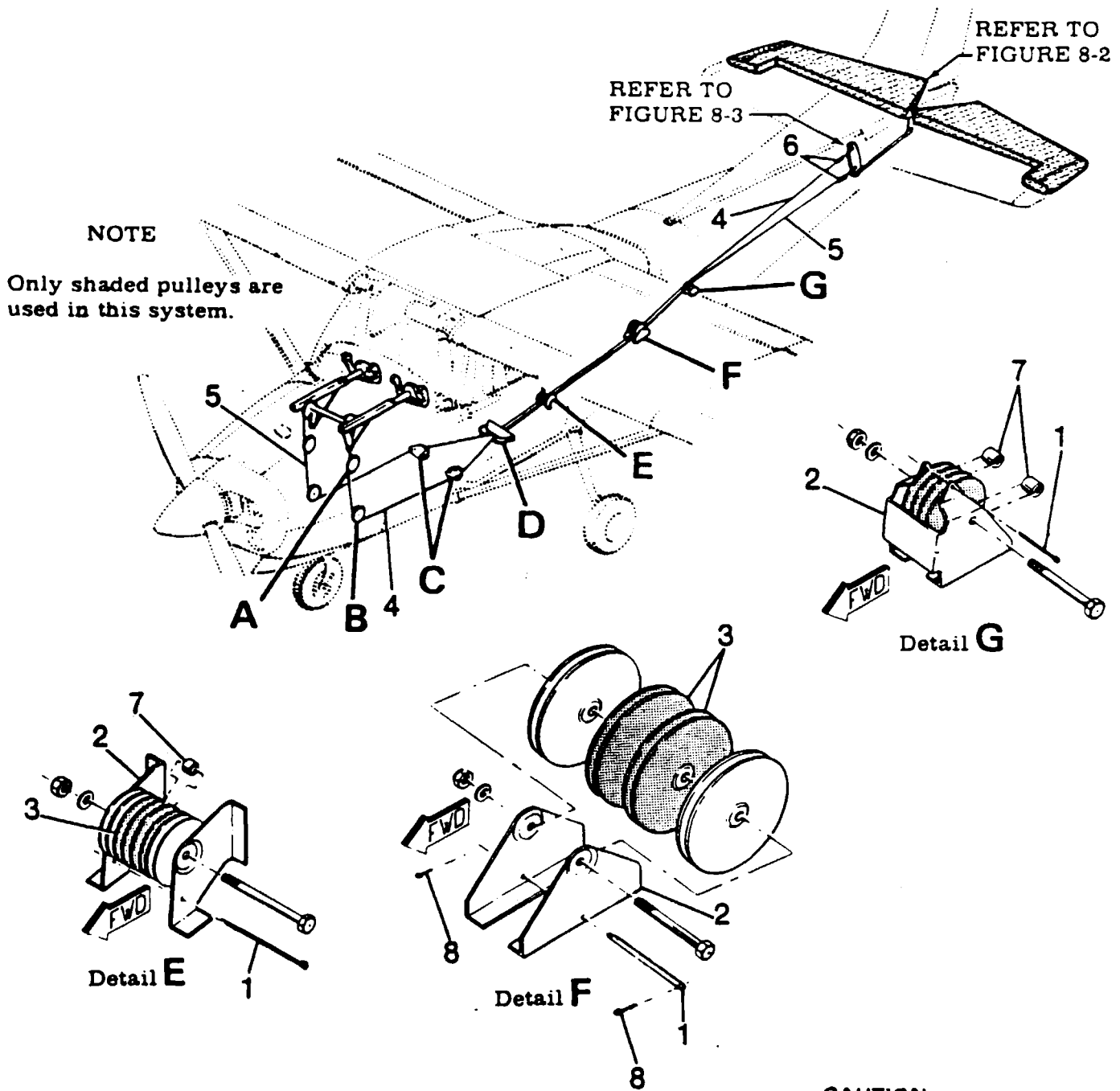
### CAUTION

MAINTAIN SPECIFIED CONTROL CABLE TENSION.

CABLE TENSION:  
30 LBS ± 10 LBS (AT AVERAGE TEMPERATURE FOR THE AREA.)  
REFER TO FIGURE 1-1 FOR TRAVEL.

Figure 8-1. Elevator Control System (Sheet 1 of 2)

MODEL R182 AND TR182 SERVICE MANUAL



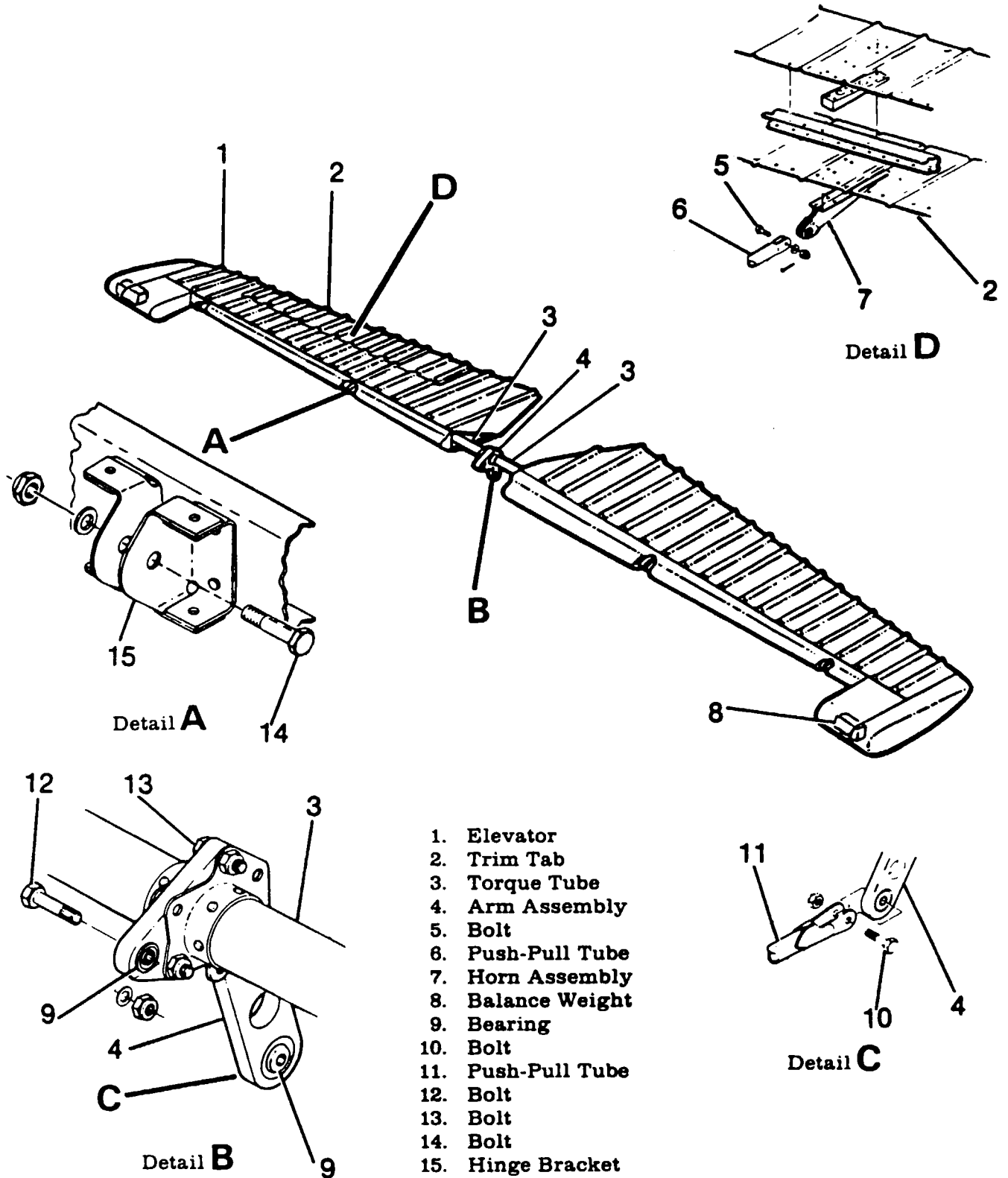
**CAUTION**

MAINTAIN SPECIFIED CONTROL CABLE TENSION.

CABLE TENSION:  
30 LBS ± 10 LBS (AT AVERAGE TEMPERATURE FOR THE AREA.)  
REFER TO FIGURE 1-1 FOR TRAVEL.

Figure 8-1. Elevator Control System (Sheet 2 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL



**NOTE**

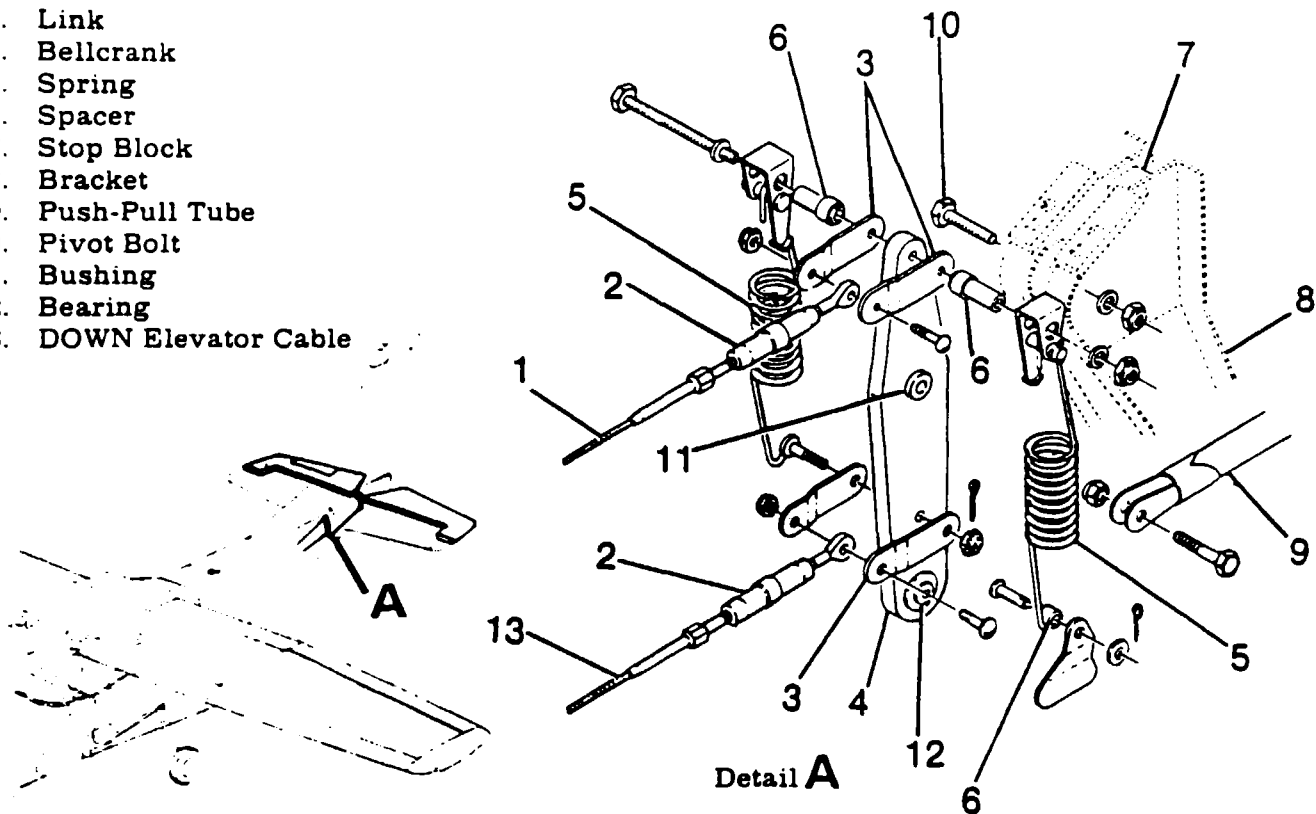
Refer to Section 9 for trim tab control system.

Figure 8-2. Elevator Installation



## MODEL R182 AND TR182 SERVICE MANUAL

1. UP Elevator Cable
2. Turnbuckle
3. Link
4. Bellcrank
5. Spring
6. Spacer
7. Stop Block
8. Bracket
9. Push-Pull Tube
10. Pivot Bolt
11. Bushing
12. Bearing
13. DOWN Elevator Cable



8-3. Elevator Bellcrank Installation

### NOTE

If trim system is not moved and actuator screw is not turned, re-rigging of trim system should not be necessary after reinstallation of elevator.

- c. Remove bolts (13) securing elevator torque tubes (3) to arm assembly (4).
- d. Remove bolts (14) from elevator hinges.
- e. Using care, remove elevator.
- f. To remove left elevator use same procedure, omitting step "b".
- g. Reverse the preceding steps for reinstallation.

8-7. REPAIR. Refer to Section 17. Hinge bearings may be replaced as necessary.

8-8. BELLCRANK. (Refer to figure 8-3.)

8-9. REMOVAL AND INSTALLATION.

- a. Remove access plate below bellcrank on tailcone.

### CAUTION

Position a support stand under tail tie-down ring to prevent the tailcone from dropping while working inside.

## MODEL R182 AND TR182 SERVICE MANUAL

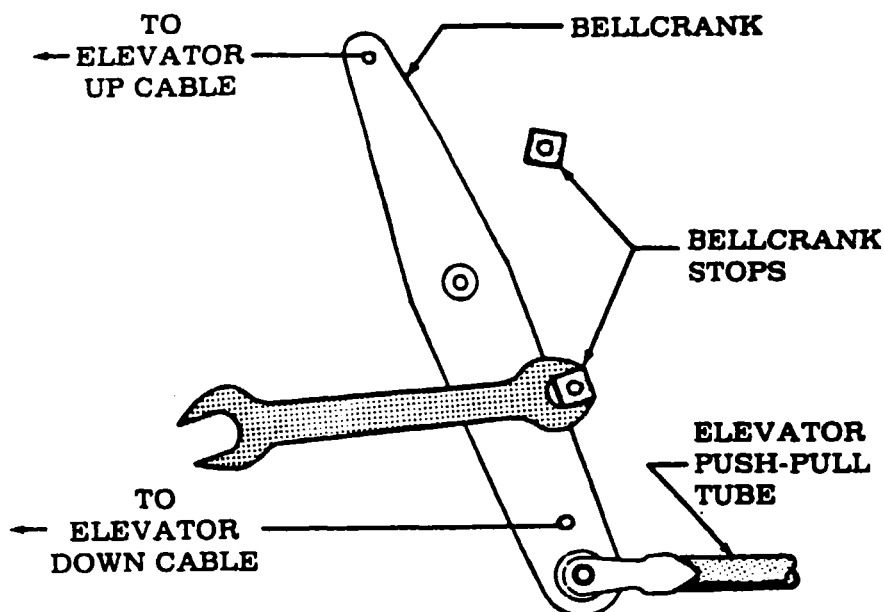


Figure 8-4. Elevator Bellcrank Travel Stop Adjustment

- b. Remove safety wire, relieve cable tension at turnbuckles (2) and disconnect turnbuckle eyes at bellcrank links (3).
- c. Disconnect elevator down-springs (5) at bellcrank (4).
- d. Disconnect push-pull tube (9) at bellcrank (4).
- e. Remove pivot bolt (10) attaching bellcrank (4) to brackets (8). Remove bellcrank.
- f. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 8-14, safety turnbuckles and reinstall all items removed for access.

8-10. ARM ASSEMBLY. (Refer to figure 8-2.)

8-11. REMOVAL AND INSTALLATION.

- a. Remove stinger.
- b. Remove bolt (10) securing push-pull tube (11) to arm assembly (4).
- c. Remove bolts (13) attaching elevator torque tubes (3) to arm assembly (4).
- d. Remove pivot bolt (12) securing arm assembly (4) and slide assembly from between elevator torque tubes.
- e. Reverse the preceding steps for reinstallation and reinstall all items removed for access.

8-12. CABLES AND PULLEYS. (Refer to figure 8-1.)

8-13. REMOVAL AND INSTALLATION.

### CAUTION

Position a support stand under tail tie-down ring to prevent the tailcone from dropping while working inside.

# MODEL R182 AND TR182 SERVICE MANUAL

## CAUTION

Maintain specified control cable tension, which is 30 Lbs±10 Lbs (at average temperature for the area).

- a. Remove seats, upholstery and access plates as necessary.
- b. Remove safety wire and relieve cable tension at turnbuckles (6).
- c. Disconnect cables at control column arm assemblies (index 18, figure 6-2).
- d. Disconnect cables at bellcrank links (index 3, figure 8-3).
- e. Remove cable guards and pulleys as necessary to work cables free of aircraft.

## NOTE

To ease routing of cables, a length of wire may be attached to the end of cable being withdrawn from aircraft. Leave wire in place, routed through structure; then attach the cable being installed and pull cable into position.

- f. After cable is routed in position, install pulleys and cable guards. Ensure cable is positioned in pulley groove before installing guards.
- g. Re-rig system in accordance with paragraph 8-14, safety turnbuckles and reinstall all items removed in step "a".

### 8-14. RIGGING. (Refer to figure 8-3.)

## CAUTION

Position a support stand under tail tie-down ring to prevent the tailcone from dropping while working inside.

## CAUTION

Maintain specified control cable tension, which is 30 Lbs±10 Lbs (at average temperature for the area).

- a. Install control column neutral position rigging tool. (Refer to figure 8-5.)
- b. Holding elevator in neutral position (streamlined with horizontal stabilizer), adjust turnbuckles (Index 2, figure 8-3) equally to obtain cable tension.
- c. Remove neutral position rigging tool from control column.
- d. Streamline elevators, mount an inclinometer on one elevator and set to 0°.

## NOTE

An inclinometer for measuring control surface travel is available from the Cessna Supply Division. Refer to Section 6.

- e. (Refer to figure 8-3.) Adjust bellcrank stop blocks (7) at brackets (8) to degree of travel specified in figure 1-1.

## MODEL R182 AND TR182 SERVICE MANUAL

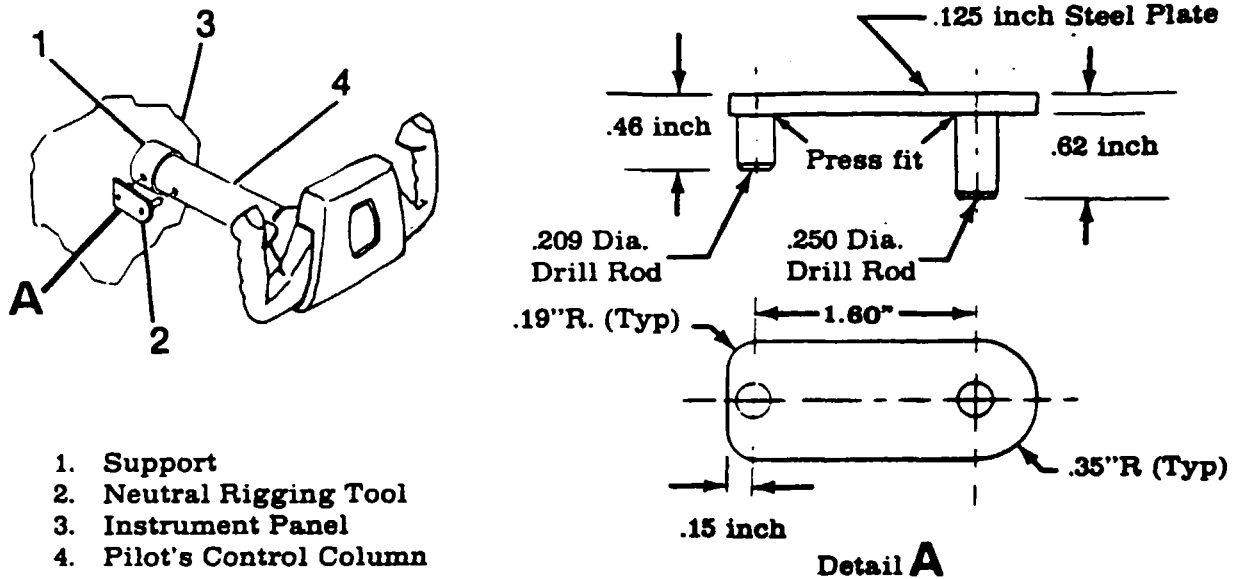


Figure 8-5. Control Column Neutral Position Rigging Tool

### NOTE

The bellcrank stop blocks (7) are four-sided bushings drilled off-center so they may be rotated to any of four positions to attain correct elevator travel. Each 90 degree rotation of the stop changes elevator travel approximately one degree.

- f. Check sponge at control column in both UP and DOWN positions and if necessary, readjust turnbuckles (Index 2, figure 8-3) to prevent the control column from hitting the instrument panel or firewall. Check for freedom of movement.
- g. Safety turnbuckles and reinstall all items removed for access.

### WARNING

Be sure elevators move in the correct direction when operated by the control wheel.

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 9

### ELEVATOR TRIM TAB CONTROL SYSTEM

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Inspection . . . . .	2H18/9-10	<b>Voltage Regulator</b>	
Tab Control Wheel . . . . .	2H18/9-11	Adjustment . . . . .	<b>2I2/9-20</b>
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9-1. ELEVATOR TRIM TAB CONTROL SYSTEM.

9-2. DESCRIPTION. The elevator trim tab, located on the trailing edge of the right elevator, is controlled by a trim wheel mounted in the pedestal. Power to operate the tab is transmitted from the trim control wheel by means of roller chains, cables, an actuator and a push-pull tube. A mechanical pointer, adjacent to the trim wheel, indicates tab position. A "nose-up" setting results in a tab-down position. An electric trim assist system may also be installed. This system is described in paragraph 9-19.

9-3. TROUBLE SHOOTING.

**NOTE**

Due to remedy procedures in the following trouble shooting chart it may be necessary to re-rig system, refer to paragraph 9-18.

# MODEL R182 AND TR182 SERVICE MANUAL

TROUBLE	PROBABLE CAUSE	REMEDY
TRIM CONTROL WHEEL MOVES WITH EXCESSIVE RESISTANCE.	Cable tension too high.	Check and adjust tension as specified in figure 9-1.
	Pulleys binding or rubbing.	Open access plates and check visually. Install cables correctly.
	Cables not in place on pulleys.	Open access plates and check visually. Install cables correctly.
	Trim tab hinge binding.	Disconnect actuator and move tab to check resistance. Lubricate or replace hinge as necessary.
	Defective trim tab actuator.	Remove chain from actuator sprocket and operate actuator manually. Replace actuator if defective.
	Rusty chain.	Check visually. Replace chain.
	Damaged sprocket.	Check visually. Replace sprockets.
	Bent sprocket shaft.	Observe motion of sprockets. Replace bent sprocket shafts.
LOST MOTION BETWEEN CONTROL WHEEL AND TRIM TAB.	Cable tension too low.	Check and adjust tension as specified in figure 9-1.
	Broken pulley.	Open access plates and check visually. Replace defective pulley.
	Cable not in place on pulleys.	Open access plates and check visually. Install cables correctly.
	Worn trim tab actuator.	Remove and replace worn actuator.
	Actuator attachment loose.	Check actuator for security. Tighten as necessary.
TRIM INDICATOR FAILS TO INDICATE CORRECT TRIM POSITION.	Indicator incorrectly engaged on wheel track.	Check visually and reset indicator as necessary.
INCORRECT TRIM TAB TRAVEL.	Stop blocks loose or incorrectly adjusted.	Adjust stop blocks on cables. Refer to figure 9-3.

## MODEL R182 AND TR182 SERVICE MANUAL

### 9-4. TRIM TAB.

### 9-5. REMOVAL AND INSTALLATION. (Refer to figure 9-2.)

- a. Disconnect push-pull tube (15) from horn assembly (16).

#### NOTE

If trim system is not moved and actuator screw is not turned, re-rigging of system should not be necessary after installation of tab.

- b. Drill out rivets securing trim tab hinge to elevator and remove trim tab.

#### NOTE

After tab has been removed and if hinge pin is to be removed, it is necessary to spread the crimped ends of the hinge before driving out pin. When a pin has been installed, crimp ends of hinge to prevent pin from working out.

- c. Reverse the preceding steps for reinstallation. Rig system if necessary in accordance with paragraph 9-18.

### 9-6. TRIM TAB ACTUATOR.

### 9-7. REMOVAL AND INSTALLATION. (Refer to figure 9-2.)

- a. Relieve cable tension at turnbuckle (index 5, figure 9-1.).

#### CAUTION

Position a support stand under the tail tiedown ring to prevent tailcone from dropping while working inside.

- b. Disconnect push-pull tube (15) at actuator (11).
- c. Remove access plate beneath actuator.
- d. Remove chain guard (10) and disengage chain from actuator sprocket (7).
- e. Remove screws attaching clamps (12) to bracket (9) and remove actuator (11) through access opening.
- f. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 9-18, safety turnbuckle and reinstall all items removed for access.

### 9-8. DISASSEMBLY. (Refer to figure 9-4.)

- a. Remove actuator in accordance with paragraph 9-7.
- b. Disassemble actuator assembly (1) as illustrated in Detail A as follows:
  1. Remove chain guard (3) if not previously removed in step "e" of paragraph 9-7.
  2. Using suitable punch and hammer, remove roll pins (8) securing sprocket (5) to screw (9) and remove sprocket from screw.
  3. Unscrew threaded rod end (15) and remove rod end from actuator.
  4. Remove roll pins (10) securing bearings (6 and 14) at the housing ends.
  5. Lightly tap screw (9) toward the sprocket end of housing, remove bearing (6) and collar (7).
  6. Lightly tap screw (9) in the opposite direction from sprocket end, remove bearing (14), O-ring (13) and collar (7).
  7. It is not necessary to remove retaining rings (11).

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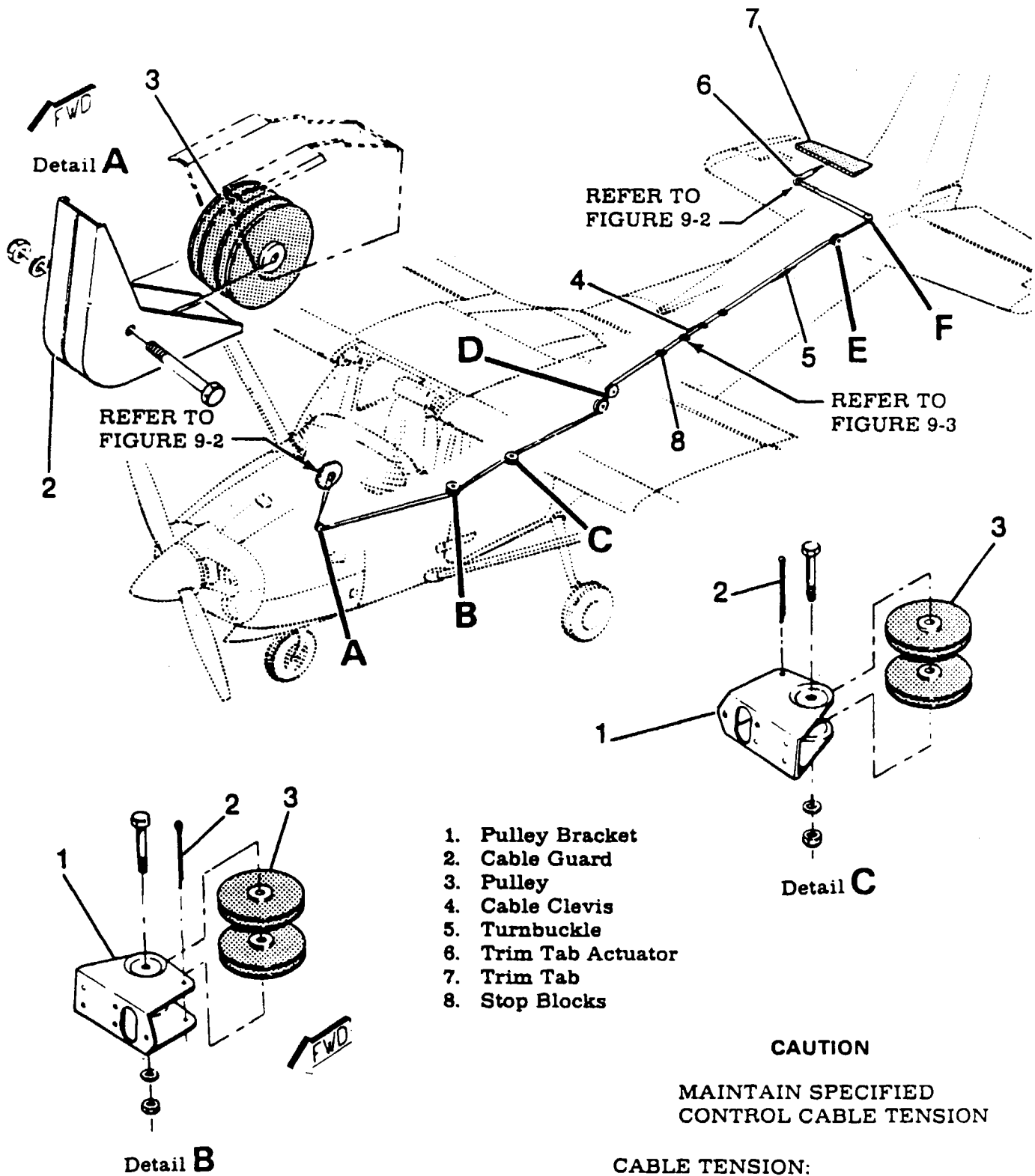


Figure 9-1. Elevator Trim Tab Control System (Sheet 1 of 2)



# MODEL R182 AND TR182 SERVICE MANUAL

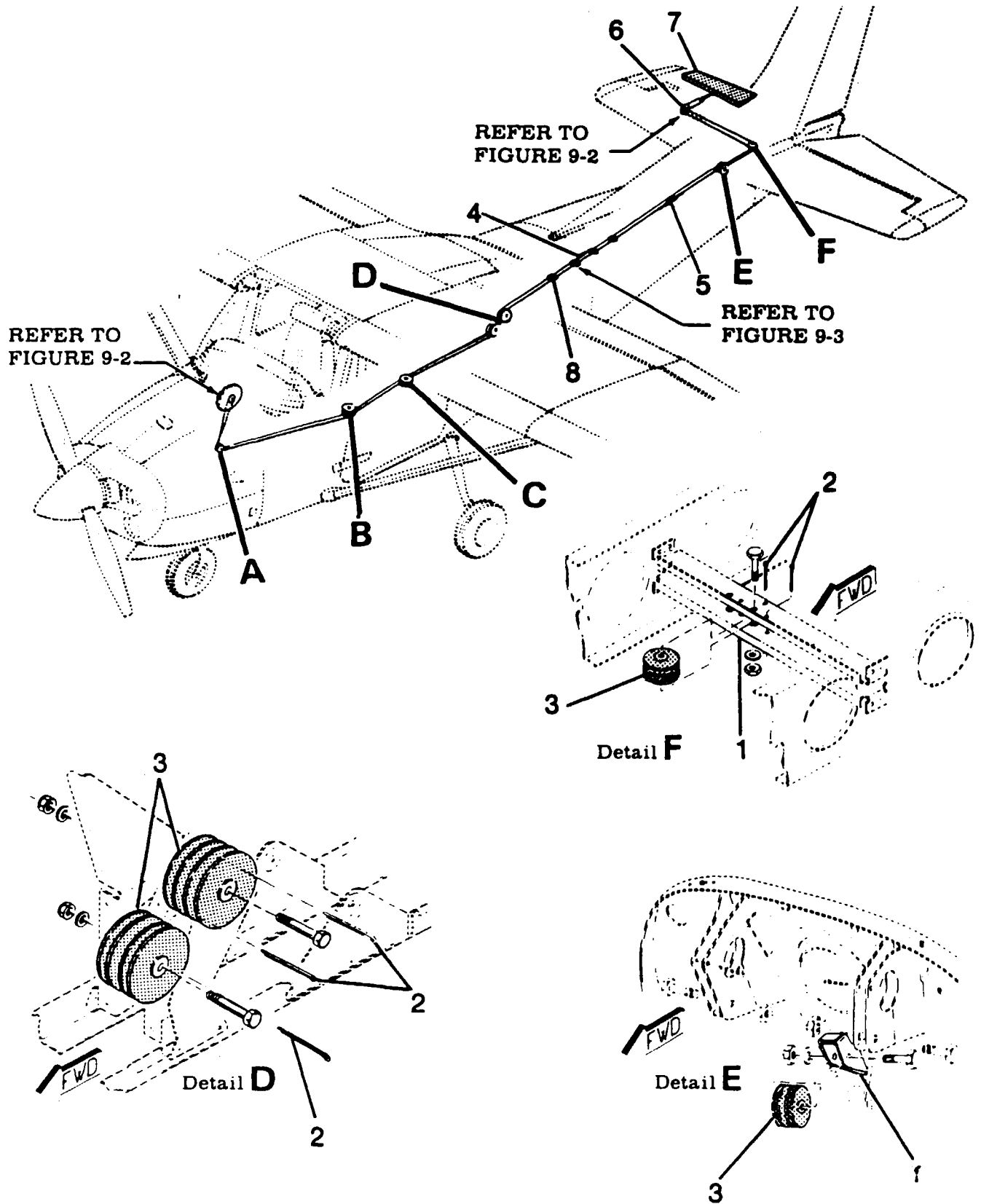


Figure 9-1. Elevator Trim Tab Control System (Sheet 2 of 2)

MODEL R182 AND TR182 SERVICE MANUAL

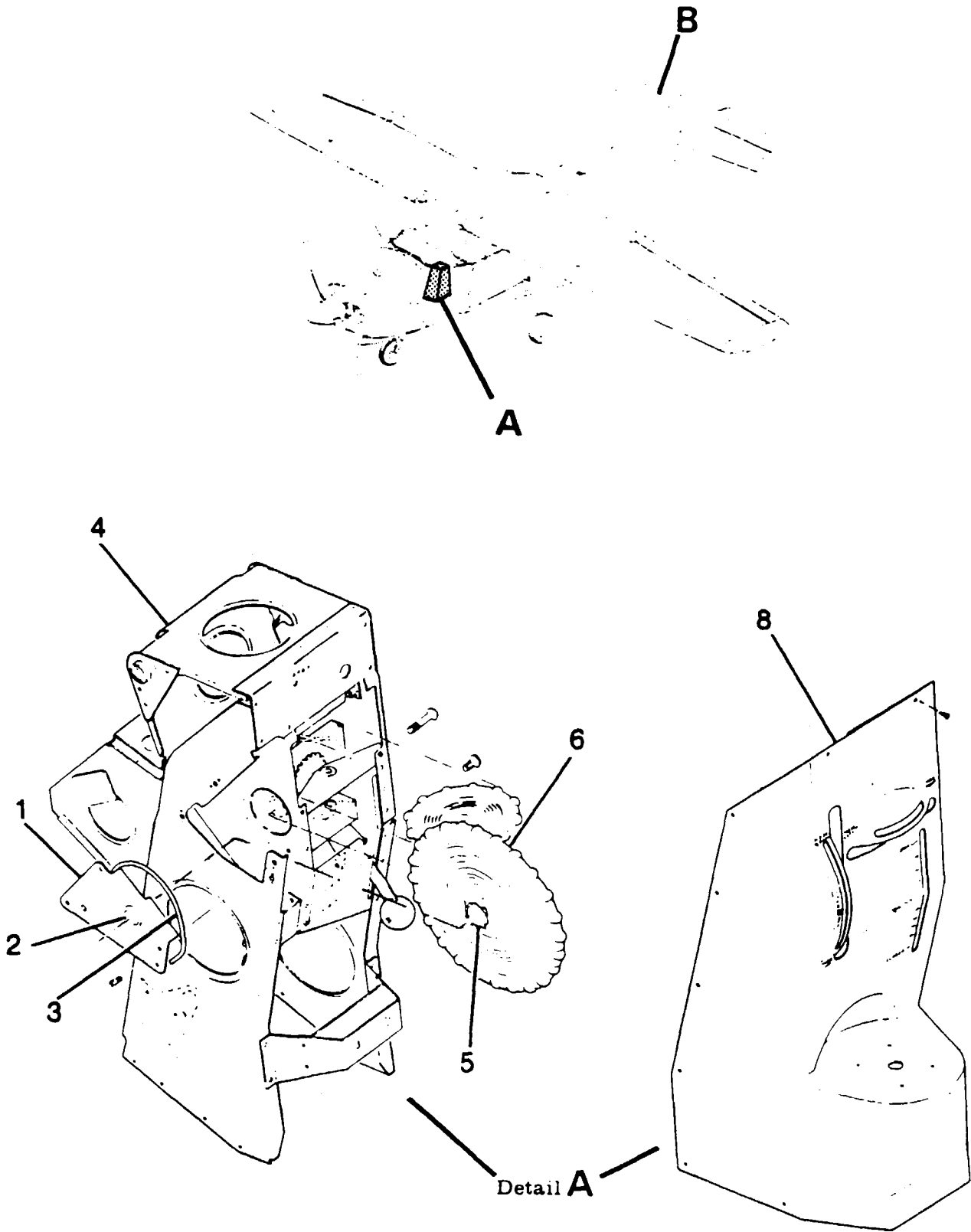
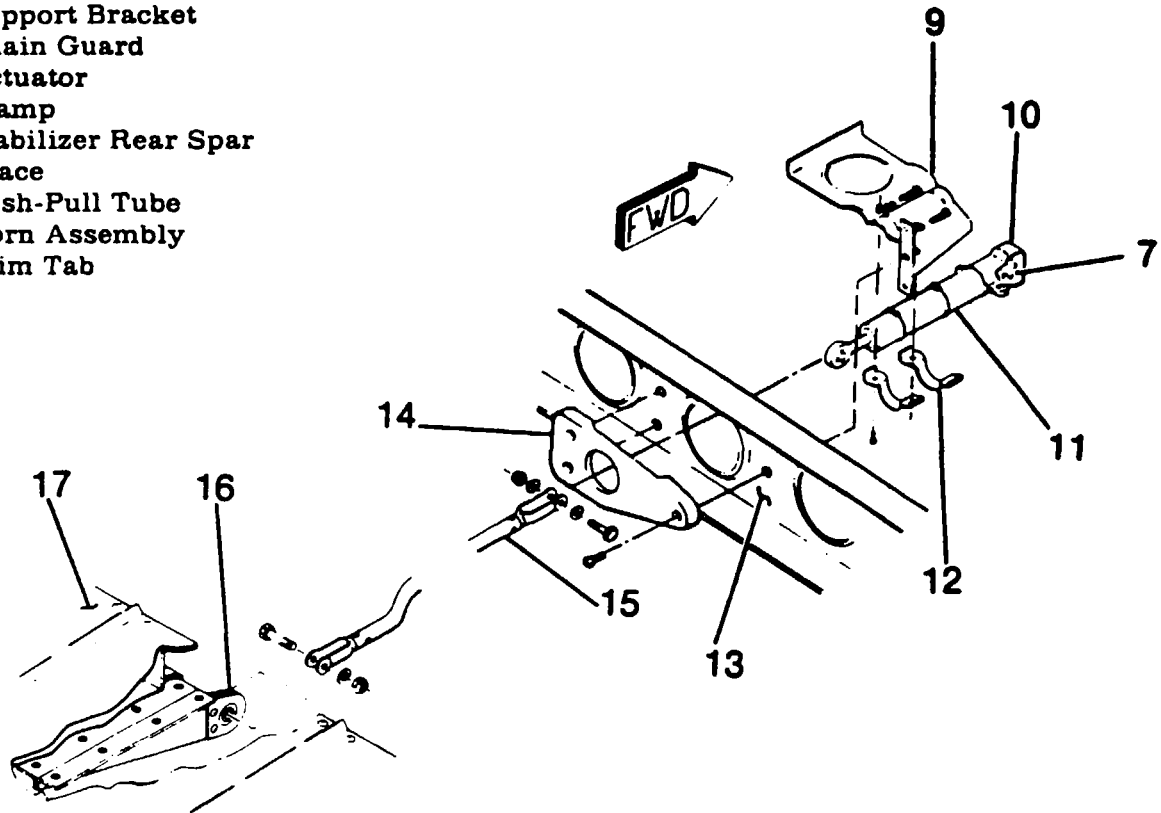


Figure 9-2. Elevator Trim Tab Control Wheel and Actuator (Sheet 1 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

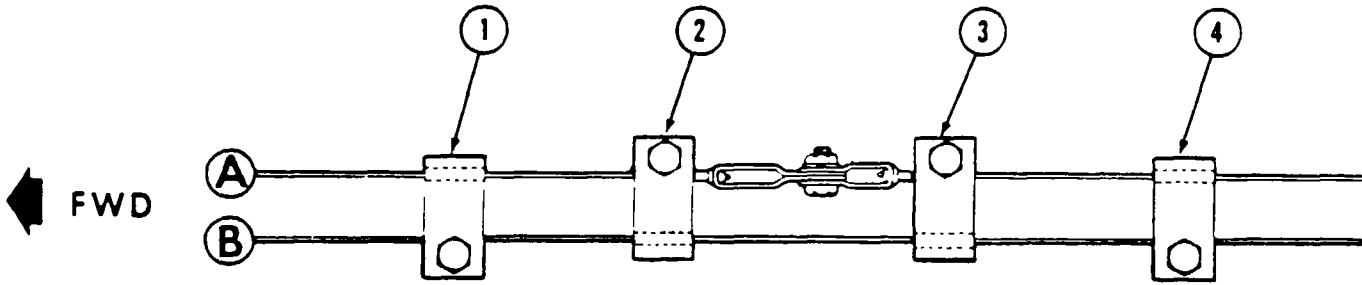
1. Retainer
2. Bearing
3. Trim Indicator
4. Pedestal Structure
5. Trim Wheel Sprocket
6. Trim Wheel
7. Sprocket
8. Pedestal Cover
9. Support Bracket
10. Chain Guard
11. Actuator
12. Clamp
13. Stabilizer Rear Spar
14. Brace
15. Push-Pull Tube
16. Horn Assembly
17. Trim Tab



Detail **B**

Figure 9-2. Elevator Trim Tab Control Wheel and Actuator (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL



1. With elevators in neutral, set trim tab to neutral (streamlined).
2. Position stop blocks (2 and 3) against cable ends and secure to cable A.
3. Place inclinometer on trim tab and lower to degree specified in figure 1-1.
4. Position stop block (4) against stop block (3) and secure to cable B.
5. Raise trim tab to specified degree, place stop block (1) against stop block (2) and secure to cable.

Figure 9-3. Elevator Trim Tab Travel Stop Adjustment

### 9-9. CLEANING, INSPECTION AND REPAIR. (Refer to figure 9-4.)

- a. **DO NOT** remove bearing (16) from threaded rod end (15) unless replacement of bearing is necessary.
- b. Clean all component parts, except bearing (16), by washing in Stoddard solvent or equivalent. Do not clean sealed bearing (16).
- c. Inspect all component parts for obvious indications of damage such as stripped threads, cracks, deep nicks and dents.
- d. Check bearings (6 and 14), screw (9) and threaded rod end (15) for excessive wear and scoring.

Dimensions of the parts are as follows:

BEARING (6)	
INSIDE DIAMETER	0.373" MIN.
INSIDE DIAMETER	0.374" MAX.
BEARING (14)	
INSIDE DIAMETER	
SMALL HOLE	0.248" MIN.
SMALL HOLE	0.249" MAX.
LARGE HOLE	0.373" MIN.
LARGE HOLE	0.374" MAX.
THREADED ROD END (15)	
OUTSIDE DIAMETER (SHANK)	0.245" MIN. 0.246" MAX.
SCREW (9)	
OUTSIDE DIAMETER	0.369" MIN. 0.370" MAX.

#### NOTE

Relative linear movement between internal threaded screw (9) and bearing (14) should be 0.004 to 0.010 inch at room temperature.

## MODEL R182 AND TR182 SERVICE MANUAL

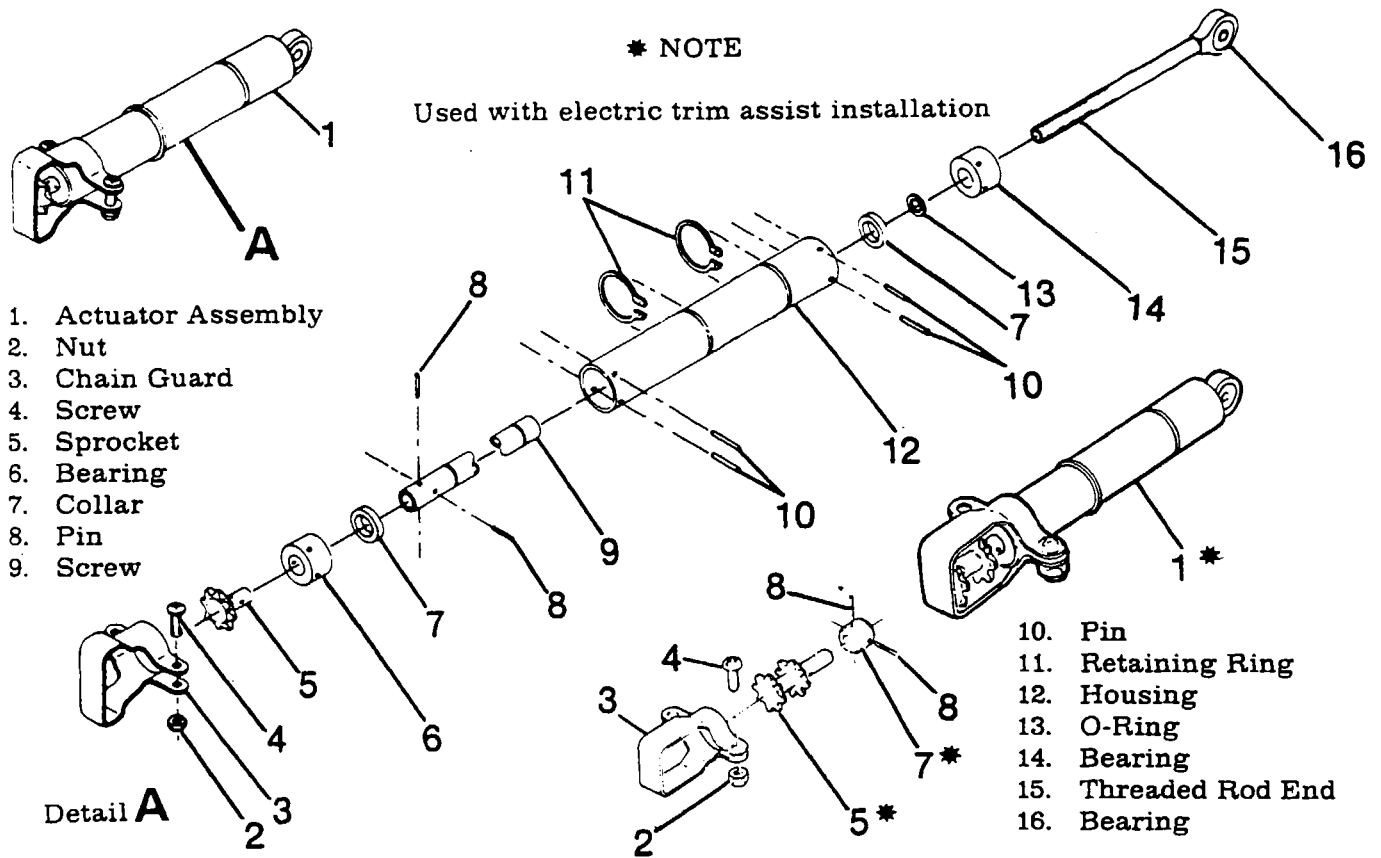


Figure 9-4. Elevator Trim Tab Actuator

- e. Examine threaded rod end (15) and screw (9) for damaged threads or dirt particles that may impair smooth operation.
- f. Check sprocket (5) for broken, chipped and/or worn teeth.
- g. Check bearing (16) for smoothness of operation.
- h. DO NOT attempt to repair damaged or worn parts of the actuator assembly. Discard all defective items and install new parts during reassembly.

### 9-10. REASSEMBLY. (Refer to figure 9-4.)

- a. Always discard the following items and install new parts during reassembly.
  1. Bearings (6 and 14).
  2. Roll Pins (8 and 10).
  3. O-Ring (13).
  4. Nuts (2).
- b. During reassembly, lubricate collars (7), screw (9) and threaded rod end (15) in accordance with Section 2.
- c. Press sprocket (5) into the end of screw (9), align roll pin holes and install new roll pins (8).
- d. Slip bearing (6) and collar (7) on screw (9) and slide them down against sprocket (5).
- e. Insert screw (9), with assembled parts, into housing (12) until bearing (6) is flush with the end of housing.

# MODEL R182 AND TR182 SERVICE MANUAL

## NOTE

When inserting screw (9) into housing (12), locate the sprocket (5) at the end of housing which is farther away from the groove for retaining ring (11).

The bearings (6 and 14) are not pre-drilled and must be drilled on assembly. The roll pins (10) are 3/32 inch in diameter, therefore, requiring a 3/32 (0.094) inch drill.

- f. With bearing (6) flush with end of housing (12), carefully drill bearing so the drill will emerge from the hole on the opposite side of housing (12). **DO NOT ENLARGE HOLES IN HOUSING.**
- g. Press new roll pins (10) into pin holes.
- h. Insert collar (7), new O-ring (13) and bearing (14) into opposite end of housing (12).
- i. Complete steps "f" and "g" for bearing (14).
- j. If a new bearing (16) is required, a new bearing may be pressed into the boss. Be sure force bears against the outer race of bearing.
- k. Screw the threaded rod end (15) into screw (9).
- l. Install retaining rings (11), if they were removed.
- m. Test actuator assembly by rotating sprocket (5) with fingers while holding threaded rod end (15). The threaded rod end should travel in and out smoothly, with no indication of binding.
- n. Reinstall actuator assembly in accordance with paragraph 9-7.

### 9-11. TRIM TAB FREE-PLAY INSPECTION. (Refer to figure 9-5.)

- a. Place elevators and trim tab in the neutral position and secure from movement.
- b. Determine maximum allowable free-play using the following instructions.
  1. Measure chord length at extreme inboard end of trim tab as shown in detail A, figure 9-5.
  2. Multiply chord length by 0.025 to obtain maximum allowable free-play.
- c. Using moderate pressure, move the trim tab trailing edge up and down by hand to check free-play.

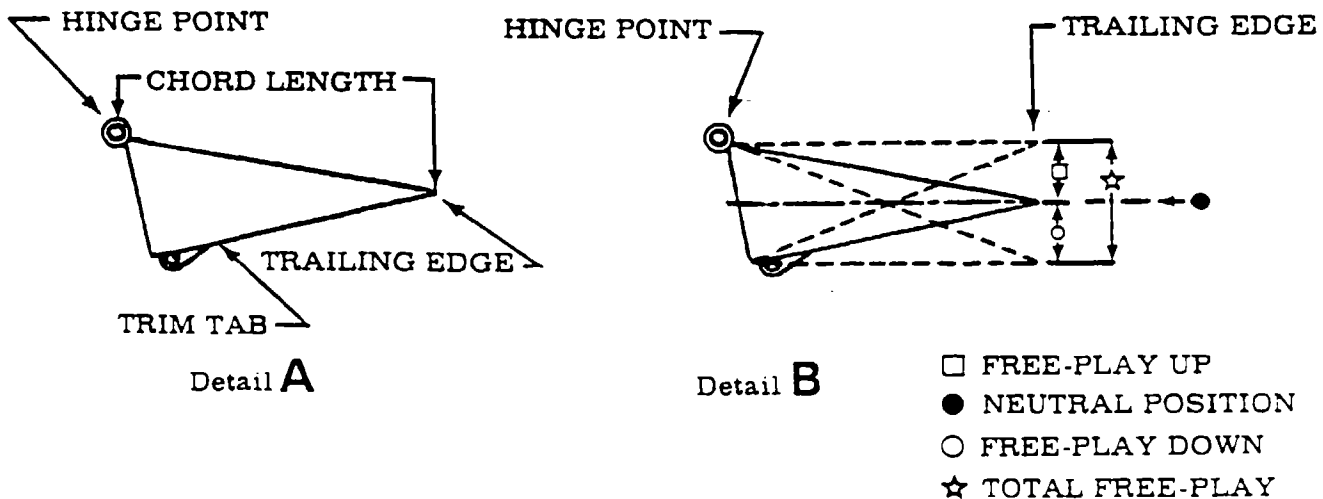


Figure 9-5. Elevator Trim Tab Free Play

# MODEL R182 AND TR182 SERVICE MANUAL

## NOTE

Measure free-play at same point on trim tab that chord length was measured. Total free-play must not exceed maximum allowable. Refer to detail B, figure 9-5.

- d. If the trim tab free-play is less than the maximum allowable, the system is within prescribed limits.
- e. If the trim tab free-play is more than the maximum allowable, check the following items for looseness while moving the trim tab up and down.
  - 1. Check push-pull tube to trim tab horn assembly attachment for looseness.
  - 2. Check push-pull tube to actuator assembly threaded rod end attachment for looseness.
  - 3. Check actuator assembly threaded rod end for looseness in actuator assembly with push-pull tube disconnected.
- f. If looseness is apparent while checking steps e-1 and e-2, repair by installing new parts.
- g. If looseness is apparent while checking step e-3, refer to paragraphs 9-6 through 9-10. Recheck trim tab free-play.

### 9-12. TRIM TAB CONTROL WHEEL.

### 9-13. REMOVAL AND INSTALLATION. (Refer to figure 9-2.)

- a. Relieve cable tension at turnbuckle (index 10, figure 9-1.)

## CAUTION

Position a support stand under the tail tiedown ring to prevent tailcone from dropping while working inside.

- b. Remove pedestal cover (8) in accordance with paragraph 9-17.
- c. Remove screws attaching control wheel retainer (1) to left side of pedestal structure (4).
- d. Remove retainer (1) and indicator (3), using care not to drop control wheel (6).
- e. Disengage roller chain from sprocket (7) and remove control wheel (6).

## NOTE

Removal of the sprocket (7) from control wheel shaft is not recommended except for replacement of parts.

- f. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 9-18, safety turnbuckle and reinstall all items removed for access.

### 9-14. CABLES AND PULLEYS.

### 9-15. REMOVAL AND INSTALLATION. (Refer to figure 9-1.)

- a. Remove seats, upholstery, pedestal cover and access plates as necessary.

## CAUTION

Position a support stand under the tail tiedown ring to prevent tailcone from dropping while working inside.

## MODEL R182 AND TR182 SERVICE MANUAL

- b. Remove travel stop blocks (8) from control cables.
- c. Disconnect control cables at turnbuckles (10) and at cable ends (9).
- d. Remove cable guards and pulleys as necessary to work cables free of aircraft. Disengage roller chains from sprockets to ease cable removal.

### NOTE

To ease routing of cables, a length of wire may be attached to end of the cable before being withdrawn from aircraft. Leave wire in place, routed through structure; then attach the cable being installed and pull cable into position.

- e. After cable is routed in position, install pulleys and cable guards. Ensure cable is positioned in pulley groove before installing guards. Ensure roller chains are positioned correctly over sprockets.
- f. Re-rig system in accordance with paragraph 9-18, safety turnbuckle and reinstall all items removed in step "a".

### 9-16. PEDESTAL COVER.

### 9-17. REMOVAL AND INSTALLATION. (Refer to figure 9-2.)

- a. Remove fuel selector valve handle and placard.
- b. Remove mike and remove mike mounting bracket.
- c. Remove cowl flap control knob.
- d. Disconnect electrical wiring to pedestal lights.
- e. Remove screws securing pedestal cover to structure and remove cover.
- f. Reverse the preceding steps for reinstallation.

### 9-18. RIGGING. (Refer to figure 9-1.)

### CAUTION

Position a support stand under the tail tiedown ring to prevent tailcone from dropping while working inside.

- a. Remove rear baggage compartment wall and access plates as necessary.
- b. Loosen travel stop blocks (8) on trim tab cables.
- c. Disconnect push-pull tube from actuator (6).
- d. Check cable tension and readjust turnbuckle (5) if necessary.

### NOTE

If chains and/or cables are being installed, permit actuator screw to rotate freely as chains and cables are connected. Adjust cable tension and safety turnbuckle (10).

- e. (Refer to figure 9-2.) Rotate trim control wheel (6) full forward (nose down). Ensure pointer (3) does not restrict wheel movement. If necessary, reposition pointer using thin screwdriver to pry trailing leg of pointer out of groove.



## MODEL R182 AND TR182 SERVICE MANUAL

### NOTE

Full forward (nose down) position of trim wheel is where further movement is prevented by the chain or cable ends contacting sprockets or pulleys.

- f. With elevator and trim tab both in neutral (streamlined), mount an inclinometer on tab and set to 0°. Disregard counterweight areas of elevators when streamlining. These areas are contoured so they will be approximately 3° down at cruising speed.

### NOTE

An inclinometer for measuring control surface travel is available from the Cessna Supply Division. Refer to Section 6.

- g. Rotate actuator screw in or out as required to place trim tab up with a maximum of 2° overtravel, with actuator screw connected to push-pull tube (15).
- h. Rotate trim wheel to position trim tab up and down, readjusting actuator screw as required to obtain overtravel in both directions.
- i. Position stop blocks and adjust as illustrated in figure 9-3 to degree of trim tab travel specified in figure 1-1.
- j. Install pedestal cover and adjust trim tab pointer to the center of the "TAKEOFF" triangle with the trim tab set at 0°.
- k. Safety turnbuckle and reinstall all items removed in step "a".

### WARNING

Be sure trim tab moves in correct direction when operated by the trim control wheel. Nose down trim corresponds to tab up position. Check for freedom of movement.

9-19. ELECTRIC ELEVATOR TRIM INSTALLATION. (Refer to figure 9-6.)

9-20. DESCRIPTION. An electric elevator trim assist system may be installed consisting of 2 switches mounted on the pilot's control wheel, a circuit breaker mounted in the lower left hand side of the instrument panel, fuselage wiring running aft to the 24 Volt D.C. electric drive assembly and a chain connecting the drive assembly to an additional sprocket mounted on the standard elevator trim actuator. The electric drive assembly includes a motor, sprockets and a chain driven solenoid type adjustable clutch. The electric drive assembly chain connects to the FORWARD sprocket of the trim tab actuator while the manual trim chain connects to the AFT sprocket of the actuator. When the clutch or the drive assembly is not energized, the drive assembly "free wheels" and, therefore, has no effect on manual operation.

## MODEL R182 AND TR182 SERVICE MANUAL

### 9-21. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
SYSTEM INOPERATIVE.	Circuit breaker out.	Check visually. Reset breaker.
	Defective circuit breaker.	Check continuity. Replace defective breaker.
	Defective wiring.	Check continuity. Repair wiring.
	Defective trim switch.	Check continuity. Replace defective switch.
	Defective trim motor.	Remove and bench test. Replace defective motor.
TRIM MOTOR OPERATING-TRIM TAB FAILS TO MOVE.	Defective clutch solenoid.	Check continuity. Replace solenoid.
	Improperly adjusted clutch tension.	Check and adjust spanner nuts for proper tension.
	Disconnected or broken cable.	Operate manual trim wheel. Connect or replace cable.
	Defective actuator.	Check actuator operation. Replace actuator.

### 9-22. REMOVAL AND INSTALLATION. (Refer to figure 9-6.)

- a. Remove covers (12) beneath tab actuator assembly (6) and drive assembly.
- b. Disconnect electrical connectors (13 and 14) and relieve tension on drive chain (8) at turnbuckle (9).
- c. Remove chain guard (10) from tab actuator.
- d. Remove mounting bolts from drive assembly and tab actuator and remove units from the aircraft.
- e. Reverse preceding steps for reinstallation. Check system rigging in accordance with paragraph 9-24.
- f. Reinstall all items removed for access.

### 9-23. CLUTCH ADJUSTMENT. (Refer to figure 9-6.)

- a. Remove access covers (12) below drive assembly.
- b. Remove safety wire and relieve drive chain tension at turnbuckle (9).
- c. Disconnect electric motor by unplugging electrical connectors (13) leading to motor assembly.
- d. Remove mounting bolts from drive assembly. It is necessary to remove unit from aircraft to make necessary adjustments to clutch.

# MODEL R182 AND TR182 SERVICE MANUAL

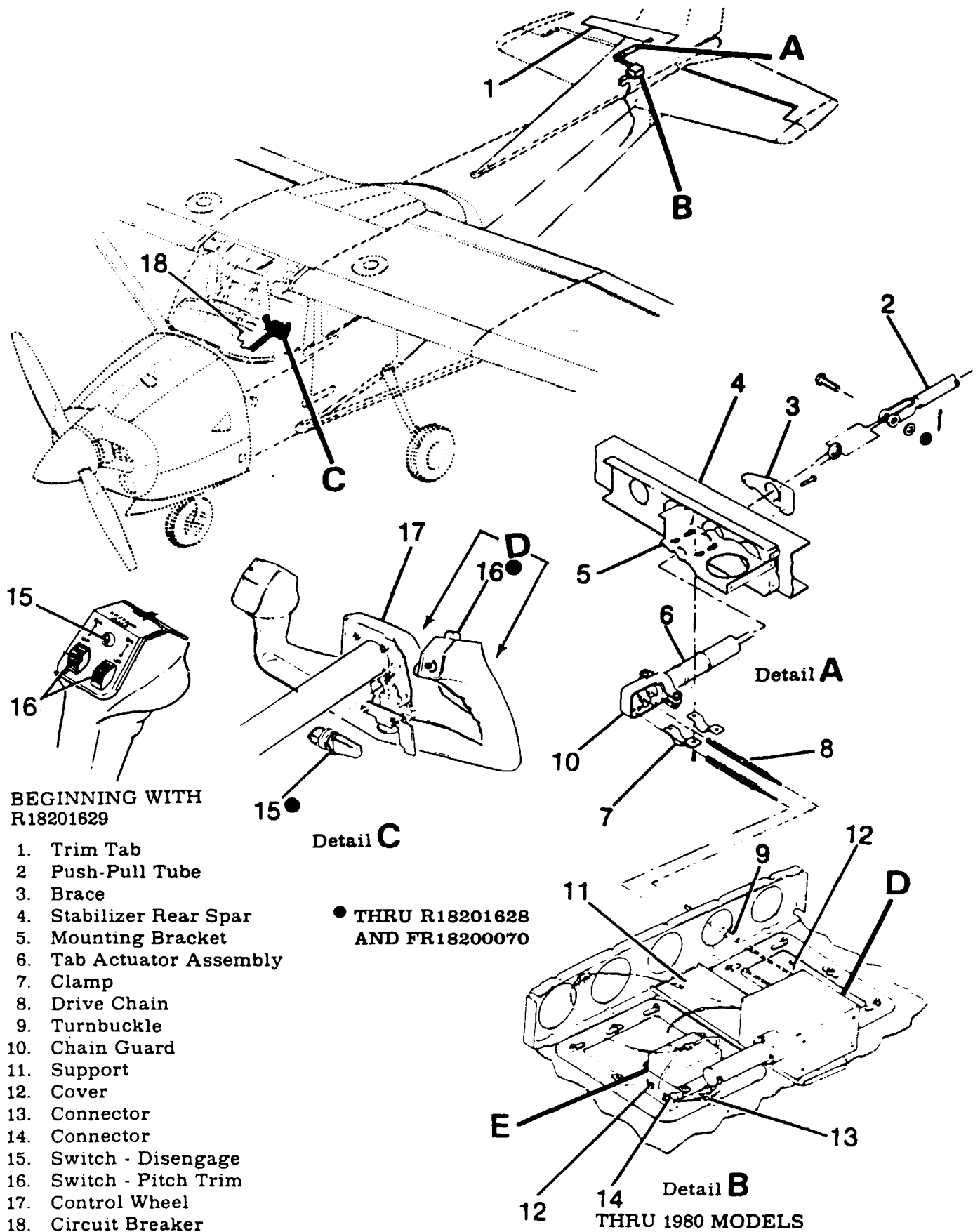


Figure 9-6. Electric Trim Installation (Sheet 1 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

- 19. Screw
- 20. Rub Strip
- 21. Cover Assembly
- 22. Shaft Assembly
- 23. Nut
- 24. Washer
- 25. Spring Washer
- 26. Washer Assembly
- 27. Chain
- 28. Sprocket
- 29. Shaft
- 30. Washer

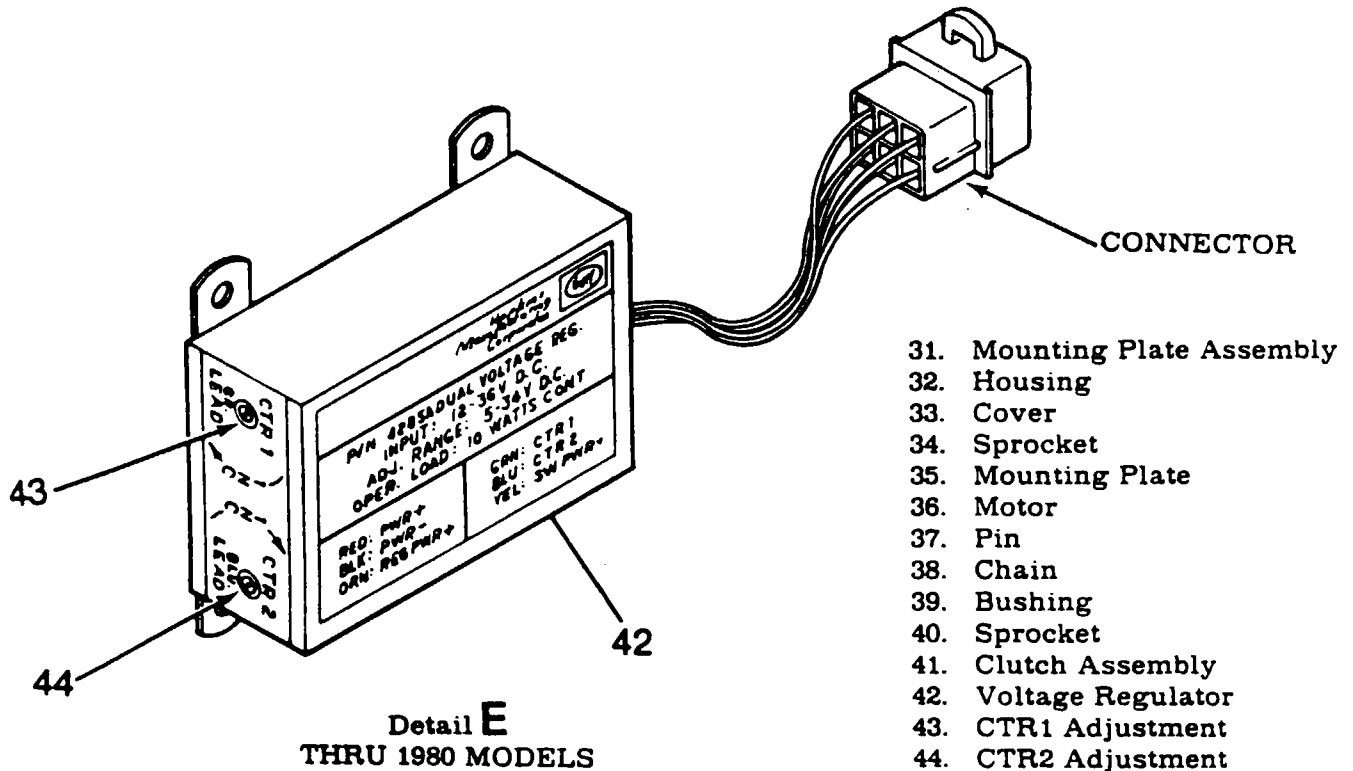
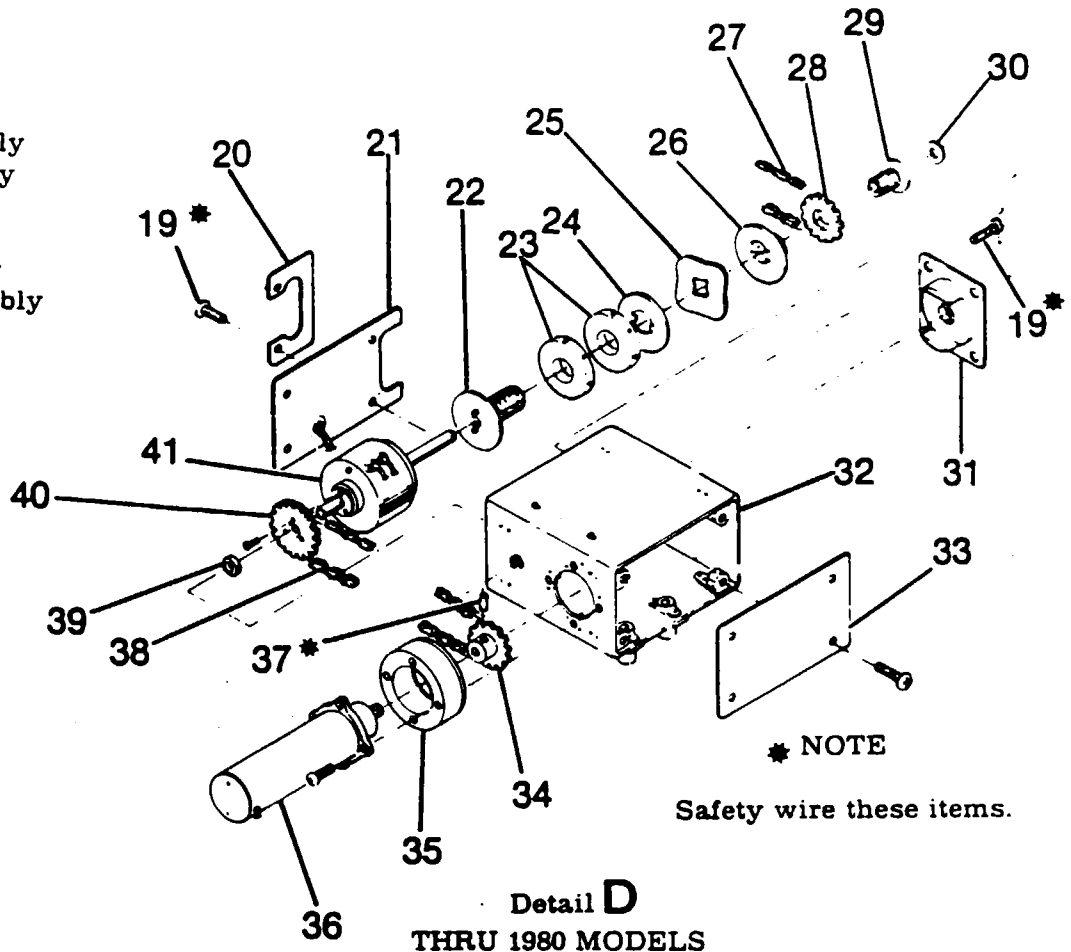


Figure 9-6. Electric Trim Installation (Sheet 2 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

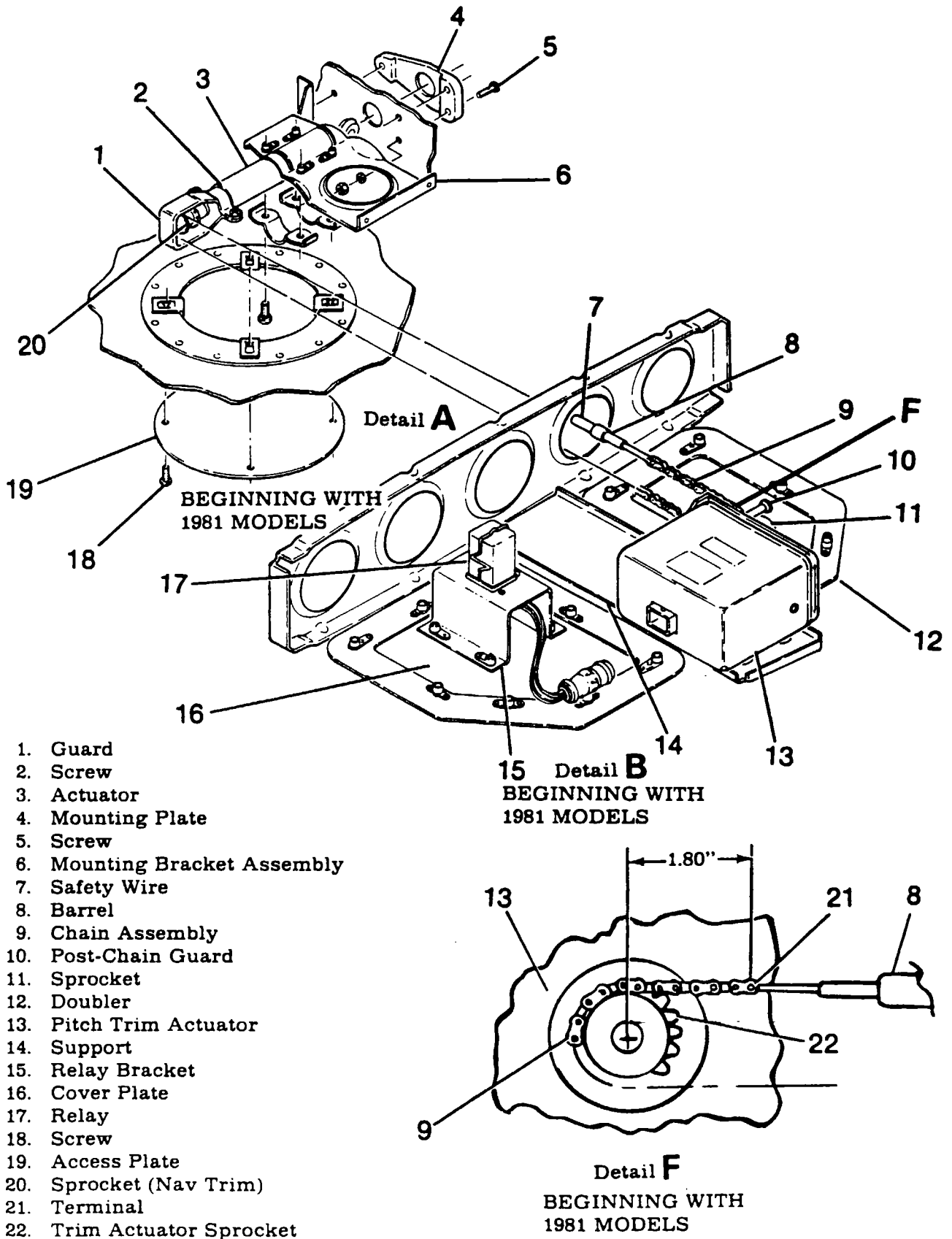


Figure 9-6. Electric Trim Installation (Sheet 3 of 3)

## MODEL R182 AND TR182 SERVICE MANUAL

### NOTE

Step 3 isolates the motor assembly from the remainder of the electric trim system so it cannot be engaged during clutch adjustment.

- e. Remove screws securing covers (20) and (21) to housing (32) and slide the cover down over electrical wiring far enough to expose the clutch assembly.
- f. Ensure the electric trim circuit breaker on the pedestal cover is pushed in and place master switch in ON position.
- g. Place disengage switch (15) in ON position.
- h. Operate pitch trim switch (16) UP or DOWN to energize the solenoid clutch (41).
- i. Attach a spring scale to drive chain and slowly pull scale till clutch slippage occurs.

### NOTE

During step "i", attach scale to drive chain so that sprocket rotates clockwise as viewed from the drive end to ensure proper clutch adjustment.

- j. Repeat steps "h" and "i" several times to break initial friction of clutch.
- k. Repeat step "i" very slowly while watching indicator on spring scale. Slippage should occur between 29.1 and 32.9 pounds.
- l. If tension is not within tolerance, loosen OUTSIDE spanner nut (23) which acts as a lock.
- m. Tighten INSIDE spanner nut to increase clutch tension and loosen nut to decrease clutch tension.
- n. When clutch tension is within tolerance, tighten outside spanner nut against inside nut.
- o. Connect electrical wiring removed in step 3, and reinstall drive assembly in aircraft.
- p. Rerig trim system in accordance with paragraph 9-24 and reinstall all items removed for access.

#### 9-24. RIGGING - ELECTRIC TRIM ASSIST. (See figure 9-1.)

- a. THRU 1980 MODELS.
  1. The standard manual elevator trim system MUST be rigged in accordance with paragraph 9-18 before rigging electric trim assist.
  2. Move elevator trim tab to full "NOSE UP" position.
  3. Locate NAS228 terminal of turnbuckle (9) at a point 0.75 inch from drive assembly housing.
  4. Adjust AN155 barrel until chain deflection between sprockets is approximately 0.25 inch.
  5. Resafety turnbuckle and reinstall all items removed for access.
- b. BEGINNING WITH 1981 MODELS.

### NOTE

Be sure the elevator control system has been rigged in accordance with Section 8 and standard manual elevator trim system is rigged in accordance with paragraph 9-18.

## MODEL R182 AND TR182 SERVICE MANUAL

1. Place control wheels in neutral position of elevator travel and secure with control neutral rigging tool shown in Section 8.
2. Remove the aft, inboard access plate on the underside of the right-hand stabilizer to gain access to the pitch trim actuator (13). Then remove the outboard access plate (19) on the right-hand stabilizer to gain access to the navomatic pitch trim sprocket assembly (20).
3. Remove the four plug buttons on the under side of the stabilizer and ensure the pitch trim actuator assembly (13) is securely bolted to the actuator support (14).
4. With the trim tab in the full UP position check to see that pitch trim actuator chain (9) is properly aligned and that barrel (8) is safely wired (7) also that the trim actuator chain (9) deflection is .25 inch between sprockets (20 & 11).
5. Locate terminal (21) shown in Detail F on upper side of chain assembly (9) and ensure that terminal (21) is 1.80 inches from the center of the sprocket (22) as shown in Detail F.

### NOTE

If the navomatic pitch trim chain assembly (9) is to be removed for readjustments, it is necessary to remove the two chain guard posts (10) on the trim actuator (13) and chain guard (1) from the actuator assembly (3).

### CAUTION

When the chain guard posts (10) are being unscrewed for removal, use caution to not lose the locking washers.

6. In order to properly adjust the electric trim system, it is first necessary to assure that you have a well regulated continuous 28.8 volts dc (aircraft should be equipped with a C611005-0102 and-0101 alternator control units applied to the electronics side of the aircraft's bus bar. This can be accomplished in one of the following methods:
  - (a) Using the standard aircraft starting procedures, run the engine at approximately 1000 RPM to maintain normal operating aircraft voltage (28.8 vdc).
  - (b) With the master switch and avionics power switch in the OFF position, connect a well regulated and filtered external power supply directly to the battery side of the battery contactor. Adjust the power supply for 28.8 volts dc and then turn ON the master switch and avionics power switch to supply power to the system.

### CAUTION

Failure to observe proper polarity when connecting an external power source directly to the battery side of the battery contactor will result in damage to the diodes in the alternator and other semiconductor devices in the aircraft.

## MODEL R182 AND TR182 SERVICE MANUAL

7. With 28.8 volts dc applied to the electronics bus, use trim switches on control and rotate the pitch command wheel to the full "NOSE-DOWN" position.
8. Place a piece of tape or a mark on the very top of the airplane's ELEVATOR TRIM command wheel so a full revolution of the ELEVATOR TRIM command wheel may be observed and timed with a stop watch.
9. Observe and time stop to stop of the aircraft ELEVATOR TRIM command wheel by placing the trim switches on the control wheel in the UP position and ensure you obtain a timing of  $33 \pm 3$  seconds for one complete rotation of the aircraft ELEVATOR TRIM command wheel. Reverse this procedure and ensure that you are getting a reading of  $33 \pm 3$  seconds for one full rotation of the ELEVATOR TRIM command wheel in the "NOSE-DOWN" position. If the rate of travel for one full rotation does not agree with the aforementioned travel time limits, then use the following procedures to obtain the desired rate of pitch trim tab travel.
10. Turn avionics power switch, and aircraft master switch to the OFF position.
11. Remove the neutral rigging tool installed in Step 1, replace the access plates removed in Step 2, replace the plug buttons removed in step 3, remove the external power source installed in step 6.

### NOTE

For Air Load Test and Mechanical Clutch Torque Adjustment, refer to the Avionics Service/Parts Manual.

- 9-25. VOLTAGE REGULATOR ADJUSTMENT. (Refer to figure 9-6.)
- a. Remove access cover (39).
  - b. Connect an external power source of 27.5 volts DC continuous to the aircraft electrical system, or if an external power supply is not available, run the aircraft engine at approximately 1000 RPM to maintain the normal operating aircraft voltage.
  - c. Disconnect the electrical power leads to the motor by unplugging the connectors installed in the RED and BLACK wire leading to the motor assembly.
  - d. Connect one lead of a DC voltmeter capable of measuring the aircraft voltage to either the RED or BLACK wire leading to the motor and the other voltmeter lead to a good aircraft ground.



## MODEL R182 AND TR182 SERVICE MANUAL

- e. Operate the electric trim switch to the Nose UP and Nose DOWN positions and check voltage present at the RED and BLACK wires.
- f. Adjust CTR 1 and CTR 2 adjustment screws on the voltage regulator counterclockwise (CCW), then slowly turn adjustment screws clockwise (CW) until a 13.5 volt output is obtained for both (RED and BLACK) leads.
- g. Remove voltmeter and reconnect the motor assembly power leads. Be sure to connect RED to RED and BLACK to BLACK when reconnecting leads.
- h. Check to see if full "NOSE UP" to full "NOSE DOWN" and full "NOSE DOWN" to full "NOSE UP" cycle time is  $50 \pm 3$  seconds.

### CAUTION

The trim motor should be allowed to cool between voltage regulator adjustments for approximately 5 minutes if several actuations of the motor become necessary during adjustment.

- i. Readjust voltage regulator as required to obtain  $50 \pm 3$  seconds cycle time.

### NOTE

If trim tab travel time exceeds 53 seconds, lubricate and "free up" elevator trim system as required per section 2.

- j. Check trim system for proper operation and reinstall all items removed for access.

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 10

### RUDDER AND RUDDER TRIM CONTROL SYSTEMS

TABLE OF CONTENTS	Page No. Aerofiche/ Manual		
<b>RUDDER CONTROL SYSTEM . . .</b>	<b>2I13/10-1</b>	<b>Cables and Pulleys . . . . .</b>	<b>2I19/10-7</b>
Description . . . . .	2I13/10-1	Removal/Installation . . . . .	2I19/10-7
Trouble Shooting . . . . .	2I13/10-1	Rigging . . . . .	2I19/10-7
Rudder Pedal Assembly . . . . .	2I14/10-2	<b>RUDDER TRIM/NOSE WHEEL</b>	
Removal/Installation . . . . .	2I14/10-2	<b>STEERING SYSTEM . . . . .</b>	<b>2I20/10-8</b>
Rudder . . . . .	2I18/10-6	Description . . . . .	2I20/10-8
Removal/Installation . . . . .	2I18/10-6	Trouble Shooting . . . . .	2I20/10-8
Repair . . . . .	2I19/10-7	Rigging . . . . .	2I24/10-12

- 10-1. RUDDER CONTROL SYSTEM. (Refer to figure 10-1.)
- 10-2. DESCRIPTION. Rudder control is maintained through use of conventional rudder pedals which also control nosewheel steering. The system is comprised of the rudder pedals, cables and pulleys, bellcranks and the nosewheel steering bungee.
- 10-3. TROUBLE SHOOTING.

#### NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to re-rig system, refer to paragraph 10-11.

TROUBLE	PROBABLE CAUSE	REMEDY
RUDDER DOES NOT RESPOND TO PEDAL MOVEMENT.	Broken or disconnected cables.	Open access plates and check visually. Connect or replace cables.
BINDING OR JUMPY MOVEMENT OF RUDDER PEDALS.	Cables too tight.	Refer to figure 10-1 for cable tension. Rig system in accordance with paragraph 10-11.
	Cables not riding properly on pulleys.	Open access plates and check visually. Route cables correctly over pulleys.
	Binding, broken or defective pulleys or cable guards.	Open access plates and check visually. Replace defective pulleys and install guards properly.

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### 10-3. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
	Pedal bars need lubrication.	Refer to Section 2.
	Defective rudder bar bearings.	If lubrication fails to eliminate binding. Replace bearing blocks.
	Defective rudder hinge bushings.	Check visually. Replace defective bushings.
	Clevis bolts too tight.	Check and readjust bolts to eliminate binding.
	Steering rods improperly adjusted.	Rig system in accordance with paragraph 10-11.
LOST MOTION BETWEEN RUDDER PEDALS AND RUDDER.	Insufficient cable tension.	Refer to figure 10-1 for cable tension. Rig system in accordance with paragraph 10-11.
INCORRECT RUDDER TRAVEL.	Incorrect rigging.	Rig in accordance with paragraph 10-11.

### 10-4. RUDDER PEDAL ASSEMBLY.

### 10-5. REMOVAL AND INSTALLATION. (Refer to figure 10-2.)

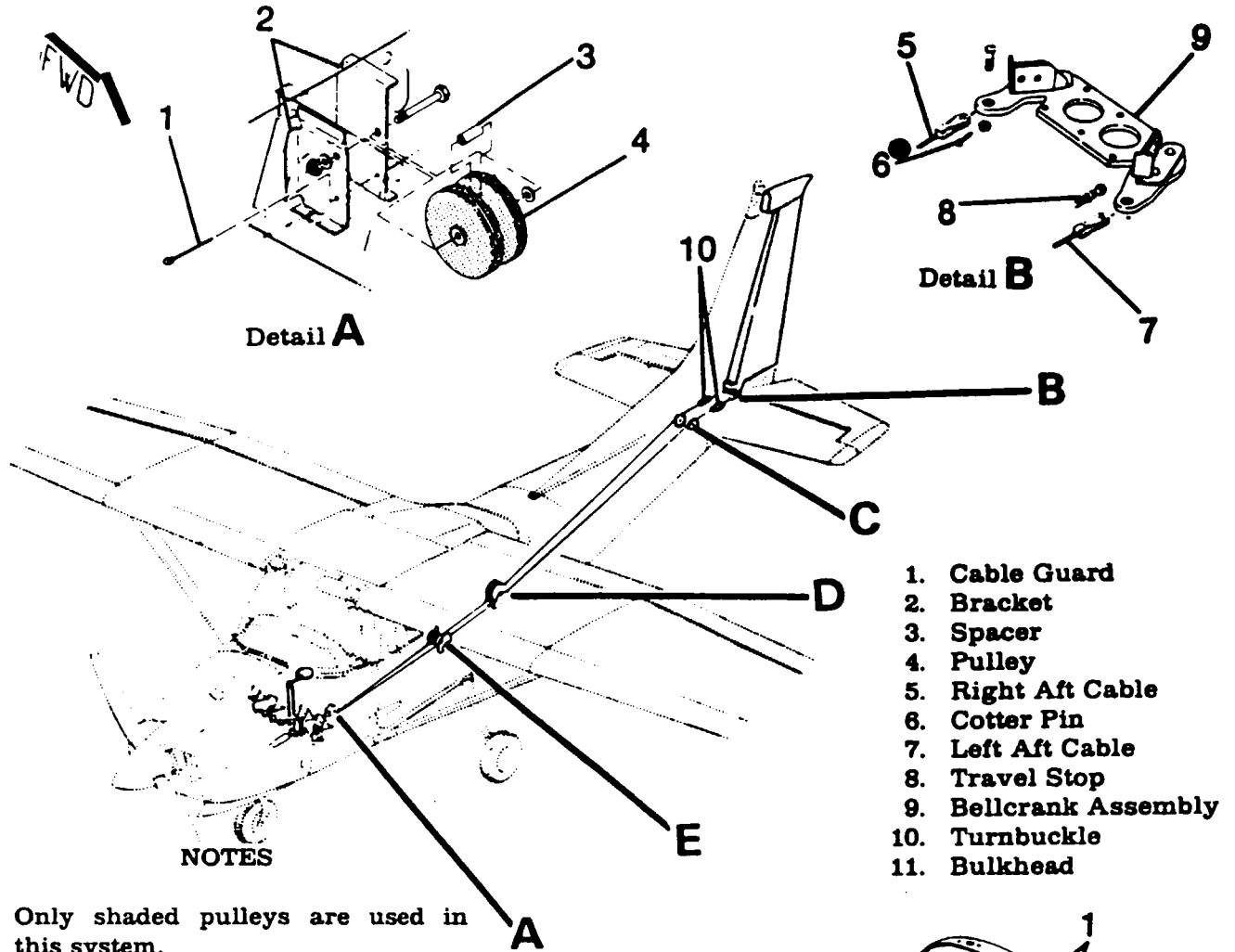
- a. Remove carpeting, shields and soundproofing from the rudder pedal and tunnel areas as necessary for access.
- b. Disconnect brake master cylinders (15) and parking brake cables at pilot's rudder pedals.

#### NOTE

Brake links (5), bellcranks (17), brake torque tubes (14) and attaching parts are not required unless dual controls ARE installed. When dual controls ARE NOT installed, hubs (18) are attached to each end of rudder bars.

- c. Remove rudder pedals (2) and brake links (5).
- d. Remove fairing from either side of vertical fin, remove safety wire and relieve cable tension by loosening turnbuckles (index 10, figure 10-1).
- e. Disconnect cables (6 and 7) from rudder bar arms (8).
- f. Disconnect steering bungee rod end (12) from rudder bar arm (13) (figure 10-5).
- g. Remove bolts securing bearing blocks (10) and carefully work rudder bars out of tunnel area.

MODEL R182 AND TR182 SERVICE MANUAL

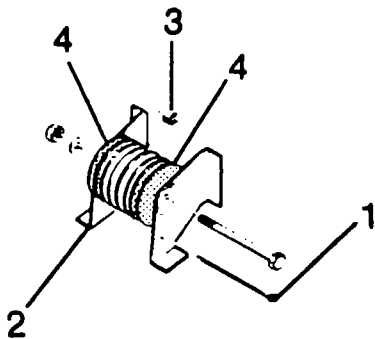


1. Cable Guard
2. Bracket
3. Spacer
4. Pulley
5. Right Aft Cable
6. Cotter Pin
7. Left Aft Cable
8. Travel Stop
9. Bellcrank Assembly
10. Turnbuckle
11. Bulkhead

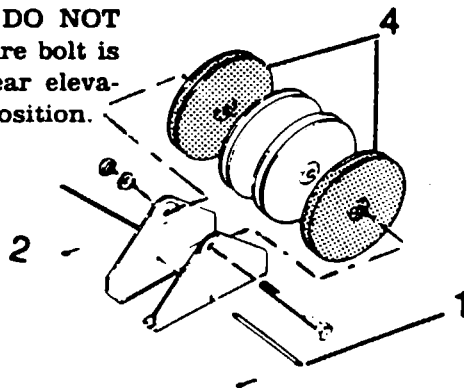
NOTES

Only shaded pulleys are used in this system.

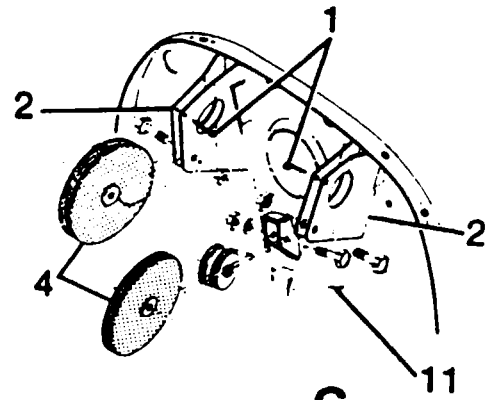
- Trim cotter pin (6) at rudder bellcrank (9) to clear elevator torque tube in UP position. DO NOT cut pin too short. Make sure bolt is proper length and will clear elevator torque tube in the UP position.



Detail E



Detail D



Detail C

CAUTION

MAINTAIN SPECIFIED CONTROL CABLE TENSION.

CABLE TENSION:  
 30 LBS ± 10 LBS (AT AVERAGE TEMPERATURE FOR THE AREA.)  
 REFER TO FIGURE 1-1 FOR TRAVEL.

Figure 10-1. Rudder Control System

# MODEL R182 AND TR182 SERVICE MANUAL

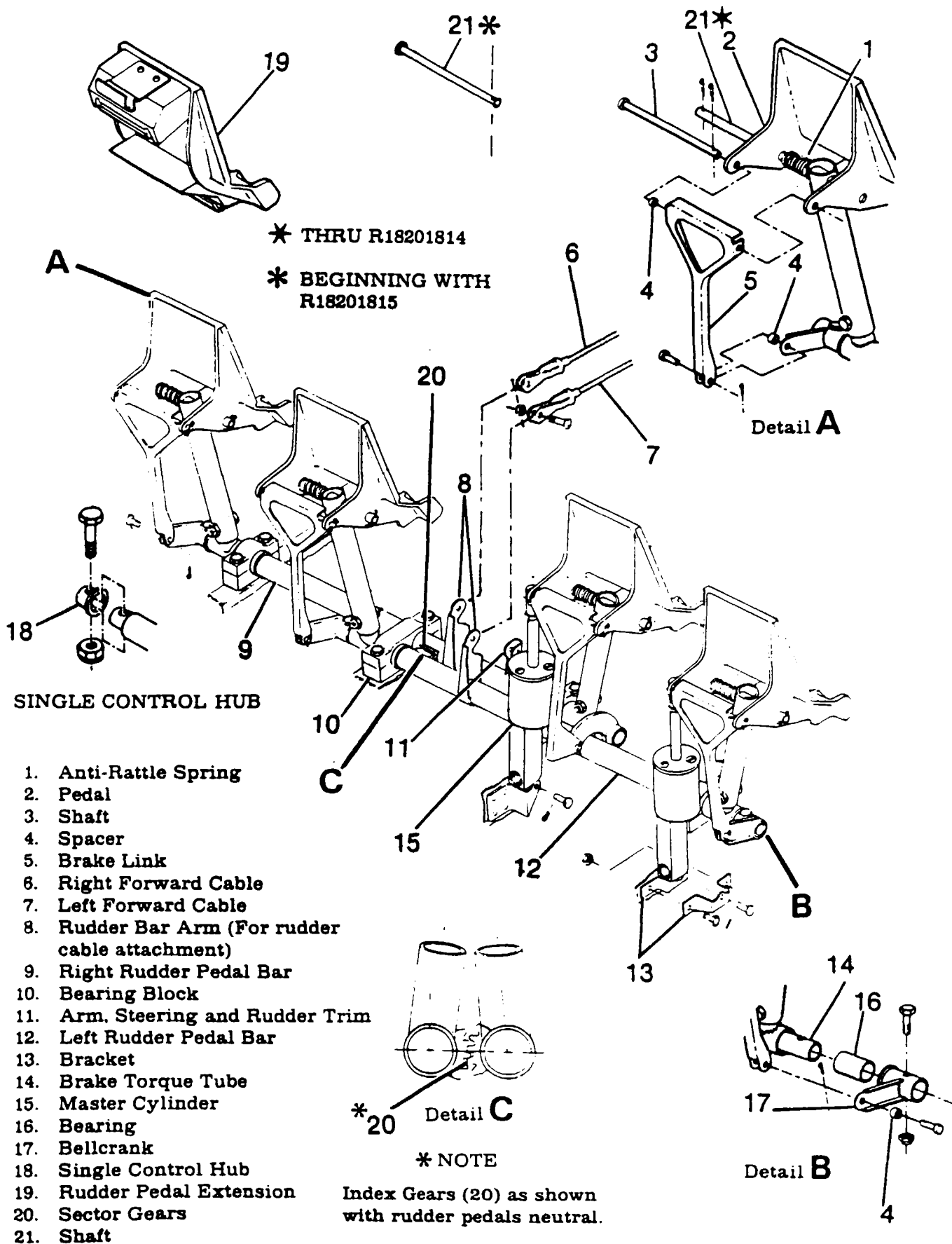
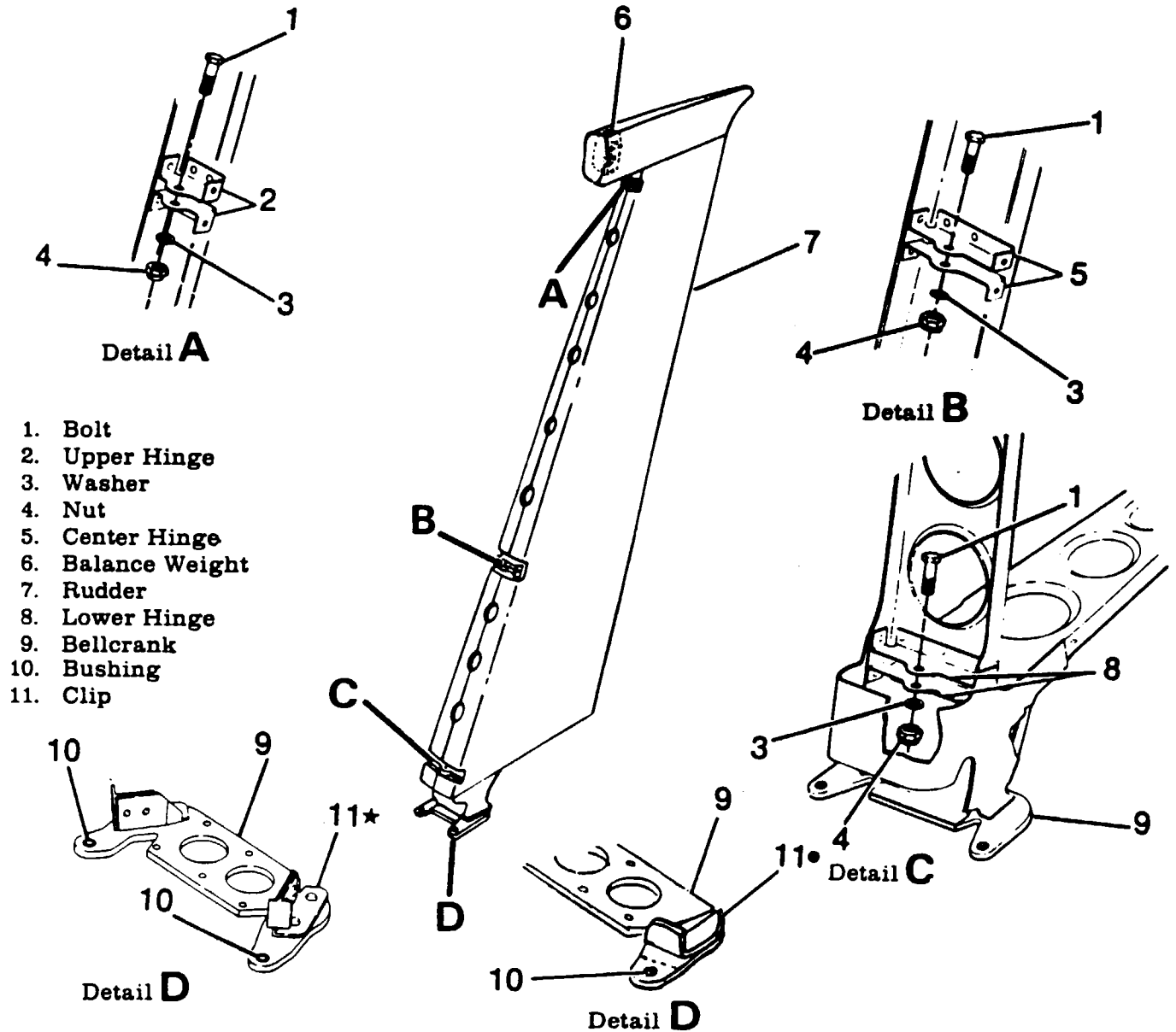


Figure 10-2. Rudder Pedals Installation

# MODEL R182 AND TR182 SERVICE MANUAL



1. Bolt
2. Upper Hinge
3. Washer
4. Nut
5. Center Hinge
6. Balance Weight
7. Rudder
8. Lower Hinge
9. Bellcrank
10. Bushing
11. Clip

★ THRU R18201254 AND FR18200045

Figure 10-3. Rudder Installation

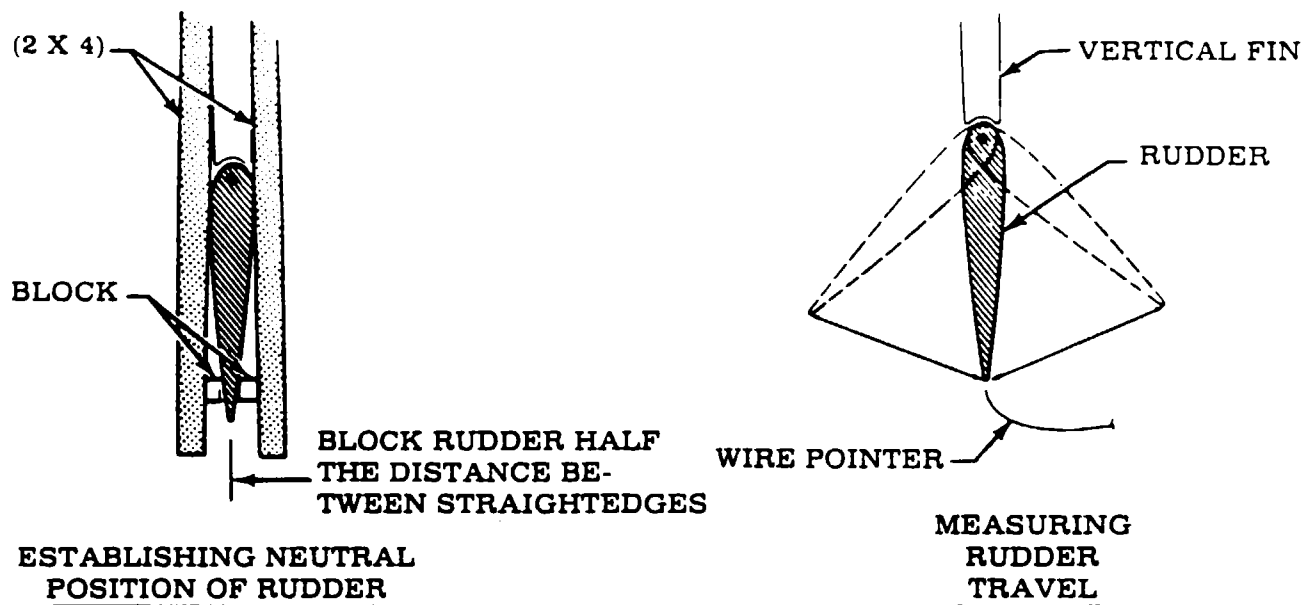
- BEGINNING WITH R18201255  
AND FR18200046 THRU FR18200070

## NOTE

The two inboard bearing blocks contain clearance holes for the rudder bars at one end and a bearing hole at the other. Tag these bearing blocks for reference on reinstallation.

- h. Reverse the preceding steps for reinstallation. Lubricate rudder bar assemblies as outlined in Section 2. Rig system in accordance with paragraph 10-11. safety turnbuckles and reinstall all items removed for access.

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1. Establish neutral position of rudder by clamping straightedge (such as a wooden 2 x 4) on each side of fin and rudder and blocking trailing edge of rudder half the distance between straightedges as shown.
2. Tape a length of soft wire to the stinger in such a manner that it can be bent to index at the lower corner of the rudder trailing edge.
3. Using soft lead pencil, mark rudder at point corresponding to soft wire indexing point (neutral).
4. Remove straightedges and blocks.
5. Hold rudder against right, then left, rudder stop. Measure distance from pointer to pencil mark on rudder in each direction of travel. Distance should be between 8.12" and 8.72".

Figure 10-4. Checking Rudder Travel

### 10-6. RUDDER.

### 10-7. REMOVAL AND INSTALLATION. (Refer to figure 10-3.)

- a. Disconnect tail navigation light.
- b. Remove stinger from tailcone.
- c. Remove fairing from either side of vertical fin, remove safety wire and relieve cable tension by loosening turnbuckles (index 10, figure 10-1.)
- d. Disconnect cables (index 5 and 7, figure 10-1) from rudder bellcrank.
- e. With rudder supported, remove all hinge bolts, and using care, lift rudder free of vertical fin.
- f. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 10-11, safety turnbuckles and reinstall all items removed for access.

## MODEL R182 AND TR182 SERVICE MANUAL

- 10-8. REPAIR. Repair may be accomplished as outlined in Section 18.
- 10-9. CABLES AND PULLEYS. (Refer to figure 10-1.)
- 10-10. REMOVAL AND INSTALLATION.
- Remove seats, upholstery and access plates as necessary.
  - Relieve cable tension at turnbuckles (10) and disconnect cables.
  - Disconnect cables (index 6 and 7, figure 10-2) from rudder bar arms.
  - Remove cable guards and pulleys as necessary to work cables free of aircraft.

### NOTE

To ease routing of cables, a length of wire may be attached to end of the cable before being withdrawn from aircraft. Leave wire in place, routed through structure; then attach cable being installed and pull the cable into position.

- Reverse the preceding steps for reinstallation.
- After cable is routed in position, install pulleys and cable guards. Ensure cable is positioned in pulley grooves before installing guards.

### NOTE

Trim cotter pin (6) at rudder bellcrank (9) to clear elevator torque tube in UP position. DO NOT cut pin too short. (Refer to figure 10-1.)

- Re-rig system in accordance with paragraph 10-11, safety turnbuckles and reinstall items removed in step "a".
- 10-11. RIGGING. (Refer to figure 10-5).
- Establish neutral position of rudder by clamping straightedge (such as wooden 2 x 4) on each side of fin and rudder and blocking trailing edge of rudder half the distance between strightedges as shown in figure 10-4.
  - Tape a length of soft wire to the stinger in such a manner that it can be bent to index at the lower corner of the rudder trailing edge.
  - Using soft lead pencil, mark rudder at point corresponding to soft wire indexing point (neutral).
  - Remove strightedges and blocks.
  - Hold rudder against right, then left, rudder stop. Measure distance from pointer to pencil mark on rudder in each direction of travel. Distance should be between 8.12" and 8.72".
  - Adjust travel stop bolts (index 8, figure 10-1) to attain correct rudder travel as specified in figure 1-1.
  - Disconnect steering bungee adjustable rod end (12) from arm (13).
  - Disengage chain (10) from sprocket (15).
  - Remove fairing from either side of vertical fin, remove safety wire and relieve cable tension at turnbuckles (index 10, figure 10-1).
  - With rudder pedals clamped in neutral position, adjust turnbuckles (index 10, figure 10-1) to specified tension with the rudder offset one degree to the right. (5 16 inch at lower trailing edge). Safety turnbuckles. Remove rudder pedal clamps.
  - Operate system and check for proper travel and freedom of movement.



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## NOTE

After completing the preceding steps, the rudder control system is rigged. The rudder system **MUST** be correctly rigged prior to rigging the rudder trim and nosewheel steering system. Refer to paragraph 10-15 for rigging the rudder trim and nosewheel steering system.

10-12. **RUDDER TRIM AND NOSEWHEEL STEERING SYSTEM.** (Refer to figure 10-5.)

10-13. **DESCRIPTION.** A sprocket-operated screw mechanism to provide rudder trim is incorporated at the aft end of the steering bungee (19). The trim system is operated by a trim control wheel (4), mounted in the pedestal. Nosewheel steering is accomplished through use of the rudder pedals. The steering bungee (19) links the nose gear to the rudder bar arm (13).

## NOTE

The rudder control system, rudder trim control system and nosewheel steering systems are interconnected. Adjustments to any one of these systems will affect the others. For maintenance to the nose gear steering, other than rigging, refer to Section 5.

10-14. **TROUBLE SHOOTING.**

## NOTE

This trouble shooting chart should be used in conjunction with the trouble shooting chart in paragraph 10-3.

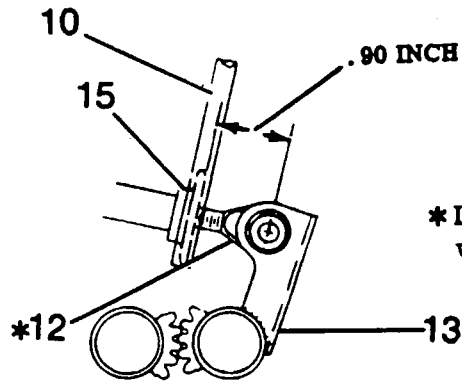
## NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to re-rig system. refer to paragraph 10-15.

TROUBLE	PROBABLE CAUSE	REMEDY
FALSE READING ON TRIM POSITION INDICATOR.	Improper rigging.	Refer to paragraph 10-15.
	Worn, bent or disconnected linkage.	Check visually. Repair or replace parts as necessary.
HARD OR SLUGGISH OPERATION OF TRIM WHEEL.	Worn, bent or binding linkage.	Check visually. Repair or replace parts as necessary.
	Incorrect rudder cable tension.	Check and adjust rudder cable tension.
FULL TRIM TRAVEL NOT OBTAINED.	Rudder trim system improperly rigged.	Refer to paragraph 10-15.

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1. Chain Tension Spring
2. Indicator
3. Bushing
4. Rudder Trim Wheel
5. Trim Wheel Sprocket
6. Aft Trim Shaft Sprocket
7. Pedestal Structure
8. Trim Shaft Bearing
9. Forward Trim Shaft Sprocket
10. Chain
11. Pivot Bolt
12. Rod End
13. Rudder Bar Arm
14. Bearing Mount
15. Sprocket
16. Steering Bellcrank
17. Strut Assembly
18. Indicator Positioning Arm
19. Bungee
20. Clamp

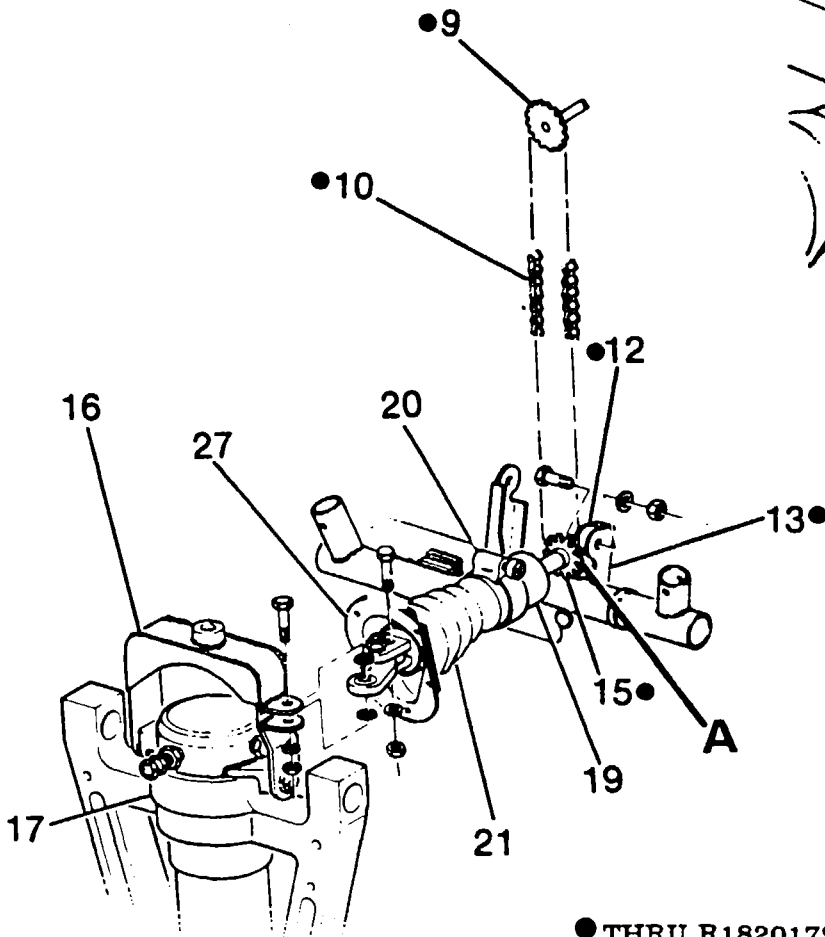
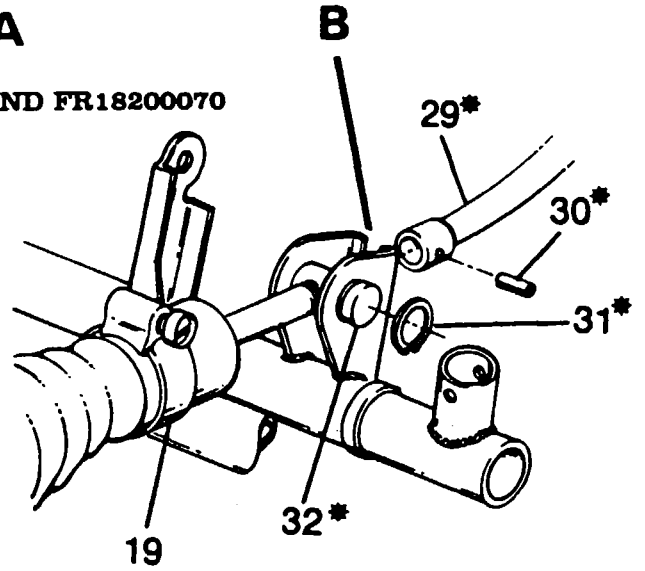


**NOTE**

\* Lube Threads on rod end (12) with MIL-G-21164.

**Detail A**

**THRU R18201798 AND FR18200070**



21. Boot
22. Cotter Pin
23. Roll Pin
24. Universal Joint
25. Washer
26. Spacer
27. Retainer
28. Rivet
29. Flexible Shaft
30. Roll Pin
31. Snap Ring
32. Shaft
33. Screw
34. Grommet

● THRU R18201798 AND FR18200070

\* R18201799 AND ON

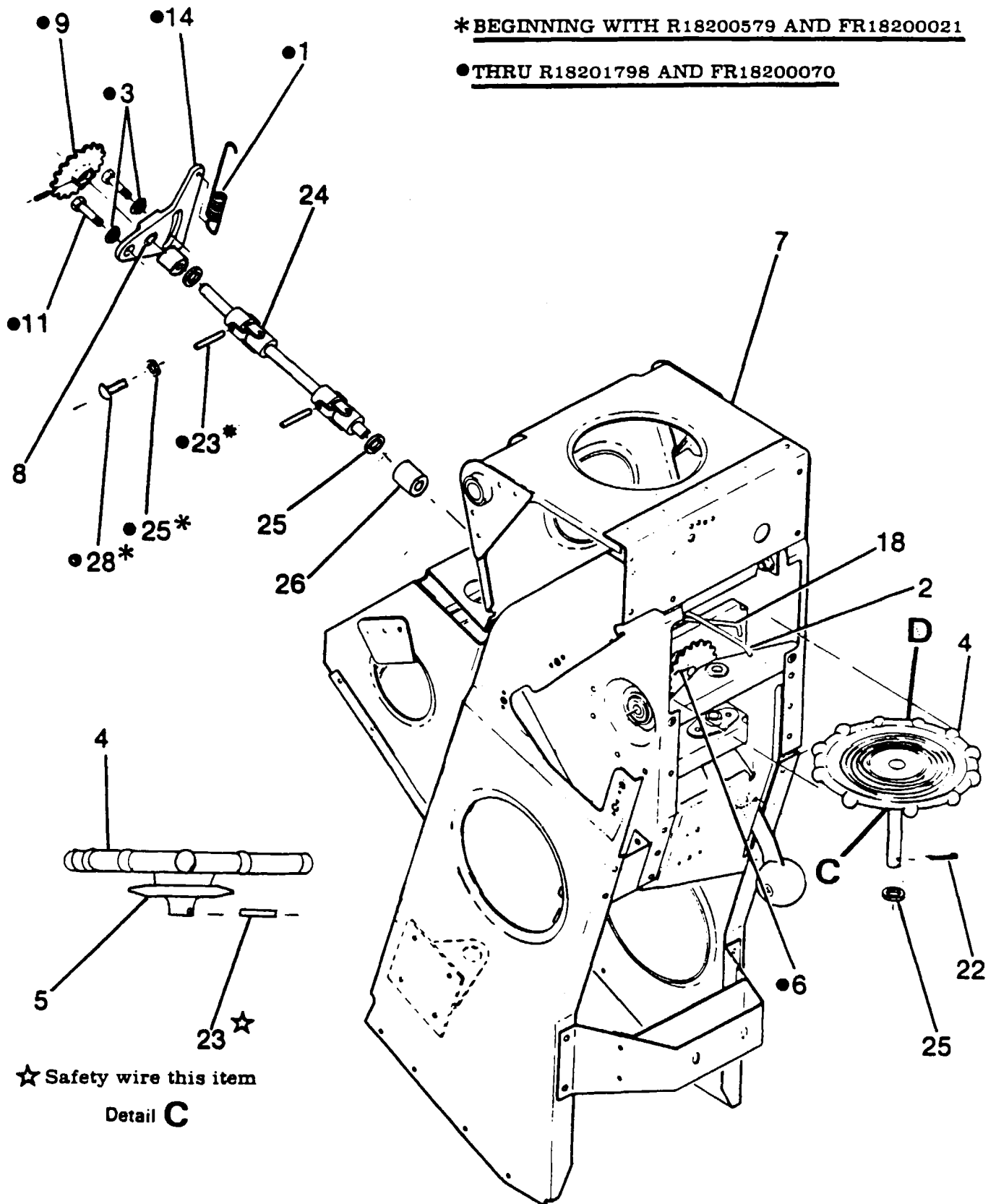
Figure 10-5. Rudder Trim Control System (Sheet 1 of 3)

MODEL R182 AND TR182 SERVICE MANUAL

\* THRU R18200578 AND FR18200020

\* BEGINNING WITH R18200579 AND FR18200021

● THRU R18201798 AND FR18200070

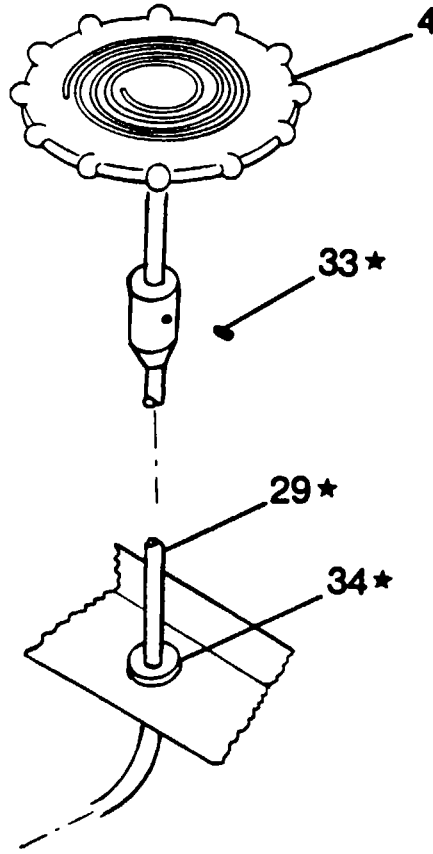


☆ Safety wire this item  
Detail C

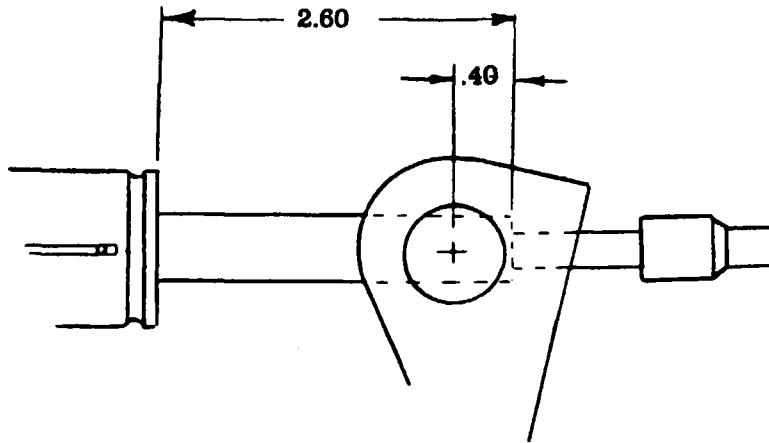
Figure 10-5. Rudder Trim Control System (Sheet 2 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

★ R18201799 AND ON



Detail **D**



Detail **B**

R18201799 AND ON

Figure 10-5. Rudder Trim Control System (Sheet 3 of 3)

## MODEL R182 AND TR182 SERVICE MANUAL

10-15. RIGGING. (Refer to figure 10-5.)

a. THRU 1981 MODELS.

### NOTE

The rudder control system **MUST** be rigged in accordance with paragraph 10-11 prior to rigging the rudder trim and nosewheel steering system.

1. After completing step "j" of paragraph 10-11, tie down or weight tail to raise nosewheel free of ground.
2. Extend strut and ensure nose gear is centered against external centering stop. (Refer to Section 5.)
3. Rotate trim control wheel (4) until indicator (2) is centered in pedestal slot (neutral).
4. With rudder pedals clamped in neutral position, adjust steering bungee rod end (12) .90 inch from bolt hole center to aft face of sprocket (15). Maintaining this adjustment, rotate sprocket (15) IN or OUT as required to align rod end (12) with attaching hole in rudder bar arm (13).

### NOTE

When connecting rod end (12) to arm (13) with chain (10) engaged, it is necessary to pull rod end (12) down with enough force to overcome tension on spring (1).

5. Without rotating sprocket (15) or moving trim indicator (2) engage chain (10) on sprocket (15) and connect rod end (12) to rudder bar arm (13).
6. Lower nose wheel to ground, remove clamps from rudder pedals, tighten all jam nuts and reinstall all items removed for access.

### NOTE

Make sure rudder moves in the correct direction when operated by the rudder pedals and the trim control wheel.

## MODEL R182 AND TR182 SERVICE MANUAL

### b. BEGINNING WITH 1982 MODELS.

1. After completing step "j" of paragraph 10-11, tie down or weight tail to raise nosewheel free of ground.
2. Extend strut and ensure nose gear is centered against external centering stop. (Refer to Section 5.)
3. With rudder pedals clamped in neutral position, adjust bungee shaft and barrel nut to dimensions shown in detail B. Maintaining this position, slip flex shaft end on bungee rod end and secure with roll pin. Safety roll pin.
4. Loosen setscrew (33) and position rudder trim wheel so that indicator is in center track and aligned with ends of outer and inner tracks.
5. Install setscrew (33) so dog engages hole in shaft of trim tab control wheel. Seal with Loctite 242 or equivalent.
6. Center indicator with respect to console cover by bending wire pointer. Do not cause wire to "jump tracks."
7. Lower nosewheel to ground, remove clamps from rudder pedals, tighten all jam nuts, and reinstall all items removed for access.

### WARNING

Make sure rudder moves in the correct direction when operated by the rudder pedals and the trim control wheel.

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 11

### ENGINE (NORMALLY ASPIRATED)

#### WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

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## 11-1. ENGINE COWLING.

11-2. **DESCRIPTION.** The engine cowling is divided into two major removable segments. The upper RH segment has an access door which provides access to the engine oil dipstick and remote fuel strainer drain control. The upper center cowl skin has an access door which provides access to the oil filler neck. Controllable cowl flaps are attached to the trailing edge of the lower cowl segment to aid in controlling engine temperature. Screws fasten the upper center and lower segments at the nose cap. Quick-release fasteners are used along the parting surfaces and at the aft end, allowing the removal of either segment individually. Cowl-mounted landing and taxi lights are mounted in the lower cowling nose cap.

## 11-3. REMOVAL AND INSTALLATION.

- a. Remove screws securing upper center and lower cowling segments to the nose cap.
- b. Release the quick-release fasteners attaching the cowling to the fuselage and at the parting surfaces of the center and lower segments.
- c. Disconnect the landing and taxi light wires at the quick-disconnects and carefully remove cowling.
- d. Reverse the preceding steps for reinstallation. Ensure the baffle seals are turned in the correct direction to confine and direct air flow around the engine. The vertically installed seals must fold forward and the side seals must fold upwards.

11-4. **CLEANING AND INSPECTION.** Wipe the inner surfaces of the cowling segments with a clean cloth saturated with cleaning solvent (Stoddard or equivalent). If the inside surface of the cowling is coated heavily with oil or dirt, allow solvent to soak until foreign material can be removed. Wash painted surfaces of the cowling with a solution of mild soap and water and rinse thoroughly. After washing, a coat of wax may be applied to the painted surfaces to prolong paint life. After cleaning, inspect cowling for dents, cracks, loose rivets and spot welds. Repair all defects to prevent spread of damage.

11-5. **REPAIR.** (Refer to Section 17.)

## 11-6. COWL FLAPS.

11-7. **DESCRIPTION.** Cowl flaps are provided to aid in controlling engine temperature. Two cowl flaps, operated by a single control in the cabin, are located at the aft edge of the lower cowl segment.

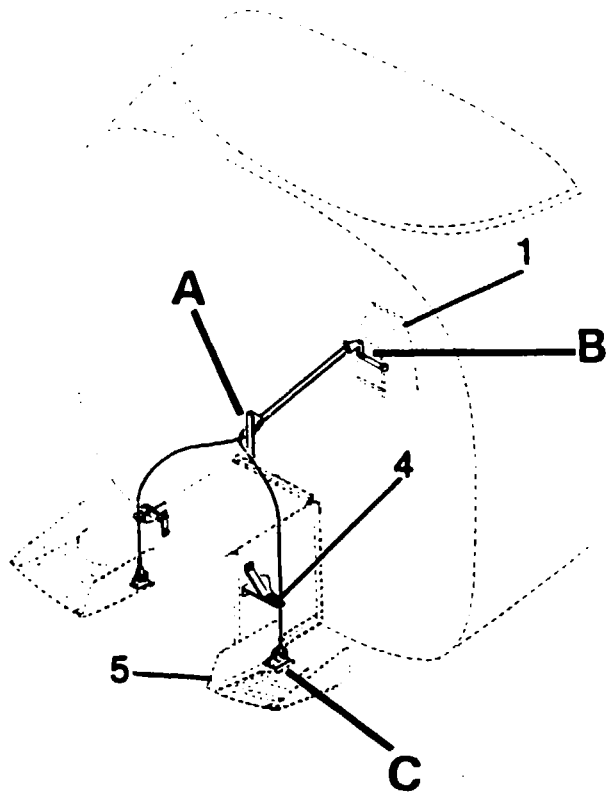
### NOTE

Refer to Section 2 for cowl flap hinge inspection frequency.

## 11-8. REMOVAL AND INSTALLATION. (See figure 11-1.)

- a. Place cowl flap control lever (11) in the OPEN position.
- b. Disconnect cowl flap control clevises (6) from cowl flap shock-mounts (7).
- c. Remove safety wire securing hinge pins to cowl flaps, pull pins and remove flaps.
- d. Reverse the preceding steps for reinstallation. Rig cowl flaps, if necessary, in accordance with paragraph 11-9.

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1. Pedestal
2. Cowl Flap Control
3. Clamp
4. Retainer
5. Cowl Flaps
6. Clevis
7. Shock-Mount
8. Bracket
9. Position Bracket
10. Clevis
11. Control Lever
12. Bushing

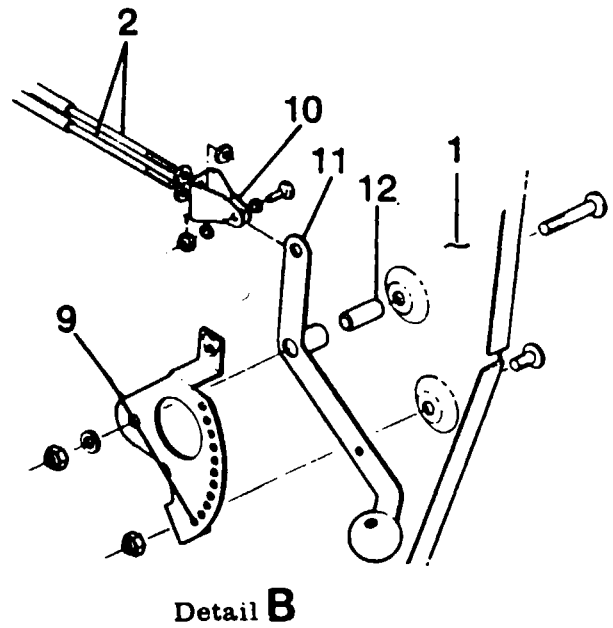
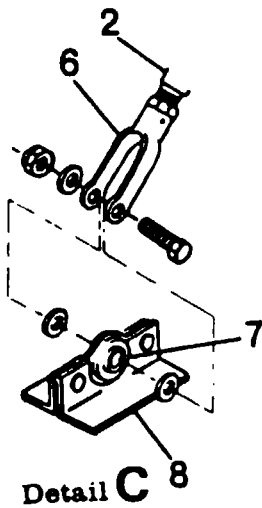
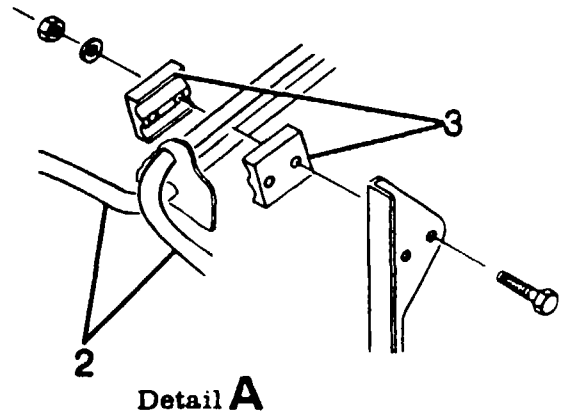


Figure 11-1. Cowl Flap Installation

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- 11-9. RIGGING. (See figure 11-1.)
- a. Disconnect cowl flap control clevises (6) from cowl flap shock-mounts (7).
  - b. Check to make sure that the flexible controls reach their internal stops in each direction. Mark controls so that full travel can be readily checked and maintained during the remaining rigging procedures.
  - c. Place cowl flap control lever (11) in the CLOSED position. If the control lever cannot be placed in the closed position, adjust controls at upper clevis (10) to position control lever in bottom hole of position bracket (9).
  - d. With the control lever in CLOSED position, hold one cowl flap closed, streamlined with trailing edge of lower cowl. Loosen jam nut and adjust clevis (6) on the control to hold cowl flap in this position. Retighten jam nut and install bolt through clevis and shock-mount.

### NOTE

Be sure threads are visible in clevis inspection holes.

- e. Repeat the preceding step for the opposite cowl flap.
  - f. Check that all clamps and jam nuts are tight.
  - g. Check for ease of operation.
- 11-10. ENGINE.
- 11-11. DESCRIPTION. An air cooled, wet-sump, six-cylinder, horizontally-opposed, direct-drive, carbureted Avco Lycoming O-540 series engine, driving a constant-speed propeller, is used to power the aircraft. The cylinders, numbered from front to rear, are staggered to permit a separate throw on the crankshaft for each connecting rod. The right front cylinder is number 1 and cylinders on the right side are identified by odd numbers 1, 3 and 5. The left front cylinder is number 2 and the cylinders on the left side are identified as number 2, 4 and 6. Refer to paragraph 11-12 for engine data. For repair and overhaul of the engine, accessories and propeller, refer to the appropriate publications issued by their manufacturers. These publications are available from Cessna Service Parts Centers.
- 11-12. TIME BETWEEN OVERHAUL (TBO). Avco Lycoming recommends engine overhaul at 2000 hours operating time for the O-540-J series engines. Refer to Avco Lycoming Service Instruction 1009AB, and to any superseding instructions, revisions or supplements thereto, for further recommendations. At the time of overhaul, engine accessories should be overhauled. Refer to Section 13 for propeller and governor overhaul periods.
- 11-13. OVERSPEED LIMITATIONS. The engine must not be operated above specified maximum continuous RPM. However, should inadvertent overspeed occur, refer to Avco Lycoming Service Bulletin 369D, and to any superseding bulletins, revisions or supplements thereto, for further recommendations.

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### 11-14. ENGINE DATA.

AIRCRAFT Series	R182 SKYLANE
MODEL (Lycoming)	O-540-J
Rated Horsepower at RPM	235 at 2400
Number of Cylinders	6 Horizontally-Opposed
Displacement	541.5 Cubic Inches
Bore	5.125 Inches
Stroke	4.375 Inches
Compression Ratio	8.5:1
Magnetos	Bendix D6LN-2031
Right Magneto	Fires 23° BTC, Upper Left, Lower Right
Left Magneto	Fires 23° BTC, Lower Left, Upper Right
Firing Order	1-4-5-2-3-6
Spark Plugs	18mm (Refer to Avco Lycoming Service Instruction No. 1042 for factory approved spark plugs and required gap.)
Torque	330 ± 30 LB-IN.
Carburetor (Marvel)	HA-6
Tachometer	Mechanical Drive
Oil Sump Capacity	8 U.S. Quarts
With External Filter	9. U.S. Quarts
Oil Pressure (PSI)	
Normal	60-90
Minimum Idling	25
Maximum (Cold Oil Starting)	100
Oil Temperature	
Normal Operating	Within Green Arc
Maximum	Red Line (245°F)
Probe Location	Accessory Housing
Cylinder Head Temperature	
Normal Operating	Within Green Arc
Maximum	Red Line (500°F)
Probe Location	Lower side of Number 5 Cylinder
Economy Mixture Indicator (EGT)	
Probe Location	Left Hand Exhaust Collector
Direction of Crankshaft Rotation (Viewed from Rear)	Clockwise
Dry Weight-With Accessories	387 LB (Weight is approximate and will vary with optional accessories installed.)

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## 11-15. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE WILL NOT START.	Improper use of starting procedure.	Refer to Pilot's Operating Handbook.
	Fuel cells empty.	Visually inspect cells. Fill with proper grade and quantity of gasoline.
	Mixture control in the IDLE CUT-OFF position.	Move control to the full RICH position.
	Fuel selector valve in OFF position.	Place selector valve in the ON position to a cell known to contain gasoline.
	Defective carburetor.	Repair or replace carburetor.
	Carburetor screen or fuel strainer plugged.	Remove carburetor and clean thoroughly. Refer to Section 12 for fuel strainer cleaning.
	Vaporized fuel. (Most likely to occur in hot weather with a hot engine.)	Refer to Pilot's Operating Handbook.
	Engine flooded.	Refer to Pilot's Operating Handbook.
	Water in fuel system.	Open fuel strainer drain and check for water. If water is present, drain fuel cell sumps, lines, strainer and carburetor.
	Defective aircraft fuel system.	Refer to section 12.
	Fuel contamination.	Drain all fuel and flush out fuel system. Clean all screens, fuel lines, strainer and carburetor.
	Defective ignition system.	Refer to paragraph 11-64.

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### 11-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE WILL NOT START. (Cont).	Defective magneto switch or grounded magneto leads.	Check continuity. Repair or replace switch or leads.
	Spark plugs fouled.	Remove, clean and regap plugs. Test harness cables to persistently fouled plugs. Replace if defective.
ENGINE STARTS BUT DIES, OR WILL NOT IDLE.	Idle stop screw or idle mixture incorrectly adjusted.	Refer to paragraph 11-46.
	Carburetor idling jet plugged.	Clean carburetor and fuel strainer. Refer to Section 12 for fuel strainer.
	Spark plugs fouled or improperly gapped.	Remove, clean and regap plugs. Replace if defective.
	Water in fuel system.	Open fuel strainer drain and check for water. If water is present, drain fuel cell sumps, lines, strainer and carburetor.
	Defective ignition system.	Refer to paragraph 11-64.
	Vaporized fuel. (Most likely to occur in hot weather with a hot engine.)	Refer to Pilot's Operating Handbook.
	Induction air leaks.	Check visually. Correct the cause of leaks.
	Manual primer leaking.	Disconnect primer outlet line. If fuel leaks through primer, repair or replace primer.

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### 11-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE STARTS BUT DIES, OR WILL NOT IDLE. (Cont).	Leaking float valve or float level set too high.	Perform an idle mixture check. Attempt to remove any rich indication with the idle mixture adjustment. If the rich indication cannot be removed, the float valve is leaking or the float level is set too high. Replace defective parts, reset float level.
	Defective carburetor.	If engine will start when primed but stops when priming is discontinued, with mixture control in full RICH position, the carburetor is defective. Repair or replace carburetor.
	Defective engine.	Check compression. Listen for unusual engine noises. Engine repair is required.
	Propeller control set in high pitch position (low RPM).	Use low pitch (high RPM) position for all ground operation.
	Defective fuel system.	Refer to Section 12.
ENGINE RUNS ROUGHLY, WILL NOT ACCELERATE PROPERLY, OR LACKS POWER.	Restriction in aircraft fuel system.	Refer to Section 12.
	Worn or improperly rigged throttle or mixture control.	Check visually. Replace worn linkage. Rig properly.
	Spark plugs fouled or improperly gapped.	Remove, clean and regap plugs. Replace if defective
	Defective ignition system.	Refer to paragraph 11-64.
	Defective or badly adjusted accelerating pump in carburetor.	Check setting of accelerating pump linkage and adjust as necessary.
	Float level set too low.	Check and reset float level.

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### 11-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE RUNS ROUGHLY, WILL NOT ACCELERATE PROPERLY, OR LACKS POWER. (Cont.)	Defective carburetor.	If engine will start when primed but stops when priming is discontinued, with mixture control in full RICH position, the carburetor is defective. Repair or replace carburetor.
	Defective engine.	Check compression. Listen for unusual engine noises. Engine repair is required.
	Restricted carburetor air filter.	Check visually. Clean in accordance with Section 2.
	Cracked engine mount.	Inspect and repair or replace mount as required.
	Defective mounting bushings.	Inspect and install new bushings as required.
	Propeller control in high pitch (low RPM) position.	Use low pitch (high RPM) position for all ground operations.
POOR IDLE CUT-OFF.	Fuel contamination.	Check all screens in fuel system. Drain all fuel and flush out system. Clean all screens, lines, strainer and carburetor.
	Worn or improperly rigged mixture control.	Check that idle cut-off stop on carburetor is contacted. Replace worn linkage. Rig properly.
	Manual primer leaking.	Disconnect primer outlet line. If fuel leaks through primer, it is defective. Repair or replace primer.
	Defective carburetor.	Repair or replace carburetor.



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- 11-16. **STATIC RUN-UP PROCEDURES.** In a case of suspected low engine power, a static RPM run-up should be conducted as follows:
- Run up engine, using takeoff power and mixture settings, with the aircraft facing 90° right and then left to the wind direction.
  - Record the RPM obtained in each run-up position.

### NOTE

Daily changes in atmospheric pressure, temperature and humidity will have a slight effect on static run-up.

- Average the results of the RPM obtained, it should be within 50 RPM of 2380 RPM.
- If the average results of the RPM obtained are lower than stated above, the following recommended checks may be performed to determine a possible deficiency.
  - Check governor control for proper rigging. It should be determined that the governor control arm travels to the high RPM stop on the governor and that the high RPM stop screw is adjusted properly. (Refer to Section 13 for procedures.)

### NOTE

If verification of governor operation is necessary, the governor may be removed from the engine and a flat plate installed over the engine pad. Run up engine to determine that governor was adjusted properly.

- Check carburetor heat control for proper rigging. If partially open it would cause a slight power loss.
  - Check magneto timing, spark plugs and ignition harness for settings and condition.
  - Check condition of induction air filter. Clean if required.
  - Perform an engine compression check. Refer to engine manufacturer's service manual.
- 11-17. **REMOVAL.** If an engine is to be placed in storage or returned to the manufacturer for overhaul, proper preparatory steps should be taken for corrosion prevention prior to beginning the removal procedure. Refer to Section 2 for storage preparation. The following engine removal procedure is based upon the engine being removed from the aircraft with the engine mount attached to the firewall.

### NOTE

Tag each item when disconnected to aid in identifying wires, hoses, lines and control linkages when engine is reinstalled. Likewise, shop notes made during removal will often clarify reinstallation. Protect openings, exposed as a result of removing or disconnecting units, against entry of foreign material by installing covers or sealing with tape.

- Attach a tail stand of suitable capacity.
- Place all cabin switches in the OFF position.
- Place fuel selector valve in the OFF position.
- Remove engine cowling in accordance with paragraph 11-3.
- Disconnect battery cables and insulate terminals as a safety precaution.
- Drain fuel strainer and lines with strainer drain control.

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## NOTE

During the following procedures, remove any clamps or lacings which secure controls, wires, hoses or lines to the engine, engine mount or attached brackets, so they will not interfere with engine removal. Some of the items listed can be disconnected at more than one place. It may be desirable to disconnect some of these items at other than the places indicated. The reason for engine removal should be the governing factor in deciding at which point to disconnect them. Omit any of the items which are not present on a particular engine installation .

- g. Drain the engine oil sump and oil cooler.
- h. Disconnect magneto primary lead wires at magnetos.

## WARNING

The magnetos are in a SWITCH ON condition when the switch wires are disconnected. Ground the magneto points or remove the high tension wires from the magnetos or spark plugs to prevent accidental firing.

- i. Remove the spinner and propeller in accordance with Section 13. Cover exposed end of crankshaft flange and propeller flange to prevent entry of foreign material.
- j. Disconnect throttle and mixture controls at carburetor. Remove clamps attaching controls to engine and pull controls aft clear of engine. Use care to avoid bending controls too sharply. Note EXACT position, size and number of attaching washers and spacers for reference on reinstallation.
- k. Disconnect propeller governor control at governor. Note EXACT position, size and number of attaching washers for reference on reinstallation. Remove clamps attaching control to engine and pull control aft clear of engine.
- l. Disconnect all hot and cold air flexible ducts and remove.
- m. Remove exhaust system in accordance with paragraph 11-83.
- n. Disconnect carburetor heat control from arm on airbox. Remove clamps and pull control clear of engine.
- o. Disconnect wires and cables as follows:
  - 1. Disconnect tachometer drive shaft at adapter.

## CAUTION

When disconnecting starter cable do not permit starter terminal bolt to rotate. Rotation of the bolt could break the conductor between bolt and field coils causing the starter to be inoperative.

- 2. Disconnect starter electrical cable at starter.
- 3. Disconnect cylinder head temperature wire at probe.
- 4. Disconnect carburetor air temperature wires at quick-disconnects.
- 5. Disconnect electrical wires and wire shielding ground at alternator.
- 6. Disconnect exhaust gas temperature wire at quick-disconnect.
- 7. Remove all clamps and lacings attaching wires or cables to engine and pull wires and cables aft to clear engine.

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- p. Disconnect lines and hoses as follows:
1. Disconnect vacuum hose at vacuum pump.
  2. Disconnect oil breather vent lines where secured to the engine.

### WARNING

Residual fuel and oil draining from disconnected lines and hoses constitutes a fire hazard. Use caution to prevent accumulation of such fuel and oil when lines or hoses are disconnected.

3. Disconnect oil temperature bulb.
  4. Disconnect primer line at engine fitting.
  5. Disconnect fuel supply hose at fuel strainer.
  6. Disconnect oil pressure line at engine fitting.
  7. Disconnect manifold pressure line at engine.
- q. Carefully check the engine again to ensure ALL hoses, lines, wires, cables, clamps and lacings are disconnected or removed which would interfere with the engine removal. Ensure all wires, cables and engine controls have been pulled aft to clear the engine.

### CAUTION

Place suitable stand under tail tie-down ring before removing engine. The loss of engine weight will cause the aircraft to be tail heavy.

- r. Attach a hoist to the lifting lug at the top center of the engine crankcase. Lift engine just enough to relieve the weight from the engine mount pads.
- s. Remove bolts attaching engine to engine mount pads and slowly hoist engine and pull it forward. Check for any items which would interfere with the engine removal. Balance the engine by hand and carefully guide the disconnected parts out as the engine is removed.
- t. Remove engine shock-mount pads and bonding straps.

11-18. **CLEANING.** Clean engine in accordance with instructions in Section 2.

11-19. **ACCESSORIES REMOVAL.** Removal of engine accessories for overhaul or for engine replacement involves stripping the engine of parts, accessories and components to reduce it to the bare engine. During the removal process, removed items should be tagged for repair or replacement with new components.

### NOTE

Items easily confused with similar items should be tagged to provide a means of identification when being installed on a new engine. All openings exposed by the removal of an item should be closed by installing a suitable cover or cap over the opening. This will prevent entry of foreign material. If suitable covers are not available, tape may be used to cover the openings.

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- 11-20. **INSPECTION.** For specific items to be inspected, refer to the engine manufacturer's manual.
- Visually inspect the engine for loose nuts, bolts, cracks and fin damage.
  - Inspect baffles, baffle seals and brackets for cracks, deterioration and breakage.
  - Inspect all hoses for internal swelling, chafing through protective plys, cuts, breaks, stiffness, damaged threads and loose connections. Excessive heat on hoses will cause them to become brittle and easily broken. Hoses and lines are most likely to crack or break near the end fittings and support points.
  - Inspect for color bleaching of the end fittings or severe discoloration of the hoses.

### NOTE

Avoid excessive flexing and sharp bends when examining hoses for stiffness.

- Refer to Section 2 for replacement intervals for flexible fluid carrying hoses in the engine compartment.
  - For major engine repairs, refer to the engine manufacturer's overhaul and repair manual.
- 11-21. **BUILD-UP.** Engine build-up consists of installation of parts, accessories and components to the basic engine to build up an engine unit ready for installation on the aircraft. All safety wire, lockwashers, nuts, gaskets and rubber connections should be new parts.
- 11-22. **INSTALLATION.** Before installing the engine on the aircraft, install any items which were removed from the engine or aircraft after the engine was removed.

### NOTE

Remove all protective covers, plugs, caps and identification tags as each item is connected or installed. Omit any items not present on a particular engine installation.

- Hoist the engine to a point near the engine mount.
- Install engine shock-mount pads as illustrated in figure 11-2.
- Carefully lower engine slowly into place on the engine mount. Route controls, lines, hoses and wires in place as the engine is positioned on the engine mount pads.

### NOTE

Be sure engine shock-mount pads, spacers and washers are in place as the engine is lowered into position.

- Install engine-to-mount bolts, then remove the hoist and support stand placed under tail tie-down fitting. Torque bolts to 450-500 lb-in.
- Route throttle, mixture and propeller controls to their respective units and connect. Secure controls in position with clamps.
- Route carburetor heat control to airbox and connect. Secure control in position with clamps.

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## NOTE

Throughout the aircraft fuel system, from the fuel cells to the carburetor, use NS-40 (RAS-4) (Snap-On-Tools Corp., Kenosha, Wisconsin), MIL-T-5544 (Thread Compound Antiseize, Graphite Petrolatum), USP Petrolatum or engine oil as a thread lubricator or to seal a leaking connection. Apply sparingly to male threads, exercising extreme caution to avoid "stringing" sealer across the end of the fitting. Always ensure that a compound, the residue from a previously used compound, or any other foreign material cannot enter the system.

- g. Connect lines and hoses as follows:
  - 1. Connect manifold pressure line at engine fitting.
  - 2. Connect oil pressure line at engine fitting.
  - 3. Connect fuel supply hose at fuel starter.
  - 4. Connect primer line at engine fitting.
  - 5. Connect oil temperature bulb.
  - 6. Connect oil breather vent line where secured to the engine.
  - 7. Connect vacuum hose at vacuum pump.
- h. Connect wires and cables as follows:
  - 1. Connect electrical wires and wire shielding ground at alternator.
  - 2. Connect cylinder head temperature wire at probe. (Do not exceed 4 lb-in torque.)

## CAUTION

When connecting starter cable, do not permit starter terminal bolt to rotate. Rotation of the bolt could break the conductor between bolt and field coils causing the starter to be inoperative.

- 3. Connect starter electrical cable at starter.
- 4. Connect tachometer drive shaft at adapter. Be sure drive cable engages drive in adapter. Torque housing attach nut to 100 lb-in.
- 5. Connect exhaust gas temperature wire and carburetor air temperature wires at quick-disconnects.
- 6. Install clamps and lacings securing wires and cables to engine, engine mount and brackets.
- i. Install exhaust system in accordance with paragraph 11-83.
- j. Connect all hot and cold air flexible ducts.
- k. Install propeller and spinner in accordance with instructions outlined in Section 13.
- l. Complete a magneto switch ground-out and continuity check, then connect primary lead wires to the magnetos. Remove the temporary ground or connect spark plug leads, whichever procedure was used during removal.

## WARNING

Be sure magneto switch is in OFF position when connecting switch wires to magnetos.

- m. Clean and install induction air filter in accordance with Section 2.
- n. Service engine with proper grade and quantity of engine oil. Refer to Section 2 if engine is new, newly overhauled or has been in storage.

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- o. Check all switches are in the OFF position and connect battery cables.
- p. Rig engine controls in accordance with paragraphs 11-69, 11-70, 11-71 and 11-72.
- q. Inspect engine installation for security, correct routing of controls, lines, hoses and electrical wiring, proper safetying and tightness of all components.
- r. Install engine cowling in accordance with paragraph 11-3. Rig cowl flaps in accordance with paragraph 11-9.
- s. Perform an engine run-up and make final adjustments on the engine controls.

### 11-23. FLEXIBLE FLUID HOSES.

- 11-24. LEAK TEST. Refer to Section 2 for leak test interval. Perform leak check as follows:
- a. Examine the exterior of hoses for evidence of leakage or wetness.
  - b. Hoses found leaking should be replaced.
  - c. Refer to paragraph 11-20 for detailed inspection procedures for flexible hoses.

### 11-25. REPLACEMENT.

- a. Hoses should not be twisted on installation. Pressure applied to a twisted hose may cause failure or loosening of the nut.
- b. Provide as large a bend radius as possible.
- c. Hoses should have a minimum of one-half inch clearance from other lines, ducts, hoses or surrounding objects or be butterfly clamped to them.
- d. Rubber hoses will take a permanent set during extended use in service. Straightening a hose with a bend having a permanent set will result in hose cracking. Care should be taken during removal so that hose is not bent excessively, and during reinstallation to assure hose is returned to its original position.
- e. Refer to AC 43.13-1, Chapter 10, for additional installation procedures for flexible fluid hose assemblies.

### 11-26. ENGINE BAFFLES.

- 11-27. DESCRIPTION. The sheet metal baffles installed on the engine direct the flow of air around the cylinders and other engine components to provide optimum cooling. These baffles incorporate rubber-asbestos composition seals at points of contact with the engine cowling and other engine components to help confine and direct the airflow to the desired area. It is very important to engine cooling that the baffles and seals are in good condition and installed correctly. The vertical seals must fold forward and the side seals must fold upwards. Removal and installation of the various baffle segments is possible with the cowling removed. Be sure that any new baffles seal properly.

- 11-28. CLEANING AND INSPECTION. The engine baffles should be cleaned with a suitable solvent to remove oil and dirt.

### NOTE

The rubber-asbestos seals are oil and grease resistant but should not be soaked in solvent for long periods.

Inspect baffles for cracks in the metal and for loose and/or torn seals. Repair or replace any defective parts.

- 11-29. REMOVAL AND INSTALLATION. Removal and installation of the various baffle segments are possible with the cowling removed. Be sure that any replaced baffles and seals are installed correctly and that they seal to direct the airflow in the correct direction. Various lines, hoses, wires and controls are routed through some baffles. Make sure that these parts are reinstalled correctly after installation of baffles.

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- 11-30. **REPAIR.** Repair of an individual segment of engine baffle is generally impractical, since, due to the small size and formed shape of the part, replacement is usually more economical. However, small cracks may be stop-drilled and a reinforcing doubler installed. Other repairs may be made as long as strength and cooling requirements are met. Replace sealing strips if they do not seal properly.
- 11-31. **ENGINE MOUNT.** (See figure 11-2.)
- 11-32. **DESCRIPTION.** The engine mount is composed of sections of steel tubing welded together and reinforced with gussets. The mount is fastened to the fuselage at four points. The engine is attached to the engine mount with shock-mount assemblies which absorb engine vibrations. Each engine mount pad has a small hole for a locating pin which serves as a locating dowel for the engine shock-mounts.
- 11-33. **REMOVAL AND INSTALLATION.**
- Remove engine in accordance with paragraph 11-17.
  - Remove bolts from upper and lower mount-to-fuselage structure and carefully remove engine mount.
  - Reverse the preceding steps for reinstallation. Reinstall engine in accordance with paragraph 11-22.

### NOTE

Torque engine-to-mount bolts to 450-500 lb-in. Torque mount-to-firewall bolts to 160-190 lb-in.

- 11-34. **REPAIR.** (Refer to Section 17.)
- 11-35. **PAINTING.** (Refer to Section 18.)
- 11-36. **ENGINE SHOCK-MOUNT PADS.** (See figure 11-2.) The bonded rubber and metal shock-mounts are designed to reduce transmission of engine vibrations to the airframe. The rubber pads should be wiped clean with a clean dry cloth.

### NOTE

Do not clean the rubber pads and dampener assembly with any type of cleaning solvent.

Inspect the metal parts for cracks and excessive wear due to aging and deterioration. Inspect the rubber pads for separation between the pad and metal backing, swelling, cracking or a pronounced set of the pad. Install new parts for all parts that show evidence of wear or damage.

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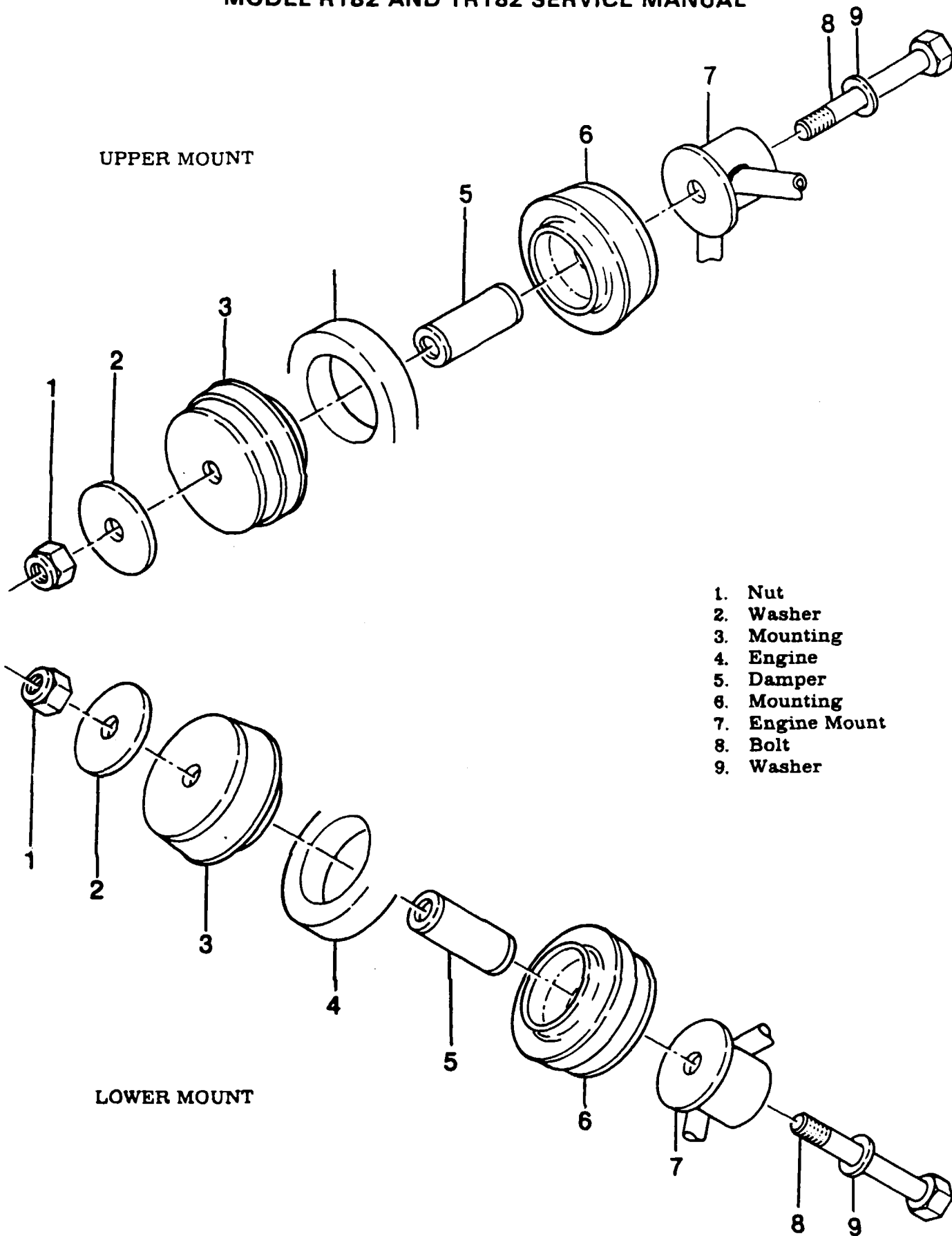
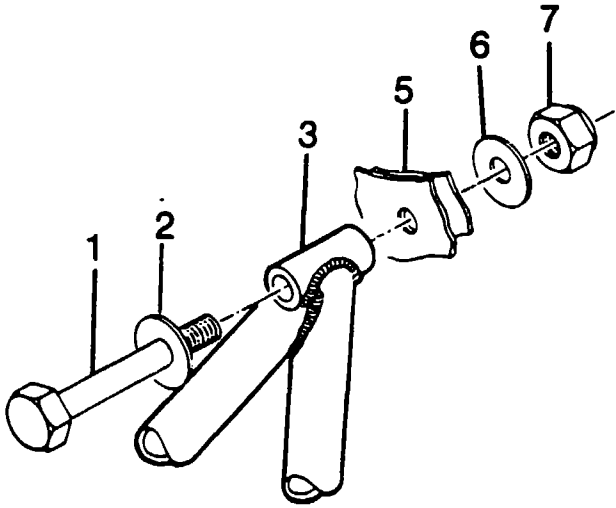
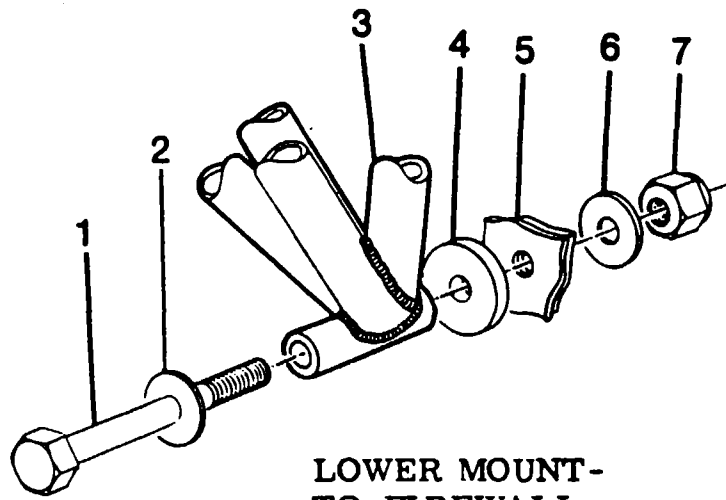


Figure 11-2. Engine Mount (Sheet 1 of 2)





UPPER MOUNT-  
TO-FIREWALL



LOWER MOUNT-  
TO-FIREWALL

1. Bolt
2. Washer
3. Engine Mount
4. Washer (Lower Mount Only)
5. Firewall
6. Washer
7. Nut

Figure 11-2. Engine Mount (Sheet 2 of 2)

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### 11-37. OIL SYSTEM.

11-38. **DESCRIPTION.** A wet-sump, pressure-lubricating oil system is employed in the engine. An external, replaceable oil filter is standard equipment. The engine may also be equipped with a noncongealing oil cooler. Refer to applicable engine manual for specific details.

### WARNING

The U.S. Environmental Protection Agency advises that mechanics and other workers who handle engine oil are advised to minimize skin contact with used oil and promptly remove used oil from the skin. In a laboratory study, mice developed skin cancer after skin was exposed to used engine oil twice a week without being washed off, for most of their life span. Substances found to cause cancer in laboratory animals may also cause cancer in humans.

### 11-39. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
NO OIL PRESSURE.	No oil in sump.	Check with dipstick. Fill sump with proper grade and quantity of oil. Refer to Section 2.
	Oil pressure line broken, disconnected or pinched.	Inspect pressure lines. Replace or connect lines as required.
	Oil pump defective.	Remove and inspect. Examine engine. Metal particles from damaged pump may have entered engine oil passages.
	Defective oil pressure gage.	Check with a known good gage. If second reading is normal, replace gage.
	Oil congealed in gage line.	Disconnect line at engine and gage; flush with kerosene. Pre-fill with kerosene and install.
	Relief valve defective.	Remove and check for dirty or defective parts. Clean and install; replace valve if defective.
LOW OIL PRESSURE.	Low oil supply.	Check with dipstick. Fill sump with proper grade and quantity of oil. Refer to Section 2.

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### 11-39. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
LOW OIL PRESSURE. (Cont).	Low viscosity oil.	Drain sump and refill with proper grade and quantity of oil.
	Oil pressure relief valve spring weak or broken.	Remove and inspect spring. Replace weak or broken spring.
	Defective oil pump.	Check oil temperature and oil level. If temperature is higher than normal and oil level is correct, internal failure is evident. Remove and inspect. Examine engine. Metal particles from damaged pump may have entered oil passages.
	Secondary result of high oil temperature.	Observe oil temperature gage for high indication. Determine and correct reason for high oil temperature.
	Dirty oil screens.	Remove and clean oil screens.
HIGH OIL PRESSURE.	High viscosity oil.	Drain sump and refill with proper grade and quantity of oil.
	Relief valve defective.	Remove and check for dirty or defective parts. Clean and install; replace valve if defective.
	Defective oil pressure gage.	Check with a known good gage. If second reading is normal, replace gage.
LOW OIL TEMPERATURE.	Defective oil temperature gage or temperature bulb.	Check with a known good gage. If second reading is normal, replace gage. If reading is similar, the temperature bulb is defective. Replace bulb.

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### 11-39. TROUBLE SHOOTING.(Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
<b>LOW OIL TEMPERATURE</b> (Cont).	Oil cooler thermostatic bypass valve defective or stuck.	Remove valve and check for proper operation. Replace valve if defective.
	Secondary effect of low oil pressure.	Observe oil pressure gage for low indication. Determine and correct reason for low oil pressure.
	Oil congealed in cooler.	This condition can occur only in extremely cold temperatures. If congealing is suspected, use an external heater or a heated hangar to warm the congealed oil.
<b>HIGH OIL TEMPERATURE.</b>	Oil cooler air passages clogged.	Inspect cooler core. Clean air passages.
	Oil cooler passages clogged.	Drain oil cooler and inspect for sediment. Remove cooler and flush thoroughly.
	Thermostatic bypass valve damaged or held open by solid matter.	Feel front of cooler core with hand. If core is cold, oil is bypassing cooler. Remove and clean valve and seat. If still inoperative, replace.
	Low oil supply.	Check with dipstick. Fill sump with proper grade and quantity of oil. Refer to Section 2.
	Oil viscosity too high.	Drain sump and refill with proper grade and quantity of oil.
	Prolonged high speed operation on the ground	Hold ground running above 1500 RPM to a minimum.
	Defective oil temperature gage.	Check with a known good gage. If second reading is normal, replace gage.

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### 11-39. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
HIGH OIL TEMPERATURE (Cont).	Defective oil temperature bulb.	Check for correct oil pres- sure, oil level and cylinder head temperature. If they are correct, check oil temp- erature gage for being de- fective; similar reading is observed, bulb is defective. Replace bulb.
OIL LEAK AT FRONT OF ENGINE.	Damaged crankshaft seal.	Replace. Also refer to Service Newsletter SNL85-8.
OIL LEAK AT PUSH ROD HOUSING.	Damaged pushrod housing oil seal.	Replace.

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## 11-39A. FULL-FLOW OIL FILTER.

11-39B. DESCRIPTION. A disposable spin-on oil filter attaches to a threaded fitting on the oil pump casting. The filter contains an internal bypass valve.

## 11-39C. REMOVAL.

- a. Remove engine cowl in accordance with paragraph 11-3.
- b. Cut safety wire and turn filter counterclockwise to remove it from the adapter.

### NOTE

Before discarding filter, remove filter element from can and cut off both ends. Carefully unfold the element and inspect for evidence of internal engine damage such as chips or metal from bearings. In new or newly overhauled engines chips and bearing metal may be found, and generally are of no consequence. However, particles produced by impact, abrasion, or pressure are evidence of internal engine damage and justify further examination to determine the cause.

## 11-39D. INSTALLATION.

- a. Lightly lubricate filter gasket with engine oil or Dow-Corning compound (DC-4).
- b. Turn filter clockwise until filter gasket contacts base of adapter; then tighten  $3/4$  to 1 turn or torque to 15/20 FT/LBS. and safety wire.
- c. Start engine, check for proper oil pressure. Warm up engine and check filter for leaks.
- d. Check that engine torque does not cause filter to contact adjacent parts.
- e. Replace engine cowl in accordance with paragraph 11-3.
- f. Check oil level and filter leakage after operating engine at high power setting, or after a flight around the field.

## 11-40. OIL COOLER.

11-41. DESCRIPTION. The external oil cooler is mounted on the left forward engine baffle. Flexible hoses carry the oil to and from the cooler. Ram air passes through the cooler coil and is discharged into the engine compartment. At each engine oil change, drain the oil cooler. Refer to Section 2 for servicing instructions.

## 11-42. FUEL SYSTEM.

11-43. DESCRIPTION. The engine is equipped with a carburetor mounted on the lower aft end of the engine. The carburetor has a manual altitude mixture control. For overhaul and repair of the carburetor, refer to the manufacturer's overhaul and repair manual.

## 11-44. CARBURETOR.

## 11-45. REMOVAL AND INSTALLATION.

- a. Place fuel selector valve in the OFF position.

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- b. Remove engine cowling in accordance with paragraph 11-3.
- c. Drain fuel from strainer and lines with strainer drain control.
- d. Remove bolts attaching air box ducting to carburetor, and remove air box ducting.
- e. Disconnect throttle and mixture controls at the carburetor. Note EXACT position, size and number of attaching washers and spacers for reference on reinstallation.
- f. Disconnect and cap or plug fuel line at carburetor.
- g. Remove safety wire, nuts and washers attaching carburetor to engine, and remove carburetor and mounting gasket.
- h. Reverse the preceding steps for reinstallation. Use new gaskets when installing carburetor. Rig controls in accordance with paragraphs 11-70, 11-71 and 11-72. (Check carburetor throttle arm to idle stop arm attachment for security and proper safetying at each normal engine inspection in accordance with figure 11-3.)

11-46. **IDLE SPEED AND MIXTURE ADJUSTMENTS.** Idle speed and mixture adjustment should be accomplished after the engine has been warmed up. Since idle RPM may be affected by idle mixture adjustment, it may be necessary to readjust idle RPM after setting the idle mixture correctly.

- a. Set the throttle stop screw (idle RPM) to obtain  $600 \pm 25$  RPM, with throttle control pulled full out against idle stop.

### NOTE

Engine idle speed may vary among different engines. An engine should idle smoothly, without excessive vibration and the idle speed should be high enough to maintain idling oil pressure and to preclude any possibility of engine stoppage in flight when the throttle is closed.

- b. Advance throttle to increase engine speed to approximately 1000 RPM.
- c. Pull mixture control knob slowly and steadily toward the idle cut-off position, observing tachometer, then return control full IN (RICH) position before engine stops.
- d. Adjust mixture adjusting screw at upper end of carburetor intake throat to obtain a slight and momentary gain of 25 RPM maximum at 1000 RPM engine speed as mixture control is moved from full IN (RICH) toward idle cut-off position. Return control to full IN (RICH) to prevent engine stoppage.
- e. If mixture is set too LEAN, engine speed will drop immediately, thus requiring a richer mixture. Turn adjusting screw OUT (counterclockwise) for a richer mixture.
- f. If mixture is set too RICH, engine speed will increase above 25 RPM, thus requiring a leaner mixture. Turn adjusting screw IN (clockwise) for a leaner mixture.

### NOTE

After each adjustment to the idle mixture, run engine up to approximately 2000 RPM to clear engine of excess fuel to obtain a correct idle speed.

11-47. **INDUCTION AIR SYSTEM.**

11-48. **DESCRIPTION.** Ram air enters the induction air system through an intake port and a filter on the left aft side of the cowling, and is ducted to the airbox near the firewall. From the induction airbox the filtered air is ducted to the inlet of the carburetor mounted on the lower aft end of the engine, through the carburetor, where the fuel is mixed with the air to the intake

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manifold. From the intake manifold, the fuel-air mixture is distributed to each cylinder by separate intake pipes. The intake pipes are attached to the manifold with hoses and clamps and to the cylinder with a four bolt flange sealed with a gasket. A butterfly valve, located in the airbox, may be operated manually from the cabin to permit the selection of either cold or heated air. When the induction air door is closed, heated air is drawn from a shroud on the left exhaust stack assembly.

- 11-48A. **INSTALLATION OF INDUCTION AIR SYSTEM DUCTS.** When cutting induction air system ducts to length, the support wire should be cut back far enough to bend back (minimum bend radius, 1/8 inch) under the clamp and protrude 1/4 inch. Do not break the bond between the wire and the fabric. Before tightening clamps, make sure there is no twist or torque on the duct. If the duct is supported with MIL-Y-1140 cord in place of wire, the preceding installation applies except: MIL-Y-1140 cord has no minimum bend radius requirements. The minimum installed bend radii for wire-supported ducts in plane of bend, measured from the wall of the duct, are as follows:
- Neoprene - one ply, 1/4 diameter of the maximum duct dimension.
  - Neoprene - two ply, and silicone one ply, 1/3 diameter of the maximum duct dimension.
  - Silicone - two ply, 1/2 diameter of the maximum duct dimension.

### NOTE

Duct carrying filtered induction air may not have local areas hand-formed to a different cross section.

- 11-49. **AIRBOX.**

- 11-50. **REMOVAL AND INSTALLATION.**

- Remove upper left engine cowl in accordance with paragraph 11-3.
- Disconnect flexible duct from forward end of airbox.
- Disconnect flexible duct from carburetor adapter assembly.
- Disconnect carburetor heat control arm on the forward side of the airbox and remove clamp securing control to the airbox.
- Remove screw attaching upper airbox support to firewall stiffener.
- Remove four screws and washers attaching airbox to the firewall and carefully remove airbox.
- Reverse the preceding steps for reinstallation. Rig carburetor heat control in accordance with paragraph 11-72.

- 11-51. **CLEANING AND INSPECTION.** Clean metal parts of the induction airbox with Stoddard solvent or equivalent. Inspect for cracks, dents, loose rivets, etc. Minor cracks may be stop-drilled. In case of continued or severe cracking, replace airbox. Inspect gaskets and install new gaskets, if damaged. Check manually-operated air door for ease of operation and proper rigging.

- 11-52. **INDUCTION AIR FILTER.**

- 11-53. **DESCRIPTION.** An induction air filter, mounted on the induction airbox on the left aft side of the engine compartment, removes dust particles from the ram air entering the engine.

- 11-54. **REMOVAL AND INSTALLATION.**

- Release the four quick-release fasteners securing the filter assembly to the airbox.
- Reverse the preceding step for reinstallation.



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- 11-55. **CLEANING AND INSPECTION.** Clean and inspect filter in accordance with instructions in Section 2.

### NOTE

If air filter gasket becomes loose, bond with EC-1300L or equivalent.

- 11-56. **IGNITION SYSTEM.**

- 11-57. **DESCRIPTION.** The ignition system is comprised of dual magnetos in one housing, two spark plugs in each cylinder, an ignition wiring harness, an ignition switch mounted on the instrument panel and required wiring between the ignition switch and magnetos.

- 11-58. **TROUBLE SHOOTING**

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE FAILS TO START.	Defective ignition switch.	Check switch continuity. Replace if defective.
	Spark plugs defective, improperly gapped or fouled by moisture or deposits.	Clean, regap and test plugs. Replace if defective.
	Defective ignition harness.	If no defects are found by a visual inspection, check with a harness tester. Replace defective parts.
	Magneto "P" lead grounded.	Check continuity. "P" lead should not be grounded in the ON position, but should be grounded in OFF position. Repair or replace "P" lead.
	Failure of impulse coupling.	Impulse coupling pawls should engage at cranking speeds. Listen for loud clicks as impulse couplings operate. Remove magnetos and determine cause. Replace defective magneto.
	Defective magneto.	Refer to paragraph 11-64.
	Broken drive gear.	Remove magneto and check magneto and engine gears. Replace defective parts. Make sure no pieces of damaged parts remain in engine or engine disassembly will be required.

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### 11-58. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE WILL NOT IDLE OR RUN PROPERLY:	Spark plugs defective, im- properly gapped or fouled by moisture or deposits.	Clean, regap and test plugs. Replace if defective.
	Defective ignition harness.	If no defects are found by a visual inspection, check with a harness tester. Replace defective parts.
	Defective magneto.	Refer to paragraph 11-64.
	Impulse coupling pauls remain engaged.	Listen for loud clicks as impulse coupling operates. Remove magneto and determine cause. Re- place defective magneto.
	Spark plugs loose.	Check and install properly.

### 11-59. MAGNETOS.

11-60. DESCRIPTION. The Bendix D-2000 series magneto consists of two electrically independent ignition circuits in one housing. A single four pole rotor provides the magnetic energy for both circuits. The magneto uses an impulse coupling to provide reliable ignition at engine cranking speed. Suppression of breaker contact point arcing is accomplished by feed-thru type capacitors mounted in the magneto cover which forms a part of the magneto harness assembly.

### 11-61. REMOVAL AND INSTALLATION.

#### WARNING

The magneto is in a SWITCH ON condition when the switch wire is disconnected. Therefore, ground the breaker contact points or disconnect the high-tension wires from magneto to spark plugs.

- a. Remove engine cowling in accordance with paragraph 11-3.
- b. Remove the eight screws securing the high-tension outlet cover to the magneto. The "P" leads may be disconnected for additional clearance if necessary.

#### NOTE

It is a good practice to position No. 1 cylinder at its approximate advanced firing position before removing the magneto.

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- c. Remove nuts, washers and clamps attaching the magneto to the engine accessory housing. Note the approximate angular position at which the magneto is installed, then remove the magneto.
- d. Reverse the preceding steps for reinstallation and time magneto-to-engine in accordance with paragraph 11-63.

### 11-62. INTERNAL TIMING. (MAGNETO REMOVED FROM ENGINE.)

#### NOTE

A magneto, correctly timed internally, will have the red painted tooth of the large distributor gears approximately centered in the timing windows, the L ("E" gap) mark on the rotor shaft in alignment with the pointer and both sets of breaker contacts opening, all at the same time.

- a. Remove breaker contact point assembly cover, if installed, by removing the cover screws, pulling cover directly aft away from housing and disconnecting both capacitor leads from breaker contact assemblies.
- b. Remove timing inspection hole plugs from magneto.
- c. Slowly turn the rotor shaft until the red painted tooth of the large distributor gear for each side is approximately centered in the inspection windows with the L ("E" gap) mark on the rotor aligned with the pointer. Lock the rotor in this EXACT position using Bendix Rotor Holding Tool, Part No. 11-8465 or equivalent.

#### NOTE

Position the 11-8465 Rotor Holding Tool on drive end of rotor shaft in the 4 o'clock position so that any shaft deflection caused by clamping action will be in a plane parallel to the breaker contacts.

- d. Connect the timing light (Bendix Part No. 11-9110 or equivalent) black lead to any unpainted surface of the magneto. Connect the red lead to the left breaker contact terminal and the green lead to the right breaker contact terminal.
- e. Carefully adjust the LEFT breaker contacts to just begin to open (light will go out) with the timing pointer within the width of the L ("E" gap) mark.
- f. Repeat step "e" for the RIGHT breaker contacts.
- g. Loosen the rotor holding tool and turn rotor shaft in normal direction of rotation until cam followers of contact assemblies are on the high point of cam lobes. Contact point clearance should be  $0.016 \pm 0.002$  inch and  $0.016 \pm 0.004$  inch on LEFT and RIGHT contacts respectively. If dimensions do not fall within limits, readjust contact points and recheck to be sure the points just begin to open when the timing pointer is within the width of the L ("E" gap) mark.

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## NOTES

Wire feeler gages are recommended when checking contact point clearance.

No attempt should be made to stone or dress contact points.

If the above conditions are met and within the tolerance, the magneto is timed internally and ready for installation. If the above conditions are not within tolerance, proceed to step "h".

- h. While holding the rotor shaft, loosen the screw securing breaker contact cam to rotor shaft and back screw out approximately half way. Place the end of a broad bladed screwdriver between the bottom of the cam and housing. Strike the screwdriver handle with a sharp downward blow to "pop" the cam loose from taper of shaft.
- i. Rotate cam until breaker contact cam followers are on the high point of cam lobes. Adjust breaker points to obtain a clearance of  $0.016 \pm 0.004$  inch on LEFT and RIGHT contacts respectively. Tighten breaker contact securing screws to 20-25 lb-in.
- j. Repeat step "c."
- k. While holding rotor shaft in this EXACT position, rotate the breaker contact cam in the opposite direction of rotation a few degrees BEYOND where the breaker contacts close, then rotate cam in the normal direction of rotation until the breaker contacts just begin to open. Point opening should be determined by the use of a timing light. (Bendix Part No. 11-9110 or equivalent.)
- l. While holding cam in this EXACT POSITION, push cam on rotor shaft as far as possible with the fingers. Tighten cam securing screw thereby drawing the cam down evenly and tightly. Torque cam securing screw to 16-20 lb-in.

## NOTE

Extreme care must be exercised in this operation. If cam adjustment is changed in the slightest degree, the timing of the magneto will be thrown off. Do not drive cam on rotor shaft with a mallet or other instrument.

- m. Recheck timing to make sure both sets of breaker contacts begin to open within the width of the L ("E" gap) mark and that the contact point clearance is in accordance with dimensions in step "g".

## NOTE

When reinstalling the inspection hole plugs, make sure the ventilated plugs are installed in the ends of the magneto. Torque plugs to 12-15 lb-in.

- 11-63. MAGNETO-TO-ENGINE-TIMING. The magneto must be installed with its timing marks carefully aligned, with number one cylinder on its compression stroke and with the number one position at its advanced firing position. Refer to paragraph 11-14 for the advanced firing position of number one piston. To locate the compression stroke of the number one cylinder, remove the lower spark plug from number 2, 3, 4, 5, and 6 cylinders. Remove the upper spark

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plug from number 1 cylinder. Place the thumb of one hand over the spark plug hole of number one cylinder and rotate crankshaft in the direction of normal rotation until the compression stroke is indicated by positive pressure inside the cylinder lifting the thumb off the spark plug hole. After the compression stroke is attained, locate number one piston at its advanced firing position. Locating the advanced firing position of number one piston may be obtained by rotating the crankshaft opposite to its normal direction of rotation until it is approximately 30 degrees before top dead center (BTC) on the compression stroke of number one cylinder. Rotate crankshaft in a normal direction to align the timing mark on the front face of the starter ring gear support with the drilled hole in the starter, making sure the final motion of the ring gear is in the direction of normal rotation.

### NOTE

An accurate top center indicator which screws into a spark plug mounting hole, and a pendulum pointer mounted on a 360-degree timing disc may also be used to locate the advanced firing position. The timing disc should be adapted to fit over the end of the propeller spinner in such a manner that it may be rotated as necessary. In all cases, it must be definitely determined that the number one cylinder is at the correct firing position and on the compression stroke when the engine is turned in its normal direction of rotation.

After the engine has been placed in the correct firing position, install the magneto to the engine in the following manner:

- a. Remove the timing window plug from the most convenient side of the magneto housing.
- b. Remove the rotor viewing location plug from the top center of the housing.
- c. Turn the rotating magnet drive shaft in the normal direction of magneto rotation until the red painted tooth of the large distributor gear is centered in the timing hole (hole at each side of magneto).
- d. Also observe at this time that the built in pointer just ahead of the rotor viewing window aligns with the L ("E" gap) mark on the rotor.
- e. Install the magneto-to-engine gasket on the magneto flange.

### WARNING

Do not attach harness spark plug leads to the spark plugs until all magneto-to-engine timing procedures are completed and the switch leads ("P" leads) are connected.

- f. Remove the engine-to-magneto drive gear train backlash by turning magneto drive opposite to normal rotation as far as possible.
- g. With the No. 1 cylinder at its correct firing position and on the compression stroke, hold the magneto as close to its No. 1 firing position as possible (red tooth in center of window and pointer over L ("E" gap) mark on rotor and install magneto to the engine. Loosely tighten magneto in position.

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### NOTE

To facilitate connection of a timing light to the switch lead ("P" lead) terminals, short adapter leads may be fabricated. These can be made by using two switch lead terminals and two short pieces of insulated wire. Install the fabricated adapter leads in the switch lead outlet terminals of the cover.

- h. Attach the red lead of the timing light (Bendix Part No. 11-9110 or equivalent) to the left switch lead adapter, the green lead of the timing light to the right switch lead adapter and the black lead of the timing light to the magneto housing (common ground).

### NOTE

An internal timing tolerance is allowed when adjusting the two main breakers. Therefore, one of the main breakers may open slightly before the other. Magneto-to-engine timing should be accomplished using the first main breaker to open as the reference point when the engine is in the firing position for No. 1 cylinder. This will ensure that ignition created by either spark plug will not occur prior to the desired engine firing point.

- i. Turn the entire magneto in direction of rotor rotation until the timing lights are on.
  - j. Turn magneto in direction of rotor rotation, right-hand rotation to right and left-hand rotation to left, until one of the timing lights just goes off. Then tighten the magneto mounting clamps evenly in this position.
  - k. Back the engine up approximately 10° and then carefully "bump" the engine forward while observing the timing lights.
  - l. At the No. 1 cylinder firing position, one of the timing lights should go off. Continue turning the engine in its normal direction of rotation until the other timing light goes off. This should be not more than 3 engine degrees later than the first light. If not, repeat steps "i" thru "k" until these conditions are obtained.
  - m. Make sure the magneto clamps are tightened securely, recheck timing once more and remove timing equipment.
  - n. Reinstall inspection plugs and torque plugs to 12-15 lb-in.
- 11-64. MAINTENANCE. At the first 25-hour inspection, first 50-hour inspection, first 100-hour inspection and thereafter at each 100-hour inspection, the contact breaker point compartment and magneto-to-engine timing should be inspected and checked. If magneto-to-engine timing is correct within plus zero and minus two degree, internal timing need not be checked. If timing is out of tolerance, remove magneto and set internal timing (paragraph 11-62), then install and time to engine.

### NOTE

If engine operating troubles develop which appear to be caused by the ignition system, it is advisable to check the spark plugs and ignition harness first before working on the magnetos. If the trouble appears definitely associated with a magneto, the following may be used to help disclose the source of trouble without overhauling the magneto.

## MODEL R182 AND TR182 SERVICE MANUAL

- a. Moisture check.
  - 1. Remove contact breaker point assembly cover and inspect cover, cables and capacitor for moisture in the area.
  - 2. Inspect distributor block high tension outlets for moisture.
  - 3. If any moisture is evident, lightly wipe with a soft, dry, clean, lint-free cloth.

### CAUTION

Do not use gasoline or any other solvent, as these will remove the wax coating on some parts and cause an electrical leak.

- b. Breaker contact compartment check.
  - 1. Check all parts of the contact breaker assembly for security. Check distributor block high-tension outlet springs for evidence of spark erosion and proper height. The end of spring should not be more than 0.422 inch from top of tower.
  - 2. Check breaker contact assembly points for excessive wear, burning, deep pits and carbon deposits. Breaker points may be cleaned with a hard finish paper. If breaker points are found defective, install a new assembly. Make no attempts to stone or dress breaker points. Clean new breaker points with clean unleaded gasoline and hard finish paper before installing.
  - 3. Check condition of the cam follower felt. Squeeze felt between thumb and finger. If fingers are not moistened with oil, re-oil using 2 or 3 drops of lubricant (Bendix Part No. 10-86527 or equivalent). Allow approximately 30 minutes for felt to absorb the lubricant. Blot off excess lubricant with a clean, lint-free cloth. Too much lubricant could foul breaker points and cause excessive burning.
  - 4. Check capacitors for looseness in the magneto cover of the harness assembly and for any physical damage. If equipment is available, check the capacitors for leakage, series resistance and capacitance. The capacitance should be 0.34 to 0.41 microfarads.

### NOTE

Spring in capacitor outlet may cause an indication of a short to ground if an adapter lead is not used.

- c. If the trouble has not been corrected after accomplishing the moisture and breaker contact compartment check, check magneto-to-engine timing in accordance with paragraph 11-63. If timing is incorrect, remove magneto and adjust internal timing in accordance with paragraph 11-62.
- d. Reinstall magneto and time to engine in accordance with paragraph 11-63.
- e. If the trouble has not been corrected, magneto overhaul or replacement is indicated.

### 11-65. MAGNETO CHECK.

- a. Start and run engine until the oil and cylinder head temperatures are in the normal operating ranges.
- b. Advance engine speed to 1700 RPM.
- c. Turn the ignition switch to the "R" position and note the RPM drop, then return the switch to the "BOTH" position to clear the opposite set of plugs.
- d. Turn the switch to the "L" position and note the RPM drop, then return the switch to the "BOTH" position.

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- e. The RPM drop should not exceed 175 RPM on either magneto setting or show greater than 50 RPM differential between magneto settings. A smooth RPM drop-off past normal is usually a sign of a too lean or too rich mixture. A sharp RPM drop-off past normal is usually a sign of a fouled plug, a defective harness lead or a magneto out of time. If there is doubt concerning operation of the ignition system, RPM checks at a leaner mixture setting or at higher engine speeds will usually confirm whether a deficiency exists.

### NOTE

An absence of RPM drop may be an indication of faulty grounding of one side of the ignition system, a disconnected ground lead at magneto or possibly the magneto timing is set too far in advance.

- 11-66. **SPARK PLUGS.** Two 18-mm spark plugs are installed in each cylinder and screw into helicoil type thread inserts. The spark plugs are shielded to prevent spark plug noise in the radios and have an internal resistor to provide longer terminal life. Spark plug life will vary with operating conditions. A spark plug that is kept clean and properly gapped will give better and longer service than one that is allowed to collect lead deposits and is improperly gapped.

### NOTE

Refer to Section 2 for inspection interval. Remove, clean, inspect and regap all spark plugs at each inspection. Install lower spark plugs in upper portion of cylinders and install upper spark plugs in lower portion of cylinders. Since deterioration of lower spark plugs is usually more rapid than that of the upper spark plugs, rotating helps prolong spark plug life.

- 11-67. **ENGINE CONTROLS.**

- 11-68. **DESCRIPTION.** The throttle, mixture and carburetor heat controls are of the push-pull type. The mixture control is equipped to lock in any position desired. To move the control, the spring-loaded button, located in the end of the control knob, must be depressed. When the button is released, the control is locked. The mixture control also has a vernier adjustment. Turning the knob in either direction will change the control setting. The vernier is primarily for precision control setting. The throttle control has neither a locking button nor a vernier adjustment, but contains a knurled friction knob which is rotated for more or less friction as desired. The friction knob prevents vibration induced "creeping" of the control. The carburetor heat control has no locking device.

- 11-69. **RIGGING.** When adjusting any engine control, it is important to check that the control slides smoothly throughout its full range of travel, that it locks securely if equipped with a locking device and the arm or lever it operates moves through its full arc of travel.

### CAUTION

Whenever engine controls are being disconnected, pay particular attention to the EXACT position, size and number of attaching washers and spacers. Be sure to install attaching parts as noted when connecting controls.



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### 11-70. THROTTLE CONTROL. (See figure 11-3.)

#### NOTE

Before rigging throttle control, check that control end (13) is secure. If any indication of looseness or breakage is apparent, replace the throttle control.

- a. Screw friction lock nut (2) into threads of barrel (7).
- b. Ensure washer (5) and nut (6) on forward side of panel are secure.
- c. Push knob assembly (1) full in against friction lock nut (2), then pull knob assembly out approximately 1/8-inch to obtain "cushion".
- d. Tighten friction lock nut (2) against barrel (7).
- e. At the carburetor, attach throttle arm hardware to rod end (16).

#### NOTE

Ensure palnut (17) is on threads of plunger (18) before installing rod end (16).

- f. Screw rod end (16) up threads of plunger (18) until throttle arm contacts full power stop; secure with palnut (17).

#### NOTE

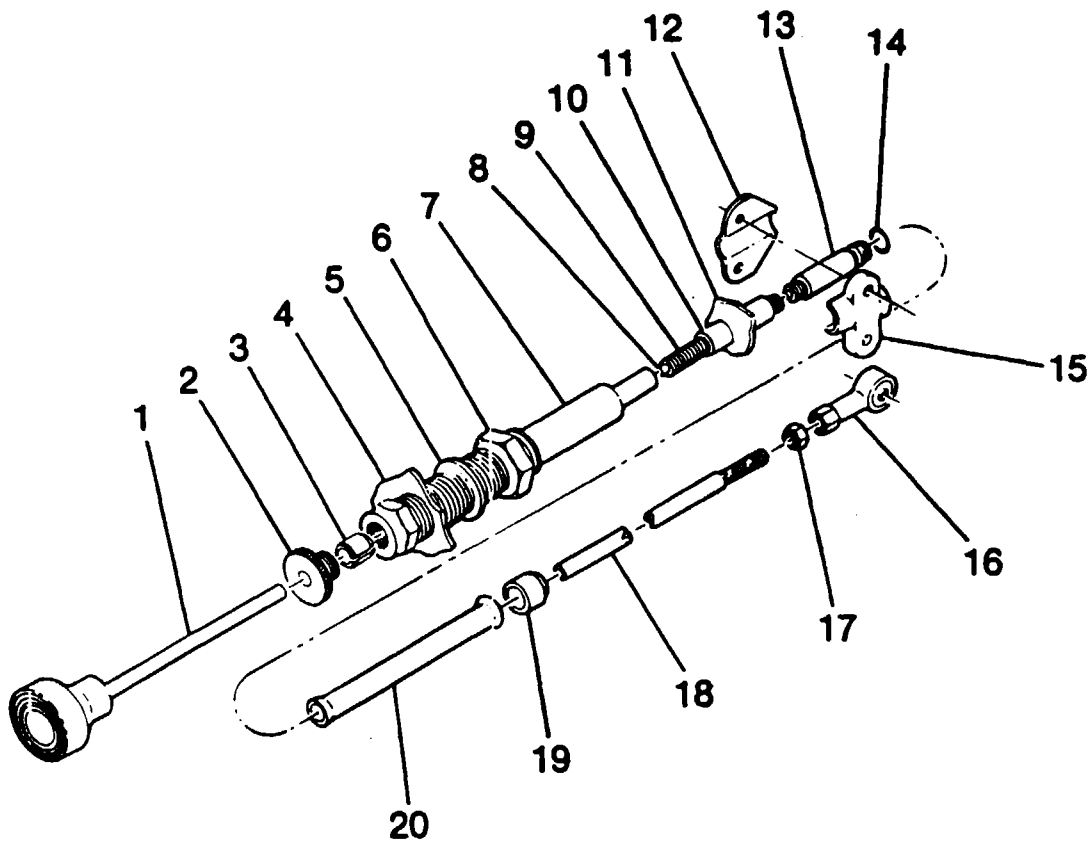
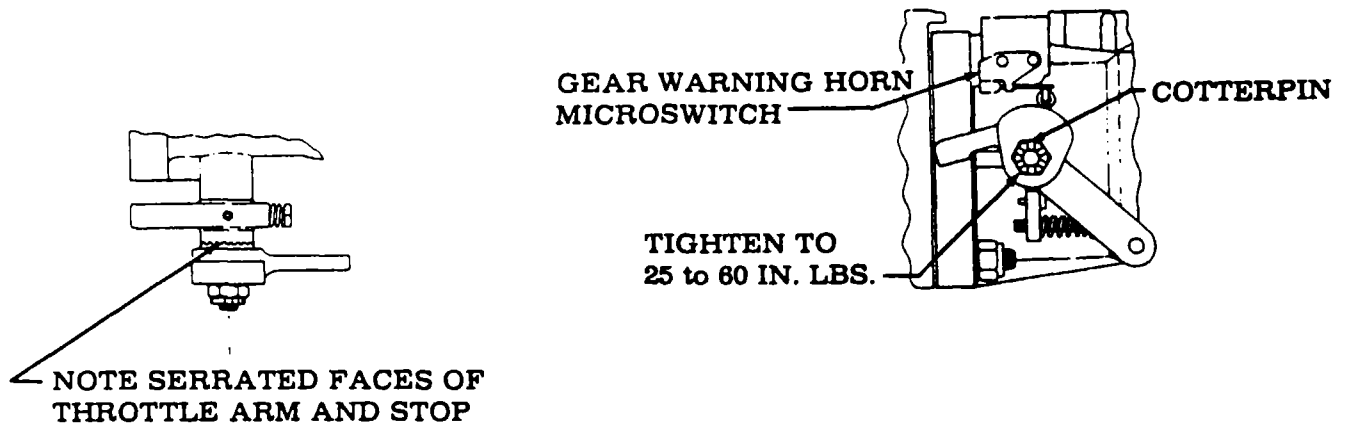
Ensure that rod end (16) is threaded on to plunger (18) so that .020-inch safety wire cannot be installed through drilled hole in rod end.

- g. Check control end (13) clamping in bracket (12) and clamp (15).
- h. Pull knob assembly full out and check that idle stop on carburetor is contacted.
- i. Work throttle control in and out several times to check for binding.

### 11-71. MIXTURE CONTROL.

- a. Push mixture control full in, then pull it out approximately 1/8 inch for cushion.
- b. Loosen clamp securing the control to the engine.
- c. Shift control housing in the clamp so that the mixture arm on the carburetor is in the full open position (RICH). Tighten the clamp in this position.
- d. Unlock and pull mixture control full out. Check that idle mixture arm on carburetor is full closed (IDLE CUT-OFF).
- e. Check that the bolt and nut at the mixture arm on carburetor secures the control wire and that the bolt will swivel in the arm.

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- |                      |                   |
|----------------------|-------------------|
| 1. Knob Assembly     | 11. Firewall      |
| 2. Friction Lock Nut | 12. Bracket       |
| 3. Locking Collet    | 13. Control End   |
| 4. Instrument Panel  | 14. Packing       |
| 5. Washer            | 15. Clamp         |
| 6. Nut               | 16. Rod End       |
| 7. Barrel            | 17. Palnut        |
| 8. Core              | 18. Plunger       |
| 9. Casing            | 19. Plunger Seal  |
| 10. Clamping Sleeve  | 20. Plunger Guide |

Figure 11-3. Throttle Control and Throttle Arm to Idle Stop Adjustment

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- f. Bend the wire tip 90 degrees to prevent it from being withdrawn if the attaching nut should become loose.
- g. When installing a new control, it may be necessary to shorten the wire and/or control housing.
- h. The mixture arm on the carburetor must contact the stops in each direction, and the control should have approximately 1/8 inch cushion when pushed in.

### NOTE

Refer to the inspection chart in Section 2 for inspection, lubrication and/or replacement interval for the mixture control.

#### 11-72. CARBURETOR HEAT CONTROL.

- a. Loosen clamp securing the control to the bracket on engine.
- b. Push control full in, then pull it out approximately 1/8 inch from panel for cushion.
- c. Shift control housing in its clamp so that the valve in the airbox is seated in the full open position. Tighten clamp in this position.
- d. Pull out on the control and check that the air valve inside the airbox seats in the opposite direction.
- e. Check that bolt and nut on the air valve lever secures the control wire and that the bolt will swivel in the lever.
- f. Bend the wire tip 90 degrees to prevent it from being withdrawn if the attaching nut should become loose.

### NOTE

Refer to the inspection chart in Section 2 for inspection, lubrication and/or replacement interval for the carburetor heat control.

#### 11-73. PROPELLER CONTROL. (Refer to Section 13.)

#### 11-74. STARTING SYSTEM.

- 11-75. DESCRIPTION. The starting system employs an electrical starter motor mounted at the front (propeller end) lower left side of the engine. A starter solenoid is activated by the ignition key on the instrument panel. When the solenoid is activated, its contacts close and electrical current energizes the starter motor. Initial rotation of the starter armature shaft, engaged with the reduction gear, drives the Bendix shaft and pinion. When the armature turns the reduction gear, the Bendix drive pinion meshes with the crankshaft ring gear assembly by inertia and action of the screw threads within the Bendix sleeve. A detent pin engages in a notch in the screw threads which prevents demeshing if the engine fails to start when the starting circuit is de-energized. When the engine reaches a predetermined speed, centrifugal action forces the detent pin out of the notch in the screw shaft and allows the pinion to demesh from the ring gear.

# MODEL R182 AND TR182 SERVICE MANUAL

## CAUTION

Never operate the starter motor more than 12 seconds at a time. Allow starter motor to cool between cranking periods to avoid overheating. Longer cranking periods without cooling time will shorten the life of the starter motor.

- 11-76. **PRIMARY MAINTENANCE.** The starting circuit should be inspected at regular intervals, the frequency of which should be determined by the service and conditions under which the equipment is operated. Inspect the battery and wiring. Check battery for fully charged condition, proper electrolyte level with approved water and terminals for cleanliness. Inspect wiring to be sure that all connections are clean and tight and that the wiring insulation is sound. Check that the brushes slide freely in their holders and make full contact on the commutator. When brushes are worn to one-half of their original length, install new brushes (compare brushes with new ones). Check the commutator for uneven wear, excessive glazing or evidence of excessive arcing. If the commutator is only slightly dirty, glazed or discolored, it may be cleaned with a strip of No. 00 or No. 000 sandpaper. If the commutator is rough or worn, it should be turned in a lathe and the mica undercut. Inspect the armature shaft for rough bearing surfaces. New brushes should be properly seated when installing by wrapping a strip of No. 00 sandpaper around the commutator (with sanding side out) 1-1/4 to 1-1/2 times maximum. Drop brushes on sandpaper covered commutator and turn armature slowly in the direction of normal rotation. Clean sanding dust from motor after sanding.
- 11-77. **STARTER MOTOR.**
- 11-78. **REMOVAL AND INSTALLATION.**
- a. Remove engine cowling in accordance with paragraph 11-3.

## CAUTION

When disconnecting or connecting the starter cable, do not permit starter terminal bolt to rotate. Rotation of the bolt could break the conductor between terminal and field coils causing the starter to be inoperative.

- b. Disconnect electrical cable at starter motor. Insulate the disconnected cable terminal as a safety precaution.
- c. Remove three nuts and washers and one bolt securing starter to crankcase. Work starter from engine.
- d. To install starter, position starter on mounting pad, aligning dowel pins in starter mounting pad with holes in mounting pad on engine.
- e. Secure starter with washer, lockwasher and nut in three places and install bolt and washers.
- f. Tighten nuts and bolt evenly to a torque value of 150 lb-in.
- g. Connect electrical cable to starter terminal and install engine cowling.

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### 11-79. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
STARTER WILL NOT OPERATE.	Defective master switch or circuit.	Check continuity of master switch and circuit. Install new switch or wires.
	Defective starter switch or switch circuit.	Check continuity of switch and circuit. Install new switch or wires.
	Defective starter motor.	Check voltage to starter. If voltage is present, remove, repair or install new starter motor.
STARTER MOTOR RUNS, BUT DOES NOT TURN CRANKSHAFT.	Defective Bendix drive.	Remove starter and inspect Bendix drive. Replace defective parts.
	Damaged starter pinion gear or ring gear.	Inspect starter pinion gear and ring gear. Replace defective parts.
STARTER MOTOR DRAGS.	Low battery.	Check battery. Charge or install new battery.
	Starter switch or relay contacts burned or dirty.	Install serviceable unit.
	Defective starter motor power cable.	Inspect cable. Install new cable.
	Loose or dirty connections.	Inspect connections. Remove, clean and tighten all terminal connections.
	Defective starter motor.	Check starter motor brushes, brush spring tension, thrown solder on brush cover. Repair or install new starter motor.
STARTER EXCESSIVELY NOISY.	Dirty or worn commutator.	Inspect commutator. Clean and turn commutator.
	Worn starter pinion gear or broken teeth on ring gear.	Inspect starter pinion gear and ring gear. Replace defective parts.

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### 11-80. EXHAUST SYSTEM.

11-81. DESCRIPTION. The exhaust system consists of two exhaust stack assemblies, for the left and right bank of cylinders. Each cylinder has a riser pipe attached to the exhaust port. The three risers at each bank of cylinders are joined together into a collector forming an exhaust stack assembly. Each exhaust stack assembly connects to the muffler on its respective side of the engine. The mufflers are enclosed in a shroud which captures exhaust heat. The left muffler supplies heated air for the carburetor heat source, the right muffler supplies heated air which is used to heat the cabin. Tail pipes are clamped to each muffler.

11-82. ECONOMY MIXTURE INDICATOR (EGT). (Refer to Section 15.)

### 11-83. REMOVAL AND INSTALLATION. (See figure 11-4.)

- a. Remove engine cowling in accordance with paragraph 11-3.
- b. Disconnect ducts from heater shroud on muffler assembly.
- c. Disconnect duct from shroud on left exhaust stack assembly.
- d. Remove nuts, bolts and clamps attaching stack assemblies to the muffler.
- e. Loosen nuts attaching exhaust stacks to the cylinders and remove muffler assembly.
- f. Remove nuts attaching exhaust stack assemblies to the cylinders and remove exhaust stacks and gaskets.
- g. Reverse the preceding steps for reinstallation. Install a new copper-asbestos gasket between each riser and its mounting pad on each cylinder, regardless of apparent condition of those removed. Torque exhaust stack nuts at cylinders to 100-110 pound-inches.

11-84. INSPECTION. Since exhaust systems of this type are subject to burning, cracking and general deterioration from alternate thermal stresses and vibrations, inspection is important and should be accomplished every 50 hours of operation. Also, a thorough inspection of the engine exhaust system should be made to detect cracks causing leaks which could result in loss of engine power. To inspect the engine exhaust system, proceed as follows:

- a. Remove engine cowling as required so that ALL surfaces of the exhaust assemblies can be visually inspected.

#### NOTE

Especially check the areas adjacent to welds and slip joints. Look for gas deposits in surrounding areas, indicating that exhaust gases are escaping through a crack or hole or around the slip joints.

- b. After visual inspection, an air leak check should be made on the exhaust system as follows:
  1. Attach the pressure side of an industrial vacuum cleaner to the tailpipe opening, using a rubber plug to effect a seal as required.

#### NOTE

The inside of vacuum cleaner hose should be free of any contamination that might be blown into the engine exhaust system.

2. With vacuum cleaner operating, all joints in the exhaust system may be checked manually by feel, or by using a soap and water solution and watching for bubbles. Forming of bubbles is considered acceptable; if bubbles are blown away, system is not considered acceptable.

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1. Riser
2. Exhaust Stack Assembly
3. Spring
4. Muffler
5. Clamp Half
6. Tailpipe
7. Shroud
8. Cabin Heat Outlet
9. Cabin Heat Inlet
10. Carburetor Heat Outlet
11. Shock-Mount
12. Clamp

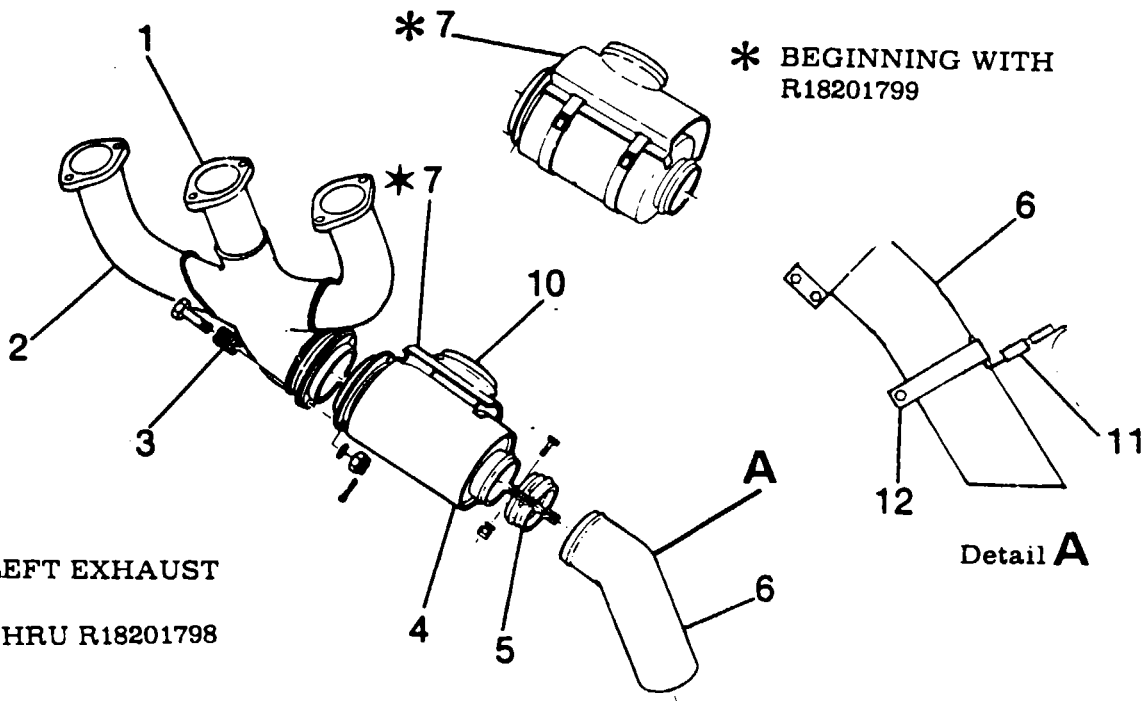
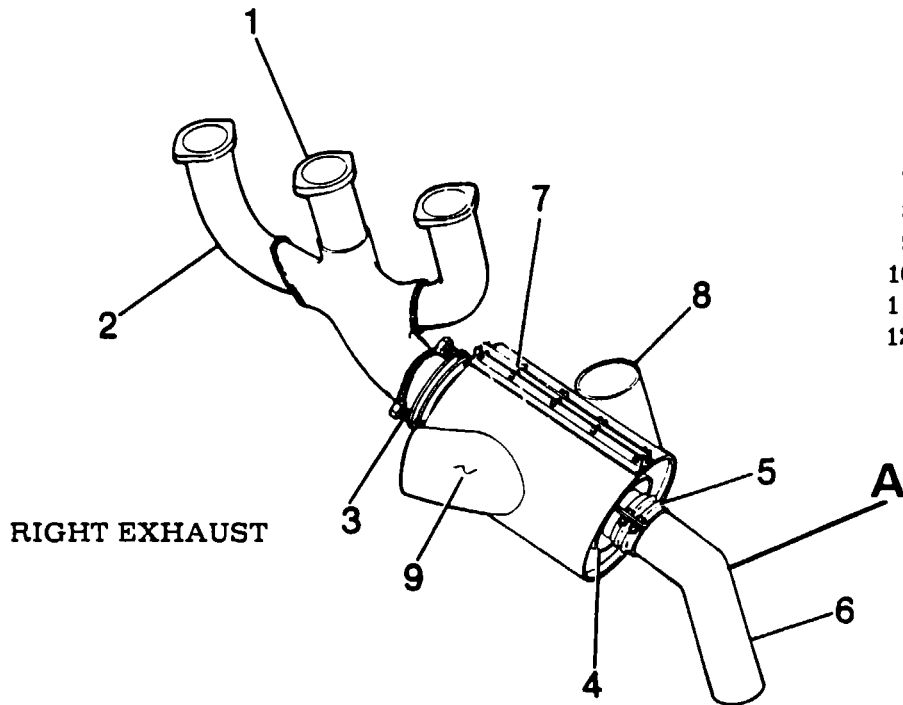


Figure 11-4. Exhaust System

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- c. Where a surface is not accessible for a visual inspection, or for a more positive test, the following procedure is recommended.
  1. Remove exhaust stack assemblies.
  2. Use rubber expansion plugs to seal openings.
  3. Using a manometer or gage, apply approximately 1-1/2 psi (3 inches of mercury) air pressure while each stack assembly is submerged in water. Any leaks will appear as bubbles and can be readily detected.
  4. It is recommended that exhaust stacks found defective be replaced before the next flight.
- d. After installation of exhaust system components perform the inspection in step "b" of this paragraph to ascertain that system is acceptable.

### 11-85. EXTREME WEATHER MAINTENANCE.

- 11-86. **COLD WEATHER.** Cold weather starting is made easier by the use of the engine primer system and installation of a ground service receptacle. The primer system is manually operated from the cabin. Fuel is supplied by a line from the fuel strainer to the plunger. Operating the primer forces fuel to the engine. With an external power receptacle installed, an external power source may be connected to assist in cold weather starting. Refer to Section 16 for use of the external power receptacle.

The following may also be used to assist engine starting in extreme cold weather. After the last flight of the day, drain the engine oil into a clean container so the oil can be preheated. Cover the engine to prevent ice or snow from collecting inside the cowling. When preparing the aircraft for flight or engine runup after these conditions have been followed, preheat the drained engine oil.

### WARNING

Do not heat the oil above 121°C (250°F). A flash fire may result. Before pulling the propeller through, ascertain that the magneto switch is in the OFF position to prevent accidental firing of the engine.

After preheating the engine oil, gasoline may be mixed with the heated oil in a ratio of 1 part gasoline to 12 parts engine oil before pouring into the engine oil sump. If the free air temperature is below minus 29°C (-20°F), the engine compartment should be preheated by a ground heater. Pre-heating the engine compartment is accomplished by inducing heated air up through the engine cowl flap openings, thus heating both the cylinder and oil. After the engine compartment has been preheated, inspect all engine drain and vent lines for presence of ice. After this procedure has been complied with, pull propeller through several revolutions by hand before attempting to start the engine.

### CAUTION

Due to the desludging effect of the diluted oil, engine operation should be observed closely during the initial warm-up of the engine. Engines that have considerable amount of operational hours accumulated since their last dilution period may be seriously affected by the dilution process. This will be caused by the diluted oil dislodging sludge and carbon deposits within the engine. This



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residue will collect in the oil sump and possibly clog the screened inlet to the oil sump. Small deposits may actually enter the oil sump and be trapped by the main oil filter screen. Partial or complete loss of engine lubrication may result from either condition. If these conditions are anticipated after oil dilution, the engine should be run for several minutes at normal operating temperatures and then stopped and inspected for evidence of sludge and carbon deposits in the oil sump and oil filter screen. Future occurrence of this condition can be prevented by diluting the oil prior to each engine oil change. This will also prevent the accumulation of the sludge and carbon deposits.

- 11-87. **SEACOAST AND HUMID AREAS.** In salt water areas special care should be taken to keep the engine, accessories and airframe clean to prevent oxidation. In humid areas, fuel and oil should be checked frequently and drained of condensation to prevent corrosion.
- 11-88. **GROUND SERVICE RECEPTACLE.** With the ground service receptacle installed, the use of an external power source is recommended for cold weather starting, and lengthy maintenance of the aircraft electrical system. Refer to Section 16 for additional information.

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## SECTION 11A

### ENGINE (TURBOCHARGED)

#### WARNING

When performing any inspection or maintenance that required turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

#### NOTE

For additional information covering turbocharger and component maintenance, overhaul and trouble-shooting refer to manufacturer's overhaul manual.

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**11A-1. ENGINE COWLING.**

**11A-2. DESCRIPTION.** The engine cowling is divided into major removable segments. The upper RH segment has an oil dipstick and remote fuel strainer drain control access door. The upper center cowl skin has the oil filler neck access door, and the lower LH panel contains the turbocharger access door. Controllable cowl flaps are integral with the lower trailing edge of cowl skin. They are hinged at the front edge, and controlled manually to maintain efficient engine operating temperature. The upper center and lower cowl segments are screw fastened at the nose cap, but RH and LH segments use quick release fasteners all around for easy access. Cowl mounted landing and taxi lights are mounted in the nose cap lower cowling.

**11A-3. REMOVAL AND INSTALLATION.** (Refer to Section 11.)

**11A-4. CLEANING AND INSPECTION.** (Refer to Section 11.)

**11A-5. REPAIR.** (Refer to Section 17.)

**11A-6. COWL FLAPS.**

**11A-7. DESCRIPTION.** Cowl flaps are provided to aid in controlling efficient engine temperature. Two cowl flaps, operated by a single control in the cabin, are located at the aft edge of the lower cowl segment.

**11A-8. REMOVAL AND INSTALLATION.** (Refer to Section 11.)

**11A-9. RIGGING.** (Refer to Section 11.)

**11A-10. ENGINE.**

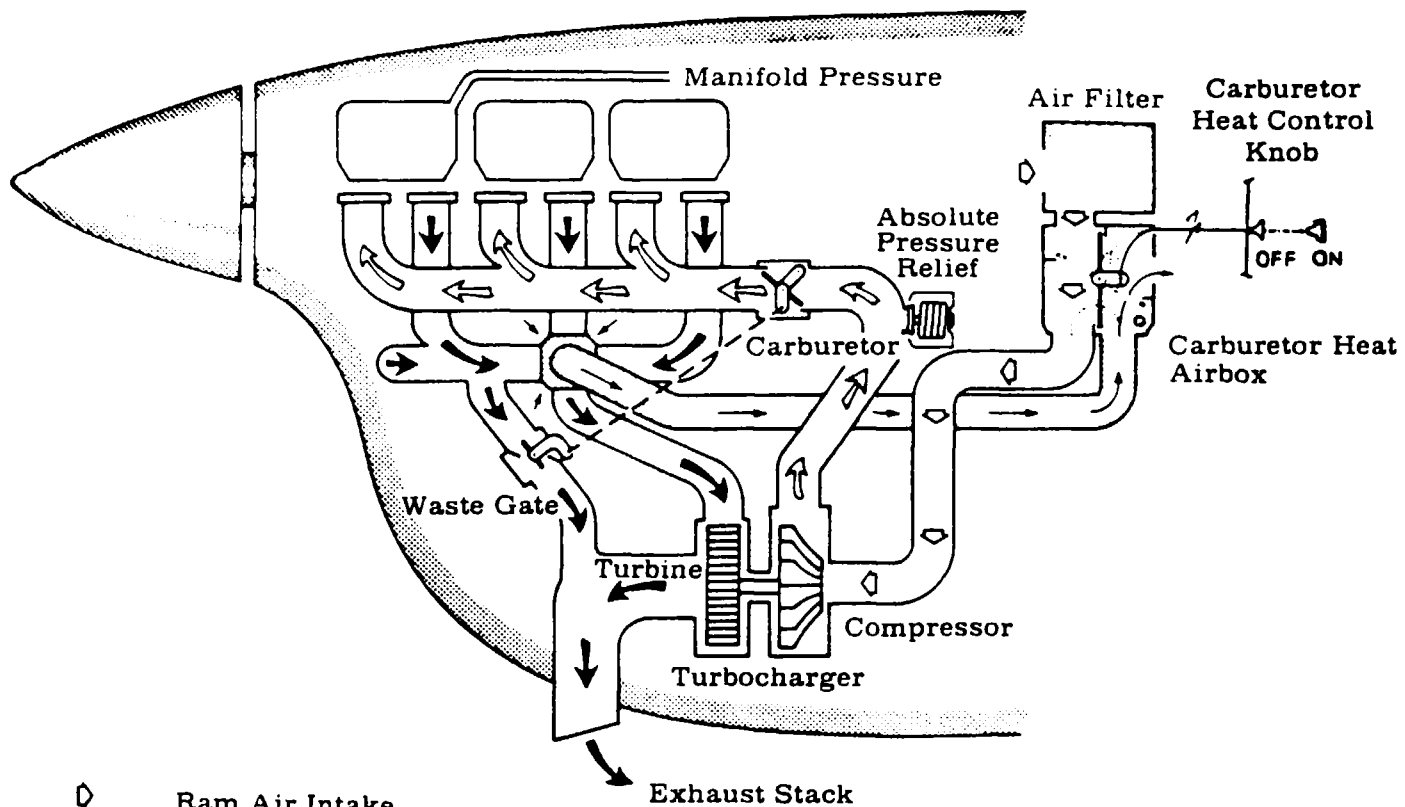
**11A-11. DESCRIPTION.** An air cooled, wet-sump, six-cylinder, horizontally-opposed, direct-drive, carbureted, turbocharged Avco Lycoming O-540-L series engine, driving a constant-speed propeller is used to power the aircraft. Refer to paragraph 11A-12 for engine performance data. Repair and overhaul of the engine, turbocharger controls, accessories, and propeller are covered in the appropriate publications, which are issued by the respective manufacturers. These publications are available from Cessna Service Parts Center.

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### 11A-12. ENGINE DATA.

AIRCRAFT Series	TR182 SKYLANE
MODEL (Lycoming)	O-540-L3C5D
Rated Horsepower at RPM	235 at 2400 to 20,000 Feet
Number of Cylinders	6 Horizontally-Opposed
Displacement	541.5 Cubic Inches
Bore	5.125 Inches
Stroke	4.375 Inches
Compression Ratio	8.5:1
Magnetos	Bendix D6LN-2031
Right Magneto	Fires 23° BTC, Upper Left, Lower Right
Left Magneto	Fires 23° BTC, Lower Left, Upper Right
Firing Order	1-4-5-2-3-6
Spark Plugs	18mm (Refer to Avco Lycoming Service Instruction No. 1042 for factory approved spark plugs and required gap.)
Torque	330 ± 30 LB-IN.
Carburetor (Marvel)	HA-6
Tachometer	Mechanical Drive
Oil Sump Capacity	8 U.S. Quarts
With External Filter	9. U.S. Quarts
Oil Pressure (PSI)	
Normal	60-90
Minimum Idling	25
Maximum (Cold Oil Starting)	100
Oil Temperature	
Normal Operating	160°F - 245°F
Maximum	Red Line (245°F)
Probe Location	Accessory Housing
Cylinder Head Temperature	
Normal Operating	200°F - 500°F
Maximum	Red Line (500°F)
Probe Location	Lower side of Number 3 Cylinder THRU 1979 Lower side of Number 5 Cylinder 1980 & ON
Economy Mixture Indicator (EGT)	
Probe Location	Left Hand Exhaust Collector
Direction of Crankshaft Rotation (Viewed from Rear)	Clockwise
Dry Weight-With Accessories	430 LB (Weight is approximate and will vary with optional accessories installed.)

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- ◊ Ram Air Intake
- ⇒ Compressed Air (MP)
- Exhaust Gas
- ≡ Alternate/Carb Heat Air
- Engine Cooling Air for Carburetor Heat
- Mechanical Linkage

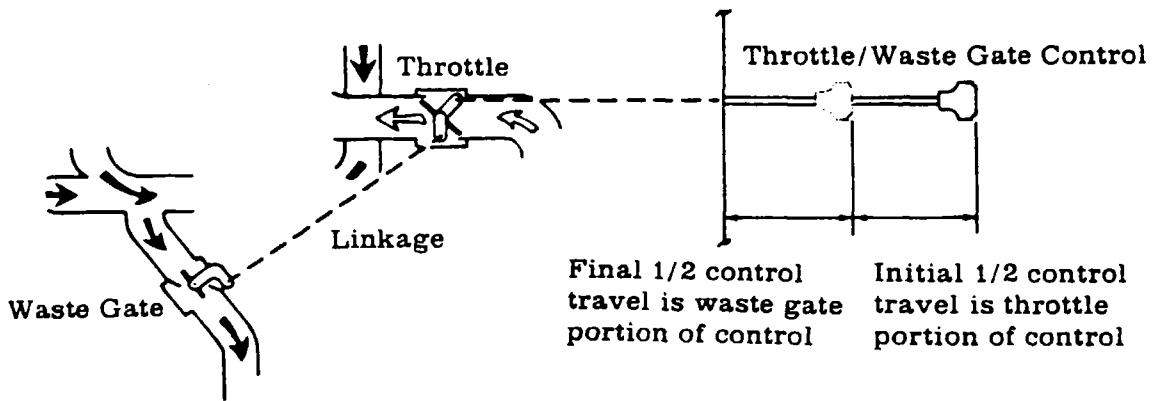


Figure 11A-1. Turbocharger Airflow Schematic

## MODEL R182 AND TR182 SERVICE MANUAL

11A-13. **TIME BETWEEN OVERHAUL (TBO).** Avco Lycoming recommends engine overhaul at 2000 hours operating time for the O-540-L3C5D series engines. Refer to Avco Lycoming Service Instruction 1009AA, and to any superseding instructions, revisions or supplements thereto, for further recommendations. At the time of overhaul, engine accessories should be overhauled. Refer to Section 13 for propeller and governor overhaul periods.

11A-14. **OVERSPEED LIMITATIONS.** The engine must not be operated above specified maximum continuous RPM. If inadvertent overspeed occurs, refer to Avco Lycoming Bulletin 369F, and any superseding bulletins, revisions, or supplements for complete coverage.

11A-15. **TROUBLE SHOOTING.**

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE WILL NOT START.	Improper starting procedure.	Refer to Pilot's Operating Handbook.
	Fuel tanks empty.	Visually inspect cells. Fill with proper grade and quantity of gasoline.
	Mixture control in the IDLE CUT-OFF position.	Move control to the full RICH position.
	Fuel selector valve in OFF position.	Place selector valve in the ON position to a cell known to contain gasoline.
	Engine flooded.	Refer to Pilot's Operating Handbook.
	Water in fuel system.	Open fuel strainer drain and check for water. If water is present, drain fuel cell sumps, lines, strainer and carburetor.
	Carburetor screen or fuel strainer plugged.	Remove carburetor and clean thoroughly. Refer to Section 12 for fuel strainer cleaning.
	Fuel contamination.	Drain all fuel and flush out fuel system. Clean all screens, fuel lines, strainer and carburetor.
	Defective carburetor.	Repair or replace carburetor.

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### 11A-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE WILL NOT START (Cont).	Vaporized fuel. (Most likely to occur in hot weather with a hot engine.)	Refer to Pilot's Operating Handbook.
	Defective aircraft fuel system.	Refer to Section 12.
	Defective ignition system.	Refer to paragraph 11-64.
	Defective magneto switch or grounded magneto leads.	Check continuity. Repair or replace switch or leads.
	Spark plugs fouled.	Remove, clean and regap plugs. Test harness cables to persistently fouled plugs. Replace if defective.
ENGINE STARTS BUT DIES, OR WILL NOT IDLE.	Water in fuel system.	Open fuel strainer drain and check for water. If water is present, drain fuel cell sumps, lines, strainer and carburetor.
	Propeller control set in high pitch position (low RPM).	Use low pitch (high RPM) position for all ground operation.
	Vaporized fuel. (Most likely to occur in hot weather with a hot engine.)	Refer to Pilot's Operating Handbook.
	Induction air leaks.	Check visually. Correct the cause of leaks.
	Idle stop screw or idle mixture incorrectly adjusted.	Refer to paragraph 11A-46.
	Carburetor idling jet plugged.	Clean carburetor and fuel strainer. Refer to Section 12 for fuel strainer.
	Spark plugs fouled or improperly gapped.	Remove, clean and regap plugs. Replace if defective.

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### 11A-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE STARTS BUT DIES, OR WILL NOT IDLE (Cont).	Manual primer leaking.	Disconnect primer outlet line. If fuel leaks through primer, repair or replace primer.
	Defective ignition system.	Refer to paragraph 11-64.
	Fuel boost pump.	Check fuel pressure.
	Leaking float valve or float level set too high.	Perform an idle mixture check. Attempt to remove any rich indication with the idle mixture adjustment. If the rich indication cannot be removed, the float valve is leaking or the float the level is set too high. Replace defective parts, reset float level.
	Defective carburetor.	If engine will start when primed but stops when priming is discontinued, with mixture control in full RICH position, the carburetor is defective. Repair or replace carburetor.
	Defective fuel system.	Refer to Section 12.
	Turbocharger wheels rubbing.	Replace turbocharger.
	Improperly adjusted or defective waste gate.	Refer to paragraph 11A-64 or 11A-65.
	Leak in turbocharger discharge pressure system.	Correct cause of leaks. Repair or replace damaged parts.
	Malfunctioning turbocharger.	Check operation, listen for unusual noise. Check operation of waste gate valve and for exhaust system defects. Tighten loose connections.
Defective engine.	Check compression. Listen for unusual engine noises. Engine repair is required.	



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### 11A-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE RUNS ROUGHLY, WILL NOT ACCELERATE PROPERLY, OR LACKS POWER.	Restriction in aircraft fuel system.	Refer to Section 12.
	Worn or improperly rigged throttle or mixture control.	Check visually. Replace worn linkage. Rig properly.
	Fuel pump output low.	Check fuel pressure.
	Restricted induction air filter.	Check visually. Clean in accordance with Section 2.
	Propeller control in high pitch (low RPM) position.	Use low pitch (high RPM) position for all ground operations.
	Fuel contamination.	Check all screens in fuel system. Drain all fuel and flush out system. Clean all screens, lines, strainer and carburetor.
	Low upper deck pressure.	Check absolute pressure relief valve.
	Float level set too low.	Check and reset float level.
	Spark plugs fouled or improperly gapped.	Remove, clean and regap plugs. Replace if defective.
	Defective ignition system.	Refer to paragraph 11-64.
Defective carburetor.	If engine will start when primed but stops when priming is discontinued, with mixture control in full RICH position, the carburetor is defective. Repair or replace carburetor.	
Cracked engine mount.	Inspect and repair or replace mount as required.	

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### 11A-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE RUNS ROUGHLY, WILL NOT ACCELERATE PROPERLY, OR LACKS POWER. (Cont.)	Defective mounting bushings.	Inspect and install new bushings as required.
	Defective engine.	Check compression. Listen for unusual engine noises. Engine repair is required.
POOR IDLE CUT-OFF.	Worn or improperly rigged mixture control.	Check that idle cut-off stop on carburetor is contacted. Replace worn linkage. Rig properly.
	Manual primer leaking.	Disconnect primer outlet line. If fuel leaks through primer, it is defective. Repair or replace primer.
	Defective carburetor.	Repair or replace carburetor.
ENGINE LACKS POWER, REDUCTION IN MAXIMUM MANIFOLD PRESSURE.	Carburetor heat on.	Check control.
	Improperly adjusted waste gate.	Refer to paragraph 11A-64 or 11A-65.
	Loose or damaged exhaust system.	Inspect entire exhaust system to turbocharger for cracks and leaking connections, replace damaged parts. Refer to paragraph 11A-73.
	Malfunctioning turbocharger	Check for unusual noise in turbocharger. If malfunction is suspected, remove exhaust and/or air inlet connections and check turbine and compressor wheels for damaged blades. Check shaft bearing. Replace turbocharger if damage is noted.
	Leak in induction system.	Check visually. Correct the cause of leaks.

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- 11A-16. **STATIC RUN-UP PROCEDURES.** If low engine RPM is encountered or suspected, a static run-up should be conducted according to the following procedures.
- Run engine, using takeoff power and mixture settings, first with airplane facing 90° right to prevailing wind, and second with airplane facing 90° left to prevailing wind direction.
  - Record the maximum RPM obtained in each instance, for analysis.

### NOTE

Daily changes in atmospheric pressure, temperature, and humidity will have a slight affect on static run-up.

- Average the results of the RPM readings. The average should be within 50 RPM of 2350 RPM.
- If the average reading is lower than minimum limit, the following checks may be performed to determine probable discrepancy.
  - Check condition of induction air filter: clean if required.
  - Check carburetor heat control for proper adjustment. If it is partially open, it would cause RPM drop (slight power loss).
  - Check governor control for proper rigging. The control arm should be limited by high RPM stop on governor and the high RPM stop screw adjusted so the above average RPM is within tolerance. Refer to Section 13 for adjustment procedures.

### NOTE

If verification of governor operation is necessary, the governor may be removed from the engine, and a flat plate installed over mount pad. Run up engine to determine that governor was adjusted properly.

- Check magneto timing, spark plugs, and ignition harness for settings and condition.
- Perform an engine compression check. Refer to engine manufacturer's service manual for procedures and requirements.

- 11A-17. **REMOVAL.** If an engine is to be placed in storage or returned to the manufacturer for overhaul, proper preparatory steps should be taken for corrosion prevention prior to beginning the removal procedure. Refer to Section 2 for storage preparation. The following engine removal procedure is based upon the engine being removed from the aircraft with the engine mount attached to the firewall.

### NOTE

Tag each item when disconnected to aid in identifying wires, hoses, lines and control linkages when engine is reinstalled. Likewise, shop notes made during removal will often clarify reinstallation. Protect openings, exposed as a result of removing or disconnecting units, against entry of foreign material by installing covers or sealing with tape.

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- a. Attach a tail stand of suitable capacity.
- b. Place all cabin switches in the OFF position.
- c. Place fuel selector valve in the OFF position.
- d. Remove engine cowling in accordance with paragraph 11-3.
- e. Disconnect battery cables and insulate terminals as a safety precaution.
- f. Drain fuel strainer and lines with strainer drain control.

### NOTE

During the following procedures, remove any clamps or lacings which secure controls, wires, hoses or lines to the engine, engine mount or attached brackets, so they will not interfere with engine removal. Some of the items listed can be disconnected at more than one place. It may be desirable to disconnect some of these items at other than the places indicated. The reason for engine removal should be the governing factor in deciding at which point to disconnect them. Omit any of the items which are not present on a particular engine installation.

- g. Drain the engine oil sump and oil cooler.
- h. Disconnect magneto primary lead wires at magnetos.

### WARNING

The magnetos are in a SWITCH ON condition when the switch wires are disconnected. Ground the magneto points or remove the high tension wires from the magnetos or spark plugs to prevent accidental firing.

- i. Remove the spinner and propeller in accordance with Section 13. Cover exposed end of crankshaft flange and propeller flange to prevent entry of foreign material.
- j. Disconnect throttle and mixture controls at carburetor. Remove clamps attaching controls to engine and pull controls aft clear of engine. Use care to avoid bending controls too sharply. Note EXACT position, size and number of attaching washers and spacers for reference on reinstallation.
- k. Disconnect propeller governor control at governor. Note EXACT position, size and number of attaching washers for reference on reinstallation. Remove clamps attaching control to engine and pull control aft clear of engine.
- l. Disconnect all hot and cold air flexible ducts and remove.
- m. Remove exhaust system in accordance with paragraph 11A-72.
- n. Disconnect carburetor heat control from arm on airbox. Remove clamps and pull control clear of engine.
- o. Disconnect wires and cables as follows:
  1. Tachometer drive shaft at adapter.

### CAUTION

When disconnecting starter cable do not permit starter terminal bolt to rotate. Rotation of the bolt could break the conductor between bolt and field coils causing the starter to be inoperative.

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2. Starter electrical cable at starter.
  3. Cylinder head temperature wire at probe.
  4. Carburetor air temperature wires at quick-disconnects.
  5. Electrical wires and wire shielding ground at alternator.
  6. Exhaust gas temperature wire at quick-disconnect.
  7. Remove all clamps and lacings attaching wires or cables to engine, and pull wires and cables aft to clear engine.
- p. Disconnect lines and hoses as follows:
1. Vacuum hose at vacuum pump.
  2. Oil breather vent lines where secured to the engine.

### WARNING

Residual fuel and oil draining from disconnected lines and hoses constitutes a fire hazard. Use caution to prevent accumulation of such fuel and oil when lines or hoses are disconnected.

3. Oil temperature bulb.
  4. Primer line at engine fitting.
  5. Fuel supply hose at fuel strainer.
  6. Oil pressure line at engine fitting.
  7. Manifold pressure line at engine.
- q. Carefully check the engine again to ensure ALL hoses, lines, wires, cables, clamps and lacings which would interfere with the engine removal are disconnected or removed. Ensure all wires, cables and engine controls have been pulled aft to clear the engine.

### CAUTION

Place suitable stand under tail tie-down ring before removing engine. The loss of engine weight will cause the aircraft to be tail heavy.

- r. Attach a hoist to the lifting lug at the top center of the engine crankcase. Lift engine just enough to relieve the weight from the engine mount pads.
- s. Remove bolts attaching engine to engine mount pads and slowly hoist engine and pull it forward. Check for any items which would interfere with the engine removal. Balance the engine by hand and carefully guide the disconnected parts out as the engine is removed.
- t. Remove engine shock-mount pads and bonding straps.

11A-18. **CLEANING.** Clean engine in accordance with instructions in Section 2.

11A-19. **ACCESSORIES REMOVAL.** Removal of engine accessories for overhaul or for engine replacement involves stripping parts, accessories and components from the engine to reduce it to the bare engine. During the removal process, items removed should be tagged for repair or replacement as required.

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### NOTE

Items easily confused with similar items should be tagged to provide a means of identification when being installed on a new engine. All openings exposed by the removal of an item should be closed by installing a suitable cover, cap, or tape over the opening. This will prevent entry of foreign material.

- 11A-20. INSPECTION. For specific items to be inspected, refer to the engine manufacturer's manual.
- Visually inspect the engine for loose nuts, bolts, cracks and fin damage.
  - Inspect baffles, baffle seals and brackets for cracks, deterioration and breakage.
  - Inspect all hoses for internal swelling, chafing through protective plys, cuts, breaks, stiffness, damaged threads and loose connections. Excessive heat on hoses will cause them to become brittle and easily broken. Hoses and lines are most likely to crack or break near the end fittings and support points.
  - Inspect for color bleaching of the end fittings or severe discoloration of the hoses.

### NOTE

Avoid excessive flexing and sharp bends when examining hoses for stiffness.

- Refer to Section 2 for replacement intervals for flexible fluid carrying hoses in the engine compartment.
  - For major engine repairs, refer to the engine manufacturer's overhaul and repair manual.
- 11A-21. BUILD-UP. Engine build-up consists of installation of parts, accessories and components to the basic engine to build up an engine unit ready for installation on the aircraft. All safety wire, lockwashers, nuts, gaskets and rubber connections should be new parts.
- 11A-22. INSTALLATION. Before installing the engine on the aircraft, install any items which were removed from the engine or aircraft after the engine was removed.

### NOTE

Remove all protective covers, plugs, caps and identification tags as each item is connected or installed. Omit any items not present on a particular engine installation.

- Hoist the engine to a point near the engine mount.
- Install engine shock-mount pads as illustrated in figure 11-2.
- Carefully lower engine slowly into place on the engine mount. Route controls, lines, hoses and wires in place as the engine is positioned on the engine mount pads.

### NOTE

Be sure engine shock-mount pads, spacers and washers are in place as the engine is lowered into position.

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- d. Install engine-to-mount bolts, torque bolts to 450-500 lb-in., then remove the hoist and support stand placed under tail tie-down fitting.
- e. Route throttle, mixture and propeller controls to their respective units and connect. Secure controls in position with clamps.
- f. Route carburetor heat control to airbox and connect. Secure control in position with clamps.

### NOTE

The manufacturer recommends that NS-40 (RAS-4) (Snap-On-Tools Corp., Kenosha, Wisc.), MIL-T-5544 (Thread Compound Antiseize, Graphite Petrolatum), USP Petrolatum or engine oil be used as a thread lubricant and to seal fittings. Apply sparingly to male threads omitting first two threads on the fitting. Use care so lubricant does not string across the opening. Be sure area is clean to prevent fuel contamination.

- g. Connect lines and hoses as follows:
  - 1. Manifold pressure line at engine fitting.
  - 2. Oil pressure line at engine fitting.
  - 3. Fuel supply hose at fuel strainer.
  - 4. Primer line at engine fitting.
  - 5. Oil temperature bulb.
  - 6. Oil breather vent line where secured to the engine.
  - 7. Vacuum hose at vacuum pump.
- h. Connect wires and cables as follows:
  - 1. Electrical wires and wire shielding ground at alternator.
  - 2. Cylinder head temperature wire at probe.(Do not exceed 4 lb-in torque.)

### CAUTION

When connecting starter cable, do not permit starter terminal bolt to rotate. Rotation of the bolt could break the conductor between bolt and field coils causing the starter to be inoperative.

- 3. Starter electrical cable at starter.
- 4. Tachometer drive shaft at adapter. Be sure drive cable engages drive in adapter. Torque housing attach nut to 100 lb-in.
- 5. Exhaust gas temperature wire and carburetor air temperature wires at quick-disconnects.
- 6. Install clamps and lacings securing wires and cables to engine, engine mount and brackets.
- i. Install exhaust system in accordance with paragraph 11A-72.
- j. Connect all hot and cold air flexible ducts.
- k. Install propeller and spinner in accordance with instructions outlined in Section 13.
- l. Complete a magneto switch ground-out and continuity check, then connect primary lead wires to the magnetos. Remove the temporary ground or connect spark plug leads, whichever procedure was used during removal.

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## WARNING

Be sure magneto switch is in OFF position when connecting switch wires to magnetos.

- m. Clean and install induction air filter in accordance with Section 2.
- n. Service engine with proper grade and quantity of engine oil. Refer to Section 2 if engine is new, newly overhauled or has been in storage.
- o. Be sure all switches are in the OFF position, and connect battery cables.
- p. Rig engine controls in accordance with paragraphs 11A-64, 11A-65, 11A-66 and 11A-67.
- q. Inspect engine installation for security, correct routing of controls, lines, hoses and electrical wiring, proper safetying and tightness of all components.
- r. Install engine cowling in accordance with paragraph 11A-3. Rig cowl flaps in accordance with paragraph 11A-9.
- s. Perform an engine run-up and make final adjustments on the engine controls.

### 11A-23. FLEXIBLE FLUID HOSES.

11A-24. LEAK TEST. Refer to Section 2 for leak test interval. Perform leak check as follows:

- a. Examine the exterior of hoses for evidence of leakage or wetness.
- b. Hoses found leaking should be replaced.
- c. Refer to paragraph 11-20 for detailed inspection procedures for flexible hoses.

### 11A-25. REPLACEMENT.

- a. Hoses should not be twisted on installation. Pressure applied to a twisted hose may cause failure or loosening of the nut.
- b. Provide as large a bend radius as possible.
- c. Hoses should have a minimum of one-half inch clearance from other lines, ducts, hoses or surrounding objects or be butterfly clamped to them.
- d. Rubber hoses will take a permanent set during extended use in service. Straightening a hose with a bend having a permanent set will result in hose cracking. Care should be taken during removal so that hose is not bent excessively, and during reinstallation to assure hose is returned to its original position.
- e. Refer to Advisory Circular 43.13-1, Chapter 10, for additional installation procedures for flexible fluid hose assemblies.

### 11A-26. ENGINE BAFFLES.

11A-27. DESCRIPTION. The sheet metal baffles installed on the engine direct the flow of air around the cylinders and other engine components to provide optimum cooling. These baffles incorporate rubber-asbestos composition seals at points of contact with the engine cowling and other engine components to help confine and direct the airflow to the desired area. It is very important that the baffles and seals are in good condition and installed correctly. The vertical seals must fold forward and the side seals must fold upwards. Removal and installation of the various baffle segments is possible with the cowling removed. Be sure that any new baffles seal properly.

11A-28. CLEANING AND INSPECTION. The engine baffles should be cleaned with a suitable solvent to remove oil and dirt.

## NOTE

The rubber-asbestos seals are oil and grease resistant but should not be soaked in solvent for long periods.



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Inspect baffles for cracks in the metal and for loose and/or torn seals. Repair or replace any defective parts.

- 11A-29. **REMOVAL AND INSTALLATION.** Removal and installation of the various baffle segments are possible with the cowling removed. Be sure that any replaced baffles and seals are installed correctly and that they seal to direct the airflow in the correct direction. Various lines, hoses, wires and controls are routed through some baffles. Make sure that these parts are reinstalled correctly after installation of baffles.
- 11A-30. **REPAIR.** Repair of an individual segment of engine baffle is generally impractical, due to the small size and formed shape of the part, replacement is usually more economical. However, small cracks may be stop-drilled and a reinforcing doubler installed. Other repairs may be made as long as strength and cooling requirements are met. Replace sealing strips if they do not seal properly.
- 11A-31. **ENGINE MOUNT.** (See figure 11-2.)
- 11A-32. **DESCRIPTION.** The engine mount is composed of sections of steel tubing welded together and reinforced with gussets. The mount is fastened to the fuselage at four points. The engine is attached to the engine mount with shock-mount assemblies which absorb engine vibrations. Each engine mount pad has a small hole for a locating pin which serves as a locating dowel for the engine shock-mounts.
- 11A-33. **REMOVAL AND INSTALLATION.** (Refer to paragraph 11-33.)

### NOTE

Torque engine-to-mount bolts to 450-500 lb-in. Torque mount-to-firewall bolts to 160-190 lb-in.

- 11A-34. **REPAIR.** (Refer to Section 17.)
- 11A-35. **PAINTING.** (Refer to Section 18.)
- 11A-36. **ENGINE SHOCK-MOUNT PADS.** (Refer to paragraph 11-36.)
- 11A-37. **ENGINE OIL SYSTEM.**
- 11A-38. **DESCRIPTION.** A wet-sump, pressure-lubricating oil system is employed in the engine. An external, replaceable oil filter is standard equipment. The engine is equipped with a noncongealing oil cooler. Refer to applicable engine manual for specific details.

### WARNING

The U.S. Environmental Protection Agency advises that mechanics and other workers who handle engine oil are advised to minimize skin contact with used oil and promptly remove used oil from the skin. In a laboratory study, mice developed skin cancer after skin was exposed to used engine oil twice a week without being washed off, for most of their life span. Substances found to cause cancer in laboratory animals may also cause cancer in humans.

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11A-39. TROUBLE SHOOTING. (Refer to Section 11).

11A-39A. TROUBLE SHOOTING. (OIL LEAK) (R18200584 thru R18201973).

The source of oil leakage which appears in this area can generally be isolated easily by accomplishing the following.

- a. Remove cowling and wash engine with approved solvents.
- b. Reinstall cowling and run the engine.
- c. Remove cowling and inspect for oil leak sources such as rocker arm covers, push rod tubes, turbocharger oil supply lines, return lines, gaskets, fittings, connecting flanges, and bolts.

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### 11A-40. OIL COOLER.

11A-41. DESCRIPTION. On aircraft through serial R18201313 the external oil cooler is mounted on the left forward engine baffle. Beginning with aircraft serial R18201314 the external oil cooler is mounted on the firewall. Flexible hoses carry the oil to and from the cooler. Ram air passes through the cooler coil and is discharged into the engine compartment. At each engine oil change, drain the oil cooler. Refer to Section 2 for servicing instructions.

### 11A-42. ENGINE FUEL SYSTEM.

11A-43. DESCRIPTION. The engine is equipped with a carburetor mounted on the lower aft end of the engine. The carburetor has a manual altitude mixture control. For overhaul and repair of the carburetor, refer to the manufacturer's overhaul and repair manual.

### 11A-44. CARBURETOR.

#### 11A-45. REMOVAL AND INSTALLATION.

- a. Place fuel selector valve in the OFF position.
- b. Remove engine cowling in accordance with paragraph 11A-3.
- c. Drain fuel from strainer and lines with strainer drain control.
- d. Disconnect throttle and mixture controls at the carburetor. Note EXACT position, size and number of attaching washers and spacers for reference on reinstallation.
- e. Disconnect and cap or plug fuel line at carburetor.
- f. Remove safety wire, nuts and washers attaching carburetor to engine, and remove carburetor and mounting gasket.
- g. For overhaul and cleaning procedures, refer to the manufacturer's overhaul and repair manual.
- h. Reverse the preceding steps for reinstallation, using new gaskets. Rig controls in accordance with paragraphs 11A-64, 11A-65, 11A-66 and 11A-67.

11A-46. IDLE SPEED AND MIXTURE ADJUSTMENTS. Idle speed and mixture adjustment should be accomplished after the engine has been warmed up. Since idle RPM may be affected by idle mixture adjustment, it may be necessary to readjust idle RPM after setting the idle mixture correctly.

- a. Set the throttle stop screw (idle RPM) to obtain  $600 \pm 25$  RPM, with throttle control pulled full out against idle stop.

#### NOTE

Engine idle speed may vary among different engines. An engine should idle smoothly, without excessive vibration and the idle speed should be high enough to maintain idling oil pressure and to preclude any possibility of engine stoppage in flight when the throttle is closed.

- b. Advance throttle to increase engine speed to approximately 1000 RPM.
- c. Pull mixture control knob slowly and steadily toward the idle cut-off position, observing tachometer, then return control full IN (RICH) position before engine stops.
- d. Adjust mixture adjusting screw at upper end of carburetor intake throat to obtain a slight and momentary gain of 25 RPM maximum at 1000 RPM engine speed as mixture control is moved from full IN (RICH) toward idle cut-off position. Return control to full IN (RICH) to prevent engine stoppage.

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- e. If mixture is set too LEAN, engine speed will drop immediately, thus requiring a richer mixture. Turn adjusting screw OUT (counterclockwise) for a richer mixture.
- f. If mixture is set too RICH, engine speed will increase above 25 RPM, thus requiring a leaner mixture. Turn adjusting screw IN (clockwise) for a leaner mixture.

### NOTE

After each adjustment to the idle mixture, run engine up to approximately 2000 RPM to clear engine of excess fuel to obtain a correct idle speed.

11A-47. **INDUCTION AIR SYSTEM.** Ram air enters the induction air system through an intake port and a filter on the aft left side of the cowling. It is ducted to the airbox, and onward to the turbocharger compressor section, located under and to the left of engine. After compression, the air is forced through the carburetor, where fuel is intermixed and then to the intake manifold through the throttle valve. The mixture is distributed to each cylinder as demanded through separate intake pipes. A butterfly valve, located in the airbox may be operated manually from the cockpit to permit selection of carburetor heated air, which in this application is also alternate air selection. When carburetor heat is selected, heated air is drawn from a shroud on the left exhaust stack assembly.

- 11A-47A. **INSTALLATION OF INDUCTION AIR SYSTEM DUCTS.** When cutting induction air system ducts to length, the support wire should be cut back far enough to bend back (minimum bend radius, 1/8 inch) under the clamp and protrude 1/4 inch. Do not break the bond between the wire and the fabric. Before tightening clamps, make sure there is no twist or torque on the duct. If the duct is supported with MIL-Y-1140 cord in place of wire, the preceding installation applies except: MIL-Y-1140 cord has no minimum bend radius requirements. The minimum installed bend radii for wire-supported ducts in plane of bend, measured from the wall of the duct, are as follows:
- a. Neoprene - one ply, 1/4 diameter of the maximum duct dimension.
  - b. Neoprene - two ply, and silicone one ply, 1/3 diameter of the maximum duct dimension.
  - c. Silicone - two ply, 1/2 diameter of the maximum duct dimension.

### NOTE

Duct carrying filtered induction air may not have local areas hand-formed to a different cross section.

- 11A-48. **FILTER REMOVAL AND INSTALLATION.**
- a. Remove upper left cowling according to paragraph 11A-3.
  - b. Release the four quick-release fasteners securing the filter assembly to the airbox.
  - c. Reverse the preceding steps for installation.
- 11A-49. **CLEANING AND INSPECTION.** Clean and inspect filter in accordance with instructions in Section 2.

### NOTE

If filter gasket becomes loose, bond with EC-1300L or equivalent.

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### 11A-50. AIRBOX REMOVAL AND INSTALLATION.

- a. Remove upper left cowl according to Section 11.
- b. Disconnect flexible compressor inlet (upper) duct at airbox.
- c. Disconnect flexible carburetor heat (lower) duct from airbox.
- d. Disconnect carburetor heat control wire from control arm on airbox, and remove clamp.
- e. Remove clamp attaching air filter box to air box.
- f. Remove screw attaching upper airbox support to firewall stiffener.
- g. Remove four screws attaching airbox to firewall and remove airbox, retaining washers for installation.
- h. Reverse the preceding steps for reinstallation. Rig carburetor heat control according to paragraph 11A-67.

11A-51. **CLEANING AND INSPECTION.** Clean metal parts of the induction airbox with Stoddard solvent or equivalent. Inspect for cracks, dents, loose rivets, etc. Minor cracks may be stop-drilled. In case of continued or severe cracking, replace airbox. Inspect gaskets and install new gaskets, if damaged. Check manually-operated air door for ease of operation and proper rigging.

### 11A-52. IGNITION SYSTEM.

11A-53. **DESCRIPTION.** The ignition system is comprised of dual magnetos in one housing, two spark plugs in each cylinder, an ignition wiring harness, an ignition switch mounted on the instrument panel and required wiring between the ignition switch and magnetos.

11A-54. **TROUBLE SHOOTING.** (Refer to Section 11.)

### 11A-55. MAGNETOS.

11A-56. **DESCRIPTION.** The Bendix D-2000 series magneto consists of two electrically independent ignition circuits in one housing. A single four pole rotor provides the magnetic energy for both circuits. The magneto uses an impulse coupling to provide reliable ignition at engine cranking speed. Suppression of breaker contact point arcing is accomplished by feed-thru type capacitors mounted in the magneto cover which forms a part of the magneto harness assembly.

### 11A-57. REMOVAL AND INSTALLATION.

#### WARNING

The magneto is in a SWITCH ON condition when the switch wire is disconnected. Therefore, ground the breaker contact points or disconnect the high-tension wires from magneto to spark plugs.

- a. Remove engine cowling in accordance with paragraph 11A-3.
- b. Remove the eight screws securing the high-tension outlet cover to the magneto. The "P" leads may be disconnected for additional clearance if necessary.

#### NOTE

It is a good practice to position No. 1 cylinder at its approximate advanced firing position before removing the magneto.

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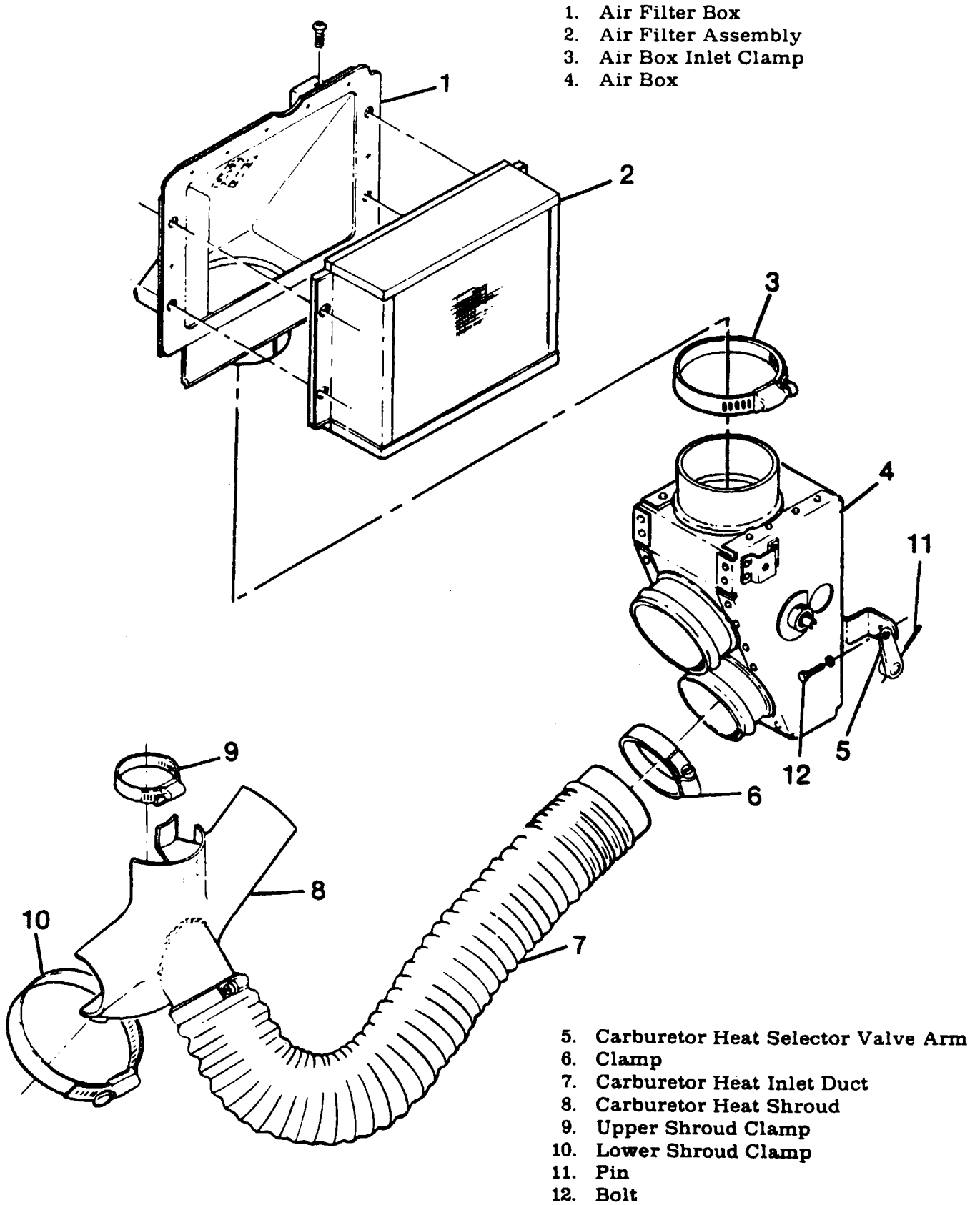


Figure 11A-2. Carburetor Heat and Air Filter Installation

## MODEL R182 AND TR182 SERVICE MANUAL

- c. Remove nuts, washers and clamps attaching the magneto to the engine accessory housing. Note the approximate angular position at which the magneto is installed, then remove the magneto.
- d. Reverse the preceding steps for reinstallation and time magneto-to-engine in accordance with paragraph 11-62.

11A-58. INTERNAL TIMING. (MAGNETO REMOVED FROM ENGINE.) (Refer to Section 11.)

11A-59. MAGNETO-TO-ENGINE-TIMING. (Refer to Section 11.)

11A-60. MAINTENANCE. (Refer to Section 11.)

11A-61. MAGNETO CHECK. (Refer to Section 11.)

11A-62. SPARK PLUGS. (Refer to Section 11.)

11A-63. ENGINE CONTROLS.

11A-64. RIGGING THROTTLE AND WASTE GATE CONTROL ASSEMBLY. (THRU TR18201628)  
(See figure 11A-3.)

- a. With throttle valve fully open, position arm (5) at the 2:30 o'clock position, that is between  $7^{\circ} 30'$  and  $22^{\circ} 30'$  up from horizontal casting line (2) on carburetor throat.
- b. Install throttle shaft extension (30) finger tight and roll pin (31) so it doesn't protrude beyond edge of extension.
- c. Assemble bolt (6) through levers (9), (11), and (12) using washers (7) and bushings (8) in the order shown in figure 11A-3, and screw throttle control rod end (14) on bolt (6) with lock nut to hold.
- d. In above step be sure that washers (16) and (19), cam (18), and castellated nut (15) are properly installed.

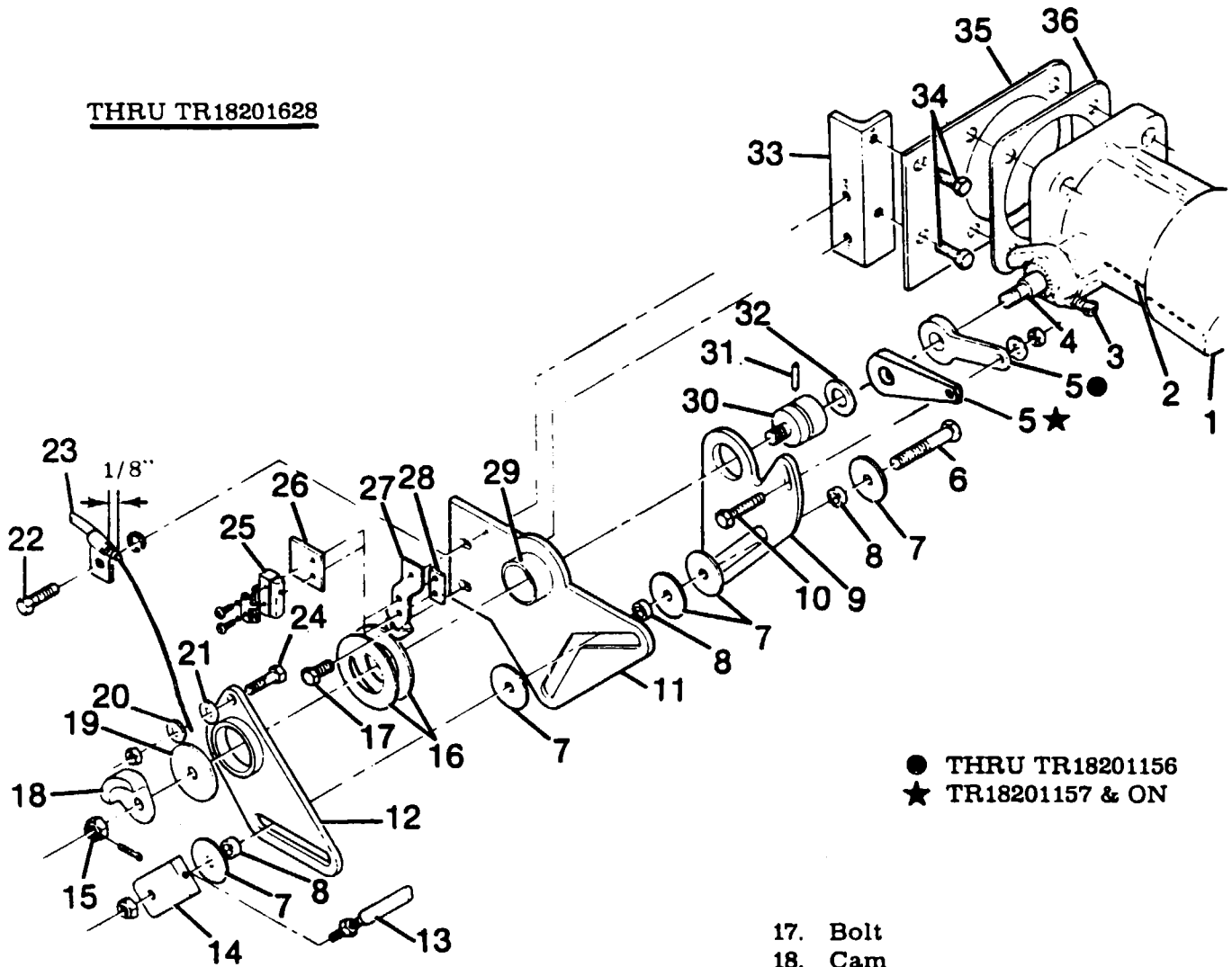
### NOTE

Index cam according to Section 5. After completion of this rigging procedure.

- e. Install throttle arm bolt (10) through throttle arm (5) and lever (9), while throttle is full open, torque bolt (10) to 20-30 in/lbs.
- f. Assemble support (33) and mount (35) using bolts (34), do not tighten until entire unit is assembled and free movement ascertained.
- g. Install switch bracket (27) bolt (17) and (22), do not tighten until entire unit is assembled and free movement ascertained.
- h. Install switch (25) using insulator (26) and nut plate (28). Rig in accordance to Section 5.
- i. Install waste gate control (23) with bolts (22) and (24). Waste gate control arm (10) must be against maximum stop screw adjustment (8) (refer to figure 11A-6), and wire must not be bent. Ensure 0.072" clearance exists between butterfly valve and throat while arm rests against the adjustable stop.
- j. Install throttle control (13) so approximately 1/8" cushion exists at each end of travel of the cockpit throttle control.

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THRU TR18201628



● THRU TR18201156  
 ★ TR18201157 & ON

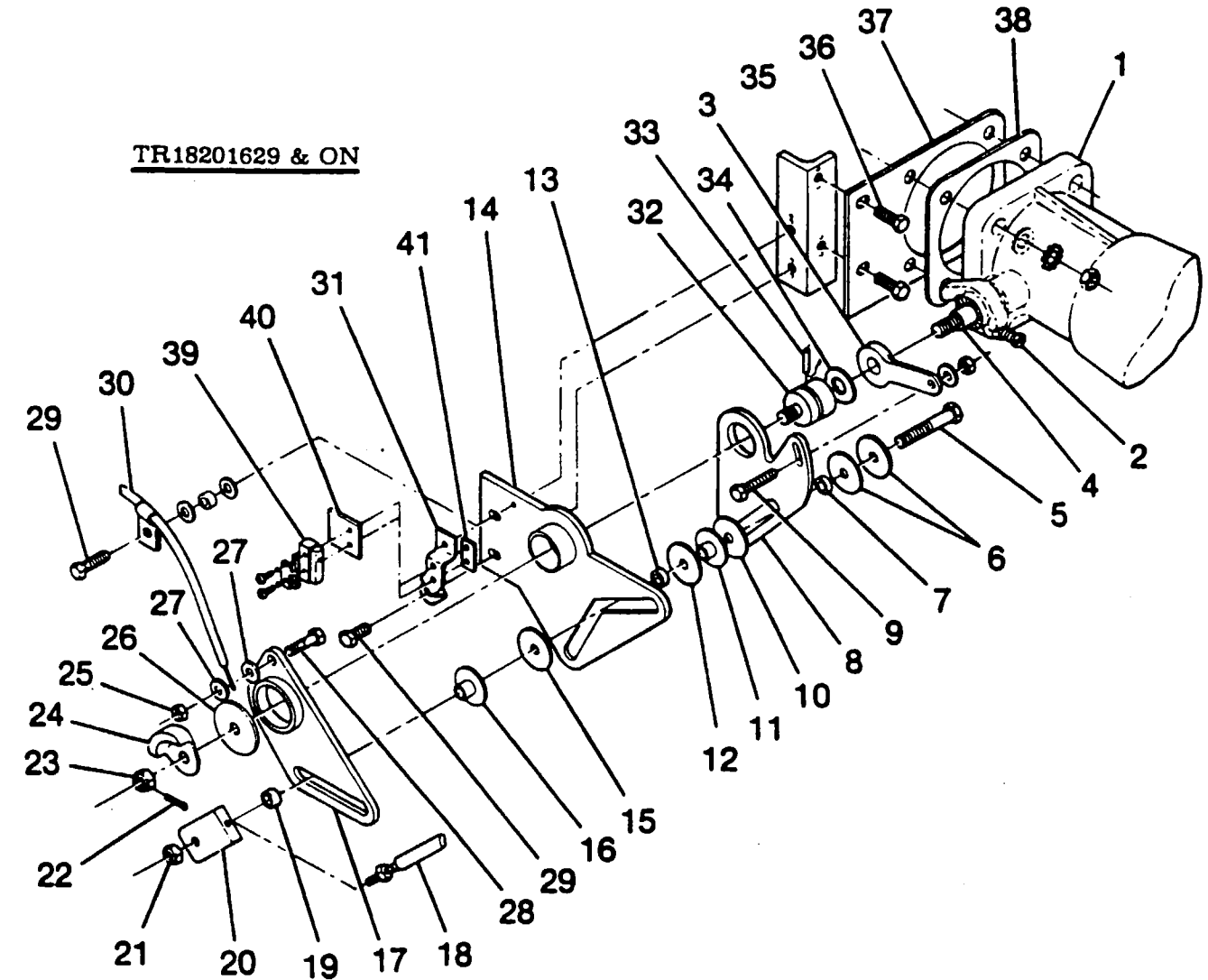
- |                                       |                              |
|---------------------------------------|------------------------------|
| 1. Carburetor                         | 17. Bolt                     |
| 2. Casting Line                       | 18. Cam                      |
| 3. Idle Adjusting Screw               | 19. Washer                   |
| 4. Throttle Shaft                     | 20. Washer                   |
| 5. Throttle Arm (Thru R18201156)      | 21. Washer                   |
| 5. Bracket (Beginning with R18201157) | 22. Bolt                     |
| 6. Bolt                               | 23. Waste Gate Control Cable |
| 7. Washers                            | 24. Bolt                     |
| 8. Bushings                           | 25. Micro Switch             |
| 9. Lever Slotted Throttle             | 26. Insulator                |
| 10. Bolt                              | 27. Switch Bracket           |
| 11. Lever Slotted Stationary          | 28. Nut Plate                |
| 12. Lever Slotted Waste Gate          | 29. Bushing                  |
| 13. Throttle Control                  | 30. Throttle Shaft Extension |
| 14. Throttle Control Rod End          | 31. Roll Pin                 |
| 15. Castellated Nut                   | 32. Washer                   |
| 16. Washers                           | 33. Mount Support            |
|                                       | 34. Bolts                    |
|                                       | 35. Mount                    |
|                                       | 36. Gasket                   |

Figure 11A-3. Throttle to Carburetor and Waste Gate Installation (Sheet 1 of 2)



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TR18201629 & ON



- |                           |                              |                              |
|---------------------------|------------------------------|------------------------------|
| 1. Carburetor             | 15. Washer                   | 29. Bolt                     |
| 2. Idle Adjusting Screw   | 16. Retainer                 | 30. Waste Gate Control Cable |
| 3. Throttle Arm           | 17. Lever                    | 31. Switch Bracket           |
| 4. Throttle Shaft         | 18. Throttle Control         | 32. Throttle Shaft Extension |
| 5. Bolt                   | 19. Bearing                  | 33. Spring Pin               |
| 6. Washers                | 20. Throttle Control Rod End | 34. Washer                   |
| 7. Bearing                | 21. Nut                      | 35. Support Assembly         |
| 8. Lever Slotted Throttle | 22. Cotter Pin               | 36. Bolts                    |
| 9. Bolt                   | 23. Castellated Nut          | 37. Mount                    |
| 10. Washer                | 24. Cam                      | 38. Gasket                   |
| 11. Retainer              | 25. Nut                      | 39. Switch                   |
| 12. Washer                | 26. Washer                   | 40. Insulator                |
| 13. Bearing               | 27. Washer                   | 41. Nutplate                 |
| 14. Bracket               | 28. Clamp                    |                              |

Figure 11A-3. Throttle to Carburetor and Waste Gate Installation (Sheet 2 of 2)

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### NOTE

Slots are provided to allow free movement alignment, tighten bolts in proper sequence to prevent binding. If after complete assembly, the return spring will not return arm, readjustment is necessary.

- k. After free movement is obtained, follow the following bolt tightening sequence:
  - 1. Tighten throttle arm bolt (10), torque 20-30 lbs.
  - 2. Throttle rod bolt, tightened as soon as all levers (9, 11, and 12) bushings (8 and 29), and washers (7, 16, and 19) are installed.
  - 3. Castellated nut (15) tighten after throttle rod bolt.
  - 4. Stationary lever mount bolts (17 and 22) tighten before support mount bolts.
  - 5. Support mount (33) retaining bolts (34) tighten last, only after adjustment is complete and free movement ascertained.

### 11A-65. RIGGING THROTTLE AND WASTE GATE CONTROL ASSEMBLY. (TR18201629 & ON) (See figure 11A-3.)

- a. Install washer (34) and throttle shaft extension (32) on throttle shaft (4) tighten finger tight, then install spring pin (33) making certain it does not protrude beyond the edge of the extension.
- b. Assemble bolt (5) through levers (8, 14 and 17) in the exact order as shown in figure 11A-3, and screw throttle control rod end (20) on bolt (5) with lock nut.

### NOTE

Make sure nylon washers are on retainer and not between AN960 washers and retainers.

- c. Be sure that washers (26), cam (24) and castellated nut (23) are properly installed.
- d. Install throttle arm bolt (9) through lever (8) and throttle arm (3).
- e. Assemble support (35) and mount (37) using bolts (36), do not tighten until entire unit is assembled and freedom of movement is assured.
- f. Install switch bracket (31) bolt (29), do not tighten until entire unit is assembled and free movement is ascertained.
- g. Install switch (39) using insulator (40) and nutplate (41). Rig in accordance to Section 5.

### NOTE

Lubricate waste gate control cable (30) with molybdenum disulfide (MIL-M-7866) suspended in petroleum distillate.

- h. Install waste gate control (30) with bolts (28 and 29).
- i. See figure 11A-6. Waste gate control arm (10) must be against maximum stop screw adjustment (8) and wire must not be bent. Ensure 0.072" clearance exists between butterfly valve and throat while arm rests against the adjustable stop.
- j. Install throttle control (18) so approximately 1/8" cushion exists at each end of travel of the cockpit throttle control.

### NOTE

Slots are provided to allow free movement alignment, tighten bolts in proper sequence to prevent binding. If after complete assembly the return spring will not return the arm, readjustment is necessary.

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- k. After free movement is obtained, follow the following bolt tightening sequence.
  1. Tighten throttle arm bolt (9), torque 20-30 in-lbs.
  2. Throttle rod bolt (5) tighten as soon as all levers (8, 14 and 17), washers (6, 10, 12 and 15), bearings (7, 13 and 19) and retainers (11 and 16) are installed.
  3. Tighten castellated nut (23) and install cotter pin (22) after throttle rod bolt.
  4. Tighten stationary lever bolts (29) before support mount bolts.
  5. Tighten support mount bolts (36) only after adjustment is complete and free movement is assured.

11A-66. MIXTURE CONTROL. (Refer to Section 11.)

11A-67. CARBURETOR HEAT CONTROL. (Refer to Section 11.)

11A-68. PROPELLER CONTROL. (Refer to Section 13.)

11A-69. STARTING SYSTEM. (Refer to Section 11.)

11A-70. EXHAUST SYSTEM.

11A-71. DESCRIPTION. The exhaust system consists of a single pipe for each cylinder, two short stacks, a crossover tube, a Y connector, the turbine section of the turbocharger, a waste gate, and a single exhaust outlet. The single pipes collect exhaust gases from each respective cylinder, and route it to the two stacks, one for the set of odd numbered cylinders and one for the set of even numbered cylinders. The left bank, even numbered, exhaust gases are used to drive the turbine wheel of the turbocharger, which in turn drives the compressor wheel. The right bank, odd numbered, exhaust is routed through the crossover around the front of the engine to the Y connection, which directs exhaust to the waste gate. All excess exhaust gases bypass the turbine wheel of the turbocharger through the waste gate. Manual linkage connects the waste gate valve to the carburetor throttle linkage. As the throttle is moved toward the open position, the waste gate is operated mechanically to ensure that proper manifold pressure is maintained.

11A-72. REMOVAL AND INSTALLATION. (See figure 11A-4.)

- a. Remove engine cowling in accordance with paragraph 11-3.
- b. Disconnect ducts from heater shroud on muffler assembly.
- c. Disconnect duct from shroud on left exhaust stack assembly.
- d. Remove nuts, bolts and clamps attaching stack assemblies to the turbocharger.
- e. Remove nuts attaching exhaust stack assemblies to the cylinders and remove exhaust stacks and gaskets.
- f. Reverse the preceding steps for reinstallation. Install a new copper-asbestos gasket between each riser and its mounting pad on each cylinder, regardless of apparent condition of those removed. Torque exhaust stack nuts at cylinders to 100-110 pound-inches.

11A-73. INSPECTION. Since exhaust systems of this type are subject to burning, cracking and general deterioration from alternate temperatures extremes and vibrations, inspection is important and should be accomplished every 50 hours of operation. To inspect the engine exhaust system, proceed as follows:

- a. Remove engine cowling as required so that ALL surfaces of the exhaust assemblies can be visually inspected.

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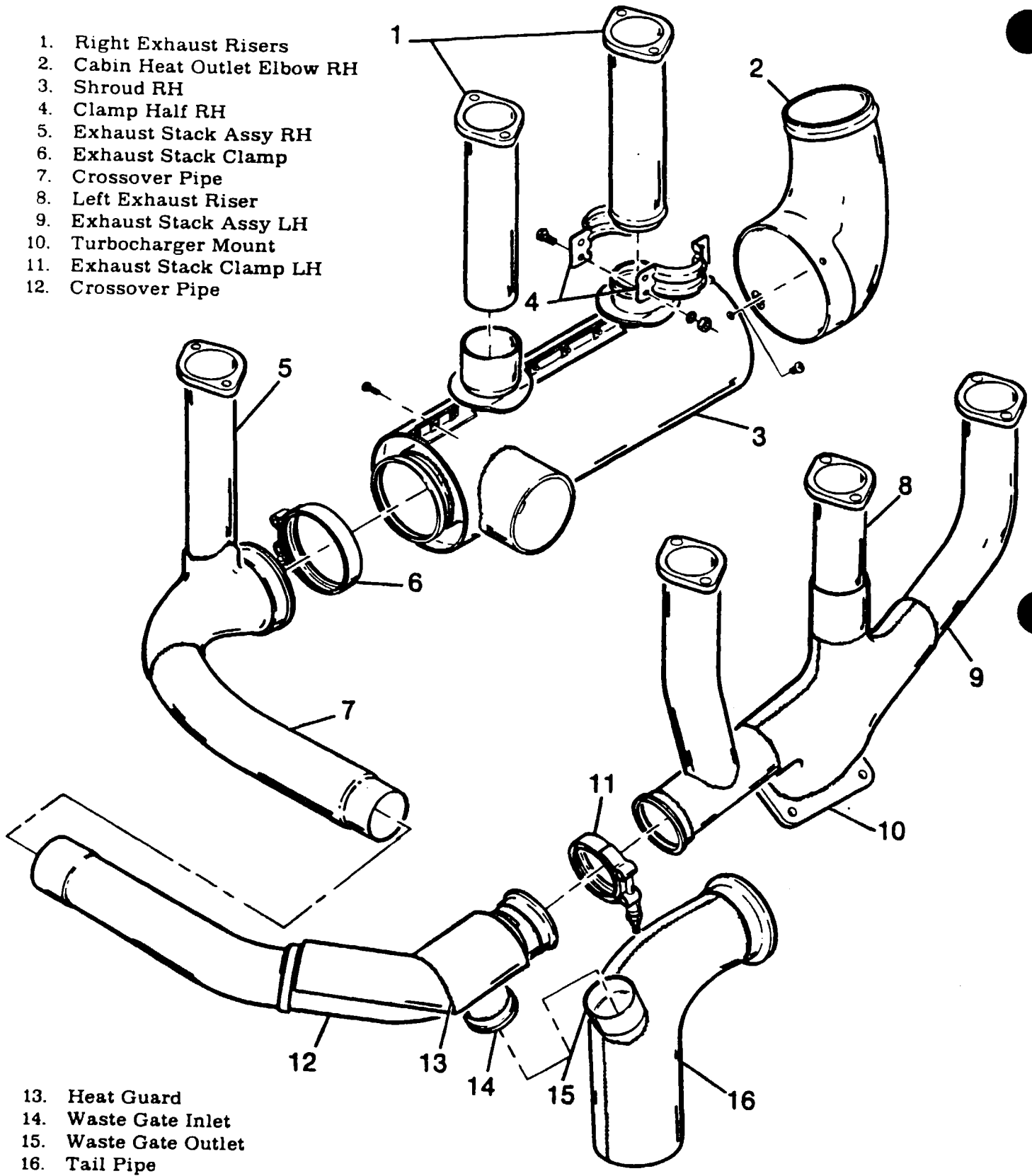


Figure 11A-4. Exhaust System Installation

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### NOTE

Especially check the areas adjacent to welds and slip joints. Look for gas deposits in surrounding areas, indicating that exhaust gases are escaping through a crack or hole or around the slip joints.

- b. After visual inspection, an air leak check should be made on the exhaust system as follows:
1. Attach the pressure side of an industrial vacuum cleaner to the tailpipe opening, using a rubber plug to effect a seal as required.

### NOTE

The inside of vacuum cleaner hose should be free of any contamination that might be blown into the engine exhaust system.

2. With vacuum cleaner operating, all joints in the exhaust system may be checked manually by feel, or by using a soap and water solution and watching for bubbles. Forming of bubbles is considered acceptable; if bubbles are blown away, system is not considered acceptable.
- c. Where a surface is not accessible for a visual inspection, or for a more positive test, the following procedure is recommended.
1. Remove exhaust stack assemblies.
  2. Use rubber expansion plugs to seal openings.
  3. Using a manometer or gage, apply approximately 1-1/2 psi (3 inches of mercury) air pressure while each stack assembly is submerged in water. Any leaks will appear as bubbles and can be readily detected.
  4. It is recommended that exhaust stacks found defective be replaced before the next flight.
- d. After installation of exhaust system components perform the inspection in step "b" of this paragraph to ascertain that system is acceptable.

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### 11A-74. TURBOCHARGER.

#### NOTE

For additional information covering turbocharger and component maintenance, overhaul and trouble shooting, refer to the Manufacturer's Overhaul Manual.

11A-75. DESCRIPTION. The turbocharger is an exhaust gas-driven compressor, or air pump, which provides high velocity air to the engine intake manifold. The turbocharger is composed of a turbine wheel, compressor wheel, turbine housing and compressor housing. The turbine, compressor wheel and interconnecting drive shaft comprise one complete assembly and are the only moving parts in the turbocharger. Turbocharger bearings are lubricated with filtered oil supplied from the engine oil system. Engine exhaust gas enters the turbine housing to drive the turbine wheel. The turbine wheel, in turn, drives the compressor wheel, producing a high velocity of air in the engine induction system. Exhaust gas is then dumped overboard through the exhaust outlet of the turbine housing and exhaust tailpipe. Ram air is drawn into the compressor through the induction air filter and is forced out of the compressor housing through the carburetor, to intake manifold. This high velocity air enters the carburetor where fuel is added, and flow is limited by the throttle valve setting. During the transient interval from low to high RPM, the absolute pressure relief valve functions to limit maximum pressure available to the carburetor by releasing surplus to engine compartment atmosphere. It also presets a maximum available manifold pressure when throttle control is moved to quickly to the full open position. Actual available manifold pressure is regulated by the turbocharger speed, controlled by the waste gate bypass action, or indirectly by the operator.

#### CAUTION

This turbocharged engine installation is equipped with an overboost control valve which functions as a safety device, but is not an automatic controller.

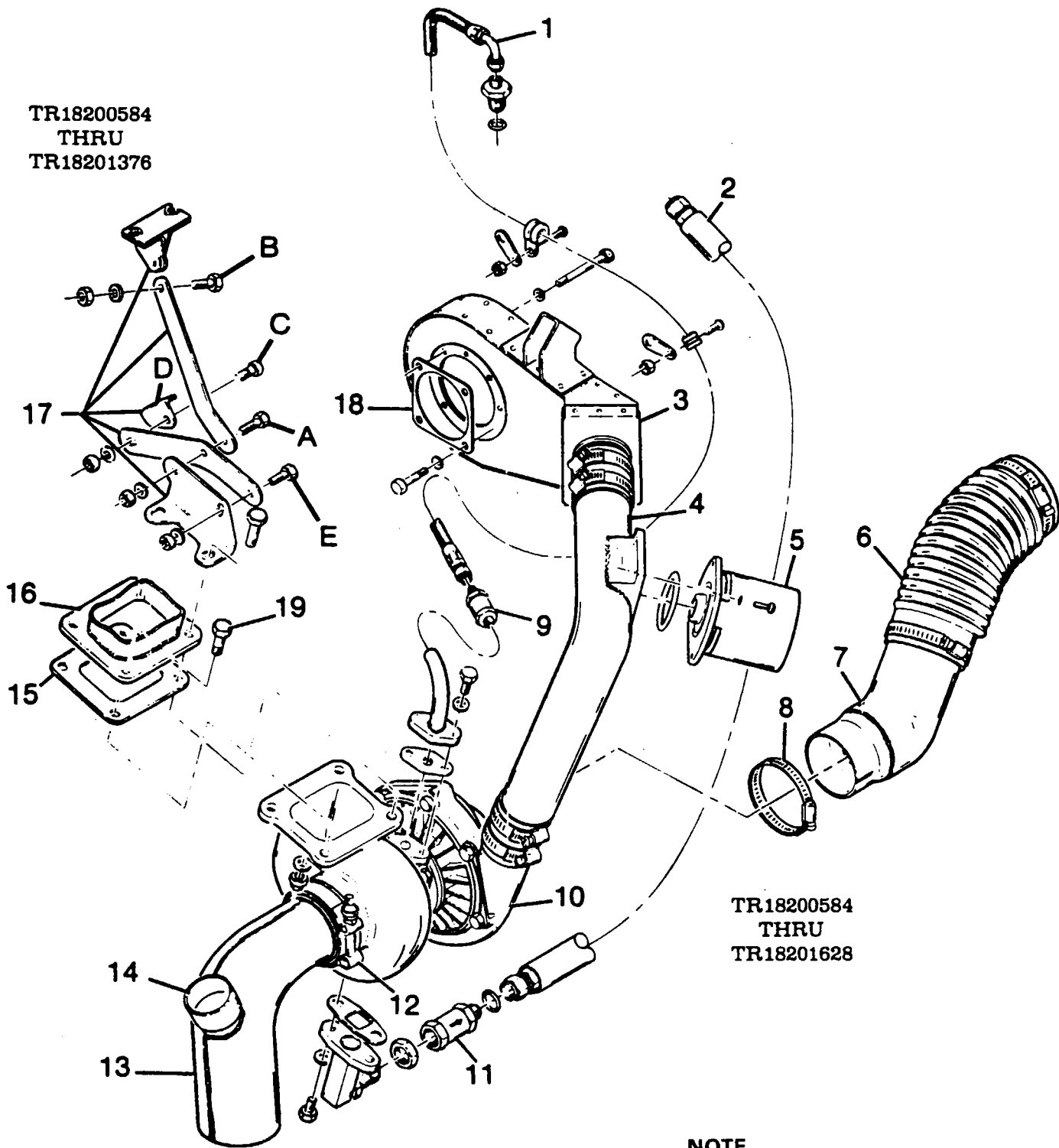
Consequently, it is necessary that the pilot observe and control the manifold pressure, particularly during takeoff, climb and power changes in flight.

The slight overboosting of manifold pressure beyond established maximums which is occasionally experienced during initial takeoff roll or during a power change in flight is not considered detrimental to the engine as long as it does not exceed 2 inches and is momentary.

**OVERBOOST EXCEEDING 2 INCHES** beyond established maximum is excessive and can result in engine damage. Refer to Lycoming Service Bulletin No. 369F and all revisions or supplements thereto.

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THRU  
TR18201376



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NOTE

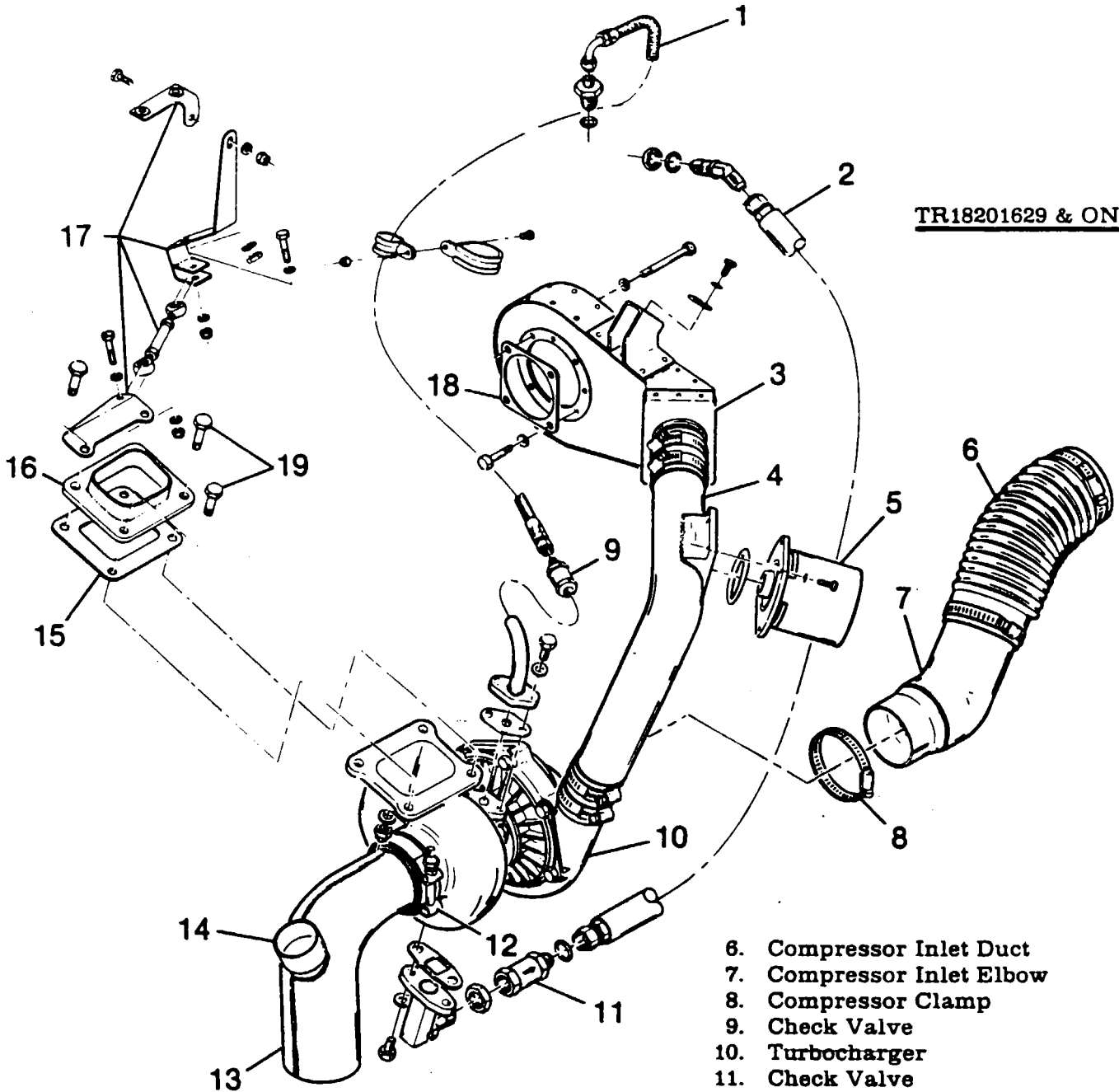
A-E Mount bolts tighten in ascending order.

Figure 11A-5. Turbocharger Installation (Sheet 1 of 2)

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TR18201377 & ON

TR18201629 & ON



- 1. Oil Pressure Line
- 2. Oil Scavenge Line
- 3. Carburetor Air Box
- 4. Compressor Outlet Tube
- 5. Absolute Pressure Relief Valve
- 6. Compressor Inlet Duct
- 7. Compressor Inlet Elbow
- 8. Compressor Clamp
- 9. Check Valve
- 10. Turbocharger
- 11. Check Valve
- 12. Turbine Outlet Clamp
- 13. Tail Pipe
- 14. Waste Gate Connection
- 15. Gasket
- 16. Exhaust Manifold
- 17. Turbocharger Mount Brackets
- 18. Carburetor Inlet Gasket
- 19. Turbocharger Mount Bolts

Figure 11A-5. Turbocharger Installation (Sheet 2 of 2)



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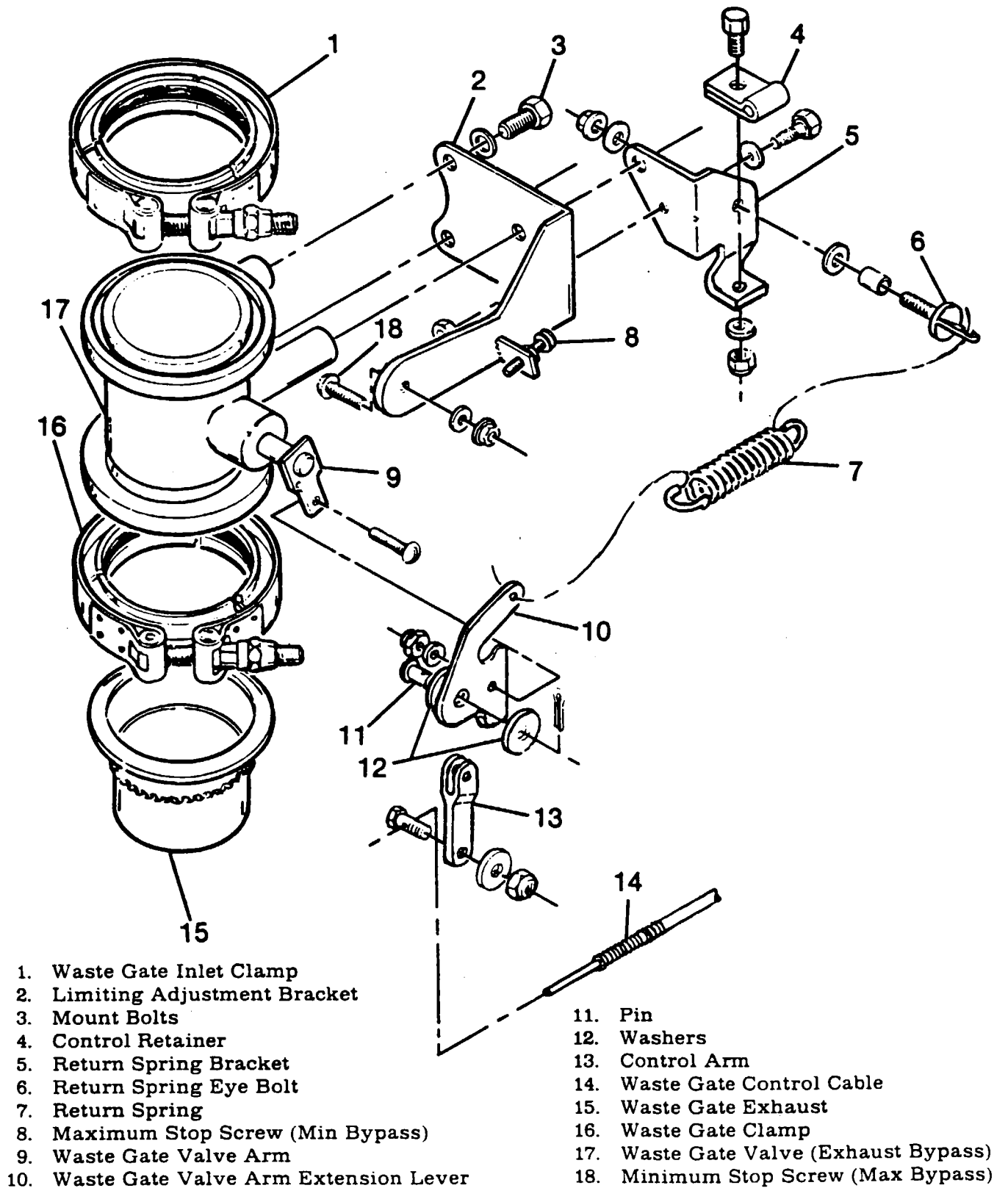


Figure 11A-6. Waste Gate Assembly

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### 11A-76. REMOVAL AND INSTALLATION. (See figure 11A-5.)

- a. Remove engine cowling as required.
- b. Remove waste gate to tailpipe clamp at (14).
- c. Loosen clamp (12) at turbine exhaust outlet and work tailpipe (13) from turbine outlet, and cover to prevent entrance of foreign material.
- d. Loosen clamps (8) and remove air inlet, elbow (7) and duct (6) from turbocharger compressor section (10), and cover both parts to prevent damage.
- e. Disconnect oil pressure (1) and scavenge lines (2) from turbocharger (10), plug and cap all openings. Remove all clamps and ties as necessary.
- f. Remove four bolts (19) attaching turbine to LH exhaust manifold (16).
- g. Carefully remove turbocharger from engine compartment, at aft LH side near the firewall.
- h. Reverse the preceding steps for reinstallation. Always use a new gasket between turbocharger and exhaust manifold.

### NOTE

Install all hardware in exact removal sequence.

- i. If mount bolts were removed or loosened, retighten in sequence of ascending order as shown in figure 11A-5.
- j. Refer to paragraph 11A-64 or 11A-65, for waste gate control linkage installation and adjustment.

### 11A-77. ECONOMY MIXTURE INDICATOR (EGT). (Refer to Section 15.)

### 11A-78. EXTREME WEATHER MAINTENANCE.

11A-79. COLD WEATHER. Cold weather starting is made easier by the use of the engine primer system and installation of a ground service receptacle. The primer system is manually operated from the cabin. Fuel is supplied by a line from the fuel strainer to the plunger. Operating the primer forces fuel to the engine. With an external power receptacle installed, an external power source may be connected to assist in cold weather starting. Refer to Section 16 for use of the external power receptacle.

The following may also be used to assist engine starting in extreme cold weather. After the last flight of the day, drain the engine oil into a clean container so the oil can be preheated. Cover the engine to prevent ice or snow from collecting inside the cowling. When preparing the aircraft for flight or engine runup after these conditions have been followed, preheat the drained engine oil.

### WARNING

Do not heat the oil above 121°C (250°F), or a flash fire may result. Before pulling the propeller through, ascertain that the magneto switch is in the OFF position, or that primary lead is grounded to prevent accidental firing of the engine.

## MODEL R182 AND TR182 SERVICE MANUAL

After preheating the engine oil, gasoline may be mixed with the heated oil in a ratio of 1 part gasoline to 12 parts engine oil before pouring into the engine oil sump. If the free air temperature is below minus 29°C (-20°F), the engine compartment should be preheated by a ground heater. Pre-heating the engine compartment is accomplished by inducing heated air up through the engine cowl flap openings, thus heating both the cylinders and oil. After the engine compartment has been preheated, inspect all engine drain and vent lines for presence of ice. After this procedure has been complied with, pull propeller through several revolutions by hand before attempting to start the engine.

### CAUTION

Due to the desludging effect of the diluted oil, engine operation should be observed closely during the initial warm-up of the engine. Engines that have considerable amount of operational hours accumulated since their last dilution period may be seriously affected by the dilution process. This will be caused by the diluted oil dislodging sludge and carbon deposits within the engine. This residue will collect in the oil sump and possibly clog the screened inlet to the oil sump. Small deposits may actually enter the oil sump and be trapped by the main oil filter screen. Partial or complete loss of engine lubrication may result from either condition. If these conditions are anticipated after oil dilution, the engine should be run for several minutes at normal operating temperatures and then stopped and inspected for evidence of sludge and carbon deposits in the oil sump and oil filter screen. Future occurrence of this condition can be prevented by diluting the oil prior to each engine oil change. This will also prevent the accumulation of the sludge and carbon deposits.

- 11A-80. SEACOAST AND HUMID AREAS. In salt water areas special care should be taken to keep the engine, accessories and airframe clean to prevent oxidation. In humid areas, fuel and oil should be checked frequently, and condensation drained to prevent corrosion.
- 11A-81. GROUND SERVICE RECEPTACLE. With the ground service receptacle installed, the use of an external power source is recommended for cold weather starting, low battery starting and lengthy maintenance of the aircraft electrical system. Refer to Section 16 for additional information.

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## SECTION 12

### FUEL SYSTEM

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# MODEL R182 & TR182 SERIES SERVICE MANUAL

## 12-1. FUEL SYSTEM.

12-2. DESCRIPTION. A rubberized bladder-type fuel (cell) tank, or an integral fuel tank is located in the inboard bay of each wing. When the fuel system is in operation, depending upon the airplane's configuration, gravity, an electric or engine-driven fuel pump, draws the fuel from the tanks through the tank strainers, a selector valve, fuel strainer, electric or engine-driven fuel pump to the carburetor. In the 1977 thru 1978 Models, system ventilation is provided by vented fuel caps and a vent line and check valve extends from the left wing tank and emerges through the lower wing skin adjacent to the wing strut. Beginning with the 1979 Models, a vent line and check valve is also used on the right wing tank. The forward fuel lines from the right and left tanks are also utilized as vapor return lines and are teed into a tank crossover vent line connected to the right and left vent lines. The fuel strainer has a quick-drain valve on the bottom and is used to remove water and sediment from the system. Fuel sump drain valves (one in each tank), are located in the bottom, inboard end of each tank and are provided for draining trapped water and sediment. Integral fuel tank equipped airplanes R18200584 and On, incorporating SK182-100 have four additional quick-drain valves installed in each bay.

12-3. PRECAUTIONS. Observe the following general precautions and rules during fueling, defueling, tank or integral fuel bay purging, repairing, assembly or disassembly of system components and electrical system checks and repairs on the airplane fuel system.

### WARNING

During all fueling procedures, fire fighting equipment must be available. Attach a ground wire from approved ground stakes to the mooring eyebolt on LH and RH wing struts or mooring ring on LH and RH wings. Ground fuel nozzle to airplane during fueling operations.

- a. Plugs or caps should be placed on all disconnected hoses, lines and fittings to prevent residual fuel drainage, thread damage, or entry of dirt or foreign materials into the fuel system.

### WARNING

ASSURE THAT ALL CONTAMINATES, INCLUDING WATER, ARE REMOVED FROM FUEL AND FUEL SYSTEM BEFORE FLIGHT. FAILURE TO ASSURE CONTAMINATE FREE FUEL AND HEED ALL SAFETY INSTRUCTIONS AND OWNER ADVISORIES PRIOR TO FLIGHT CAN RESULT IN BODILY INJURY OR DEATH.

PLACARD 0705098-1

# MODEL R182 AND TR182 SERVICE MANUAL

## 12-4. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
NO FUEL AT CARBURETOR.	Fuel selector valve-closed.	Open selector valve, or repair as necessary.
	Fuel cells empty.	Service with proper fuel.
	Plugged fuel strainer.	Remove and clean screen.
	Carburetor inlet screen plugged.	Clean or replace.
	Fuel cell outlet plugged.	Remove and clean screens, and flush fuel cells.
<b>CAUTION</b>		
Aircraft will require de-fueling for this operation.		
FUEL STARVATION AFTER STARTING.	Fuel line plugged.	Repair or replace line.
	Fuel line disconnected or broken.	Repair or replace fuel line.
	Mechanical fuel pump defective.	Repair or replace mechanical fuel pump.
	Auxiliary fuel pump circuit breaker open.	Reset circuit breaker.
	Auxiliary fuel pump or circuitry defective.	Repair or replace fuel pump or pump wiring.
	Plugged fuel cell vent.	Refer to paragraph 12-24.
	Water in fuel.	Drain fuel cell sumps, lines, and strainers.
	Intermittent fuel pump operation.	Repair or replace fuel pump or wiring.

## MODEL R182 AND TR182 SERVICE MANUAL

### 12-4. TROUBLE SHOOTING (Cont).

NO FUEL QUANTITY INDICATION.	Fuel cell empty.	Service with proper fuel.
	Open or defective circuit breaker.	Reset or replace if necessary.
	Open circuit-loose connections, breaker wiring.	Repair wiring or tighten connections.
	Defective fuel quantity transmitter or gage.	Remove and replace defective component.
PRESSURIZED FUEL CELL.	Plugged bleed hole in fuel vent.	Check out using paragraph 12-24 as guide.

### 12-5. FUEL CELLS.

12-6. **DESCRIPTION.** Rubberized, bladder-type fuel cells are installed in the inboard bay of each wing panel. These cells are secured by fasteners to prevent collapsing because they are flexible.

12-7. **GENERAL PRECAUTIONS.** When storing, inspecting or handling rubberized, bladder-type fuel cells, the following precautions should be observed:

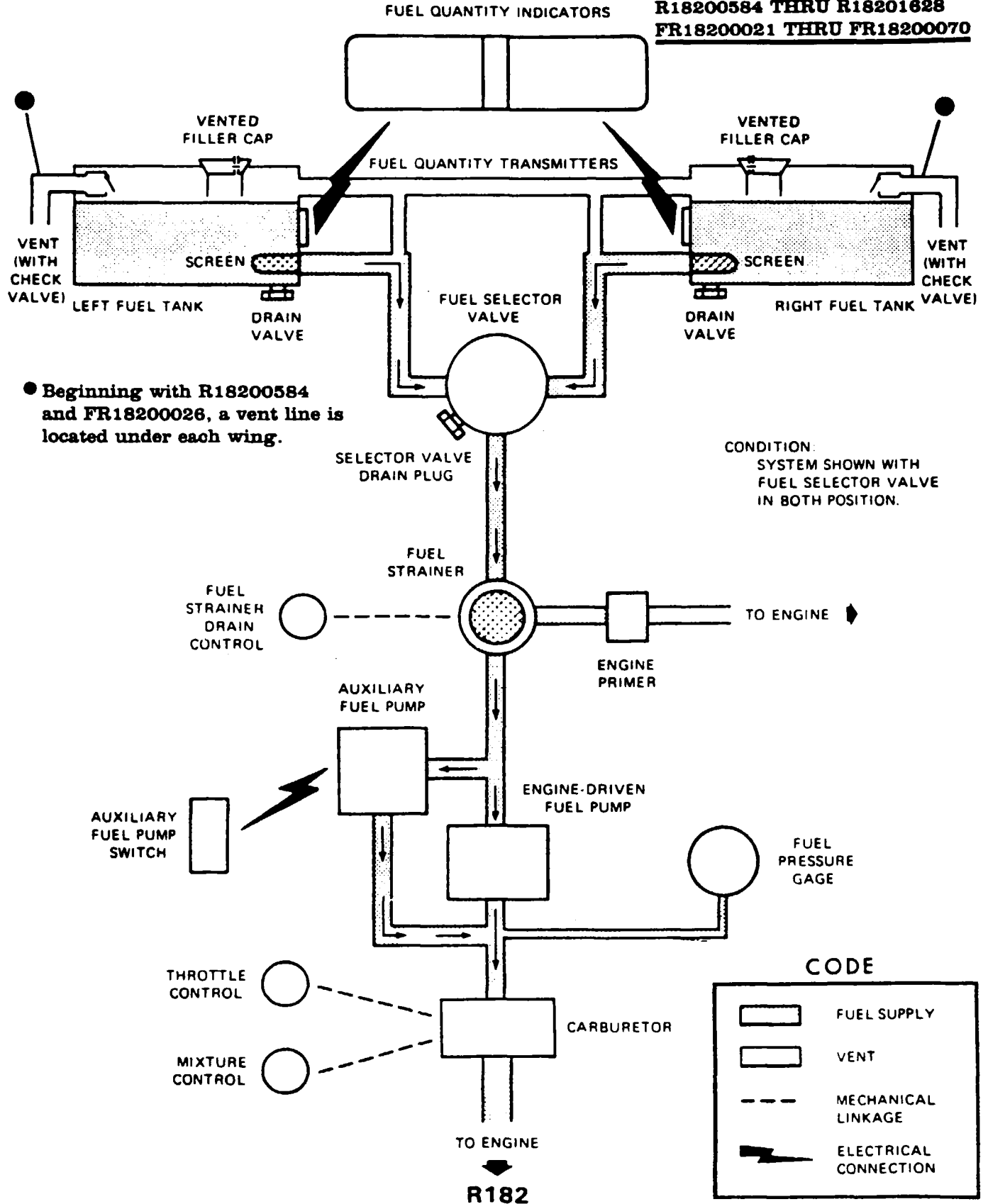
- a. Fold cells as smoothly and lightly as possible with a minimum number of folds. Place protective wadding between folds.
- b. Wrap cell in moisture-proof paper and place in a suitable container. Do not crowd cell in container. Use wadding to prevent movement.
- c. Stack boxed cells to allow access to oldest cell first. Do not allow stacks to crush bottom boxes. Leave cells in boxes until used.
- d. Storage area must be cool, 30°F to 85°F, and free of exposure to sunlight, dirt and damage.
- e. Used cells must be cleaned with soap and warm water prior to storage. Dry and package as outlined in the preceding steps.
- f. Do not carry cells by fittings. Maintain original cell contours or folds when refolding for boxing.

### 12-8. REMOVAL.

- a. Place fuel selector valve in LEFT, RIGHT or OFF position only, if placed in BOTH ON, fuel will have to be drained from both cells. Drain applicable fuel cell, wipe out with cloth, and purge with fresh air, until all traces of fuel are gone.
- b. Remove wing root fairings and disconnect fuel lines at wing root.
- c. Remove clamps from forward and aft fuel cell bosses at wing root, and carefully work fuel strainers and lines from cell bosses.
- d. Disconnect electrical lead and ground strap from fuel quantity transmitter, and carefully work transmitter from fuel cell and wing rib.
- e. Remove screws attaching drain adapter to lower surface of wing.
- f. Remove clamps attaching crossover vent line to fuel cells, and work vent line out of cell being removed. In aircraft equipped with long-range cells, remove vent extension tube from inside cell. Vent extension tube is attached to the crossover vent bars on the cell.
- g. Remove fuel filler adapter and gaskets by removing screws attaching adapter to wing and fuel cell. On aircraft equipped with long-range cells, remove cover plate and gaskets, and remove nylon vent tube from inside cell.

# MODEL R182 AND TR182 SERVICE MANUAL

**R18200584 THRU R18201628  
FR18200021 THRU FR18200070**

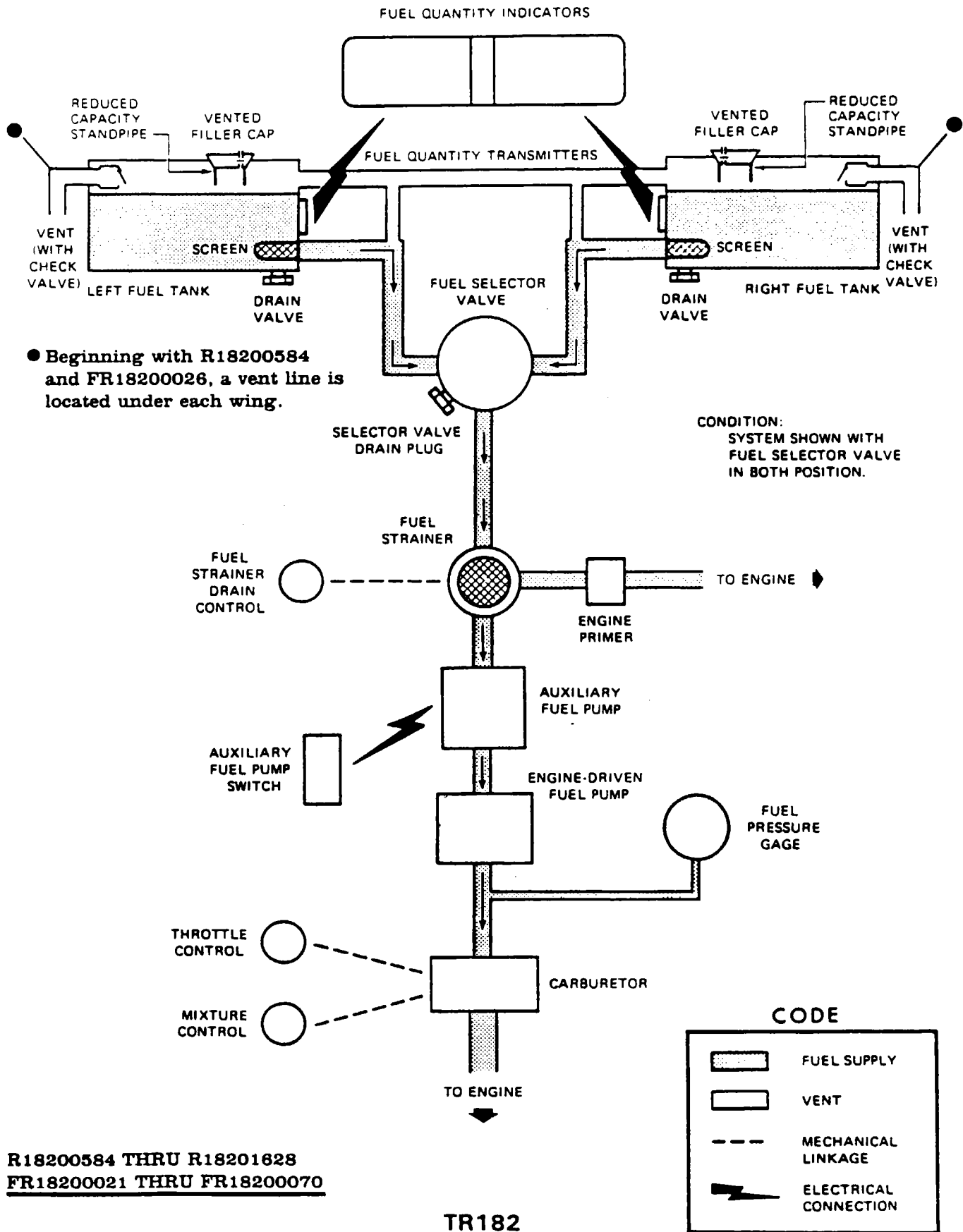


● Beginning with R18200584 and FR18200026, a vent line is located under each wing.

Figure 12-1. Fuel System Schematic (Sheet 1 of 3)



# MODEL R182 AND TR182 SERVICE MANUAL



● Beginning with R18200584 and FR18200026, a vent line is located under each wing.

**R18200584 THRU R18201628**  
**FR18200021 THRU FR18200070**

**TR182**

Figure 12-1. Fuel System Schematic (Sheet 2 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

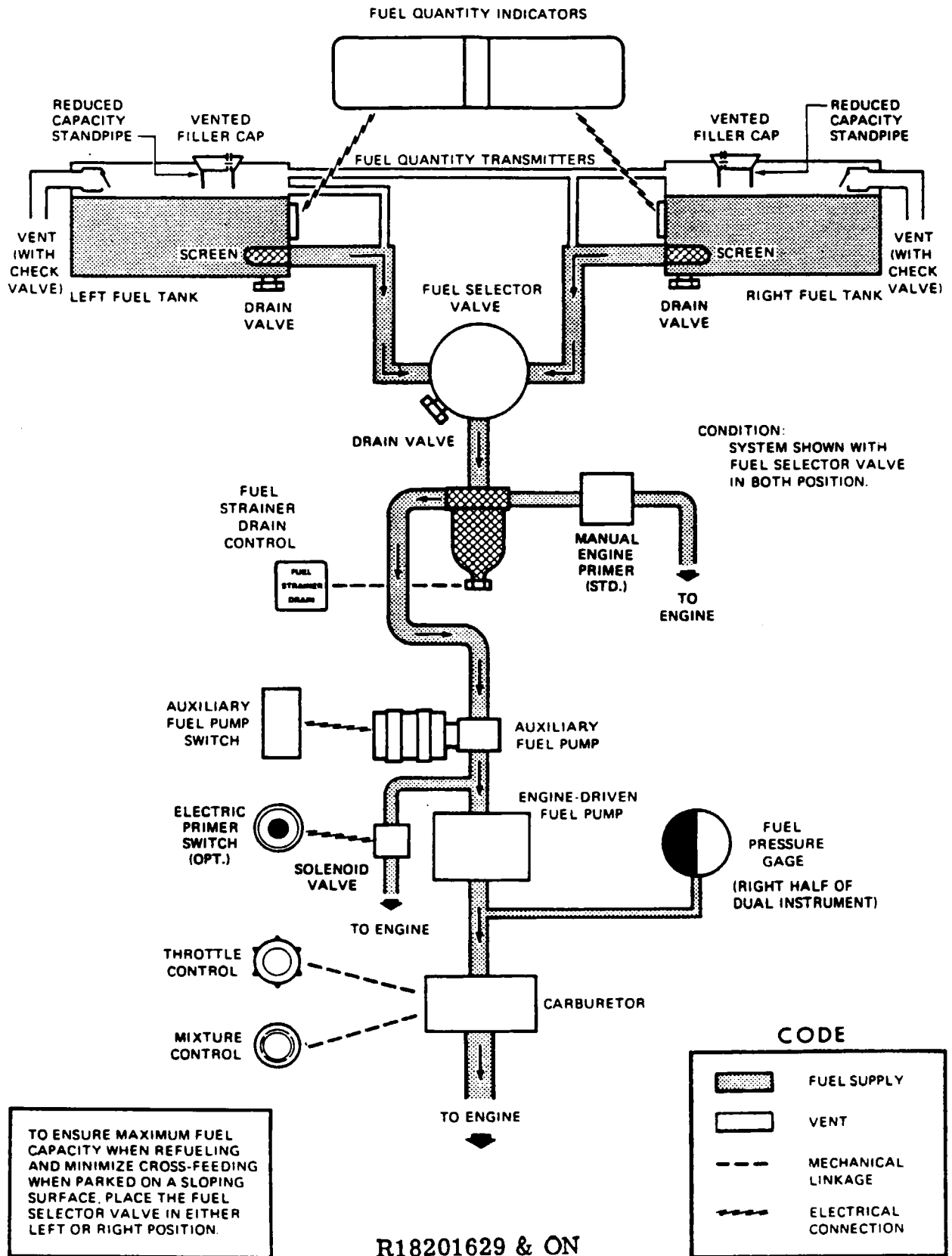
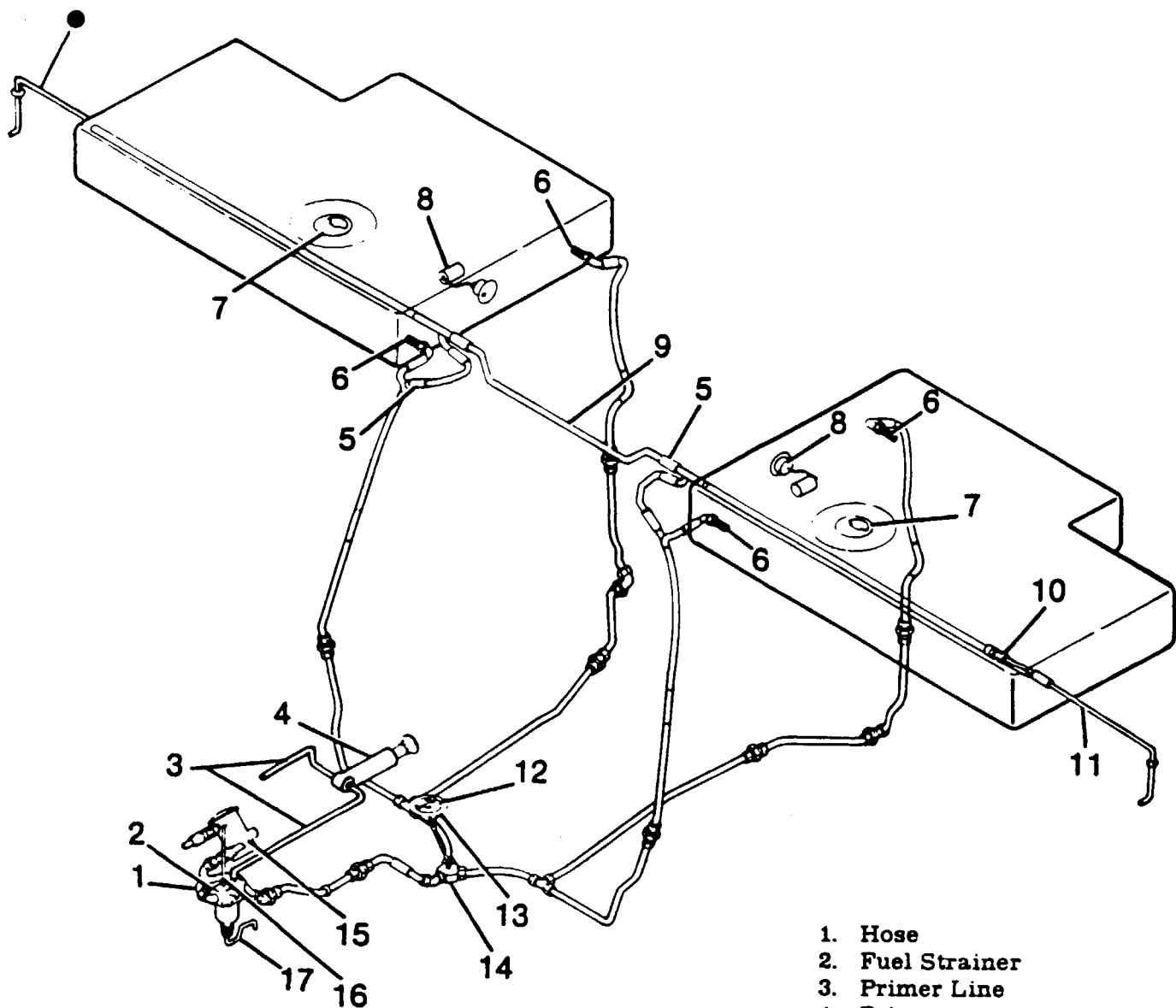


Figure 12-1. Fuel System Schematic (Sheet 3 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL



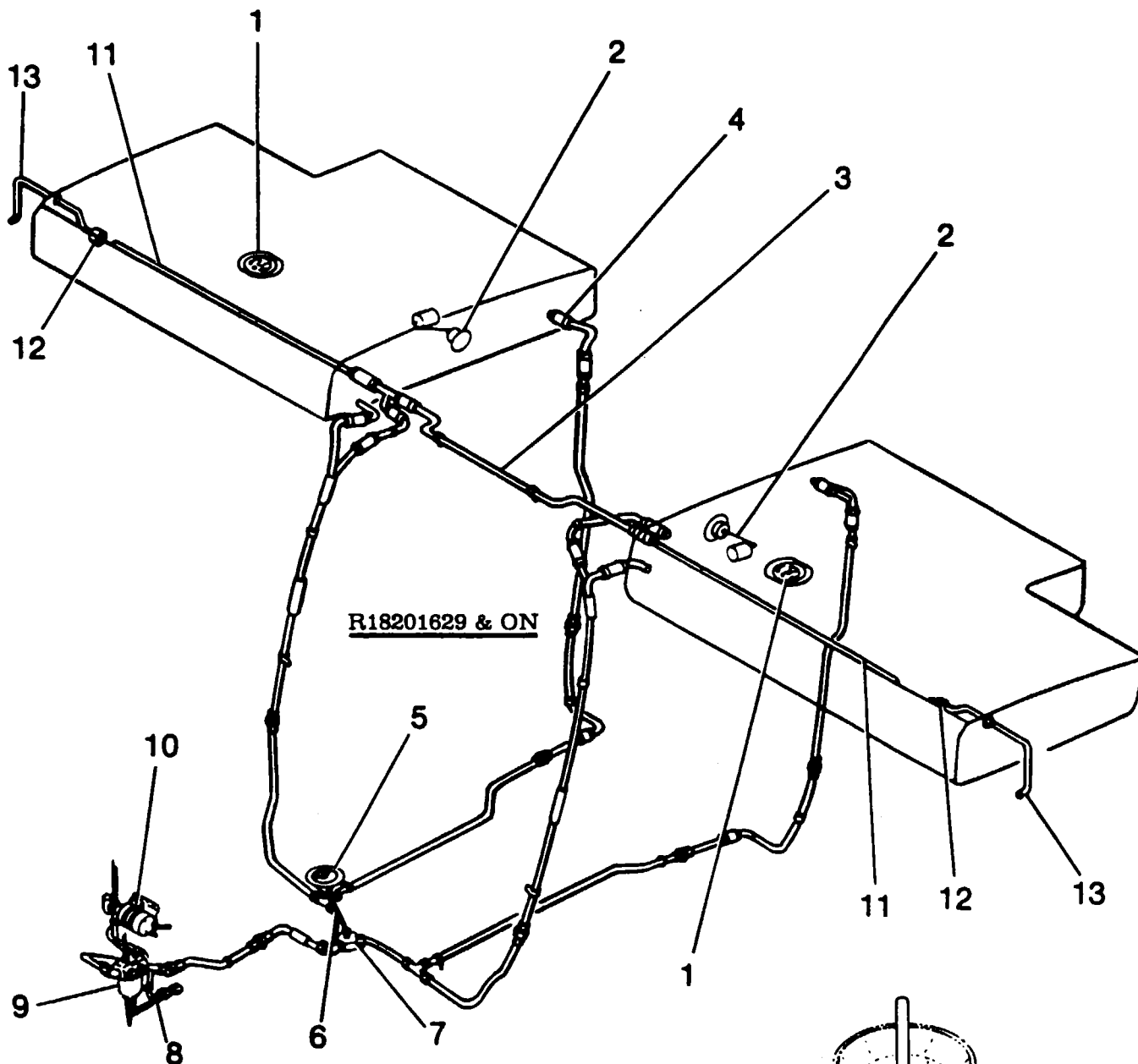
1. Hose
2. Fuel Strainer
3. Primer Line
4. Primer
5. Hose
6. Finger Strainer
7. Fuel Filler Cap
8. Fuel Quantity Transmitter
9. Crossover Vent Line
10. Fuel Vent Valve
11. Vent Line
12. Placard
13. Gear and Shaft Assembly
14. Fuel Selector Valve
15. Auxiliary Fuel Pump
16. Strainer Drain Control
17. Drain Line

**THRU R18201628 AND FR18200070**

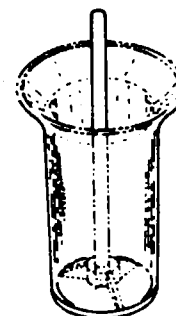
● RH vent line added to system at serials R18200584 and FR18200028.

Figure 12-2. Fuel System (Sheet 1 of 2)

MODEL R182 AND TR182 SERVICE MANUAL



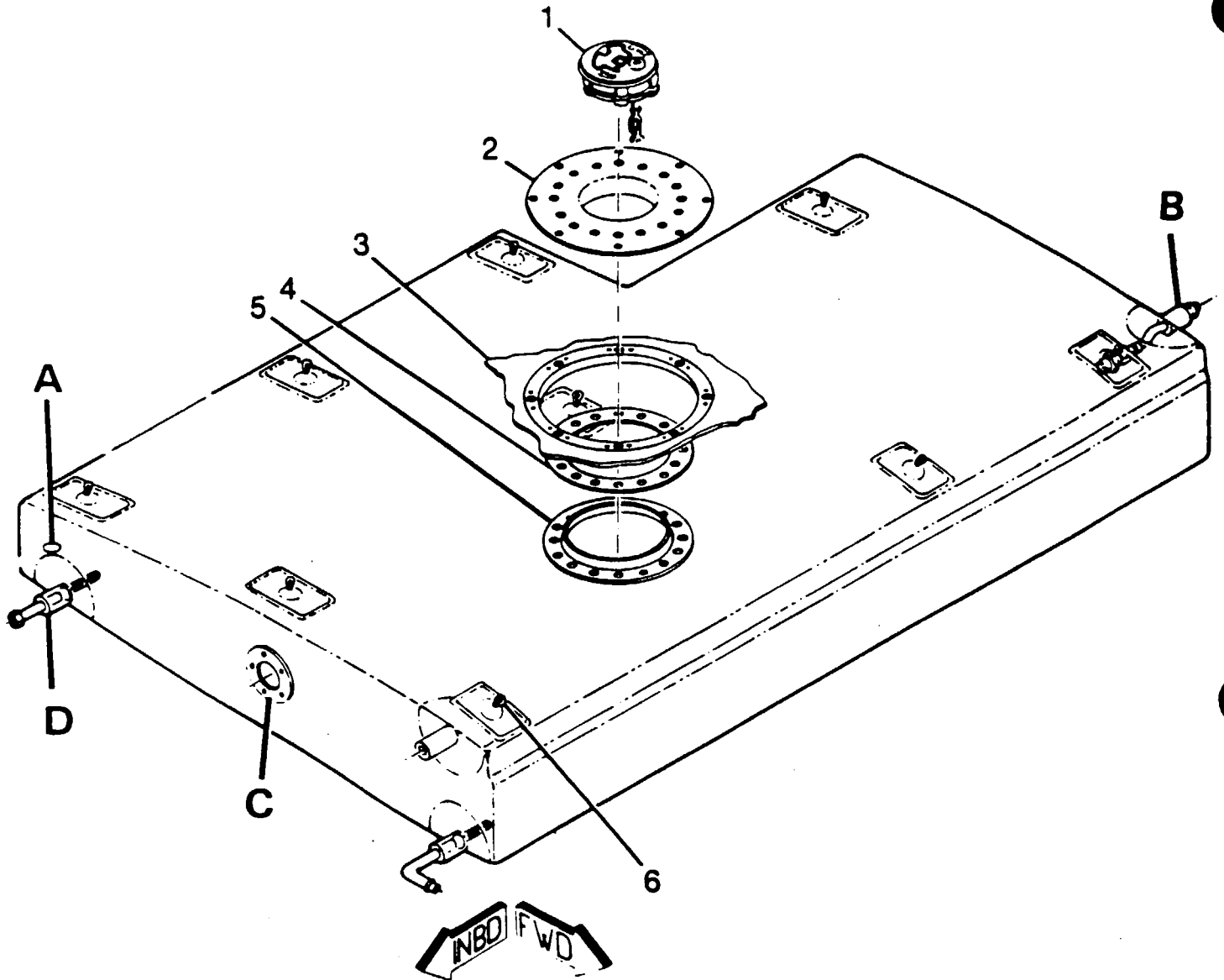
- 1. Fuel Filler Cap
- 2. Fuel Quantity Transmitter
- 3. Crossover Vent Line
- 4. Hose
- 5. Placard
- 6. Gear and Shaft Assembly
- 7. Fuel Selector Valve
- 8. Drain Line
- 9. Fuel Strainer
- 10. Auxiliary Electric Fuel Pump
- 11. Vent Line
- 12. Fuel Vent Valve
- 13. Vent Line



**FUEL SAMPLER CUP**  
 For use with drain valves.  
 (Refer to Section 2 of this manual.)

Figure 12-2. Fuel System (Sheet 2 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL



1. Filler Cap
2. Adapter
3. Wing Skin
4. Gasket
5. Fitting
6. Hanger

## NOTE

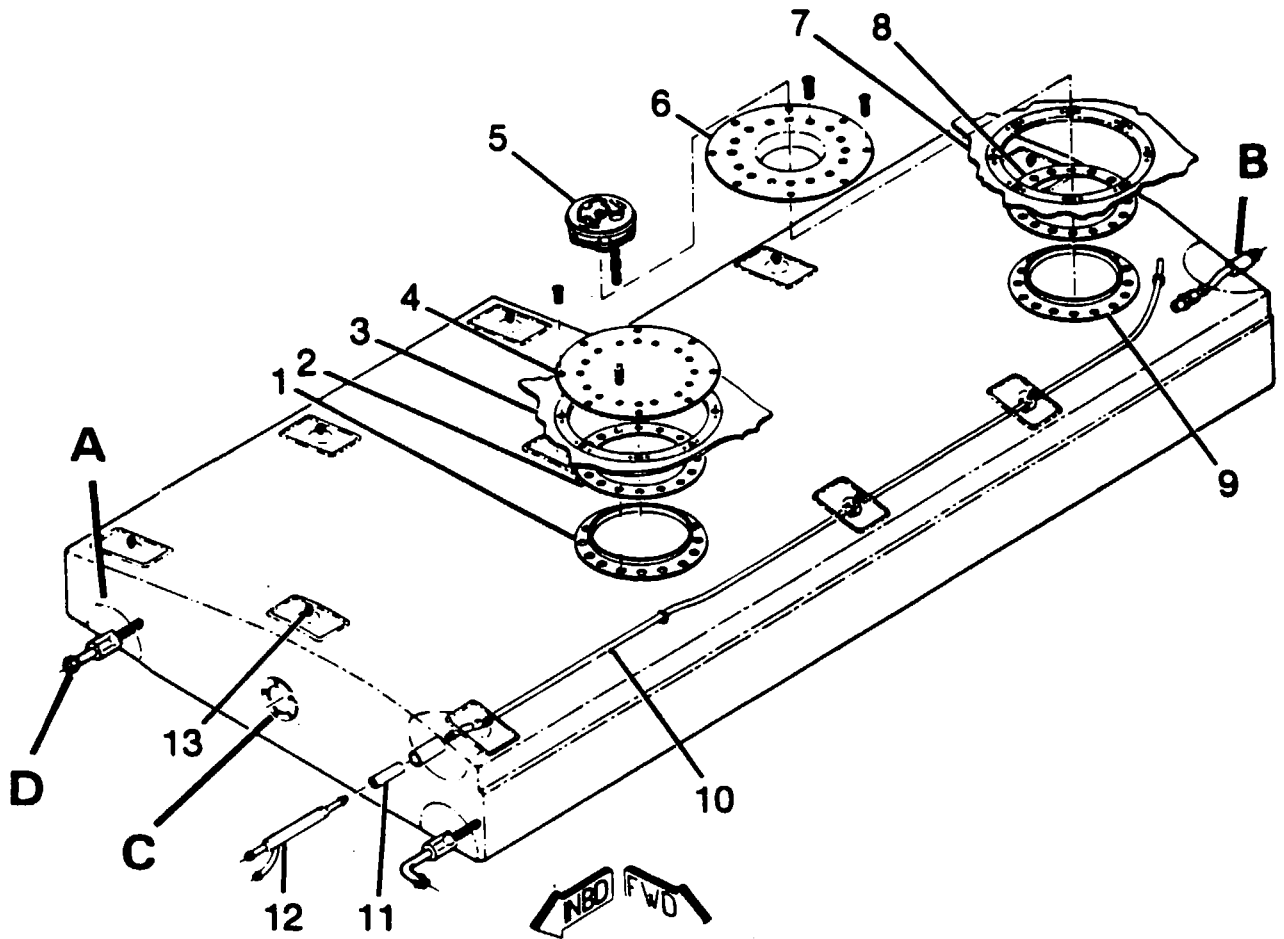
Fuel cell is replaced by integral fuel bay. See figure 12-13.

R18200001 THRU R18200583  
FR18200001 THRU FR18200020

## STANDARD CELL

Figure 12-3. Fuel Cell Installation (Sheet 1 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL



1. Fitting
2. Gasket
3. Wing Skin
4. Cover Plate
5. Filler Cap
6. Adapter
7. Wing Skin
8. Gasket
9. Fitting
10. Nylon Tube
11. Hose
12. Vent Adapter
13. Hanger

## NOTE

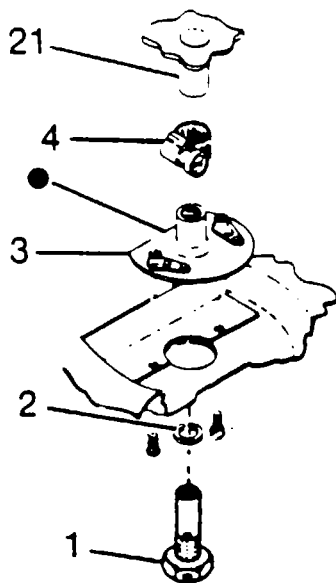
Fuel cell is replaced by integral fuel bay. See figure 12-13.

R18200001 THRU R18200583  
FR18200001 THRU FR18200020

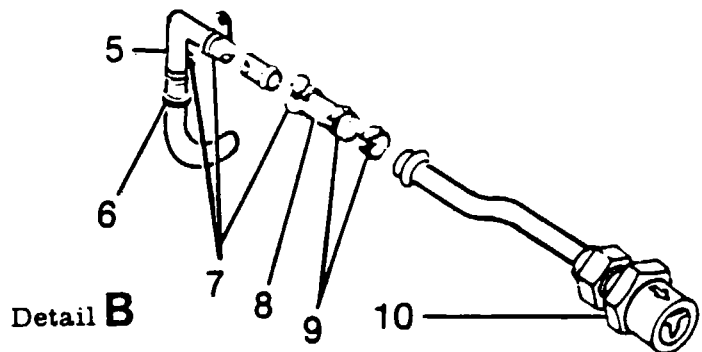
LONG - RANGE CELL

Figure 12-3. Fuel Cell Installation (Sheet 2 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL



Detail A

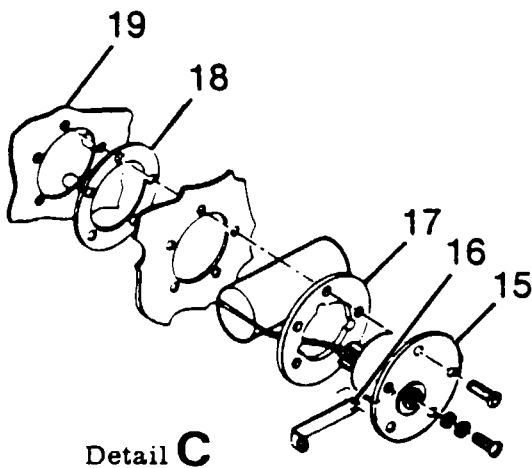


Detail B

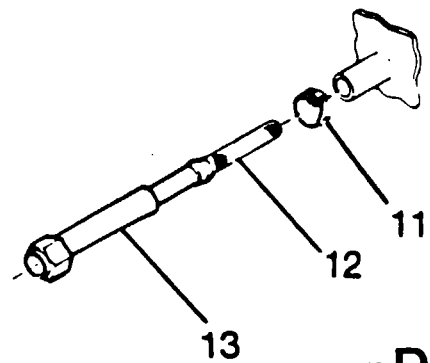
Hinge for vent valve (10) must be at top. Tube for vent extends into fuel cell, then bends down and inboard. Vent valve (10) is used in the left wing fuel cell only.

Torque drain valve (1), 15 to 35 in-lbs and safety-wire. Drain valve gasket (2) should be lightly oiled and installed with asbestos side against head of valve.

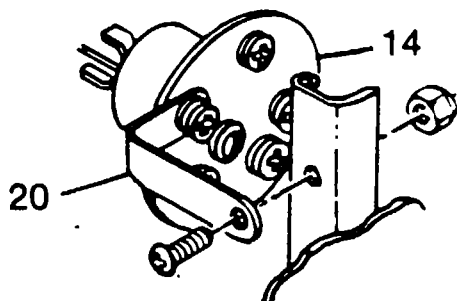
- This surface to be installed toward and parallel to aft side of tank.



Detail C



Detail D



FUELL QUANTITY TRANSMITTER  
INSTALLATION AND GROUNDING

- |                               |                   |
|-------------------------------|-------------------|
| 1. Drain Valve                | 16. Ground Strap  |
| 2. Gasket                     | 17. Gasket (Seal) |
| 3. Adapter                    | 18. Gasket        |
| 4. Clamp                      | 19. Adapter       |
| 5. Vent Line                  | 20. Ground Strap  |
| 6. Grommet                    | 21. Nipple        |
| 7. Clamp                      |                   |
| 8. Hose                       |                   |
| 9. Clamp                      |                   |
| 10. Vent Valve                |                   |
| 11. Clamp                     |                   |
| 12. Strainer                  |                   |
| 13. Protector                 |                   |
| 14. Fuel Quantity Transmitter |                   |
| 15. Fuel Quantity Transmitter |                   |

Figure 12-3. Fuel Cell Installation (Sheet 3 of 3)

## MODEL R182 AND TR182 SERVICE MANUAL

- h. Working through filler neck opening, loosen snap fasteners. Tilt snap fasteners slightly when pulling cell free, to prevent tearing rubber.
- i. Collapse and carefully fold cell for removal, then work cell out of fuel bay through filler opening in upper wing surface. Use care when removing to prevent damage to cell.
- j. Unfold cell and remove fittings, snap fasteners and fuel sump drain adapter.

### 12-9. REPAIR.

#### NOTE

For fuel cell repair information, refer to Cessna Service News Letter dated August 28, 1970. For minor repair, a fuel cell repair kit is available from Goodyear, complete with required materials and instructions.

### 12-10. INSTALLATION.

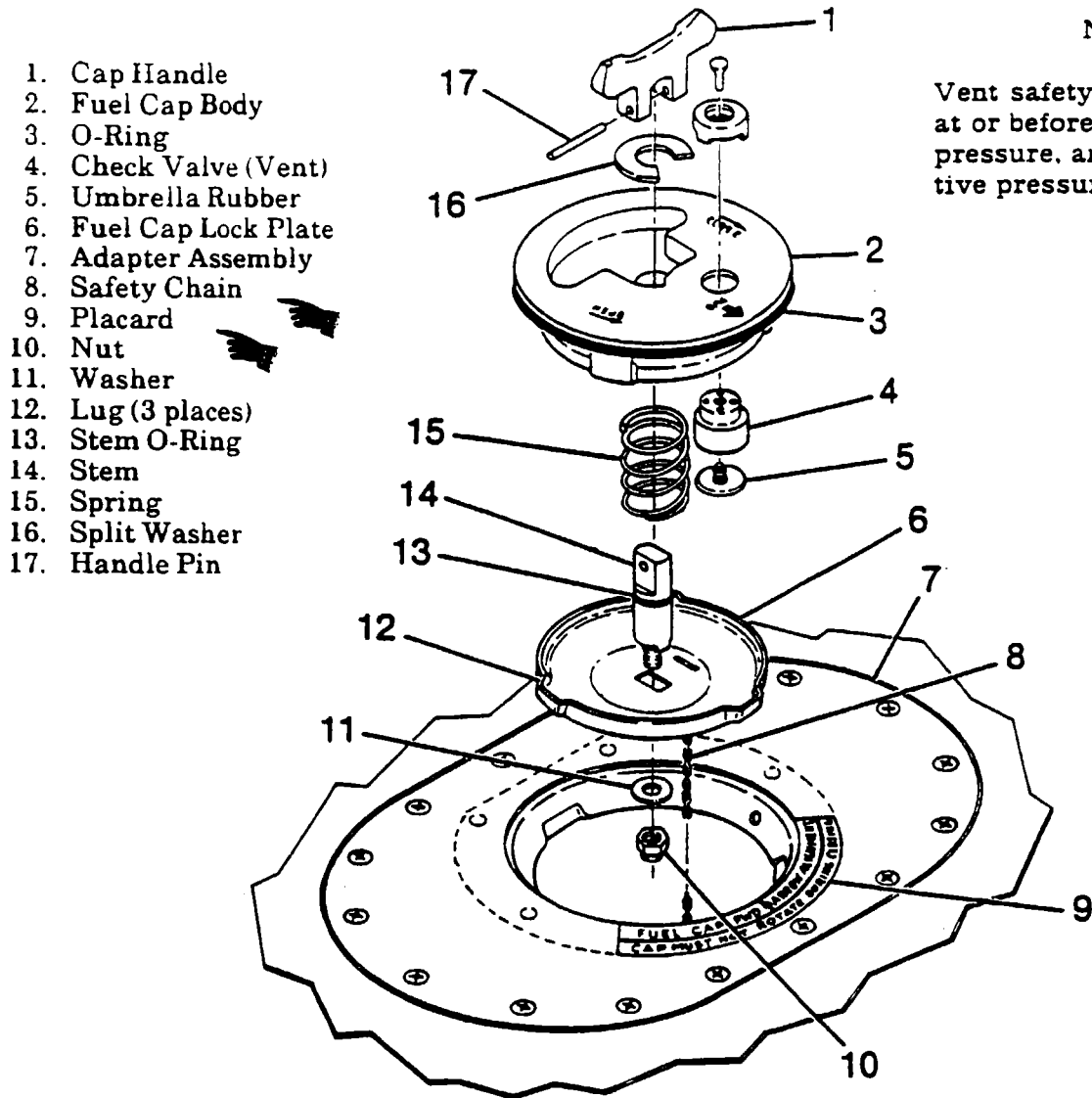
- a. Clean all filings, trimmings, loose washers, bolts, nuts, etc. from cell compartment.
- b. Round all sharp edges or rivets, and tape over them to protect bladder.
- c. Inspect cell compartment just prior to installation of a cell for conditions noted in the preceding steps.
- d. Install fuel drain adapter and snap fasteners.
- e. Check to insure cell is warm enough to be flexible and fold as necessary to fit through fuel cell access opening.
- f. Place cell in compartment, develop it out to full size and attach fasteners, then reverse procedures outlined in preceding paragraph for installation. Install all new gaskets when installing cell.
- g. On aircraft equipped with long-range cells, install nylon vent tube inside cell, inserting tube through four hangers in top of cell. If a replacement cell is being installed, use nylon vent tube removed from old cell and/or order tube from applicable Parts Catalog.
- h. When tightening screw-type clamps on standard fuel cell (BTC-39) construction), apply a maximum of torque of 20 inch-pounds to clamp screws. On the extended range fuel cell (BTC-67 construction), apply a maximum torque of 30-35 inch-pounds to clamp screws. A light application of #10 engine oil to metal tube aids installation into nipple fittings.
- i. When installing filler adapter, cover plate and fuel quantity transmitter to the wing and fuel cell, tighten attaching screw evenly. The sealing or compression surfaces must be assembled when absolutely dry (NO SEALING PASTE IS TO BE USED).
- j. After installation has been completed, cell should be inspected for final fit within compartment, making certain that cell is extended out to the structure and no corners are folded in.
- k. The final inspection, prior to closing the cell, should be a close check to insure that cell is free of foreign matter such as lint, dust, oil or any installation equipment. If a cell is not thoroughly clean, it should be cleaned with a lint-free cloth, soaked in water, alcohol, or kerosene. NO OTHER SOLVENT SHALL BE USED.

### 12-11. VENTED FUEL FILLER CAPS.

- 12-12. DESCRIPTION. The filler cap assemblies may be constructed of either metal or red plastic. Both cap assemblies incorporate a vent safety valve that provides vacuum and positive pressure relief for their respective fuel tanks. It is important that both type caps be cleaned on an as required basis, if proper filler cap sealing is to be maintained.



# MODEL R182 AND TR182 SERVICE MANUAL



## NOTE

Vent safety valve (4) opens at or before 1.0 PSI vacuum pressure, and 10.0 PSI positive pressure.

**R18200001 THRU R18200583**  
**FR18200001 THRU FR18200020**

Figure 12-4. Metal Fuel Filler Cap

12-13. METAL "FLUSH-TYPE" FILLER CAPS. Except for minor differences in construction and weight, metal fuel filler caps perform the same functions as red plastic fuel filler caps. The caps are interchangeable and will fit the same adapter assembly.

12-14. INSPECTION.

## NOTE

If fuel collects in the handle well it could indicate stem O-ring leakage. Fuel collecting around perimeter of cap could indicate cap O-ring or check valve leakage.

## MODEL R182 AND TR182 SERVICE MANUAL

- a. Remove fuel cap from adapter (7), remove safety chain (9) from cap and cover or plug fuel opening to keep out foreign matter.
- b. Remove nut (10) and, observing position of lock plate (6) in relation to stem (14) disassemble cap.
- c. Note resiliency of O-rings (3 & 13) and condition of grooves. If the O-rings (3 & 13) have deteriorated they must be replaced.

### 12-15. CLEANING.

- a. Using a cotton swab and Stoddard solvent or equivalent, gently lift edges of rubber umbrella (5) and clean stainless steel seat and umbrella removing all contaminants. Using a second swab wipe seat and umbrella thoroughly, removing all cotton fibers. Repeat until swabs show no discoloration.
- b. If O-ring grooves appear contaminated, clean with Stoddard solvent or equivalent and cotton swabs.
- c. Ascertain that all vent holes in check for defects.
- d. Clean cap body and lock plate, check for defects.
- e. If the umbrella continues to leak or is deteriorated it must be replaced.
- f. To remove umbrella, lubricate the umbrella stem with (MIL-H-5606) hydraulic fluid and use a small blunt tool to insert the retaining knob on the umbrella stem into the check valve body to prevent damaging the stem.

### 12-16. REASSEMBLY.

- a. Place split washer (16) in cap well correctly.
- b. With handle (1) and O-ring installed on stem (14), insert stem (14) through split washer (16) on cap body (2).
- c. Place spring (15) on stem (14).
- d. Position cap handle (1) to full "OPEN" position.
- e. Place lock plate (6) on threaded end of stem (14) and align all three lugs (12) with three guide bosses on the cap body (2).
- f. Check that square hole in bottom of lock plate (6) is aligned with square surface on threaded end of stem (16).

### NOTE

It is possible to install the lock plate (6) 180° out of the desired position, if the alignment procedures in steps "d", "e" and "f" are not followed. If the cap will not fit when assembled, remove the lock plate (6) and reassemble after rotating it 180°.

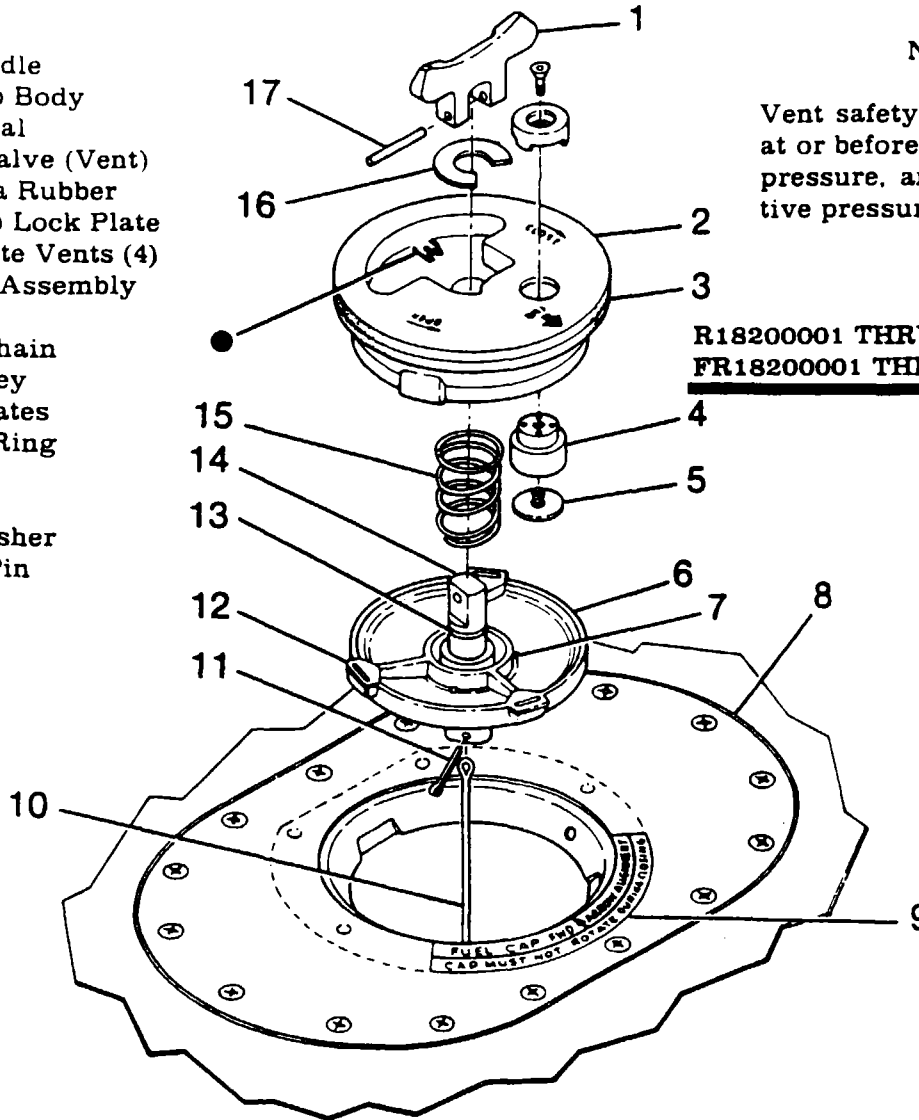
- g. Compress the lock plate (6) and fuel cap body (2) and secure with washer (11) and nut (10).
- h. Connect fuel cap assembly to safety chain (9) and reinstall in tank.

12-16A. CHECKING FILLER CAPS. With fuel cap in the locked position, try to twist cap out of position by pressing down and twisting the fuel cap handle clockwise using as much force as you can with your fingers. If the "FWD" arrow on the cap rotates out of alignment with the arrow on the placard, install more washers until the cap will not rotate. If fuel leaks from a fuel cap, observe where the fuel collects. Fuel in the handle well could indicate stem O-ring leakage. Fuel collecting around the perimeter of the fuel cap body could indicate outer seal or check valve leakage.

12-17. RED PLASTIC "FLUSH-TYPE" FILLER CAPS. A red plastic "Flush-Type" vented filler cap may be used. Extra care is required when reinstalling plastic filler caps in the fuel filler adapter assembly. An improperly installed filler cap could cause a loss of fuel from the tanks during flight.

# MODEL R182 AND TR182 SERVICE MANUAL

1. Cap Handle
2. Fuel Cap Body
3. Outer Seal
4. Check Valve (Vent)
5. Umbrella Rubber
6. Fuel Cap Lock Plate
7. Lock Plate Vents (4)
8. Adapter Assembly
9. Placard
10. Safety Chain
11. Cotter Key
12. Metal Plates
13. Stem O-Ring
14. Stem
15. Spring
16. Split Washer
17. Handle Pin



## NOTE

Vent safety valve (4) opens at or before .25 PSI vacuum pressure, and 5.0 PSI positive pressure.

**R18200001 THRU R18201973  
FR18200001 THRU FR18200070**

Figure 12-5. Red Plastic or Metal Fuel Filler Cap (Sheet 1 of 2)

## CAUTION

On aircraft serials R18200001 thru R18201973 and FR18200001 thru FR18200070 the O-ring type outer seal (3), (P/N 4196-17) is not to be used as a replacement on the red plastic fuel caps. Replace with the correct gasket type seal from Service Kit SK182-65. Seals used on the metal and plastic caps are not interchangeable.

- A letter M on the fuel cap body (2) under the handle (1) signifies that the outer seal (3) mounting groove is machined.

## MODEL R182 & TR182 SERIES SERVICE MANUAL

### R18201974 AND ON

1. Umbrella
2. Check Valve
3. Gasket
4. Frictionless Washer
5. Body
6. Cover
7. Screw

#### NOTE

Check condition of gasket (3) and frictionless washer (4). Replace gasket and washer if worn or fuel leaks between adapter and gasket (3).

#### NOTE

Check valve (2) shall open at or before 4.0 inches of water vacuum pressure, and be able to withstand 0.5 PSI positive pressure without leakage.

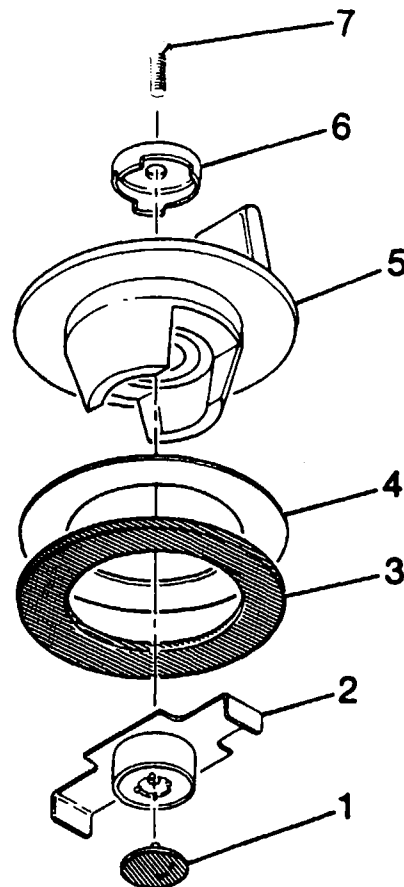


Figure 12-5. Fuel Filler Cap - LSE (Sheet 2 of 2)

#### 12-17A. CLEANING LSE FUEL FILLER CAPS.

- a. Disconnect safety chain and remove RH filler cap from fuel tank adapter.
- b. Plug fuel tank opening to keep dirt and foreign matter from contaminating the tank.

#### NOTE

Check condition of gasket (3) and frictionless washer (4). Replace gasket and washer if worn or fuel leaks between adapter and gasket (3).

- c. Using cotton swabs and Stoddard solvent or equivalent, gently lift edges of rubber umbrella (1) and clean stainless steel seat and umbrella, removing all contaminants. Using a second swab, wipe seat and umbrella thoroughly, removing all cotton fibers. Repeat until swabs show no discoloration.
- d. If the umbrella continues to leak or is deteriorated, remove and replace. To remove the umbrella, lubricate the umbrella stem with (MIL-H-5606) hydraulic fluid to prevent tearing the stem. When installing the new umbrella, lubricate the stem with (MIL-H-5606) hydraulic fluid and use a small blunt tool to insert the retaining knob on the umbrella into the check valve body.

## MODEL R182 AND TR182 SERVICE MANUAL

### 12-18. INSPECTION.

#### NOTE

If fuel collects in the handle well it could indicate stem O-ring leakage. Fuel collecting around perimeter of cap could indicate cap outer seal or check valve leakage.

- a. Remove fuel cap from adapter (8), remove safety chain (10) from cap and cover or plug fuel opening to keep out foreign matter.
- b. Rotate cap handle (1) to the "OPEN" position, compress cap body (2) and lock plate (6) to expose the .125 inch diameter handle pin (17).
- c. Using a small wire push out the handle pin (17).
- d. Note resiliency of O-ring (13), outer seal (3), and condition of grooves. If the O-ring or the outer seal (3) have deteriorated they must be replaced.
- e. Note condition of tabs on lockplate (6) for signs of abnormal wear, if such wear is evident, replace the complete cap assembly.

### 12-19. CLEANING METAL OR RED PLASTIC CAPS.

- a. Using a cotton swab and Stoddard solvent or equivalent, gently lift edges of rubber umbrella (5) and clean stainless steel seat and umbrella removing all contaminants. Using a second swab wipe seat and umbrella thoroughly, removing all cotton fibers. Repeat until swabs show no discoloration.
- b. If O-ring or outer seal grooves appear contaminated, clean with Stoddard solvent or equivalent and cotton swabs.
- c. Ascertain that all vent holes in check valve are unobstructed.
- d. Clean cap body and lock plate, check for defects.
- e. If the umbrella continues to leak or is deteriorated, it must be replaced.
- f. To remove umbrella, lubricate the umbrella stem with (MIL-H-5606) hydraulic fluid to prevent tearing the stem.
- g. To replace the umbrella, lubricate the umbrella stem with (MIL-H-5606) hydraulic fluid and use a small blunt tool to insert the retaining knob on the umbrella stem into the check valve body to prevent damaging the stem.

### 12-20. REASSEMBLY.

#### NOTE

If fuel was observed leaking around the cap periphery prior to disassembly and the leakage was not due to a bad O-ring or outer seal an additional split washer (16) may be added for a total of two, prior to reassembling cap. To make sure that these washers are not installed upside down, check to see that edges of the split parallel the respective sides of the cap well. The addition of a washer under the cap handle will increase the effort required to uncap the fuel tank.

- a. Install spring (15) on stem (14).
- b. Install fuel cap body (2) on stem (14).
- c. Check that three metal plates (12) on top rim of lock plate (6) are aligned with three guide bosses on fuel cap body (2).

## MODEL R182 AND TR182 SERVICE MANUAL

### CAUTION

It is possible to install the handle pin in the pin hole 180° out of the desired position, if the alignment procedures in step "c" is not followed. If the handle (1) is not installed properly the FWD arrow on the cap will not align with the arrow on the placard (9) when the cap is reinstalled.

- d. Compress cap body (2) and lock plate (6), install split washer(s) (16) as required.
- e. Install cap handle (1) on stem (14) so that the handle (1) will be in the open position.
- f. Insert handle pin (17) through handle (1) and stem (14).
- g. Connect fuel cap assembly to safety chain (10) and reinstall fuel cap. Make certain that the arrow on the fuel cap body (2) and the arrow on the placard (9) align.

**12-20A. LEAK TESTING METAL OR RED PLASTIC FILLER CAPS.** The following procedure may be used to detect fuel filler cap leakage.

- a. Service the aircraft with approved fuel filling each bay.
- b. Place the fuel selector in the OFF position.
- c. Plug one of the fuel bay vent lines (where it protrudes beneath the wing) with a small rubber plug or tape.
- d. Connect a rubber hose to the other vent. Then tee into this hose a pressure measuring device, such as a water manometer, manifold pressure gage, or airspeed indicator.
- e. Blow into the open end of the hose. The pressure must not exceed .7 psi which equals 20 inches of water on a water manometer, or 1.43 inches Hg on a manifold pressure gage, or 174 Kts on an airspeed indicator.

### WARNING

Do not inhale fuel vapor while blowing into the rubber hose.

- f. It may take several applications of pressure to bring the bay to the desired pressure level.

### WARNING

Do not apply regulated or unregulated air pressure from an air compressor to the fuel vent. Over inflation and major structural damage will occur if more than .7 psi is applied.

- g. Pinch or close the rubber hose to sustain pressure in the fuel bay.
- h. Apply a soap solution to the fuel filler caps and inspect for leakage around the rubber seal to filler neck junction, the fuel cap vent, and the fuel cap handle stem. Load the cap sideways in all directions by pressing on the fuel cap vent housing by hand.

### NOTE

No leakage is permissible. If leaks are present, replace the cap with a new unit or repair in accordance with Cessna Service Information Letter SE 80-59 Supplement No. 1, dated June 23, 1980.

# MODEL R182 AND TR182 SERVICE MANUAL

## NOTE

Beginning with R18200584 and ON: 90° dimension may be deviated outboard on LH or RH vent line **ONLY** in order to balance venting of the system.

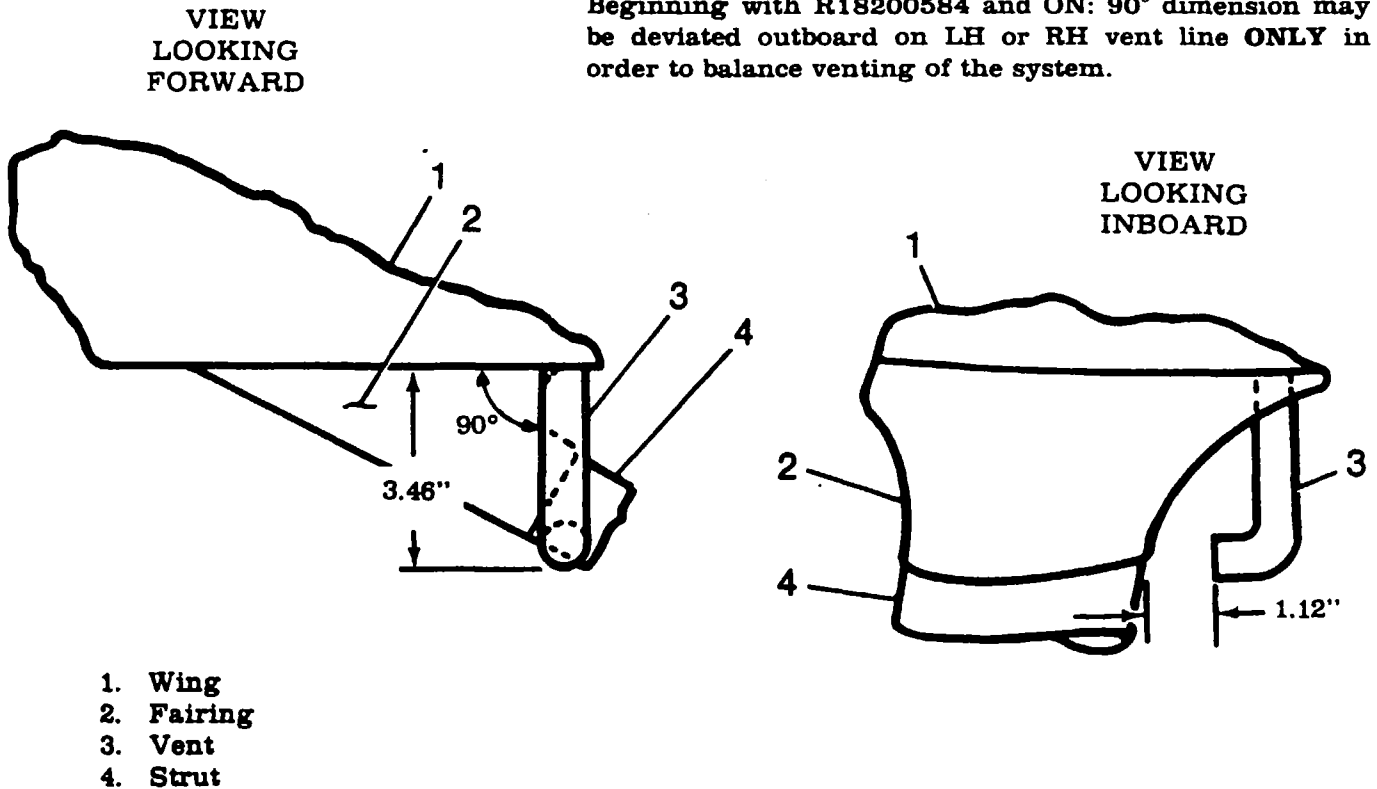


Figure 12-6. Fuel Vent Location

## CAUTION

Care must be exercised in removing the fuel filler caps until the system has been depressurized.

- i. After replacement or repair of either fuel filler cap, repeat the inspection.
- j. Remove the rubber hose, unplug or remove the tape from the other fuel vent, and place the fuel selector in the desired position.

12-21. **FUEL QUANTITY TRANSMITTERS.** Refer to Section 15 for a complete description and maintenance procedures of the transmitters.

12-22. **FUEL VENTS.**

12-23. **DESCRIPTION.** A vent line is installed in the outboard end of each fuel cell and extends overboard through the lower wing skin. The inboard end of the vent line extends into the fuel cell, then forward and slightly upward. A vent valve is installed on the inboard end of the vent line inside the fuel cell, and a crossover line connects the cells together. On aircraft equipped with long-range cells, a nylon vent tube is attached to the crossover line at the inboard end of each cell. This vent tube extends into the fuel cell, and is suspended by four hangers in the top of the cell.

## MODEL R182 AND TR182 SERVICE MANUAL

- 12-24. **CHECKING.** The following procedure may be used to check the vent and bleed hole in the valve assembly.
- a. Attach a rubber tube to the end of vent line beneath the wing.
  - b. Plug vent on opposite wing from one being tested.
  - c. With a .5 psi MAX air pressure source, slightly pressurize cell, if air can be blown into cell, vent line is open.
  - d. After cell is slightly pressurized, insert end of rubber tube into a container of water and watch for a continuous stream of bubbles, which indicates the bleed hole in valve assembly is open and relieving pressure.
  - e. After completion of step "c", again slightly pressurize the cell. Crimp rubber tube to retain pressure within the cell. Loosen, but do not remove filler cap on opposite wing to check cell crossover line. If pressure escapes from filler cap, crossover line is open. Remove rubber tube from end of vent line beneath the wing after completion of check.

### NOTE

Remember that a plugged vent line or bleed hole can cause either fuel starvation or the pressurization of bays by fuel expansion.

- f. Repeat procedures for opposite fuel bay.

### NOTE

The fuel vent line protruding beneath the wing near the wing strut must be correctly aligned to avoid possible icing. Dimensions are shown in figure 12-6.

- 12-24A. **ADJUSTMENT.** On aircraft serials R18200584 and on, uneven fuel flow from the integral fuel bays, when the aircraft fuel selector valve is positioned to feed from both fuel bays, can be caused by unequal pressures in the fuel venting system. When uneven fuel flow is observed, the venting system may be checked and unequal pressures in the system corrected by using the following procedures:

### NOTE

The following procedure should be accomplished during a sequence of routine flight operations. Special flights for the sole purpose of checking and adjusting fuel tank feed rates are not recommended.

- a. Inspect the venting system to ensure the lines are open, connections secure and that the system is functioning properly.
- b. Park the aircraft on a level surface and select the BOTH position on the fuel selector. Leave the aircraft parked until the tank levels are equal or fill both tanks.
- c. With the fuel selector in the BOTH position, take off and climb to an altitude where the air is smooth.
- d. Trim the aircraft for straight and level flight. Make sure the aircraft is free of any yaw by trimming the rudder to center the ball. Cruise at the top of the green band on manifold pressure for a period of at least one hour.
- e. At the end of the hour and while still in straight and level flight, take note of the fuel tank levels and indicated on the fuel gage.



## MODEL R182 AND TR182 SERVICE MANUAL

- f. If the fuel tank levels are greater than 5 gallons apart, land the aircraft and perform the following procedure.
  1. Bend the underwing vent of the tank which had the highest level outboard 1/4 inch.
  2. Bend the underwing vent of the tank which had the lowest level inboard 1/4 inch, providing the vent is not squarely behind the strut. Repeat the first five steps.

### CAUTION

At least one of the vent tubes should remain behind the strut to ensure that icing cannot block both vents.

3. No adjustment need be performed when satisfactory equalization of fuel tank feeding is obtained.

12-25. FUEL SELECTOR VALVE. (See figure 12-7.)

12-26. DESCRIPTION. A four position fuel selector valve is located beneath the floorboard just aft and slightly to the left of the pedestal structure. A shaft incorporating two meshing gears links the valve to a handle and shaft assembly mounted on the pedestal structure. The positions of the handle are labeled OFF, LEFT, BOTH ON AND RIGHT. Valve repair is limited to replacement of component parts only.

12-27. REMOVAL AND INSTALLATION.

- a. Drain all fuel from wing tanks, fuel strainer, lines and selector valve, observing precautions outlined in paragraph 12-3.
- b. Remove selector valve handle (1) and pedestal cover.
- c. Peel back carpet as required to gain access to inspection plates aft of pedestal structure.
- d. Disconnect drive shaft assembly (4) at selector valve (6).
- e. Disconnect and cap inlet and outlet fuel lines to valve.
- f. Remove screws attaching valve to mounting bracket (10) and withdraw valve.
- g. Reverse preceding steps for installation. Service aircraft in accordance with Section 2, turn fuel selector valve to ON position and check for leaks.
- h. Replace items removed for access.

12-28. DISASSEMBLY.

- a. Remove fuel selector valve in accordance with paragraph 12-27.
- b. Remove screws securing cover (2) to valve body (8) and carefully remove cover. Discard O-rings (3) and (16), but retain ball (4) and spring (5) for reinstallation.
- c. Slowly withdraw rotor (6) from valve body.

### NOTE

Removal of rotor (6) will allow seal (9), O-ring (10), washer (11) and spring (12) (one each installed in both inlet ports) to spring free.

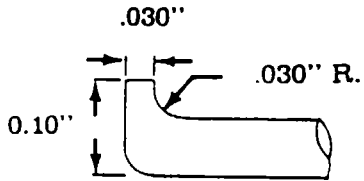
- d. Remove washer (7), plug (14), and O-ring (13).

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R18200001 THRU R18200583  
FR18200001 THRU FR18200020

1. Handle
2. Placard
3. Gear Assembly
4. Drive Shaft
5. Inlet Line
6. Selector Valve
7. Inlet Line
8. Spring Compressor (Locally Mfg.)
9. Outlet Line
10. Mounting Bracket

Grind flat  
 and break sharp edges



Detail **B**

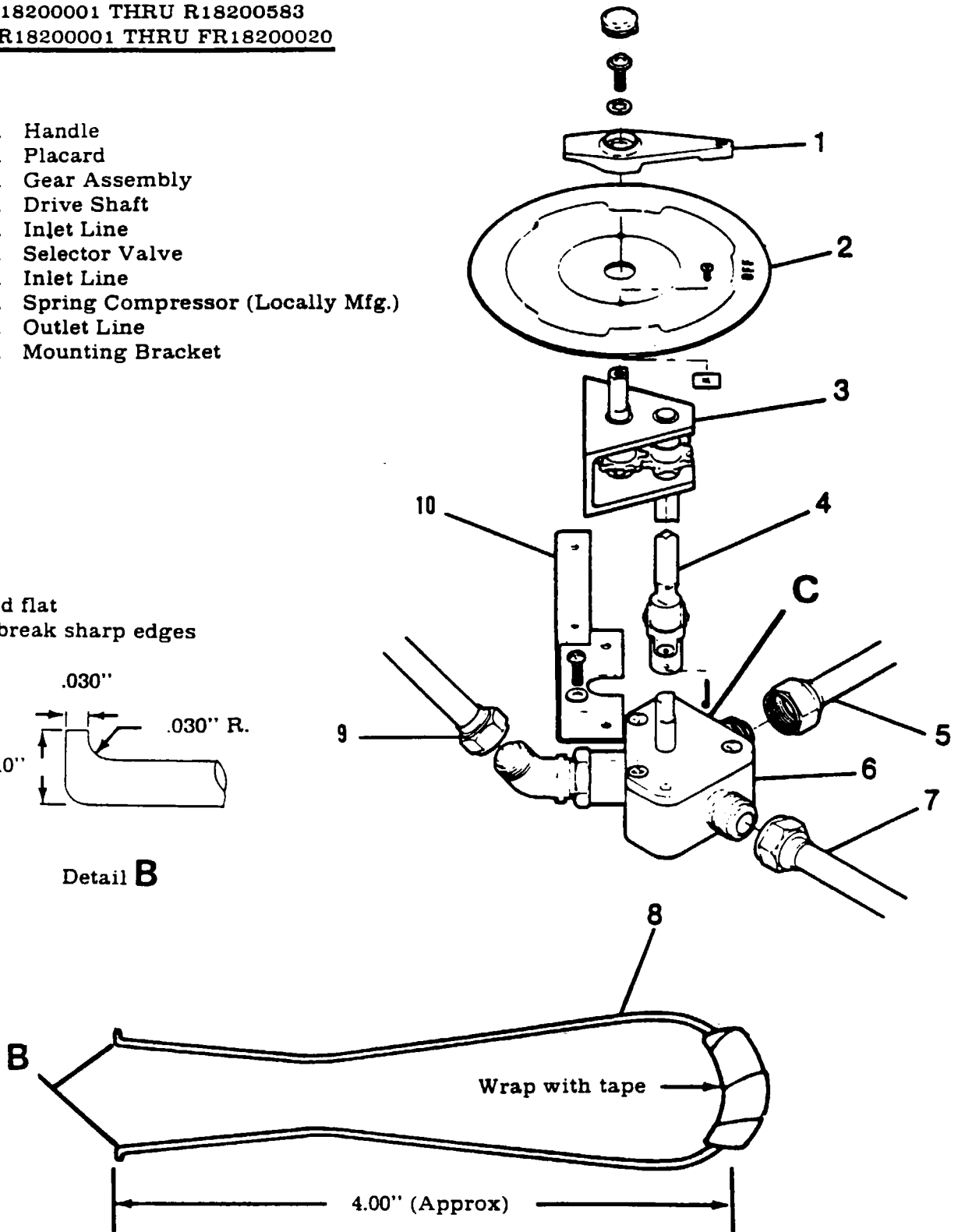
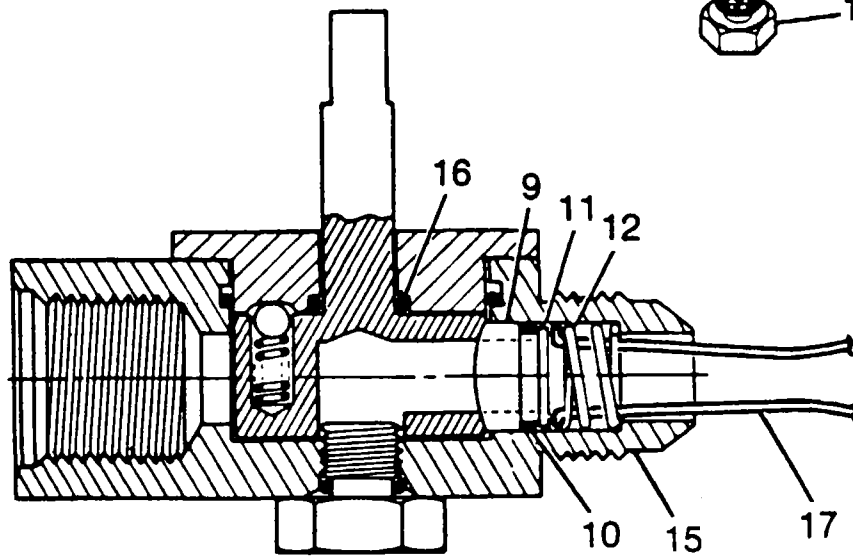
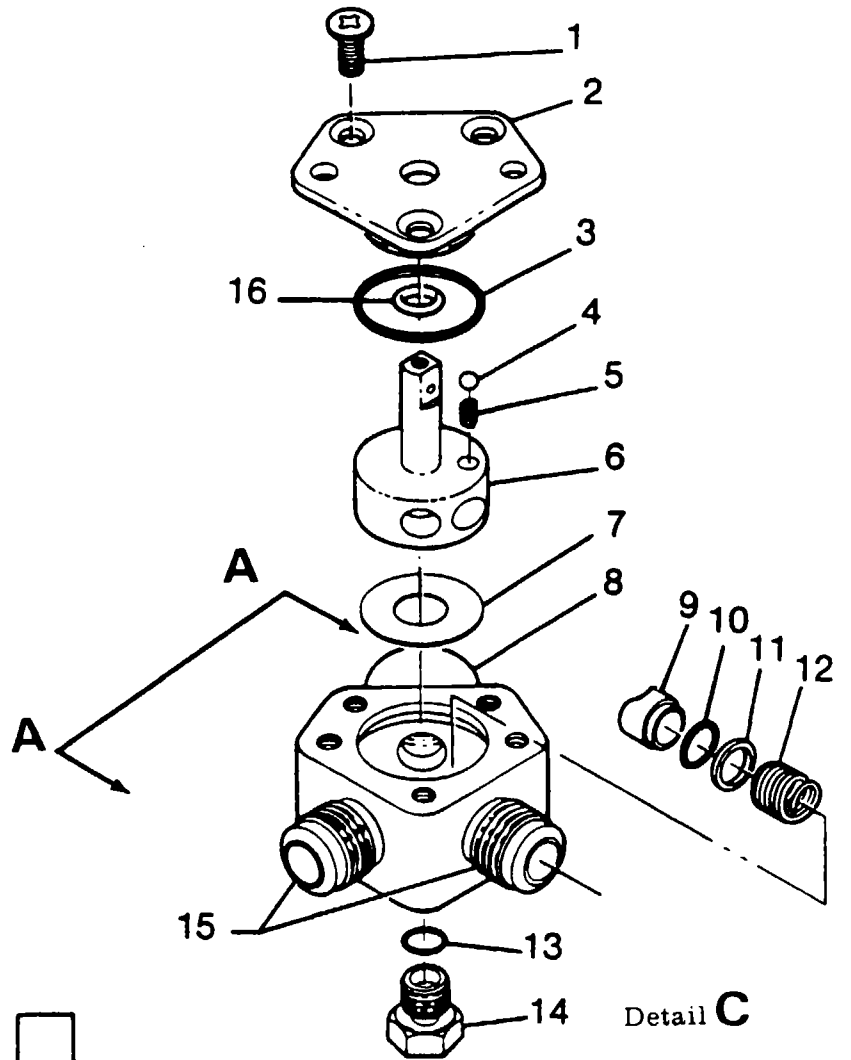


Figure 12-7. Fuel Selector Valve (Sheet 1 of 5)

# MODEL R182 AND TR182 SERVICE MANUAL

- 1. Screw
- 2. Cover
- 3. O-Ring
- 4. Ball
- 5. Spring
- 6. Rotor
- 7. Washer
- 8. Body
- 9. Seal
- 10. O-Ring
- 11. Washer
- 12. Spring
- 13. O-Ring
- 14. Plug
- 15. Inlet Ports
- 16. O-Ring
- 17. Spring Compressor



Cross Section **A-A**

Figure 12-7. Fuel Selector Valve (Sheet 2 of 5)

# MODEL R182 AND TR182 SERVICE MANUAL

R18200584 THRU R18201798  
FR18200021 THRU FR18200070

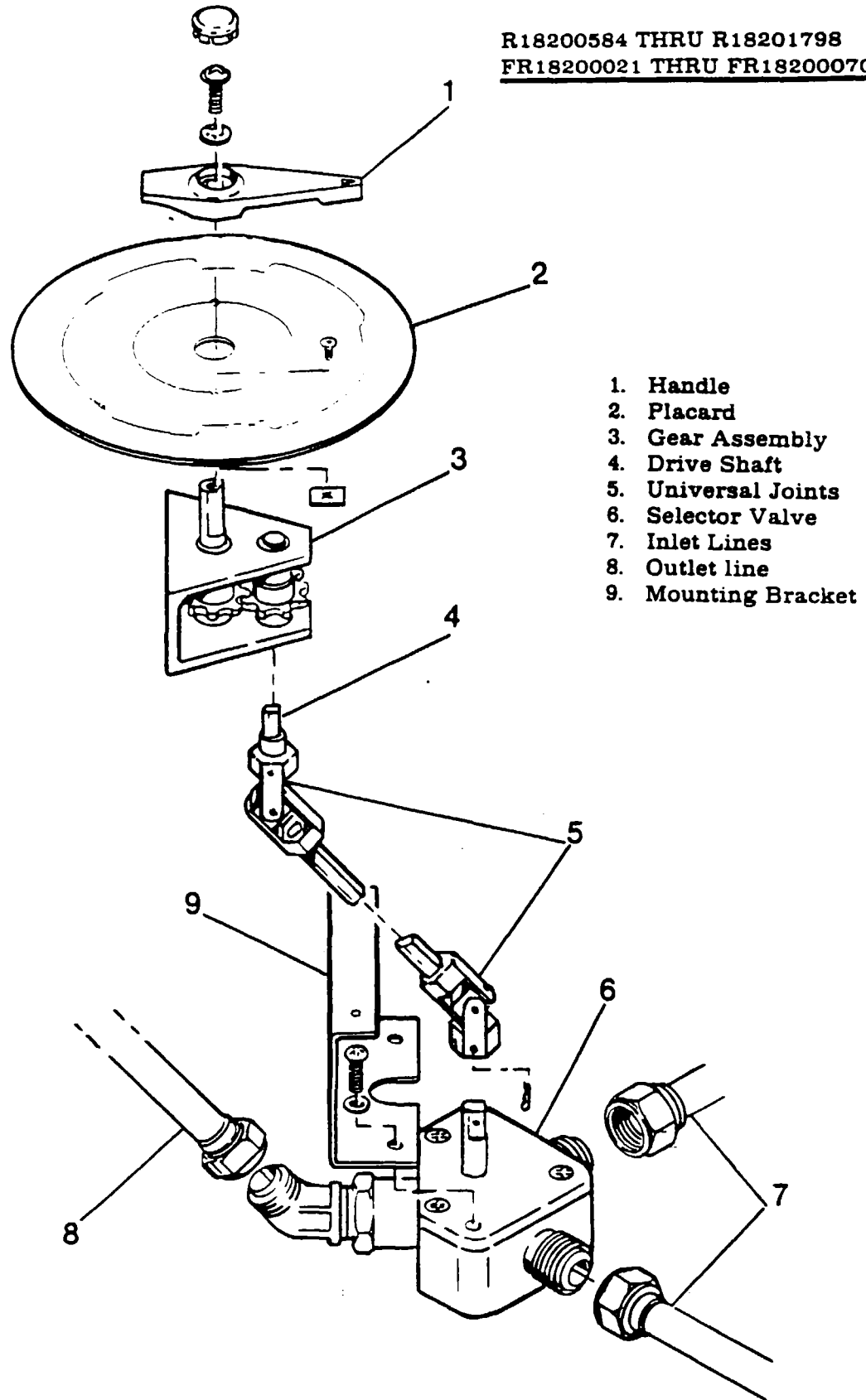


Figure 12-7. Fuel Selector Valve (Sheet 3 of 5)

# MODEL R182 AND TR182 SERVICE MANUAL

R18201799 THRU R18201999

**NOTE**  
The support (3) must be adjusted so that the drive shaft (4) moves freely.

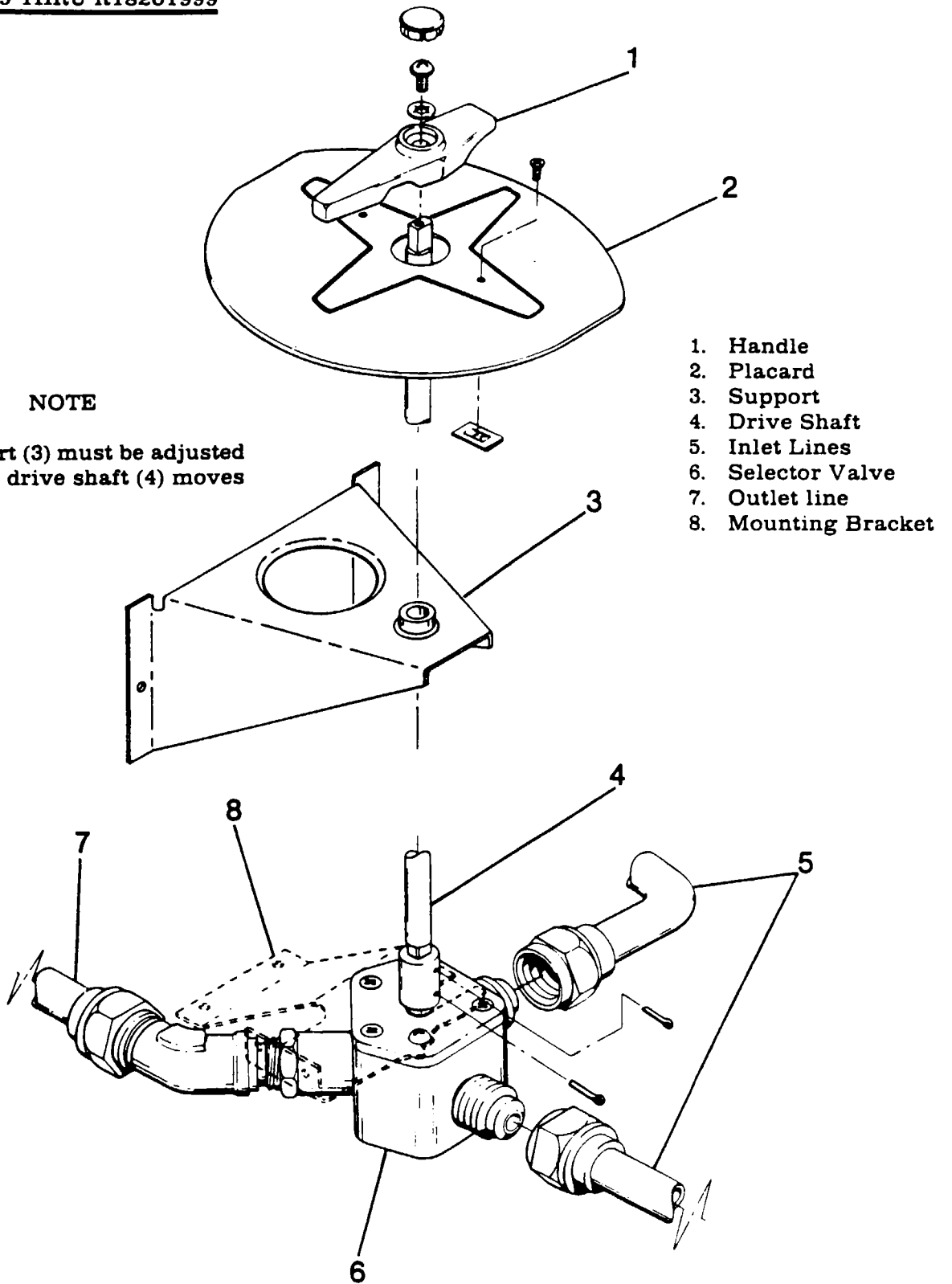
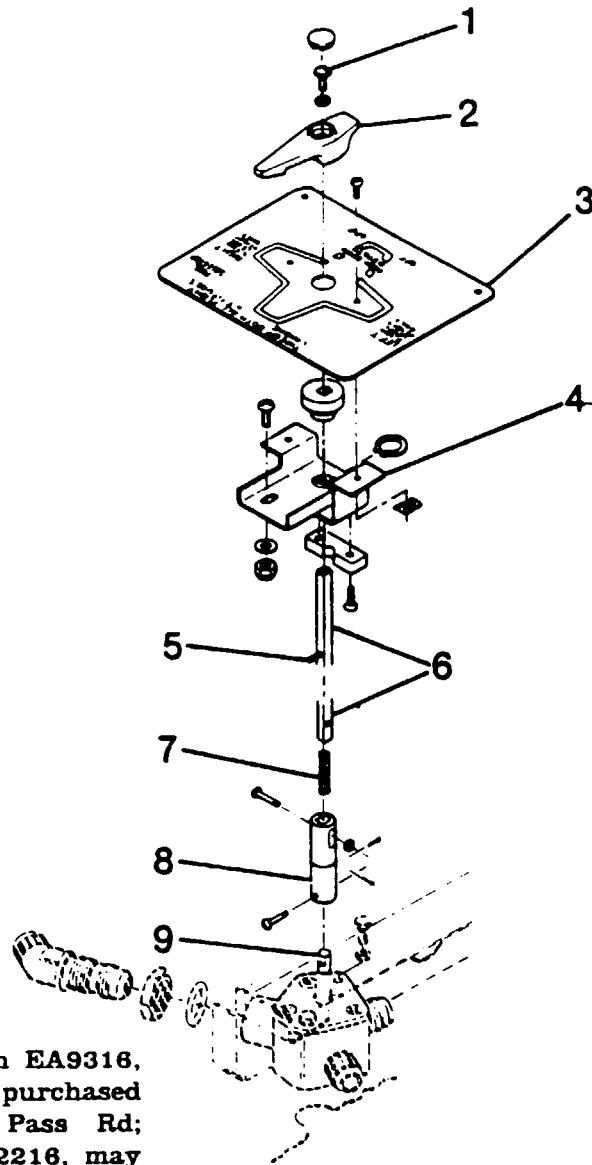


Figure 12-7. Fuel Selector Valve (Sheet 4 of 5)

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## R18202000 AND ON

1. Screw
2. Handle
3. Plate
4. Bracket
5. Roll Pin
6. Drive Shaft
7. Spring
8. Collar
9. Selector Valve



### NOTES

Roll pin (5) must be bonded to shaft (6) with EA9316, EA9309 or EA9314. These products may be purchased from Hystol Div., Dexter Corp., Willow Pass Rd; Pittsburg, CA 94565. Equivalent product, EC2216, may be purchased from 3M Co., St. Paul, MN 55119. Clean roll pin (5) and shaft (6) with MEK, and thoroughly dry parts before applying bonding agent. At 75°F, bond cures to 80% ultimate tensile strength within 24 hours. Accelerated cure times are as follows:

- (a) Five minutes at 250°F.
- (b) Ten minutes at 200°.

Before installing screw (1) on drive shaft (6), clean threads of screw (1) with MEK or equivalent. After threads have thoroughly dried, apply Grade CV Loctite Catalog 85 or 83, Loctite 242, or equivalent. Loctite products may be obtained from: Loctite Corp., 705 Mountain Rd, Newington, CT 06111.

Figure 12-7. Fuel Selector Valve (Sheet 5 of 5)

## MODEL R182 AND TR182 SERVICE MANUAL

### 12-29. CLEANING, INSPECTION AND REPAIR.

#### NOTE

Repair of damaged or worn parts of the selector valve assembly is NOT authorized, therefore, is limited to replacement of component parts only.

- a. Clean disassembled parts by washing in Stoddard solvent or equivalent. Blow dry parts using clean compressed air.
- b. Inspect all parts for obvious wear or damage as follows:
  1. Check detent holes in cover (2) for excessive wear and examine bearing surfaces of rotor (6).
  2. Inspect shaft and bearing surfaces of rotor (6) for removal of black anodized finish indicating wear. Check for internal corrosion of drilled passages.
  3. Examine valve body (8) for wear, cracks, distortion and internal corrosion. Any damage to thread surfaces at inlet and outlet ports or cover attach screw holes is cause for rejection.

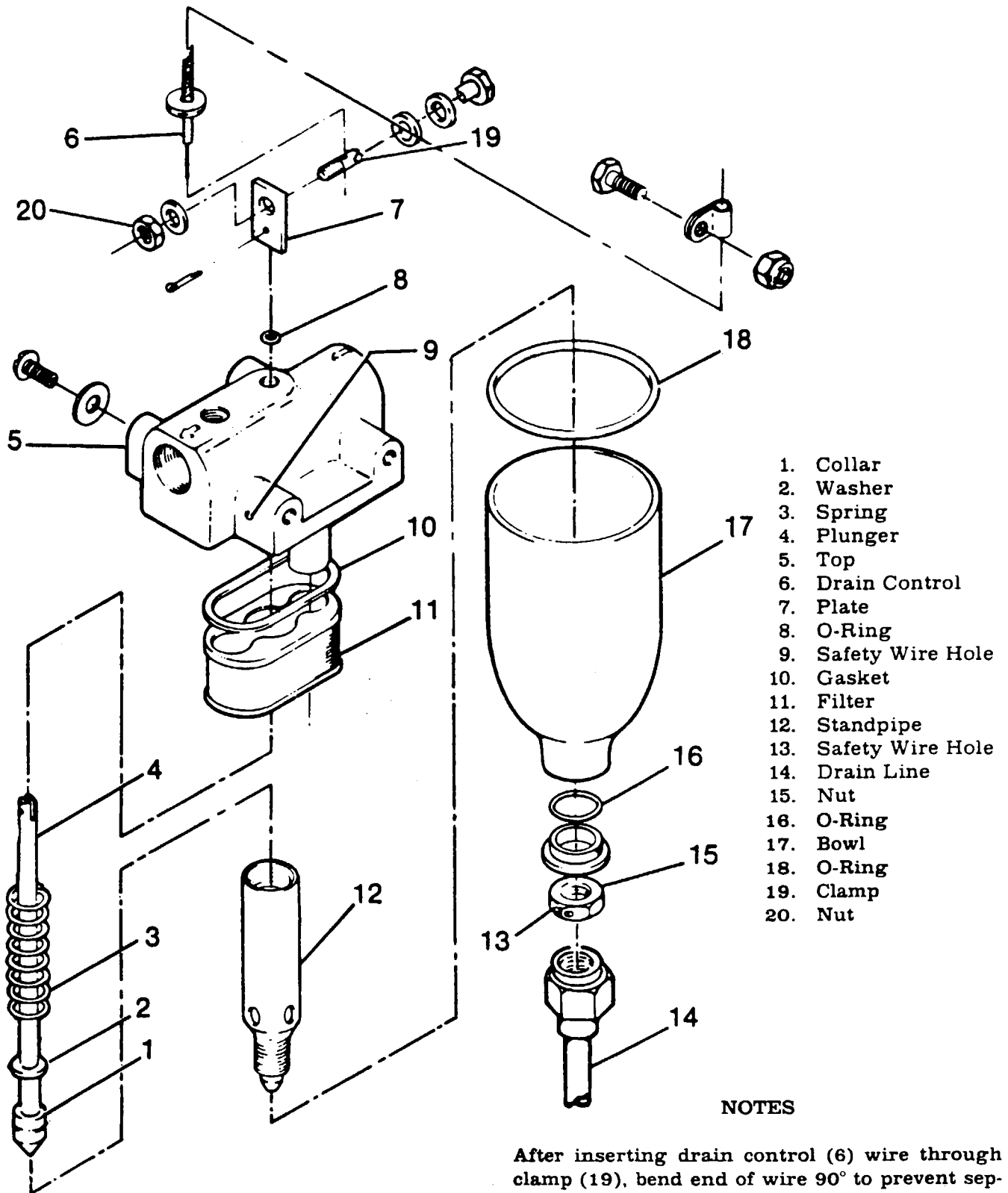
### 12-30. REASSEMBLY.

#### NOTE

Mount selector valve in a vise or equivalent bench support, making sure that valve body (8, figure 12-7), is protected from damage. Fabricate two spring compressors (21, figure 12-7), to aid assembly. Stock is 1/16 inch diameter #1 OX-WELD AC welding rod (or equivalent) according to dimensions shown. Replace O-rings (10, and 16, figure 12-7) each time valve rotor is removed from body.

- a. Ensure all component parts are clean, and coat sparingly with lightweight engine oil.
- b. Insert washer (11) and springs (12) into body (8).
- c. With spring compressors (17) in place as shown in Section A-A, figure 12-7, compress springs (12) and install washers (11), new O-rings (10) and seals (9) into inlet ports.
- d. Holding springs compressed, carefully insert rotor (6) into valve body (8). Release spring compressors and check for proper seating of seals to rotor.
- e. Insert new O-ring (3) into recess at top of valve body (8).
- f. Place new O-ring over shaft of rotor.
- g. Lubricate spring (5) and ball (4) with lubricant conforming to Military Specification VV-P-236 (USP Petrolatum or equivalent), inserting spring into hole in top of rotor.
- h. Place ball on spring and turn rotor as required to index one of the detent holes in cover (2).
- i. Attach cover (2) and test rotation of rotor shaft for ease of operation and positive detent engagement.
- j. Replace plug (14) using new O-ring (13).
- k. Reinstall selector valve in accordance with paragraph 12-27.

MODEL R182 AND TR182 SERVICE MANUAL



NOTES

After inserting drain control (6) wire through clamp (19), bend end of wire 90° to prevent separation from clamp if nut (20) should loosen.

Torque nut (15) to 25-30 in-lbs and safety-wire.

Figure 12-8. Fuel Strainer



## MODEL R182 AND TR182 SERVICE MANUAL

12-31. FUEL STRAINER. (See figure 12-8.)

12-32. DESCRIPTION. The fuel strainer is mounted at the firewall in the lower engine compartment and is equipped with a quick-drain valve which provides a means of draining trapped water and sediment from the fuel system. The quick-drain control is located adjacent to the oil dipstick and is accessible through the oil dipstick door.

### NOTE

The fuel strainer can be disassembled, cleaned and reassembled without removing the assembly from the aircraft.

12-33. REMOVAL AND INSTALLATION.

- a. Remove cowling as necessary to gain access to strainer.
- b. With selector valve in OFF position, drain fuel from strainer and lines with strainer quick-drain control.
- c. Disconnect and cap or plug all fuel lines and control from strainer. (Observe precautions in paragraph 12-3.)
- d. Remove bolts attaching assembly to firewall, and remove strainer.
- e. Reverse the preceding steps for installation. With selector valve in ON position, check for leaks and proper operation of quick-drain valve.

12-34. DISASSEMBLY AND ASSEMBLY.

- a. With selector valve in OFF position, drain fuel from bowl and lines with quick-drain control.
- b. Remove drain tube, safety wire, nut, and washer at bottom of filter bowl and remove bowl.
- c. Carefully unscrew standpipe and remove.
- d. Remove filter screen and gasket. Wash filter screen and bowl with solvent (Federal Specification P-S-661, or equivalent) and dry with compressed air.
- e. Using a new gasket between filter screen and top assembly, install screen and standpipe. Tighten standpipe only finger tight.
- f. Using all new O-rings, install bowl. Note that step-washer at bottom of bowl is installed so that step seats against O-ring. Connect drain tube.
- g. With selector valve in ON position, check for leaks and proper operation of quick-drain valve.
- h. Safety wire bottom nut to top assembly. Wire must have right hand wrap, at least 45 degrees.

12-35. PRIMING SYSTEM.

12-36. DESCRIPTION. The priming system is comprised of a plunger-type manually-operated primer, which draws fuel from the strainer and forces it through a tee fitting to each of the rear four cylinders, no's. 3, 4, 5 & 6.

12-37. REMOVAL AND INSTALLATION.

- a. With selector valve in the OFF position, drain fuel from strainer and lines with quick-drain control.
- b. Disconnect and cap or plug all fuel lines at primer. (Observe precautions in paragraph 12-3.)
- c. Unscrew knurled nut, and remove plunger from pump body.
- d. Remove pump body from instrument panel.

## MODEL R182 AND TR182 SERVICE MANUAL

### 12-37A. PRIMING SYSTEM (TR182 OPTIONAL)

12-37B. DESCRIPTION. The optional electric primer consists of a solenoid valve, switch, circuit breaker, and necessary plumbing. The solenoid valve is mounted on a tee attached to the outlet side of the auxiliary fuel pump. A line to the engine-driven pump is attached to the other side of the tee. The primer functions in conjunction with the auxiliary electric fuel pump. With the auxiliary electric fuel pump on, and the primer switch depressed, the solenoid valve opens, allowing fuel to flow to the cylinders.

### NOTE

Visually inspect primer lines for crushed, kinked or broken condition. Insure proper clamping to prevent fatigue due to vibration and chafing.

### 12-38. AUXILIARY ELECTRIC FUEL PUMP.

12-39. DESCRIPTION. An electrically driven auxiliary fuel pump is mounted on the firewall, and is connected in parallel with fuel flow of the primary pump. This pump is designed to be used if the primary pump should fail. It is controlled by the Auxiliary Fuel Pump Switch located adjacent to Master Switch. As the fuel pressure and plunger spring tension become equal, the pumping action is automatically reduced due to limited plunger movement which maintains low tolerance output pressure.

### 12-40. REMOVAL AND INSTALLATION.

- a. Place fuel selector valve in OFF position.
- b. Make sure that Master Switch and Auxiliary Fuel Pump Switch are OFF.
- c. Remove fuel lines from pump, observing precautions in paragraph 12-3.
- d. Disconnect wire at connector.
- e. Remove two mount bolts, retaining hardware for reinstallation.
- f. Reverse preceding steps for installation, and check pump operation when repair is completed.

### 12-41. TURBOCHARGED AIRPLANES.

12-42. DESCRIPTION. On turbocharged airplanes a high pressure fuel pump is used to ensure adequate fuel flow.

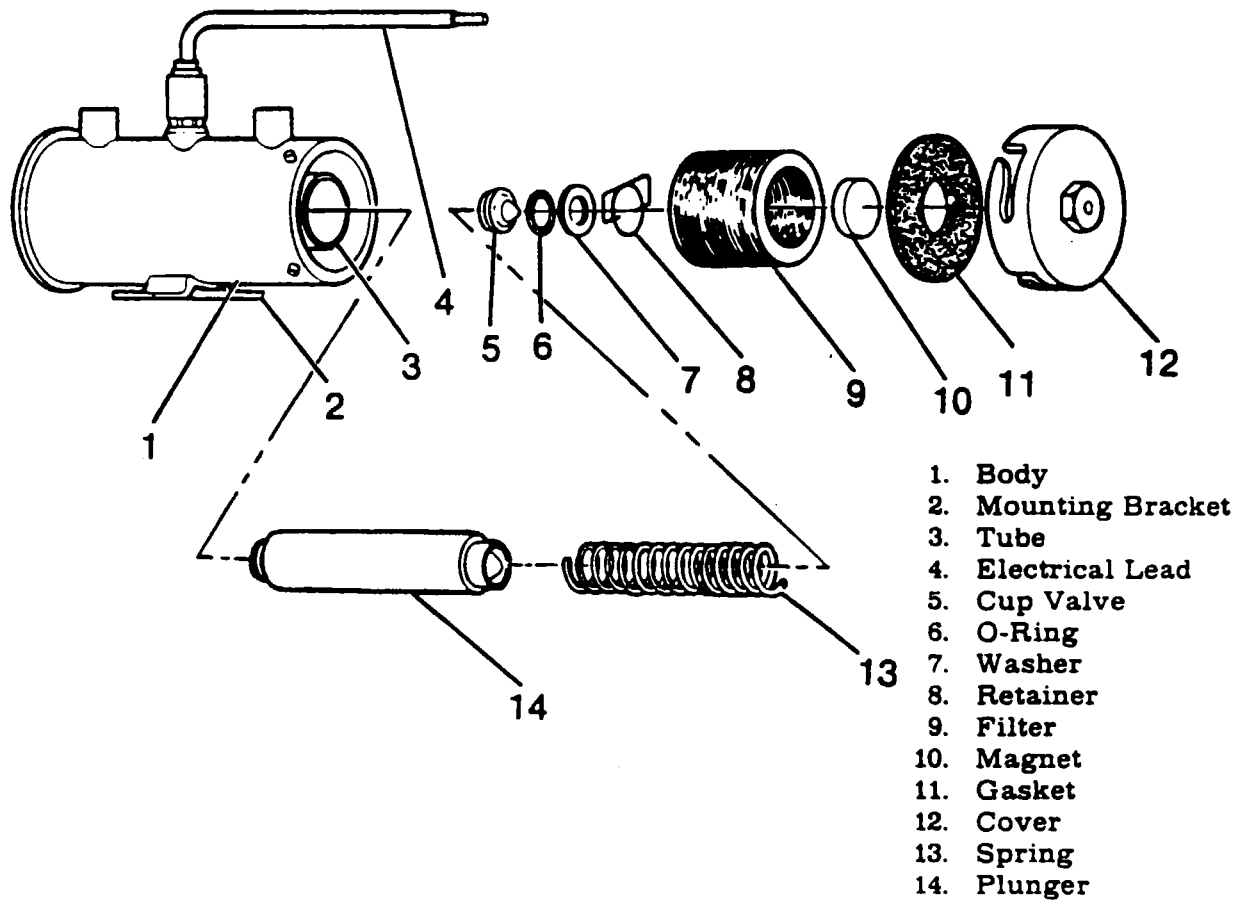
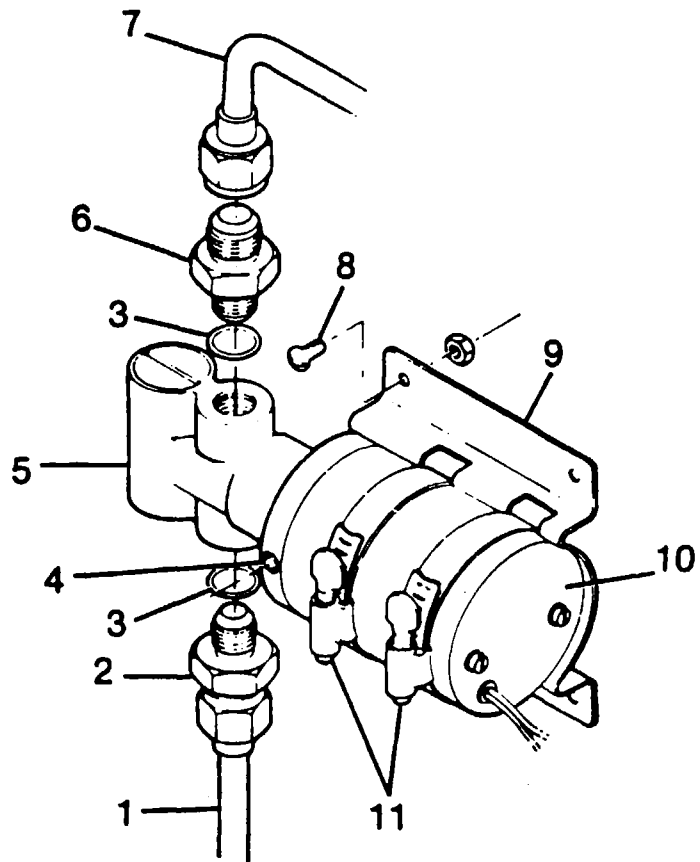


Figure 12-9. Auxiliary Fuel Pump

# MODEL R182 AND TR182 SERVICE MANUAL



1. Fuel Line (Inlet)
2. Fitting
3. O-Rings
4. Fuel Pump Drain Fitting
5. Auxiliary Fuel Pump
6. Fitting
7. Fuel Line (Outlet)
8. Screw
9. Mount Bracket
10. 28V Single Speed Motor
11. Clamps

Figure 12-10. Auxiliary Fuel Pump on Turbo Equipped Airplane

## MODEL R182 AND TR182 SERVICE MANUAL

### 12-43. REMOVAL AND INSTALLATION.

- a. Place Fuel Selector Valve in OFF position.
- b. Be sure that Master Switch and Auxiliary Fuel Pump switch are OFF.
- c. Remove fuel lines from pump, observing precautions in paragraph 12-3.
- d. Disconnect wire at connector.
- e. Remove two mount bolts, retaining hardware for reinstallation.
- f. Reverse preceding steps for installation, check pump operation when repair is completed.

### 12-44. INTEGRAL FUEL BAY.

12-44A. DESCRIPTION. Beginning serial R18200584 and FR18200021. The integral fuel bay is a sealed portion of the inboard wing structure between the wing spars, extending approximately five feet into each wing. This type construction reduces weight as well as increasing the strength of the wing member, and extends the operable range of the airplane considerably.

12-45. FUEL LEAK CLASSIFICATION. Fuel leaks which do not constitute a flight hazard are stains, seeps, and heavy seeps NOT in an enclosed area. All leaks should be repaired when the airplane is grounded for other maintenance. Fuel leaks that constitute a flight hazard are running leaks in any area, seeps, heavy seeps, or stains in an enclosed area, such as the wing leading edge, sections of wing inboard of fuel bay, and the area between the rear fuel spar and trailing edge. This type leak must be repaired prior to flight. A wet or stained spot on the wing is the visual indication of leak intensity. Classification of fuel leakage is shown in figure 12-11.

### NOTE

Stains and seeps that are not considered a flight hazard must be inspected after each flight to ensure that they have not increased.

If a flight hazard leak should be identified at a field where no repair facilities are available. We recommend that the applicable bay be drained, a temporary patch placed over the leak to prevent escaping fumes, and fly to nearest facility that can complete repair action. Switch fuel selector to opposite bay, and fly aircraft normally to repair facility.

### 12-46. FUEL BAY PURGING.

### WARNING

Purge fuel bays with an inert gas prior to repairing fuel leaks, to preclude the possibility of explosions.

The following procedure may be used to purge the bay with argon or carbon dioxide.

- a. Ground airplane to suitable ground stake.
- b. Place fuel selector in OFF position.
- c. Drain all fuel from applicable bay, observing precautions in paragraph 12-3.
- d. Remove access door and insert inert gas supply hose into bay.
- e. Allow gas to flow into bay for several minutes to remove all fuel vapors.

Since argon or carbon dioxide are heavier than air, these gases will remain in the bay during the repair. Non-sparking tools shall be used to make repair. (air motors, plastic scrapers, etc.)

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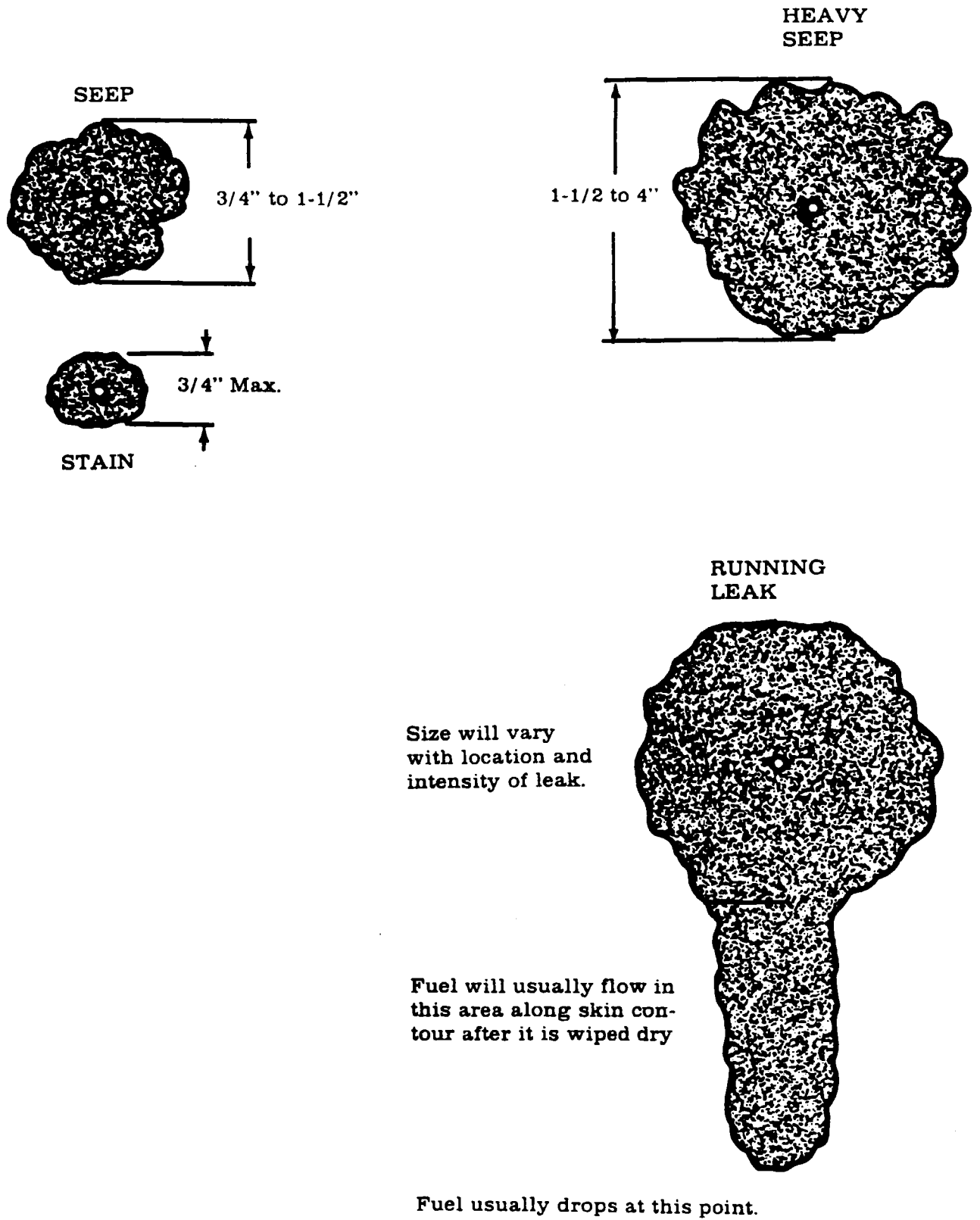


Figure 12-11. Classifications of Fuel Leaks

# MODEL R182 AND TR182 SERVICE MANUAL

## NOTE

Portable vapor detectors are available to determine presence of explosive mixtures and are calibrated for leaded fuel. These detectors can be used to determine when it is safe to make repairs.

- 12-47. **INTEGRAL FUEL BAY SEALANT.** Two kinds of sealants are used, one to seal the bay and the other to seal the access doors and fuel quantity transmitter adapter. The access door sealant is more pliable, and will not adhere to metal so firmly as the bay sealant does. This permits the access doors and fuel quantity transmitter adapter to be removed without damage to them. Service Kits SK210-56 (6-ounce tube) and SK210-101 (2.5-ounce tube), which are available from the Cessna Supply Division, contain these sealants with the proper quantity of accelerator for each sealant. The sealants can be identified by color. The bay sealant is white, and its accelerator is a black paste. The access door sealant is gray, and its accelerator is a clear liquid.

## WARNING

Keep sealants away from heat and flame. Use only in a well ventilated area. Avoid skin and eye contact. **WEAR EYE SHIELDS.** In case of eye contact, flush generously with clean water, and secure prompt medical attention.

- 12-48. **MIXING SEALANT.** Use all the accelerator and sealant in the container when mixing, to ensure the proper ratio of accelerator to sealant. Stir the accelerator to absorb all floating liquid before it is mixed with the sealant. The accelerator can then be poured into the container of sealant for mixing, otherwise, a wax-free container must be used. Stir accelerator and sealant until it becomes a uniform mixture. Do not stir air into mixture so it forms blubbles, if bubbles appear they must be removed.
- 12-49. **SEALING DURING STRUCTURAL REPAIR.**

## CAUTION

Protect drain holes and fuel outlet screens when applying sealants.

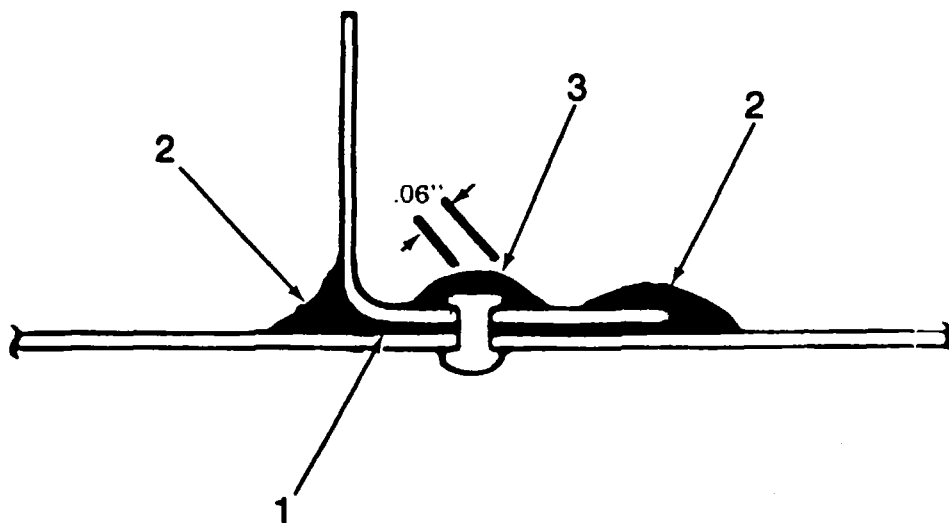
Any repair that breaks the fuel bay seal will necessitate resealing that bay area. Repair parts that need sealing must be installed during the sealing operations. All joints within the boundary of the bay, but do not provide a direct fuel path out of the bay, as such fuel spar flanges, and rib flanges which must be fay surface sealed and fillet sealed on the fuel side. Fay surface sealing is applying sealant to one mating part before assembly. Enough sealant must be applied so it will squeeze out completely around joint when the parts are fastened together. The fillet seal is applied after the joint is fay surface sealed and fastened. Sealer is (fillet) applied to the edge of all riveted joints, joggles, bend reliefs, voids, rivets, or fasteners. All boundaries are sealed, and any other place that could become a fuel leak. The fay sealant need not be cured before applying the fillet sealer, however, the fay sealant must be free of dirt or other contaminants before applying fillet seal. Fillets laid on intersecting joints shall be joined together to produce a continuous seal. Sealant must be pressed into the joint to displace any entrapped air bubbles. Use an extrusion gun to lay a bead along joint, and work out all entrapped air with a small paddle to eliminate bubbles.

# MODEL R182 AND TR182 SERVICE MANUAL

## NOTE

Refer to paragraph 12-49.

### TYPICAL INSPECTION PLATE



### TYPICAL RIB SECTION

1. Faying
2. Fillet Seal
3. Rivet and Fastener Seal

Figure 12-12. Typical Fuel Bay Sealing (Sheet 1 of 2)



MODEL R182 AND TR182 SERVICE MANUAL

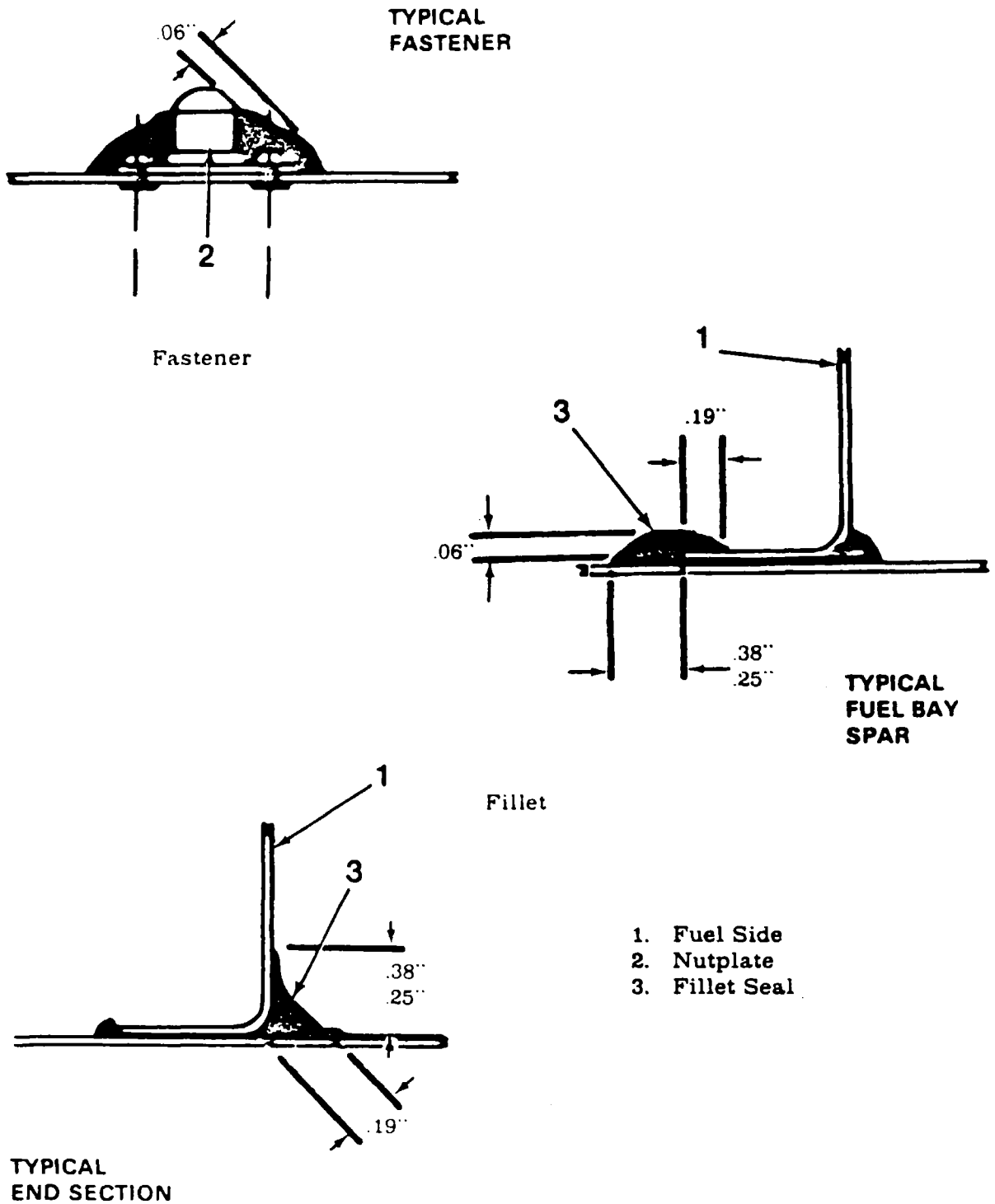


Figure 12-12. Typical Fuel Bay Sealing (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

### NOTE

During structural repair, parts must be predrilled, countersunk or dimpled, and cleaned before sealed and positioned for final installation.

- a. Remove all existing sealant from area to be sealed, leaving a taper on the remaining sealant. The taper will allow a scarf bond, and a continuous seal when the new sealant is applied.

### NOTE

The best method of removing sealant is with a chisel-like tool made of hard fiber. Remaining sealant can be removed with aluminum wool. Steel wool or sandpaper must not be used.

- b. Vacuum thoroughly to remove all chips, filings, dirt, etc., from bay area.
- c. All surfaces to be sealed should be thoroughly cleaned by wiping with a clean cloth dampened with Methyl Ethyl Ketone (MEK), Acetone or similar solvent, and dried with a clean cloth before allowing solvent to evaporate. Always pour the solvent on the cloth to prevent contaminating solvent. Do not allow cloth to drip. Never use contaminated solvent.

### NOTE

Work life of EC-1675B/A sealant is two hours from the start of mixing. Work life of EC-1608B/A sealant is two hours. These are set on the standard day, 77°F and 50% relative humidity. An increase in temperature or a decrease in humidity will shorten the work life of the sealant.

- d. Apply fay surface sealant to one mating part, and install rivets or fasteners while sealant is still within its work life.

### NOTE

During sealing, the supply of mixed sealant must be monitored to be certain it has not exceeded the normal work life. To check, use a small wooden paddle, or tongue depressor, to gather a small amount of sealant. Touch this sealant to a piece of clean sheet metal. If it adheres, sealant can still be used, if it doesn't adhere, then the sealant has exceeded the allowable work life, and must not be used.

- e. Apply a fillet seal to the repaired area on the inside of the bay.
- f. Apply a fay surface seal to access doors and fuel quantity transmitters adapter, if removed, and install the doors.
- g. Allow sealant to cure, refer to paragraph 12-51 for time requirements.
- h. Clean stains on outer surface.
- i. Test fuel bay for leaks as described in paragraph 12-52.

## MODEL R182 AND TR182 SERVICE MANUAL

- 12-50. **SEALING FUEL LEAKS.** First determine the source of the fuel leak. Fuel can flow along a seam or structure of the wing for several inches, making the leak source difficult to find. A stained area is an indication of the leak source. Fuel leaks can be found by testing the complete bay as described in paragraph 12-52. Another method of detecting the source of a fuel leak is to remove access doors and blow with an air nozzle from the inside of the bay in the area of the leak while soap bubble solution is applied to the outside of the bay. After the leak source has been found, proceed as follows:
- Remove existing sealant in the area of the leak as described in paragraph 12-49.
  - Clean the area and apply a fillet seal. Press sealant into leaking area with a small paddle, working out all air bubbles.
  - If leakage occurs around a rivet or bolt, restrike the rivet or loosen bolt, retorque, and reseal around nut plate.
  - Apply fay surface door sealant to access doors, fuel quantity transmitters, etc., if removed, and install.
  - Test fuel bay for leakage as outlined in paragraph 12-52.
- 12-51. **NORMAL CURE TIME.** Service Kit SK210-56 contains: (A) SP654706B2 access door sealant and (B) SP654890B2 fuel bay sealant. Cure times for (A) and (B) are 24 hours. Service Kit SK210-101 contains: (C) PR1321B 1/2 access door sealant and (D) PR1422B 1/2 fuel bay sealant. Cure time for (C) is 18 hours; cure time for (D) is 45 hours. Cure times for both kits are based on 77°F (25°C) and 50 percent relative humidity.
- 12-51A. **NORMAL WORK TIME.** Normal work time for Service Kit SK210-56 is two hours, and 0.5 hour for Service Kit SK210-101. Shelf life of these kits is approximately six months. If more rapid cure times are desired, refer to the following note and accelerated curing time chart.

### NOTE

Temperature shall not exceed 160°F (71°C). Bay must be vented to relieve pressure during accelerated curing.

### ACCELERATED CURING TIME

°F of Sealant	Time in Hours
160	3
140	4
● 130	5 1/2
120	7

- Applicable to SK210-101 only.

- 12.51B. **INTEGRAL FUEL TANK QUICK-REPAIR SEALANT.** GC-435 is a quick-repair synthetic rubber sealant for use in fuel tanks. The sealant requires no cure time, and may be used when it is necessary to refuel tanks as soon as the repair has been made. The sealant is a two-part, medium-viscosity, polysulfide liquid polymer and may be applied by brush or extrusion. The base compound is cream colored and the accelerator is black. GC-435 may be purchased from: Goal Chemical Sealants Corp., 3137 East 26th Street, Los Angeles, CA 90023.

### NOTE

Unless specifically noted, all items relating to Integral Fuel Tank Sealants also apply to GC-435 sealants.

## MODEL R182 AND TR182 SERVICE MANUAL

### WARNING

The accelerators contain heavy metal peroxides. Keep away from heat and flame. Use only in a well ventilated area. Avoid skin and eye contact. **WEAR EYE SHIELDS.** In case of eye contact, flush generously with water, and get prompt medical attention.

#### 12-52. TESTING INTEGRAL FUEL BAY.

- a. Remove vent line from vent fitting and cap fitting.
- b. Disconnect fuel lines from bay.
- c. To one of the bay fittings, attach a water manometer capable of measuring twenty inches of water.
- d. To the other bay fitting, connect a well regulated supply of air (**1/2 PSI MAXIMUM, or 13.8 INCHES of water**). Nitrogen may be used where the bay might be exposed to temperature changes while testing.
- e. Make sure filler cap is installed and sealed.

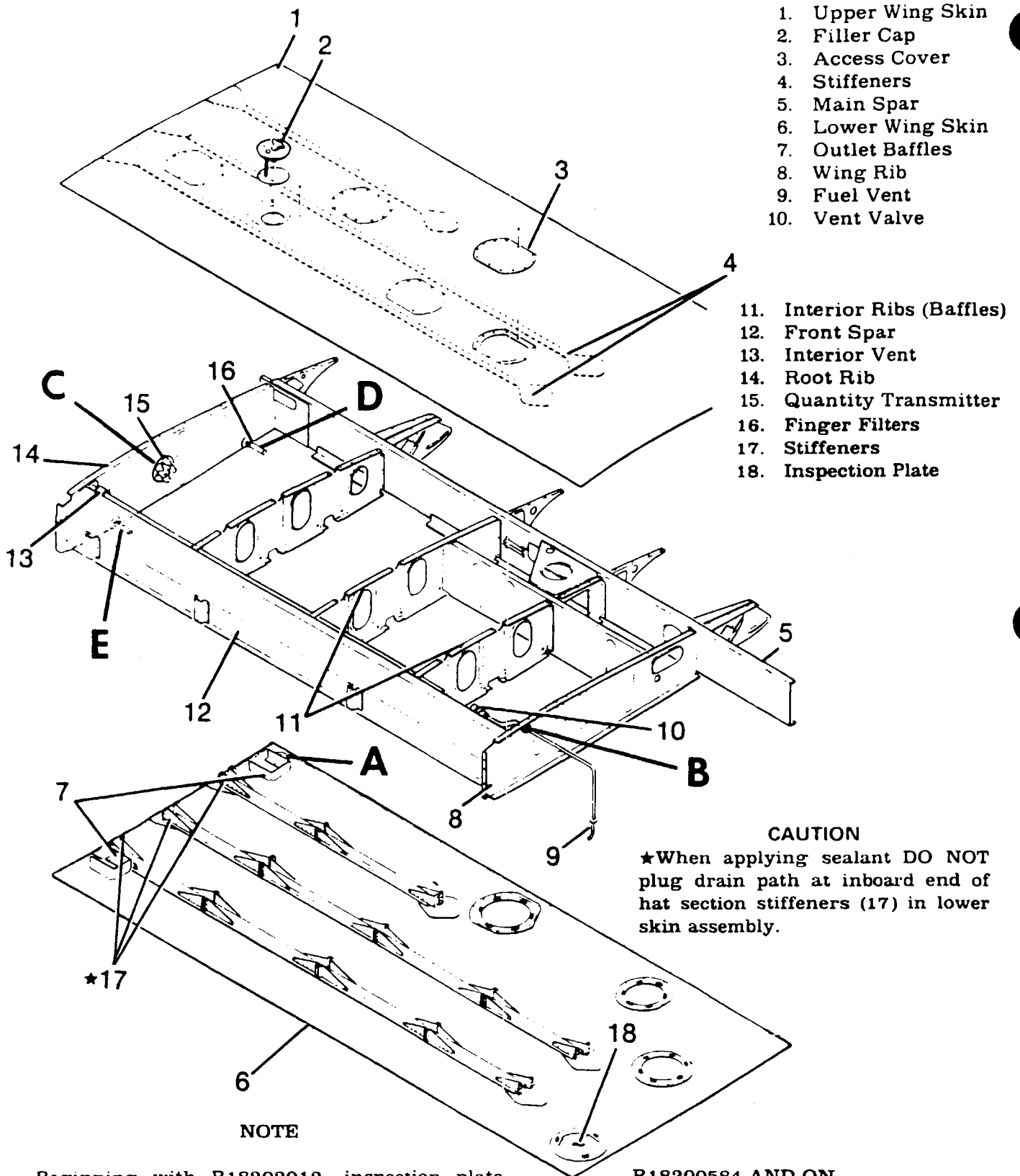
### CAUTION

Do not attempt to apply pressure to the bay without a good regulator, and a positive shutoff in the supply line. Do not inflate the fuel bay to more than 1/2 PSI or damage may occur.

- f. Apply pressure slowly until 1/2 PSI is obtained.
- g. Apply a soap solution as required.
- h. Allow 15 to 30 minutes for pressure to stabilize.
- i. If bay holds for 15 minutes, without pressure loss, bay is acceptable.
- j. Reseal and retest if any leaks are found.

12-53. **FUEL QUANTITY TRANSMITTERS.** One float-actuated, variable-resistive transmitter is located in each fuel bay. They are connected to a magnetic gage, that indicates fuel level in each fuel bay. Complete description, operation, and maintenance is covered in Section 16.

# MODEL R182 AND TR182 SERVICE MANUAL



- 1. Upper Wing Skin
- 2. Filler Cap
- 3. Access Cover
- 4. Stiffeners
- 5. Main Spar
- 6. Lower Wing Skin
- 7. Outlet Baffles
- 8. Wing Rib
- 9. Fuel Vent
- 10. Vent Valve
- 11. Interior Ribs (Baffles)
- 12. Front Spar
- 13. Interior Vent
- 14. Root Rib
- 15. Quantity Transmitter
- 16. Finger Filters
- 17. Stiffeners
- 18. Inspection Plate

**CAUTION**  
 ★When applying sealant DO NOT plug drain path at inboard end of hat section stiffeners (17) in lower skin assembly.

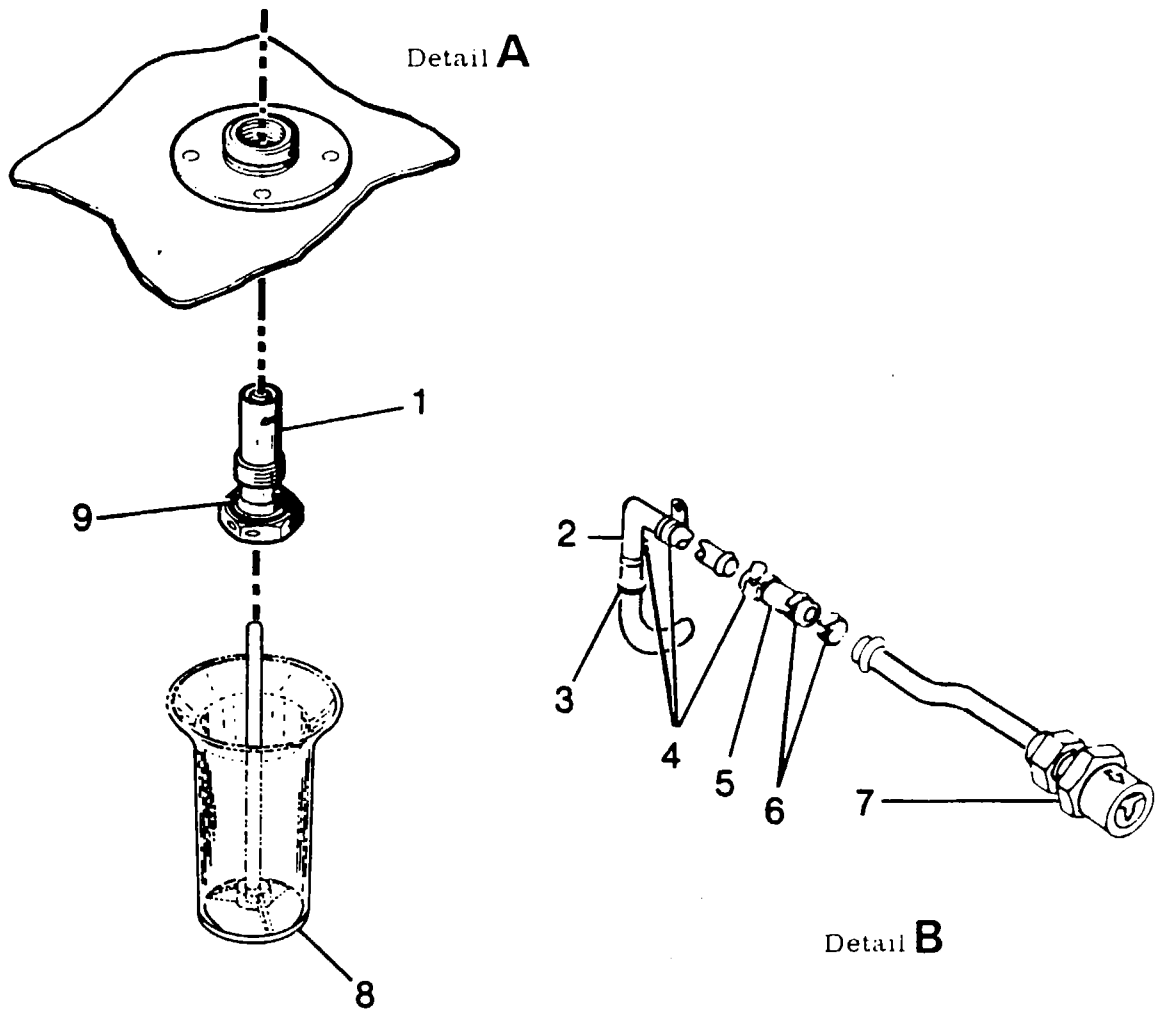
**NOTE**

Beginning with R18202012, inspection plate (18) fasteners change from 3 ea. to 6 ea. recessed countersunk screws.

**R18200584 AND ON**  
**FR18200021 THRU FR18200070**

Figure 12-13. Integral Fuel Bay Installation (Sheet 1 of 5)

# MODEL R182 AND TR182 SERVICE MANUAL



1. Drain Valve
2. Vent Line
3. Grommet
4. Clamp
5. Hose
6. Clamp
7. Vent Valve
8. Fuel Sampler Cup
9. Drain Valve Gasket

Torque drain valve (1), 15 to 35 in-lbs. Drain valve gasket (9) should be lightly oiled and installed with asbestos side side against head of valve. Safety-wire drain valve.

Beginning with serial R18200584 and FR18200026, items 2 thru 7 are installed in LEFT and RIGHT wings.

Figure 12-13. Integral Fuel Bay Installation (Sheet 2 of 5)

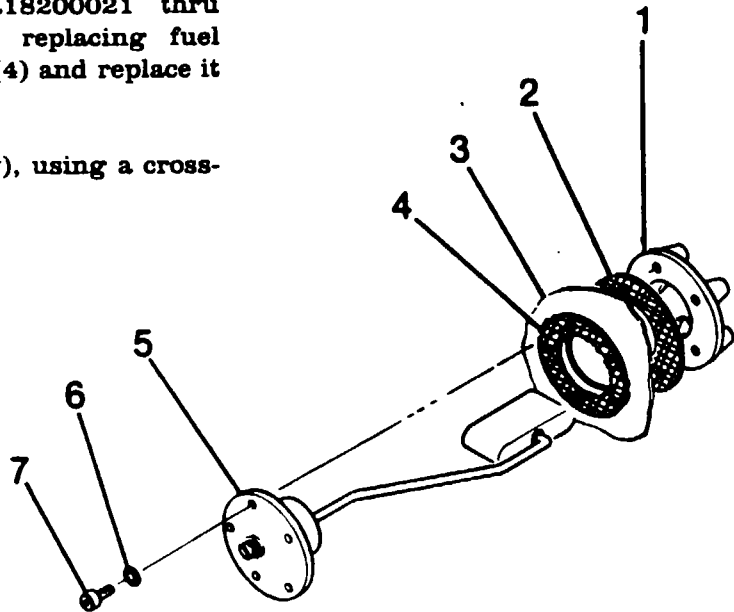
# MODEL R182 & TR182 SERIES SERVICE MANUAL

## NOTES

Beginning with serial R18202007, nutring (1) is bonded to root rib (3). Oder kit number SK210-56 or SK210-101, fuel tank sealant from Cessna Supply Division.

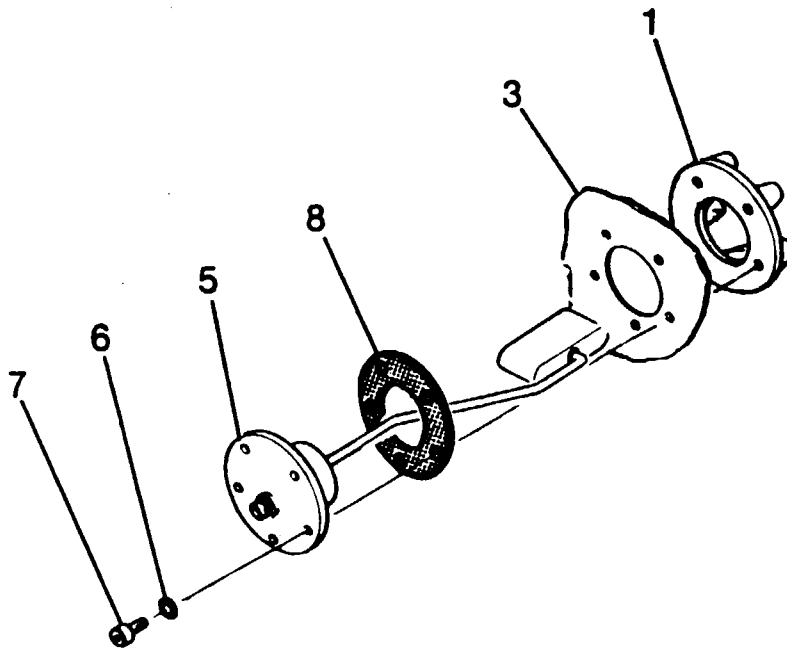
R18200584 thru R18202007 and FR18200021 thru FR18200070, whenever removing and replacing fuel quantity transmitter (5), discard gasket (4) and replace it with new S2670-1 gasket (8).

Torque screws (7) to 20 in-lbs (once only), using a cross-pattern sequence.



1. Nutring
2. Gasket
3. Root Rib
4. Gasket - Transmitter
5. Fuel Quantity Transmitter
6. Washer
7. Screw
8. Gasket

**R18200584 THRU R18202007  
AND FR18200021 THRU  
FR18200070**



**R18202008 AND ON**

Detail **C**

Figure 12-13. Integral Fuel Bay Installation (Sheet 3 of 5)

# MODEL R182 AND TR182 SERVICE MANUAL

## NOTE

Torque clamps (2) and (4) to 8-10 in.-lb.

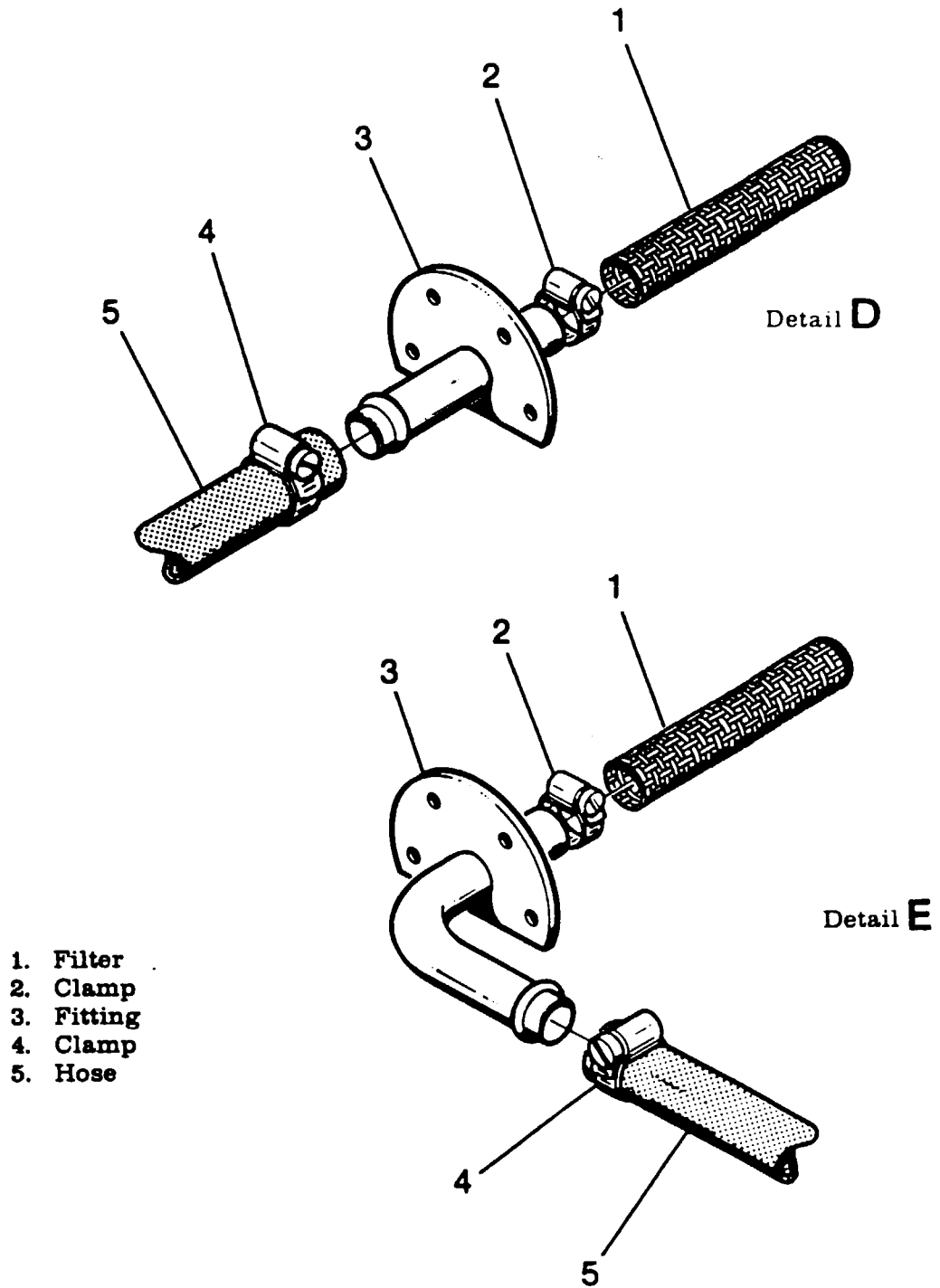


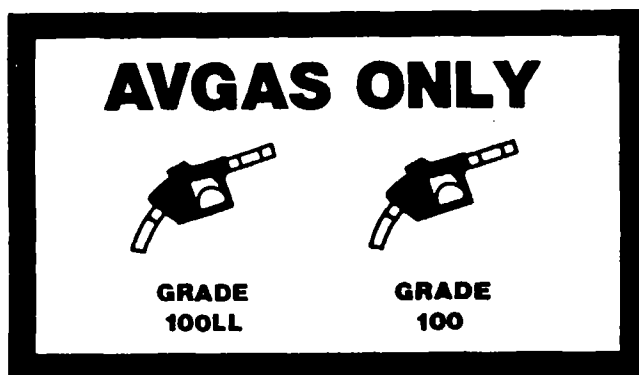
Figure 12-13. Integral Fuel Bay Installation (Sheet 4 of 5)



# MODEL R182 & TR182 SERIES SERVICE MANUAL

**FUEL**  
100LL/100 MIN. GRADE AVIATION GASOLINE  
CAP. 46.0 U.S. GAL.  
CAP. 34.5 U.S. GAL. TO BOTTOM OF FILLER COLLAR

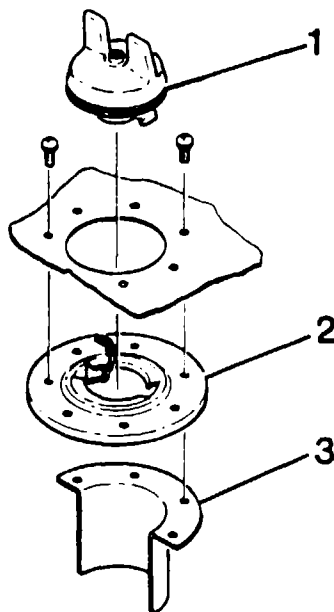
## Fuel Quantity Placard



## Fuel Grade Placard

1. Fuel Cap (See figure 12-5)
2. Adapter
3. Fuel Filler Collar

R18201929 AND ON



R18202000 AND ON

Figure 12-13. Integral Fuel Bay Installation (Sheet 5 of 5)

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 13

### PROPELLER AND GOVERNOR

#### WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

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13-1. PROPELLER DESCRIPTION. The constant-speed propeller is a single acting unit, where governor regulated oil pressure opposes the centrifugal twisting moment of the rotating blades and spring force to obtain the correct blade pitch for engine load. Engine lubricating oil is supplied to the power piston in the propeller hub through the engine crankshaft. The amount and pressure of the engine oil used is controlled by the propeller governor. An increase or decrease in throttle setting or a change in aircraft attitude will affect the balance to maintain the most efficient and economical RPM, which the pilot has previously selected. If the throttle is opened more, or the aircraft speed is increased, the engine RPM will also begin to increase. This change is sensed by the propeller governor, and it directs oil pressure to the forward side of the piston. The blades will move to a higher pitch to load the engine, thereby maintaining constant RPM. Conversely, if the throttle is closed somewhat, or aircraft speed is decreased, the engine RPM will try to decrease. The governor senses this, and it allows oil to drain from the forward side of the piston. Spring tension and centrifugal twisting moment will move the propeller blades to a lower pitch to maintain selected engine speed.

## MODEL R182 AND TR182 SERVICE MANUAL

### 13-2. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
FAILURE TO CHANGE PITCH.	Governor control disconnected or broken.	Check visually. Connect or replace control.
	Governor not correct for propeller. (Sensing wrong.)	Check that correct governor is installed. Replace governor.
	Defective governor.	Refer to paragraph 13-10.
	Defective pitch changing mechanism inside propeller or excessive propeller blade friction.	Propeller repair or replacement is required.
FAILURE TO CHANGE PITCH FULLY.	Improper rigging of governor control.	Check that governor control arm and control have full travel. Rig control and arm as required.
	Defective governor.	Refer to paragraph 13-10.
SLUGGISH RESPONSE TO PROPELLER CONTROL.	Excessive friction in pitch changing mechanism inside propeller or excessive blade friction.	Propeller repair or replacement is required.
STATIC RPM TOO HIGH OR TOO LOW.	Improper propeller governor adjustments.	Perform static RPM check. Refer to Section 11 and 11A for procedures.
ENGINE SPEED WILL NOT STABILIZE.	Sludge in governor.	Refer to paragraph 13-10.
	Air trapped in propeller actuating cylinder.	Trapped air should be purged by exercising the propeller several times prior to take-off after propeller has been reinstalled or has been idle for an extended period.
	Excessive friction in pitch changing mechanism inside propeller or excessive blade friction.	Propeller repair or replacement is required.
	Defective governor.	Refer to paragraph 13-10.

## MODEL R182 AND TR182 SERVICE MANUAL

### 13-2. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
OIL LEAKAGE AT PROPELLER MOUNTING FLANGE.	Damaged O-ring and seal between engine crankshaft flange and propeller.	Check visually. Remove propeller and install O-ring seal.
	Foreign material between engine crankshaft flange and propeller mating surfaces or mounting nuts not tight.	Remove propeller and clean mating surfaces; install new O-ring and tighten mounting nuts evenly to torque value in figure 13-1.
OIL LEAKAGE AT ANY OTHER PLACE.	Defective seals, gaskets, threads, etc., or incorrect assembly.	Propeller repair or replacement is required.

- 13-3. REPAIR. Metal propeller repair is a two step operation. First, the damage must be evaluated. Second, a determination of degree of the damage must be made under criteria contained in Federal Aviation Regulations, Part 43 (FAR 43) and Federal Aviation Agency Advisory Circular No 43.14 (FAA AC 43.13). These instructions must be served anytime repairs or alterations are being made, because they authorize the level of repair for each action.

#### NOTE

For information not covered in this section, refer to the applicable McCauley Service Manual and supplements thereto.

- 13-4. REMOVAL. (THRU R18201313) (See figure 13-1.)

#### WARNING

Be sure magneto is grounded before turning propeller.

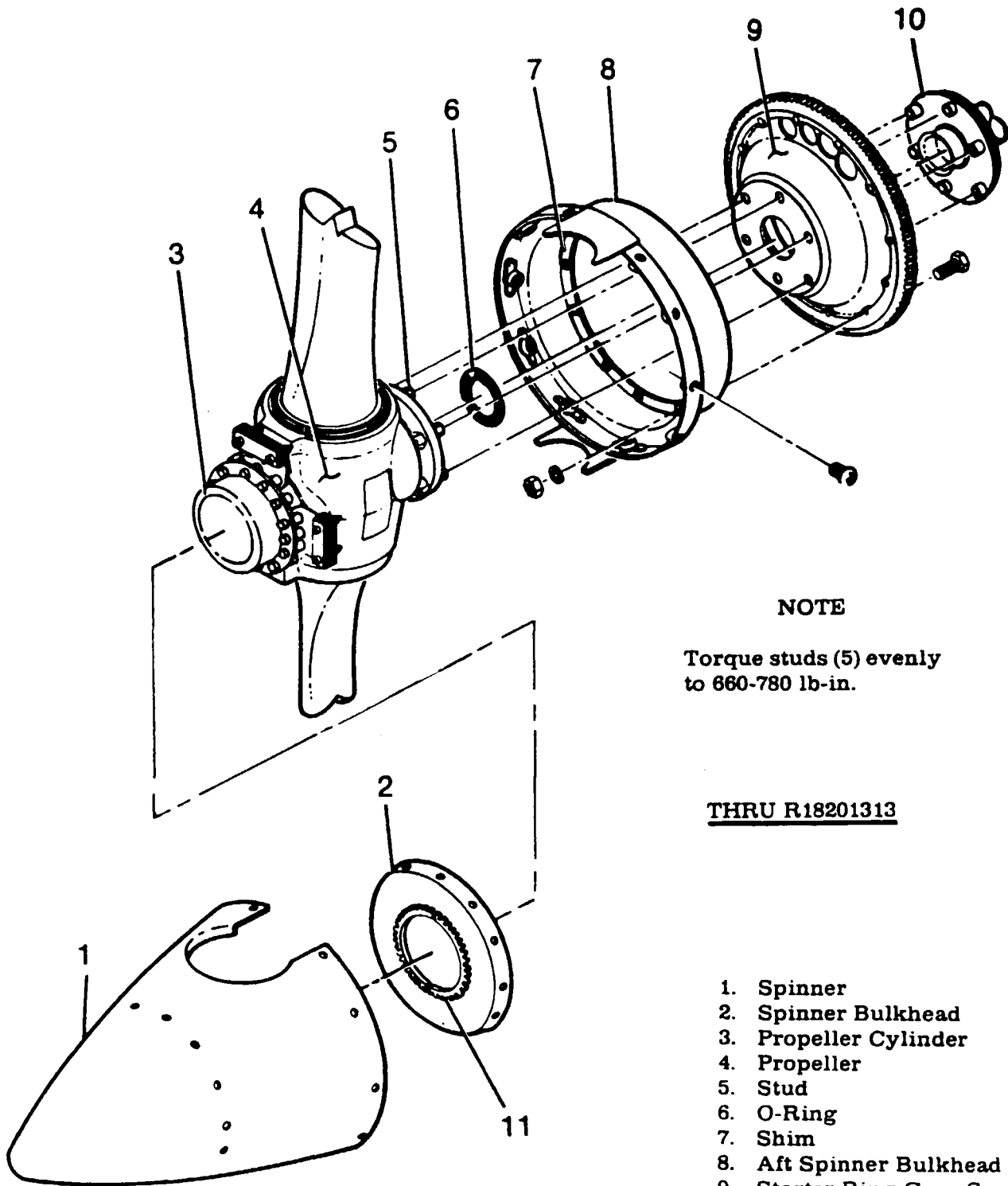
- a. Remove spinner dome.
- b. Remove safety wire, back off bolts attaching propeller to engine crankshaft about one-fourth inch, and pull propeller forward.

#### NOTE

Bolts will have to be backed out evenly so propeller can be pulled forward (approximately 1/4 inch each time) until all bolts are disengaged from engine crankshaft flange. As the propeller is separated from the engine crankshaft, oil will drain from the propeller and engine crankshaft cavities.

- c. Pull propeller from engine crankshaft.
- d. If necessary to remove the aft spinner bulkhead, remove bolts, washers, and nuts attaching bulkhead to starter ring gear support, but retain shims for use in reinstallation.

# MODEL R182 AND TR182 SERVICE MANUAL



## NOTE

Torque studs (5) evenly  
to 660-780 lb-in.

THRU R18201313

1. Spinner
2. Spinner Bulkhead
3. Propeller Cylinder
4. Propeller
5. Stud
6. O-Ring
7. Shim
8. Aft Spinner Bulkhead
9. Starter Ring Gear Support
10. Engine Crankshaft
11. Grommet

Figure 13-1. Propeller Installation (Sheet 1 of 3)

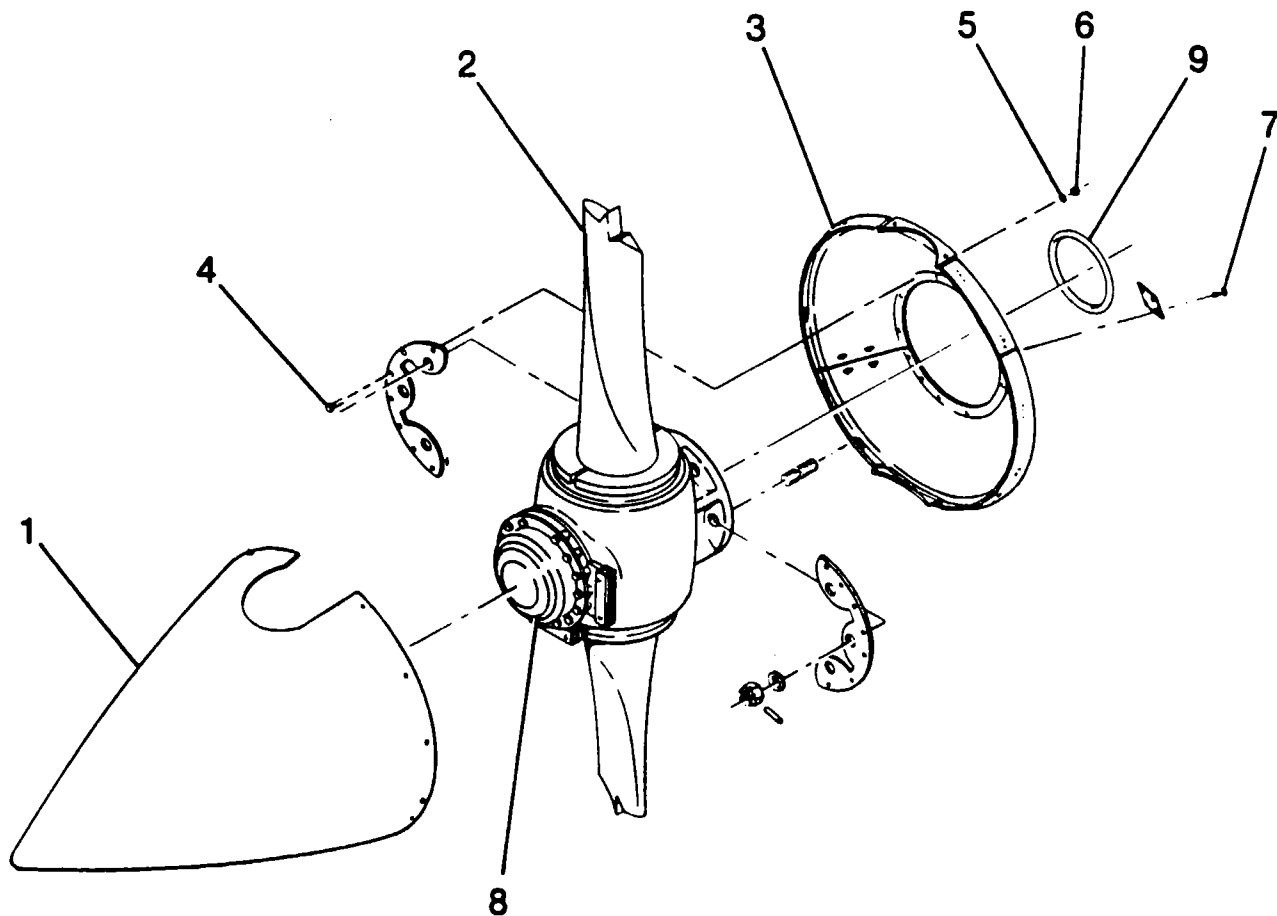
# MODEL R182 AND TR182 SERVICE MANUAL

## NOTE

### NOTE

Torque propeller mounting bolts to 660-780 lb-in.

Additional spacers, 0752620-3, may be required when installing a new spinner (1) on 2 or 3 bladed propellers to ensure a snug fit between spinner and support. Do NOT USE more than 6 spacers in these installations.



R18201314 & ON

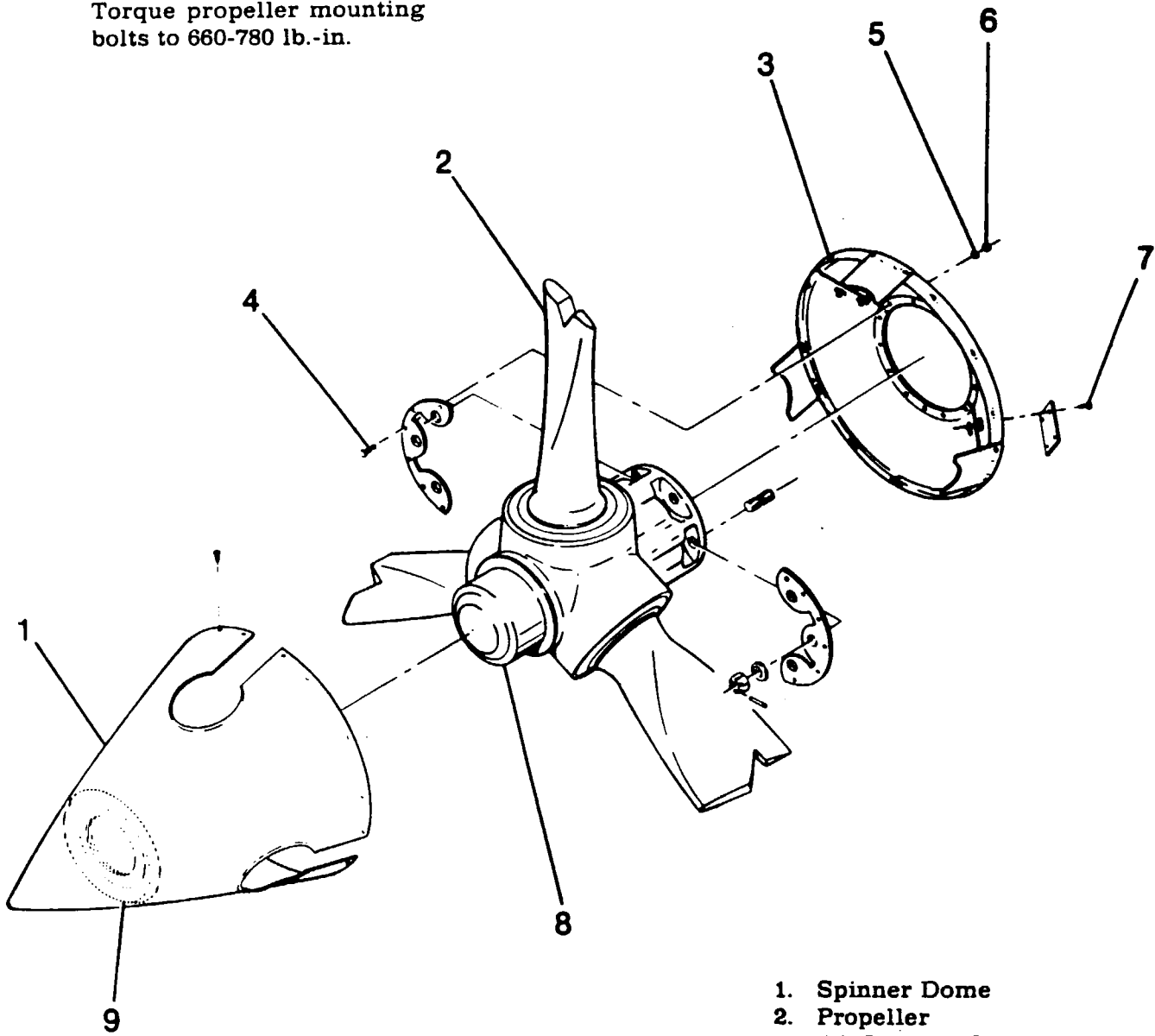
1. Spinner Dome
2. Propeller
3. Aft Spinner Bulkhead
4. Screw
5. Washer
6. Nut
7. Screw
8. Propeller Hub
9. O-Ring

Figure 13-1. Propeller Installation (Sheet 2 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

## NOTE

Torque propeller mounting bolts to 660-780 lb.-in.



OPTIONAL 3-BLADED

1. Spinner Dome
2. Propeller
3. Aft Spinner Bulkhead
4. Screw
5. Washer
6. Nut
7. Screw
8. Propeller Hub
9. Forward Support

Figure 13-1. Propeller Installation (Sheet 3 of 3)

## MODEL R182 AND TR182 SERVICE MANUAL

### NOTE

After removing the propeller, the starter ring gear assembly may be removed from the engine crankshaft to allow easier access to the aft spinner bulkhead attaching bolts. Loosen alternator adjusting arm and disengage drive belt from pulley on aft face of starter ring gear support assembly.

### 13-5. INSTALLATION. (THRU R18201313) (See figure 13-1.)

### WARNING

Be sure magneto is grounded before turning propeller.

- a. If aft spinner bulkhead was removed, reinstall on ring gear support, using bolts, nuts, and shims, as shown in figure 13-1.
- b. If starter ring gear support and aft spinner bulkhead were removed, clean mating surfaces of support assembly and engine crankshaft flange.
- c. Place alternator drive belt in pulley groove of starter ring gear support. Fit starter ring gear over propeller flange bushings on crankshaft.

### NOTE

Make sure bushing hole in ring gear support, marked O, is assembled adjacent to O mark on crankshaft flange bushing. The starter ring gear must be located correctly to assure proper alignment of the timing mark on the ring gear.

- d. Clean propeller hub cavity and mating surfaces of propeller hub and ring gear support.
- e. Lightly lubricate new O-ring and crankshaft pilot with clean engine oil, and install O-ring in the propeller hub.
- f. Align propeller mounting bolts with proper holes in engine crankshaft flange, and slide propeller carefully over crankshaft pilot until bolts can be started in crankshaft flange bushing. Position propeller blades to extend through aft spinner bulkhead with ample clearance.
- g. Tighten bolts evenly, and work propeller aft on crankshaft flange. Torque bolts per figure 13-1.
- h. Install .040 inch diameter corrosion resistant safety wire through bolts in pairs.
- i. Adjust alternator drive belt tension as outlined in Section 16.
- j. Install spinner dome.



## MODEL R182 AND TR182 SERVICE MANUAL

### 13-6. REMOVAL. (R18201314 & ON)

#### WARNING

Be sure magneto is grounded before turning propeller.

- a. Remove spinner dome (1).
- b. Remove safety wire, back off bolts attaching propeller to engine crankshaft about one-fourth inch, and pull propeller forward.

#### NOTE

Bolts will have to be backed out evenly so propeller (2) can be pulled forward (approximately 1/4 inch each time) until all bolts are disengaged from engine crankshaft flange. As the propeller is separated from the engine crankshaft, oil will drain from the propeller and engine crankshaft cavities.

- c. If necessary, the aft spinner bulkhead (3) can be removed by removing screws (4), washers (5), and nuts (6) attaching bulkhead to the propeller. Then remove screws (7) to separate bulkhead halves.
- d. Pull propeller from engine crankshaft.

### 13-7. INSTALLATION. (R18201314 & ON) (See figure 13-1.)

#### WARNING

Be sure magneto is grounded before turning propeller.

- a. If aft spinner bulkhead was removed, reinstall on ring gear support using bolts, nuts, and shims as shown on figure 13-1.
- b. If starter ring gear support and aft spinner bulkhead were removed, clean mating surfaces of support assembly and engine crankshaft flange.
- c. Place alternator drive belt in pulley groove of starter ring gear support. Fit starter ring gear over propeller flange bushings on crankshaft.

#### NOTE

Make sure bushing hole in right gear support, marked "O", is assembled adjacent to "O" mark on crankshaft flange bushing. The starter ring gear must be located correctly to assure proper alignment of the timing mark on the right gear.

- d. Clean propeller hub cavity and mating surfaces of propeller hub and ring gear support.
- e. On the standard 2 bladed propeller, lightly lubricate new O-ring (9) and crankshaft pilot with clean engine oil, and install O-ring in the propeller hub.
- f. Align propeller mounting bolts with proper holes in engine crankshaft flange, and slide propeller carefully over crankshaft pilot until bolts can be started in crankshaft flange bushing. Position propeller blades to extend thru aft spinner bulkhead with ample clearance.

## MODEL R182 AND TR182 SERVICE MANUAL

- g. Tighten bolts evenly, and work propeller aft on crankshaft flange. Torque bolts per figure 13-1.
- h. Install .040 inch diameter corrosion resistant safety wire through bolts in pairs.
- i. Adjust alternator drive belt tension as outlined in Section 16.
- j. Install 0752620-3 spacer (if required) and spinner support on propeller cylinder (8). If spacers are not centered mechanically (piloted), visually center and hold them until spinner support is forced firmly in place.
- k. Hold spinner (1) snug against spinner support and check alignment of holes in spinner (1) with holes in spinner bulkhead (3). Add or remove 0752620-3 spacers from propeller cylinder (8) until holes are within .050 of alignment.
- l. Push hard on spinner (1) to align holes and install screws and washers (if required) in three (3) or more equal spaces around the bulkhead (3). Relax pressure on spinner and install remaining screws and washers (if required) in spinner (1).
- m. Tighten all screws uniformly around the spinner.

### NOTE

When replacing optional three bladed propeller assembly (2), apply Y8560 Polyurethane Film (3M Company), a minimum of one wrap on propeller hub (8), then as required to obtain as snug fit of forward support (9) to propeller hub (8).

- 13-8. **TIME BETWEEN OVERHAUL (TBO).** Propeller overhaul shall coincide with engine overhaul, but interval between overhauls of propeller shall not exceed 1500 hours. Refer to Section 11 & 11A for engine time between overhaul (TBO) periods.
- 13-9. **GOVERNOR DESCRIPTION.** The engine mounted, centrifugal, single-acting propeller governor is mounted on the upper left side of engine just forward of number two cylinder. The term "single-acting" refers to the way engine oil is directed to the propeller to effect pitch change. This governor directs oil pressure to increase blade pitch. Decreased blade pitch is caused by centrifugal twisting moment of rotating propeller blades and the force of an internal spring, as oil pressure is relieved. When oil is relieved by the governor, it returns to the oil sump through governor pilot spool valve action. Basically the governor consists of an engine driven gear pump, pressure relief valve, rotating flyweights, a pilot spool valve, and a control lever to vary spring load on flyweights, which presets engine load through blade pitch.

### NOTE

Outward physical appearance of specific governors is the same, but internal parts determine the action of oil pressure output: i.e., oil pressure to increase or decrease blade pitch. Always be sure the correct governor is used with the propeller.

## MODEL R182 AND TR182 SERVICE MANUAL

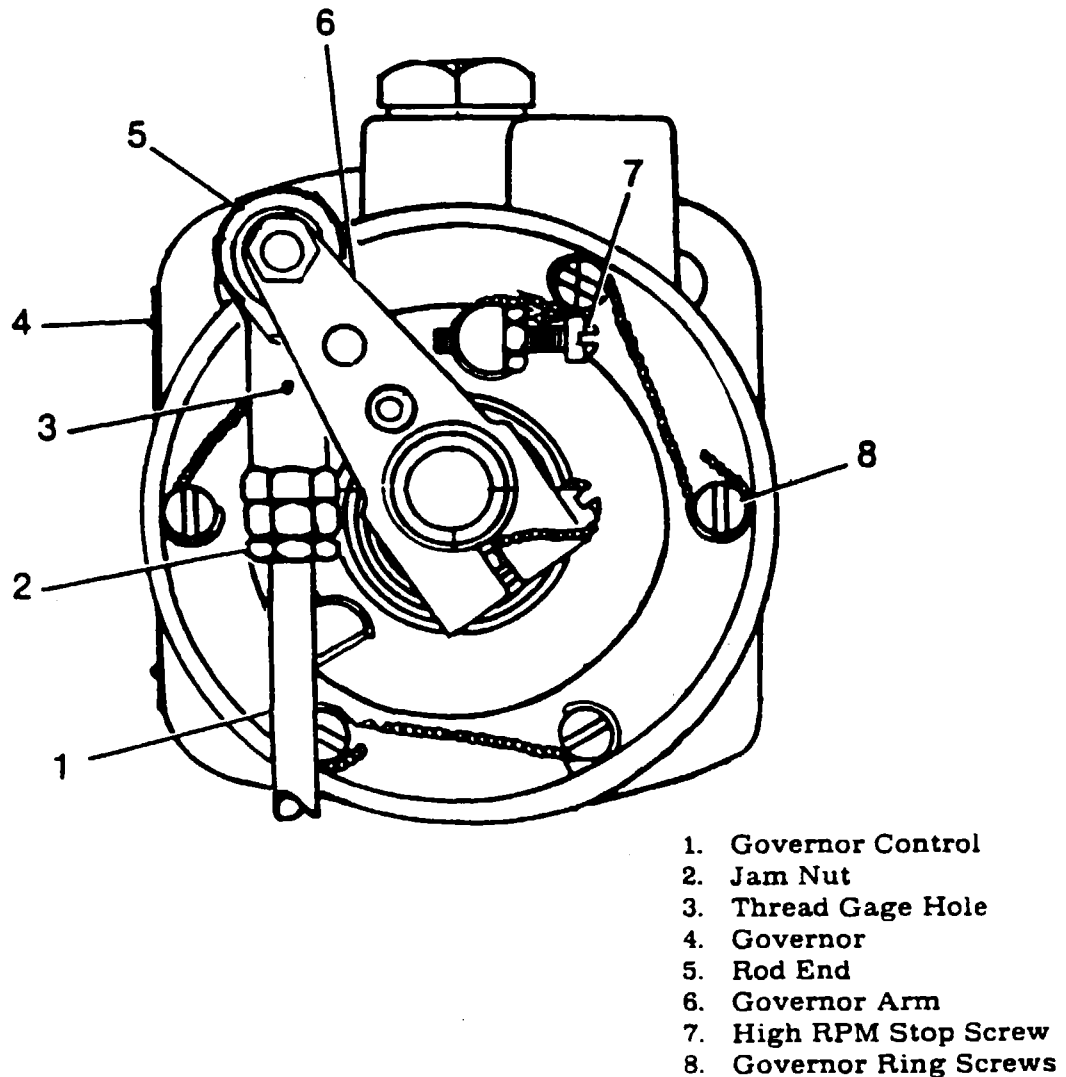


Figure 13-2. Propeller Governor

- 13-10. **TROUBLE SHOOTING.** Since governor action is directly related to propeller pitch, very few governor troubles can be isolated with governor installed and operated on the aircraft. Failure of propeller to change pitch correctly may be caused by the governor or propeller. Except for locating obvious troubles, it is best to install a governor known to be in good condition to check whether the propeller or the governor is at fault when trouble occurs in the propeller pitch change mechanism. If the trouble disappears the governor was at fault. If the trouble persists, the propeller may be at fault. Removal, installation, rigging of control, high-speed stop adjustment, desludging, and installation of governor mounting gasket are not major repairs and may be accomplished in the field. Repairs to propeller governors are classified as propeller major repairs in Federal Aviation Regulations, which also define who may accomplish such repairs.

## MODEL R182 AND TR182 SERVICE MANUAL

### 13-11. REMOVAL.

- a. Remove engine cowling as required for access.
- b. Disconnect control from arm or governor and from bracket.
- c. Remove nuts and washers securing governor to engine crankcase.
- d. Remove governor and mount gasket.

### 13-12. INSTALLATION.

#### WARNING

Be sure magneto is grounded before turning propeller.

- a. Wipe governor and adapter mounting pad clean.
- b. Install new gasket with screen facing governor (outward).
- c. Position governor on mount studs, aligning governor pump drive splines with engine drive splines, and install nuts and washers. Do not force spline engagement. Rotate crankshaft slightly, and splines will mesh smoothly when properly aligned.
- d. Install mount washers and nuts in removal sequence.
- e. Connect control bracket to engine, and control end to governor arm. Rig per paragraph 13-14.
- f. Install engine cowling previously removed for access in removal sequence.

### 13-13. HIGH RPM STOP ADJUSTMENT. (See figure 13-2.)

- a. Remove engine cowling as necessary for access.
- b. Loosen high-speed stop screw lock nut.
- c. Turn stop screw IN for decrease in RPM, and OUT to increase maximum RPM. One complete turn will cause a change of approximately 25 RPM.
- d. Tighten lock nut, and adjust linkage as necessary to maintain full travel. Insure that governor arm contacts stop screw in both maximum and minimum settings, and that a cushion exists on control in both positions.
- e. Install cowling and test-operate governor-propeller combination.

#### NOTE

It is possible for either the propeller low pitch stop or the governor high RPM stop to be the limiting factor. It is desirable for the governor high RPM stop to limit the engine speed at the maximum rated RPM for a particular aircraft. Due to climate conditions, field elevation, low pitch propeller blade angle, and other factors, an engine may not reach rated RPM on the ground. It may be necessary to readjust the governor stop after test flying to obtain maximum rated RPM when airborne.

## MODEL R182 AND TR182 SERVICE MANUAL

### 13-14. RIGGING.

#### NOTE

The result of rigging of the governor control is full travel of the governor control arm (bottomed out against both high and low pitch stops) with some "cushion" at both ends of the control travel.

- a. Disconnect control from governor arm.
  - b. Place control, in cockpit, full forward, then pull back approximately 1/8" and lock in this position. This will allow "cushion" to assure full contact with governor high RPM stop screw.
  - c. Place governor arm against high RPM stop screw.
  - d. Loosen jam nuts on control rod end, and adjust rod end to align with arm. Be sure sufficient thread engagement is maintained, it may be necessary to adjust control in mount bracket, to achieve proper alignment and thread engagement.
  - e. Attach control rod end to governor arm, tighten previously loosened jam nuts, and safety wire.
  - f. Operate the propeller control to see that governor arm has full travel, and contacts stops in both directions with proper "cushion".
- 13-15. TIME BETWEEN OVERHAUL (TBO). Propeller governor overhaul shall coincide with engine overhaul, but interval between governor overhauls shall not exceed 1800 hours. Refer to Section 11 for engine overhaul frequency requirements. The McCauley Service Manual is available from Cessna Service Parts Center.

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 14 UTILITY SYSTEMS

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- 14-1. UTILITY SYSTEMS.
- 14-2. HEATING SYSTEM.
- 14-3. DESCRIPTION. The heating system is comprised of the heat exchange section of the exhaust muffler, a shut-off valve mounted on the right forward side of the firewall, a push-pull control on the instrument panel, outlets and flexible ducting connecting the system.
- 14-4. OPERATION. Ram air is ducted through engine baffle inlets and heat exchange section of the exhaust muffler, to the shut-off valve at the firewall. The heated air flows from the shut-off valve into a duct across the aft side of the firewall, where it is distributed into the cabin. The shut-off valve, operated by a push-pull control labeled "CABIN HEAT", located on the instrument panel, regulates the volume of heated air entering the system. Pulling the control full out supplies maximum flow and pushing control in gradually decreases flow, shutting off flow completely when the control is pushed full in.
- 14-5. TROUBLE SHOOTING. Most of the operational troubles in the heating and defrosting systems are caused by sticking or binding valves and their controls, damaged air ducting or defects in the exhaust muffler. In most cases, valves or controls can be freed by proper lubrication. Damaged or broken parts must be repaired or replaced. When checking controls, ensure valves respond freely to control movement, that they move in the correct direction, that they move through their full range of travel and seal properly. Check that hoses are properly secured and replace hoses that are burned, frayed or crushed. If fumes are detected in the cabin, a thorough inspection of the exhaust system should be accomplished. Refer to applicable paragraph in Section 11 or 11A for this inspection. Since any holes or cracks may permit exhaust fumes to enter the cabin, replacement of defective parts is imperative because fumes constitute an extreme danger. Seal any gaps in heater ducts across the firewall with Pro-Seal #700 (Coast Pro-Seal Co., Los Angeles, California) compound or equivalent compound.
- 14-6. REMOVAL, INSTALLATION AND REPAIR. Figure 14-1 may be used as a guide during removal, installation and repair of heating system components. Burned, frayed or crushed hoses must be replaced with new hoses, cut to length and installed in the original routing. Trim hose winding shorter than the hose to allow clamps to be fitted. Defective air valves must be repaired or replaced. Check for proper operation of valves and their controls after repair or replacement.
- 14-7. DEFROSTER SYSTEM.
- 14-8. DESCRIPTION. The defrosting system is comprised of a duct across the aft side of the firewall, a defroster outlet and shut-off valve assembly mounted on the left side of the cowl deck immediately aft of the windshield, a shutoff valve control on the instrument panel and flexible ducting connecting the system.
- 14-9. OPERATION. Air from the duct across the aft side of the firewall flows through a flexible duct to the defroster outlet. The temperature and volume of this air is controlled by the settings of the heater system control.
- 14-10. TROUBLE SHOOTING. Since the defrosting system depends on proper operation of the heating system, refer to paragraph 14-5 for trouble shooting the defrosting system.

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- 14-11. **REMOVAL, INSTALLATION AND REPAIR.** Figure 14-1 may be used as a guide during removal, installation and repair of defrosting system components. Cut hose to length and install in the original routing. Trim hose winding shorter than the hose to allow clamps to be fitted. A defective defroster outlet must be repaired or replaced.
- 14-12. **VENTILATING SYSTEM.**
- 14-13. **DESCRIPTION.** The ventilating system is comprised of two airscoops mounted in the inboard leading edge of each wing, a manually-adjustable ventilator installed on each side of the cabin near the upper corners of the windshield, two plenum chambers mounted in the rear cabin wing root areas, a fresh airscoop door on the right side of the fuselage just forward of the copilot's seat, a control knob on the instrument panel and flexible ducting connecting the system.
- 14-14. **OPERATION.** Air received from scoops mounted in the inboard leading edges of the wing is ducted to adjustable ventilators mounted on each side of the cabin near the upper corners of the windshield. Rear seat ventilation is provided by plenum chambers mounted in the left and right rear cabin wing root areas. These plenum chambers receive ram air from the airscoops in the inboard leading edges of the wings. Each plenum chamber is equipped with a valve which meters the incoming cabin ventilation air. This provides a chamber of expansion of cabin air which greatly reduces inlet air noise. Filters at the air inlets are primarily noise reduction filters. Forward cabin ventilation is provided by a fresh airscoop door mounted on the right side of the fuselage, just forward of the copilot seat. The scoop door is operated by a control in the instrument panel marked "CABIN AIR." Fresh air from the scoop door is routed to the duct across the aft side of the firewall, where it is distributed into the cabin. As long as the "CABIN HEAT" control is pushed in, no heated air can enter the firewall duct; therefore, when the "CABIN AIR" control is pulled out, only fresh air from the scoop will flow through the duct into the cabin. As the "CABIN HEAT" control is gradually pulled out, more and more heated air will blend with the fresh air from the scoop and be distributed into the cabin. Either one, or both of the controls may be set at any position from full open to full closed.
- 14-15. **TROUBLE SHOOTING.** Most of the operational troubles in the ventilating system are caused by sticking or binding of the inlet scoop door or its control. Check the airscoop filter elements in the wing leading edges for obstructions. The elements may be removed and cleaned or replaced. Since air passing through the filters is emitted into the cabin, do not use a cleaning solution which would contaminate the air. The filters may be removed to increase air flow. However, their removal will cause a slight increase in noise level.
- 14-16. **REMOVAL, INSTALLATION AND REPAIR.** Figure 14-2 may be used as a guide during removal, installation and repair of the ventilating system components. A defective ventilator or scoop must be repaired or replaced. Check for proper operation of ventilating controls after installation or repair.
- 14-17. **OXYGEN SYSTEM.** (See figure 14-3.)
- 14-18. **DESCRIPTION.** The oxygen system consists of an oxygen cylinder, pressure gage, regulator assembly, control assembly, filler valve, pressure lines, outlets and oxygen masks with line assemblies. The pilot's mask is designed to provide a greater flow of oxygen than the passengers' oxygen masks. The masks are color-coded with a sleeve adjacent to the quick-connect adapter to indicate altitude ratings. Pilot's color code is red, and the passengers' color code is orange. The volume of oxygen is controlled by an orifice in the connector. A built-in flowmeter provides a visual indication of correct oxygen flow. The pilot's mask is equipped with a microphone that is keyed by a switch button on the pilot's



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control wheel. Oxygen valve outlets are located overhead of each station. Low-pressure oxygen is provided to each mask when mask line is connected to an oxygen valve outlet. A gage to measure pressure of oxygen in cylinder is located immediately adjacent to the oxygen valve outlet in the overhead console. The control assembly consists of a knob-cable apparatus which turns the oxygen supply on and off. The control is located in the overhead console. The control is connected to the cylinder-regulator assembly by a control cable. Thru R18201798, the oxygen cylinder is mounted on the aft side of bulkhead station 140.00. Beginning with R18201799, the oxygen cylinder is mounted fore-and-aft, on the left side of the tailcone, between bulkhead stations 140.00 and 156.00. A circular access plate, located on the left-hand side of the fuselage, provides access to the oxygen filler valve assembly.

### 14-19. TROUBLE SHOOTING -- Oxygen System.

TROUBLE	PROBABLE CAUSE	REMEDY
NO PRESSURE INDICATION ON PRESSURE GAGE (Oxygen Not Depleted)	Leak at capillary line connection.	Correct leakage.
	Crimped or damaged capillary line.	Replace line.
OXYGEN DURATION IS TOO SHORT.	Defective pressure gage.	Replace gage.
	Leak in system.	Locate and tighten loose fittings.
	Defective part.	Functionally test system. Replace defective part.
PRESSURE INDICATION NORMAL, BUT NO FLOW OF OXYGEN WITH CYLINDER REGULATOR ON.	Defective cylinder regulator.	Replace cylinder regulator.
	Crimped or damaged lines.	Replace damaged lines.
	Damaged control cable.	Replace control cable.

### 14-20. MAINTENANCE PRECAUTIONS.

#### NOTE

Before any maintenance is performed on the oxygen system, personnel should read and thoroughly understand the following. Careful adherence to these instructions will aid in maintaining a trouble-free oxygen system.

#### WARNING

Do not permit smoking or open flame near aircraft while maintenance is being performed on the oxygen system. Assure all electrical power is disconnected and that the aircraft is properly grounded. In addition, oils, grease, and solvents may burn or explode spontaneously when contacted by oxygen under pressure.

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- a. Use extreme caution to assure every port on the system is kept thoroughly clean and free of water, oil, grease, and solvent contamination.
- b. Cap all openings immediately upon removal of any component. Do not use tape or caps which will induce moisture.
- c. Lines and fittings shall be clean and dry. One of the following methods may be used to clean lines.

### CAUTION

Most air compressors are oil-lubricated and a small amount of oil may be carried by the airstream into the system. A water-lubricated compressor can be used to blow tubing clean only when nitrogen or argon are not available. However, air flow from such a compressor must be clean, dry, and filtered.

1. Wash with a vapor-degreasing solution of stabilized trichloroethylene conforming to MIL-T-7003, followed by blowing tubing clean and dry with a jet of nitrogen gas (BB-N-411) Type 1, Class 1, Grade A or Technical Argon (MIL-A-18455).
2. Flush with naphtha conforming to Specification TT-N-95; then blow clean and dry with clean, dry, filtered air. Flush with anti-icing fluid conforming to MIL-F-5566 or anhydrous ethyl alcohol. Rinse thoroughly with fresh water and dry with a jet of nitrogen gas (BB-N-411) Type 1, Class 1, Grade A or Technical Argon (MIL-A-18455).
2. Flush with hot inhibited alkaline cleaner until free from oil and grease. Rinse with fresh water and dry with a jet of nitrogen gas (BB-N-411) Type 1, Class 1, Grade A or Technical Argon (MIL-A-18455).

### NOTE

Cap all lines immediately after drying.

- d. Fabrication of pressure lines is not recommended. Lines should be replaced from factory by part number.
- e. Use only S1465 Teflon lubricating tape on threads of male fittings. No lubricating tape is used on coupling sleeves or outside of flares.
- f. Maintenance personnel must assure that their hands are free of dirt and grease prior to installation of oxygen tubing or fittings.

### WARNING

Use nonsparking tools.

### CAUTION

With oxygen cylinder charged, do not pull control to "ON" position with outlet ports (low pressure) open to atmosphere. Damage to regulator metering poppet may occur.

### CAUTION

Whenever a component of the oxygen system has been removed, reinstalled, replaced or the system has been disassembled for any reason, the oxygen system must be leak checked and purged.

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- g. All tools used for installing of oxygen tubes or fittings must be free of dirt, grease, and oils.

14-21. OXYGEN CYLINDER GENERAL INFORMATION. The following information is permanently stamped on the shoulder, neck or top head of the oxygen cylinder to aid in proper identification.

- a. Cylinder specification followed by service pressure such as "ICC or DOT-3AA1800".

### NOTE

**Effective 1 January, 1970, all newly-manufactured cylinders are stamped "DOT" (Department of Transportation), rather than "ICC" (Interstate Commerce Commission). An example of the new designation would be: "DOT-3AA1800".**

- b. Cylinder serial number is stamped below or directly following cylinder specification. The symbol of the purchaser, user or maker, if registered with the Bureau of Explosives, may be located directly below or following the serial number. The cylinder serial number may be stamped in an alternate location on the cylinder top head.
- c. Inspector's official mark near serial number.
- d. Date of manufacture: This is the date of the first hydrostatic test (such as 8-81 for August 1981). The dash between the month and the year figures may be replaced with the mark of the testing or inspection agency (e.g. 8L81).
- e. Hydrostatic test date: The dates of subsequent hydrostatic tests shall be steel stamped (month and year) directly below the original manufacturer date. The dash between the month and year figures can be replaced with the mark of the testing agency.
- f. A Cessna identification placard is located near the center of the cylinder body.
- g. Halogen test stamp: "Halogen Tested", date of test (month, day and year) inspector's mark appears directly underneath the Cessna identification placard.

14-22. CYLINDER-REGULATOR. The cylinder-regulator assembly consists of a 48.0 cubic foot capacity cylinder with a factory-assembled, non field-servicable regulator. The cylinder is classified as lightweight DOT-3AA1800 and is subject to periodic inspections. Standard weight DOT-3AA1800 cylinders must be hydrostatically tested to 5/3 their working pressure every five years, commencing with the date of the last hydrostatic test. Standard weight DOT-3AA1800 cylinders have no age life limitations and may continue to be used until they fail hydrostatic test.

### NOTE

These test periods and life limitations are established by the Interstate Commerce Commission Code of Federal Regulations, Title 49, Chapter 1, Para. 73.34.

14-23. SERVICING OXYGEN CYLINDER-REGULATOR. A circular access plate is provided on the left side of the fuselage, just aft of bulkhead station 140.00. This provides access to the oxygen system filler valve assembly.

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### WARNING

Oil, grease or other lubricants, in contact with high-pressure oxygen, create a serious fire hazard, and such contact should be avoided. Do NOT permit smoking or open flame in or near aircraft while work is being performed on oxygen systems.

- a. Breathing oxygen conforming to MIL-O-27210D must be used.
- b. Check oxygen system pressure gage.

### WARNING

Be sure to ground aircraft and ground servicing equipment before charging oxygen system.

- c. Do not attempt to charge oxygen cylinders if servicing equipment fittings or filler valve are corroded or contaminated. If in doubt, clean with stabilized trichlorethylene and let air dry. Do not allow solvent to enter any internal parts.
- d. If cylinder is completely empty, do not charge, as the cylinder must be removed, inspected and cleaned.

### CAUTION

A cylinder which is completely empty may well be contaminated. The regulator-cylinder assembly must then be disassembled, inspected and cleaned by an FAA-approved facility, before filling. Contamination, as used here, means dirt, dust or any other foreign material, as well as ordinary air in large quantities. If a gage line or filler line is disconnected and the fittings capped immediately, the cylinder will not become contaminated unless temperature variation has created a suction within the cylinder. Ordinary air contains water vapor which could condense and freeze. Since there are very small orifices in the system, it is very important that this condition not be allowed to occur.

- e. Connect cylinder valve outlet or outside filler valve to manifold or portable oxygen cascade.
- f. Slowly open valve on cascade cylinder or manifold with lowest pressure, as noted on pressure gage, allow pressure to equalize, then close cascade cylinder valve.
- g. Repeat this procedure, using a progressively higher pressure cascade cylinder, until system has been charged to the pressure indicated in the chart immediately following step "h".
- h. Ambient temperature listed in the chart is the air temperature in the area where the system is to be charged. Filling pressure refers to the pressure to which aircraft cylinders should be filled. This table gives approximations only, and assumes a rise in temperature of approximately 25°F. due to heat of compression. This table also assumes the aircraft cylinder will be filled as quickly as possible and that it will only be cooled by ambient air; no water bath or other means of cooling be used.

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## TABLE OF FILLING PRESSURES

Ambient Temp °F	Filling Press psig	Ambient Temp °F	Filling Press- psig
0	1600	70	1925
10	1650	80	1950
20	1675	90	2000
30	1725	100	2050
40	1775	110	2100
50	1825	120	2150
60	1875	130	2200

### 14-24. REMOVAL OF OXYGEN CYLINDER-REGULATOR (Thru 1981 Models.) (See figure 14-3.)

- a. Remove aft baggage partition to gain access to oxygen cylinder-regulator assembly.
- b. Straighten cable end of ON-OFF control (11) at regulator (13).
- c. Loosen cable clamp and remove control (11) from regulator (13).
- d. Remove and cap the high pressure gage line (17) at tee (16).
- e. Remove and cap low pressure line (15) at regulator (13).
- f. Break safety wire and loosen clamps securing oxygen cylinder (14), and remove oxygen cylinder.

### 14-25. INSTALLATION OF OXYGEN CYLINDER-REGULATOR. (Thru 1981 Models.) (See figure 14-3.)

- a. Slip clamps over cylinder, ensuring that orientation is correct for installation of lines (15) and (18) and control (11). Secure oxygen cylinder and safety wire clamps.
- b. Uncap and install low pressure line (15) at regulator (13).
- c. Uncap and install high pressure gage line (17) at tee (16).
- d. Insert ON-OFF control (11) in cable clamp and cable housing clamp at regulator (13).
- e. Test operate oxygen system to ensure that lever (32) will function properly.
- f. Bend cable end of ON-OFF control (11) 90°
- g. Reinstall aft baggage partition.

### 14-26. REMOVAL OF OXYGEN CYLINDER-REGULATOR. (Beginning with 1982 Models.) (See figure 14-3.)

- a. Remove access cover from left side of tailcone to gain access to oxygen cylinder-regulator assembly.

#### WARNING

Ensure that battery cover and contactor cover are installed. When removing or installing oxygen cylinder-regulator assembly, avoid contacting battery, contactor, or wiring with cylinder or regulator.

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- b. Straighten cable end of ON-OFF control (11) at regulator (13).
- c. Loosen cable clamp and cable housing clamp. Remove control (11) from regulator (13).
- d. Remove and cap high pressure gage line (10) at tee (9).
- e. Remove and cap low pressure line (15) at regulator (13).
- f. Break safety wire and loosen clamps securing oxygen cylinder (14).
- f. Remove oxygen cylinder.

### 14-27. INSTALLATION OF OXYGEN CYLINDER-REGULATOR. (Beginning with 1982 Models.) (See figure 14-3.)

- a. Slip clamps over oxygen cylinder (14), ensuring that orientation is correct for installation of lines (8) and (15) and control (11). Secure oxygen cylinder and safety wire clamps.
- b. Uncap and install low pressure line (15) at regulator (13).
- c. Uncap and install gage line (10) at tee (9).
- d. Insert ON-OFF control (11) in cable clamp and cable housing clamp at regulator (13).
- e. Test operate oxygen system to ensure that lever (32) will function properly.
- f. Bend cable end of ON-OFF control (11) 90°.
- g. Reinstall access cover on left side of tailcone.

### 14-28. INSPECTION OF OXYGEN CYLINDER-REGULATOR.

- a. A careful visual inspection of the oxygen cylinder should be performed during routine maintenance and periodic inspections. If any bad dents, scratches or areas of corrosion are found, the cylinders must be checked in accordance with the following chart, Inspection Criteria for Acceptance of Oxygen Cylinders.

#### NOTE

If the acceptability of the cylinder is questionable after using inspection criteria, return cylinder to manufacturer.

Discrepancies	Tolerance (in)	See Note
Isolated Pitting or Corrosion (Depth)	0.010	1 2
Local Pitting or Corrosion or Line Corrosion (Depth)	0.005	2 3
General Corrosion	Not Allowed	4
Cuts, Digs, Gouges (Depth)	0.005	5
Dents (Depth)	0.031	6
Fire Damage	Not Allowed	7
Bulges	Not Allowed	8

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## NOTES

1. Isolated pits of small cross section involving loss of wall thickness by corrosive media. Small isolated pits with a maximum depth as shown are acceptable.
2. If depth exceeds figure shown, cylinder must be returned to the manufacturer for disposition.
3. Local pitting or corrosion or line corrosion involving loss of wall thickness by corrosive media with a pattern of pits which are connected to others in a band or line. A small area with a minimum depth as shown is acceptable. Areas extending beyond 3 inches in diameter or 4 inches long shall be considered general corrosion.
4. General corrosion (sometimes accompanied by pitting) involving loss of wall thickness by corrosive media covering a considerable area. Cylinder must be returned to the manufacturer for hydrostatic testing.
5. Deformations caused by contact with a sharp object cutting or upsetting the material of the cylinder must be returned to the manufacturer for removal of defects and verification of cylinder strength by hydrostatic testing.
6. Deformations caused by contact with blunt objects in such a manner that the thickness of the metal is not impaired. The major diameter of the dent must be equal to or greater than 32 times the depth of the dent. Sharper dents (or deeper dents) than this are considered too abrupt and must be returned to the cylinder manufacturer for disposition.
7. Fire damage is indicated by charring or burning or sintering of the metal, charring or burning of the paint, distortion of the cylinder, functioned safety relief devices, melting of valve parts, etc. Cylinders must be returned to the cylinder manufacturer for disposition.
8. Bulged cylinders are not acceptable. Cylinders must be returned to the cylinder manufacturer for disposition.

## NOTE

The preceding data must be used to determine that oxygen cylinders are acceptable for service. This criteria should be used prior to charging cylinders.

- b. Regulator shall be removed and overhauled by manufacturer or an FAA-approved facility during hydrostatic testing.
- c. Actuate regulator controls and valve to check for ease of operation.

## CAUTION

Damage to regulator will occur if the control of a charged oxygen cylinder is turned ON with the low pressure side of the regulator open to the atmosphere.

- d. Pressurize the system and check for leaks.

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14-29. OXYGEN FILLER VALVE. (See figure 14-3.)

14-30. DESCRIPTION. The oxygen filler valve is mounted on the left fuselage skin, aft of bulkhead station 140.00 (aft of station 156.00 on 1983 Models).

14-31. REMOVAL. (Thru 1981 Models.) (See figure 14-3.)

- a. Remove access plate (1) from fuselage skin.
- b. Remove filler line (20) from filler valve (3); cap filler line.
- c. Remove screws attaching filler valve (3) to adaptor assembly (4).
- d. Remove filler valve (3) from adapter assembly (4).
- e. Remove spacer (2).

14-32. INSTALLATION. (Thru 1981 Models.) (See figure 14-3.)

- a. Install filler valve (3) in adapter assembly (4) and secure with screws.
- b. Install adapter assembly (4) and spacer (2).
- c. Install access plate (34) to fuselage skin and adapter assembly (2) with screws.
- d. Uncap filler line (20) and attach to filler valve (3).

14-32A. REMOVAL. (Beginning with 1982 Models.) (See figure 14-3.)

- a. Remove access plate (19) from fuselage skin.
- b. Remove filler line (17) from (22); cap filler line.
- c. Remove screws attaching filler valve (21) to adaptor assembly (22).
- d. Remove filler valve (21) from adapter assembly (22).
- e. Remove spacer (20).

14-32B. INSTALLATION. (Beginning with 1982 Models.) (See figure 14-3.)

- a. Install filler valve (21) in adapter assembly (22) and secure with screws.
- b. Install adapter assembly (22) and spacer (20).
- c. Install cover (19) to fuselage skin and adapter assembly (22) with screws.
- d. Uncap filler line (17) and attach to adapter (22).

14-33. OXYGEN LINES. (See figure 14-3.)

14-34. DESCRIPTION. A pressure line is routed from the oxygen cylinder regulator to the pressure gage, located in the overhead console, above the pilot and copilot stations. A line is routed from the oxygen cylinder regulator to a tee, adjacent to the regulator. A line is routed from the tee to the oxygen filler valve. A line is routed from the tee to a union, located along the right fuselage sidewall. A line is routed from the union to a cross, installed above the cabin headliner at fuselage station 77.50. Two lines are routed from the cross, one to the left passenger oxygen supply outlet, and one to the right passenger oxygen outlet valve assembly. A line is routed from the cross to a tee, located at the aft end of the overhead console. Two lines are routed from the tee, one to the pilot's oxygen outlet valve assembly, and one to the copilot's oxygen outlet valve assembly, both installed in the overhead console.



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- 14-35. **REMOVAL AND INSTALLATION.** (See figure 14-3.) Assure that the oxygen control is off. Access to the various lines is gained by removing the cabin headliner and/or appropriate upholstery sidepanels depending on line location. Removal and installation procedures for cabin headliner and upholstery side panels are outlined in Section 3 of this manual. Lines are secured by clamps and/or nylon ties. Whenever ties are removed, replace with new ties.

### NOTE

Observe all cautions, warnings, precautions and procedures outlined in paragraph 14-20 when removing or installing oxygen lines.

- 14-36. **OUTLET VALVE ASSEMBLIES.** (See figure 14-3.)
- 14-37. **DESCRIPTION.** The pilot and copilot outlet valve assemblies are mounted in the overhead console. Passenger outlet valve assemblies are mounted overhead and outboard of each passenger station.
- 14-38. **REMOVAL OF PASSENGER OUTLET VALVE ASSEMBLY.** (See figure 14-3.)

### NOTE

Ensure oxygen control is OFF.

- a. Remove lock ring (19) and cover (10).
  - b. Remove window moulding.
  - c. Remove cabin headliner as outlined in Section 3 of this manual.
  - d. Remove nut (28).
  - e. Remove outlet (35) from bracket (20).
  - f. Disconnect oxygen line (22) from outlet (10), and cap line.
  - g. Remove nut (28) from outlet (35).
- 14-39. **INSTALLATION OF PASSENGER OUTLET VALVE ASSEMBLY.** (See figure 14-3.)
- a. Install nut (28) on threads of outlet valve assembly (35) and install outlet valve assembly in mounting hole of bracket (20); install and tighten outer nut (28) on outlet (35).
  - b. Uncap and connect oxygen line (22) to outlet valve assembly (35).
  - c. Install bracket (20) to sidewall of aircraft.
  - d. Turn oxygen control ON and test connection for leaks.
  - e. Install cabin headliner as outlined in Section 3 of this manual.
  - f. Install window moulding.
  - g. Install cover (20) and lock ring (19)
- 14-40. **REMOVAL OF PILOT AND/OR COPILOT OUTLET VALVE ASSEMBLY.** (See figure 14-3.)

### NOTE

Ensure oxygen control is OFF.

## MODEL R182 AND TR182 SERVICE MANUAL

- a. Remove overhead console as outlined in Section 3 of this manual.
- b. Disconnect oxygen line at rear of outlet valve assembly; cap oxygen line.
- c. Remove nut (28).
- d. Remove outlet valve assembly (35) from bracket (36)

### 14-41. INSTALLATION OF PILOT AND/OR COPILOT OUTLET VALVE ASSEMBLY. (See figure 14-3.)

- a. Install outlet valve assembly in mounting hole of bracket (36).
- b. Install and tighten nut (28).
- c. Uncap and install oxygen line at rear of outlet valve assembly.
- d. Turn oxygen control ON and test connection for leaks.
- e. Install overhead console.

### 14-42. INSPECTION/TEST OF OXYGEN OUTLET VALVE ASSEMBLIES.

- a. Assure that oxygen system is fully charged.
- b. Insert an oxygen outlet adapter, connected to a pressure gage, into the oxygen outlet valve.
- c. Test outlets (35) for leaks with fluid leak detector. No bubbles are permitted.
- d. After completion of leak tests, fully charge oxygen system as outlined in paragraph 14-23.

### 14-43. OXYGEN SYSTEM FUNCTIONAL TEST.

#### NOTE

Whenever the oxygen system regulator (cylinder-regulator assembly) has been replaced or overhauled, perform a flow test to determine that system functions properly.

- a. Fully charge the oxygen system as outlined in paragraph 14-23.
- b. Install an oxygen outlet adapter into a pressure gage (calibrated in one pound increments from 0 to 100 PSIG) and insert adapter into pilot's oxygen outlet valve assembly.

## MODEL R182 AND TR182 SERVICE MANUAL

- c. Turn oxygen system ON. Pressure should be 70+ PSIG. If pressure does not fall within these tolerances, replace cylinder-regulator and repeat test.
- d. Recharge oxygen system as required as outlined in paragraph 14-23.

14-44. OXYGEN GAGE. (See figure 14-3.)

14-45. DESCRIPTION. The oxygen gage is located on the right-hand side of the overhead console. The oxygen gage is calibrated from 0 to 2000 PSI.

14-46. REMOVAL. (See figure 14-3.)

### NOTE

The system does not have to be discharged before removing high pressure lines as there is a check valve in the regulator to shut off the flow of oxygen when a connection is broken. Ensure the system is OFF.

- a. Remove aft baggage partition for access to oxygen cylinder-regulator assembly.
- b. Disconnect pressure gage line (10) at tee (9).
- c. Remove overhead console for access to pressure gage (37).
- d. Disconnect pressure gage line (10) from pressure gage (37); remove pressure gage by unscrewing bezel and removing clear lens.

14-47. INSTALLATION. (See figure 14-3.)

- a. Install pressure gage (37) in overhead console, install clear lens and screw bezel on pressure gage threads, attaching pressure gage to overhead console.
- b. Connect pressure gage line (10) to pressure gage (37).
- c. Connect pressure gage line (10) to tee (9).
- d. Turn oxygen control ON and test for leaks.
- e. Install aft baggage partition.
- f. Install overhead console.

### NOTE

Pressure gage is not repairable and must be tested by the manufacturer every 3000 flight hours or three years, whichever comes first.

14-48. INSPECTION. The only inspection possible is to observe indicated pressure rise as the system is charged and decrease as oxygen is bled off.

14-49. OXYGEN MASKS.

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14-50. DESCRIPTION. One pilot's mask and three passengers' masks are provided with the aircraft. The pilot's mask has a built-in microphone and also provides a greater flow of oxygen. The masks are of the constant-flow type, with a metering orifice in the quick-connect adapter. A flowmeter built into the line, approximately six-inches from the connector, provides a visual indication of proper oxygen flow, showing red when no flow is taking place, red and green with a partial flow, and green with full flow. The masks provided with the R182 aircraft are color-coded by a sleeve adjacent to the quick-connect adapter; orange for pilot, 14,000 to 22,000 foot altitude rating, and green for passenger, 8,000 to 14,000 foot rating. The masks provided with the TR182 are color-coded by a sleeve adjacent to the quick-connect adapter; red for pilot, 22,000 to 30,000 foot altitude rating, and orange for passengers, 14,000 to 22,000 foot rating.

### 14-51. INSPECTION.

- a. Check oxygen masks for cracks and rough face seals.
- b. Flex mask hose gently over its entirety and check for evidence of deterioration or dirt.
- c. Examine mask and hose storage compartment for cleanliness and general condition.
- d. Observe that each mask breathing tube end is free of nicks, and that the tube end will slip into the cabin oxygen receptacle with ease and will not leak.
- e. If a mask assembly is defective (leaks, does not allow breathing or contains a defective microphone), it is advisable to return the mask assembly to the manufacturer or an FAA-approved repair station.
- f. Replace hose if it shows evidence of deterioration.

### 14-52. CLEANING.

- a. Clean and disinfect mask assemblies after use with rubbing alcohol, as appropriate.
- b. If installed, remove microphone from mask.

### CAUTION

Do not allow rubbing alcohol to enter microphone or electrical connections.

- c. Apply rubbing alcohol to mask with a cotton swab or the equivalent, as required, to remove contamination.
- d. If used, install microphone.

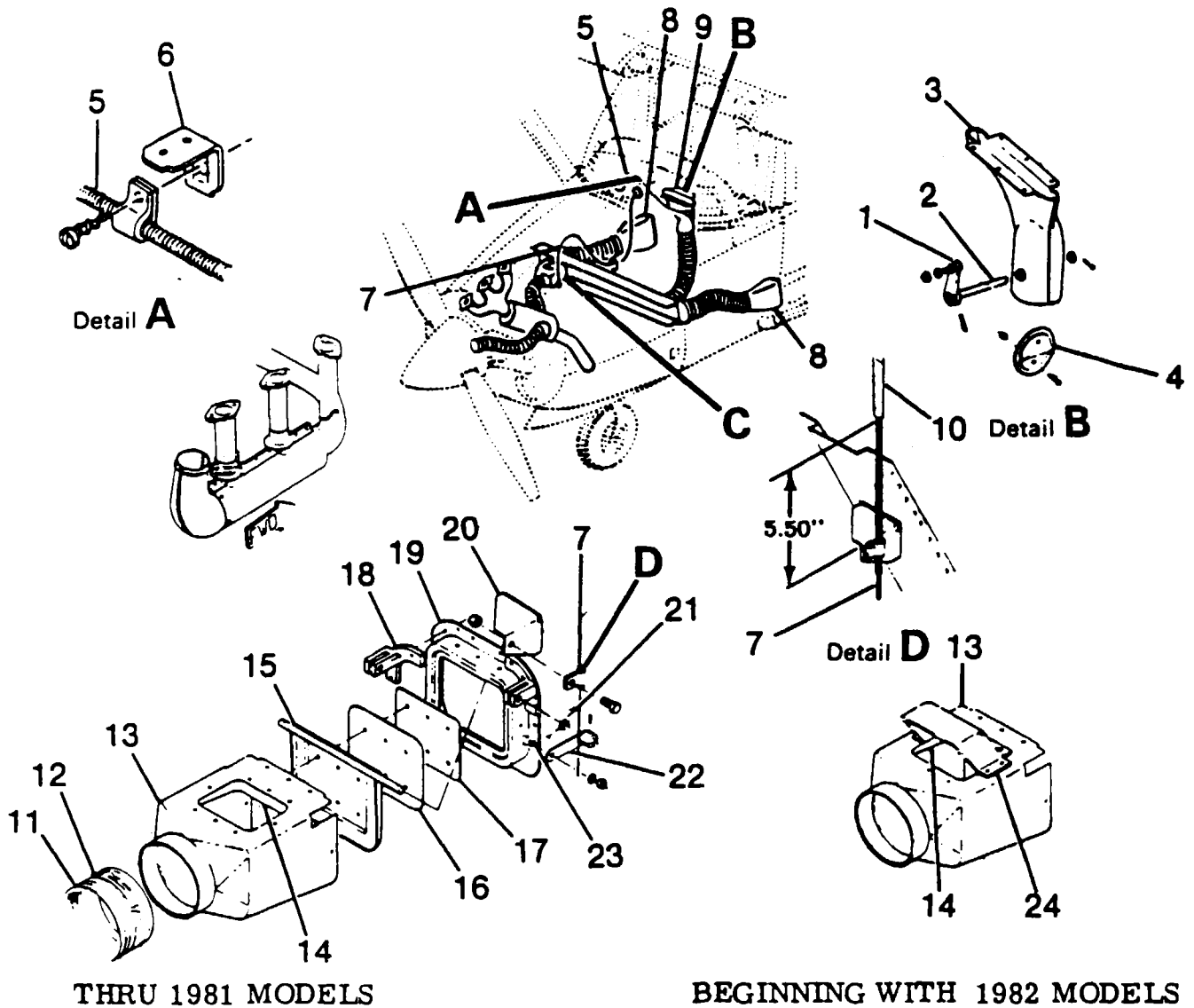
### 14-53. FUNCTIONAL TEST.

### NOTE

Each mask should be periodically tested to ensure its correct functioning.

- a. Turn oxygen control ON.
- b. Insert oxygen mask adapter into its outlet valve assembly.
- c. Observe that the flowmeter shows a proper flow of oxygen (indicator shows green only.)
- d. Return mask to storage.
- e. Recharge oxygen system as outlined in paragraph 14-23.

# MODEL R182 AND TR182 SERVICE MANUAL



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BEGINNING WITH 1982 MODELS

Detail C

- |                      |                  |                            |
|----------------------|------------------|----------------------------|
| 1. Arm               | 9. Defroster     | 17. Retainer               |
| 2. Shaft             | 10. Nylon Sleeve | 18. Bearing                |
| 3. Nozzle            | 11. Hose         | 19. Valve Seat             |
| 4. Valve Assembly    | 12. Clamp        | 20. Control Attach Bracket |
| 5. Defroster Control | 13. Valve Body   | 21. Spring                 |
| 6. Angle Bracket     | 14. Seat         | 22. Arm                    |
| 7. Heater Control    | 15. Valve Door   | 23. Clamp                  |
| 8. Duct              | 16. Seal         | 24. Deflector              |

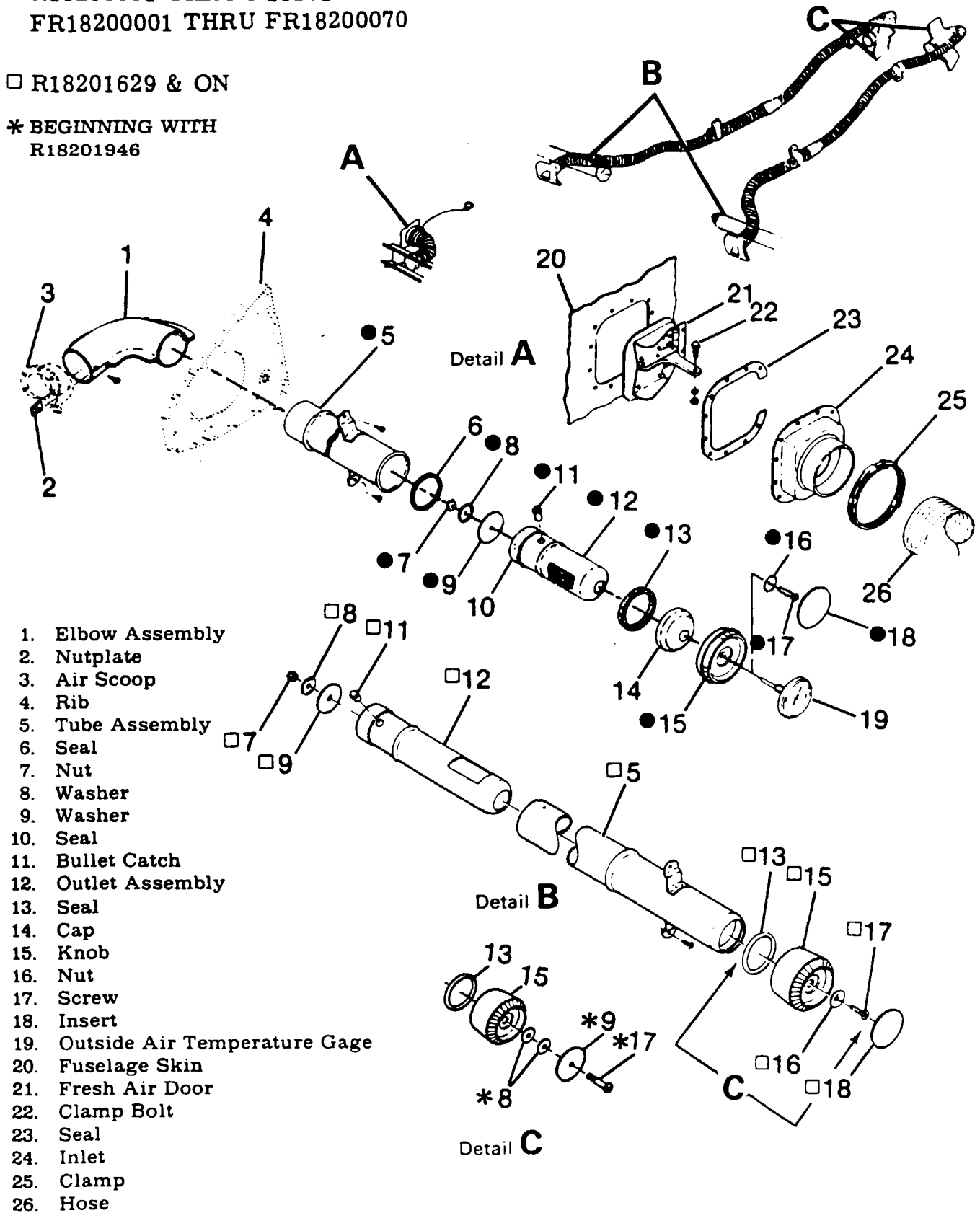
Figure 14-1. Heating and Defrosting Systems

# MODEL R182 AND TR182 SERVICE MANUAL

● R18200001 THRU R18201628  
FR18200001 THRU FR18200070

□ R18201629 & ON

\* BEGINNING WITH  
R18201946



1. Elbow Assembly
2. Nutplate
3. Air Scoop
4. Rib
5. Tube Assembly
6. Seal
7. Nut
8. Washer
9. Washer
10. Seal
11. Bullet Catch
12. Outlet Assembly
13. Seal
14. Cap
15. Knob
16. Nut
17. Screw
18. Insert
19. Outside Air Temperature Gage
20. Fuselage Skin
21. Fresh Air Door
22. Clamp Bolt
23. Seal
24. Inlet
25. Clamp
26. Hose

Figure 14-2. Ventilating System (Sheet 1 of 2)

MODEL R182 AND TR182 SERVICE MANUAL

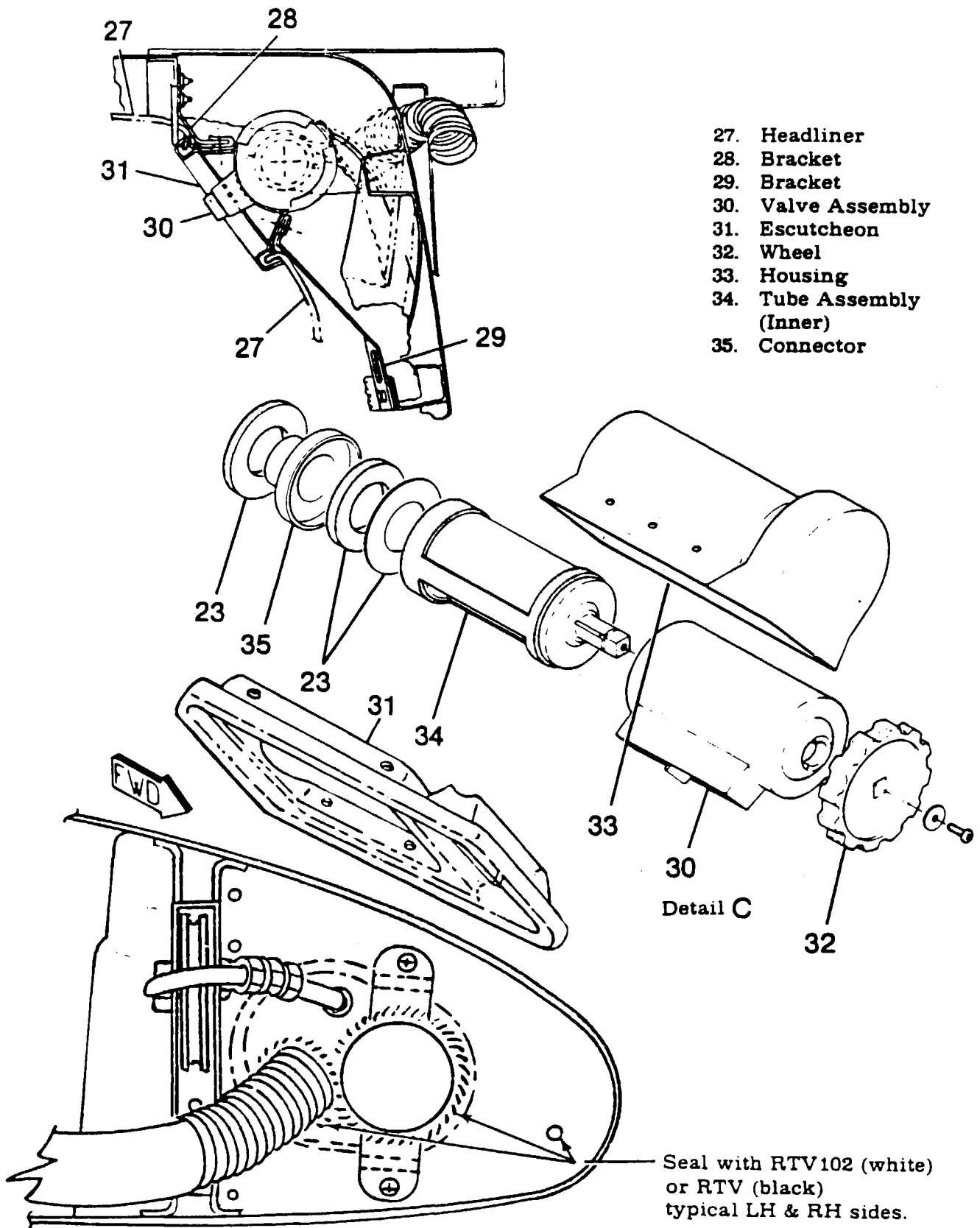
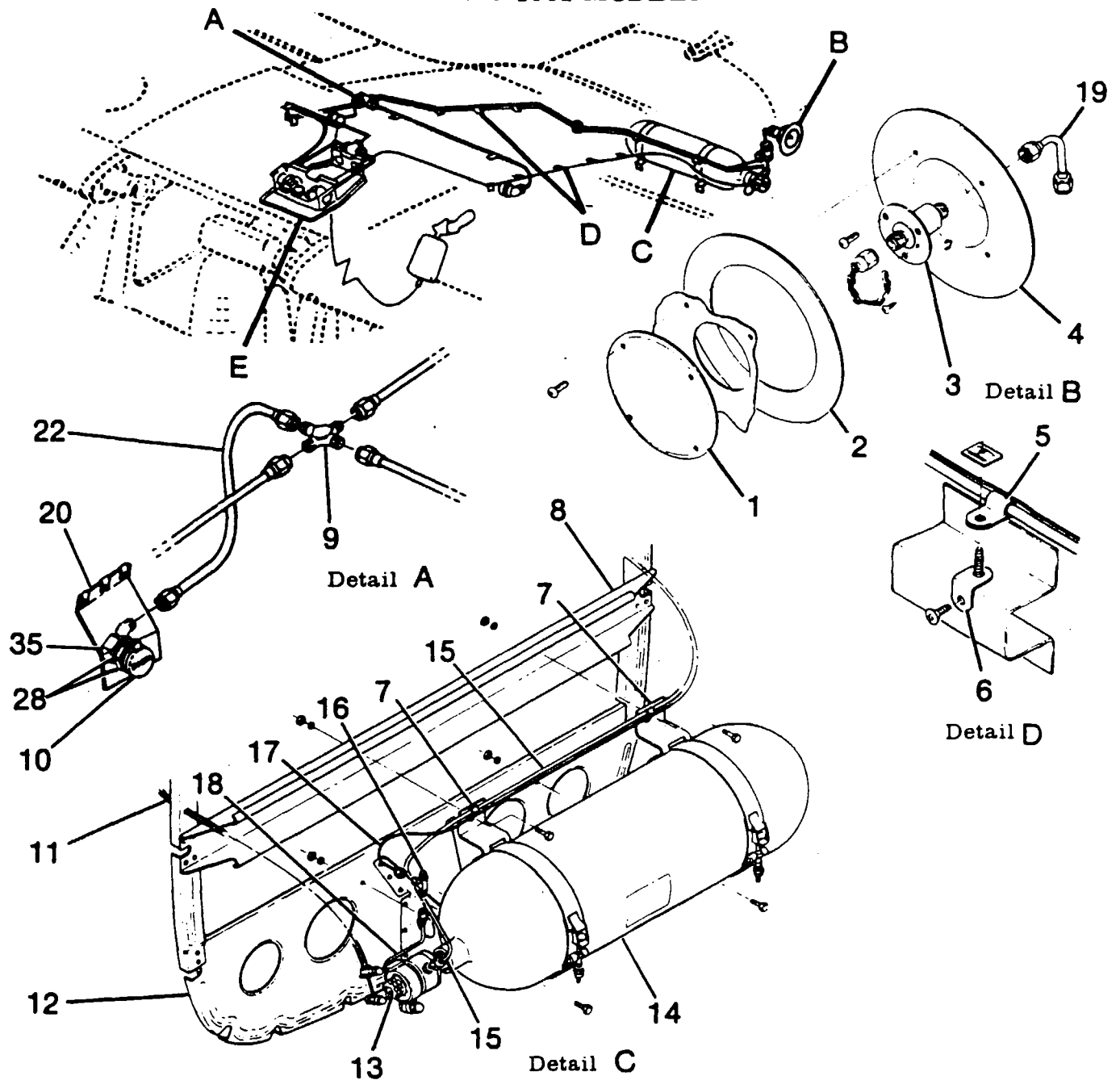


Figure 14-2. Ventilating System (Sheet 2 of 2)

MODEL R182 AND TR182 SERVICE MANUAL

THRU 1981 MODELS

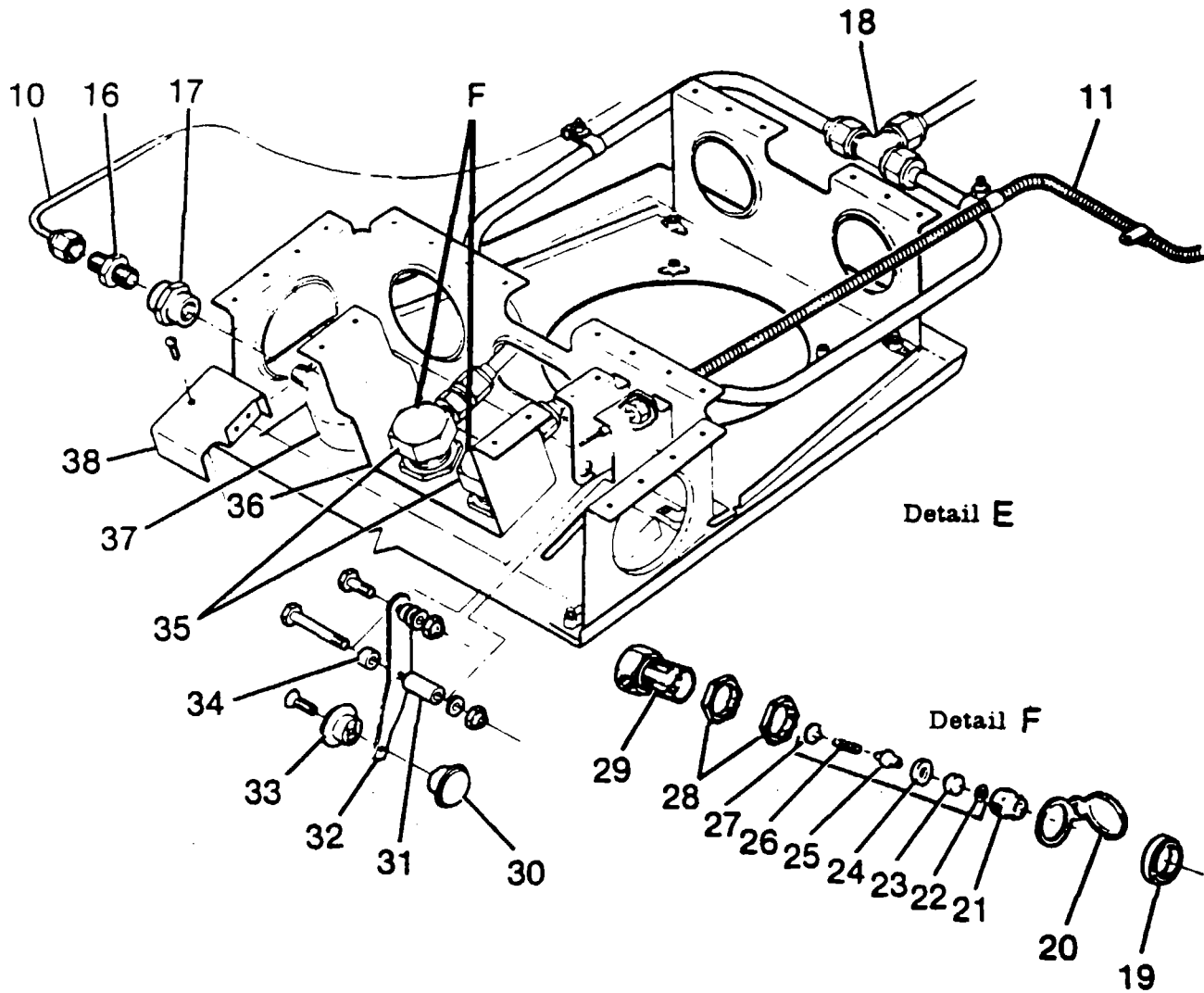


- |                     |                 |                          |
|---------------------|-----------------|--------------------------|
| 1. Cover            | 9. Cross        | 17. Gage Line            |
| 2. Spacer           | 10. Outlet      | 18. Gage and Filler Line |
| 3. Filler Valve     | 11. Control     | 19. Filler Line          |
| 4. Adapter          | 12. Bulkhead    | 20. Bracket              |
| 5. Clamp            | 13. Regulator   | 28. Nut                  |
| 6. Bracket          | 14. Cylinder    | 35. Outlet               |
| 7. Mounting Bracket | 15. Supply Line |                          |
| 8. Support          | 16. Tee         |                          |

Figure 14-3. Oxygen System (Sheet 1 of 3)



# MODEL R182 AND TR182 SERVICE MANUAL



- |               |             |
|---------------|-------------|
| 10. Gage Line | 27. Button  |
| 16. Coupling  | 28. Nut     |
| 17. Nipple    | 29. Body    |
| 18. Tee       | 30. Knob    |
| 19. Ring      | 31. Spacer  |
| 20. Cover     | 32. Lever   |
| 21. Adapter   | 33. Knob    |
| 22. O-Ring    | 34. Spacer  |
| 23. Insert    | 35. Outlet  |
| 24. Seat      | 36. Bracket |
| 25. Poppet    | 37. Gage    |
| 26. Spring    | 38. Bracket |

Figure 14-3. Oxygen System (Sheet 2 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

## BEGINNING WITH 1982 MODELS

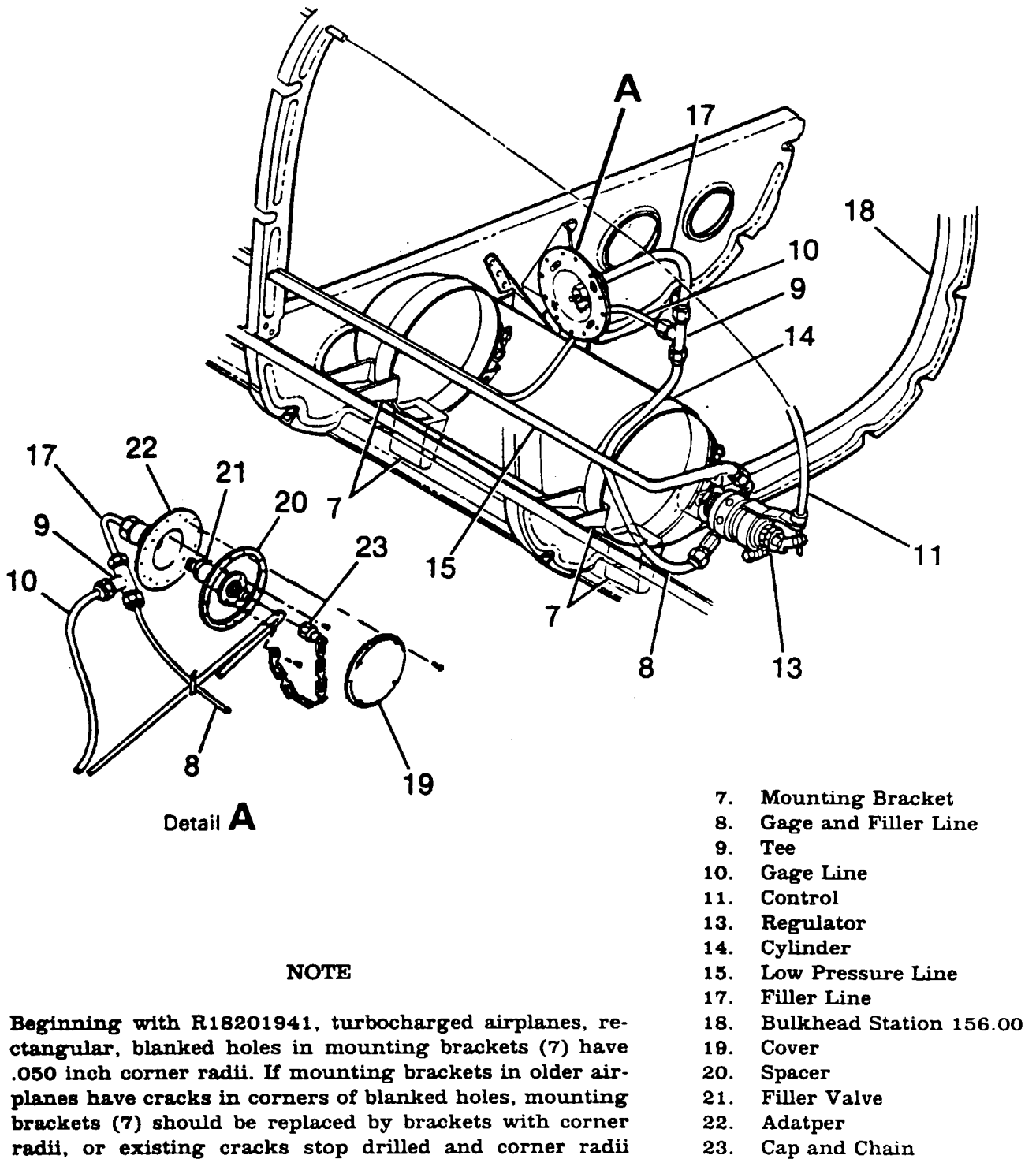


Figure 14-3. Oxygen System (Sheet 3 of 3)

MODEL R182 AND TR182 SERVICE MANUAL

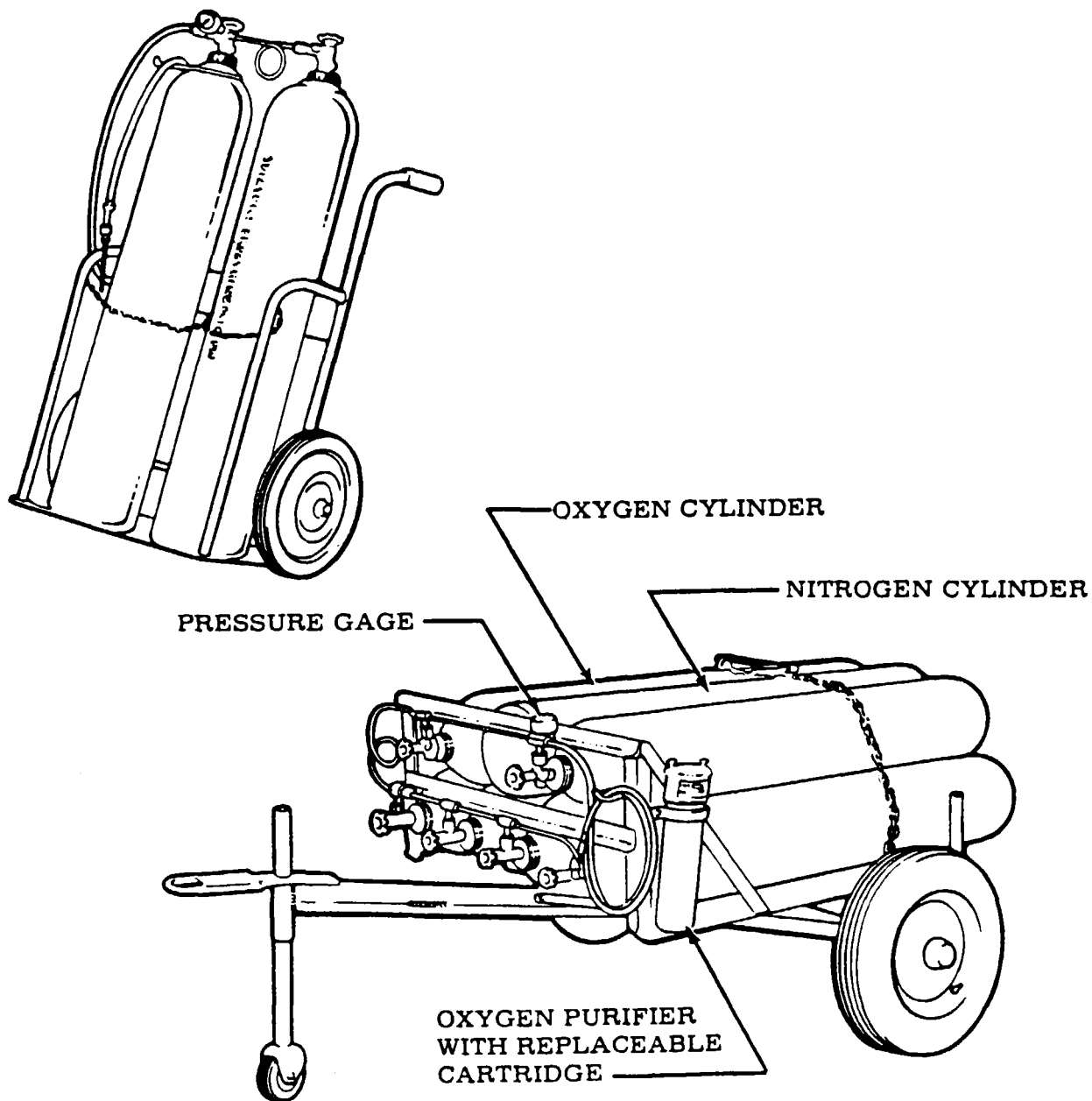


Figure 14-4. Portable Oxygen Cascades

## MODEL R182 AND TR182 SERVICE MANUAL

- 14-54. **PROPELLER DE-ICE SYSTEM.** (B.F. Goodrich, 2-Bladed Propeller Installation.) (See figure 14-5.)
- 14-55. **DESCRIPTION.** The system is of an electrothermal type, consisting of electrically heated de-icer boots bonded to each propeller blade, a slip ring assembly for power distribution to the de-icers, a brush block assembly to transfer electrical power to the rotating slip ring, a timer to cycle electrical power to the de-icers in proper sequence, an ammeter, mounted in the instrument panel, a shunt, mounted on the forward side of the right hand stationary instrument panel, switch and a circuit breaker. The de-ice system applies heat to the surfaces of the propeller blades where ice would normally adhere. This heat, plus centrifugal force and the blast from the airstream, removes accumulated ice. When the de-ice switch is turned on, the timer provides power through the brush block and slip ring to a heating element on each blade for 90 seconds and off for 90 seconds. System components may be removed and replaced, using the figure as a guide. Propeller removal is necessary before de-ice system components, except the brush block assembly, can be installed or removed.
- 14-56. **TROUBLE SHOOTING.**

### NOTE

The propeller de-ice ammeter may be used while trouble shooting the system. The ammeter needle should rest within the shaded band for 90 seconds while the system is heating, and then to zero for 90 seconds while the system is off.

TROUBLE	PROBABLE CAUSE	REMEDY
<b>ELEMENTS DO NOT HEAT.</b>	Circuit breaker out or defective.	Reset circuit breaker. If it pops out again, determine cause and correct.
	Defective wiring.	Repair or replace wiring.
	Defective switch.	Replace switch.
	Defective timer.	Replace timer.
	Defective brush-to-slip ring connection.	Check alignment. Replace defective parts.
<b>CYCLING SEQUENCE NOT CORRECT OR NO CYCLING.</b>	Crossed Connections.	Correct wiring.
	Defective timer.	Replace timer.
<b>RAPID BRUSH WEAR, FREQUENT BREAK-AGE, SCREECHING OR CHATTERING.</b>	Brush block or slip ring out of alignment.	Align properly.

# MODEL R182 AND TR182 SERVICE MANUAL

## 14-57. TIMER TEST.

- a. Remove connector plug of wire harness from timer and jump power input socket of wire harness to timer input pin. (Refer to chart following this paragraph for pin identification.)
- b. Jump timer ground pin to ground.
- c. Turn on De-Ice System.
- d. Check timer operation per the chart. (Use a voltmeter.)
- e. Check volts to ground in each case. If engine is not running, and auxiliary power is not used, voltage will be battery voltage and cycle time may be slightly longer than indicated.
- f. Hold voltmeter probe on the pin until the voltage drops to 0. Move the probe to the next pin in the sequence shown in the chart. Check voltage at each pin in sequence.

TIMER P/N	POWER INPUT PIN	GROUND PIN	OUTPUT PIN	TIME REPEAT CYCLE TIME
3E1899-1	B (28VDC)	G (28VDC)	C (28VDC)	(SECONDS)
				90

- 14-58. SLIP RING ALIGNMENT. After installation, the slip ring assembly must be checked for run-out, and adjustments made, if necessary.

### NOTE

Excessive slip ring run-out will result in severe arcing between the slip ring and brushes and cause rapid brush wear. If allowed to persist, this condition will result in rapid deterioration of the slip ring and brush contact surfaces, leading to eventual failure of the de-ice system.

- a. Securely attach dial indicator gage to engine, and place pointer on slip ring.
- b. Rotate propeller slowly by hand, noting the deviation of the slip ring from a true plane as indicated on the gage.
- c. Check that total run-out does not exceed 0.008-inch ( $\pm 0.004$ -inch). Also check that run-out does not exceed 0.002-inch within any 4-inches of slip ring travel.

### CAUTION

Due to the loose fit of some propeller thrust bearings, a considerable error may be indicated in the readings by pushing in or pulling out on the propeller while rotating it. Care must be taken to exert a uniform push or pull the propeller to hold this error to a minimum.

- d. If slip ring run-out is within limits specified in step "c", no corrective action is required. A small amount of run-out may be corrected by varying the torque of the attachment bolts within the limits specified by the propeller manufacturer.
- e. If the procedure outlined in step "d" does not produce acceptable run-out, fabricate small washer-shaped shims (approximately 0.010-inch), and place on attachment bolts, limit one washer per bolt, between slip ring and spinner bulkhead or mounting plate.
- f. Recheck run-out. Adjust shim thickness and vary torque of attachment bolts until slip ring runs true within the prescribed tolerance.

## MODEL R182 AND TR182 SERVICE MANUAL

- 14-59. INSTALLATION AND ALIGNMENT OF BRUSH BLOCK ASSEMBLY. (See figures 14-7 and 14-8.)

### NOTE

Installation of the brush block should be deferred, when possible, until after the slip ring, propeller, and related components are installed. However, the brush block assembly may be replaced without removing the propeller. To avoid breakage when installing the brush block assembly, keep brushes retracted in brush block until slip ring and propeller assemblies have been installed.

### CAUTION

Make sure that slip ring run-out has been corrected before attempting to align brushes on slip ring.

- a. In order to get smooth, efficient and quiet transfer of electric power from the brushes to the slip ring, brush alignment must be checked and adjusted, if necessary to meet the following requirements.
  1. Projection must be such that the distance between the brush block and the slip ring is 0.062 ( $\pm 0.030$ -inch).
  2. The brushes must be lined up with the slip ring so that the entire face of each brush is in contact with the slip ring throughout the full 360° of slip ring rotation.
  3. The brushes must contact the slip ring at an angle of approximately 2° from perpendicular to the slip ring surface, measured toward the direction of rotation of the slip ring.
- b. Brush projection can normally be adjusted by loosening hardware attaching the brush block and holding the brushes in the desired location while retightening the hardware. Slotted holes are provided.
- c. One method for face alignment is described in step "b". Another is to use shims between brush block and bracket. Laminated metal shims are generally provided. Layers of metal .003" are used to make up shims which are approximately 0.20" thick overall. Shims may be fabricated locally.
- d. Loosen mounting bolts and twist block while tightening to attain proper angular adjustment.

### CAUTION

Use care not to disturb other adjustments when adjusting angular alignment.

- 14-60. REPLACEMENT OF DE-ICE BOOTS. To remove or loosen installed de-ice boots, use toluol to soften the "cement line". Apply a minimum amount of this solvent to the cement line as tension is applied to peel back the boot. Removal should be slow enough to allow the solvent to undercut the cement so that parts will not be damaged. To install a propeller anti-ice boot, proceed as follows:
- a. Clean the metal to be bonded with Methyl Ethyl Ketone, (MEK). For final cleaning, wipe the solvent film off quickly with a clean, dry cloth before it has time to dry.
  - b. Prepare a pattern the size of the boot, including three inches of the boot strap. Draw a centerline (lengthwise) through the pattern.
  - c. Draw a line on the centerline of the leading edge of the blade. Position the pattern centerline over the leading edge centerline. Position pattern so bottom of boot is 1/2" below spinner cutout. Draw a line on the propeller hub on each side of the pattern boot

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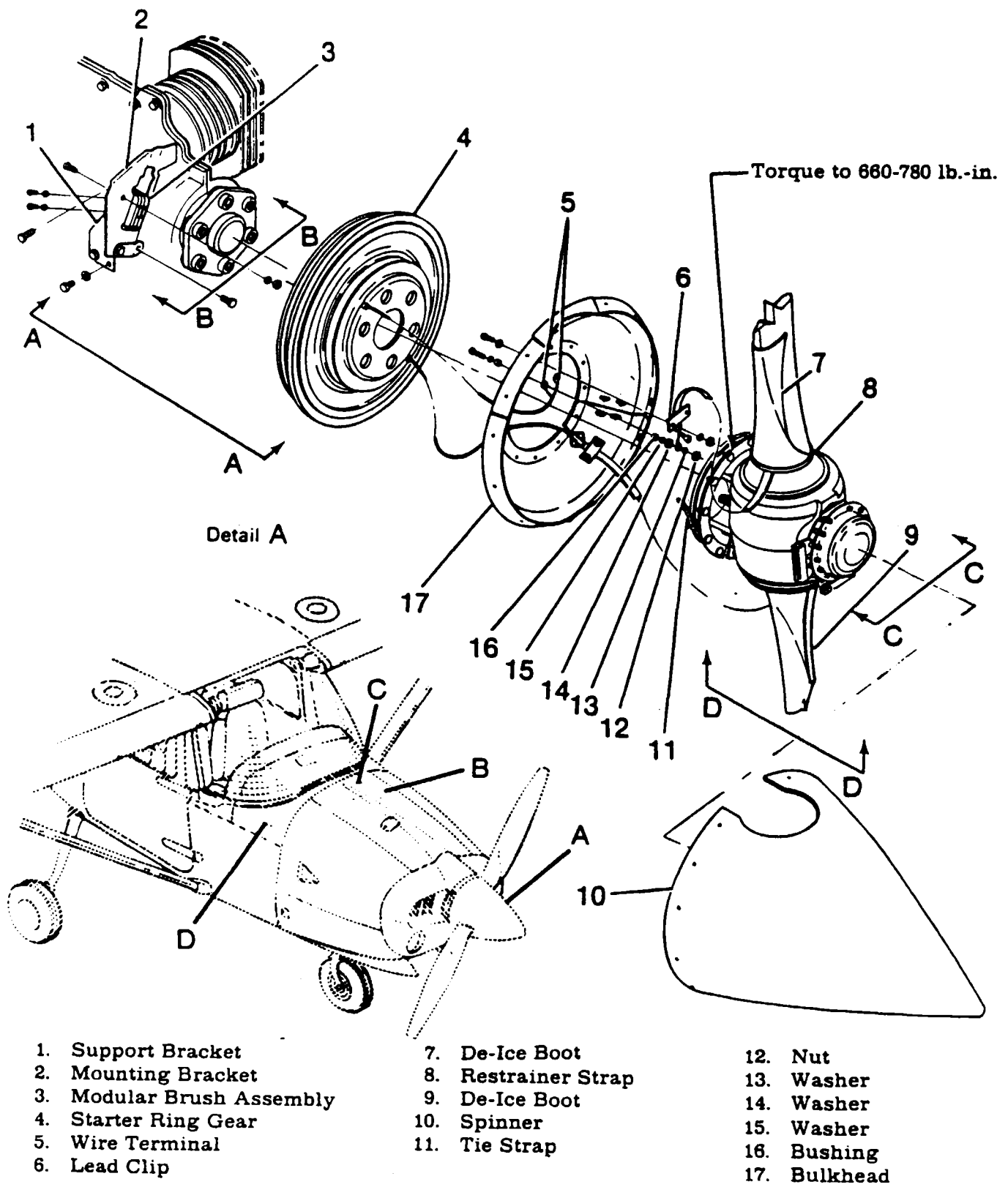
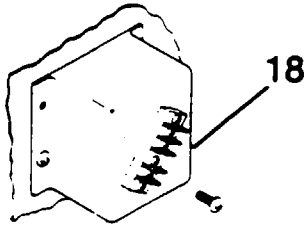


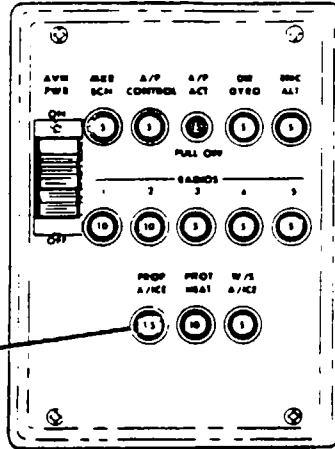
Figure 14-5. B.F. Goodrich 2-Bladed Propeller De-Ice System (Sheet 1 of 4)

# MODEL R182 AND TR182 SERVICE MANUAL

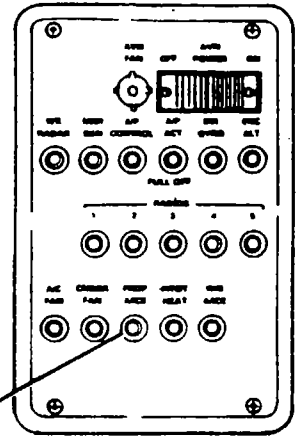


Detail **D**

- 18. Timer
- 19. Circuit Breaker
- 20. Prop De-ice Switch
- 21. Prop De-ice Ammeter
- 22. Shunt



THRU 1982 MODELS

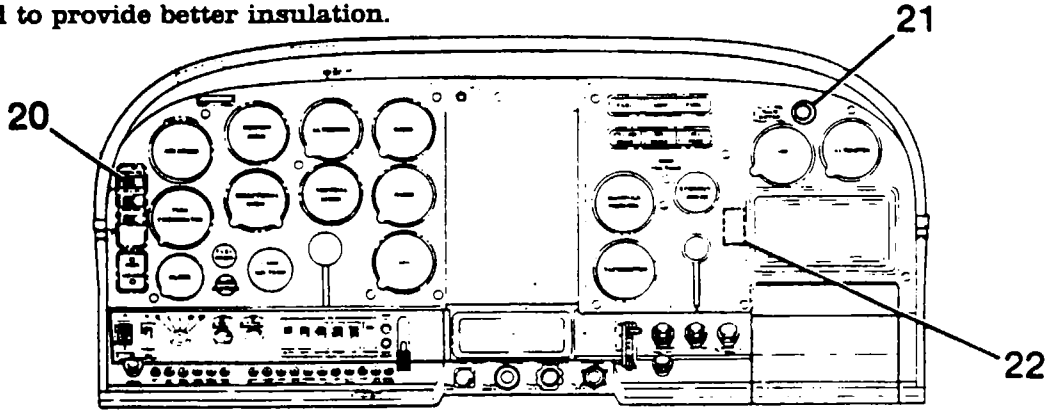


BEGINNING WITH 1983 MODELS

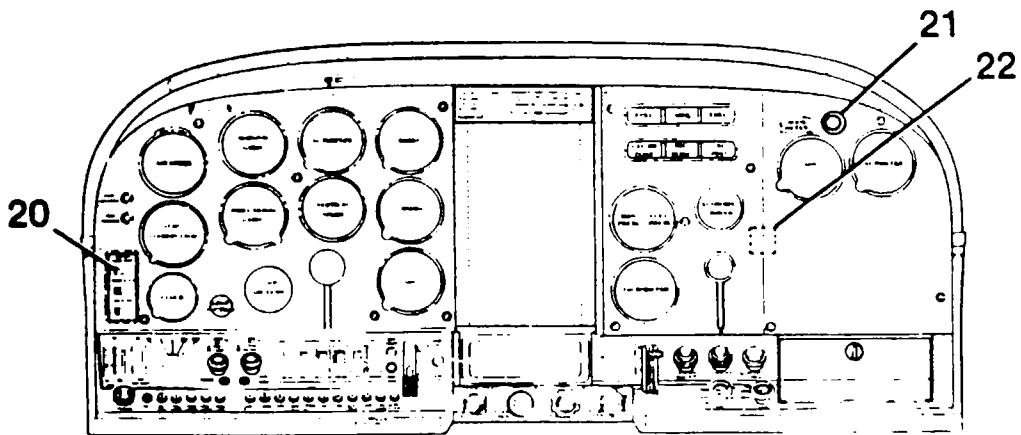
**NOTE**

Beginning with R18202012, turbocharged air-palnes. Shunt (22) is dip-coated and terminal covers added to provide better insulation.

Detail **B**



THRU 1982 MODELS



BEGINNING WITH 1983 MODELS

Detail **C**

Figure 14-5. B.F. Goodrich 2-Bladed Propeller De-Ice System (Sheet 2 of 4)



3. Modular Brush Assembly

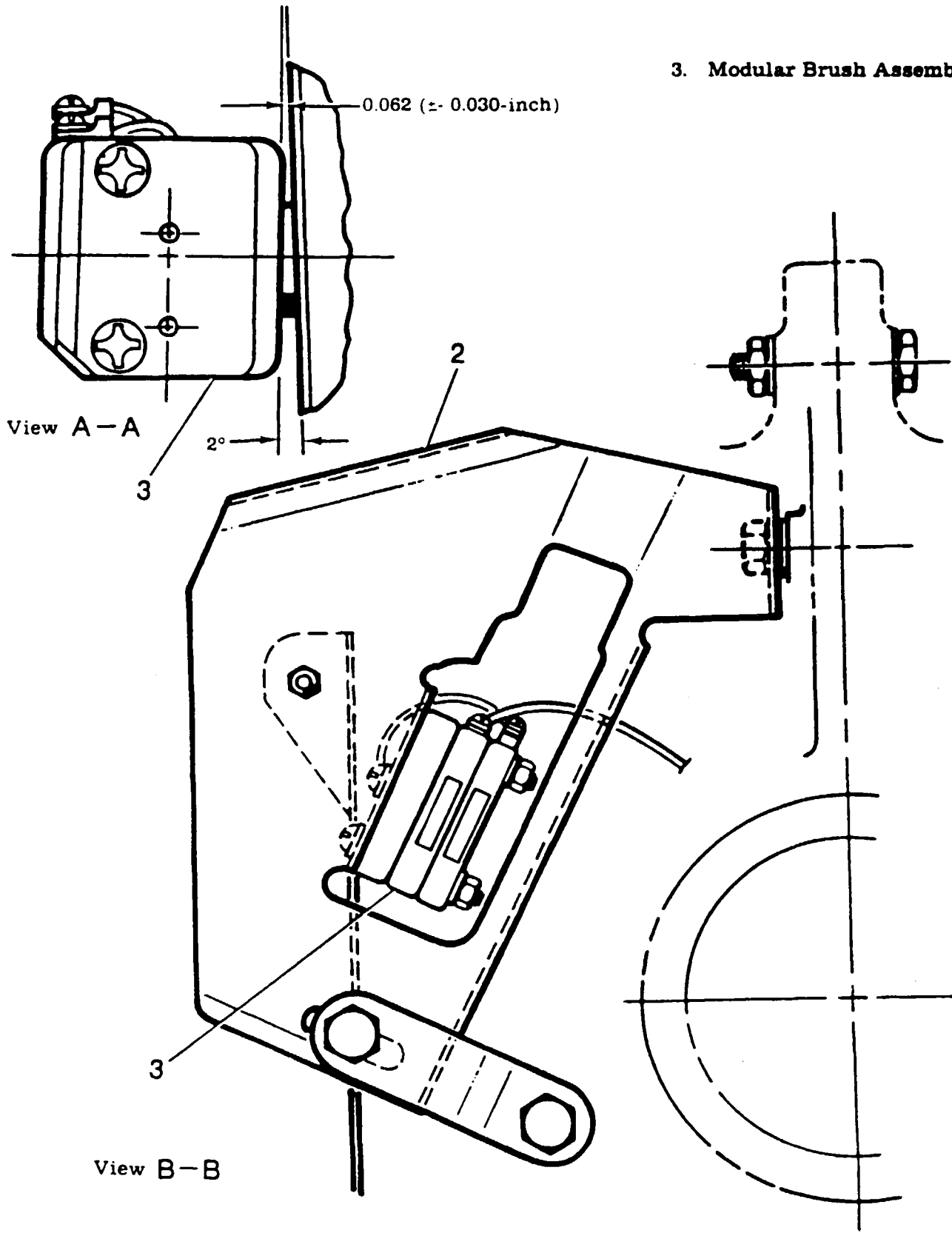
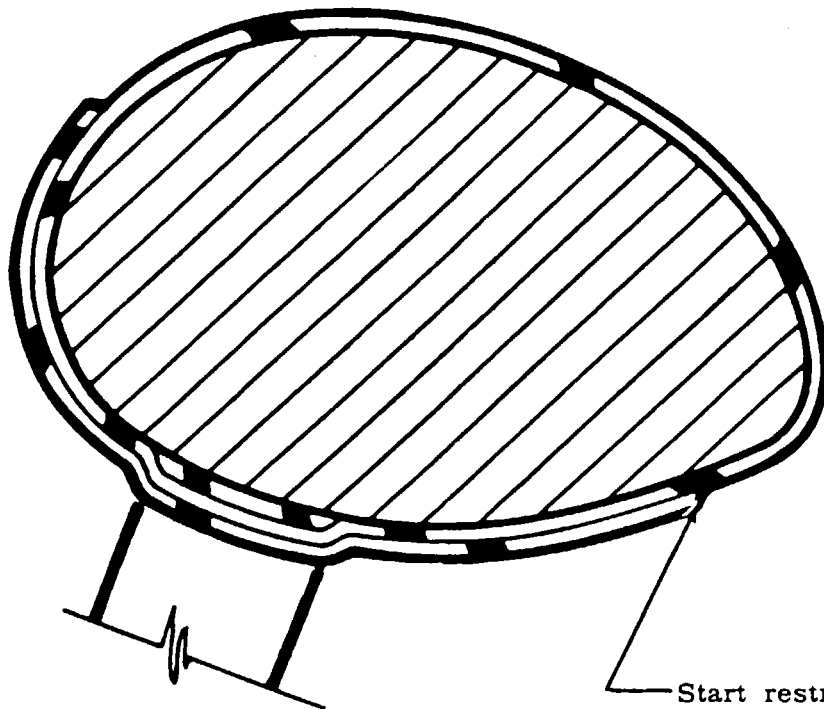
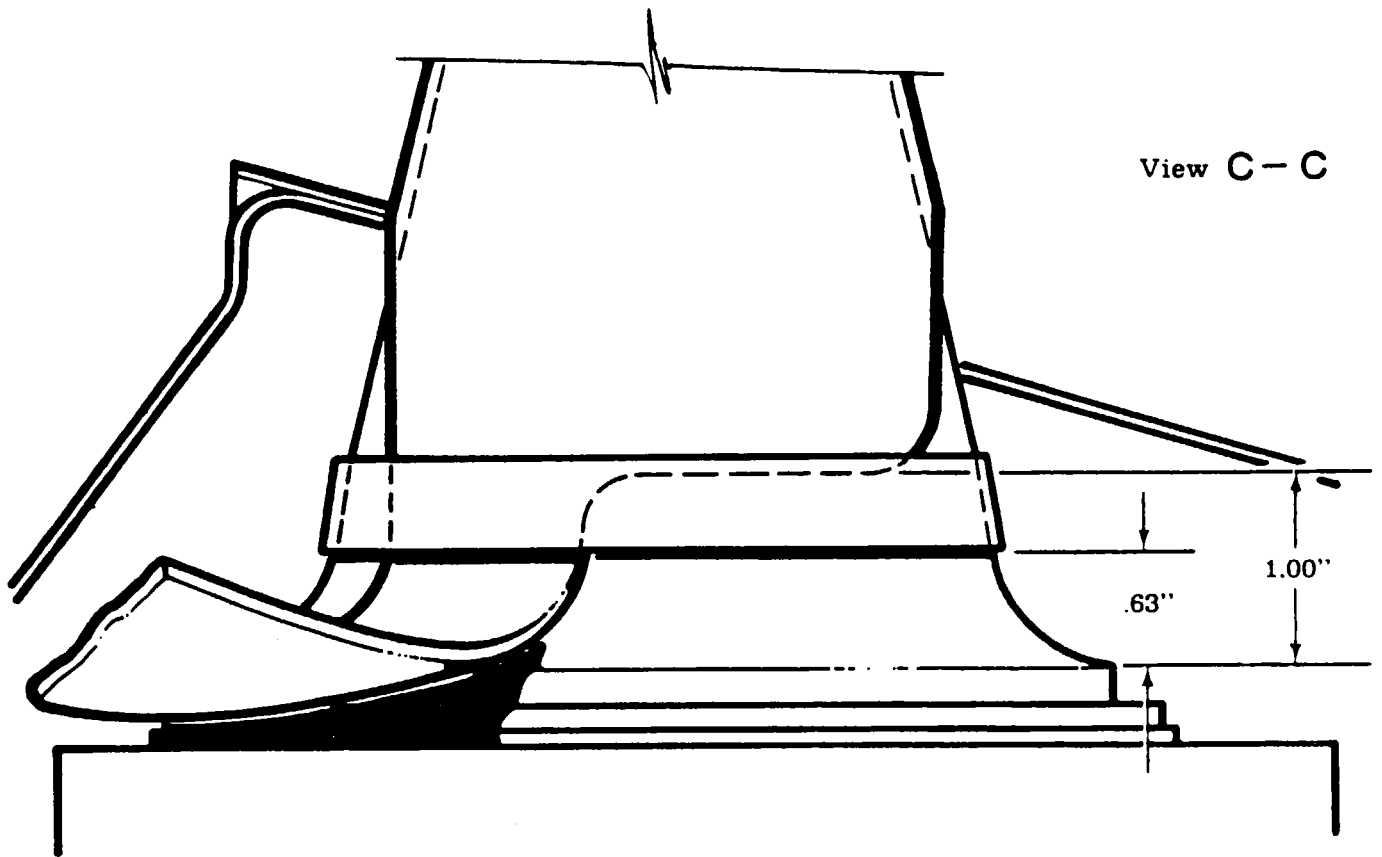


Figure 14-5. B.F. Goodrich 2-Bladed Propeller De-Ice System (Sheet 3 of 4)

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Start restrainer strap approximately in this location so a double thickness is over lead strap of the de-icer.

Figure 14-5. B.F. Goodrich 2-Bladed Propeller De-Ice System (Sheet 4 of 4)

## MODEL R182 AND TR182 SERVICE MANUAL

- strap where it crosses the hub. Check boot strap position by fitting restraining strap on the hub and comparing its position with the marked position of the strap.
- d. Mask off an area 1/2" from each side and outer end of the pattern, and remove the pattern.

### NOTE

Apply cement at room temperature (65°-75°F). For best results, allow to air dry for a minimum of one hour at 50°F or above when relative humidity is less than 75%. If the humidity is 75% and 90%, allow additional drying time. Do not apply cement if relative humidity is higher than 90% or if the temperature is below 50°F. Allow 12 hours cement curing time before starting engine. Allow 24 hours cement curing time before operating the de-icers.

- e. Mix EC-1300L cement (Minnesota Mining & Mfg. Co.) thoroughly. Surfaces shall be 65°F prior to applying cement. During periods of high humidity, care shall be taken to prevent moisture condensation due to the cooling effect of the evaporating solvent. This can be done by warming the area with a heat gun or heat lamp. Apply one even brush coat of EC-1300L cement to the cleaned metal surface. Allow the air dry for a minimum of one hour. Allow to air dry for a minimum of one hour and then apply a second even brush coat of EC-1300L cement.
- f. Moisten a cloth with Methyl Ethyl Ketone and clean the unglazed back surface of the boot, changing cloths frequently to avoid contamination of the cleaned area.
- g. Apply one even coat of EC-1300L cement to back surface of boot. It is not necessary to cement more than 1/2" of the boot strap.
- h. Using a silver-colored pencil, mark a centerline along the leading edge of the propeller blade and a corresponding centerline on the cemented side of the boot.
- i. Reactivate the surface of the cement using a clean, lint-free cloth, heavily moistened with toluol. Avoid excessive rubbing of cement, which would remove the cement.
- j. Position the boot centerline on the propeller leading edge, starting at the hub end at the position marked. Make sure that boot strap will fall in the position marked. Tack the boot centerline to the leading edge of the propeller blade. If the boot is allowed to get off-center, pull up with a quick motion and replace properly. Roll firmly along centerline with a rubber roller.
- k. Gradually tilting the roller, work the boot carefully over either side of the blade contour to avoid trapping air in pockets.
- l. Roll outwardly from the centerline to the edges tends to form wrinkles, work them out smoothly and carefully with fingers.
- m. Apply one even coat of EC-539 (Minnesota Mining & Mfg. Co.), mixed per manufacturer's instructions, around the edges of the installed boot.
- n. Remove masking tape from the propeller and clean the surface of the propeller by wiping with a clean cloth dampened with toluol.
- o. Install restrainer strap as shown in detail in figure 14-5, sheet 4. Start strap approximately in location shown in detail so a double thickness is over lead strap of the de-icer. The lead strap must not be twisted more than one turn (180°) in lining up the respective leads. Trim restrainer strap so it will end approximately as shown in the detail.
- p. Secure electrical leads of restrainer strap with screws, washers and sleeves.
- 14-61. PROPELLER DE-ICE SYSTEM. (McCauley, 3-Bladed Propeller Installation.) (See figure 14-6.)
- 14-62. DESCRIPTION. The system is of an electrothermal type, consisting of electrically heated

## MODEL R182 AND TR182 SERVICE MANUAL

de-icers bonded to each propeller blade, a slip ring assembly for power distribution to the propeller de-icers, a brush block assembly to transfer electrical power to the rotating slip ring, a timer to cycle electric power to the de-icers in proper sequence, an ammeter, mounted in the instrument panel, a shunt, a switch and a circuit breaker. The de-ice system applies heat to the surfaces of the propeller blades where ice would normally adhere. This heat, plus centrifugal force and the blast from the airstream, removes accumulated ice. Each de-icer has two separate electrothermal heating elements, an inboard section and an outboard section. When the switch is turned on, the timer provides power through the brush block and slip ring to outboard elements for approximately 20 seconds, reducing ice and adhesion in these areas. Then the timer switches power to inboard heating elements for approximately 20 seconds. It then returns to the outer elements and continues cycling action. This outboard-inboard sequence is very important since the loosened ice, through centrifugal force moves outboard. Heating may begin at any phase in the cycle, depending on timer position when the switch was turned off from previous use. Ground checkout of the systems is permitted when the engine is not running. System components may be removed and replaced, using the figure as a guide. Propeller removal is necessary before de-ice components, except brush block assembly, can be installed or removed.

### 14-63. TROUBLE SHOOTING.

#### NOTE

The propeller anti-ice ammeter may be used while trouble shooting the system. The ammeter needle should rest within the shaded band except for "flickers" approximately 20 seconds apart, as the step switch of the timer operates. The ammeter will also reflect a bad connection or open circuit by reading below normal or zero. A high reading indicates a short circuit.

TROUBLE	PROBABLE CAUSE	REMEDY
ELEMENTS DO NOT HEAT.	Circuit breaker out or defective.	Reset circuit breaker. If it pops out again, determine cause and correct. Replace defective parts.
	Defective wiring.	Repair or replace wiring.
	Defective switch.	Replace switch.
	Defective timer.	Replace timer.
SOME ELEMENTS DO NOT HEAT.	Defective brush-to-slip ring connection.	Check alignment. Replace defective parts.
	Incorrect wiring.	Correct wiring.
	Defective wiring.	Repair or replace wiring.
	Defective timer.	Replace timer.

# MODEL R182 AND TR182 SERVICE MANUAL

## 14-63. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
SOME ELEMENTS DO NOT HEAT (CONT).	Defective brush-to-slip ring connection.	Check alignment. Replace defective parts.
	Defective element.	Replace element.
CYCLING SEQUENCE NOT CORRECT OR NO CYCLING.	Crossed connections.	Correct wiring.
	Defective timer.	Replace timer.
RAPID BRUSH WEAR, FREQUENT BREAKAGE, SCREECHING OR CHATTERING.	Brush block or slip ring out of alignment.	Align properly.

## 14-64. TIMER TEST.

- a. Remove connector plug of wire harness from timer and jump power input socket of wire harness to timer input pins. (Refer to chart following this paragraph for pin identification.)
- b. Jump timer ground pin to ground.
- c. Turn on de-icing system.
- d. Check timer operation per the chart. (Use a voltmeter.)
- e. Check volts to ground in each case. If engine is not running, and auxiliary power is not used, voltage will be battery voltage and cycle time may be slightly longer than indicated.
- f. Hold voltmeter probe on pin until voltage drops to 0. Move probe to next pin in the sequence shown in the chart. Check voltage at each pin in sequence. When correctness of the cycling sequence is established, turn propeller de-ice switch off at the beginning of one of the on-time periods, and record the number of the pin at which the voltage supply is present.

TIMER P/N	POWER INPUT PIN	GROUND PIN	OUTPUT SEQUENCE (TIME)	TIME REPEAT CYCLE TIME (SECONDS)
C40171	1 (24VDC)	5 (24VDC)	Three, 20 seconds each	60

- 14-65. SLIP RING ALIGNMENT. After installation, the slip ring assembly must be checked for run-out, and adjustments made, if necessary.

### NOTE

Excessive slip ring run-out will result in severe arcing between the slip ring and brushes, and cause rapid brush wear. If allowed to persist, this condition will result in rapid deterioration of the slip ring and brush contact surfaces, and lead to the eventual failure of the De-Icing System.

# MODEL R182 AND TR182 SERVICE MANUAL

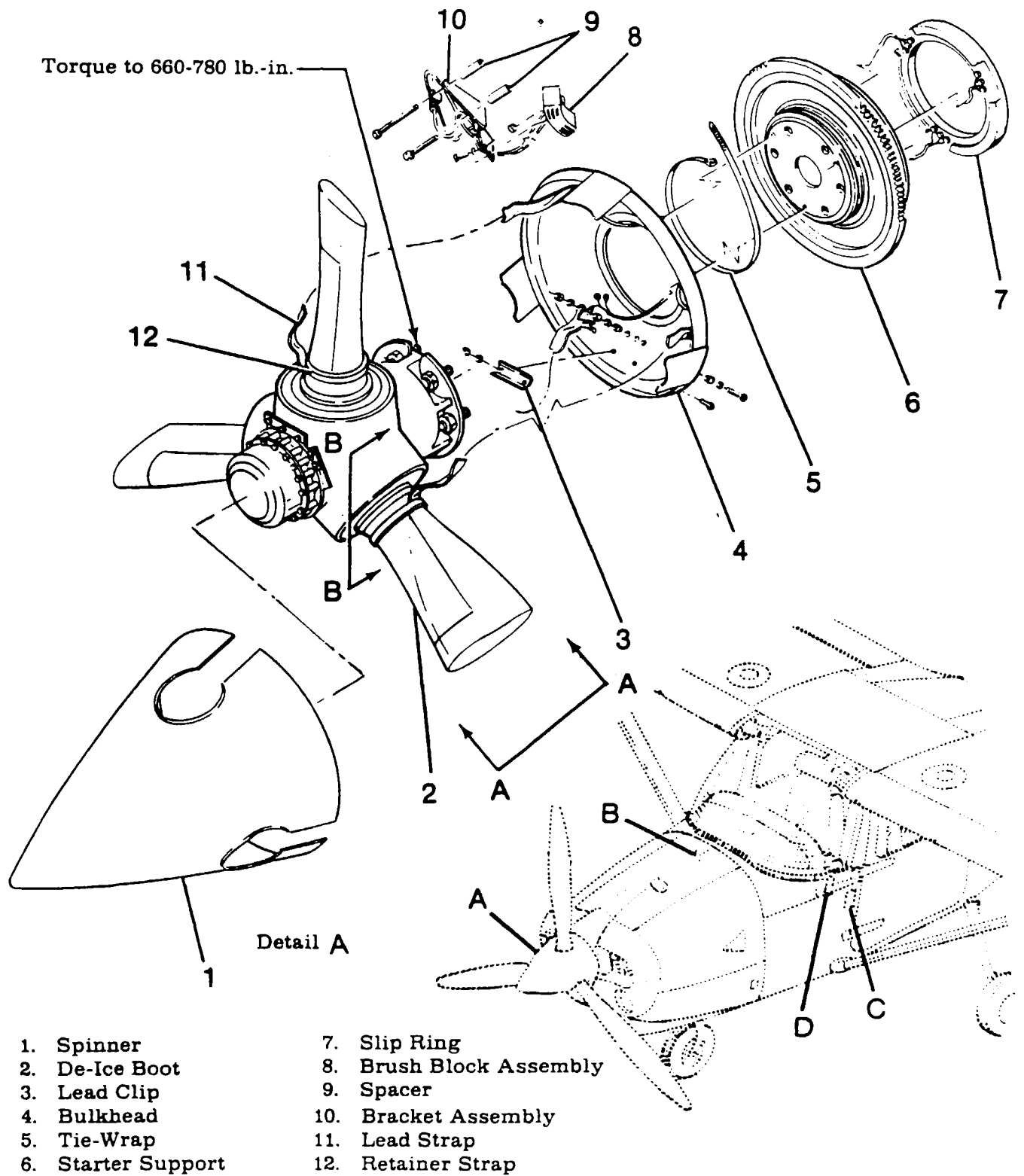
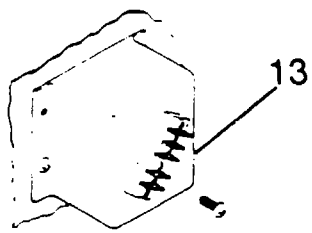
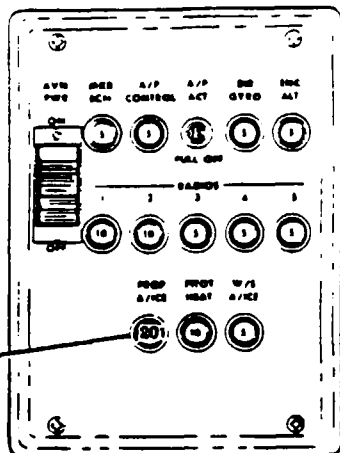


Figure 14-6. McCauley 3-Bladed Propeller De-Ice System (Sheet 1 of 3)

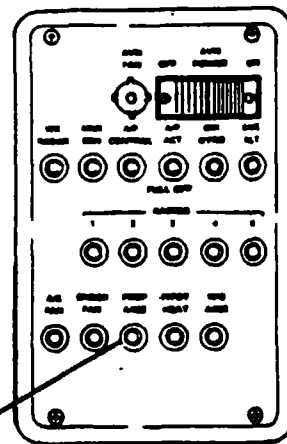
# MODEL R182 AND TR182 SERVICE MANUAL



Detail **B**



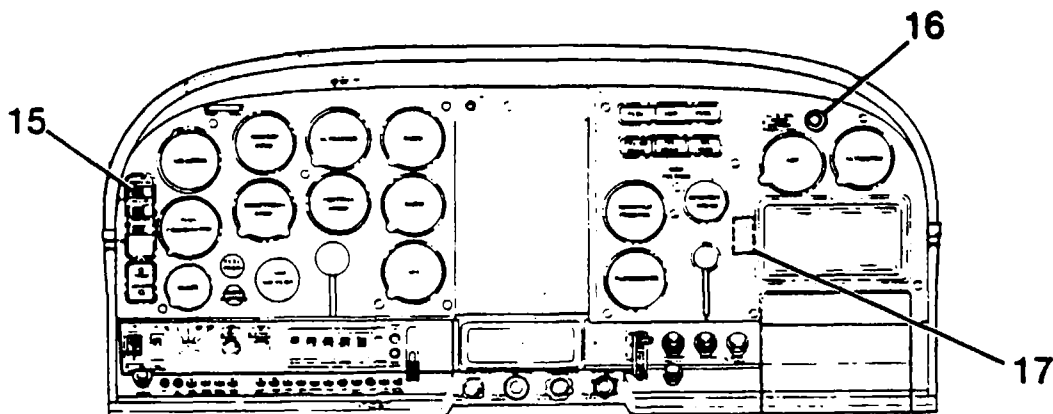
THRU 1982 MODELS



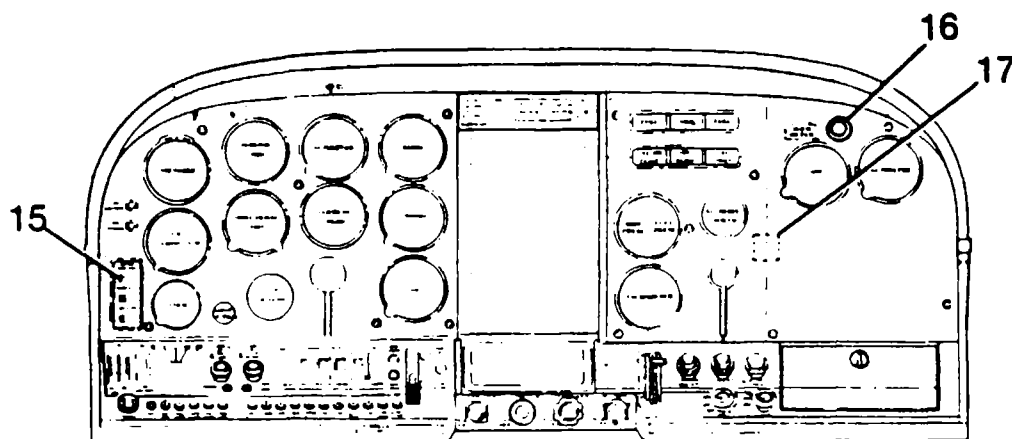
BEGINNING WITH 1983 MODELS

- 13. Timer
- 14. Circuit Breaker
- 15. Prop De-ice Switch
- 16. Prop De-ice Ammeter
- 17. Shunt

Detail **C**



THRU 1982 MODELS

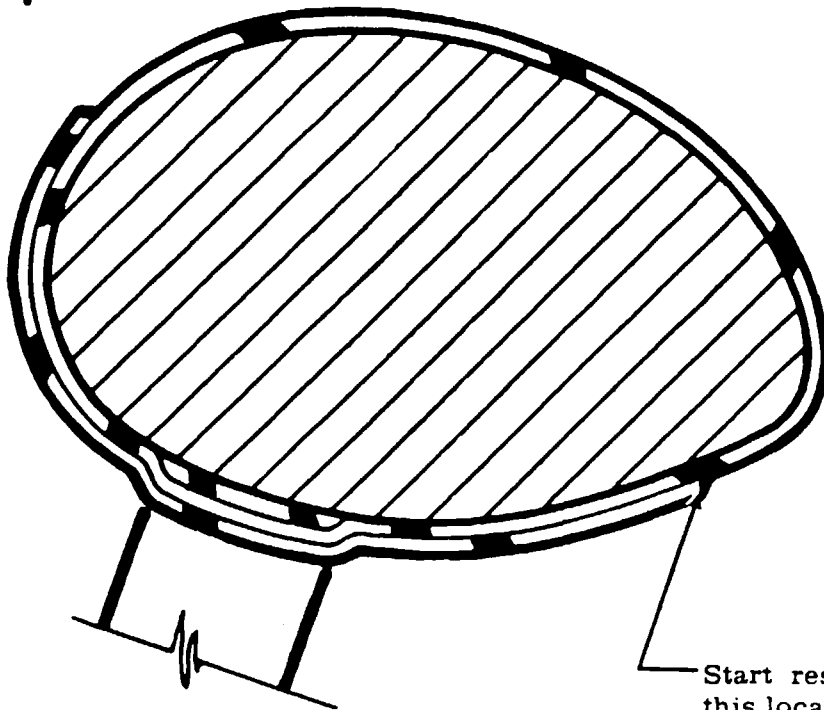
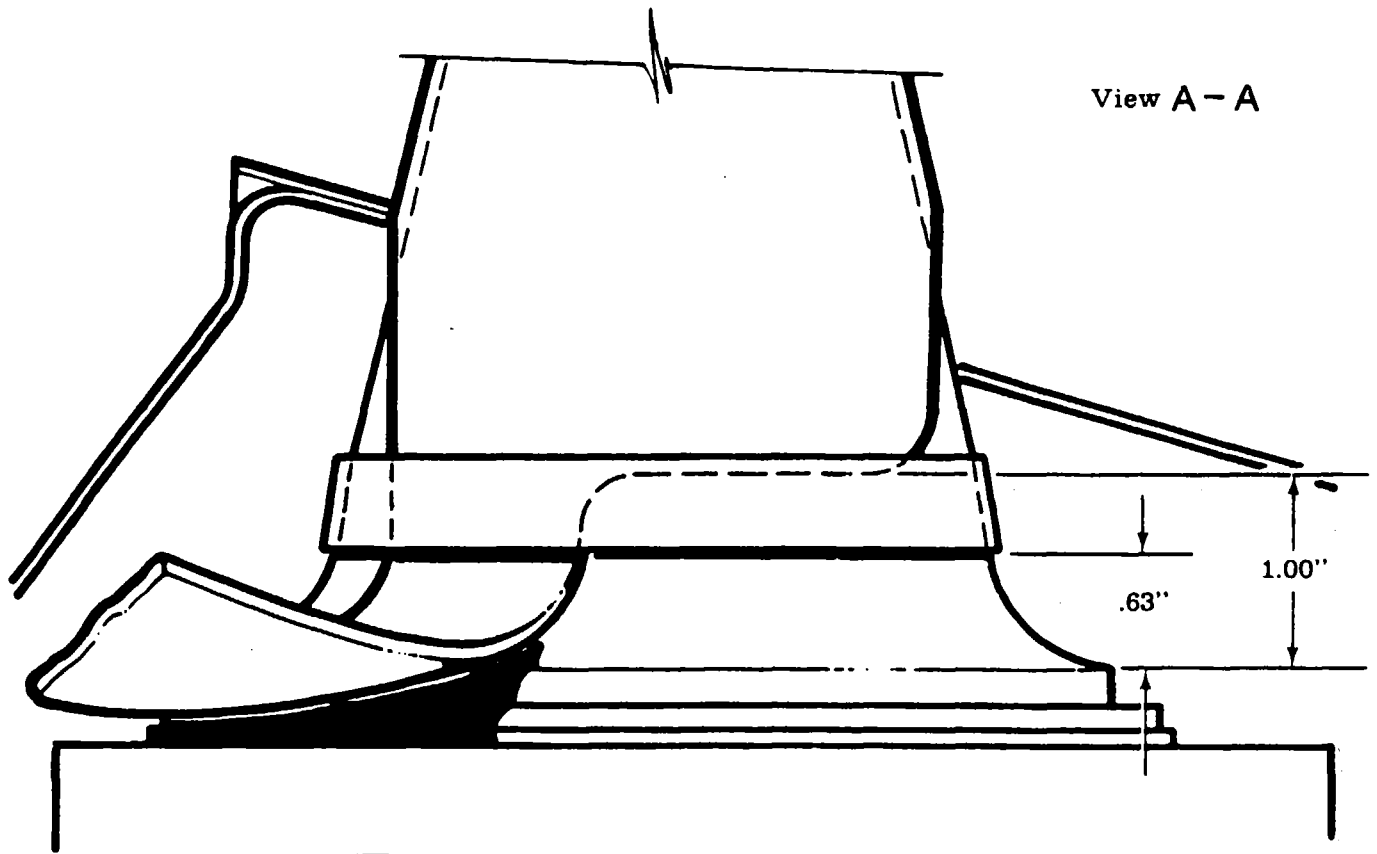


BEGINNING WITH 1983 MODELS

Detail **D**

Figure 14-6. McCauley 3-Bladed Propeller De-Ice System (Sheet 2 of 3)

MODEL R182 AND TR182 SERVICE MANUAL



Start restrainer strap approximately in this location so a double thickness is over lead strap of the de-icer.

Figure 14-6. McCauley 3-Bladed Propeller De-Ice System (Sheet 3 of 3)



## MODEL R182 AND TR182 SERVICE MANUAL

- a. Securely attach dial indicator gauge to the engine, and place the pointer on the slip ring.
- b. Rotate propeller slowly by hand, noting the deviation of the slip ring from a true plane as indicated on the gauge.
- c. Check that total run-out does not exceed 0.008-inch ( $\pm 0.004$ -inch). Also check that run-out does not exceed 0.002-inch within any 4 inches of slip ring travel.

### CAUTION

Due to the loose fit of some propeller bearings, a considerable error may be indicated in the readings by pushing in or pulling out on the propeller while rotating it. Care must be taken not to exert a uniform push or pull on the propeller to hold this error to a minimum.

- d. If slip ring run-out is within the limits specified, no corrective action is required. A small amount of run-out may be corrected by varying the torque of the attachment bolts within the limits specified by the propeller manufacturer.
- e. If the procedure outlined in step "d" does not produce acceptable run-out, fabricate small washer shaped shims (approximately .010 inch), and place on attachment bolts, limit one washer per bolt, between slip ring and spinner bulkhead or mounting plate.
- f. Recheck run-out. Adjust shim thickness and vary torque of attachment bolts until slip ring runs true within the prescribed tolerance.

14-66. INSTALLATION AND ALIGNMENT OF BRUSH BLOCK ASSEMBLY. (See figures 14-7 and 14-8.)

### NOTE

Installation of the brush block should be deferred, when possible, until after the slip ring, propeller, and related components are installed. However, the brush block assembly may be replaced without removing the propeller. To avoid breakage when installing the brush block assembly, keep brushes retracted in brush block until slip ring and propeller assemblies have been installed.

### CAUTION

Make sure that slip ring run-out has been corrected before attempting to align brushes on slip ring.

- a. In order to get smooth, efficient and quiet transfer of electric power from the brushes to the slip ring, brush alignment must be checked and adjusted, if necessary to meet the following requirements.
  1. Length of brushes from slip ring to brush block housing to be 0.063 ( $\pm 0.015$ -inch).
  2. The brushes must be lined up with the slip ring so that the entire face of each brush is in contact with the slip ring throughout the full 360° of slip ring rotation.
  3. The brushes must contact the slip ring at an angle of approximately 2° from perpendicular to the slip ring surface, measured toward the direction of rotation of the slip ring.

## MODEL R182 AND TR182 SERVICE MANUAL

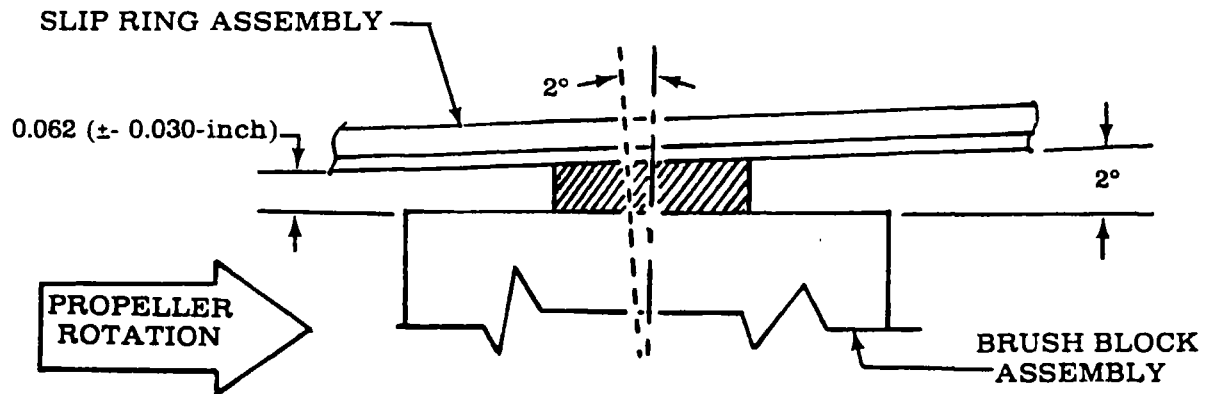


Figure 14-7. Angular Brush Alignment

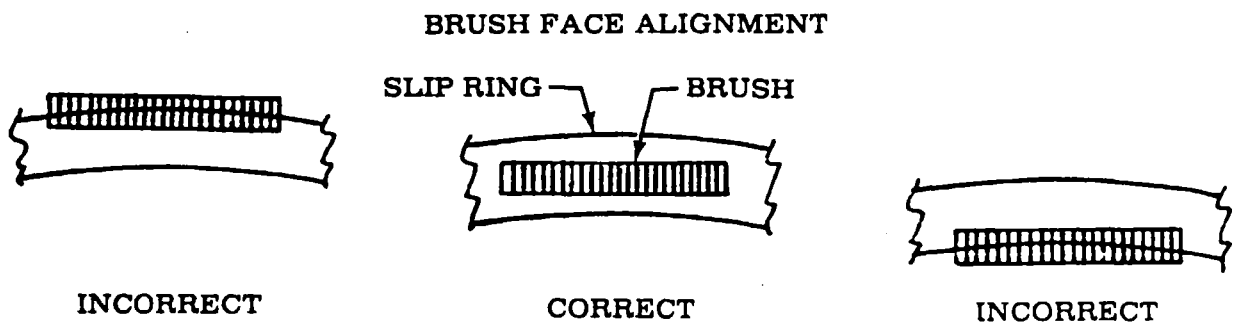


Figure 14-8. Brush Face Alignment

- b. Brush projection can normally be adjusted by loosening hardware attaching the brush block and holding the brushes in the desired location while retightening the hardware. Slotted holes are provided.

14-67. REPLACEMENT OF DE-ICE BOOTS. (Refer to paragraph 14-38.)

14-68. HEATED WINDSHIELD PANEL. (REMOVABLE.) (See figure 14-9.)

14-69. DESCRIPTION. The panel is constructed of two sheets of plate glass, covering a layer of vinyl. Imbedded in the vinyl is a fine resistance wire which provides the heat for windshield de-icing. The lower mounting assembly of the panel is hinged for easy cleaning between the panel and the windshield. The hinge pins are spring-loaded and fit into mounting brackets, installed on the windshield retainer and upper cowl deck. The spring-loaded pins facilitate easy removal and installation. The upper end of the panel is supported by a bumper which holds the panel of the windshield. Power to the windshield panel is provided through a plug, located in a housing assembly, just left of the lower outboard support bracket. The system is controlled by a switch on the instrument panel. The system is protected by a 5-amp. circuit breaker, located in the left circuit breaker panel.

14-70. REMOVAL AND INSTALLATION. (See figure 14-9.) The figure may be used as a guide for removal and installation of the heated windshield panel.

MODEL R182 AND TR182 SERVICE MANUAL

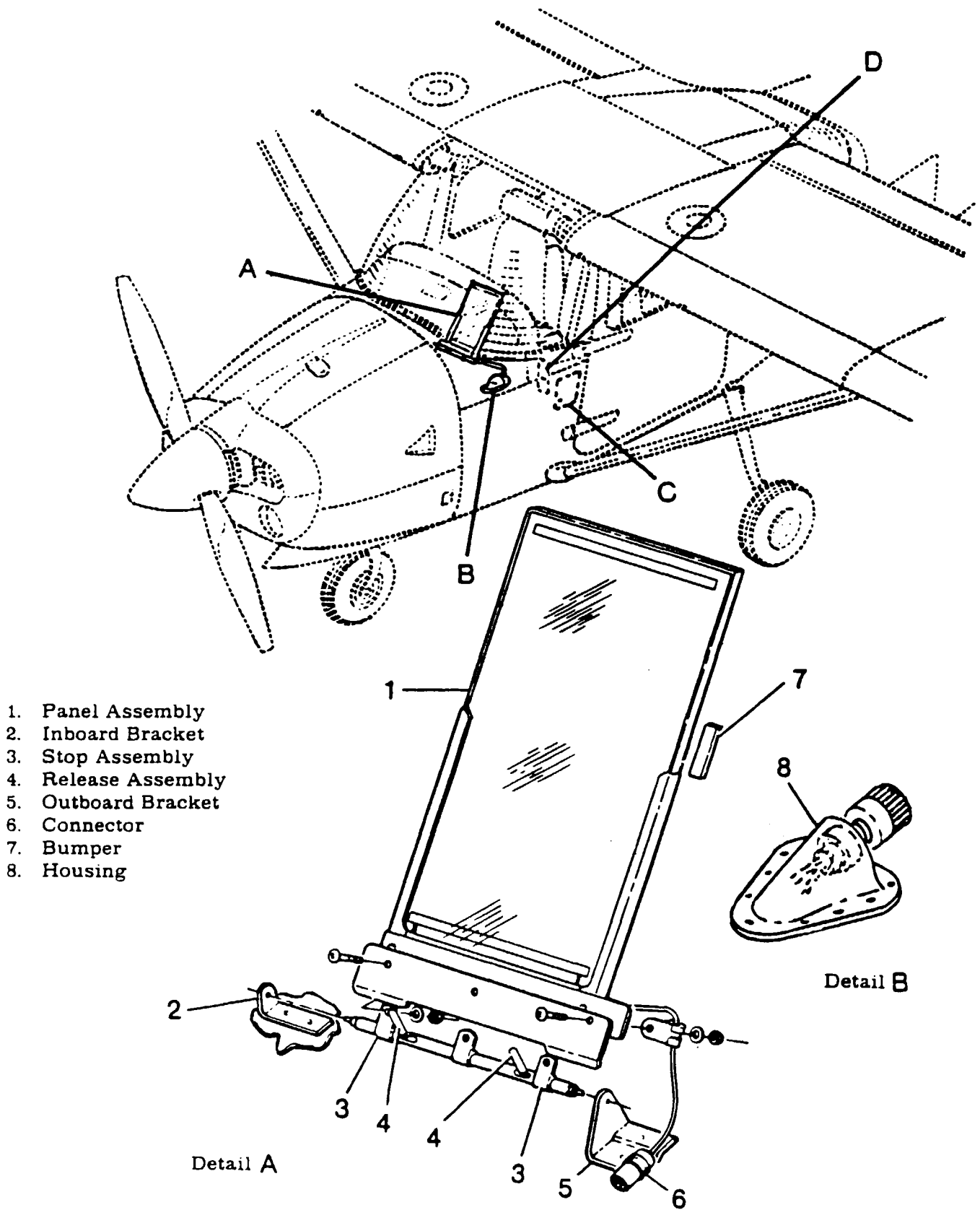
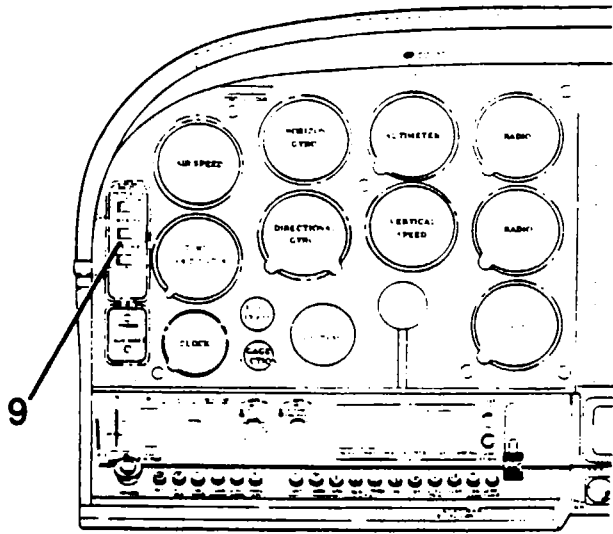
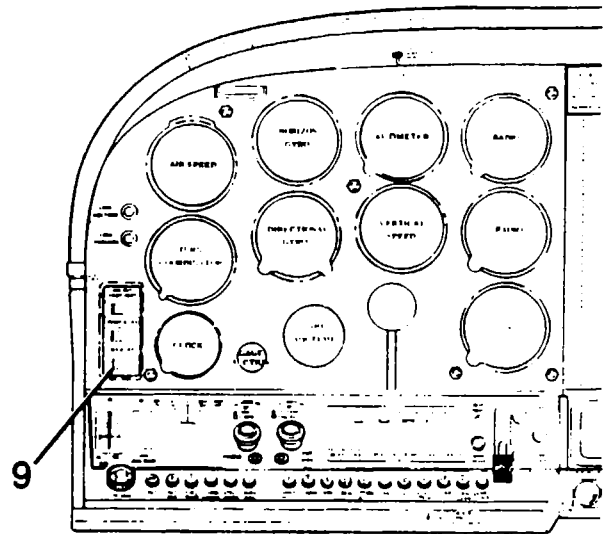


Figure 14-9. Heated Windshield Panel (Removable) (Sheet 1 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL



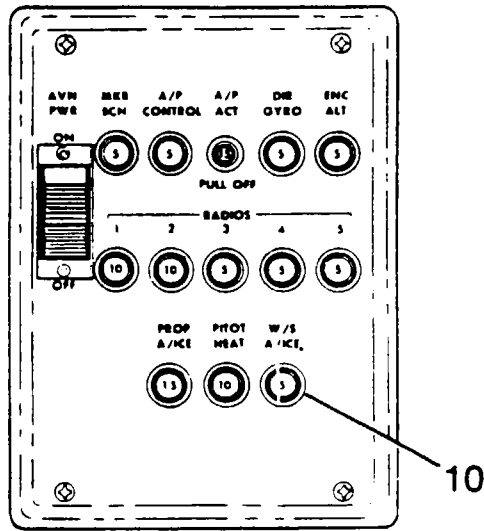
THRU 1982 MODELS



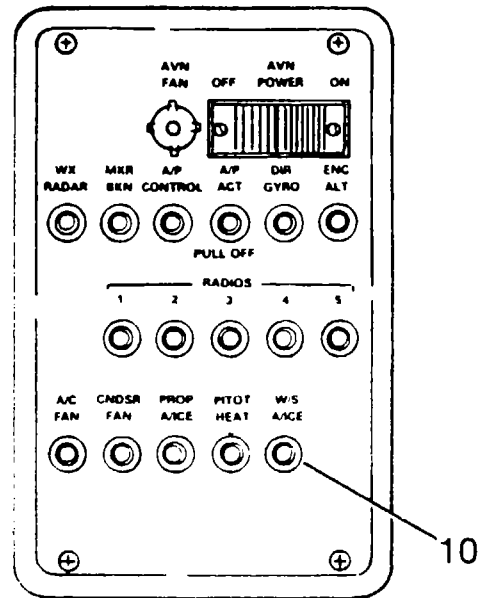
BEGINNING WITH  
1983 MODELS

Detail **D**

- 9. Switch
- 10. Circuit Breaker



THRU 1982 MODELS



BEGINNING WITH  
1983 MODELS

Detail **C**

Figure 14-9. Heated Windshield Panel (Removable) (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

### 14-71. CONTROL SURFACE DISCHARGERS.

14-72. DESCRIPTION. Wick type static dischargers may be installed on the trailing edge surfaces of the ailerons, elevators, and rudder of the aircraft. One type discharger is fabricated with the wick and base combined into an integral unit; in the other type, the wick is attached to the base by a threaded fitting, and may be replaced without removing the base from the aircraft. The installation of static dischargers reduces the build-up of static electricity on the airframe as a consequence of flying through haze, dust, rain, snow or ice crystals. In some cases, if dischargers are not installed or not functioning as a result of age or repeated exposure static electricity, static build-up can result in the loss of usable radio signals on all communication and navigation equipment. Whenever static dischargers are installed, replaced, and at regular intervals during their service life, resistance checks should be performed to determine their effectiveness in reducing static build-up.

14-73. RESISTANCE CHECK. Since static dischargers lose their effectiveness with age and exposure to static electricity, they should be checked with a 500 to 1000 volt capacity megohmmeter every 500 hours or annually; whichever occurs first. Megohmmeters may be purchased from the following source:

James G. Biddle Co.  
Plymouth Meeting, PA 19462

### NOTE

A GOOD aircraft ground must be established in order to perform RELIABLE resistance checks on the control surface dischargers.

Perform the following resistance checks on each control surface discharger and replace those which do not conform to the resistance requirements.

- a. If the wick and base of the discharger are an integral unit, the resistance from the base of the discharger to a good aircraft ground should check 2.5 milliohms maximum.
- b. If the wick can be separated from the base, the resistance from the base to a good aircraft ground should check 1.0 ohm maximum.
- c. Connect the EARTH terminal of Megger tester to the base of the discharger. Check resistance at tip of discharger using the 500-volt scale of the Megger. If scale checks less than 1 megohm or greater than 100 megohms, replace the wick.

### WARNING

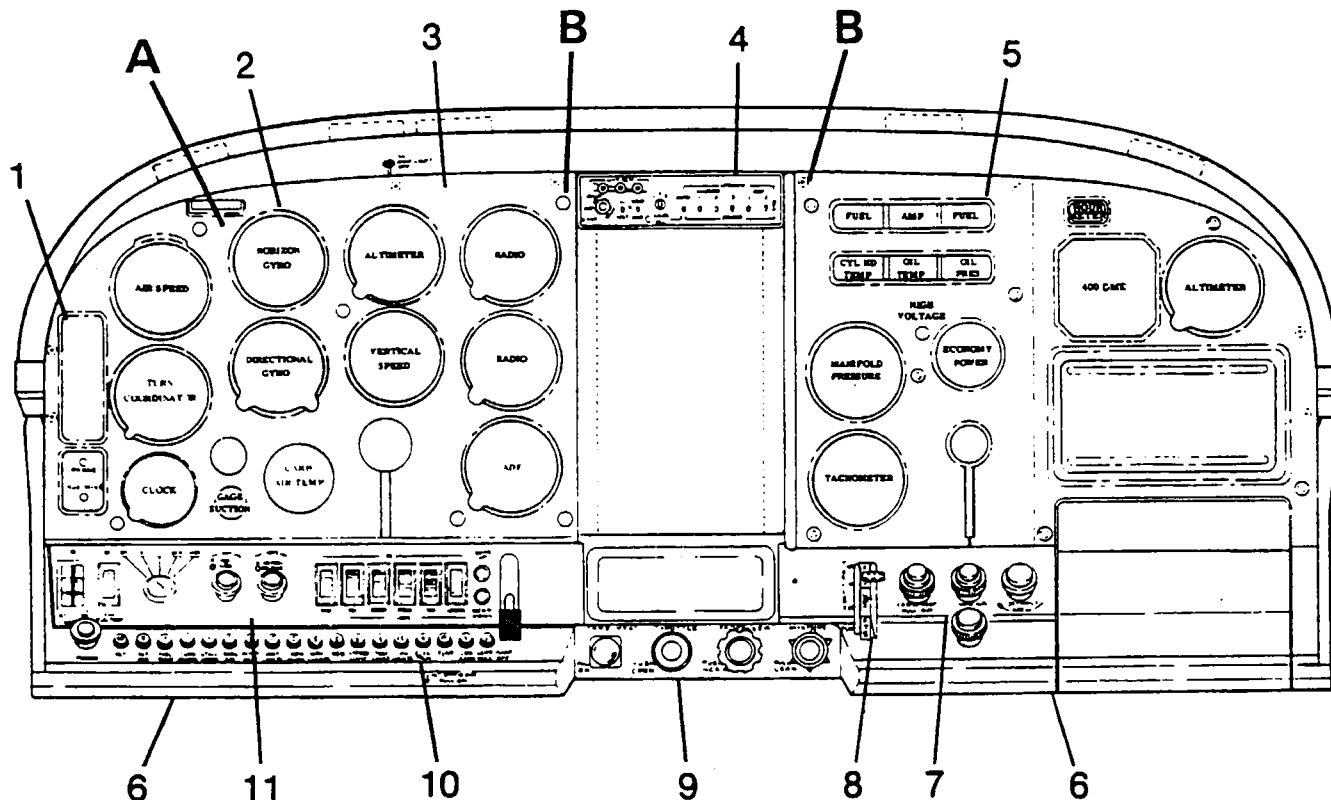
Do not bend the wick during the preceding check, since wicks have a higher resistance when bent.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

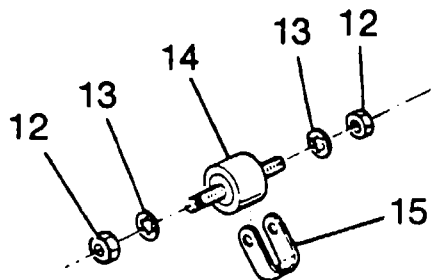
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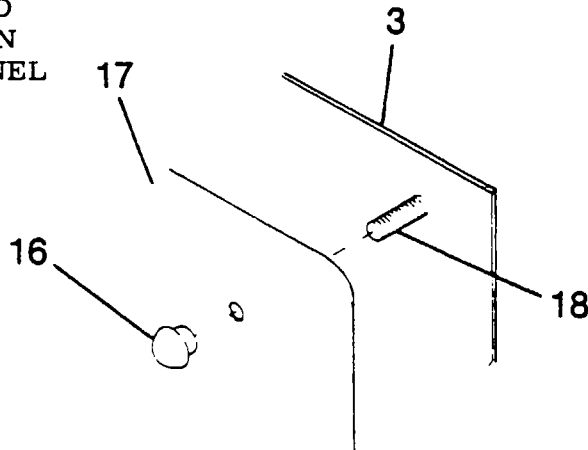
# MODEL R182 AND TR182 SERVICE MANUAL



NOTE POSITION OF GROUND STRAP AND SEQUENCE OF ATTACHING PARTS WHEN REMOVING OR INSTALLING SHOCK PANEL



Detail A



Detail B

- |                                     |                           |
|-------------------------------------|---------------------------|
| 1. Marker Beacon Controls           | 10. Circuit Breaker Panel |
| 2. Shock Mounted Panel              | 11. Switch Panel          |
| 3. Removeable Panel                 | 12. Nut                   |
| 4. Radio and Switch Panel           | 13. Washer                |
| 5. Fuel and Engine Instruments      | 14. Shock Mount           |
| 6. Knee Pad                         | 15. Ground Strap          |
| 7. Heating and Ventilating Controls | 16. Threaded Button       |
| 8. Wing Flap Control                | 17. Decorative Cover      |
| 9. Engine Controls                  | 18. Stud                  |

Figure 15-1. Instrument Panel

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- 15-1. INSTRUMENTS AND INSTRUMENT SYSTEMS.
- 15-2. GENERAL. This section describes typical instrument installations and their respective operating systems. Emphasis is placed on trouble shooting and corrective measures only. It does NOT deal with specific instrument repairs since this usually requires special equipment and data and should be handled by instrument specialists. Federal Aviation Regulations require malfunctioning instruments be sent to an approved instrument overhaul and repair station or returned to manufacturer for servicing. Our concern here is with preventive maintenance on various instrument systems and correction of system faults which result in instrument malfunctions. The descriptive material, maintenance and trouble shooting information in this section is intended to help the mechanic determine malfunctions and correct them, up to the defective instrument itself, at which point an instrument technician should be called in. Some instruments, such as fuel quantity and oil pressure gages, are so simple and inexpensive, repairs usually will be more costly than a new instrument. On the other hand, aneroid and gyro instruments usually are well worth repairing. The words "replace instrument" in the text, therefore, should be taken only in the sense of physical replacement in aircraft. Whether replacement is to be with a new instrument, an exchange one, or original instrument is to be repaired must be decided on basis of individual circumstances.
- 15-3. INSTRUMENT PANEL. (See figure 15-1.)
- 15-4. DESCRIPTION. The instrument panel assembly consists of a stationary panel, a removable flight instrument panel and a shock-mounted panel. The stationary panel, containing fuel and engine instruments is secured to the engine mount stringers and a forward fuselage bulkhead. The removeable panel, containing flight instruments such as airspeed, vertical speed and altimeter is secured to the stationary panel with screws. The shock-mounted panel, containing major flight instruments such as the horizontal and directional gyros is secured to the removable panel with rubber shock-mounted assemblies. Most of the instruments are screw mounted on the panel.
- 15-5. REMOVAL AND INSTALLATION.
- a. Flight Instrument Panel.
    1. Unscrew threaded buttons and remove decorative cover. Disconnect post light wiring if installed.
    2. Tag and disconnect plumbing and wiring. Cap plumbing.
    3. Remove screws securing flight instrument panel to stationary panel and pull straight back to remove.
    4. To install, place panel in position and install screws.
    5. Install flight instruments in panel.
    6. Uncap plumbing and connect plumbing also wiring. Do not over-tighten connections. Refer to note in paragraph 15-9.
  - b. Shock-Mounted Panel.

### NOTE

Due to the difficulty encountered when removing the shock-mounted panel with the gyros installed, it is recommended that the directional gyro be disconnected and removed prior to removal of the shock-mounted panel.



## MODEL R182 AND TR182 SERVICE MANUAL

1. Unscrew threaded buttons and remove decorative cover. Disconnect post light wiring if installed.
2. Tag, disconnect and cap gyro plumbing.
3. Remove directional gyro mounting screws and remove gyro from panel.
4. Remove shock-mount nuts and washers then work panel out from behind flight instrument panel. The horizon gyro may also be removed from panel if desired.
5. To install shock-mounted panel, place panel over shock mount studs. Be sure the ground strap is installed in the proper position, if removed, then install nuts and washers.
6. Install gyros, uncap and install plumbing. Refer to note in paragraph 15-9.
7. Install decorative cover.

15-6. **SHOCK-MOUNTS.** Service life of shock-mounted instruments is directly related to adequate shock-mounting of the panel. If removal of shock-mounted panel is necessary, check mounts for deterioration and replace as necessary.

15-7. **INSTRUMENTS.** (See figure 15-1.)

15-8. **REMOVAL.** Most instruments are secured to the panel with screws inserted through the panel face, under the decorative cover. To remove an instrument, remove decorative cover, disconnect wiring or plumbing to instrument, remove mounting screws and take instrument out from behind, or in some cases, from front of panel. Instrument clusters are installed as units and are secured by a screw at each end. A cluster must be removed from panel to replace an individual gage. In all cases when an instrument is removed, disconnected lines or wires should be protected. Cap open lines and cover pressure connections on instrument to prevent thread damage and entrance of foreign matter. Wire terminals should be insulated or tied up to prevent accidental grounding or short-circuiting.

15-9. **INSTALLATION.** Generally, installation procedure is the reverse of removal procedure. Ensure mounting screw nuts are tightened firmly, but do not over-tighten, particularly on instruments having plastic cases. The same rule applies to connecting plumbing and wiring.

### NOTE

All instruments (gages and indicators), requiring a thread seal or lubricant, shall be installed using teflon tape on male fittings only. This tape is available through the Cessna Supply Division.

When replacing an electrical gage in an instrument cluster assembly, avoid bending pointer or dial plate. Distortion of dial or back plate could change the calibration of gages.

15-10. **PITOT AND STATIC SYSTEMS.**

15-11. **DESCRIPTION.** The pitot system conveys ram air pressure to the airspeed indicator. The static system vents vertical speed indicator, altimeter and airspeed indicator to atmospheric pressure through plastic tubing connected to static ports. A static line sump is installed at each source button to collect condensation in static system. A pitot tube heater may be installed. The heating element is controlled by a switch at the instrument panel and

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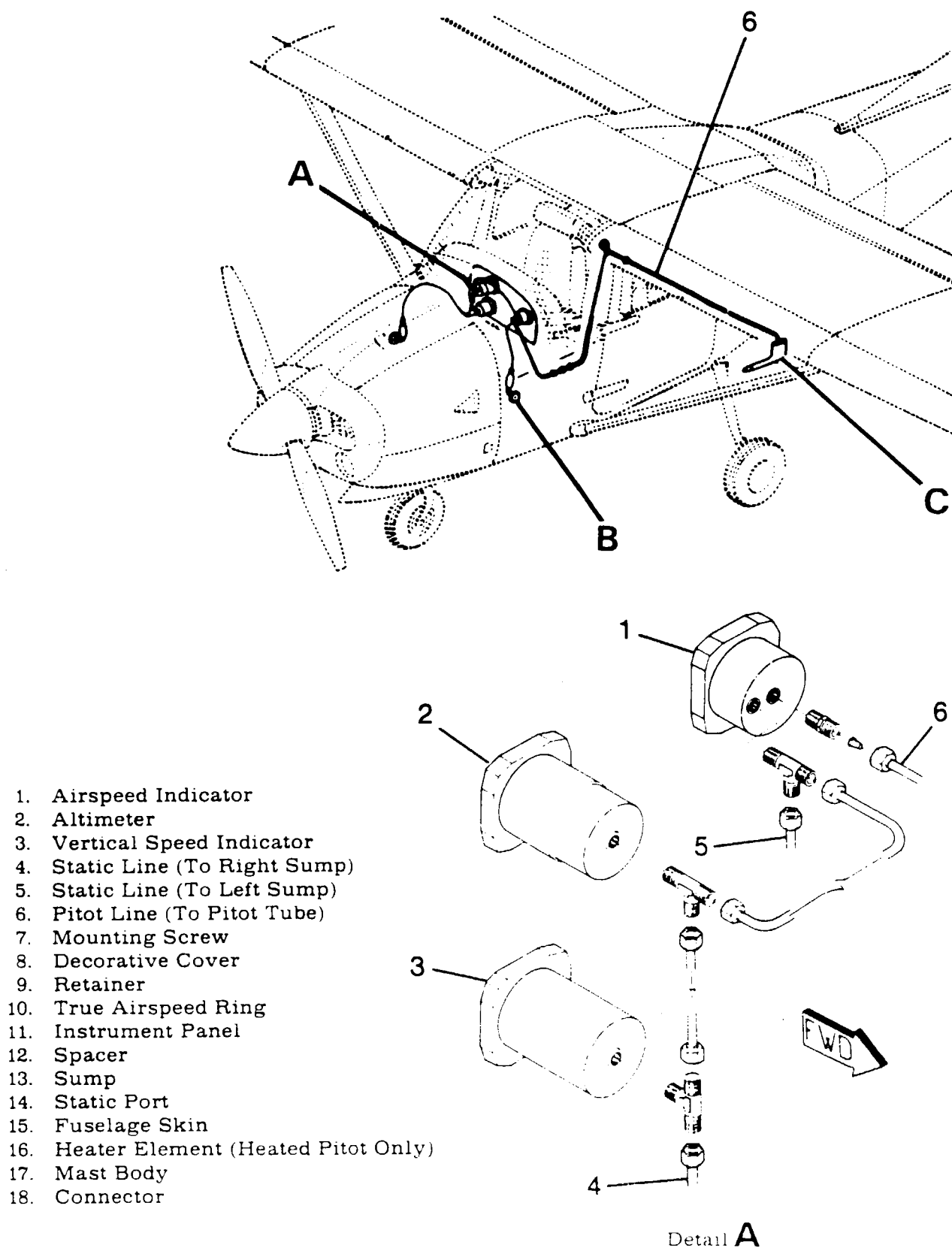


Figure 15-2. Pitot-Static Systems (Sheet 1 of 2)

MODEL R182 AND TR182 SERVICE MANUAL

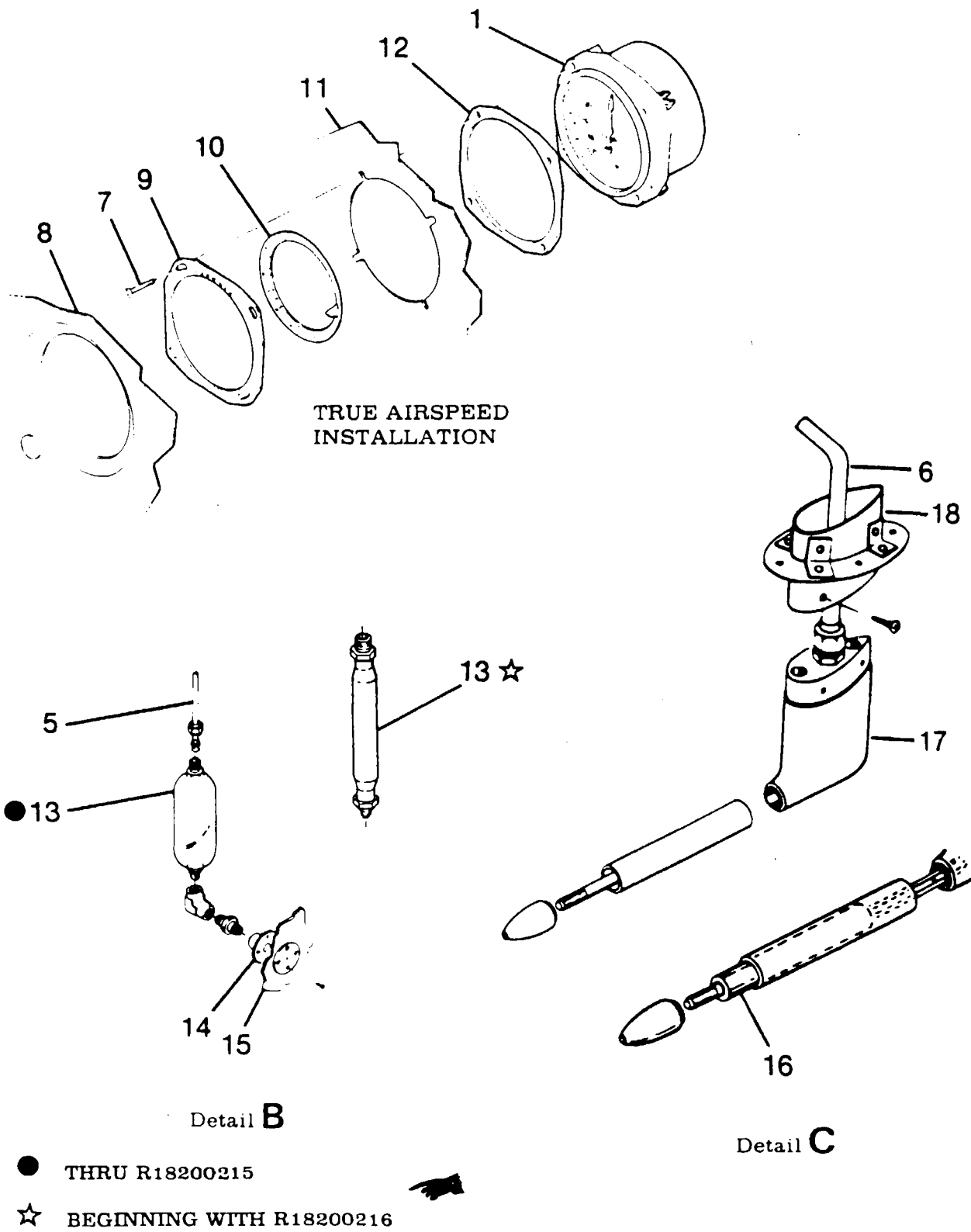


Figure 15-2. Pitot-Static Systems (Sheet 2 of 2)

MODEL R182 AND TR182 SERVICE MANUAL

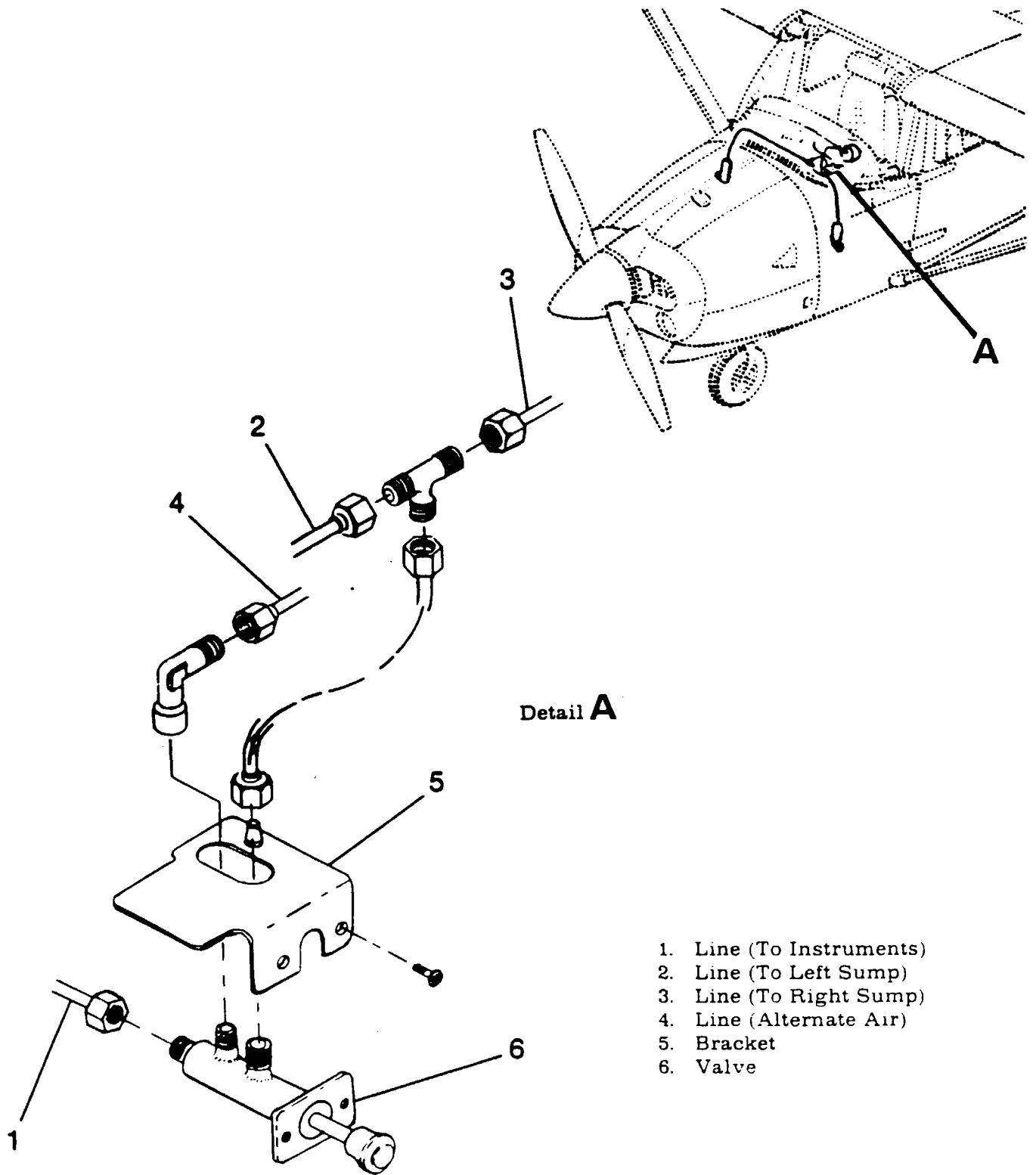


Figure 15-3. Alternate Static Air System

## MODEL R182 AND TR182 SERVICE MANUAL

powered by the electrical system. A static pressure alternate source valve may be installed in the static system for use when the external static source is malfunctioning. This valve also permits draining condensate from the static lines. Refer to PILOT'S OPERATING HANDBOOK for flight operation using alternate static source pressure. The encoding altimeter supplies an altimeter reading to the optional 300 or 400 transponder for signal transmission. The standby altimeter is connected to the static system by a tube to the vertical speed indicator. The static tube installation will vary when an alternate static source is installed.

- 15-12. **MAINTENANCE.** Proper maintenance of pitot and static system is essential for proper operation of altimeter, vertical speed and airspeed indicators. Leaks, moisture and obstructions in pitot system will result in false airspeed indications, while static system malfunctions will affect readings of all three instruments. Under instrument flight conditions, these instrument errors could be hazardous. Cleanliness and security are the principal rules for system maintenance. The pitot tube and static ports **MUST** be kept clean and unobstructed.
- 15-13. **STATIC PRESSURE SYSTEM INSPECTION AND LEAKAGE TEST.** The following procedure outlines inspection and testing of static pressure system, assuming altimeter has been tested and inspected in accordance with current Federal Aviation Regulations.
- a. Ensure static system is free from entrapped moisture and restrictions.
  - b. Ensure no alterations or deformations of airframe surface have been made which would affect the relationship between air pressure in static pressure system and true ambient static air pressure for any flight configuration.
  - c. Seal one static source port with pressure sensitive tape. This seal must be air tight.
  - d. Close static pressure alternate source valve, if installed.
  - e. Attach a source of suction to the remaining static pressure source opening. Figure 15-5 shows one method of obtaining suction.
  - f. Slowly apply suction until altimeter indicates a 1000-foot increase in altitude.

### CAUTION

When applying or releasing suction, do not exceed range of vertical speed indicator or airspeed indicator.

- g. Cut off suction source to maintain a "closed" system for one minute. Leakage shall not exceed 100 feet of altitude loss as indicated on altimeter.
- h. If leakage rate is within tolerance, slowly release suction source and remove tape from static port.

### NOTE

If leakage rate exceeds the maximum allowable, first tighten all connections, then repeat leakage test. If leakage rate still exceeds the maximum allowable, use following procedure.

- i. Disconnect static pressure lines from airspeed indicator and vertical speed indicator. Use suitable fittings to connect lines together so altimeter is the only instrument still connected into static pressure system.

## MODEL R182 AND TR182 SERVICE MANUAL

- j. Repeat leakage test to check whether static pressure system or the bypassed instruments are cause of leakage. If instruments are at fault, they must be repaired by an "appropriately rated repair station" or replaced. If static pressure system is at fault, use following procedure to locate leakage.
- k. Attach a source of positive pressure to static source opening. Figure 15-4 shows one method of obtaining positive pressure.

### CAUTION

Do not apply positive pressure with airspeed indicator or vertical speed indicator connected to static pressure system.

- l. Slowly apply positive pressure until altimeter indicates a 500-foot decrease in altitude and maintain this altimeter indication while checking for leaks. Coat line connections and static source flange with LEAK-TEC or a solution of mild soap and water, watching for bubbles to locate leaks.
  - m. Tighten leaking connections. Repair or replace parts found defective.
  - n. Reconnect airspeed and vertical speed indicators into static pressure system and repeat leakage test per steps "c" thru "h".
- 15-14. **PITOT SYSTEM INSPECTION AND LEAKAGE TEST.** To check pitot system for leaks, place a piece of tape over small hole in lower aft end of pitot tube, fasten a piece of rubber or plastic tubing over pitot tube, close opposite end of tubing and slowly roll up tube until airspeed indicator registers in cruise range. Secure tube and after a few minutes recheck airspeed indicator. Any leakage will have reduced the pressure in system, resulting in a lower airspeed indication. Slowly unroll tubing before removing it, so pressure is reduced gradually. Otherwise instrument may be damaged. If test reveals a leak in system, check all connections for tightness.
- 15-15. **BLOWING OUT LINES.** Although the pitot system is designed to drain down to pitot tube opening, condensation may collect at other points in system and produce a partial obstruction. To clear the line, disconnect it at airspeed indicator. Using low pressure air, blow from indicator end of line toward the pitot tube.

### CAUTION

Never blow through pitot or static lines toward the instruments.

Like the pitot lines, static pressure lines must be kept clear and connections tight. Static source sumps collect moisture and keeps system clear. However, when necessary, disconnect static line at first instrument to which it is connected, then blow line to clear with low pressure air.

### NOTE

On aircraft equipped with alternate static source, use the same procedure, opening alternate static source valve momentarily to clear line, then close valve and clear remainder of system.

## MODEL R182 AND TR182 SERVICE MANUAL

Check all static pressure line connections for tightness. If hose or hose connections are used, check for general condition and clamps for security. Replace hoses which have cracked, hardened or show other signs of deterioration.

15-16. **REMOVAL AND INSTALLATION OF COMPONENTS.** (See figure 15-2.) To remove pitot mast, remove four mounting screws on side of connector (18) and pull mast out of connector far enough to disconnect pitot line (6). Electrical connections to heater assembly (if installed) may be disconnected through wing access opening just inboard of mast. Pitot and static lines are removed in the usual manner, after removing wing access plates, lower wing fairing strip and upholstery as required. Installation of tubing will be simpler if a guide wire is drawn in as tubing is removed from wing. The tubing may be removed intact by drawing it out through cabin and right door. When replacing components of pitot and static pressure systems, use anti-seize compound sparingly on male threads on both metal and plastic connections. Avoid excess compound which might enter lines. Tighten connections firmly, but avoid overtightening and distorting fittings. If twisting of plastic tubing is encountered when tightening fittings, VV-P-236 (USP Petrolatum), may be applied sparingly between tubing and fittings.

15-17. **TROUBLE SHOOTING -- PITOT-STATIC SYSTEM.**

TROUBLE	PROBABLE CAUSE	REMEDY
LOW OR SLUGGISH AIR-SPEED INDICATION. (Normal altimeter and vertical speed.)	Pitot tube deformed, leak or obstruction in pitot line.	Straighten tube, repair or replace damaged line.
INCORRECT OR SLUGGISH RESPONSE. (All three instruments.)	Leaks or obstruction in static line.	Repair or replace line.
	Alternate static source valve open.	Close for normal operation.

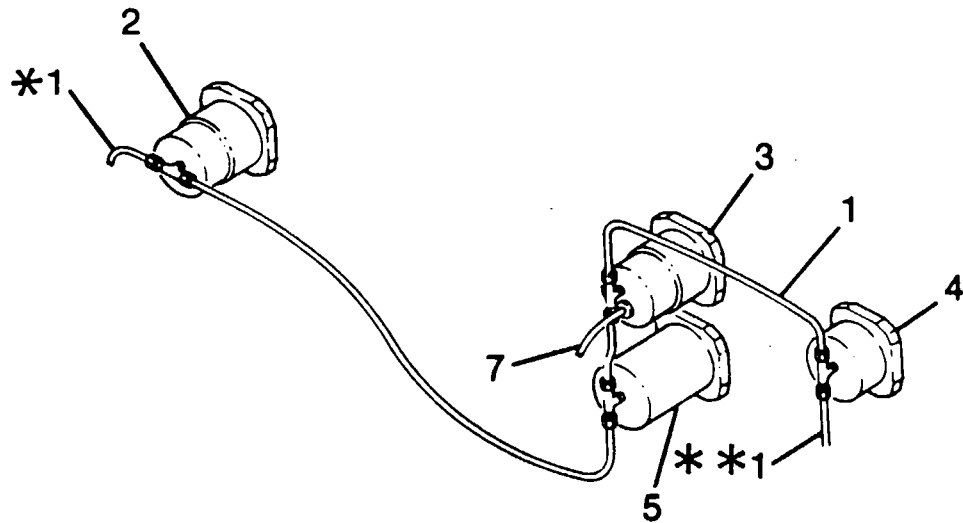
15-18. **TRUE AIRSPEED INDICATOR.** A true airspeed indicator may be installed. This indicator is equipped with a conversion ring which is rotated until pressure altitude is aligned with outside air temperature, then airspeed indicated on the instrument is read as true airspeed on the adjustable ring. See figure 15-2 for removal and installation. Upon installation, before tightening mounting screws (7), calibrate the instrument as follows: Rotate ring (10) until 105 knots on adjustable ring aligns with 105 knots on indicator. Holding this setting, move retainer (9) until 60°F aligns with zero pressure altitude, then tighten mounting screws (7) and replace decorative cover.

### NOTE

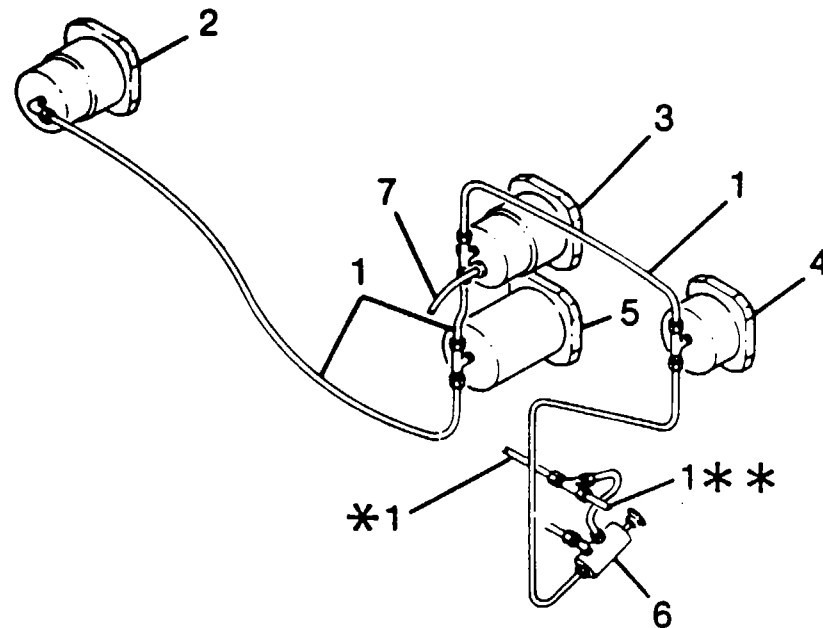
Do not overtighten screws (7) and do not lubricate any parts.

Use spacers (12) as required for adequate friction on ring assembly (10).

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WITHOUT ALTERNATE STATIC SOURCE INSTALLED



WITH ALTERNATE STATIC SOURCE INSTALLED

NOTE

- \* TO R/H STATIC SOURCE
- \* \* TO L/H STATIC SOURCE

1. Static Line
2. Standby Altimeter
3. Encoding Altimeter
4. Airspeed Indicator
5. Vertical Speed Indicator
6. Alternate Static Source Valve
7. Line (To Transponder)

Figure 15-4. Encoding Altimeter Installation



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### 15-19. TROUBLE SHOOTING -- AIRSPEED INDICATOR.

#### NOTE

Refer to paragraph 15-15 before blowing out pitot or static lines.

TROUBLE	PROBABLE CAUSE	REMEDY
HAND FAILS TO RESPOND.	Pitot pressure connection not properly connected to pressure line from pitot tube.	Repair or replace damaged line, tighten connections.
	Pitot or static lines clogged.	Blow out lines.
INCORRECT INDICATION OR HAND OSCILLATES.	Leak in pitot or static lines.	Repair or replace damaged lines, tighten connections.
	Defective mechanism.	Replace instrument.
	Leaking diaphragm.	Replace instrument.
	Alternate static source valve open.	Close for normal operation.
HAND VIBRATES.	Excessive vibration caused by loose mounting screws.	Tighten mounting screws.
	Excessive tubing vibration.	Tighten clamps and connections, replace tubing with flexible hose.

### 15-20. TROUBLE SHOOTING -- ALTIMETER.

#### NOTE

Refer to paragraph 15-15 before blowing out pitot or static lines.

TROUBLE	PROBABLE CAUSE	REMEDY
INSTRUMENT FAILS TO OPERATE.	Static line plugged.	Blow out lines.
	Defective mechanism.	Replace instrument.
INCORRECT INDICATION.	Hands not carefully set.	Reset hands with knob.
	Leaking diaphragm.	Replace instrument.
	Pointers out of calibration.	Replace instrument.

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### 15-20. TROUBLE SHOOTING -- ALTIMETER (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
HAND OSCILLATES.	Static pressure irregular.	Blow out lines, tighten connections.
	Leak in airspeed or vertical speed indicator installations.	Blow out lines, tighten connections.

### 15-21. TROUBLE SHOOTING -- VERTICAL SPEED INDICATOR.

#### NOTE

Refer to paragraph 15-15 before blowing out pitot or static lines.

TROUBLE	PROBABLE CAUSE	REMEDY
INSTRUMENT FAILS TO OPERATE.	Static line plugged.	Blow out lines.
	Static line broken.	Repair or replace damaged line, tighten connections.
INCORRECT INDICATION.	Partially plugged static line.	Blow out lines.
	Ruptured diaphragm.	Replace instrument.
	Pointer off zero.	Reset pointer to zero.
POINTER OSCILLATES.	Partially plugged static line.	Blow out lines.
	Leak in static line.	Repair or replace damaged lines, tighten connections.
	Leak in instrument case.	Replace instrument.

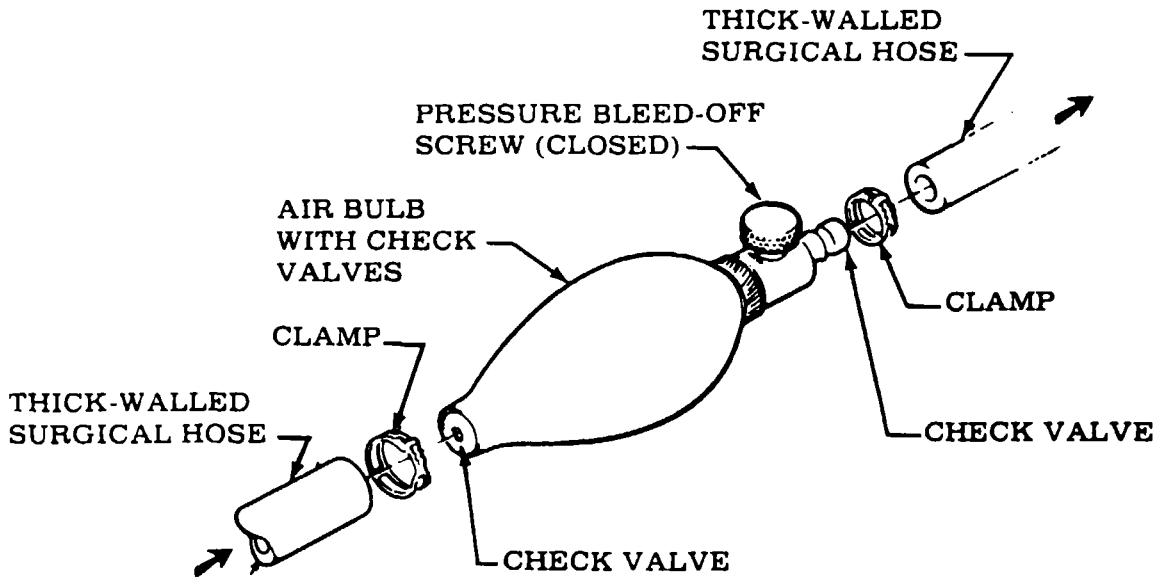
### 15-22. TROUBLE SHOOTING -- PITOT TUBE HEATER.

#### NOTE

Refer to paragraph 15-15 before blowing out pitot or static lines.

TROUBLE	PROBABLE CAUSE	REMEDY
TUBE DOES NOT HEAT OR CLEAR ICE.	Switch turned "OFF".	Turn switch "ON".
	Open circuit breaker.	Reset breaker.
	Break in wiring.	Repair wiring.
	Heating element burned out.	Replace element.

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### TO APPLY SUCTION:

1. Squeeze air bulb to expel as much air as possible.
2. Hold suction hose firmly against static pressure source opening.
3. Slowly release air bulb to obtain desired suction, then pinch hose shut tightly to trap suction in system.
4. After leak test, release suction slowly by intermittently allowing a small amount of air to enter static system. To do this, tilt end of suction hose away from opening, then immediately tilt it back against opening. Wait until vertical speed indicator approaches zero, then repeat. Continue to admit this small amount of air intermittently until all suction is released, then remove test equipment.

### TO APPLY PRESSURE:

#### CAUTION

Do not apply positive pressure with airspeed indicator or vertical speed indicator connected into static system.

1. Hold pressure hose firmly against static pressure source opening.
2. Slowly squeeze air bulb to apply desired pressure to static system. Desired pressure may be maintained by repeatedly squeezing bulb to replace any air escaping through leaks.
3. Release pressure by slowly opening pressure bleed-off screw, then remove test equipment.

Figure 15-5. Static System Test Equipment

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### 15-23. VACUUM SYSTEM.

15-24. DESCRIPTION. A dry vacuum system is installed on the aircraft. The system utilizes a sealed bearing, engine-driven vacuum pump. A discharge tube is connected to the pump to expel the air from the pump overboard. A suction relief valve is used to control system pressure and is connected between the pump inlet and the instruments. In the cabin, the vacuum line is routed from the gyro instruments to the relief valve at the firewall. A central air filtering system is utilized. The reading of the suction gage indicates net difference in suction before and after air passes through a gyro. This differential pressure will gradually decrease as the central air filter becomes dirty, causing a lower reading on the suction gage.

### 15-25. TROUBLE SHOOTING -- VACUUM SYSTEM.

#### NOTE

Refer to paragraph 15-15 before blowing out pitot or static lines.

TROUBLE	PROBABLE CAUSE	REMEDY
HIGH SUCTION GAGE READINGS. (Gyros function normally.)	Suction relief valve filter clogged. Relief valve malfunction.	Replace filter. Reset relief valve. Replace gage.
LOW SUCTION GAGE READINGS.	Leaks or restriction between instruments and relief valve, relief valve out of adjustment, defective pump.  Central air filter dirty.	Repair or replace lines, adjust or replace relief valve, repair or replace pump.  Replace filter.
SUCTION GAGE FLUCTUATES.	Defective gage or sticking relief valve.	Replace gage. Clean sticking valve with Stoddard solvent. Blow dry and test. If valve sticks after cleaning, replace it.

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### 15-26. TROUBLE SHOOTING -- GYROS.

TROUBLE	PROBABLE CAUSE	REMEDY
HORIZON BAR FAILS TO RESPOND.	Central air filter dirty.	Replace filter.
	Suction relief valve improperly adjusted.	Adjust or replace relief valve.
	Faulty suction gage.	Replace suction gage.
	Vacuum pump failure.	Replace pump.
	Vacuum line kinked or leaking.	Repair or replace damaged lines, tighten connections.
HORIZON BAR DOES NOT SETTLE.	Defective mechanism.	Replace instrument.
	Insufficient vacuum.	Adjust or replace relief valve.
	Excessive vibration.	Replace defective shock panel mounts.
HORIZON BAR OSCILLATES OR VIBRATES EXCESSIVELY.	Central air filter dirty.	Replace filter.
	Suction relief valve improperly adjusted.	Adjust or replace relief valve.
	Faulty suction gage.	Replace suction gage.
	Defective mechanism.	Replace instrument.
	Excessive vibration.	Replace defective shock panel mounts.
EXCESSIVE DRIFT IN EITHER DIRECTION.	Central air filter dirty.	Replace filter.
	Low vacuum, relief valve improperly adjusted.	Adjust or replace relief valve.
	Faulty suction gage.	Replace suction gage.
	Vacuum pump failure.	Replace pump.
	Vacuum line kinked or leaking.	Repair or replace damaged lines, tighten connections.
DIAL SPINS IN ONE DIRECTION CONTINUOUSLY.	Operating limits have been exceeded.	Replace instrument.
	Defective mechanism.	Replace instrument.

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### 15-27. TROUBLE SHOOTING -- VACUUM PUMP.

TROUBLE	PROBABLE CAUSE	REMEDY
EXCESSIVE OIL IN DISCHARGE.	Damaged engine drive seal.	Replace gasket.
HIGH SUCTION.	Suction relief valve screen clogged.	Clean or replace screen.
LOW SUCTION.	Relief valve leaking.	Replace relief valve.
	Vacuum pump failure.	Replace vacuum pump.

### 15-28. MAINTENANCE PRACTICES.

#### NOTE

When replacing a vacuum system component, ensure all connections are made correctly to avoid damage to gyro system. When a component is removed, cap off and identify all open lines, hoses, and fittings to prevent dirt from entering system, and to ensure proper reinstallation. Upon component replacement, check all hoses carefully to be sure they are clean and free of debris, oil, solvent, collapsed inner liners, and external damage. Replace old, hard, cracked, or brittle hoses, particularly on pump inlet, to avoid possible pump damage. On vacuum pump, where hose clearance is tight, making it difficult to reinstall hoses, apply a light film of petrolatum to the fitting. Install hoses by pushing them straight on, and do not wiggle hoses from side to side as this could cause particles to be cut from inside of hose, allowing particles to enter system.

#### CAUTION

Do not use teflon tape, pipe dope, or thread lubricants of any type on fitting threads, and avoid over-tightening of connections. All filters in vacuum system must be changed when installing a new pump. Failure to do so will void pump warranty. **DO NOT CONNECT A PUMP BACKWARDS** since the manifold check valve provides no pressure relief, the pump will be destroyed within a matter of seconds after starting the engine.

### 15-28A. REMOVAL OF VACUUM PUMP.

- a. Remove upper engine cowling in accordance with procedures in Section 11 or 11A.
- b. Disconnect, cap off and identify hose on inlet side of vacuum pump.
- c. Identify and disconnect hose on outlet side of vacuum pump.
- d. Remove nuts, lockwashers, and flat washers securing vacuum pump to engine.
- e. Remove vacuum pump from mounting studs on engine.

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- f. Remove fittings from pump and retain if they are reusable. Discard any twisted fittings and damaged nuts and lockwashers.

### 15-28B. MOUNTING PAD INSPECTION.

- a. Check condition of the AND 20000 pad seal. If the seal shows any signs of oil leakage, replace the seal. Replace seal if there is any doubt as to its serviceability.

### 15-28C. INSTALLATION OF VACUUM PUMP.

- a. Before installing a new vacuum pump purge all lines in the system to remove carbon particles or pump components that may have been deposited in the lines by a previous pump.
- b. Consult the applicable Parts Catalog, the pump vendor's application list, or the PMA label on the pump box to verify that the pump is the correct model for the engine and/or system.

#### NOTE

Before installing vacuum pump on engine, ensure that mating surfaces are clean and free of any old gasket material.

- c. Position vacuum pump in a jaw-protected vise, with drive coupling downward.

#### CAUTION

Pump housing should never be placed directly in a vise, since clamping across center housing will cause an internal failure of carbon rotor. Protect pump mounting flange with soft metal or wood. NEVER INSTALL a pump that has been dropped.

#### NOTE

Do not use teflon tape, pipe dope, or thread lubricants of any type, and avoid over-tightening of connections.

- d. Install elbow in pump; hand-tighten only.

#### NOTE

Use only a box wrench to tighten fittings to desired position. Do not make more than one and one half (1-1.2) turns beyond hand-tighten position.

- e. Position new mounting pad gasket on mounting studs on engine.
- f. Position vacuum pump on mounting studs.
- g. Secure pump to engine with flat washers, new lockwashers, and nuts.

#### CAUTION

Always replace lockwashers with new ones when installing a new vacuum pump. Tighten all four mounting nuts 50-70 in. lbs.

## MODEL R182 AND TR182 SERVICE MANUAL

- h. Connect hose to inlet side of vacuum pump.
- i. Install upper engine cowling in accordance with the procedures in Section 11 or 11A.

15-29. **CLEANING.** Low pressure, dry compressed air should be used in cleaning vacuum system components. Remove and discard suction relief valve filter; suction relief valve should be washed with Stoddard solvent then dried with low-pressure air. Install new filter. Refer to Section 2 for central air filter. Check hose for collapsed inner liners as well as external damage.

### CAUTION

Never apply compressed air to lines or components installed in aircraft. The excessive pressures will damage gyros. If an obstructed line is to be blown out, disconnect at both ends and blow from instrument panel out.

15-29A. **LOW-VACUUM WARNING LIGHT.** A red low-vacuum warning light is installed on the instrument panel. The light is controlled by a vacuum switch which is teed into the line between the suction gage and the directional gyro. The switch contacts are normally closed. The light may be checked by turning ON the master switch. With the engine running, the light should illuminate when the vacuum drops below  $3 \pm .5$  inches Hg.

15-30. **VACUUM RELIEF VALVE ADJUSTMENT.** A suction gage reading of 5.3 inches of mercury is desirable for gyro instruments. However, a range of 4.6 to 5.4 inches of mercury is acceptable. To adjust relief valve, remove central air filter, run engine to 1900 RPM on ground and adjust relief valve to  $5.3 \pm .1$  inches of mercury.

### CAUTION

Do not exceed maximum engine temperature.

### NOTE

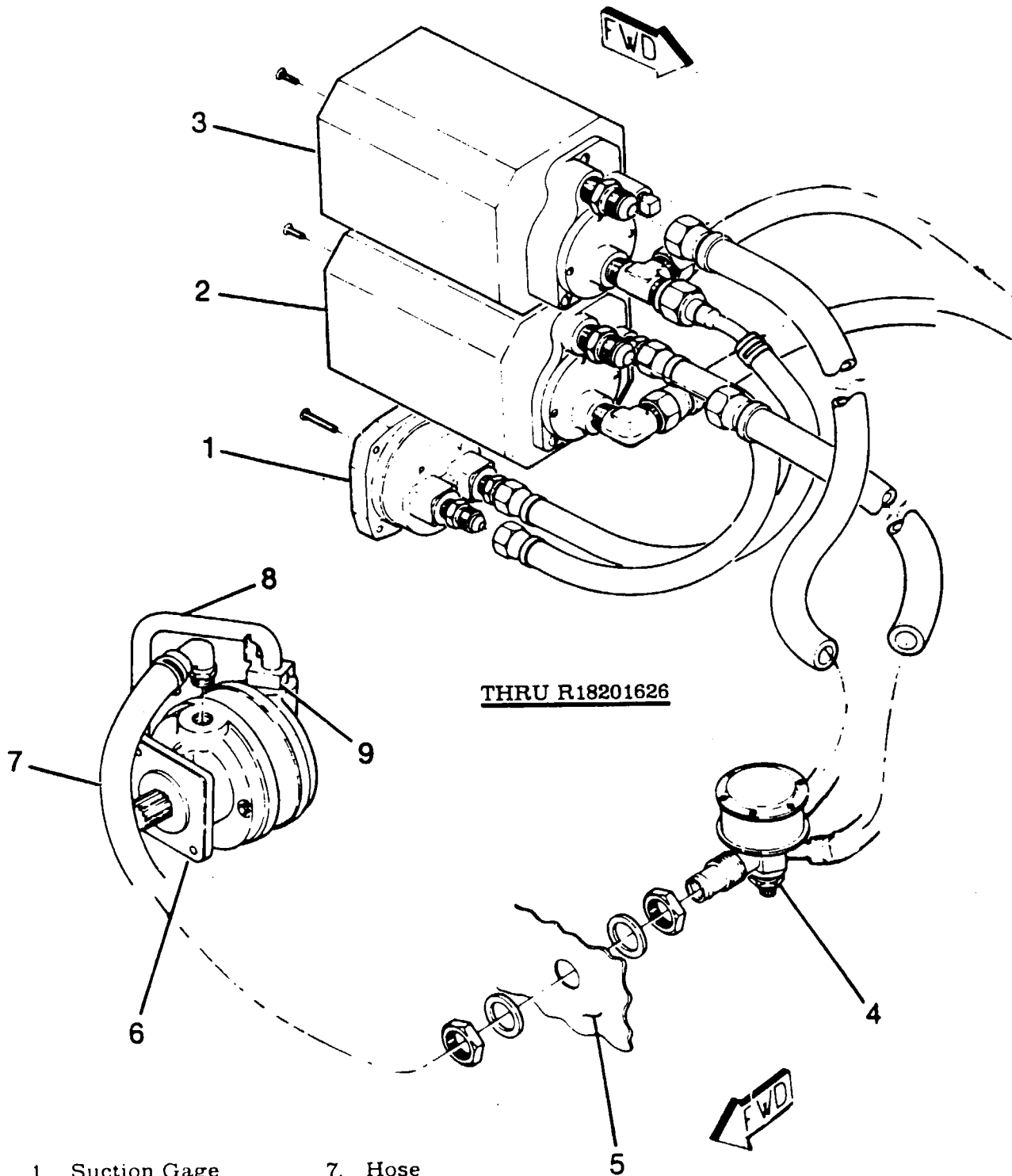
If vacuum drops noticeably after replacing central air filter, remove and replace existing filter with a new filter.

15-30A. **STANDBY VACUUM SYSTEM.**

15-30B. **DESCRIPTION.** A standby vacuum system may be installed in the airplane. The system consists of an electric motor drive vacuum pump, a vacuum relief valve, a manifold valve and associated hoses. The vacuum pump and motor assembly are mounted on the aft side of the firewall. A circuit breaker switch on the instrument panel controls and protects the system.



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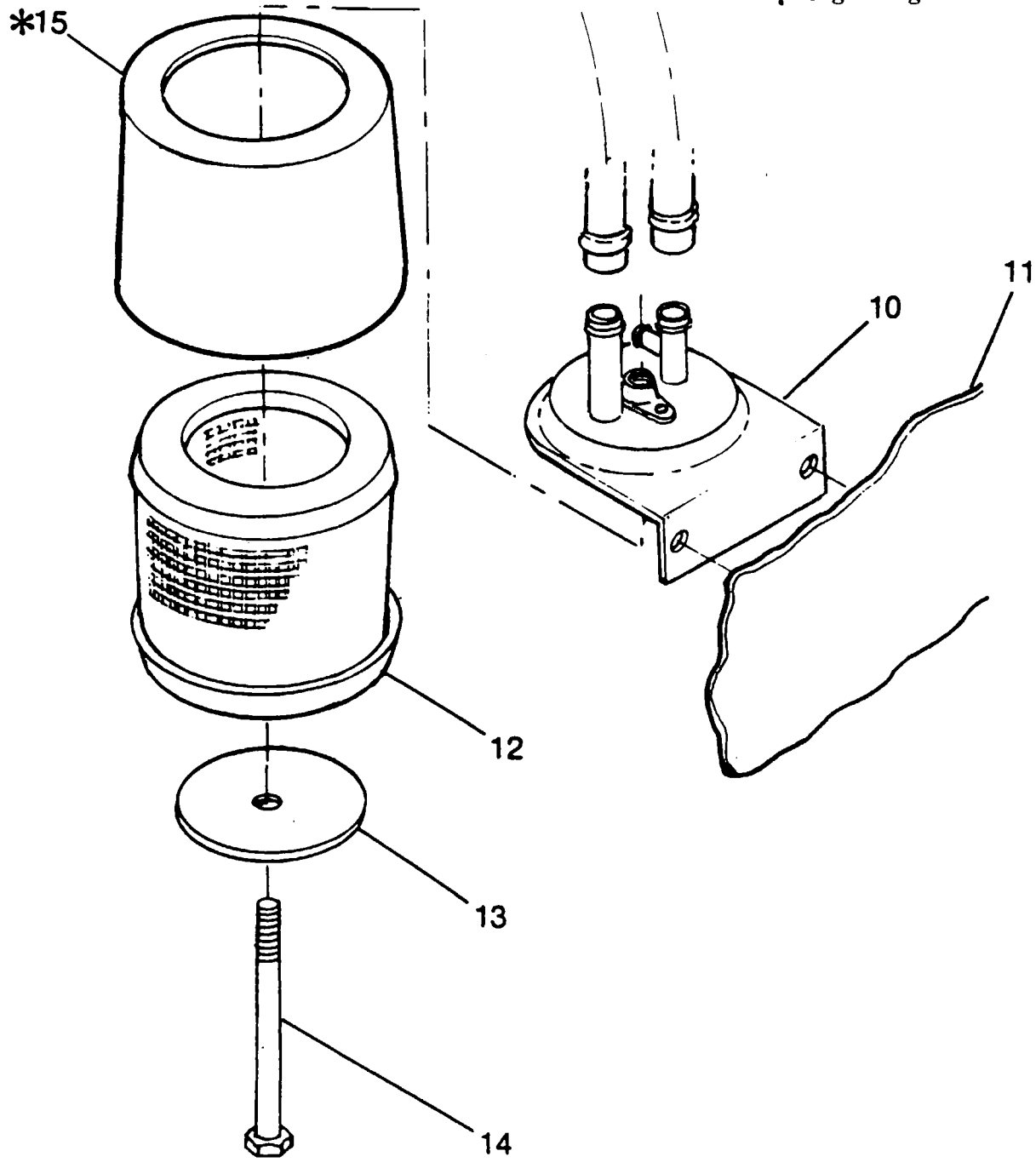


- |                         |                   |
|-------------------------|-------------------|
| 1. Suction Gage         | 7. Hose           |
| 2. Directional Gyro     | 8. Overboard Line |
| 3. Gyro Horizon         | 9. Tube Locator   |
| 4. Suction Relief Valve | 10. Bracket       |
| 5. Firewall             | 11. Cabin Skin    |
| 6. Vacuum Pump          | 12. Filter        |
|                         | 13. Washer        |
|                         | 14. Bolt          |

Figure 15-6. Vacuum System Installation (Sheet 1 of 4)

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\* Beginning with R18201991

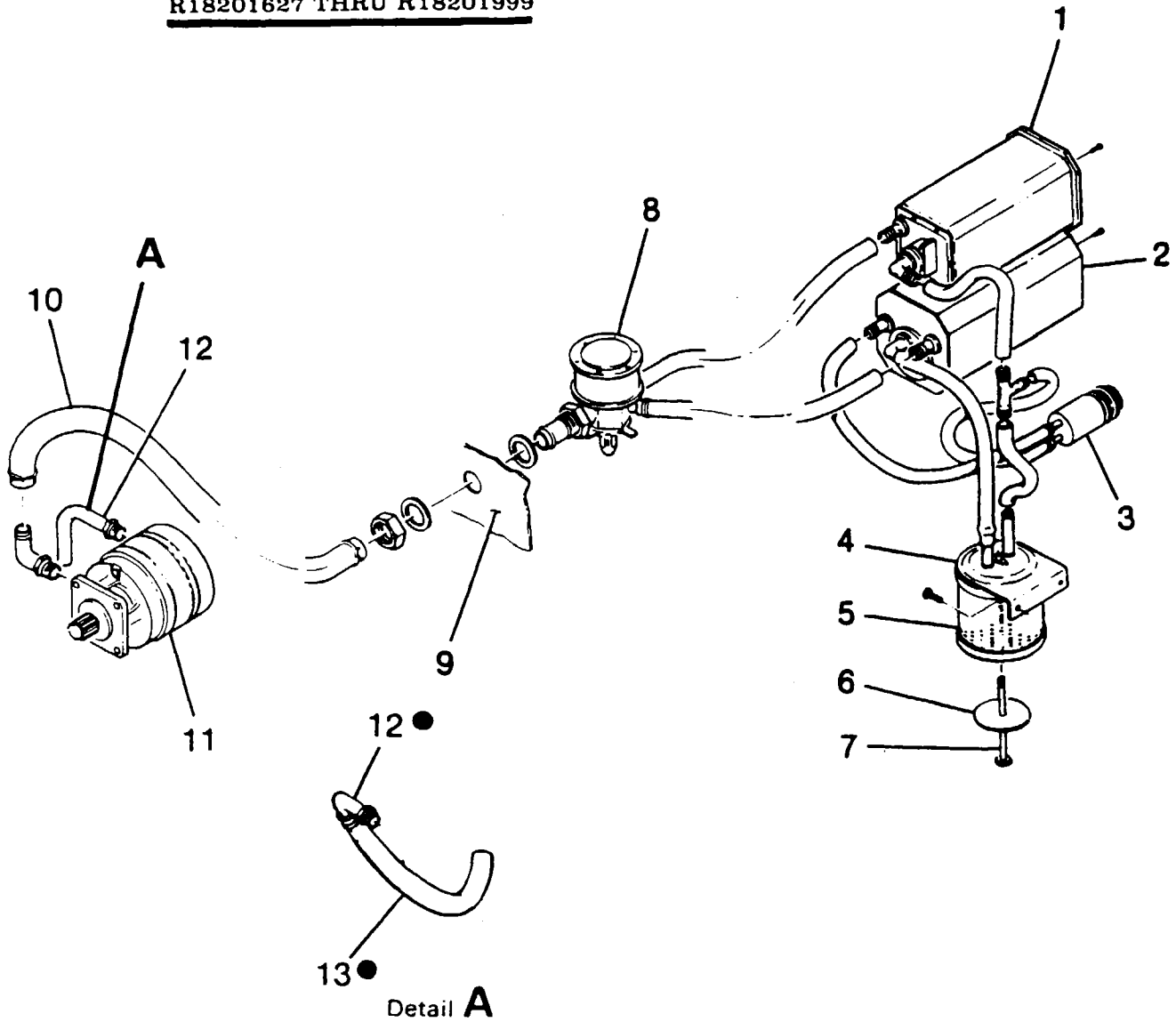


15. Cover

Figure 15-6. Vacuum System Installation (Sheet 2 of 4)

# MODEL R182 AND TR182 SERVICE MANUAL

R18201627 THRU R18201999



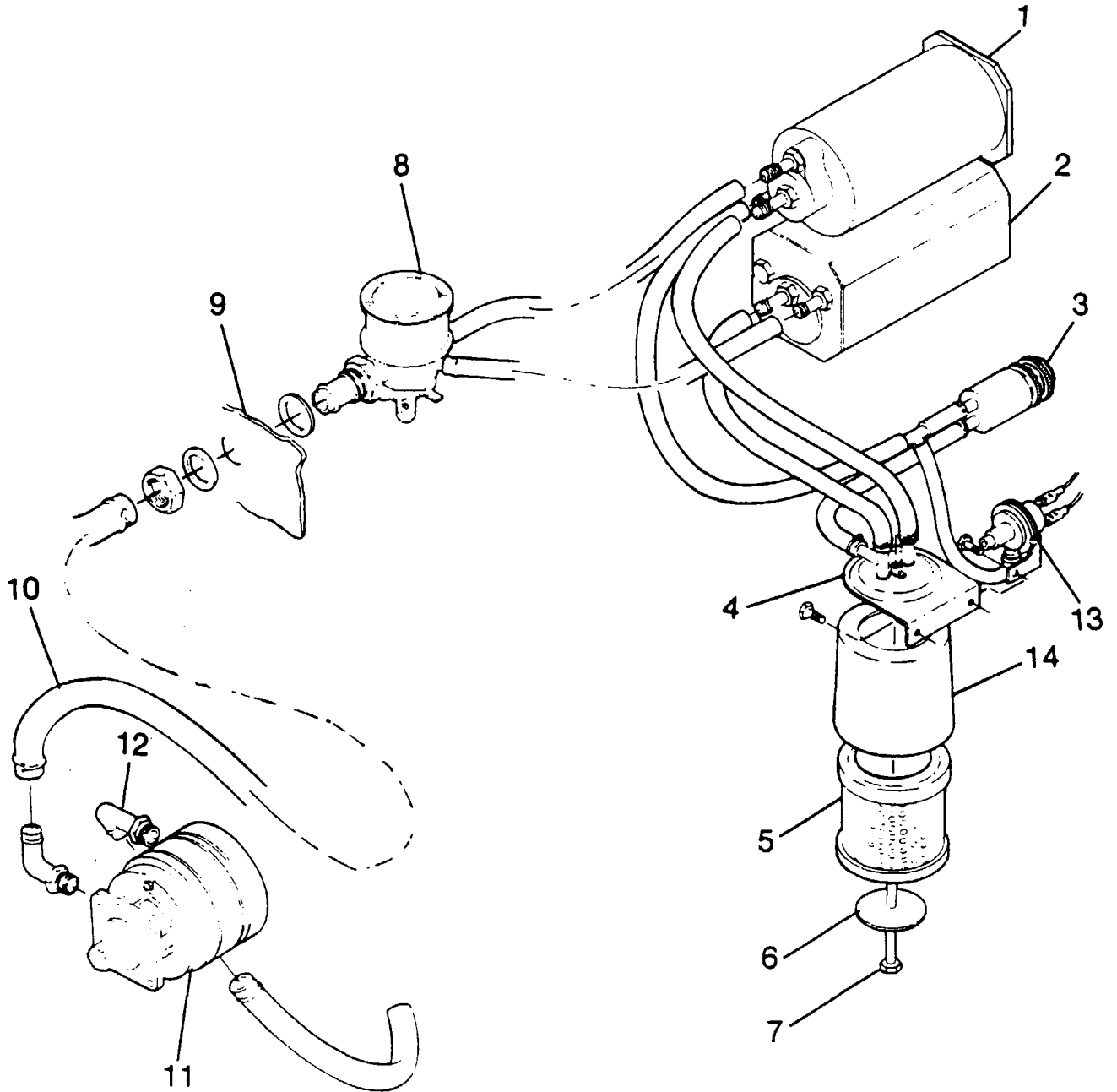
- 1. Gyro Horizon
- 2. Directional Gyro
- 3. Suction Gage
- 4. Bracket
- 5. Filter
- 6. Washer

- 7. Bolt
- 8. Suction Relief Valve
- 9. Firewall
- 10. Hose
- 11. Vacuum Pump
- 12. Overboard Line
- 13. Hose

● BEGINNING WITH R18201929

Figure 15-6. Vacuum System Installation (Sheet 3 of 4)

MODEL R182 & TR182 SERIES SERVICE MANUAL



BEGINNING WITH R18202000

- |                     |                         |
|---------------------|-------------------------|
| 1. Gyro Horizon     | 8. Suction Relief Valve |
| 2. Directional Gyro | 9. Firewall             |
| 3. Suction Gage     | 10. Hose                |
| 4. Bracket          | 11. Vacuum Pump         |
| 5. Filter           | 12. Overboard Line      |
| 6. Washer           | 13. Vacuum Switch       |
| 7. Bolt             | 14. Cover               |

Figure 15-6. Vacuum System Installation (Sheet 4 of 4)

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## 15-30C. TROUBLE SHOOTING - STANDBY VACUUM SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
NO SUCTION GAGE READING.	Circuit breaker switch has opened.	Reset circuit breaker switch. If switch reopens, check wire from switch to bus bar for short. Repair or replace wire.
	Defective motor.	Check voltage input wire and ground wire. Repair or replace wires.
	Defective pump.	Check pump operation. Replace pump.
LOW SUCTION GAGE READING.	Leak or restriction between pump and suction gage.	Check hoses and connections for leaks and obstructions. Install new clamps at connections. Clear or replace hoses.
	Relief valve not properly adjusted.	Adjust relief valve.
	Defective pump.	Check pump. Replace pump.
	Central air filter dirty.	Replace central air filter.

## 15-30D. REMOVAL. (See figure 15-6A.)

- Make sure circuit breaker switch (1) and battery switch are off.
- Remove clamps securing hoses (15) and (16) to vacuum pump (20).
- Cap hoses and pump fittings so dirt cannot enter system.
- Disconnect ground wire (18) and voltage input wire (17).
- Remove safety-wire from bolts (23).
- Remove bolts (23) and washers (24) and remove motor and pump assembly.
- If motor (26) is to be removed from assembly, remove nuts (21) and washers (22).

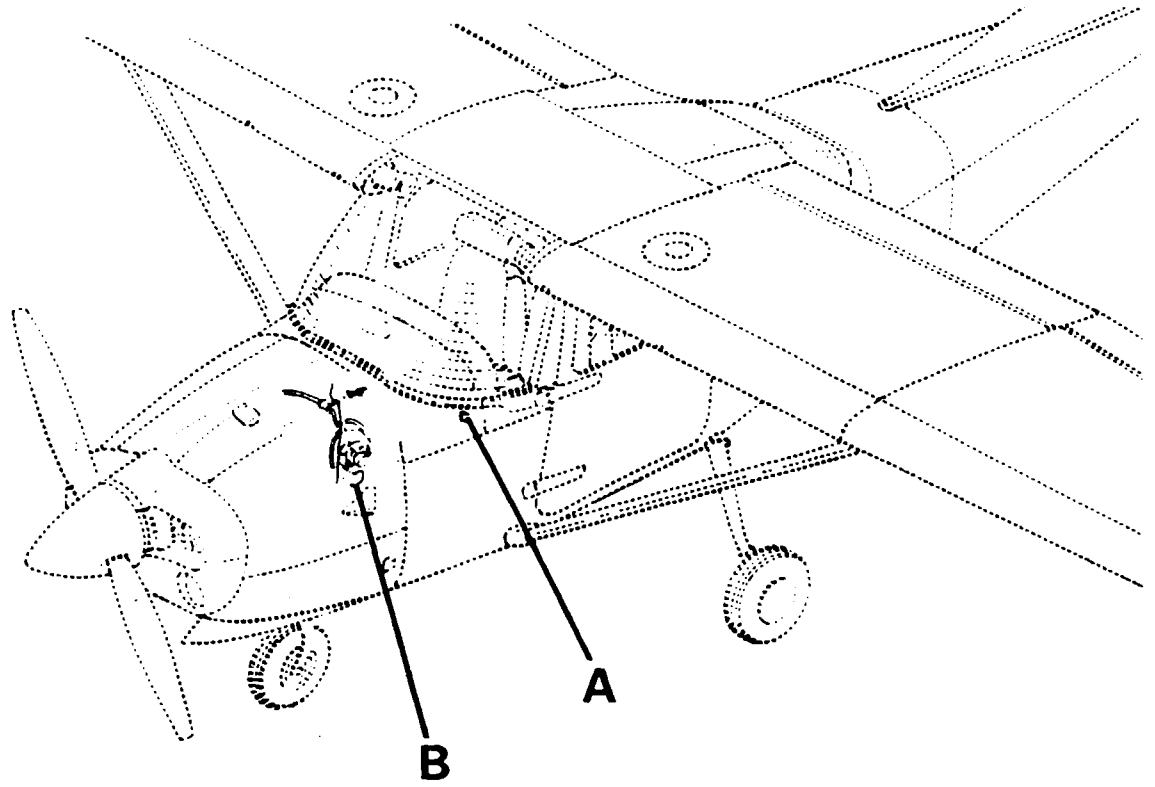
## 15-30E. INSTALLATION. (See figure 15-6A.)

- If motor was removed from assembly, position motor (26) and install washers (22) and nuts (21).
- Position pump and motor assembly on duct assembly and install washers (24) and bolts (23).
- Safety-wire bolts (23).
- Place hoses (15) and (16) over pump fittings and install clamps.
- Connect voltage input wire (17) and ground wire (18).
- Turn on battery switch and circuit breaker switch (1), then check suction gage to see that system is operating properly. Turn off switches.

### CAUTION

Check that voltage input wire (17) is not pushed down into motor as it could become entangled with the armature, locking it.

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- 1. Circuit Breaker Switch
- 2. Instrument Panel

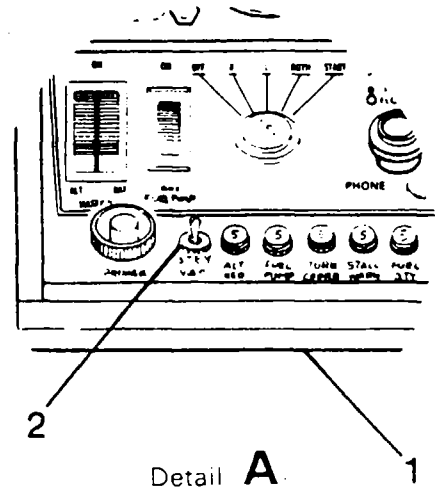
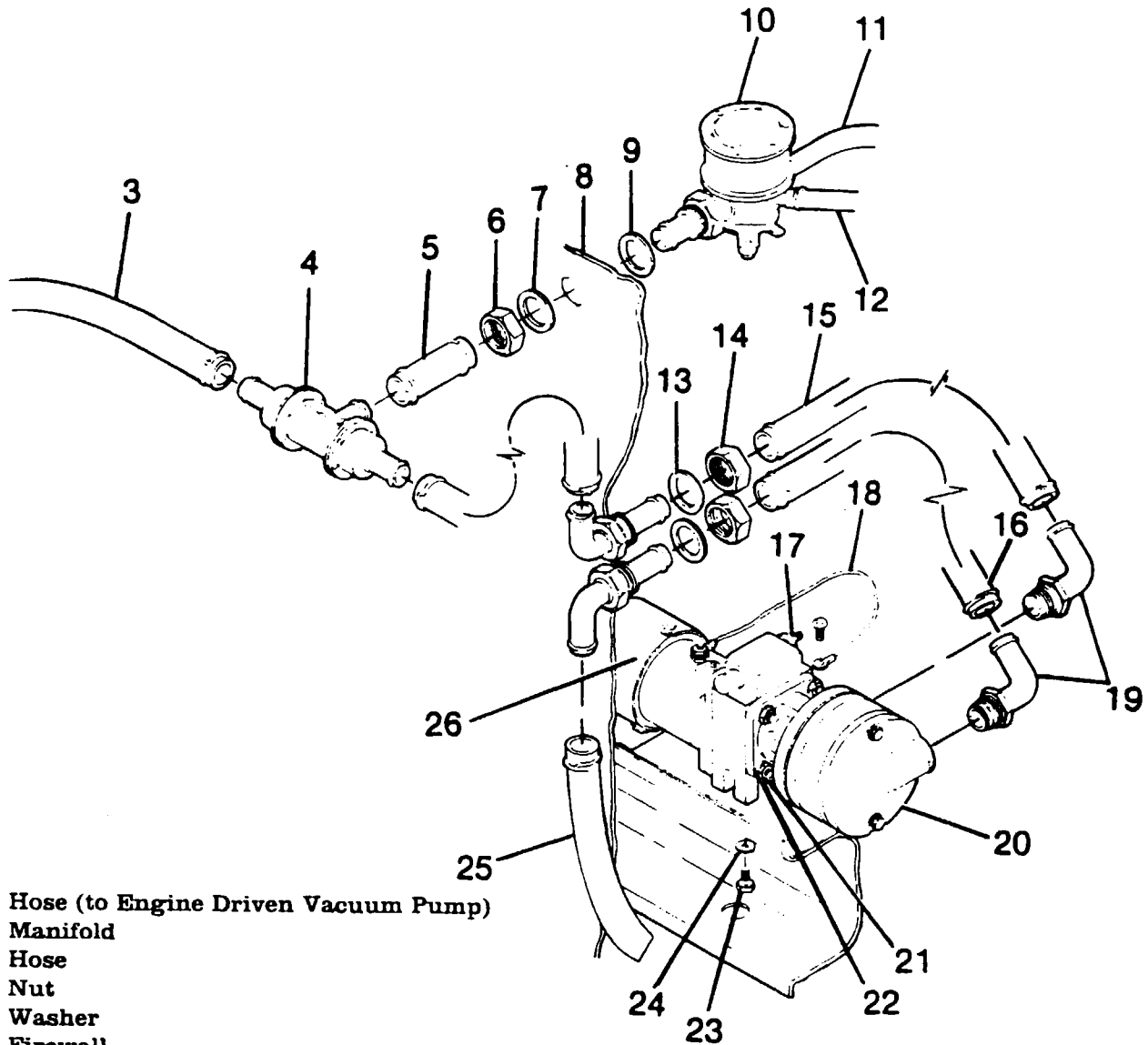


Figure 15-6A. Standby Vacuum System (Sheet 1 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL



Detail **B**

- 3. Hose (to Engine Driven Vacuum Pump)
- 4. Manifold
- 5. Hose
- 6. Nut
- 7. Washer
- 8. Firewall
- 9. Washer
- 10. Relief Valve
- 11. Hose (to Directional Gyro)
- 12. Hose (to Gyro Horizon)
- 13. Washer
- 14. Nut
- 15. Hose (to Manifold)
- 16. Hose
- 17. Voltage Input Wire
- 18. Ground Wire
- 19. Fittings
- 20. Vacuum Pump
- 21. Nut
- 22. Washer
- 23. Bolt
- 24. Washer
- 25. Vent Hose
- 26. Motor

Figure 15-6A. Standby Vacuum System (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

- 15-31. ENGINE INDICATORS.
- 15-32. TACHOMETER.
- 15-33. DESCRIPTION. The tachometer is a mechanical indicator driven at half crankshaft speed by a flexible shaft. Most tachometer difficulties will be found in the drive-shaft. To function properly, the shaft housing must be free of kinks, dents and sharp bends. There should be no bend on a radius shorter than six inches and no bend within three inches of either terminal. If a tachometer is noisy or the pointer oscillates, check cable housing for kinks, sharp bends and damage. Disconnect cable at tachometer and pull it out of housing. Check cable for worn spots, breaks and kinks.

### NOTE

Before replacing a tachometer cable in housing, coat lower two thirds with AC Type ST-640 speedometer cable grease or Lubriplate No. 110. Insert cable in housing as far as possible, then slowly rotate to make sure it is seated in the engine fitting. Insert cable in tachometer, making sure it is seated in drive shaft, then reconnect housing and torque to 50 pound-inches (at instrument).

- 15-34. MANIFOLD PRESSURE GAGE. THRU R1821433, and TR1821430.
- 15-35. DESCRIPTION. The manifold pressure gage is a barometric instrument which indicates absolute pressure in the intake manifold in inches of mercury.
- 15-36. FUEL PRESSURE GAGE. THRU R18201430 and R18201432.
- 15-37. DESCRIPTION. The 1.25 inch diameter fuel pressure gage is a pressure instrument calibrated in PSI indicating approximate fuel pressure to the engine. Pressure for operating the indicator is obtained through a hose from the fuel manifold valve.
- 15-38. MANIFOLD PRESSURE/FUEL PRESSURE GAGE. R18201434 & ON, and TR18201431, TR18201433 & ON.
- 15-39. DESCRIPTION. The manifold pressure and fuel pressure gage are in one instrument case. However, each instrument operates independently. The manifold pressure gage is a barometric instrument which indicates absolute pressure in the intake manifold in inches of mercury. The fuel pressure gage is a pressure instrument calibrated in PSI indicating approximate fuel pressure to the engine. Pressure for operating the indicator is obtained through a hose from the fuel manifold valve. The manifold pressure and fuel pressure gage on the Model R182 is equipped with a dampening screw located on the back of the gage.
- 15-39A. DAMPENING ADJUSTMENT (R182). Evacuate the instrument to 10 IN HG. absolute, release the vacuum abruptly and check time required for needle to pass from 10 IN HG. to 25 IN. HG. Set the dampening screw so time required for needle to pass from 10 IN HG. to 25 IN HG checks  $2.0 \pm 1.0$  seconds.



## MODEL R182 AND TR182 SERVICE MANUAL

### 15-40. TROUBLE SHOOTING -- MANIFOLD PRESSURE GAGE.

TROUBLE	PROBABLE CAUSE	REMEDY
EXCESSIVE ERROR AT EXISTING BAROMETRIC PRESSURE.	Pointer shifted.	Replace instrument.
	Leak in vacuum bellows.	Replace instrument.
	Loose pointer.	Replace instrument.
	Leak in pressure line.	Test line and connections for leaks. Repair or replace damaged line, tighten connections.
	Condensate or fuel in line.	Check line for obstructions. Blow out line.
JERKY MOVEMENT OF POINTER.	Excessive internal friction.	Replace instrument.
	Rocker shaft screws tight.	Replace instrument.
	Link springs too tight.	Replace instrument.
	Dirty pivot bearings.	Replace instrument.
	Defective mechanism.	Replace instrument.
	Leak in pressure line.	Test line and connections for leaks. Repair or replace damaged line, tighten connections.
SLUGGISH OPERATION OF POINTER.	Foreign matter in line.	Check line for obstructions. Blow out line.
	Damping needle dirty.	Replace instrument.
	Leak in pressure line.	Test line and connections for leaks. Repair or replace damaged line, tighten connections.
EXCESSIVE POINTER VIBRATION.	Tight rocker pivot bearings.	Replace instrument.
	Excessive vibration.	Check panel shock-mounts. Replace defective shock-mounts.
IMPROPER CALIBRATION.	Faulty mechanism.	Replace instrument.
NO POINTER MOVEMENT.	Faulty mechanism.	Replace instrument.
	Broken pressure line.	Check line and connections for breaks. Repair or replace damaged line.

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### 15-41. TROUBLE SHOOTING -- FUEL PRESSURE GAGE.

TROUBLE	PROBABLE CAUSE	REMEDY
DOES NOT REGISTER.	Pressure line clogged.	Check line for obstructions. Blow out line.
	Pressure line broken.	Check line for damage or leaks. Repair or replace damaged line.
	Fractured bellows or damaged mechanism.	Replace instrument.
	Clogged snubber orifice.	Replace instrument.
	Pointer loose on shaft.	Replace instrument.
POINTER FAILS TO RETURN TO ZERO.	Foreign matter in line.	Check line for obstructions. Blow out line.
	Clogged snubber orifice.	Replace instrument.
	Damaged bellows or mechanism.	Replace instrument.
INCORRECT OR ERRATIC READING.	Damaged or dirty mechanism.	Replace instrument.
	Pointer bent, rubbing on dial or glass.	Replace instrument.
	Leak or partial obstruction in pressure or vent line.	Check line for obstructions or leaks.  Blow out dirty line. repair or tighten loose connections.

### 15-42. CYLINDER HEAD TEMPERATURE GAGE.

15-43. **DESCRIPTION.** The temperature sending unit regulates electrical power through the cylinder head temperature gage. The gage and sending unit require little or no maintenance other than cleaning, making sure lead is properly supported and all connections are clean, tight and properly insulated. The Rochester and Stewart Warner gages are connected the same, but the Rochester gage does not have a calibration pot and cannot be adjusted. Refer to Table 2, page 15-30B when trouble shooting the cylinder head temperature gage.

#### NOTE

A Cylinder Head Temperature Gage Calibration Unit (SK182-43) is available for Stewart Warner gages and may be ordered through the Cessna Service Parts Center. Rochester gages are not adjustable.

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### 15-44. TROUBLE SHOOTING -- CYLINDER HEAD TEMPERATURE GAGE.

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE INOPERATIVE.	No current to circuit.	Repair electrical circuit.
	Defective gage, bulb or circuit.	Repair or replace defective items.
GAGE FLUCTUATES RAPIDLY.	Loose or broken wire permitting alternate make and break or gage circuit.	Repair or replace defective wire.
GAGE READS TOO HIGH ON SCALE.	High voltage.	Check "A" terminal.
	Gage off calibration.	Replace gage.
GAGE READS TOO LOW ON SCALE.	Low voltage.	Check voltage supply and "D" terminal.
	Gage off calibration.	Replace gage.
GAGE READS OFF SCALE AT HIGH END.	Break in bulb.	Replace bulb.
	Break in bulb lead.	Replace bulb.
	Internal break in gage.	Replace gage.
OBVIOUSLY INCORRECT READING.	Defective gage mechanism.	Replace gage.
	Incorrect calibration.	Calibrate system.

### 15-45. OIL PRESSURE GAGE.

15-46. DESCRIPTION. The Bourdon tube-type oil pressure gage is a direct-reading instrument, operated by a pressure pickup line connected to the engine main oil gallery. The oil pressure line from the instrument to the engine should be filled with kerosene, especially during cold weather operation, to attain an immediate oil indication.

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### 15-47. TROUBLE SHOOTING -- OIL PRESSURE GAGE

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE DOES NOT REGISTER.	Pressure line clogged.	Clean line.
	Pressure line broken.	Repair or replace damaged line.
	Fractured Bourdon tube.	Replace instrument.
	Gage pointer loose on staff.	Replace instrument.
	Damaged gage movement.	Replace instrument.
GAGE POINTER FAILS TO RETURN TO ZERO.	Foreign matter in line.	Clean line.
	Foreign matter in Bourdon tube.	Replace instrument.
	Bourdon tube stretched.	Replace instrument.
GAGE DOES NOT REGISTER PROPERLY.	Faulty mechanism.	Replace instrument.
GAGE HAS ERRATIC OPERATION.	Worn or bent movement.	Replace instrument.
	Foreign matter in Bourdon tube.	Replace instrument.
	Dirty or corroded movement.	Replace instrument.
	Pointer bent and rubbing on dial, dial screw or glass.	Replace instrument.
	Leak in pressure line.	Repair or replace damaged line.

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### 15-48. OIL TEMPERATURE GAGE.

15-49. DESCRIPTION. On some airplanes, the oil temperature gage is a Bourdon tube type pressure instrument connected by armored capillary tubing to a temperature bulb in the engine. The temperature bulb, capillary tube and gage are filled with fluid and sealed. Expansion and contraction of fluid in the bulb with temperature changes operates the gage. Checking capillary tube for damage and fittings for security is the only maintenance required. Since the tubes inside diameter is small, small dents and kinks, which would be acceptable in larger tubing, may partially or completely close off the capillary, making the gage inoperative. Some airplanes are equipped with gages that are electrically actuated and are not adjustable. Refer to Table 1, page 15-30A when trouble shooting the oil temperature gage.

### 15-50. CARBURETOR AIR TEMPERATURE GAGE.

15-51. DESCRIPTION. The carburetor air temperature gage is of the resistance-bridge type. Changes in electrical resistance of the element are indicated by the gage, calibrated for temperature. The system requires power from the airplane electrical system and operates only when the master switch is on. Although both instrument and sensing bulb are grounded, two leads are used to avoid possibility of instrument error, induced by poor electrical bonds in the airframe.

### 15-52. TROUBLE SHOOTING -- CARBURETOR AIR TEMPERATURE GAGE.

TRUBLE	PROBABLE CAUSE	REMEDY
GAGE POINTER STAYS OFF LOW END OF SCALE.	Popped circuit breaker.	Reset breaker.
	Master switch "OFF" or switch defective	Replace defective switch.
	Broken or grounded leads between gage and sensing unit.	Repair or replace defective wiring.
	Defective gage or sensing unit.	Replace gage or sensing unit.

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### 15-52. TROUBLE SHOOTING -- CARBURETOR AIR TEMPRATURE GAGE (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE POINTER GOES OFF HIGH END OF SCALE.	Broken or grounded lead.	Repair or replace defective wiring.
	Defective gage or sensing unit.	Replace gage or sensing unit.
GAGE OPERATES INTERMITTENTLY.	Defective master switch, broken or grounded lead.	Replace switch, repair or replace defective wiring.
	Defective gage or sensing unit.	Replace gage or sensing unit.
EXCESSIVE POINTER OSCILLATION.	Loose or broken lead.	Repair or replace defective wiring.
	Defective gage or sensing unit.	Replace gage or sensing unit.
	Excessive panel vibration.	Tighten panel mounting screws.
OBVIOUSLY INCORRECT TEMPERATURE READING.	Defective gage or sensing unit.	Replace gage or sensing unit.
POINTER FAILS TO GO OFF SCALE WITH CURRENT OFF.	Defective master switch.	Replace switch.
	Defective gage.	Replace gage.

### 15-53. FUEL QUANTITY INDICATING SYSTEM.

15-54. DESCRIPTION. The magnetic type fuel quantity indicators are used in conjunction with a float-operated variable-resistance transmitter in each fuel cell. The full position of float produces a minimum resistance through the transmitter, permitting maximum current flow through the fuel quantity indicator and maximum pointer deflection. As fuel level is lowered, resistance in the transmitter is increased, producing a decreased current flow through the fuel quantity indicator and a smaller pointer deflection.

### 15-55. REMOVAL AND INSTALLATION OF TRANSMITTER. (Refer to Section 12.)

- a. Drain fuel from cell/bay. (Observe the precautions in Section 12.)
- b. Remove wing root fairing.
- c. Disconnect electrical lead and ground strap from transmitter.
- d. Remove screws attaching transmitter and carefully work transmitter from cell. DO NOT BEND FLOAT ARM.
- e. Reverse preceding steps for installation, using new gaskets around opening and under screw heads.

#### NOTE

Torque retaining screws so gasket seats evenly and inspect float position to ensure bottom of float approx. .20 from bottom of fuel tank.

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### 15-56. TROUBLE SHOOTING -- FUEL QUANTITY INDICATING SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
FAILURE TO INDICATE.	No power to indicator or transmitter. (Pointer stays below E.)	Check and reset breaker. repair or replace defective wiring.
	Grounded wire. (Pointer stays above F.)	Repair or replace defective wire.
	Low voltage.	Correct voltage.
	Defective indicator.	Replace indicator.
SYSTEM OFF CALIBRATION.	Defective indicator.	Replace indicator.
	Defective transmitter. Low or high voltage.	Recalibrate or replace. Correct voltage.
STICKY OR SLUGGISH INDICATOR OPERATION.	Defective indicator.	Replace indicator.
	Low voltage.	Correct voltage.
ERRATIC READINGS.	Loose or broken wiring on indicator or transmitter.	Repair or replace defective wire.
	Defective indicator or transmitter.	Replace indicator or transmitter.
	Defective master switch.	Replace switch.

### 15-57. TRANSMITTER ADJUSTMENT. (Refer to page 15-30A).

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## 15-57. TRANSMITTER ADJUSTMENT.

### WARNING

Using the following fuel transmitter calibration procedure on components other than the originally installed (Stewart Warner) components will result in a faulty fuel quantity reading.

15-57A. STEWART WARNER GAGE TRANSMITTER CALIBRATION. Chances of transmitter calibration changing in normal service is remote; however, it is possible that float arm or float arm stops may become bent if transmitter is removed from cell. Transmitter calibration is obtained by adjusting float travel. Float travel is limited by float arm stops.

### WARNING

Use extreme caution while working with electrical components of the fuel system. The possibility of electrical sparks around an "empty" fuel cell creates a hazardous situation.

Before installing transmitter, attach electrical wires and place master switch in "ON" position. Allow float arm to rest against lower float arm stop and read indicator. The pointer should be on E (empty) position. Adjust the float arm against lower stop so pointer indicator is on E. Raise float until arm is against upper stop and adjust upper stop to permit indicator pointer to be on F (full). Install transmitter in accordance with paragraph 15-55.

15-57B. ROCHESTER GAGE TRANSMITTER. Do not attempt to adjust float arm or stop. No adjustment is allowed.

Table 1

### NOTE

Select the oil temperature sending unit part number from the left column and the temperature from the column headings. Read the ohms value under the appropriate temperature column.

Part Number	Type	72°F	120°F	165°F	220°F	250°F
S1630-1	Oil Temp				46.4	
S1630-1	Oil Temp		620.0			52.4
S1630-1	Oil Temp		620.0			52.4
S1630-1	Oil Temp			192.0		
S2335-1	Oil Temp	990.0				34.0



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Table 2

## NOTE

Select the cylinder head temperature sending unit part number from the left column and the temperature from the column headings. Read the ohms value under the appropriate temperature column.

Part Number	Type	200°F	220°F	450°F	475°F
S1372-1	CHT		310.0	34.8	
S1372-2	CHT		310.0	34.8	
S1372-3	CHT			113.0	
S1372-4	CHT			113.0	
S2334-3	CHT	745.0			38.0
S2334-4	CHT	745.0			38.0

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### 15-57C. FUEL QUANTITY INDICATING SYSTEM OPERATIONAL TEST.

**WARNING: REMOVE ALL IGNITION SOURCES FROM THE AIRPLANE AND VAPOR HAZARD AREA. SOME TYPICAL EXAMPLES OF IGNITION SOURCES ARE STATIC ELECTRICITY, ELECTRICAL POWERED EQUIPMENT (TOOLS OR ELECTRONIC TEST EQUIPMENT - BOTH INSTALLED ON THE AIRPLANE AND GROUND SUPPORT EQUIPMENT), SMOKING AND SPARKS FROM METAL TOOLS.**

**WARNING: OBSERVE ALL STANDARD FUEL SYSTEM FIRE AND SAFETY PRACTICES.**

1. Disconnect all electrical power from the airplane. Attach maintenance warning tags to the battery connector and external power receptacle stating:

**DO NOT CONNECT ELECTRICAL POWER, MAINTENANCE IN PROGRESS.**

2. Electrically ground the airplane.
3. Level the airplane and drain all fuel from wing fuel tanks. Refer to Section 2, Ground Handling, Servicing, Cleaning, Lubrication, And Inspection as required.
4. Gain access to each fuel transmitter float arm and actuate the arm through the transmitter's full range of travel.
  - A. Ensure the transmitter float arm moves freely and consistently through this range of travel. Replace any transmitter that does not move freely or consistently.

**WARNING: USE EXTREME CAUTION WHILE WORKING WITH ELECTRICAL COMPONENTS OF THE FUEL SYSTEM. THE POSSIBILITY OF ELECTRICAL SPARKS AROUND AN "EMPTY" FUEL CELL CREATES A HAZARDOUS SITUATION.**

- B. While the transmitter float arm is being actuated, apply airplane battery electrical power as required to ensure that the fuel quantity indicator follows the movement of the transmitter float arm. If this does not occur, troubleshoot, repair and/or replace components as required until the results are achieved as stated.

**NOTE:** Stewart Warner fuel quantity indicating systems can be adjusted. Refer to paragraph 15-57A for instructions for adjusting Stewart Warner fuel indicating systems. Rochester fuel quantity indicating system components are not adjustable, only component replacement or standard electrical wiring system maintenance practices are permitted.

5. With the fuel selector valve in the "OFF" position, add unusable fuel quantity to each fuel tank.
6. Apply electrical power as required to verify the fuel quantity indicator indicates "EMPTY".
  - A. If "EMPTY" is not indicated, adjust, troubleshoot, repair and/or replace fuel-indicating components as required until the "EMPTY" indication is achieved.

**NOTE:** Stewart Warner fuel quantity indicating systems can be adjusted. Refer to paragraph 15-57A for instructions for adjusting Stewart Warner fuel indicating systems. Rochester fuel quantity indicating system components are not adjustable, only component replacement or standard electrical wiring system maintenance practices are permitted.

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7. Fill tanks to capacity, apply electrical power as required and verify fuel quantity indicator indicates "FULL".
  - A. If "FULL" is not indicated, adjust, troubleshoot, repair and/or replace fuel indicating components as required until the "FULL" indication is achieved.

**NOTE:** Stewart Warner fuel quantity indicating systems can be adjusted. Refer to paragraph 15-57A for instructions for adjusting Stewart Warner fuel indicating systems. Rochester fuel quantity indicating system components are not adjustable, only component replacement or standard electrical wiring system maintenance practices are permitted.

8. Install any items and/or equipment removed to accomplish the Fuel Quantity Indicating System Operational Test, remove maintenance warning tags and connect the airplane battery.

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15-58. HOURMETER. (See figure 15-7.)

15-59. DESCRIPTION. The hourmeter is an electrically operated instrument, actuated by a pressure switch in the oil pressure gage line. Electrical power is supplied through a one-amp fuse from the electrical clock circuit, and therefore will operate independent of the master switch. A diode incorporated into the meter prevents interruption of avionics operation. This type hourmeter is identified by a white + above the positive terminal.

### NOTE

When installing the hourmeter, the positive (red) wire must be connected to the white + terminal. Connecting wires incorrectly will damage the meter.

15-60. ECONOMY MIXTURE INDICATOR.

15-61. DESCRIPTION. The economy mixture indicator is an exhaust gas temperature (EGT) sensing device which is used to aid the pilot in selecting the most desirable fuel-air mixture for cruising flight at less than 75% power. Exhaust gas temperature (EGT) varies with ratio of fuel-to-air mixture entering the engine cylinders. Refer to the PILOT'S OPERATING HANDBOOK for operating procedure of the system.

15-62. TROUBLE SHOOTING -- ECONOMY MIXTURE INDICATOR.

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE INOPERATIVE.	Defective gage, probe or circuit.	Repair or replace defective part.
INCORRECT READING.	Indicator needs calibrating.	Calibrate indicator in accordance with paragraph 15-61.
FLUCTUATING READING.	Loose, frayed or broken lead, permitting alternate make and break of current.	Tighten connections and repair or replace defective leads.

15-63. CALIBRATION. When a new EGT gage or probe is installed accomplish the following steps:

- Before flight remove the decorative cover on right hand instrument panel and temporarily install the EGT indicator with one screw.
- Test fly the airplane and establish 75% power in level flight. Carefully lean the fuel mixture to achieve peak EGT. Remove the EGT indicator from the panel and adjust the screw on the back of the instrument beneath the plastic cap with a small blade screwdriver to place the EGT indicator hand over the 4/5 scale increment of the indicator scale. Turning the screw clockwise increases the reading and counter-clockwise decreases the reading. The adjusting screw has an adjustment range of approximately 600°F or 2 increments in either direction. Stops are provided on the adjust screw which control the above and should not be forced past stops as it will affect calibration of the Unit Scale.

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## NOTE

The 4/5 scale increment setting provides the reference indicator point for relative temperature indications for normal cruise power settings within range of instrument scale.

- c. After flight reinstall indicator and decorative cover.

The yellow adjustable hand on indicator is for use to mark a reference temperature setting.

- 15-64. **REMOVAL AND INSTALLATION.** Removal of the indicator is accomplished by removing the mounting screws and disconnecting the leads. Tag leads to facilitate installation. The thermocouple probe is secured to the exhaust stack with a clamp. When installing probe, tighten clamp to 45 pound-inches and safety as required. Refer to Section 11 for exhaust system installation.
- 15-65. **MAGNETIC COMPASS.** (See figure 15-7.)
- 15-66. **DESCRIPTION.** The magnetic compass is liquid-filled, with expansion provisions to compensate for temperature changes. It is equipped with compensating magnets adjustable from the front of the case. The compass is internally lighted, controlled by the instrument lights rheostat switch. No maintenance is required on the compass except an occasional check on a compass rose and replacement of lamp. The compass mount is attached by three screws to a base plate which is bonded to windshield with methylene chloride. A tube containing the compass light wires is attached to the metal strip at the top of the windshield. Removal of the compass is accomplished by removing the screw at forward end of compass mount, unfastening the metal strip at the top of windshield and cutting the two wire splices. Removal of the compass mount is accomplished by removing three screws attaching mount to the base plate. Access to the inner screw is gained through a hole in the bottom of mount, through which a thin screwdriver may be inserted. When installing the compass, it will be necessary to splice the compass light wires.
- 15-67. **STALL WARNING HORN AND TRANSMITTER.**
- 15-68. **DESCRIPTION.** The stall warning horn is contained in the dual warning unit mounted on the right hand wing root rib. It is electrically operated and controlled by a stall warning transmitter mounted on the leading edge of the left wing. For further information on the warning horn and transmitter, refer to Section 16.
- 15-69. **TURN COORDINATOR.**
- 15-70. **DESCRIPTION.** The turn coordinator is an electrically operated, gyroscopic, roll-turn rate indicator. Its gyro simultaneously senses rate of motion roll and yaw axis which is projected on a single indicator. The gyro is a non-tumbling type requiring no caging mechanism and incorporates an ac brushless spin motor with a solid state inverter.

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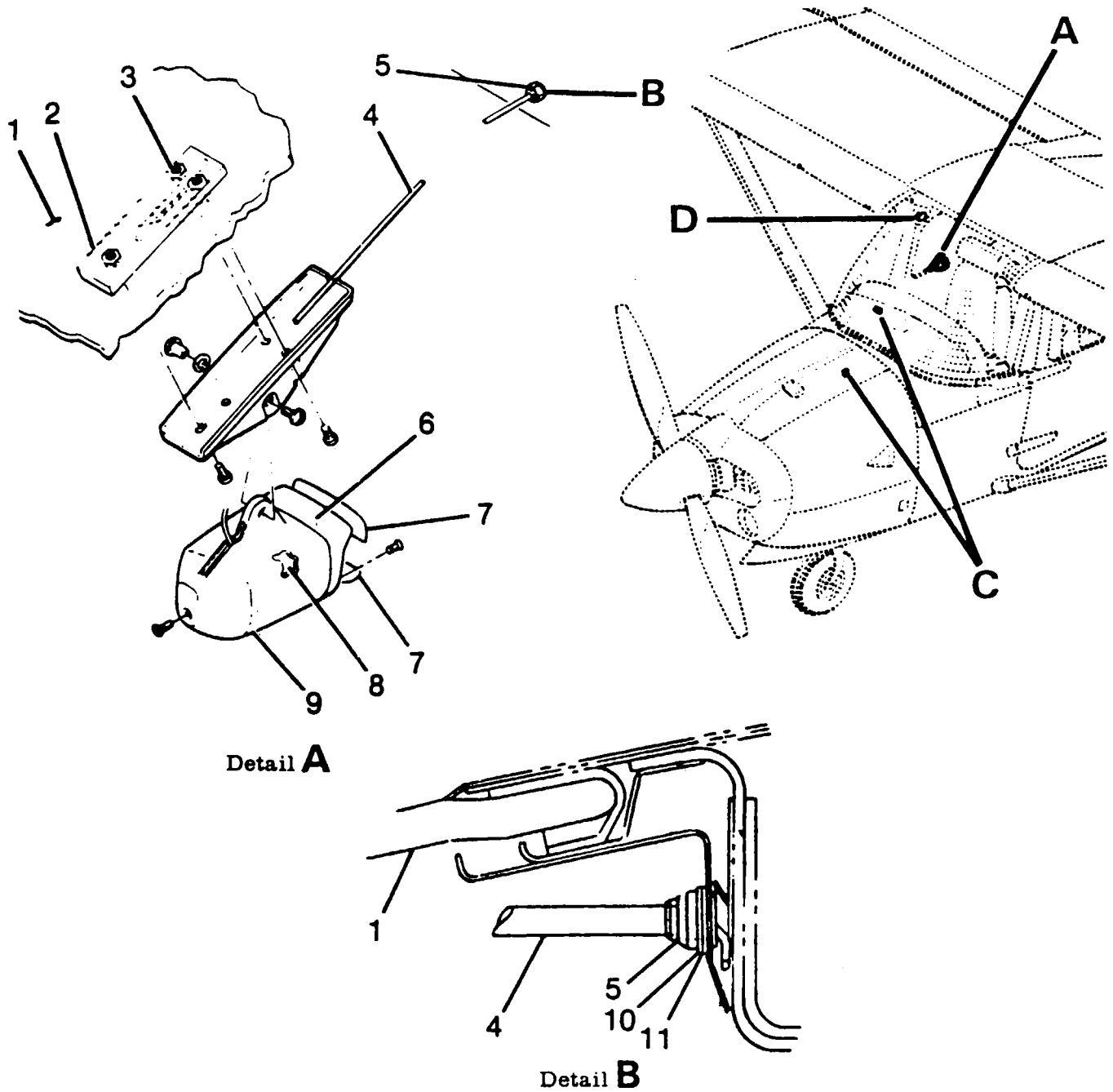


Figure 15-7. Compass, O.A.T. Gage and Hourmeter Installation (Sheet 1 of 2).

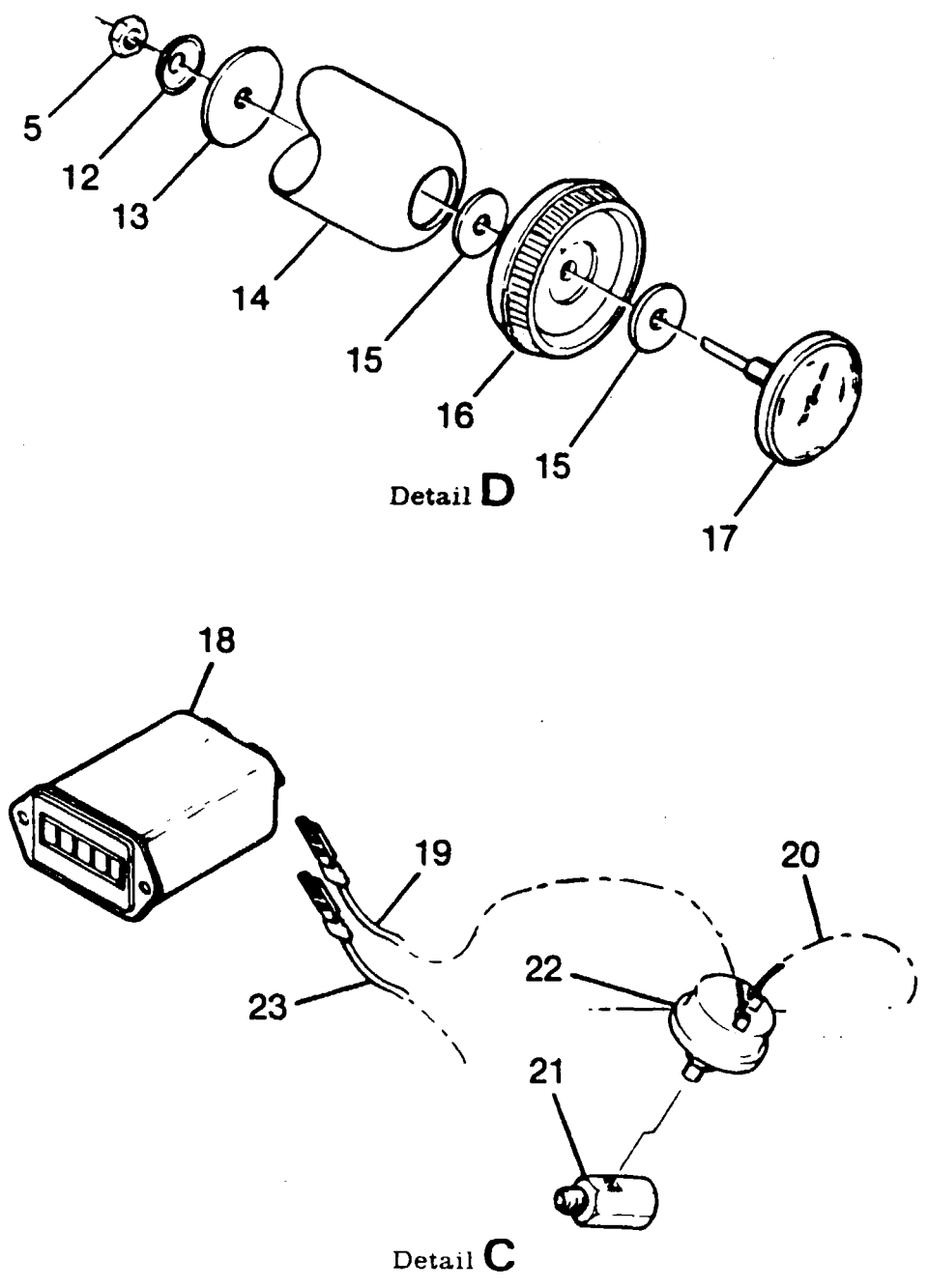


Figure 15-7. Compass, O.A.T. Gage and Hourmeter Installation (Sheet 2 of 2).

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### 15-71. TROUBLE SHOOTING -- TURN COORDINATOR.

TROUBLE	PROBABLE CAUSE	REMEDY
INDICATOR DOES NOT RETURN TO CENTER.	Friction caused by contamination in the indicator dampening.	Replace instrument.
	Friction in gimbal assembly.	Replace instrument.
DOES NOT INDICATE A STANDARD RATE TURN (TOO SLOW).	Low voltage.	Correct voltage.
	Inverter frequency changed.	Replace instrument.
NOISY MOTOR.	Faulty bearings.	Replace instrument.
ROTOR DOES NOT START.	Faulty electrical connection.	Correct voltage or replace faulty wire.
	Inverter malfunctioning.	Replace instrument.
	Motor shorted.	Replace instrument.
	Bearings frozen.	Replace instrument.
IN COLD TEMPERATURES, HAND FAILS TO RESPOND OR IS SLUGGISH.	Oil in indicator becomes too thick.	Replace instrument.
	Insufficient bearing end play.	Replace instrument.
	Low voltage.	Correct voltage.
NOISY GYRO.	High voltage.	Correct voltage.
	Loose or defective rotor bearings.	Replace instrument.

### 15-72. TURN-AND-SLIP INDICATOR.

15-73. DESCRIPTION. The turn-and-slip indicator is operated by the aircraft electrical system and operates ONLY when the master switch is on. Its circuit is protected by an automatically-resetting circuit breaker.



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### 15-74. TROUBLE SHOOTING. -- TURN-AND-SLIP INDICATOR.

TROUBLE	PROBABLE CAUSE	REMEDY
INDICATOR POINTER FAILS TO RESPOND.	Automatic resetting circuit breaker defective.	Replace circuit breaker.
	Master switch "OFF" or switch defective.	Replace defective switch.
	Broken or grounded lead to indicator.	Repair or replace defective wiring.
	Indicator not grounded.	Repair or replace defective wire.
HAND SLUGGISH IN RETURNING TO ZERO.	Defective mechanism.	Replace instrument.
	Low voltage.	Correct voltage.
POINTER DOES NOT INDICATE PROPER TURN.	Defective mechanism.	Replace instrument.
HAND DOES NOT SIT ON ZERO.	Gimbal and rotor out of balance.	Replace instrument.
	Hand incorrectly sits on rod.	Replace instrument.
	Sensitivity spring adjustment pulls hand off zero.	Replace instrument.
IN COLD TEMPERATURES, HAND FAILS TO RESPOND OR IS SLUGGISH.	Oil in indicator becomes too thick.	Replace instrument.
	Insufficient bearing end play.	Replace instrument.
NOISY GYRO.		Low voltage.
	High voltage.	Correct voltage.
	Loose or defective rotor bearings.	Replace instrument.

### 15-75. ELECTRIC CLOCK.

15-76. DESCRIPTION. The electric clock is connected to the battery through a one-ampere fuse mounted adjacent to the battery box. The electrical circuit is separate from the aircraft electrical system and will operate when the master switch is OFF.

15-77. OUTSIDE AIR TEMPERATURE GAGE. (See figure 15-7.)

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## SECTION 16

### ELECTRICAL SYSTEMS

#### WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

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Removal/Installation . . . . .	3K14 16-54	Description . . . . .	3K21 16-59
Instrument Post Lighting . . . . .	3K14 16-54	Removal/Installation . . . . .	3L4/16-66
Description . . . . .	3K14 16-54	Stall Warning Switch . . . . .	3L4/16-66
Trouble Shooting . . . . .	3K15 16-54A	Description . . . . .	3L4/16-66
Transistorized Light Dimming . . . . .	3K16 16-54B	Removal/Installation . . . . .	3L4/16-66
Description . . . . .	3K16/16-54B	Courtesy Lights . . . . .	3L4 16-66
Removal/Installation . . . . .	3K16/16-54B	Description . . . . .	3L4/16-66
Trouble Shooting Transis-		Removal/Installation . . . . .	3L4/16-66
torized Heat Sink . . . . .	3K16/16-54B	Pitot/Stall Warning	
Dome Light . . . . .	3K16/16-54B	Heaters . . . . .	3L4/16-66
Description . . . . .	3K16/16-54B	Description . . . . .	3L4/16-66
Removal/Installation . . . . .	3K16/16-54B	Cigar Lighter . . . . .	3L4/16-68
Map Light . . . . .	3K21/16-59	Description . . . . .	3L4/16-68
Description . . . . .	3K21/16-59	Removal/Installation . . . . .	3L4/16-68
Removal/Installation . . . . .	3K21/16-59	Emergency Locator	
Control Wheel Map Light . . . . .	3K21/16-59	Transmitter . . . . .	3L8/16-70
Description . . . . .	3K21/16-59	Description . . . . .	3L8/16-70
Removal/Installation . . . . .	3K21/16-59	Operation . . . . .	3L8/16-70
Landing Gear Indicator Lights . . . . .	3K21/16-59	Checkout Interval . . . . .	3L8/16-70
Description . . . . .	3K21/16-59	Removal/Installation of	
Removal/Installation . . . . .	3K21/16-59	Transmitter . . . . .	3L9/16-71
Compass and Radio Dial		Removal/Installation of	
Lights . . . . .	3K21/16-59	Antenna . . . . .	3L9/16-71
Description . . . . .	3K21/16-59	Removal/Installation of	
Pedestal Lighting . . . . .	3K21/16-59	Battery Pack . . . . .	3L14 16-76
Description . . . . .	3K21/16-59	Trouble Shooting . . . . .	3L15 16-77
Removal/Installation . . . . .	3K21/16-59	Electrical Load Analysis	
		Chart . . . . .	3L16/16-78

## 16-1. ELECTRICAL SYSTEMS.

16-2. GENERAL. This section contains service information necessary to maintain the Aircraft Electrical Power Supply System, Battery and External Power Supply System, Alternator Power System, Aircraft Lighting System, Pitot Heater, Stall Warning, Cigar Lighter, and Electrical Load Analysis.

## 16-3. ELECTRICAL POWER SUPPLY SYSTEM.

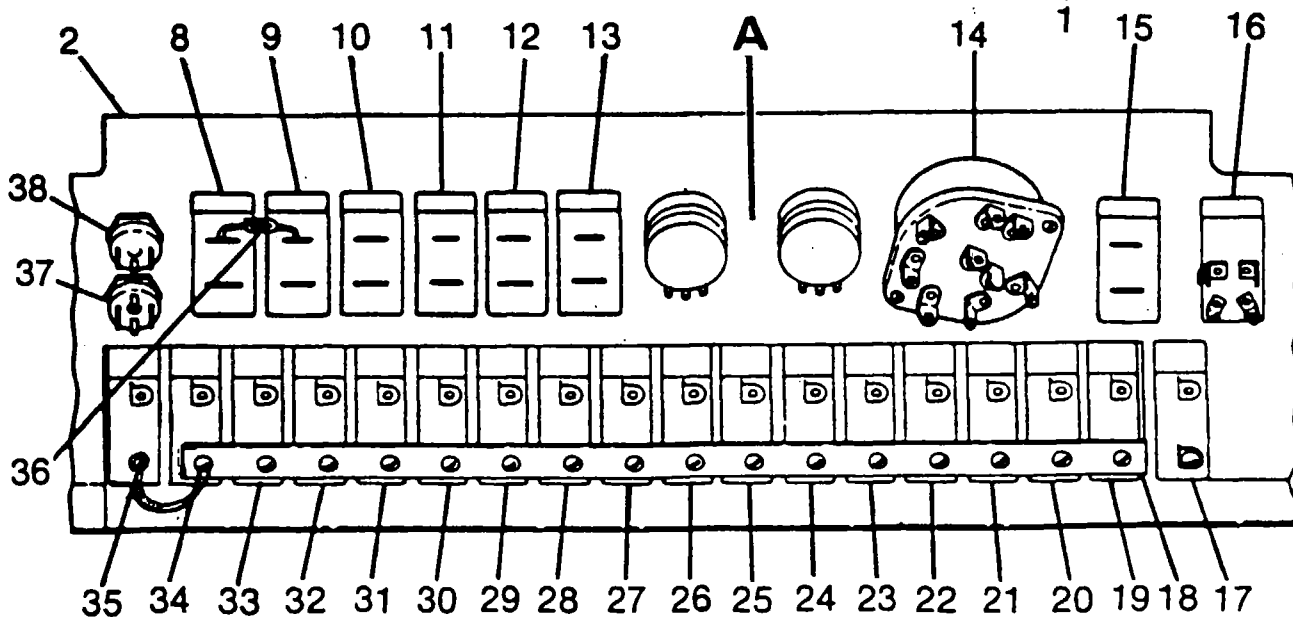
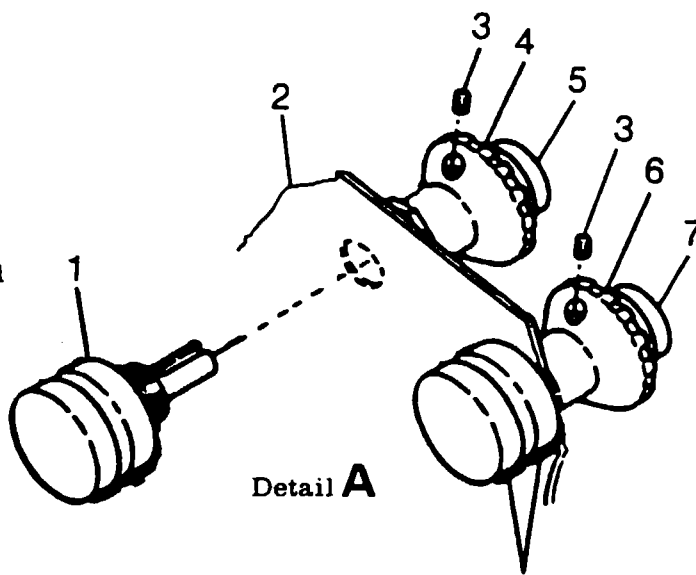
16-4. DESCRIPTION. Energy for the aircraft is supplied by a 28-volt, direct-current, single wire, negative ground electrical system. A 24-volt battery supplies power for starting and furnishes a reserve in event of alternator failure. An alternator is the normal source of power during flight and maintains a battery charge controlled by a voltage regulator/alternator control unit. An external power source receptacle may be installed to supplement the battery alternator system for starting and ground operation.

## 16-5. SPLIT BUS BAR.

16-6. DESCRIPTION. Electrical power is supplied through two bus bars. One bus bar is located on the lower left hand side of the instrument panel. This bar supplies power to the electrical equipment. The other bus bar powers the electronic equipment, and is located on the left hand cabin side forward of the cabin door. Power is transmitted from the electrical bus to the electronic bus through an avionics master switch installed on the electronic bus.

# MODEL R182 AND TR182 SERVICE MANUAL

1. Rheostat
2. Panel
3. Set Screw
4. Post Light Control
5. Flood Light Control
6. EL Panel Control
7. Engine and Radio Light Control
8. Landing Light Switch
9. Taxi Light Switch
10. Strobe Light Switch
11. Flashing Beacon Light Switch
12. Navigation Light Switch
13. Pitot Heat Switch
14. Magneto Switch

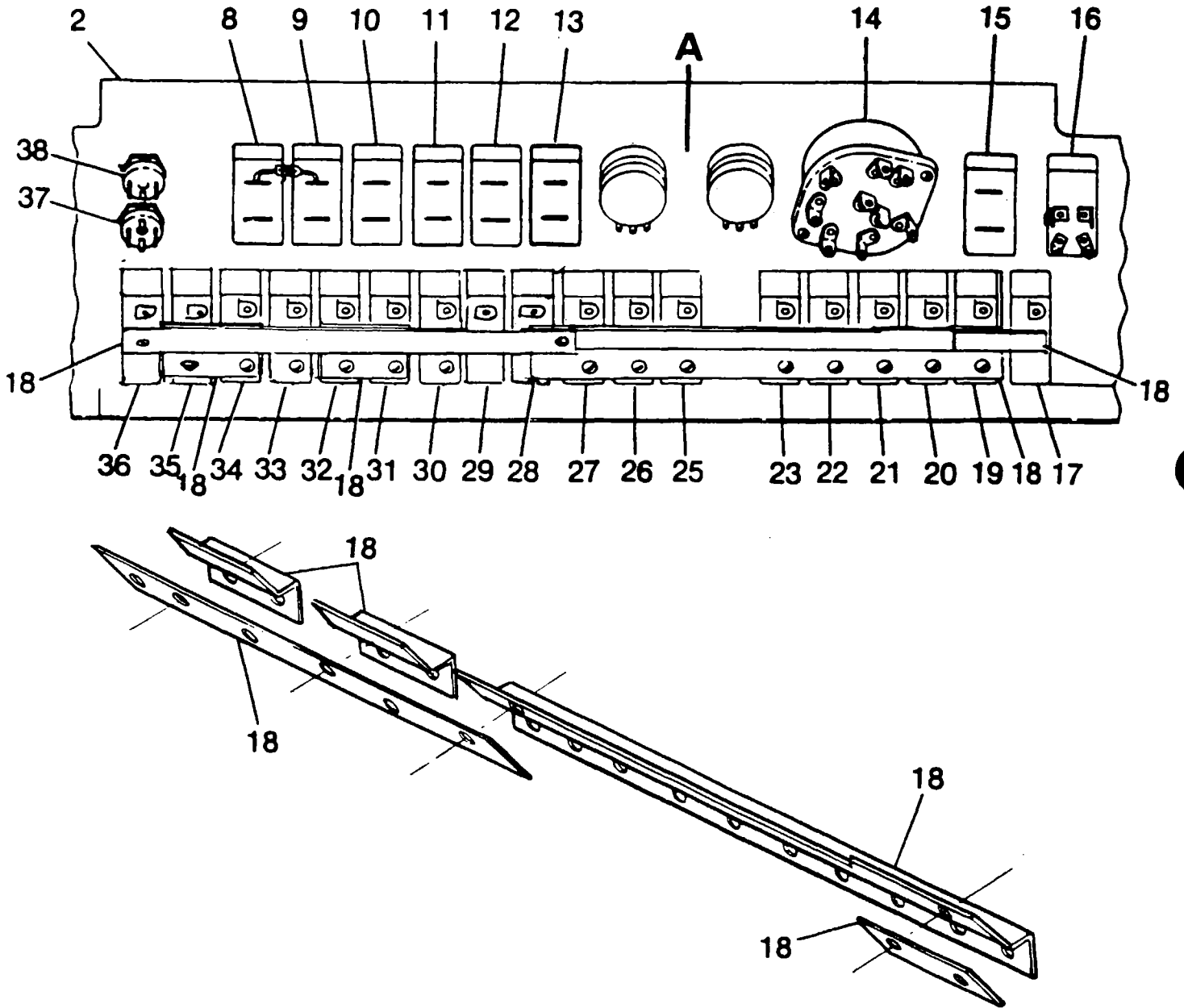


THRU 1980 MODELS

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>15. Auxiliary Fuel Pump Switch</li> <li>16. Master Switch</li> <li>17. Alternator Circuit Breaker</li> <li>18. Bus Bar</li> <li>19. Alternator Regulator Circuit Breaker</li> <li>20. Fuel Pump Circuit Breaker</li> <li>21. Turn Coordinator Circuit Breaker</li> <li>22. Stall Warning Circuit Breaker</li> <li>23. Fuel Quantity Circuit Breaker</li> <li>24. Pitot Heat Circuit Breaker</li> <li>25. Instrument Light Circuit Breaker</li> <li>26. Cabin Light Circuit Breaker</li> </ol> | <ol style="list-style-type: none"> <li>27. Navigation Light Circuit Breaker</li> <li>28. Flashing Beacon Circuit Breaker</li> <li>29. Strobe Light Circuit Breaker</li> <li>30. Taxi Light Circuit Breaker</li> <li>31. Landing Light Circuit Breaker</li> <li>32. Electric Trim Circuit Breaker</li> <li>33. Flap Circuit Breaker</li> <li>34. Landing Gear Circuit Breaker</li> <li>35. Gear Pump Circuit Breaker</li> <li>36. Diode</li> <li>37. Gear Down Light</li> <li>38. Gear Up Light</li> </ol> |
|--|---|

Figure 16-1. Switch and Circuit Breaker Installation (Sheet 1 of 3)

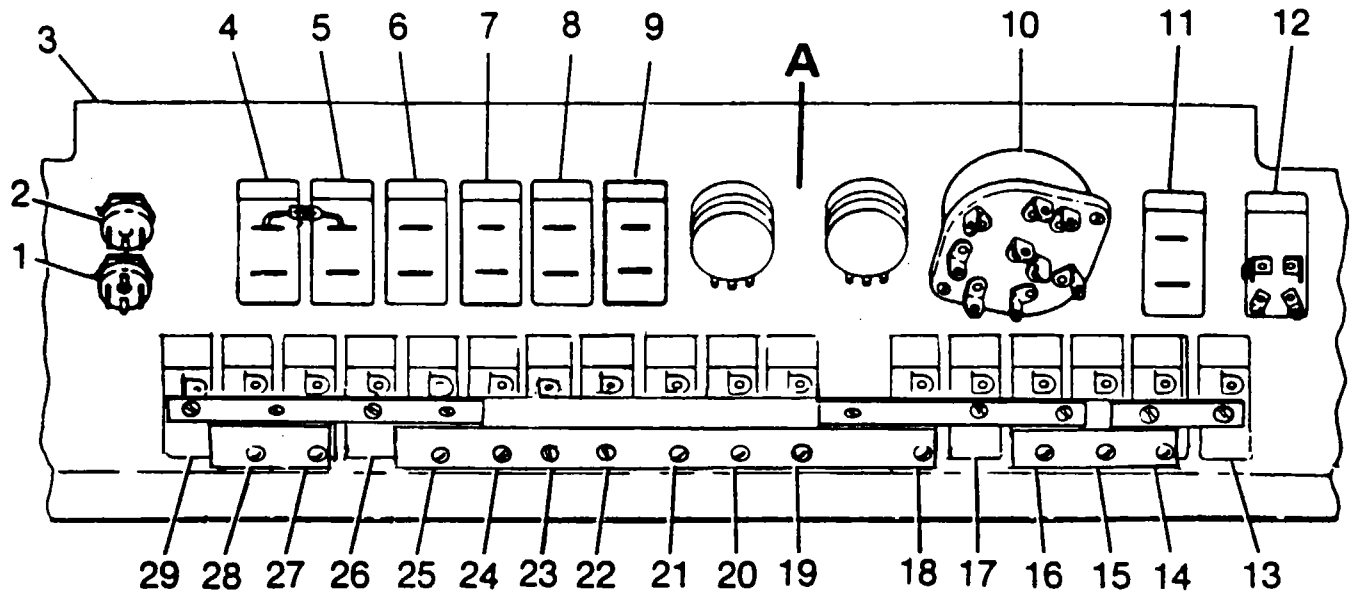
MODEL R182 AND TR182 SERVICE MANUAL



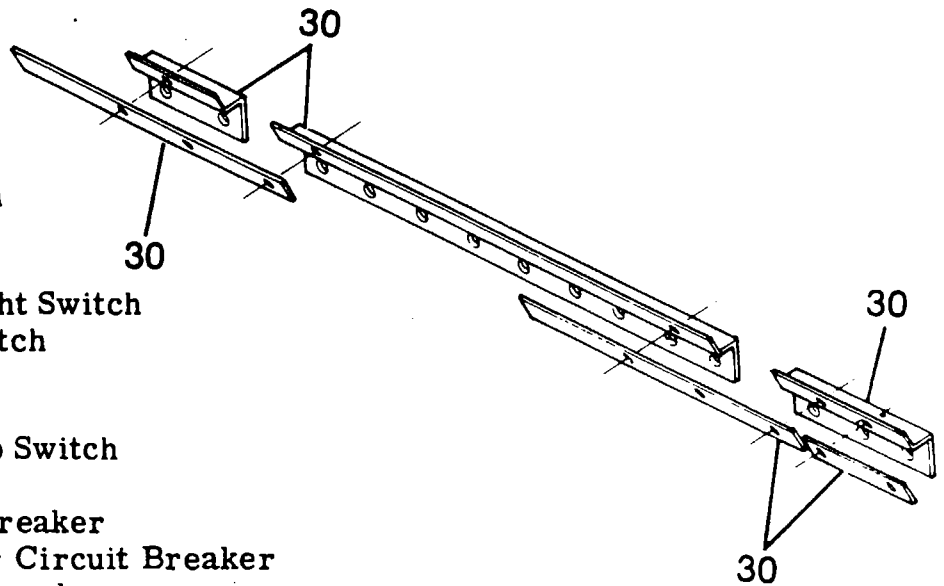
1981 THRU 1982 MODELS

Figure 16-1. Switch and Circuit Breaker Installation (Sheet 2 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL



1. Gear Down Light
2. Gear Up Light
3. Panel
4. Landing Light Switch
5. Taxi Light Switch
6. Strobe Light Switch
7. Flashing Beacon Light Switch
8. Navigation Light Switch
9. Pitot Heat Switch
10. Magneto Switch
11. Auxiliary Fuel Pump Switch
12. Master Switch
13. Alternator Circuit Breaker
14. Alternator Regulator Circuit Breaker
15. Fuel Pump Circuit Breaker
16. Turn Coordinator Circuit Breaker
17. Stall Warning Circuit Breaker
18. Fuel Quantity Circuit Breaker
19. Instrument Light Circuit Breaker
20. Cabin Lights Circuit Breaker
21. Navigation Light Circuit Breaker
22. Flashing Beacon Light Circuit Breaker
23. Strobe Light Circuit Breaker
24. Taxi Light Circuit Breaker
25. Landing Light Circuit Breaker
26. Electric Trim Circuit Breaker
27. Flap Circuit Breaker
28. Landing Gear Circuit Breaker



29. Gear Pump Circuit Breaker
30. Bus Bar

BEGINNING WITH 1983 MODELS

Figure 16-1. Switch and Circuit Breaker Installation (Sheet 3 of 3)

## MODEL R182 AND TR182 SERVICE MANUAL

- 16-7. REMOVAL AND INSTALLATION. (See figure 16-1.)
- 16-8. MASTER SWITCH.
- 16-9. DESCRIPTION. The operation of the battery and alternator systems is controlled by a master switch. The switch is an interlocking split rocker with the battery mode on the right-hand side and the alternator mode on the left-hand side. This arrangement allows the battery to be on the line without the alternator, however, operation of the alternator without the battery on the line is not possible. The switch is labeled "BAT" and "ALT" below the switch and is located on the left-hand side of the switch panel.
- 16-10. AMMETER.
- 16-11. DESCRIPTION. The ammeter is connected between the battery and the aircraft bus. The meter indicates the amount of current flowing either to or from the battery. With a low battery and the engine operating at cruise speed the ammeter will show the full alternator output when all electrical equipment is off. When the battery is fully charged and cruise RPM is maintained with all electrical equipment off, the ammeter will show a minimum charging rate.
- 16-12. BATTERY POWER SYSTEM.
- 16-13. BATTERY.
- 16-14. DESCRIPTION. A 24-volt battery with an approximate 12.75 ampere-hour capacity is installed as standard equipment, and a 15.5 ampere-hour battery as optional equipment. Thru 1979 models the battery is mounted on the forward right side of the firewall and is equipped with non-spill type filler caps. Beginning with 1980 models the battery is mounted in the tailcone on the left hand side thru 1981 models and on the right hand side beginning with 1982 models.
- 16-15. TROUBLE SHOOTING -- BATTERY.

TROUBLE	PROBABLE CAUSE	REMEDY
BATTERY WILL NOT SUPPLY POWER TO BUS OR IS INCAPABLE OF CRANKING ENGINE.	Battery discharged.	1. Measure voltage at "BAT" terminal of battery contactor with master switch and a suitable load such as a taxi light turned on. Normal battery will indicate 23 volts. If voltage is low proceed to step 2. If voltage is normal proceed to step 3.
	Battery faulty.	2. Check fluid level in cells and charge at 28 volts for approximately 30 minutes or until battery voltage rises to 28 volts. If tester indicates a good battery, the malfunction may be assumed to be a discharged battery. If tester indicates a faulty battery, replace the battery.

## MODEL R182 AND TR182 SERVICE MANUAL

### 16-15. TROUBLE SHOOTING -- BATTERY (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY	
BATTERY WILL NOT SUPPLY POWER TO BUS OR IS INCAPABLE OF CRANKING ENGINE. (Cont.)	Faulty contactor or wiring between contactor and master switch.	3. Measure voltage at master switch terminal (smallest) on contactor with master switch closed. Normal indication is zero volts. If voltage reads zero, proceed to step 4. If a voltage reading is obtained, check wiring between contactor and master switch. Also check master switch.	
	Open coil on contactor.	4. Check continuity between "BAT" terminal and master switch terminal of contactor. Normal indication is 50-70 ohms. If ohmmeter indicates an open coil, replace contactor. If ohmmeter indicates a good coil, proceed to step 5.	
	Faulty contactor contacts.	5. Check voltage on "BUS" side of contactor with master switch closed. Meter normally indicates battery voltage. If voltage is zero or intermittent, replace contactor. If voltage is normal, proceed to step 6.	
	Faulty wiring between contactor and bus.	6. Inspect wiring between contactor and bus. Repair or replace wiring.	

### 16-16. REMOVAL AND INSTALLATION OF THE BATTERY. (See figure 16-2.)

#### CAUTION

Always remove the ground cable first and connect it last to prevent accidentally shorting the battery to the airframe with tools.

- a. Thru 1978 Models.
  1. To gain access to the battery, remove the upper right half of the engine cowl.
  2. Remove the battery box lid and disconnect the battery ground cable.
  3. Disconnect the positive cable from the battery and remove the battery from the aircraft.
  4. To install a battery, reverse this procedure.
- b. 1979 Models.
  1. To gain access to the battery, remove upper right half of engine cowl.



## MODEL R182 AND TR182 SERVICE MANUAL

2. Disconnect battery ground cable.
3. Cut sta-strap and remove terminal cover, then remove positive cable.
4. Remove battery mounting bolts and cover.
5. Disconnect battery drain tube then remove battery.
6. To install battery, reverse this procedure.

c. **Beginning With 1980 Models.**

1. To gain access to the battery remove access door on right hand side of the tailcone.
2. Disconnect battery ground strap.
3. Cut sta-strap and remove terminal cover, then remove positive cable.
4. Remove battery mounting bolts and cover.
5. Disconnect battery drain tube, then remove battery.
6. To install battery, reverse this procedure.

16-17. **CLEANING THE BATTERY.** For maximum efficiency, the battery and connections should be kept clean at all times.

- a. Remove the battery in accordance with preceding paragraph.
- b. Tighten battery cell filler caps to prevent the cleaning solution from entering the cells.
- c. Wipe battery cable ends, battery terminals and entire surface of the battery with a clean cloth moistened with a solution of bicarbonate of soda (baking soda) and water.
- d. Rinse with clear water, wipe off excess water and allow battery to dry.
- e. Brighten up cable ends and battery terminals with emery cloth or a wire brush.
- f. Install the battery in accordance with the preceding paragraph.
- g. Coat the battery terminals and the cable ends with petroleum jelly.

16-18. **ADDING ELECTROLYTE OR WATER TO THE BATTERY.** A battery being charged and discharged with use will decompose the water from the electrolyte by electrolysis. When the water is decomposed, hydrogen and oxygen gases are formed which escape into the atmosphere through the battery vent system. The acid in the solution chemically combines with the plates of the battery during discharge or is suspended in the electrolyte solution during charge. Unless the electrolyte has been spilled from a battery, acid should not be added to the solution. The water will decompose into gases and should be replaced regularly. Add distilled water as necessary to maintain the electrolyte level even with the horizontal baffle plate inside the battery. When "dry charged" batteries are put into service, fill as directed with electrolyte. However, as the electrolyte level falls below normal with use add only distilled water to maintain the proper level. The battery electrolyte contains approximately 25% sulphuric acid by volume. Any change in this volume will hamper the proper operation of the battery.

### CAUTION

Do not add any type of "battery rejuvenator" to the electrolyte. When acid has been spilled from a battery, the acid balance may be adjusted by following instructions published by the Association of American Battery Manufacturers.

16-19. **TESTING THE BATTERY.** The specific gravity check method of testing the battery is preferred when the condition of the battery is in a questionable state-of-charge. However, when the aircraft has been operated for a period of time with an alternator output voltage which is known to be correct, the question of battery capability may be answered more correctly with a load type tester. If testing the battery is deemed necessary, the specific gravity should be checked first and compared with the following chart.

# MODEL R182 AND TR182 SERVICE MANUAL

## BATTERY HYDROMETER READINGS

1.280 Specific Gravity	100% Charged
1.250 Specific Gravity	75% Charged
1.220 Specific Gravity	50% Charged
1.190 Specific Gravity	25% Charged
1.160 Specific Gravity	Practically Dead

### NOTE

All readings shown are for an electrolyte temperature of 80° Fahrenheit. For higher temperatures the readings will be slightly lower. For cooler temperatures the readings will be slightly higher. Some hydrometers have a built-in temperature compensation chart and a thermometer. If this type tester is used, disregard this chart.

If the specific gravity reading indicates the battery is not fully charged the battery should be charged at approximately 10 amperes for 30 minutes or until the battery voltage rises to 28-volts.

- 16-20. **CHARGING THE BATTERY.** When the battery is to be charged, the level of electrolyte should be checked and adjusted by adding distilled water to cover the tops of the internal battery plates. The battery cables and connections should be clean.

### WARNING

When a battery is charging, hydrogen and oxygen gases are generated. Accumulation of these gases can create a hazardous explosive condition. Always keep sparks and open flame away from the battery. Allow unrestricted ventilation of the battery area during charging.

The main points of consideration during a battery charge are excessive battery temperature and violent gassing. Under a reasonable rate of charge, 15 amperes or less, the battery temperature should not rise over 120°F., nor should gassing be so violent that acid is blown from the vents.

- 16-21. **BATTERY BOX. (THRU 1978 MODELS.)**
- 16-22. **DESCRIPTION.** The battery is completely enclosed in an acid-proof box. The box has a vent tube which protrudes through the bottom of the engine cowl, allowing gases and spilled electrolyte to escape. The battery box is held in place on a support bracket by a channel assembly and two bolts.
- 16-23. **REMOVAL AND INSTALLATION.** (See figure 16-2.) The battery box is held in place by a channel across the top of the box and two bolts.
- 16-24. **MAINTENANCE.** The battery box should be inspected and cleaned periodically. The box and cover should be cleaned with a strong solution of bicarbonate of soda (baking soda) and water. When all deposits have been removed from the box, flush thoroughly with clean water.

# MODEL R182 AND TR182 SERVICE MANUAL

## WARNING

Do not allow acid deposits to come in contact with skin or clothing. Serious acid burns may result unless the affected area is washed immediately with soap and water. Clothing will be damaged upon contact with acid.

Inspect the cleaned box and cover for physical damage. A badly damaged box should be replaced.

### 16-25. BATTERY CONTACTOR.

16-26. **DESCRIPTION.** Thru 1979 Models the battery contactor is bolted to the battery box support below the box. Beginning with 1980 Models the contactor is mounted fwd of the battery on the main wheel well aft bulkhead. The contactor is a solenoid plunger type, which is actuated by turning the master switch on. When the master switch is off, the battery is disconnected from the electrical system. A silicon diode is used to eliminate spiking of the transistorized radio equipment. The cathode (-) terminal of the diode connects to the battery terminal of the battery contactor. The anode (+) terminal of the diode connects to the same terminal as the master switch wire. This places the diode directly across the contactor solenoid coil so that inductive spikes originating in the coil are clipped when the master switch is opened.

### 16-27. REMOVAL AND INSTALLATION. (See figure 16-2.)

a.

1. Thru 1978 Models remove battery box cover and disconnect ground cable from negative battery terminal. Pull cable free of battery box.
2. Beginning with 1979 Models, disconnect ground cable from negative battery terminal.
3. Remove sta-strap, cover, nut and washer securing battery positive cable to battery contactor, then remove cable and fuse wire.
4. If ground service is installed remove sta-straps, covers, nuts, and washers securing bus bar, jumper cable and wire to diode from battery contactor and ground service contactor.
5. When ground service is not installed, remove sta-strap, cover, nut and washer securing jumper cable and wire to diode.
6. Remove nipple, nut and washer securing the master switch wire to the battery contactor.
7. Remove the bolt securing each side of the contactor to the battery box support and remove contactor.
8. To install the contactor, reverse the preceding steps.

b.

1. Beginning with 1980 Models, remove aft flood of baggage compartment to gain access to the contactor.
2. Disconnect ground strap from negative terminal of the battery.
3. Cut sta-straps and remove contactor cover.
4. Remove nuts and lockwashers from contactor ports.
5. Remove and tag wires for identification for reinstallation, be sure to note position of ground wire and diode.
6. Remove bolts and washers securing contactor to bulkhead and remove contactor.
7. For installation, reverse the preceding steps.

16-28. **BATTERY CONTACTOR CLOSING CIRCUIT.** (See figure 16-2.) This circuit consists of a 5-amp fuse, a resistor and a diode mounted on the ground service receptacle bracket. This

## MODEL R182 AND TR182 SERVICE MANUAL

serves to shunt a small charge around the battery contactor so that ground power may be used to close the contactor when the battery is too dead to energize the contactor by itself.

### 16-29. GROUND SERVICE RECEPTACLE.

16-30. **DESCRIPTION.** A ground service receptacle is installed to permit the use of external power for cold weather starting or when performing lengthy electrical maintenance. A reverse polarity protection system is utilized whereby ground power must pass through an external power contactor to be connected to the bus. A silicon junction diode is connected in series with the coil on the external power contactor so that if the ground power source is inadvertently connected with a reversed polarity, the external power contactor will not close. This feature protects the diodes in the alternator, and other semi-conductor devices used in the aircraft, from possible reverse polarity damage.

### NOTE

Maintenance of the electronic installations cannot be performed when using external power. Application of external power opens the relay supplying voltage to the electronics bus. For lengthy ground testing of electronic systems, connect a well regulated and filtered power supply directly to the battery side of the battery contactor. Adjust the supply for 28 volts and close the master switch.

### NOTE

When using ground power to start the aircraft, close the master switch before removing the ground power plug. This will ensure closure of the battery contactor and excitation of the alternator field.

### CAUTION

Failure to observe polarity when connecting an external power source directly to the battery or directly to the battery side of the battery contactor, will damage the diodes in the alternator and other semiconductor devices in the aircraft.

### WARNING

External power receptacle must be functionally checked after wiring, or after replacement of components of the external power or split bus systems. Incorrect wiring or malfunctioned components can cause immediate engagement of starter when ground service plug is inserted.

### NOTE

On Aircraft Serials R1820001 thru R1820034 refer to Cessna Single-engine Service Letter SE78-19, dated March 27, 1978.

# MODEL R182 AND TR182 SERVICE MANUAL

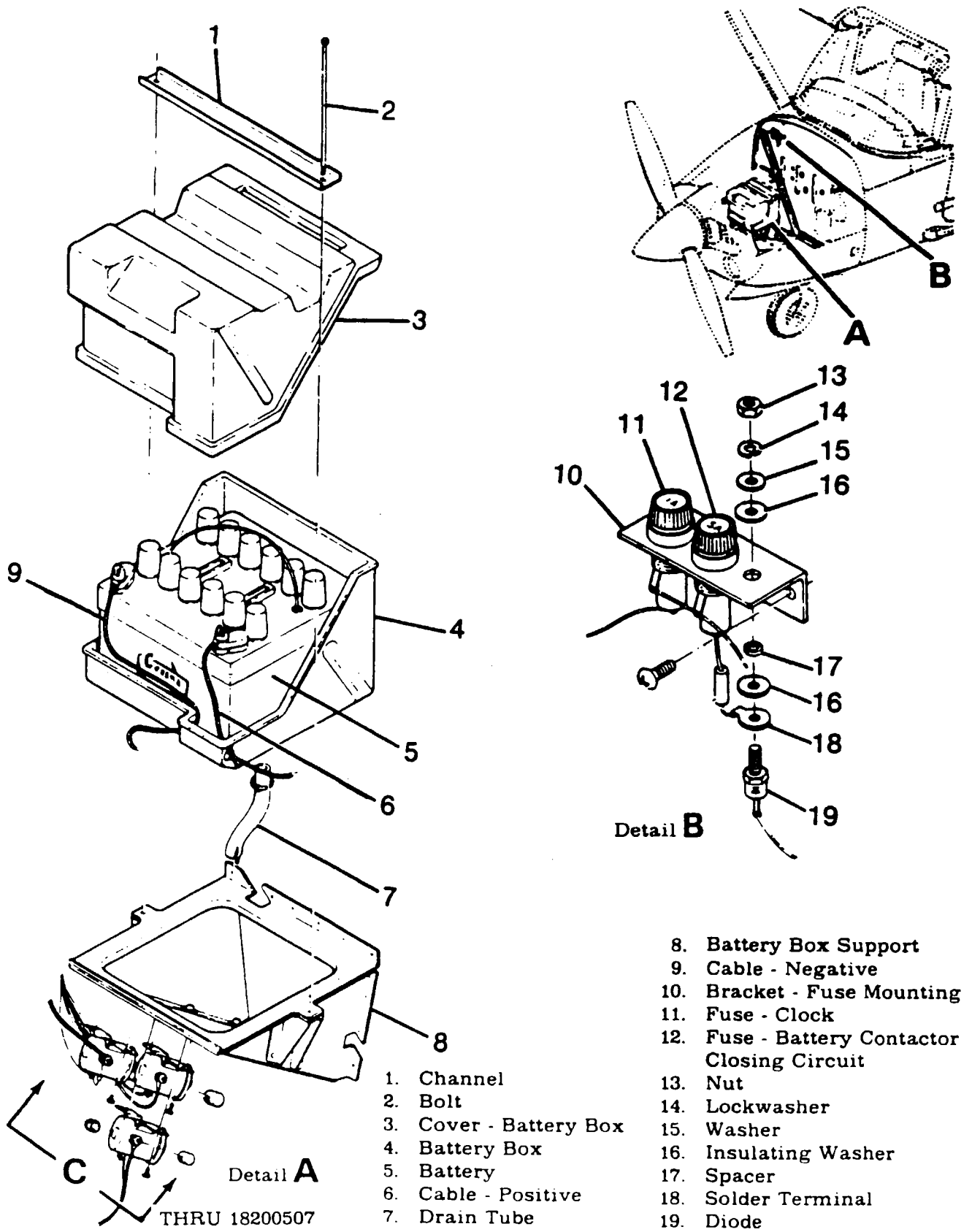
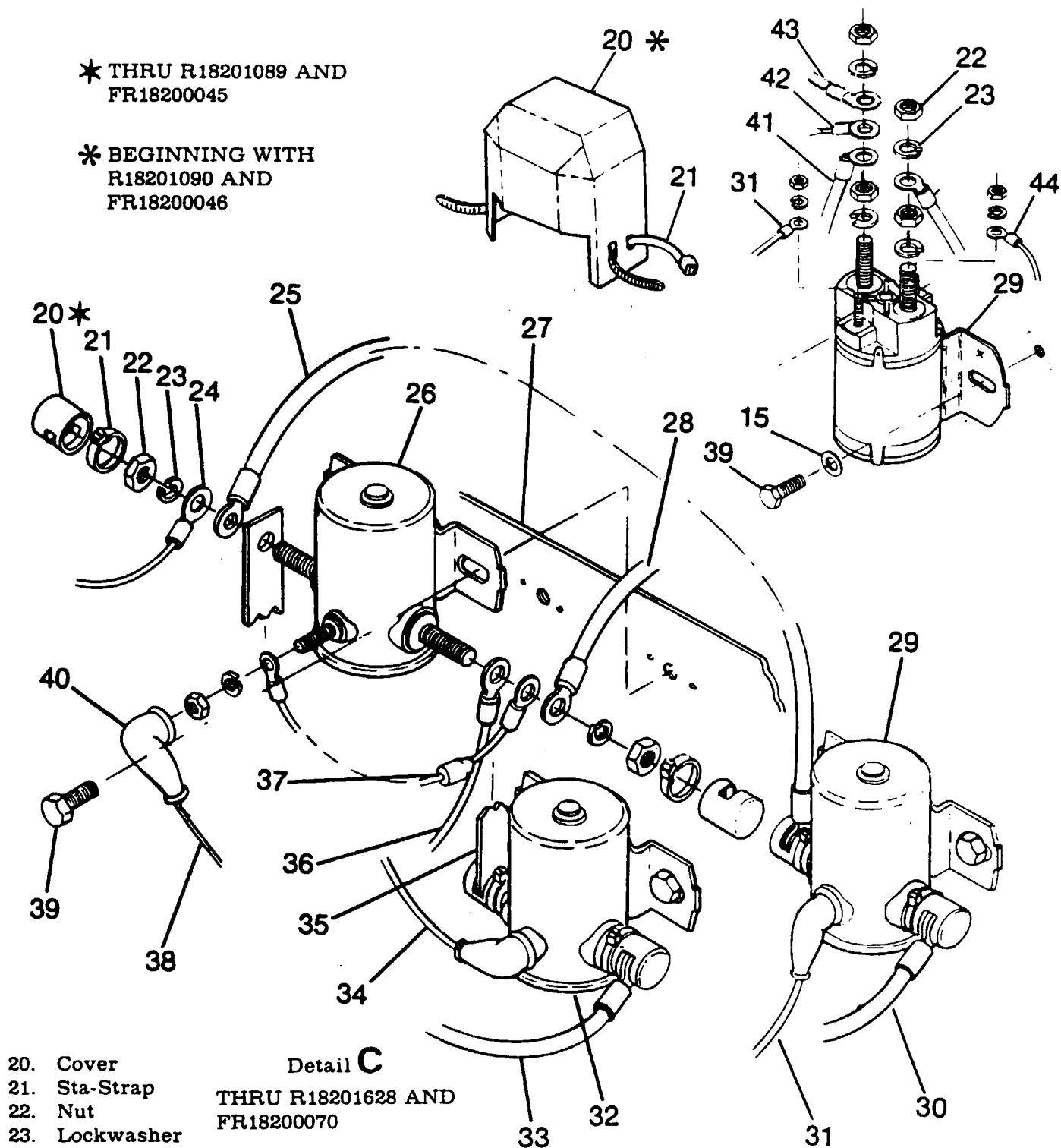


Figure 16-2. Battery and Electrical Equipment Installation (Sheet 1 of 7)

# MODEL R182 AND TR182 SERVICE MANUAL

\* THRU R18201089 AND  
FR18200045

\* BEGINNING WITH  
R18201090 AND  
FR18200046



- |                                  |                               |                                  |
|----------------------------------|-------------------------------|----------------------------------|
| 20. Cover                        | 32. Ground Service Contactor  | 39. Bolt                         |
| 21. Sta-Strap                    | 33. Cable (to Ground Service) | 40. Nipple                       |
| 22. Nut                          | 34. Wire (to Diode Board)     | 41. Cable (to Battery Contactor) |
| 23. Lockwasher                   | 35. Bus Bar                   | 42. Wire (to Ammeter)            |
| 24. Wire (to Diode)              | 36. Wire (to Fuse)            | 43. Cable (to Ground Service)    |
| 25. Cable (to Starter Contactor) | 37. Diode Assembly            | 44. Ground Wire                  |
| 26. Battery Contactor            | 38. Wire (to Master Switch)   |                                  |
| 27. Battery Box Support          |                               |                                  |
| 28. Battery Positive Cable       |                               |                                  |
| 29. Starter Contactor            |                               |                                  |
| 30. Cable (to Starter)           |                               |                                  |
| 31. Wire (to Starter Switch)     |                               |                                  |

Figure 16-2. Battery and Electrical Equipment Installation (Sheet 2 of 7)

# MODEL R182 AND TR182 SERVICE MANUAL

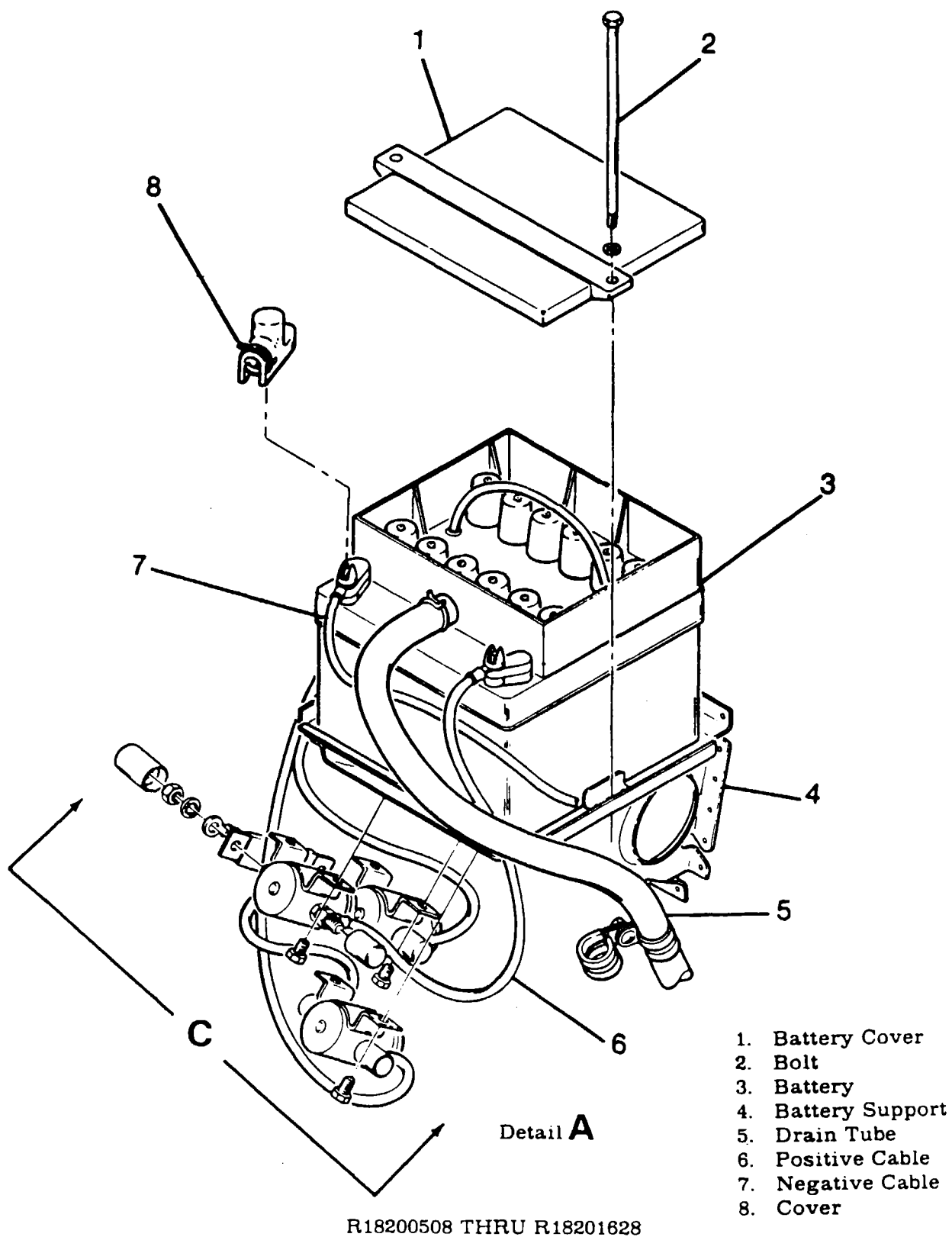
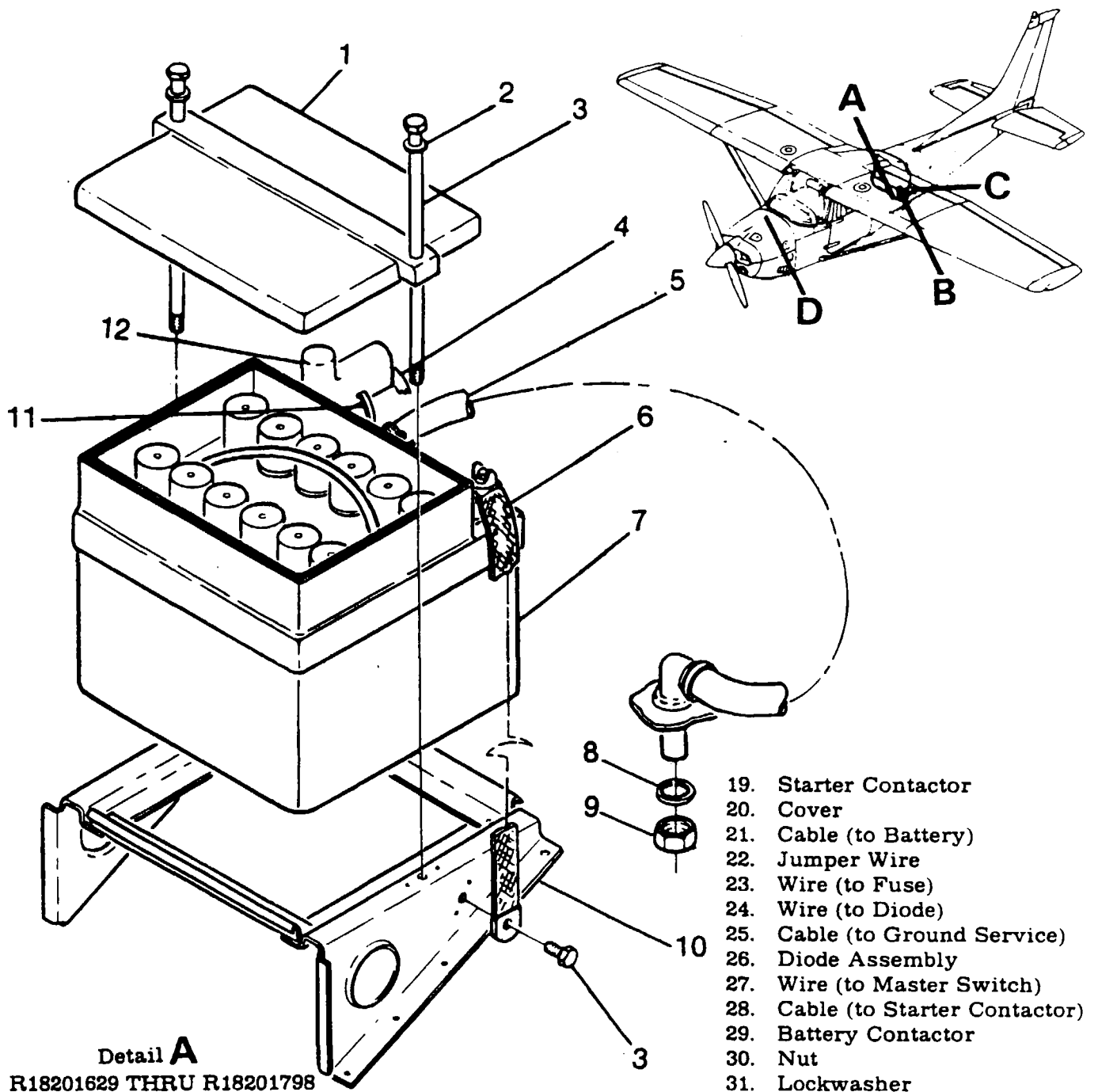


Figure 16-2. Battery and Electrical Equipment Installation (Sheet 3 of 7)

# MODEL R182 AND TR182 SERVICE MANUAL



**Detail A**  
R18201629 THRU R18201798

- |                   |                                  |  |
|-------------------|----------------------------------|--|
| 1. Battery Cover  | 10. Battery Support              | 19. Starter Contactor                        |
| 2. Washer         | 11. Sta-Strap                    | 20. Cover                                    |
| 3. Bolt           | 12. Cover                        | 21. Cable (to Battery)                       |
| 4. Positive Cable | 13. Wire (to Starter Switch)     | 22. Jumper Wire                              |
| 5. Drain Tube     | 14. Cable (to Battery Contactor) | 23. Wire (to Fuse)                           |
| 6. Ground Strap   | 15. Wire (to Ammeter)            | 24. Wire (to Diode)                          |
| 7. Battery        | 16. Lockwasher                   | 25. Cable (to Ground Service)                |
| 8. Washer         | 17. Cable (to Starter)           | 26. Diode Assembly                           |
| 9. Nut            | 18. Ground Wire                  | 27. Wire (to Master Switch)                  |
|                   |                                  | 28. Cable (to Starter Contactor)             |
|                   |                                  | 29. Battery Contactor                        |
|                   |                                  | 30. Nut                                      |
|                   |                                  | 31. Lockwasher                               |
|                   |                                  | 32. Washer                                   |
|                   |                                  | 33. Insulating Washer                        |
|                   |                                  | 34. Fuse - Battery Contactor Closing Circuit |
|                   |                                  | 35. Fuse - Clock                             |
|                   |                                  | 36. Bracket                                  |
|                   |                                  | 37. Resistor                                 |
|                   |                                  | 38. Diode                                    |
|                   |                                  | 39. Solder Terminal                          |
|                   |                                  | 40. Spacer                                   |
|                   |                                  | 41. Screw                                    |

Figure 16-2. Battery and Electrical Equipment Installation (Sheet 4 of 7)



MODEL R182 AND TR182 SERVICE MANUAL

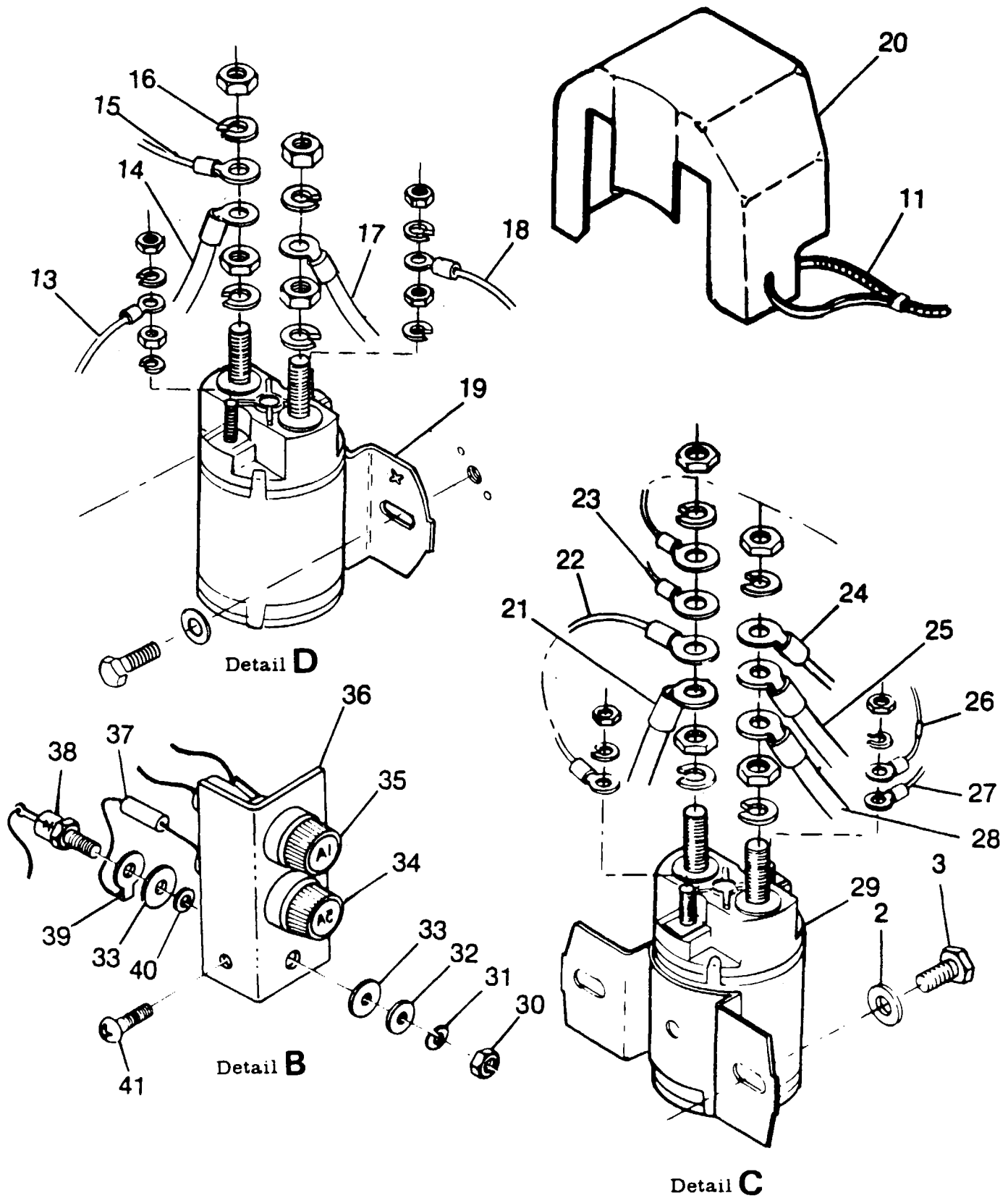
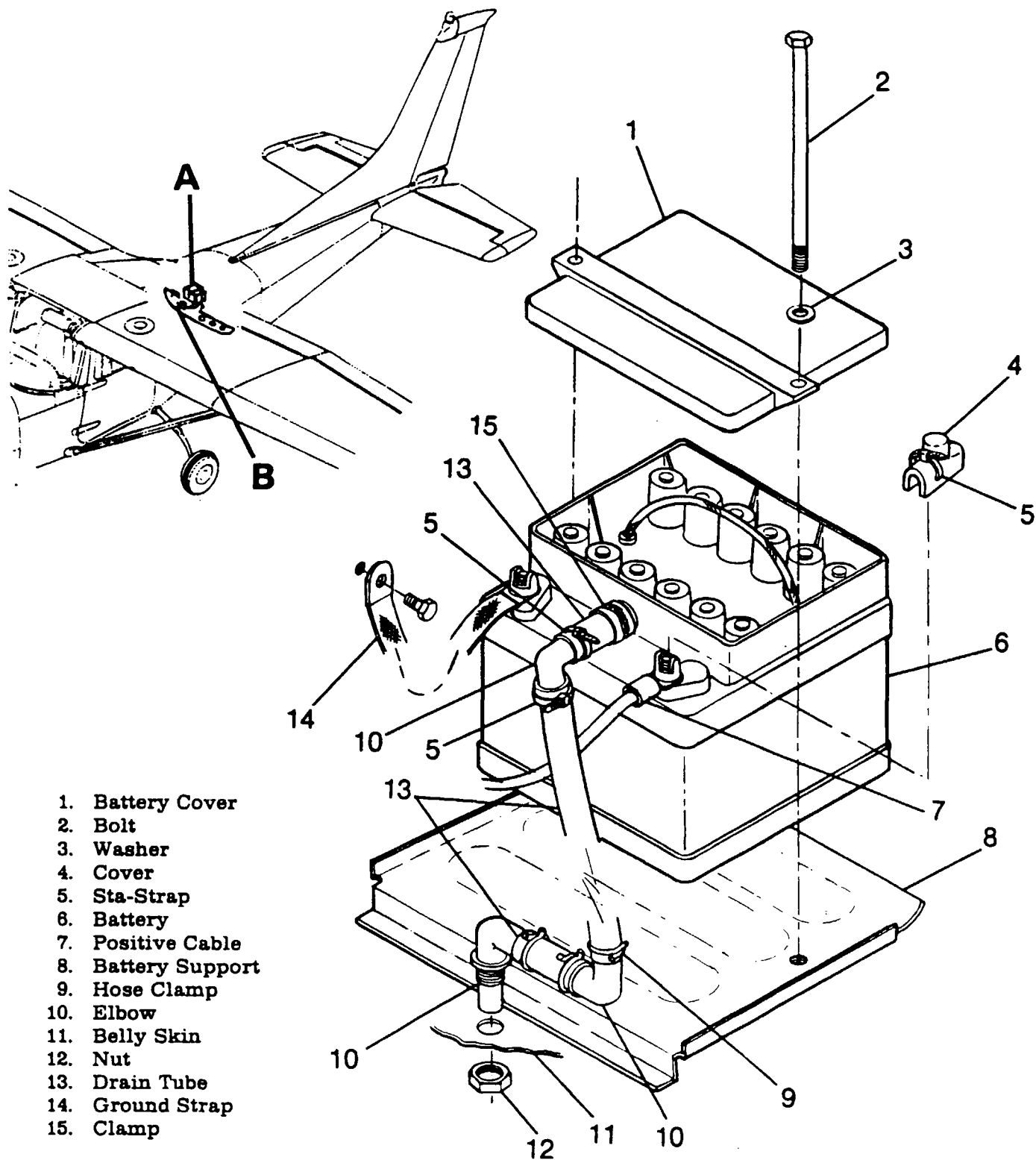


Figure 16-2. Battery and Electrical Equipment Installation (Sheet 5 of 7)

MODEL R182 AND TR182 SERVICE MANUAL



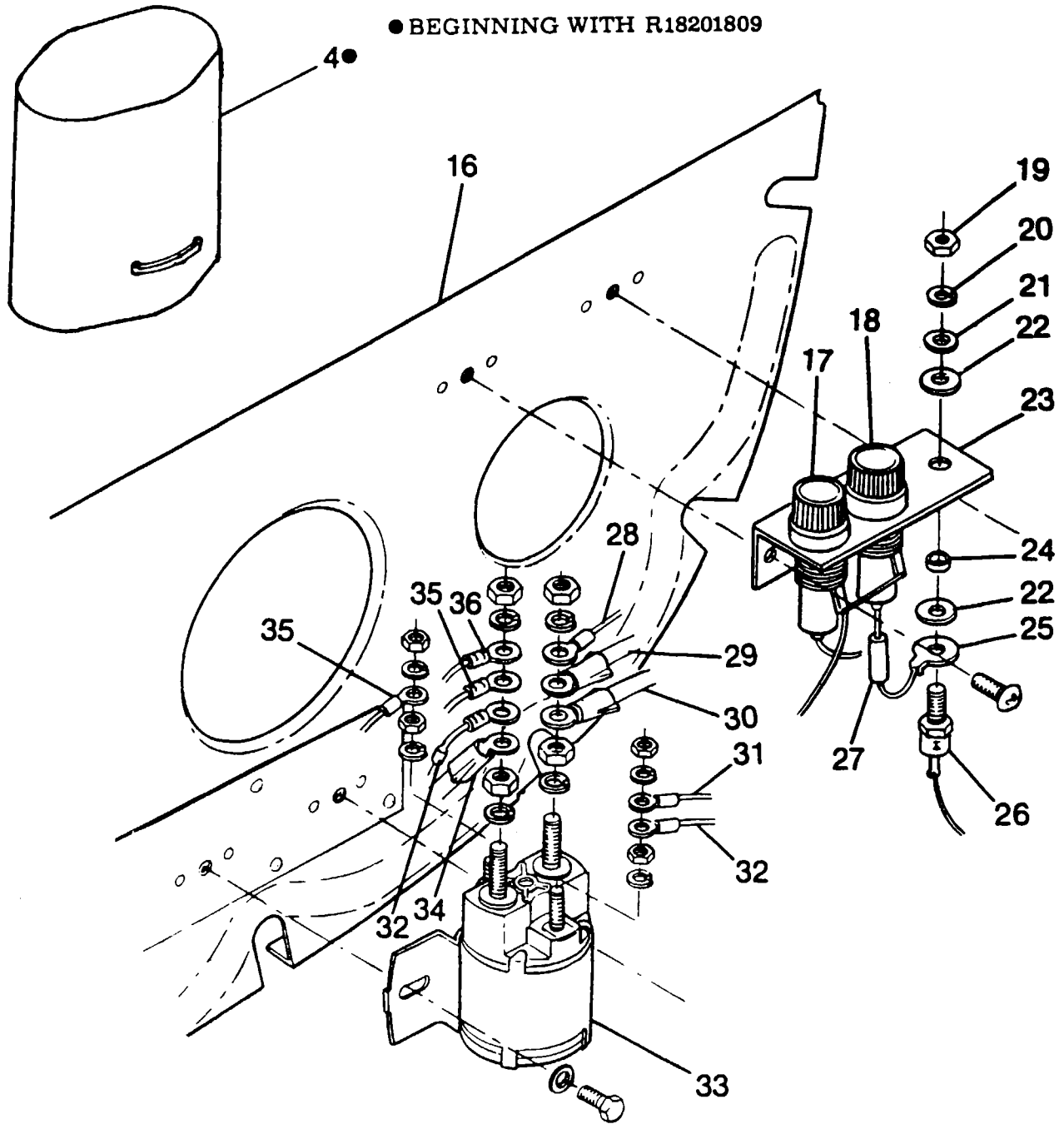
- 1. Battery Cover
- 2. Bolt
- 3. Washer
- 4. Cover
- 5. Sta-Strap
- 6. Battery
- 7. Positive Cable
- 8. Battery Support
- 9. Hose Clamp
- 10. Elbow
- 11. Belly Skin
- 12. Nut
- 13. Drain Tube
- 14. Ground Strap
- 15. Clamp

Detail **A**  
 BEGINNING WITH R18201799

Figure 16-2. Battery and Electrical Equipment Installation (Sheet 6 of 7)

# MODEL R182 AND TR182 SERVICE MANUAL

● BEGINNING WITH R18201809



## Detail B

BEGINNING WITH R18201799

- |                            |                                  |                               |
|----------------------------|----------------------------------|-------------------------------|
| 16. Bulkhead               | 23. Bracket                      | 30. Cable (to Ground Service) |
| 17. Fuse-Clock             | 24. Spacer                       | 31. Wire (to Master Switch)   |
| 18. Fuse-Battery Contactor | 25. Solder Terminal              | 32. Diode Assembly            |
| 19. Nut                    | 26. Diode                        | 33. Battery Contactor         |
| 20. Lockwasher             | 27. Resistor                     | 34. Cable (to Battery)        |
| 21. Washer                 | 28. Wire (to Diode)              | 35. Jumper Wire               |
| 22. Insulating Washer      | 29. Cable (to Starter Contactor) | 36. Wire (to Clock Fuse)      |

Figure 16-2. Battery and Electrical Equipment Installation (Sheet 7 of 7)

# MODEL R182 AND TR182 SERVICE MANUAL

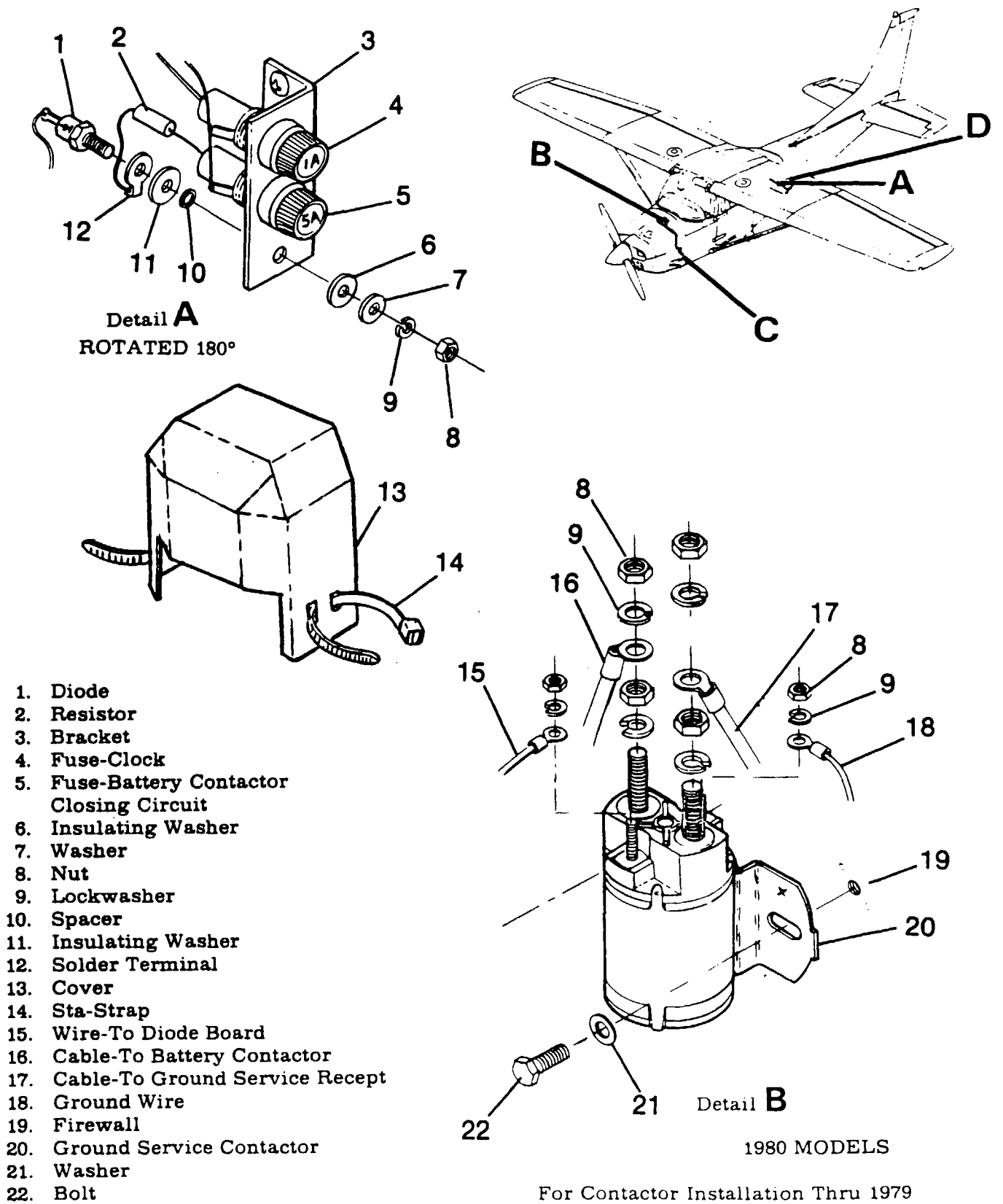
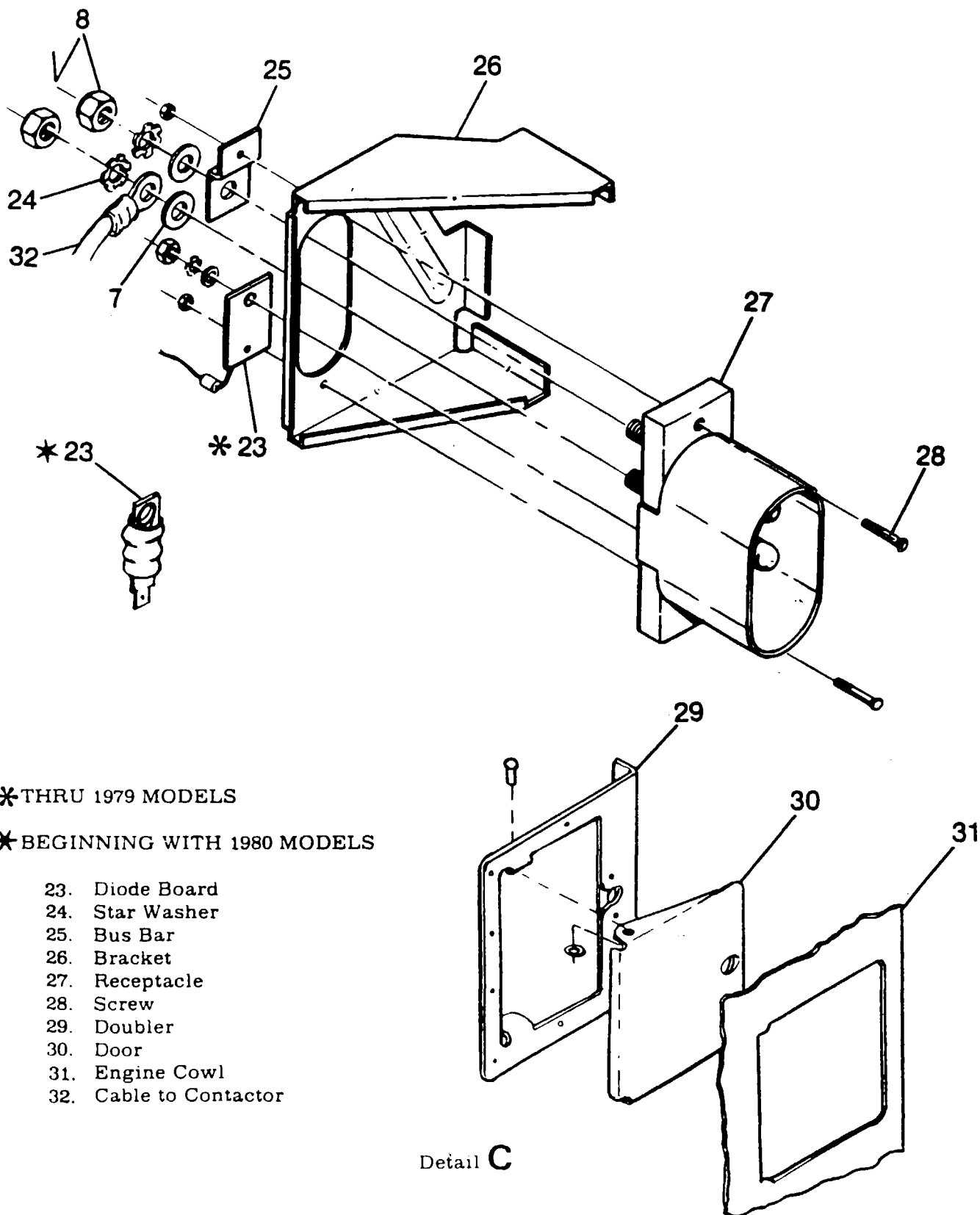


Figure 16-3. Ground Service Receptacle Installation (Sheet 1 of 4)

MODEL R182 AND TR182 SERVICE MANUAL



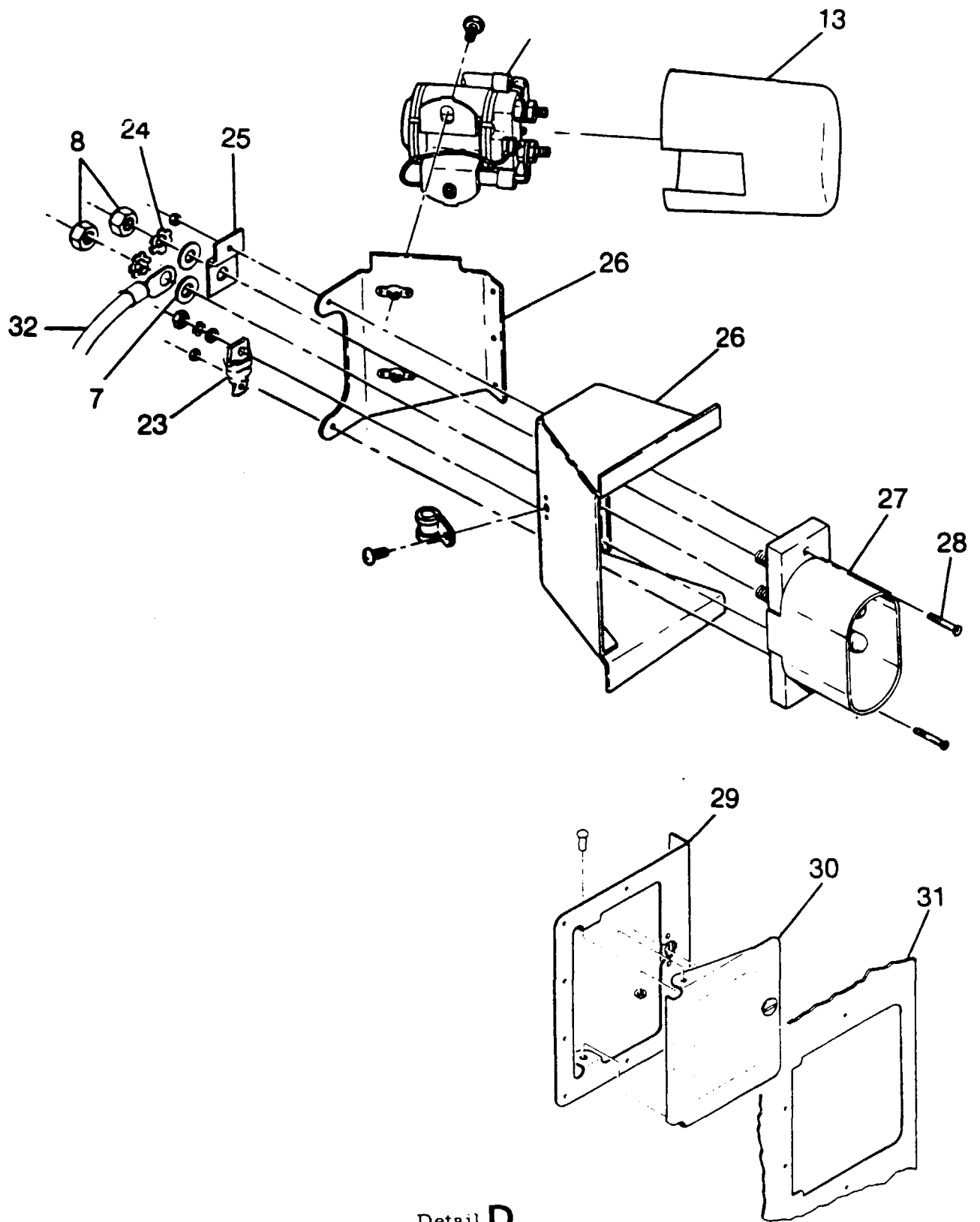
\*THRU 1979 MODELS

\*BEGINNING WITH 1980 MODELS

- 23. Diode Board
- 24. Star Washer
- 25. Bus Bar
- 26. Bracket
- 27. Receptacle
- 28. Screw
- 29. Doubler
- 30. Door
- 31. Engine Cowl
- 32. Cable to Contactor

Figure 16-3. Ground Service Receptacle Installation (Sheet 2 of 4)

MODEL R182 AND TR182 SERVICE MANUAL



Detail **D**  
1981 MODELS

Figure 16-3. Ground Service Receptacle Installation (Sheet 3 of 4)

# MODEL R182 AND TR182 SERVICE MANUAL

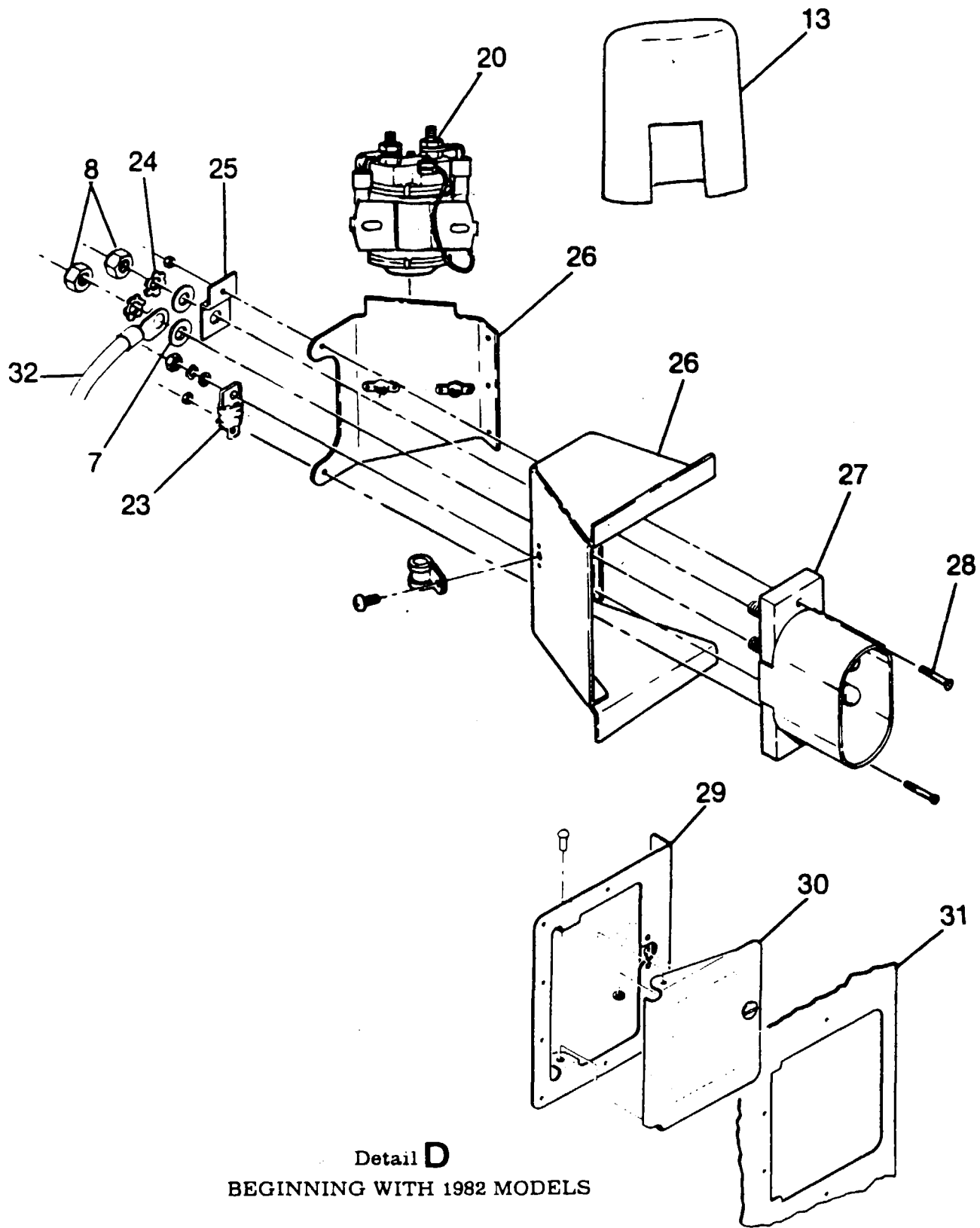


Figure 16-3. Ground Service Receptacle Installation (Sheet 4 of 4)

## MODEL R182 AND TR182 SERVICE MANUAL

### 16-31. TROUBLE SHOOTING -- GROUND SERVICE RECEPTACLE.

TROUBLE	PROBABLE CAUSE	REMEDY
GROUND POWER WILL NOT CRANK ENGINE.	Ground service connector wired incorrectly.	<p>1. Check for voltage at all three terminals of external power contactor with ground power connected and master switch off. If voltage is present on input and coil terminals but not on the output terminal, proceed to step 4. If voltage is present on the input terminal but not on the coil terminal, proceed to step 2. If voltage is present on all three terminals, check wiring between contactor and bus.</p> <p>2. Check for voltage at small terminal of ground service receptacle. If voltage is not present, check ground service plug wiring. If voltage is present, proceed to step 3.</p>
	Open or mis-wired diode on ground servicediode board assembly.	<p>3. Check polarity and continuity of diode on diode board at rear of ground service receptacle. If diode is open or improperly wired, replace diode board assembly.</p>
	Faulty external power contactor.	<p>4. Check resistance from small (coil) terminal of external power contactor to ground (master switch off and ground power unplugged.) Normal indication is 50-70 ohms. If resistance indicates an open coil, replace contactor. If resistance is normal, proceed to step 5.</p>
	Faulty contacts in external power contactor.	<p>5. With master switch off and ground power applied, check for voltage drop between two large terminals of external power (turn on taxi light for a load). Normal indication is zero volts. If voltage is intermittently present or present all the time, replace contactor.</p>



## MODEL R182 AND TR182 SERVICE MANUAL

- 16-32. REMOVAL AND INSTALLATION. (See figure 16-3.)
- Thru 1978 Models open the battery box and disconnect the ground cable from the negative terminal of the battery and pull the cable free of the box. Beginning with 1979 Models, remove negative ground strap.
  - Remove the nuts, washers, ground strap, bus bar and diode board from the studs of the receptacle and remove battery cable.
  - Remove the screws and nuts holding the receptacle, ground strap will then be free from bracket.
  - To install a ground service receptacle, reverse this procedure.
- 16-33. ALTERNATOR POWER SYSTEM.
- 16-34. DESCRIPTION. The alternator system consists of an engine driven alternator, a voltage regulator/alternator control unit and a circuit breaker located on the instrument panel. The system is controlled by the left hand portion of the split rocker, master switch labeled ALT. Thru 1978 Models an over-voltage sensor switch and red warning light, labeled HIGH VOLTAGE are incorporated to protect the system. Beginning with 1979 Models an over-voltage sensor, an under-voltage sensor and a red warning light, labeled LOW VOLTAGE are incorporated to protect the system. The aircraft battery supplies the source of power for excitation of the alternator.
- 16-35. ALTERNATOR.
- 16-36. DESCRIPTION. The 60-ampere alternator used on the aircraft is three-phase, delta-connected with integral silicon diode rectifiers. The alternator is rated at 28 volts at 60 amperes continuous output. Beginning with 1981 models, a 28-volt 95-ampere alternator is offered as optional equipment

### NOTE

Thru R18201798, a 2201074-1 balance weight is installed on tailcone bulkhead station 230.187 when the 95-ampere alternator is installed.

- 16-37. ALTERNATOR REVERSE VOLTAGE DAMAGE. The alternator is very susceptible to reverse polarity damage due to the very low resistance of the output windings and the low resistance of the silicon diodes in the output. If a high current source, such as a battery or heavy duty ground power cart is attached to the aircraft with the polarity inadvertently reversed, the current through the alternator will flow almost without limit and the alternator will be immediately damaged.

MODEL R182 AND TR182 SERVICE MANUAL

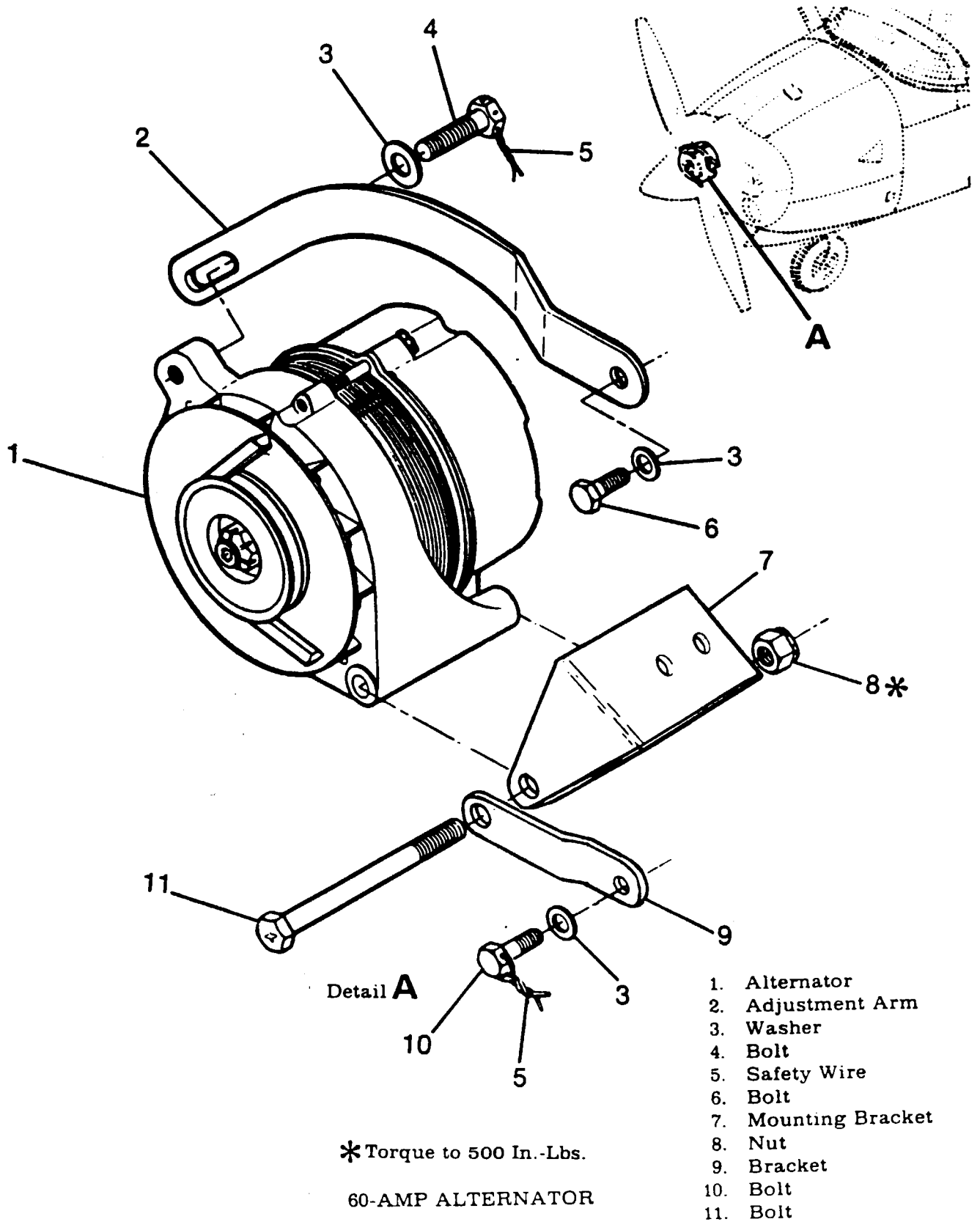


Figure 16-4. Alternator Installation (Sheet 1 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

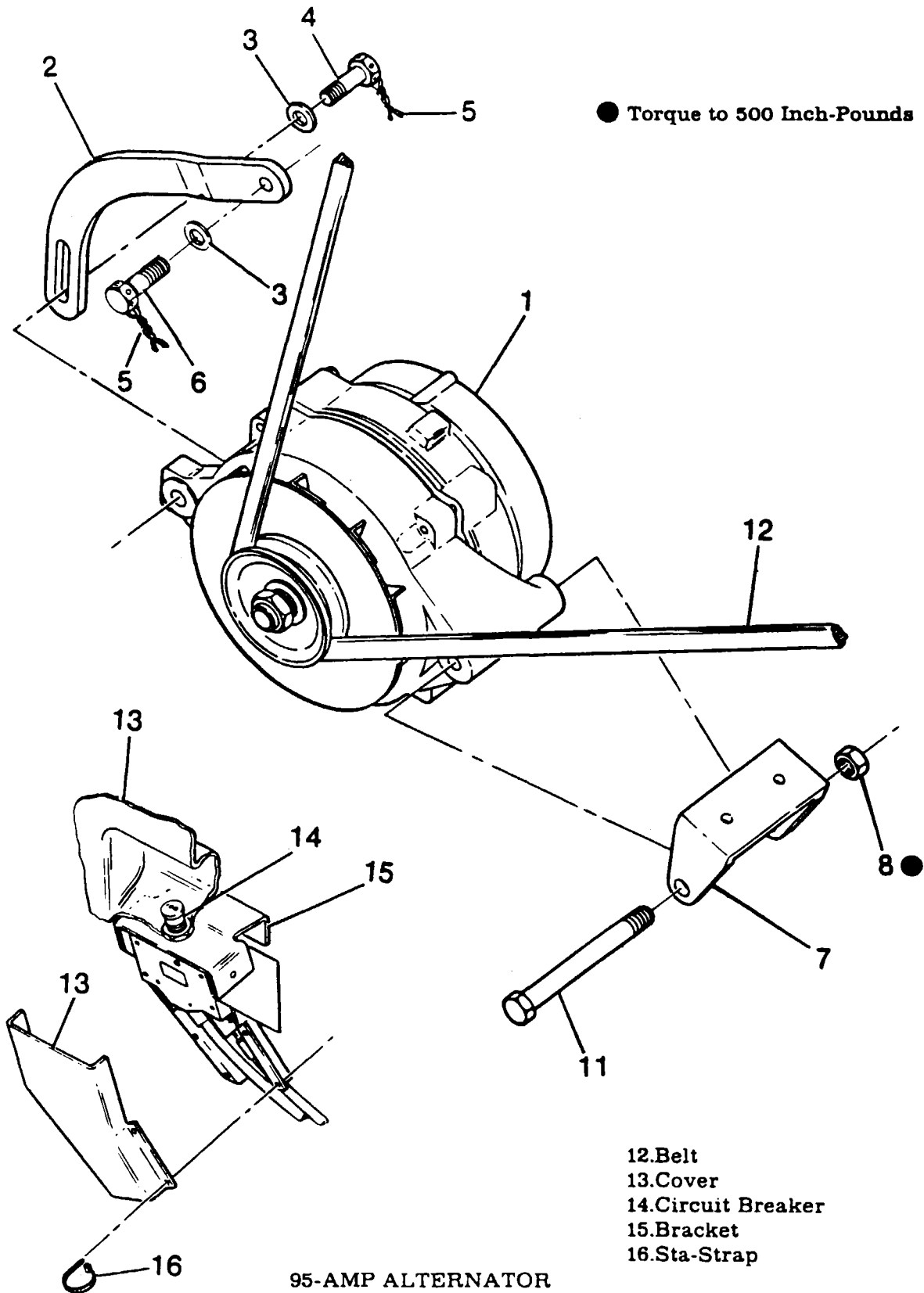


Figure 16-4. Alternator Installation (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

### 16-38. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (THRU 1978 MODELS)

#### a. ENGINE NOT RUNNING.

TROUBLE	PROBABLE CAUSE	REMEDY
<p>AMMETER INDICATES HEAVY DISCHARGE OR ALTERNATOR CIRCUIT BREAKER OPENS. (Battery Switch ON, Alternator Switch OFF, all other electrical switches OFF.)</p>	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check resistance from "B" Terminal of alternator to alternator case. Reverse leads and check again. Resistance reading may show continuity in one direction but should show an infinite reading in the other direction. If an infinite reading is not obtained in at least one direction, repair or replace alternator.
<p>ALTERNATOR REGULATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON.</p>	Short in Over-Voltage sensor.	Disconnect Over-Voltage Sensor plug and recheck. If circuit breaker stays in replace Over-Voltage Sensor.
	Short in alternator voltage regulator.	Disconnect regulator plug and recheck. If circuit breaker stays in, replace regulator.
	Short in alternator field.	Disconnect "F" terminal wire and recheck. If circuit breaker stays in, replace alternator.

#### b. ENGINE RUNNING.

<p>ALTERNATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON, OVER-VOLTAGE LIGHT DOES NOT COME ON.</p>	Defective circuit breaker.	Replace circuit breaker.
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## MODEL R182 AND TR182 SERVICE MANUAL

### 16-38. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (THRU 1978 MODELS) (Cont).

#### b. ENGINE RUNNING (Cont.)

TRouble	PROBABLE CAUSE	REMEDY
ALTERNATOR REGULATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON. OVER-VOLTAGE LIGHT DOES NOT COME ON.	Shorted field in alternator.	Check resistance from "F" terminal of alternator to alternator case, if resistance is less than 5 ohms repair/replace.
<b>CAUTION</b>		
This malfunction frequently causes a shorted regulator which will result in an over-voltage condition when system is again operated.		
ALTERNATOR MAKES ABNORMAL WHINING NOISE.	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check resistance from "B" Terminal of alternator to alternator case. Reverse leads and check again. Resistance reading may show continuity in one direction but should show an infinite reading in the other direction. If an infinite reading is not obtained in at least one direction, repair or replace alternator.
OVER-VOLTAGE LIGHT DOES NOT GO OUT WHEN ALTERNATOR AND BATTERY SWITCHES ARE TURNED ON.	Shorted regulator. Defective over-voltage sensor.	Replace regulator. Replace sensor.

## MODEL R182 AND TR182 SERVICE MANUAL

### 16-38. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (THRU 1978 MODELS) (Cont).

#### b. ENGINE RUNNING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
AFTER ENGINE START WITH ALL ELECTRICAL EQUIPMENT TURNED OFF CHARGE RATE DOES NOT TAPER OFF IN 1-3 MINUTES.	Regulator faulty or high resistance in field circuit.	With engine not running turn off all electrical loads and turn on battery and alternator switches. Measure bus voltage to ground, then measure voltage from terminal of alternator to ground. If there is more than 2 volts difference check field circuit wiring shown on alternator system wiring diagram in Section 19. Clean all contacts Replace components until there is less than 2 volts difference between bus voltage and field voltage.

#### NOTE

Also refer to battery power system trouble shooting chart.

ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED.

Alternator output voltage insufficient.

1. Connect voltmeter between D.C. Bus and ground. Turn off all electrical loads. Turn on Battery Switch, start engine and adjust for 1500 RPM, voltage should read approximately 24 volts. Turn on alternator switch, voltage should read between 27.4 and 28.0 volts. Ammeter should indicate a heavy charge rate which should taper off in 1-3 minutes. If charge rate tapers off very quickly and voltage is normal, check battery for malfunction. If ammeter shows a low charge rate or any discharge rate, and voltage does not rise when alternator switch is turned on proceed to Step 2.

## MODEL R182 AND TR182 SERVICE MANUAL

### 16-38. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (THRU 1978 MODELS) (Cont).

#### b. ENGINE RUNNING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED. (Cont.)	Alternator output voltage insufficient (cont).	<p>2. Stop engine, turn off all switches. Connect voltmeter between "F" terminal of alternator and ground. Do NOT start engine. Turn on battery switch and alternator switch. Battery voltage should be present at "F" terminal, less 1 volt drop thru regulator, if not refer to Step 3.</p> <p>3. Starting at "F" terminal of alternator trace circuit to voltage regulator, at "B" terminal of regulator trace circuit to over-voltage sensor, to master switch, to Bus Bar. Replace component which does not have voltage present at output. Refer to alternator system wiring diagram in Section 19.</p>
	Alternator field winding open.	<p>1. If voltage is present turn off alternator and battery switches. Check resistance from "F" terminal of alternator to alternator case, turning alternator shaft during measurement. Normal indication is 12-20 ohms. If resistance is high or low, repair or replace alternator. If ok refer to Step 2.</p> <p>2. Check resistance from case of alternator to air-frame ground. Normal indication is very low resistance. If reading indicates no, or poor continuity, repair or replace alternator ground wiring.</p>

## MODEL R182 AND TR182 SERVICE MANUAL

### 16-38. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (BEGINNING 1979 MODELS).

#### a. ENGINE NOT RUNNING.

TROUBLE	PROBABLE CAUSE	REMEDY
AMMETER INDICATES HEAVY DISCHARGE OR ALTERNATOR CIRCUIT BREAKER OPENS. (Battery Switch ON, Alternator Switch OFF, all other electrical switches OFF.)	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check resistance from "B" Terminal of alternator to alternator case. Reverse leads and check again. Resistance reading may show continuity in one direction but should show an infinite reading in the other direction. If an infinite reading is not obtained in at least one direction, repair or replace alternator.
ALTERNATOR REGULATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON.	Short in alternator control unit.	Disconnect Over-Voltage Sensor plug and recheck. If circuit breaker stays in, replace Over-Voltage Sensor.  Disconnect control unit plug and recheck. If circuit breaker stays in, replace alternator control unit.
	Short in alternator field.	Disconnect "F" terminal wire and recheck. If circuit breaker stays in, replace alternator.

#### b. ENGINE RUNNING.

ALTERNATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON, LOW-VOLTAGE LIGHT DOES NOT COME ON.	Defective circuit breaker.	Replace circuit breaker.
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## MODEL R182 AND TR182 SERVICE MANUAL

### 16-38. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (BEGINNING 1979 MODELS) (Cont).

#### b. ENGINE RUNNING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR REGULATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON. LOW-VOLTAGE LIGHT MAY OR MAY NOT COME ON.	Shorted field in alternator.	Check resistance from "F" terminal of alternator to alternator case, if resistance is less than 5 ohms repair/replace.

#### CAUTION

This malfunction may cause a shorted alternator control unit which will result in an over-voltage condition when system is again operated.

ALTERNATOR MAKES ABNORMAL WHINING NOISE.	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check resistance from "B" Terminal of alternator to alternator case. Reverse leads and check again. Resistance reading may show continuity in one direction but should show an infinite reading in the other direction. If an infinite reading is not obtained in one direction, repair or replace alternator.
LOW-VOLTAGE LIGHT DOES NOT GO OUT WHEN ALTERNATOR AND BATTERY SWITCHES ARE TURNED ON.	Shorted alternator control unit. Defective low-voltage sensor.	Replace alternator control unit. Replace alternator control unit.

## MODEL R182 AND TR182 SERVICE MANUAL

### 16-38. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (BEGINNING 1979 MODELS) (Cont).

#### b. ENGINE RUNNING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
AFTER ENGINE START WITH ALL ELECTRICAL EQUIPMENT TURNED OFF CHARGE RATE DOES NOT TAPER OFF IN 1-3 MINUTES.	Alternator control unit faulty or high resistance in field circuit.	With engine not running turn off all electrical loads and turn on battery and alternator switches. Measure bus voltage to ground, then measure voltage from terminal of alternator to ground. If there is more than 2 volts difference check field circuit wiring shown on alternator system wiring diagram in Section 19. Clean all contacts. Replace components until there is less than 2 volts difference between bus voltage and field voltage.

#### NOTE

Also refer to battery power system trouble shooting chart.

ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED.	Alternator output voltage insufficient.	1. Connect voltmeter between D.C. Bus and ground. Turn off all electrical loads. Turn on Battery Switch, start engine and adjust for 1500 RPM, voltage should read approximately 24 volts. Turn on alternator switch, voltage should read between 28.4 and 28.9 volts. Ammeter should indicate a heavy charge rate which should taper off in 1-3 minutes. If charge rate tapers off very quickly and voltage is normal, check battery for malfunction. If ammeter shows a low charge rate or any discharge rate, and voltage does not rise when alternator switch is turned on proceed to Step 2.
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## MODEL R182 AND TR182 SERVICE MANUAL

### 16-38. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (BEGINNING 1979 MODELS) (Cont).

#### b. ENGINE RUNNING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED. (Cont.)	Alternator output voltage insufficient (cont).	<p>2. Stop engine. turn off all switches. Connect voltmeter between "F" terminal of alternator and ground. Do NOT start engine. Turn on battery switch and alternator switch. Battery voltage should be present at "F" terminal, less 1 volt drop thru regulator, if not refer to Step 3.</p> <p>3. Starting at "F" terminal of alternator, trace circuit to alternator control unit at Pin 1 (Blue Wire). Trace circuit from Pin 3 (Red Wire) to master switch, to Bus Bar. Trace circuit from alternator control unit Pin 2 (Orange Wire) to alternator "BAT" terminal. Check connections and replace component which does not have voltage present at output. Refer to alternator system wiring diagram in Section 19.</p>
	Alternator field winding open.	<p>1. If voltage is present turn off alternator and battery switches. Check resistance from "F" terminal of alternator to alternator case, turning alternator shaft during measurement. Normal indication is 12-20 ohms. If resistance is high or low, repair or replace alternator. If ok refer to Step 2.</p> <p>2. Check resistance from case of alternator to air-frame ground. Normal indication is very low resistance. If reading indicates no. or poor continuity, repair or replace alternator ground wiring.</p>

## MODEL R182 AND TR182 SERVICE MANUAL

- 16-39. **REMOVAL AND INSTALLATION.** (See figure 16-4.)
- Make sure that the master switch remains in the off position or disconnect the negative lead from the battery.
  - Disconnect the wiring from the alternator.
  - Remove the safety wire from the upper adjusting bolt and remove the bolt from the alternator.
  - Remove the nut and washer from the lower mounting bolt.
  - Remove the alternator drive belt and lower mounting bolt to remove the alternator.
  - To replace the alternator, reverse this procedure.
  - On 60-amp alternator, adjust belt tension to obtain 3/8" deflection at the center of the belt when applying 12 pounds of pressure to the belt. On the 95-amp alternator, on initial installation belt tension should be 72 lb.; thereafter 58 to 72 lb. After the belt is adjusted and the bolt is safety wired, tighten the bottom bolt to 100-140 lb.-in. torque to remove any play between the alternator mounting foot and the U-shaped support assembly.

### CAUTION

On new aircraft or whenever a new belt is installed, belt tension should be checked within 10 to 25 hours of operation.

### NOTE

When tightening the alternator belt, apply pry bar pressure only to the end of the alternator nearest to the belt pulley.

- 16-40. **ALTERNATOR VOLTAGE REGULATOR.** (THRU 1978 MODELS.)
- 16-41. **DESCRIPTION.** A transistorized voltage regulator is installed on the aircraft. The regulator is adjustable, but adjustment on the aircraft is not recommended. A bench adjustment procedure is outlined in the Cessna Alternator Charging Systems Service/Parts Manual. A Cessna Alternator Charging System Test Box Assembly (PN. 9870000-1) is available through the Cessna Service/Parts Center for use in isolating failures in the 28-volt transistorized voltage regulator (C611002-0105) and the 28-volt Alternator.
- 16-43. **REMOVAL AND INSTALLATION.** (See figure 16-5.)
- Make sure that the master switch is off, or disconnect the negative lead from the battery.
  - Remove the connector plug from the regulator.
  - Remove two screws holding the regulator on the firewall.
  - To replace the regulator, reverse the procedure. Be sure that the connections for grounding the alternator, wiring shields and the base of the regulator are clean and bright before assembly. Otherwise, poor voltage regulation and/or excessive radio noise may result.

## MODEL R182 AND TR182 SERVICE MANUAL

### 16-43. ALTERNATOR CONTROL UNIT.

16-44. DESCRIPTION. The alternator control unit is a solid state voltage regulator with an over-voltage sensor and low-voltage sensor incorporated in the unit. The control unit is not adjustable and is a remove and replace item. A Cessna Alternator Charging System Test Box Assembly (PN9870005) is available through the Cessna Service/Parts Center for use in isolating failures in the 28-volt alternator control units (C611005-0101 and C611005-0102) and the 28-volt alternator.

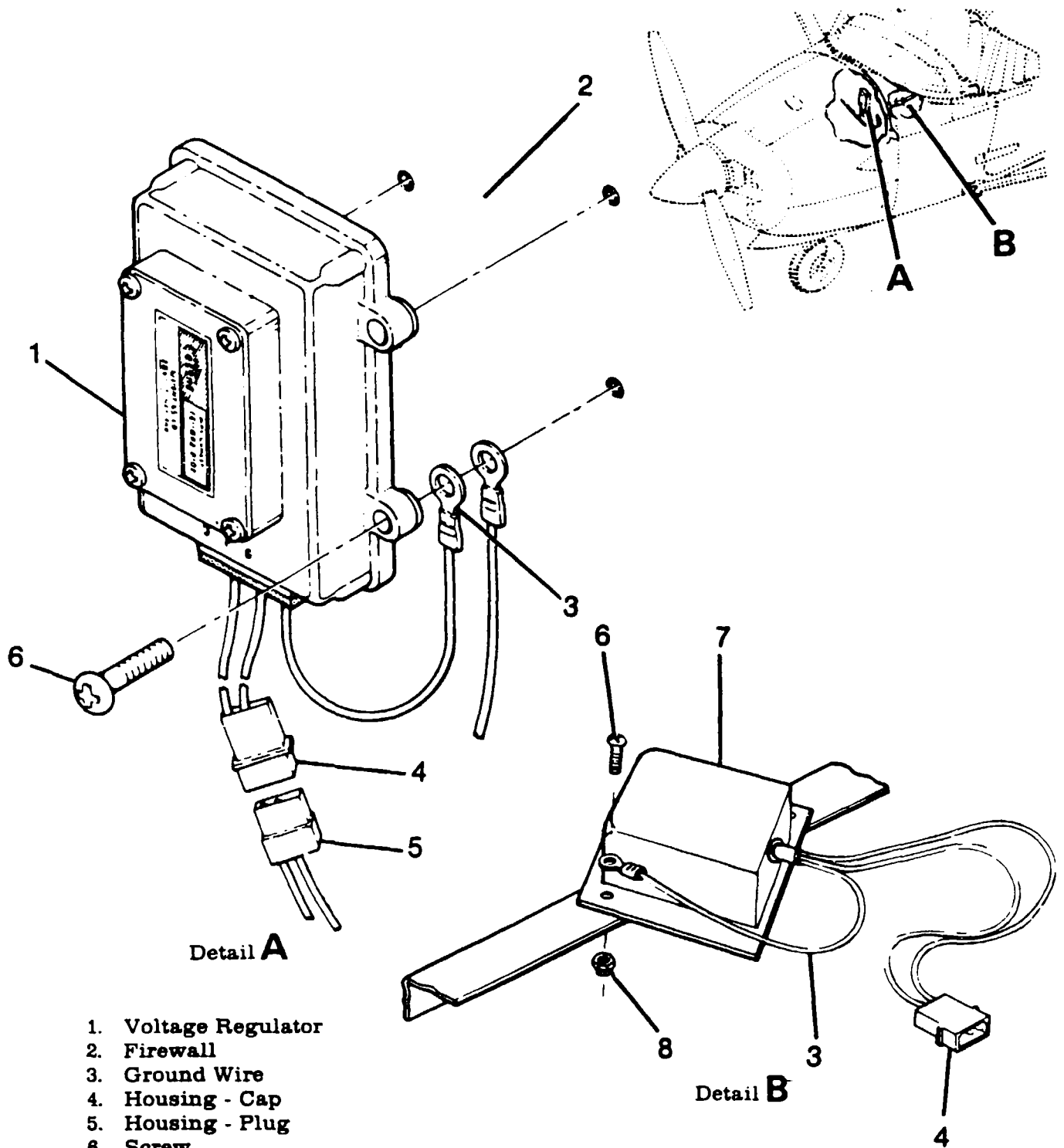
### 16-45. REMOVAL AND INSTALLATION. (See figure 16-5.)

- a. Remove upper half of engine cowl.
- b. Place master switch in the "OFF" position.
- c. Disconnect negative lead from the battery and pull lead free of the battery box.
- d. Disconnect housing plug from the regulator/alternator control unit.
- e. Remove screws securing the regulator/alternator control unit to the firewall.
- f. To install regulator/alternator control unit, reverse the preceding steps. Be sure the connections for grounding are clean and bright before assembly. Otherwise faulty voltage regulator and/or excessive radio noise may result.

### 16-46. OVER-VOLTAGE WARNING SYSTEM.

16-47. DESCRIPTION. Thru 1978 Models the over-voltage warning system consists of a sensor switch and a red warning light labeled, "HIGH VOLTAGE", on the instrument panel. When an over-voltage tripoff occurs the over-voltage sensor turns off the alternator system and the red warning light comes on. The ammeter will show a discharge. Turn off both sections of the master switch to recycle the over-voltage sensor. If the over-voltage condition was transient, the normal alternator charging will resume and no further action is necessary. If the over-voltage tripout recurs, then a generating system malfunction has occurred such that the electrical accessories must be operated from the aircraft battery only. Conservation of electrical energy must be practiced until the flight can be terminated. The over-voltage red warning light filament can be tested by turning off the Alternator portion of the Master Switch and leaving the Battery portion turned on. This test does not induce an over-voltage condition on the electrical system. Refer to figure 16-5 for sensor switch installation. Beginning with 1979 Models the over-voltage sensor is contained within the alternator control unit. The unit also contains a low-voltage sensor. A red warning light labeled "LOW VOLTAGE" is installed on the instrument panel. When an over-voltage condition occurs the over-voltage sensor turns off the alternator and the voltage in the system drops. When system voltage drops below 24.8 volts the low-voltage sensor turns on the low-voltage light indicating a drain on the battery and the ammeter will show a discharge. Turn off both sections of the master switch to recycle the over-voltage sensor. If the over-voltage condition was transient, the normal alternator charging will resume and no further action is necessary. If the over-voltage tripoff recurs, then a generating system malfunction has occurred such that the electrical accessories must be operated from the aircraft battery only. Conservation of electrical energy must be practiced until the flight can be terminated. The over-voltage light filament may be tested at any time by turning off the "Alternator" portion of the master switch and leaving the battery portion on. This test does not induce an over-voltage condition on the electrical system.

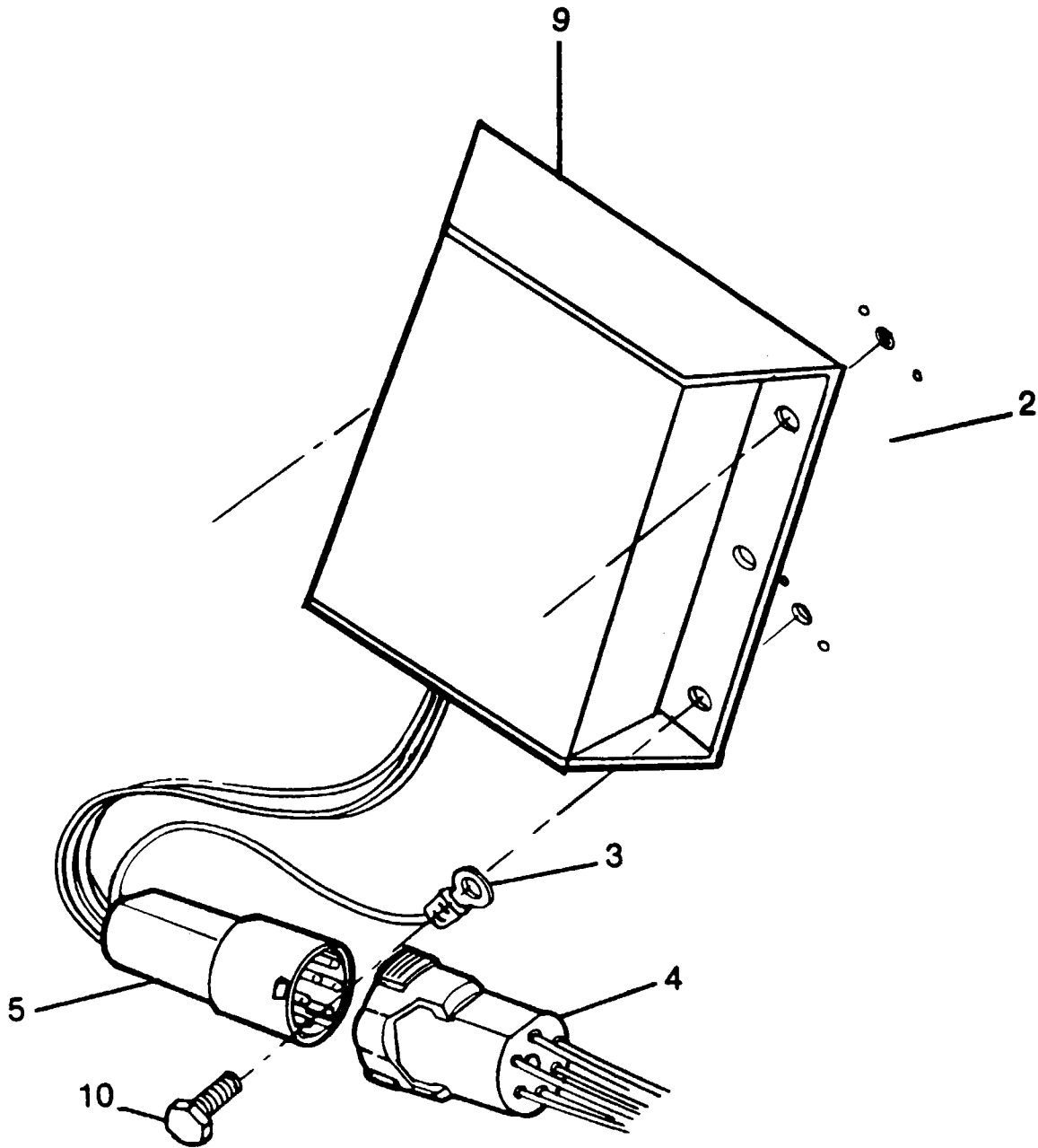
# MODEL R182 AND TR182 SERVICE MANUAL



THRU 1978 MODELS

Figure 16-5. Voltage Regulator/Alternator Control Unit Installation (Sheet 1 of 4)

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Detail A

1979 MODELS

Figure 16-5. Voltage Regulator/ Alternator Control Unit Installation (Sheet 2 of 4)

# MODEL R182 AND TR182 SERVICE MANUAL

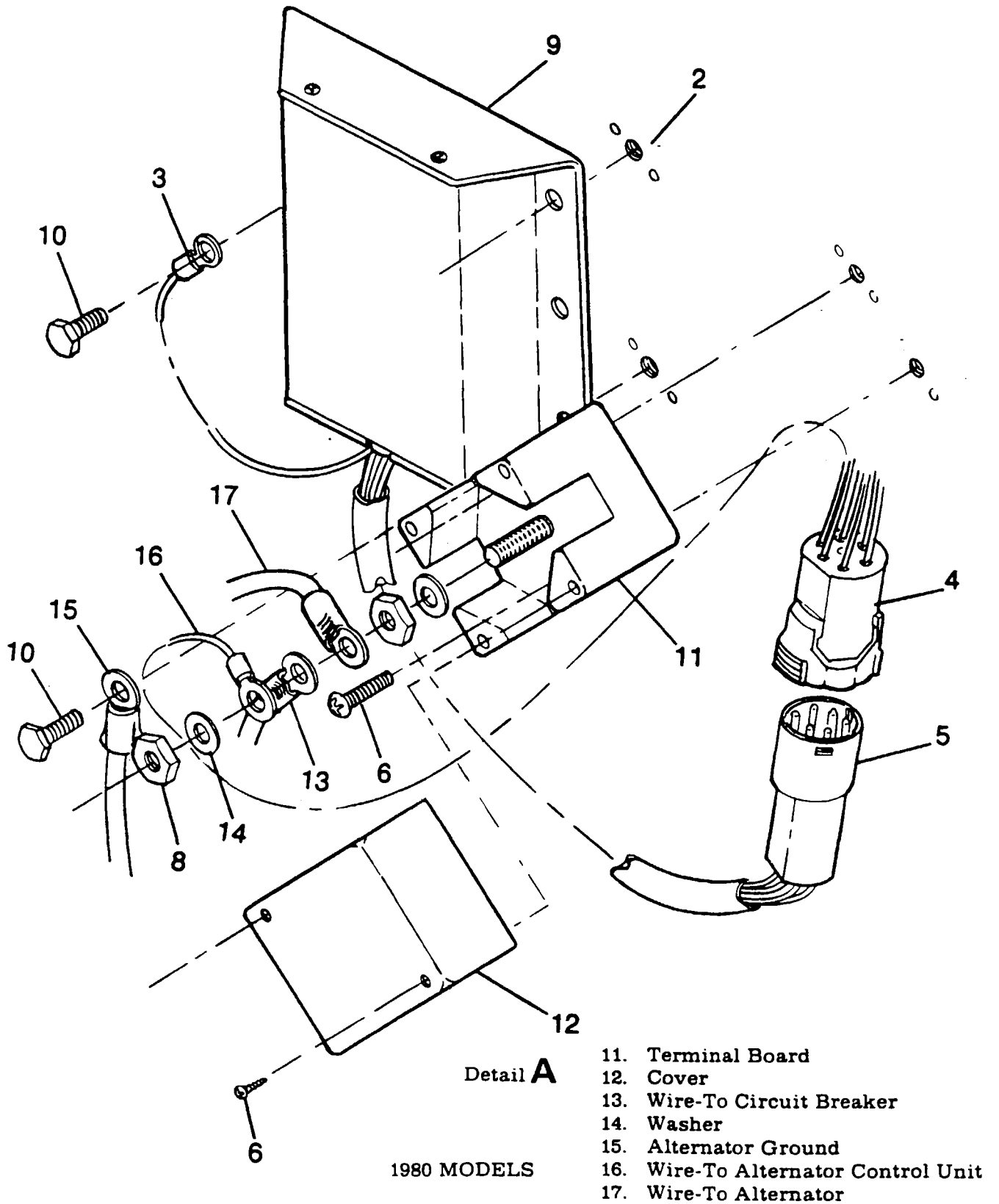
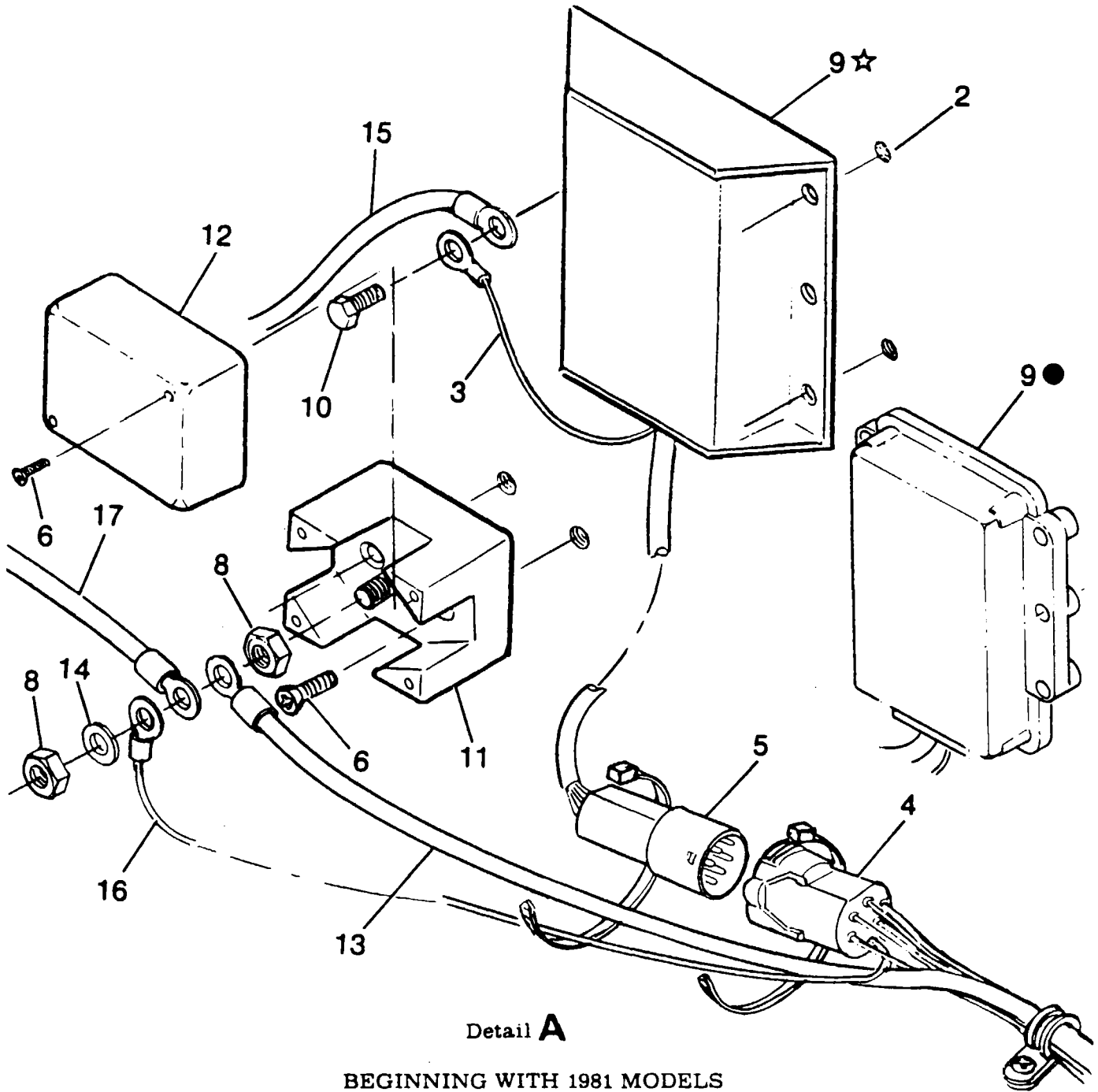


Figure 16-5. Voltage Regulator/Alternator Control Unit Installation (Sheet 3 of 4)



# MODEL R182 AND TR182 SERVICE MANUAL



- ☆ THRU R18201989
- BEGINNING WITH R18201990

Figure 16-5. Voltage Regulator/Alternator Control Unit Installation (Sheet 4 of 4)

## MODEL R182 AND TR182 SERVICE MANUAL

16-48. AIRCRAFT LIGHTING SYSTEM.

16-49. DESCRIPTION. The aircraft lighting system consists of landing and taxi lights, navigation lights, flashing beacon light, anti-collision strobe lights, dome and instrument lights, courtesy lights, control wheel map light, compass and radio dial lights.

16-50. TROUBLE SHOOTING -- LIGHTING SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
LANDING AND TAXI LIGHTS OUT.	Short circuit in wiring.	1. Inspect circuit breaker. If circuit breaker is open, proceed to step 2. If circuit breaker is ok, proceed to step 3.
	Defective wiring.	2. Test each circuit separately until short is located. Repair or replace wiring.
	Defective switch.	3. Check voltage at lights with master and landing and taxi light switches ON. Should read battery voltage. Replace switch.
LANDING OR TAXI LIGHT OUT.	Lamp burned out.	1. Test lamp with ohmmeter or new lamp. Replace lamp.
	Open circuit in wiring.	2. Test wiring for continuity. Repair or replace wiring.
FLASHING BEACON DOES NOT LIGHT.	Short circuit in wiring.	1. Inspect circuit breaker. If circuit breaker is open, proceed to step 2. If circuit breaker is ok, proceed to step 3.
	Defective wiring.	2. Test circuit until short is located. Repair or replace wiring.
	Lamp burned out.	3. Test lamp with ohmmeter or new lamp. Replace lamp. If lamp is good, proceed to step 4.
	Open circuit in wiring.	4. Test circuit from lamp to flasher for continuity. If no continuity is present, repair or replace wiring. If continuity is present, proceed to step 5.

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### 16-50. TROUBLE SHOOTING -- LIGHTING SYSTEM (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
FLASHING BEACON DOES NOT LIGHT. (Cont.)	Defective switch.	5. Check voltage at flasher with master and beacon switch on. Should read battery voltage. Replace switch. If voltage is present, proceed to step 6.
	Defective flasher.	6. Install new flasher.
FLASHING BEACON CONSTANTLY LIT.	Defective flasher.	1. Install new flasher.
ALL NAV LIGHTS OUT.	Short circuit in wiring.	1. Inspect circuit breaker. If circuit breaker is open, proceed to step 2. If circuit breaker is ok, proceed to step 3.
	Defective wiring.	2. Isolate and test each nav light circuit until short is located. Repair or replace wiring.
	Defective switch.	3. Check voltage at nav light with master and nav light switches on. Should read battery voltage. Replace switch.
ONE NAV LIGHT OUT.	Lamp burned out.	1. Inspect lamp. Replace lamp.
	Open circuit in wiring.	2. Test wiring for continuity. Repair or replace wiring.

### WARNING

The anti-collision system is a high voltage device. Do not remove or touch tube assembly while in operation. Wait at least 5 minutes after turning off power before starting work.

BOTH ANTI-COLLISION STROBE LIGHTS WILL NOT LIGHT.	Open circuit breaker.	1. Check, if open reset. If circuit breaker continues to open proceed to step 2.
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## MODEL R182 AND TR182 SERVICE MANUAL

### 16-50. TROUBLE SHOOTING -- LIGHTING SYSTEM (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
BOTH ANTI-COLLISION STROBE LIGHTS WILL NOT LIGHT. (Cont.)	Open circuit breaker	<ol style="list-style-type: none"><li>2. Disconnect red wire between aircraft power supply (battery/external power) and strobe power supplies, one at a time. If circuit breaker opens on one strobe power supply, replace strobe power supply. If circuit breaker opens on both strobe power supplies proceed to step 3. If circuit breaker does not open proceed to step 4.</li><li>3. Check aircraft wiring. Repair or replace as necessary.</li><li>4. Inspect strobe power supply ground wire for contact with wing structure.</li></ol>

#### CAUTION

Extreme care should be taken when exchanging flash tube. The tube is fragile and can easily be cracked in a place where it will not be obvious visually. Make sure the tube is seated properly on the base of the nav light assembly and is centered in the dome.

#### NOTE

When checking defective power supply and flash tube, units from opposite wing maybe used. Be sure power leads are protected properly when unit is removed to prevent short circuit.

ONE ANTI-COLLISION STROBE LIGHT WILL NOT LIGHT. (Cont.)	Defective Strobe Power Supply, or flash tube.	<ol style="list-style-type: none"><li>1. Connect voltmeter to red lead between aircraft power supply (battery/external power) and strobe power supply connecting negative lead to wing structure. Check for 24 volts. If ok, proceed to step 2. If not, check aircraft power supply (battery/external power).</li></ol>
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## MODEL R182 AND TR182 SERVICE MANUAL

### 16-50. TROUBLE SHOOTING -- LIGHTING SYSTEM (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
ONE ANTI-COLLISION STROBE LIGHT WILL NOT LIGHT. (Cont.)	Defective strobe power Supply, or flash tube.	2. Replace flash tube with known good flash tube. If system still does not work, replace strobe power supply.
DOME LIGHT TROUBLE.	Short circuit in wiring.	1. Inspect circuit breaker. If circuit breaker is open, proceed to step 2. If circuit breaker is ok, proceed to step 3.
	Defective wiring.	2. Test circuit until short is located. Repair or replace wiring.  3. Test for open circuit. Repair or replace wiring. If no short or open circuit is found, proceed to step 4.
	Lamp burned out.	4. Test lamp with ohmmeter or new lamp. Replace lamp.
	Defective switch.	5. Check for voltage at dome light with master and dome light switch on. Should read battery voltage. Replace switch.
INSTRUMENT LIGHTS WILL NOT LIGHT.	Short circuit wiring.	1. Inspect circuit breaker. If circuit breaker is open, proceed to step 2. If circuit breaker is ok, proceed to step 3.
	Defective wiring.	2. Test circuit until short is located. Repair or replace wiring.  3. Test for open circuit. Repair or replace wiring. If no short or open circuit is found, proceed to step 4.

## MODEL R182 AND TR182 SERVICE MANUAL

### 16-50. TROUBLE SHOOTING -- LIGHTING SYSTEM (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
INSTRUMENT LIGHTS WILL NOT LIGHT. (Cont.)	Faulty section in dimming potentiometer.	4. Lights will work when control is placed in position. Replace potentiometer.
	Faulty light dimming transistor.	5. Test both transistors with new transistor. Replace faulty transistor.
	Faulty selector switch.	6. Inspect. Replace switch.
INSTRUMENT LIGHTS WILL NOT DIM.	Open resistor or wiring in minimum intensity end of potentiometer.	1. Test for continuity. Replace resistor or repair wiring.
	Shorted transistor.	2. Test transistor by substitution. Replace defective transistor.
CONTROL WHEEL MAP LIGHT WILL NOT LIGHT.	Nav light switch turned off.	1. Nav light switch has to be ON before map light will light.
	Short circuit in wiring.	2. Check lamp fuse on terminal board located on back of stationary panel with ohmmeter. If fuse is open, proceed to step 3. If fuse is ok, proceed to step 4.
	Defective wiring.	3. Test circuit until short is located. Repair or replace wiring.
		4. Test for open circuit. Repair or replace wiring. If a short or open circuit is not found, proceed to step 5.
	Defective map light assembly.	5. Check voltage at map light assembly with master and nav light switches on. If battery voltage is present, replace map light assembly.

## MODEL R182 AND TR182 SERVICE MANUAL

### 16-51. LANDING AND TAXI LIGHTS.

16-52. DESCRIPTION. The landing and taxi lights are mounted in the lower half of the engine cowl. Both lights are used for landing but only the left hand for taxi. Power for the lights is supplied through a circuit breaker located on the primary bus bar. Two rocker switches control the lights. The switches are interconnected by a diode; when the taxi light switch is actuated only the left hand light is illuminated. When the landing light switch is actuated power is supplied to the landing light, and through the diode around the taxi light switch to the taxi light so both lights are illuminated.

### 16-53. REMOVAL AND INSTALLATION. (See figure 16-6.)

- a. Remove the lower cowl and disconnect wires from the landing and taxi lights.
- b. Remove screws (8) securing lamp assembly to support (2) and remove lamp assembly. Note number and position of washers between plate (3) and support (2) for reinstallation.
- c. Remove screws (7) securing bracket (6) to plate (3) and remove lamp (5) and gasket (4).
- d. To install, place lamp (5) in bracket (6) and install gasket (4) and plate (3) using screws (7).

#### NOTE

A minimum of one gasket (4) and a maximum of two gaskets may be used to secure lamp (5) between bracket (6) and plate (3).

- e. Using screws (8) secure lamp assembly to support (2) installing washers, in the proper position, removed in step (b).

#### NOTE

A maximum of two washers may be used between support (2) and plate (3) for adjustment.

- f. Connect wires to lamps and install cowl.
- g. Check lights for operation.

### 16-54. ADJUSTMENT OF LANDING AND TAXI LIGHTS. (See figure 16-6.) Adjustment of the landing and taxi lights is pre-set at the factory. If further adjustment is desired proceed as follows:

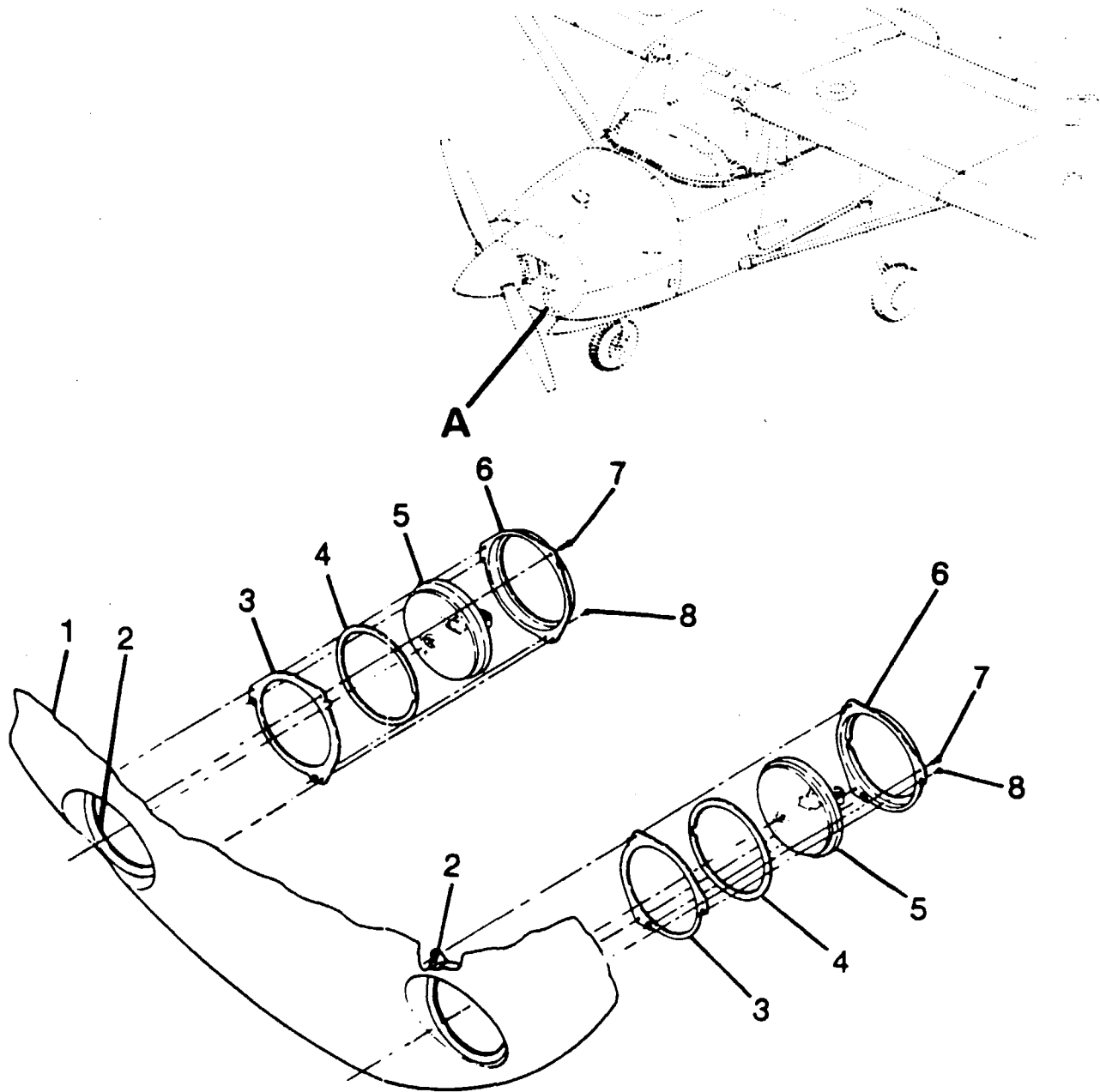
- a. Remove the lower engine cowl and disconnect wires from the landing and taxi lights.
- b. Remove screws (8) securing lamp assembly to support (2).
- c. Add or remove washers between lamp assembly and support (2).

#### NOTE

A maximum of two washers may be used between support (2) and plate (3) for adjustment.

- d. Using screws (8) secure lamp assembly to support (2).
- e. Connect wires to lamps and install cowl.
- f. Check lights for operation and direction.

MODEL R182 AND TR182 SERVICE MANUAL



Detail **A**

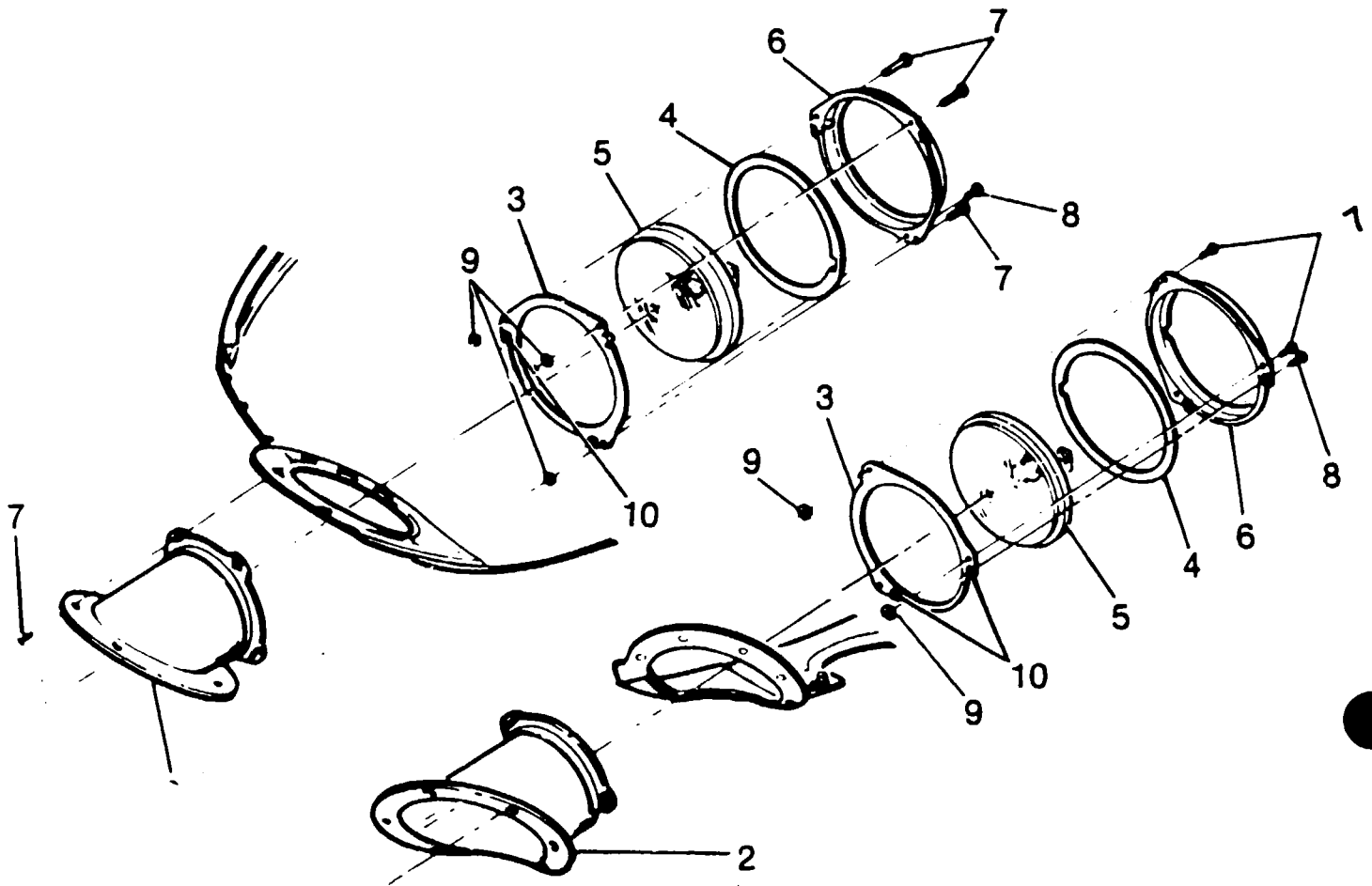
THRU R18201313 AND FR18200045

- 1. Nose Cap
- 2. Landing Light Support
- 3. Plate
- 4. Gasket
- 5. Lamp
- 6. Bracket
- 7. Screw
- 8. Tinnerman Screw

Figure 16-6. Landing and Taxi Light Installation (Sheet 1 of 2)



MODEL R182 AND TR182 SERVICE MANUAL



Detail **A**

BEGINNING WITH R18201314 AND FR18200046

- 9. Washer
- 10. Nut

Figure 16-6. Landing and Taxi Light Installation (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

- 16-55. NAVIGATION LIGHTS.
- 16-56. DESCRIPTION. The navigation lights are installed on each wing tip and the stinger. The lights are controlled by a switch located on the instrument panel.
- 16-57. REMOVAL AND INSTALLATION. For removal and installation of the navigation lights, see figure 16-7.
- 16-58. FLASHING BEACON.
- 16-59. DESCRIPTION. The flashing beacon light is attached to the vertical fin tip. The flashing beacon is an iodine-vapor lamp electrically switched by a solid-state flasher assembly. The flasher assembly is located in the vertical fin under the fin tip. Switching frequency of the flasher assembly operates the lamp at approximately 45 flashes per minute. A 1.5 ohm resistor is installed to provide a dummy load to eliminate a "pulsing" effect on the cabin lighting and ammeter.
- 16-60. REMOVAL AND INSTALLATION. (See figure 16-8.)

### CAUTION

When inserting lamp into socket always use a handkerchief or a tissue to prevent getting fingerprints on the lamp.

### NOTE

Fingerprints on lamp may shorten the life of the lamp.

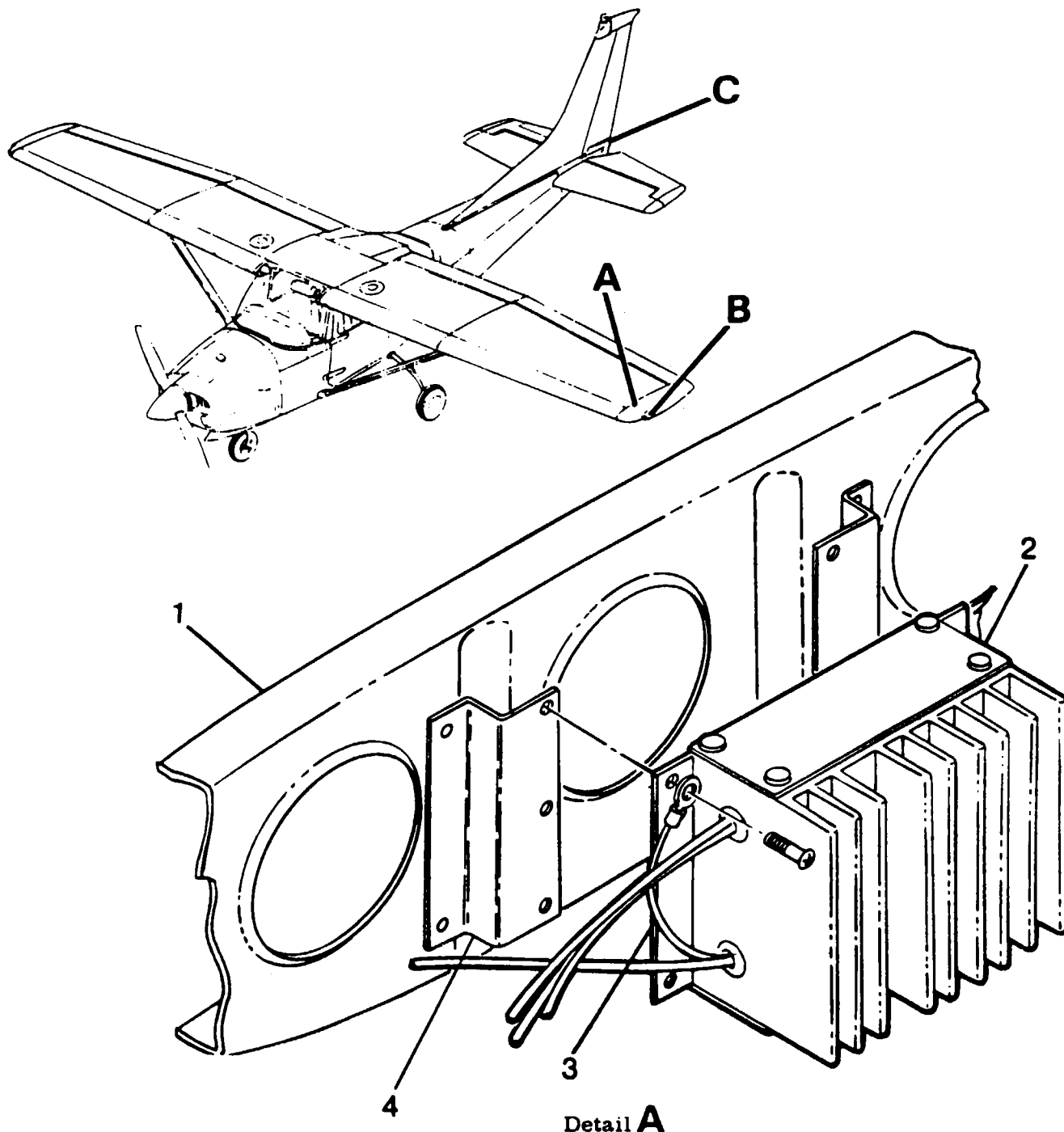
- 16-61. ANTI-COLLISION STROBE LIGHTS.
- 16-62. DESCRIPTION. A white strobe light is installed on each wing tip. These lights are vibration resistant and operate on the principle of a capacitor discharge into a xenon tube, producing an extremely high intensity flash. Energy is supplied to the strobe lights from power supplies mounted on each wing tip rib.
- 16-63. REMOVAL AND INSTALLATION. (See figure 16-7.)

### WARNING

This anti-collision system is a high voltage device. Do not remove or touch tube assembly while in operation. Wait at least 5 minutes after turning off power before starting work.

- 16-64. OVERHEAD CONSOLE.
- 16-65. DESCRIPTION. The overhead console contains the instrument flood lights which also may be used as map lights by moving the slide covers below the lamps. The intensity of the lights is controlled by a rheostat mounted on the instrument panel.
- 16-66. REMOVAL AND INSTALLATION. (See figure 16-9.)

# MODEL R182 AND TR182 SERVICE MANUAL



- |                     |                    |                         |
|---------------------|--------------------|-------------------------|
| 1. Wing Tip Rib     | 9. Spring          | 16. Flash Tube Assembly |
| 2. Power Supply     | 10. Insulator      | 17. Lens                |
| 3. Ground Wire      | 11. Housing - Plug | 18. Screw               |
| 4. Mounting Bracket | 12. Housing - Cap  | 19. Lens Retainer       |
| 5. Electrical Leads | 13. Wing Tip       | 20. Gasket              |
| 6. Cap              | 14. Lamp Socket    | 21. Lamp                |
| 7. Washer           | 15. Spacer         | 22. Seal                |
| 8. Insulated Washer |                    | 23. Grounding Washer    |

Figure 16-7. Navigation and Anti-Collision Strobe Lights Installation (Sheet 1 of 2)

MODEL R182 AND TR182 SERVICE MANUAL

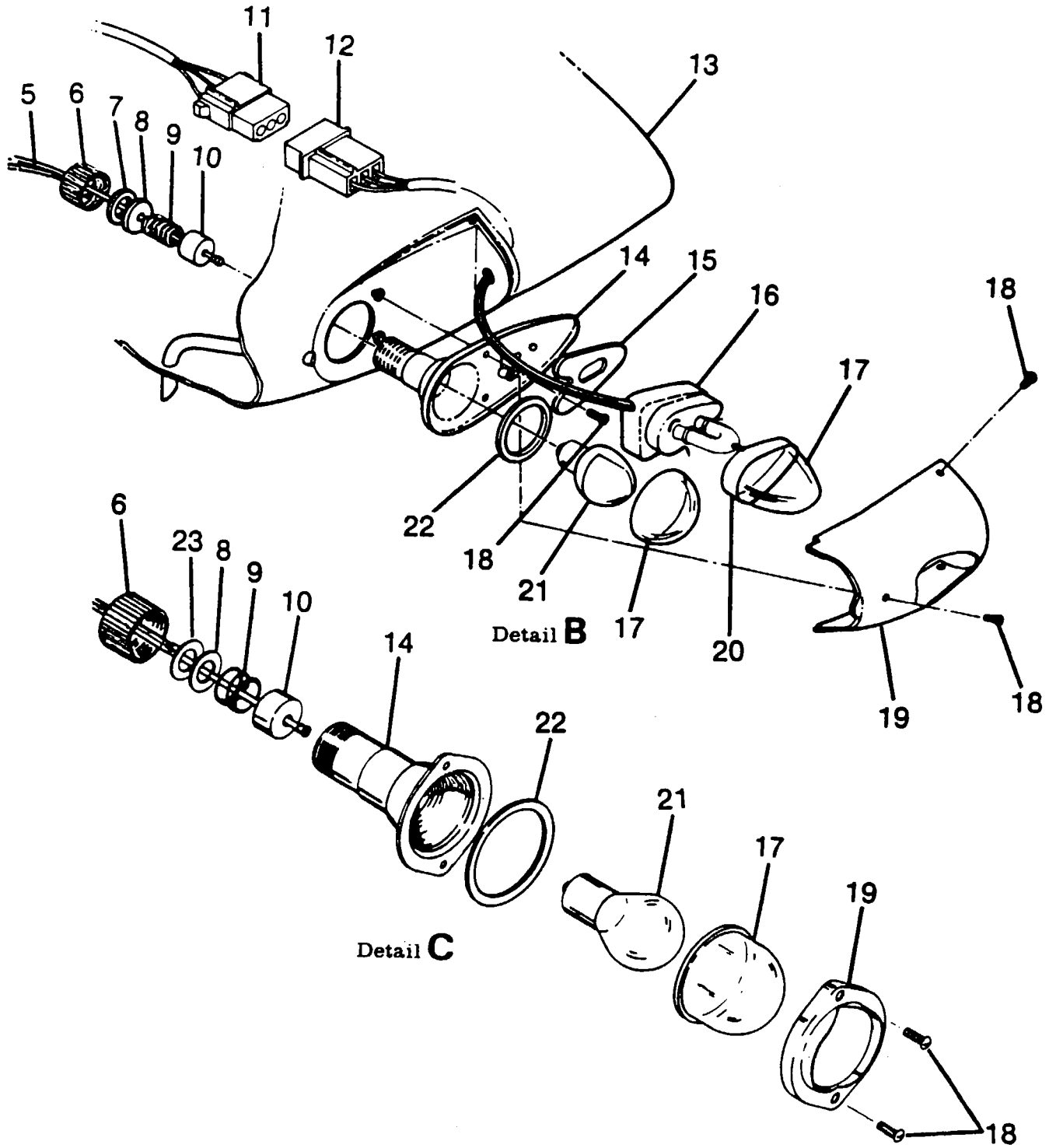


Figure 16-7. Navigation and Anti-Collision Strobe Lights Installation (Sheet 2 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

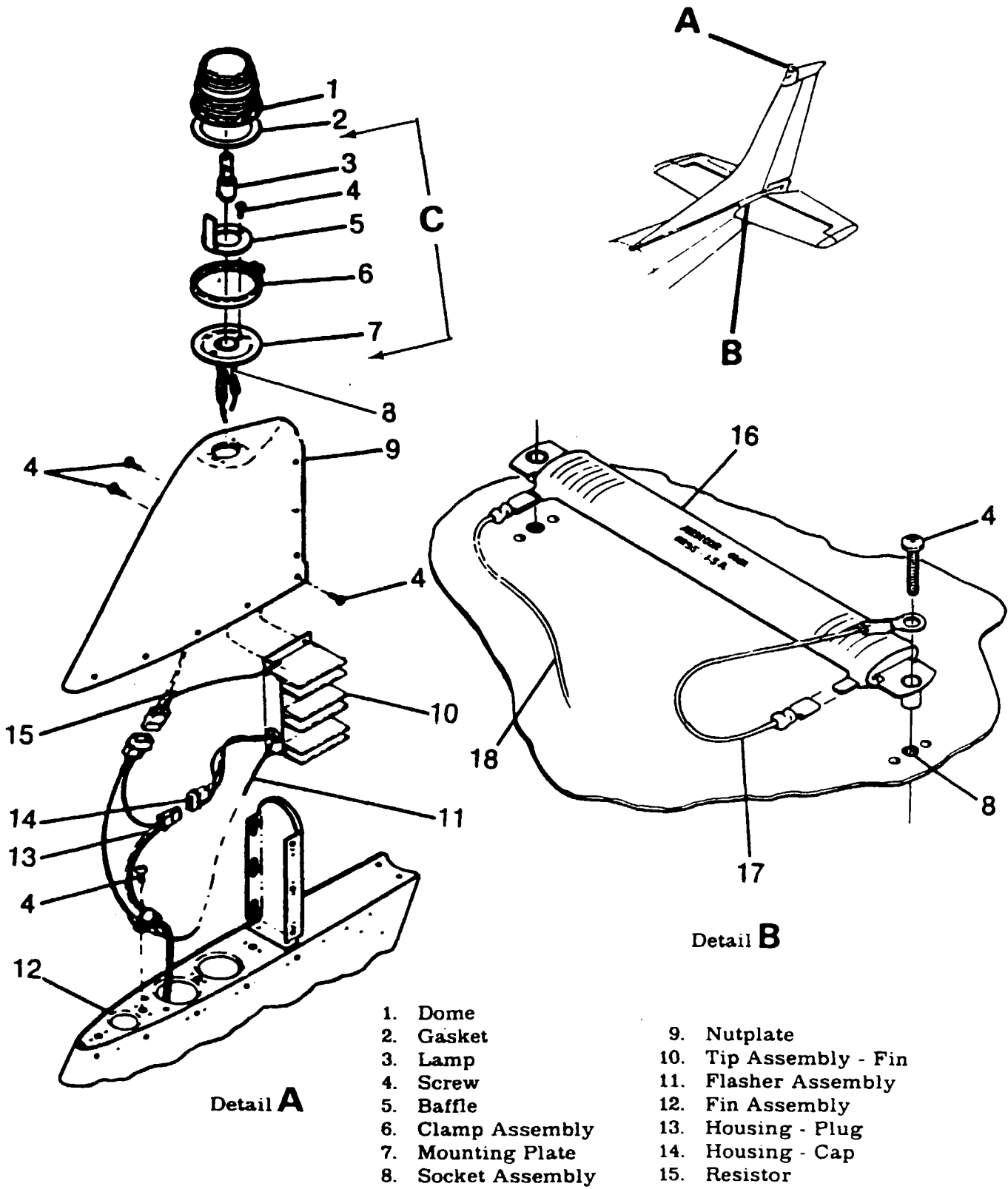
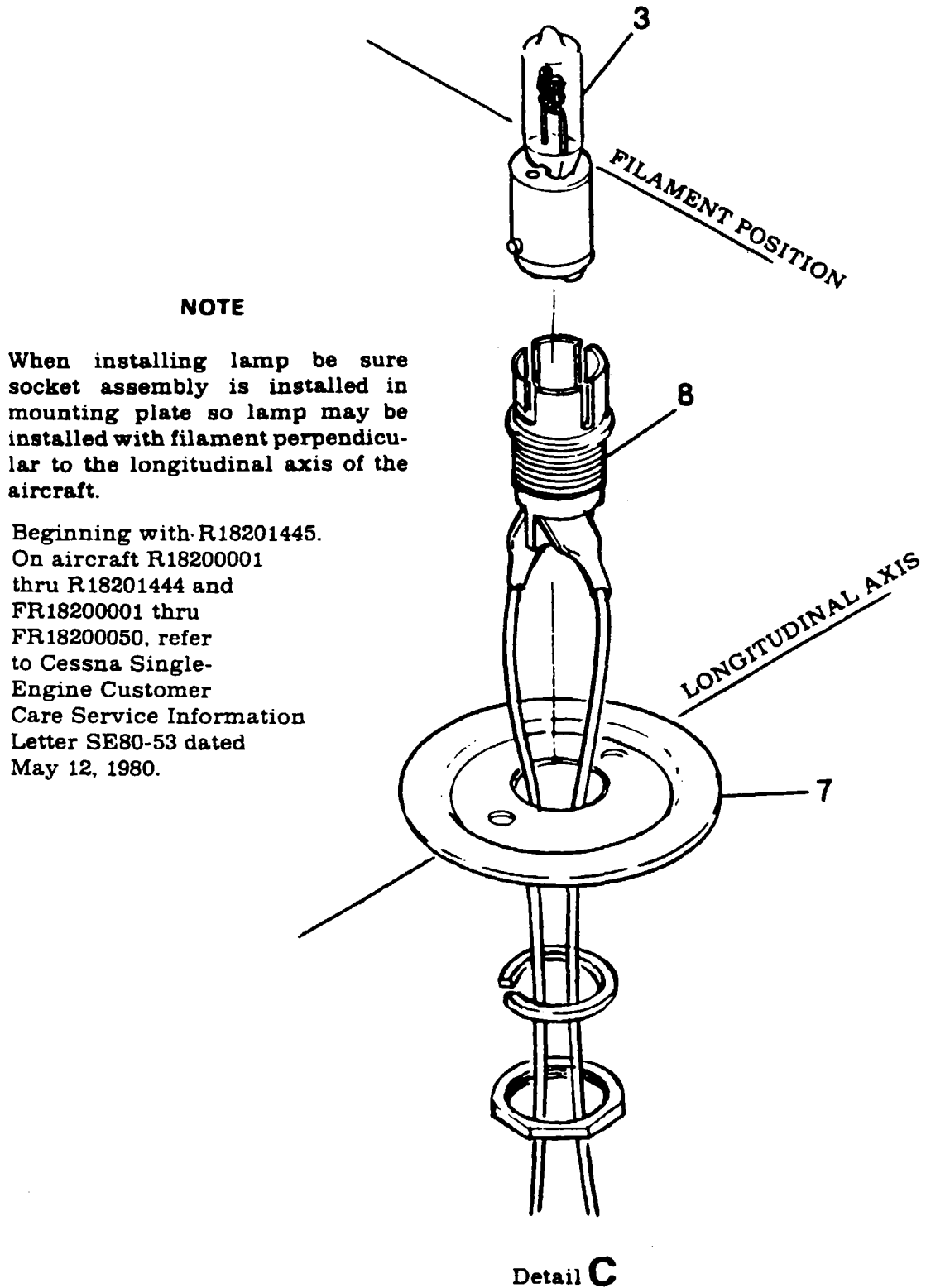


Figure 16-8. Flashing Beacon Installation (Sheet 1 of 2)

MODEL R182 AND TR182 SERVICE MANUAL



**NOTE**

When installing lamp be sure socket assembly is installed in mounting plate so lamp may be installed with filament perpendicular to the longitudinal axis of the aircraft.

Beginning with R18201445.  
On aircraft R18200001  
thru R18201444 and  
FR18200001 thru  
FR18200050, refer  
to Cessna Single-  
Engine Customer  
Care Service Information  
Letter SE80-53 dated  
May 12, 1980.

Detail C

Figure 16-8. Flashing Beacon Installation (Sheet 2 of 2)

## MODEL R182 AND TR182 SERVICE MANUAL

- 16-67. INSTRUMENT LIGHTING.
- 16-68. DESCRIPTION. The instrument panel lighting consists of two separate sections. The lower two-thirds of the panel is illuminated by two lights mounted in the overhead console. The lighting for the upper one-third of the panel is provided by four lights mounted in the instrument panel glare shield. The intensity of the lighting is controlled by the instrument light dimming rheostat located on the switch panel.
- 16-69. REMOVAL AND INSTALLATION. (See figure 16-9 and 16-10.)
- 16-70. ELECTROLUMINESCENT PANEL LIGHTING.
- 16-71. DESCRIPTION. The electroluminescent lighting consists of two "EL" panels: the switch panel and the comfort control panel. The ac voltage required to drive the "EL" panels is supplied by a small invertapak (power supply) located behind the instrument panel on the glove box. The intensity of the "EL" panel lighting is controlled by a rheostat located on the instrument switch panel.
- 16-72. REMOVAL AND INSTALLATION. (See figure 16-11.)
- Disconnect positive cable from battery.
  - Disconnect and tag all electrical leads from panel.
  - Remove knobs, decorative nuts, and switches.
  - Remove screws securing panel to stationary panel and remove panel.
  - For installation reverse the preceding steps. After installation, check all switches for operation.
- 16-73. INSTRUMENT POST LIGHTING.
- 16-74. DESCRIPTION. Individual post lighting may be installed to provide non-glare instrument lighting. The post light consists of a cap and a clear lamp assembly with a tinted lens. The intensity of the post lights is controlled by the instrument light-dimming rheostat on the switch panel.

### NOTE

When installing postlight assemblies, assemblies shall be coated with RTV-102, General Electric, Waterford, New York, on forward side of panel where postlight could come in contact with sheet metal subpanel. This coating shall insulate postlight assembly from contact with air-plane structure. Maximum coating thickness to be .03.

## MODEL R182 & TR182 SERIES SERVICE MANUAL

### 16-74A. TROUBLE SHOOTING - POSTLIGHTING.

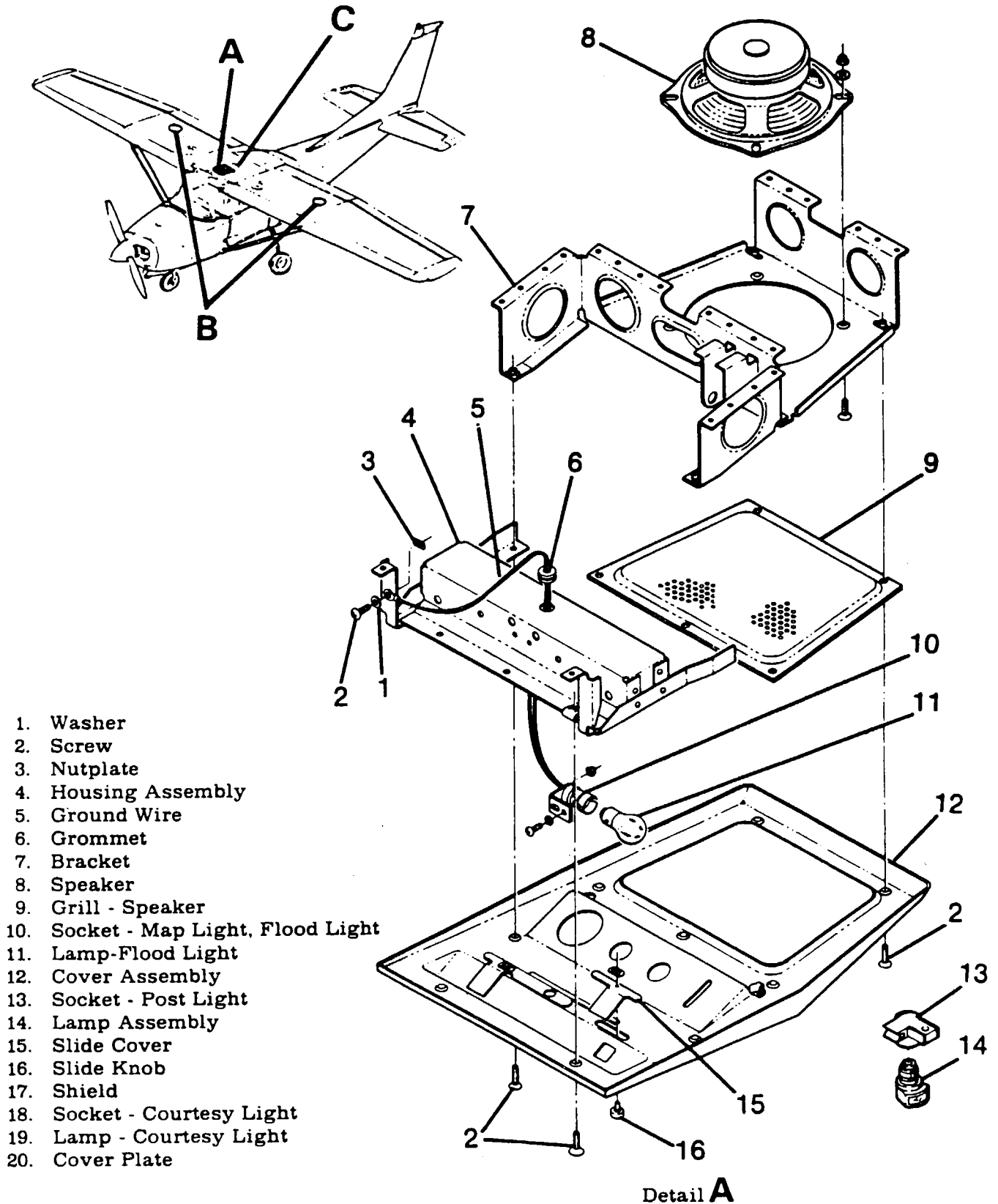
TROUBLE	PROBABLE CAUSE	REMEDY
LAMP WILL NOT LIGHT.	Defective lamp.	1. Test lamp with ohmmeter or replace with a new lamp. If lamp is OK, proceed to step 2.
	Defective socket or open circuit.	2. With switch on, test socket. If defective, replace socket or wiring.
ONE SECTION OF LAMPS WILL NOT LIGHT.	Defective connector.	1. Test for voltage on lamp side of connector. If voltage is not present, check opposite side of connector. If voltage is present, replace pins and sockets as necessary. If voltage is not present, check connections at terminal block.
	Defective circuit in dimming assembly.	2. Refer to paragraph 17-90B.
ONE SECTION OF LAMPS WILL NOT LIGHT. (Cont)	Defective rheostat.	2. Check voltage at output side of rheostat with battery switch on.
		Should read battery voltage with rheostat turned full clockwise. Voltage should decrease as rheostat is turned counterclockwise. If no voltage is present or voltage has a sudden drop before rheostat has been turned full counterclockwise replace rheostat.
ALL LAMPS OUTS.	Open circuit breaker.	1. With battery switch on, check circuit breaker. Reset if open. If circuit breaker is set, check voltage at output side of breaker. If no voltage is present, replace circuit breaker.
LAMPS WILL NOT DIM.	Defective resistor or rheostat.	1. Check resistor and rheostat for continuity and resistance value. Also, check transistors for partial short.



## MODEL R182 & TR182 SERIES SERVICE MANUAL

- 16-75. TRANSISTORIZED LIGHT DIMMING.
- 16-76. DESCRIPTION. The light-dimming circuit consists of a two-circuit transistorized dimming assembly, mounted on the right hand side of the cabin forward of the instrument panel, and two controls on the lower left hand side of the panel. The left control is a dual rheostat with a concentric knob arrangement. The center portion controls lower panel lighting, the outer portion controls engine instrument and radio lighting. The right hand is a single rheostat and controls instrument lighting, this includes, glare shield lights, instrument flood lights, compass light and post lighting if installed.
- 16-77. REMOVAL AND INSTALLATION. (See figure 16-11.)
- 16-77A. TROUBLE SHOOTING - TRANSISTORIZED HEAT SINK. Remove heat sink from airplane. Check transistors for opens and shorts, check transistor sockets for evidence of shorting out against heat sink, especially on the bottom side. Check that legs of transistor socket have not been bent up against heat sink. If this has happened, you may see burned spot on the socket leg. If the transistor sockets and wiring appear to be in good condition, install transistor back in heat sink and make a continuity check. Attach one lead of an ohmmeter to the heat sink then check every pin of the pigtail plug with the other lead for continuity. (These should not be continuity). If continuity is found, this will burn out transistors immediately.
- 16-78. DOME LIGHT.
- 16-79. DESCRIPTION. The dome light is mounted aft of the overhead console. The assembly consists of a housing, a socket and lamp and a cover. The light is controlled by a slide switch mounted on the cover aft of the light.
- 16-80. REMOVAL AND INSTALLATION. (See figure 16-9.)
- 16-81. MAP LIGHT.
- 16-82. DESCRIPTION. A light assembly is installed in the instrument panel glare shield above the pilot's control wheel. The light has blue lens. A switch located forward of the light controls the light.
- 16-83. REMOVAL AND INSTALLATION. (See figure 16-10.)

# MODEL R182 AND TR182 SERVICE MANUAL



1. Washer
2. Screw
3. Nutplate
4. Housing Assembly
5. Ground Wire
6. Grommet
7. Bracket
8. Speaker
9. Grill - Speaker
10. Socket - Map Light, Flood Light
11. Lamp-Flood Light
12. Cover Assembly
13. Socket - Post Light
14. Lamp Assembly
15. Slide Cover
16. Slide Knob
17. Shield
18. Socket - Courtesy Light
19. Lamp - Courtesy Light
20. Cover Plate

Detail **A**

Figure 16-9. Overhead Console, Dome and Courtesy Light Installation (Sheet 1 of 4)

MODEL R182 AND TR182 SERVICE MANUAL

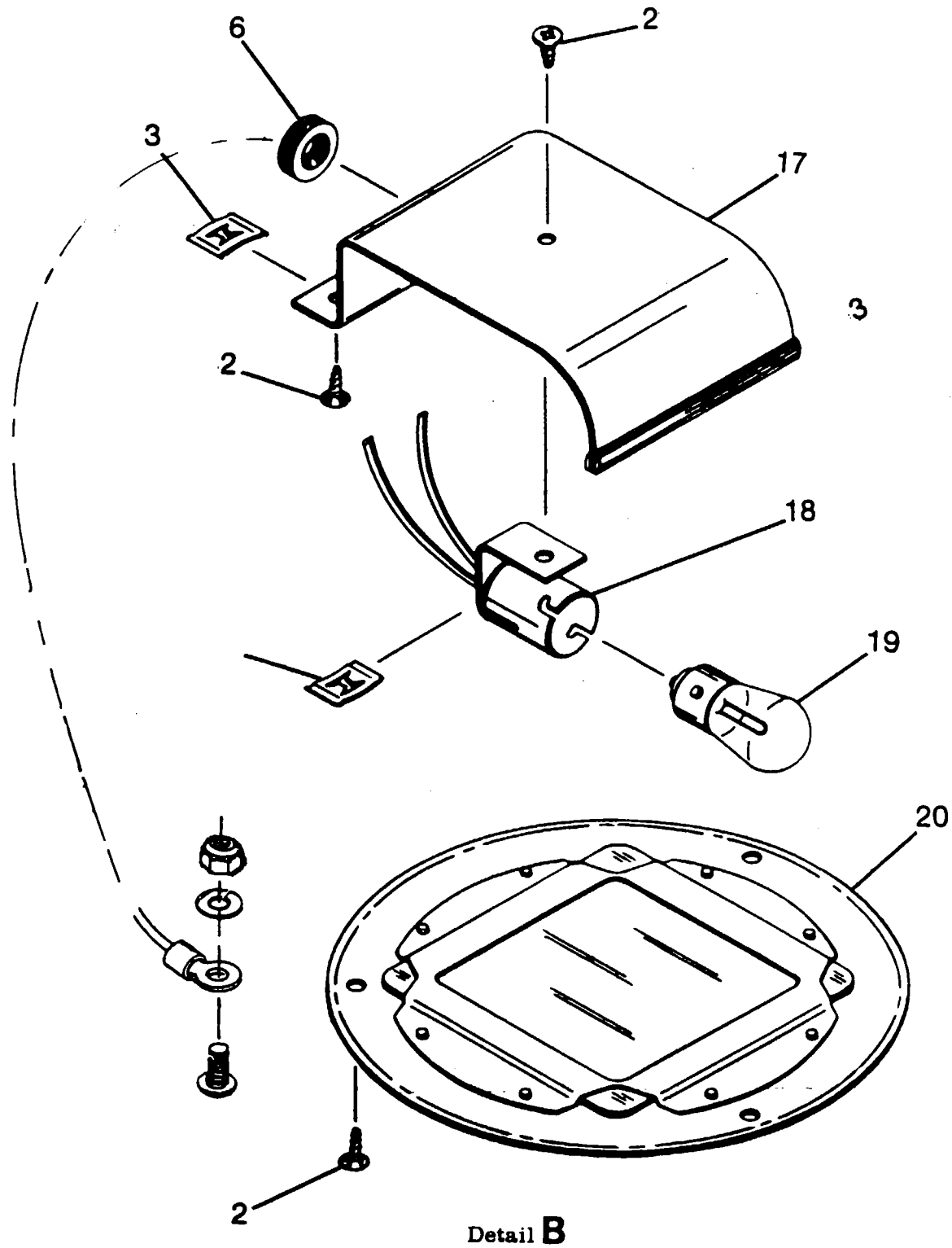
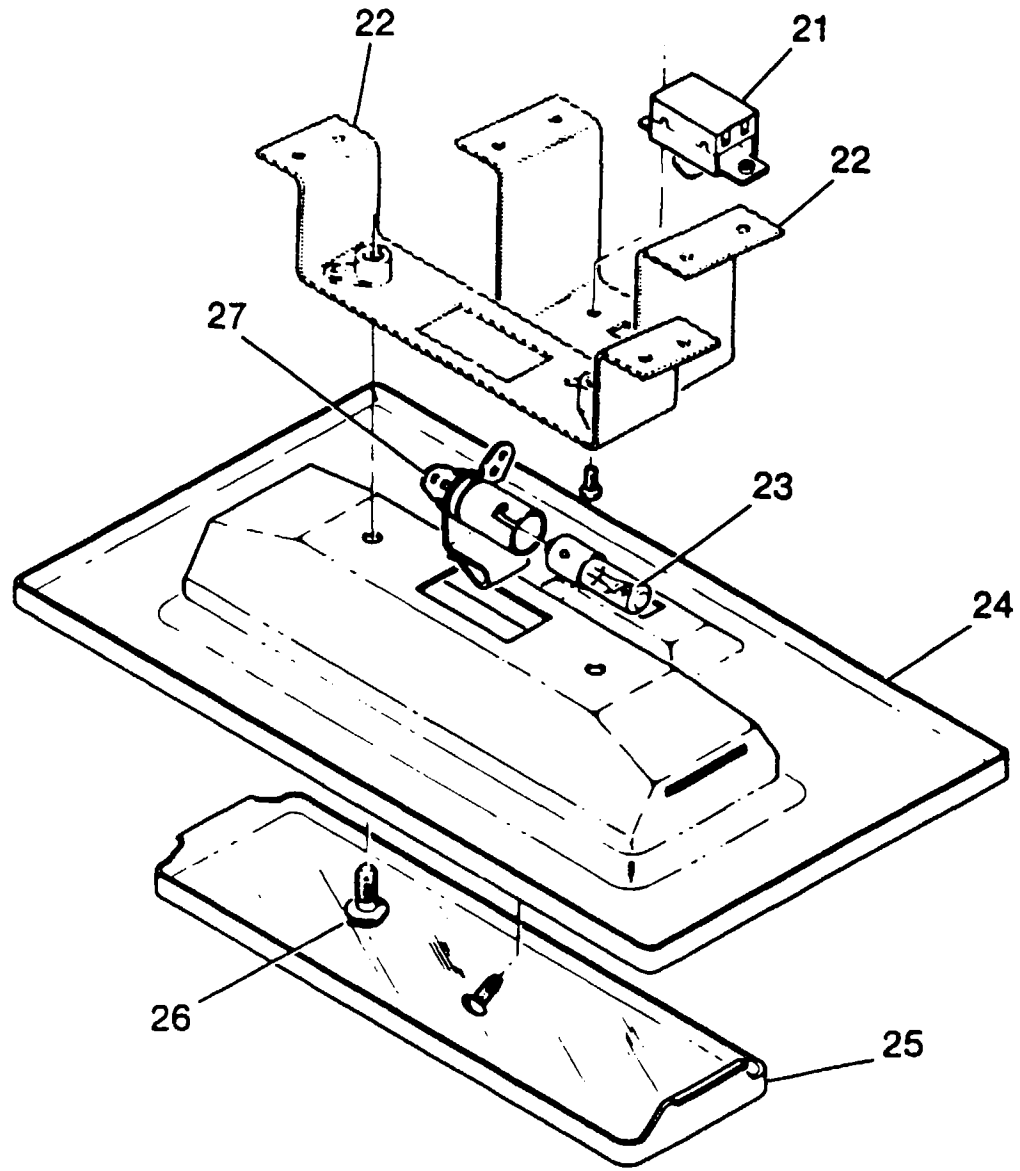


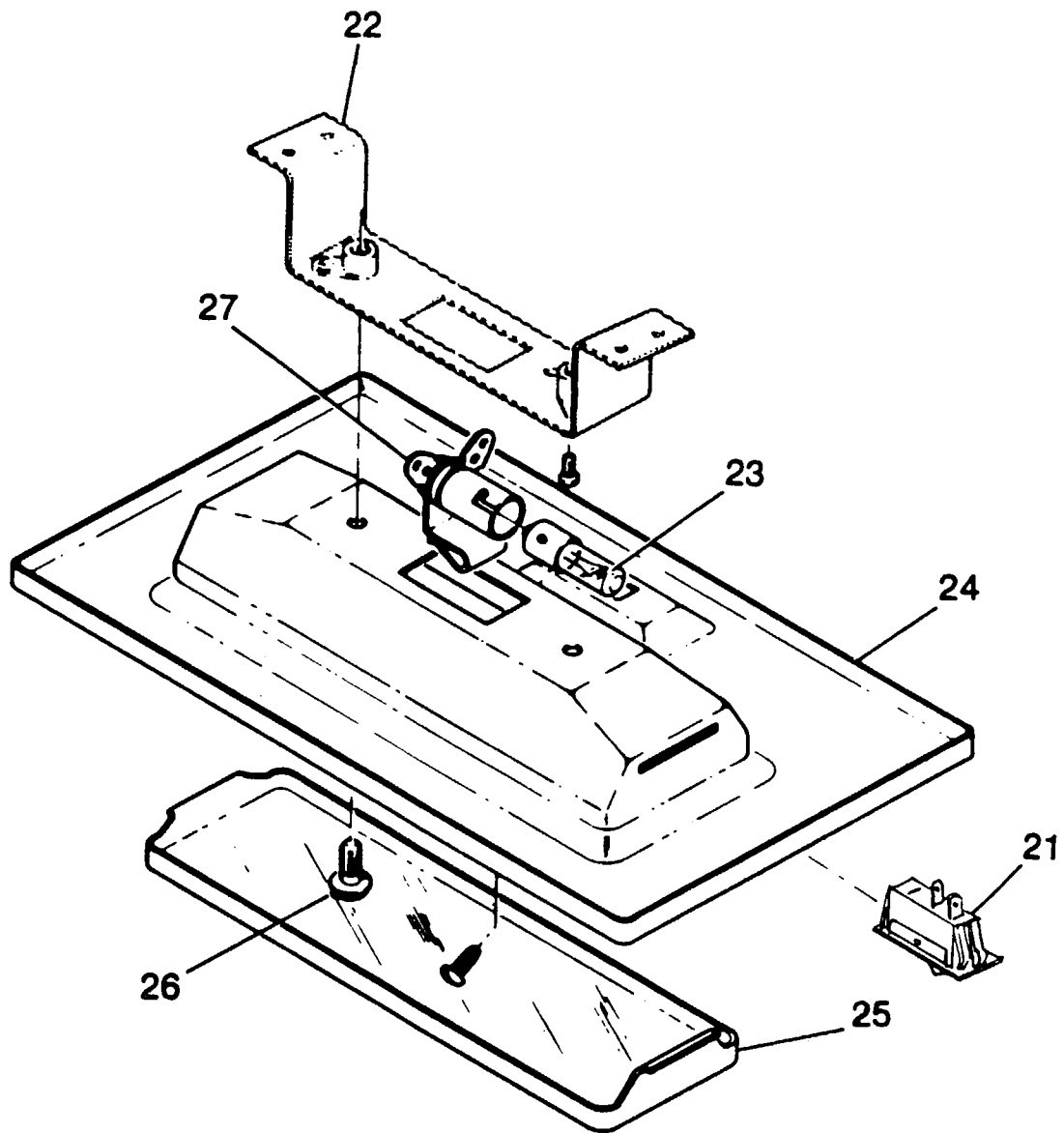
Figure 16-9. Overhead Console, Dome and Courtesy Light Installation (Sheet 2 of 4)



Detail C  
THRU R18201634

- 21.Switch
- 22.Bracket
- 23.Lamp
- 24.Cover
- 25.Lens
- 26.Screw
- 27.Socket

Figure 16-9. Overhead Console, Dome and Courtesy Light Installation (Sheet 3 of 4)



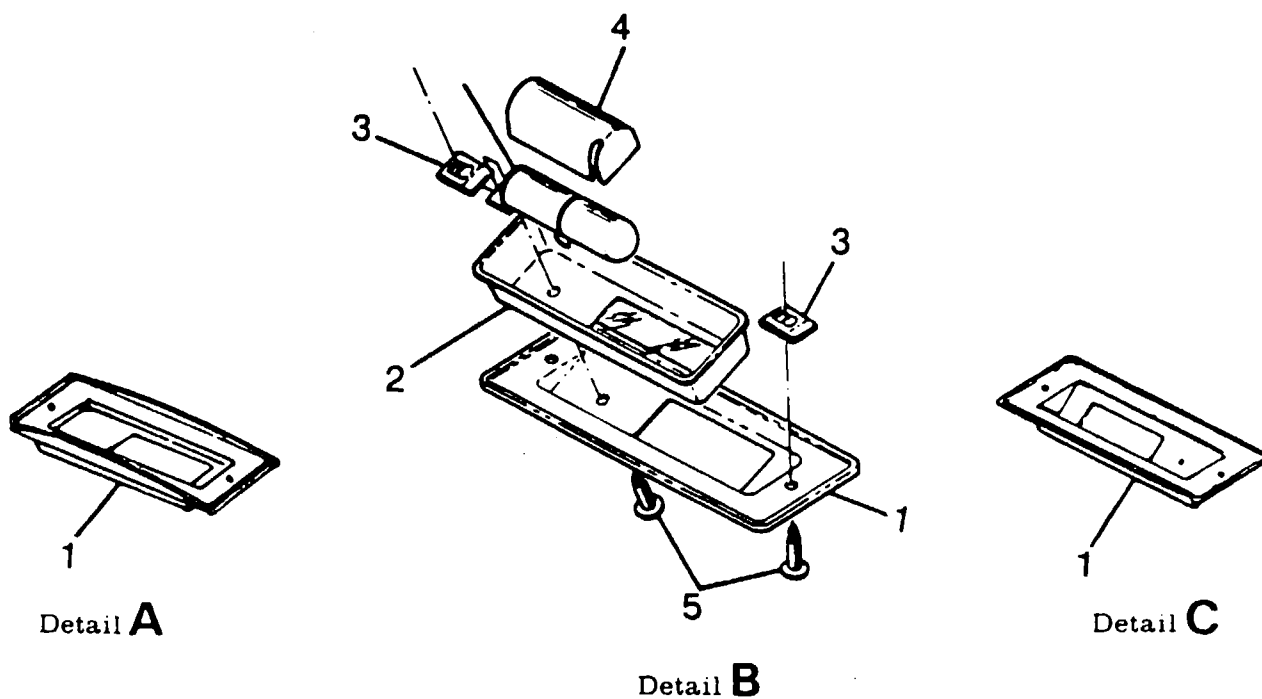
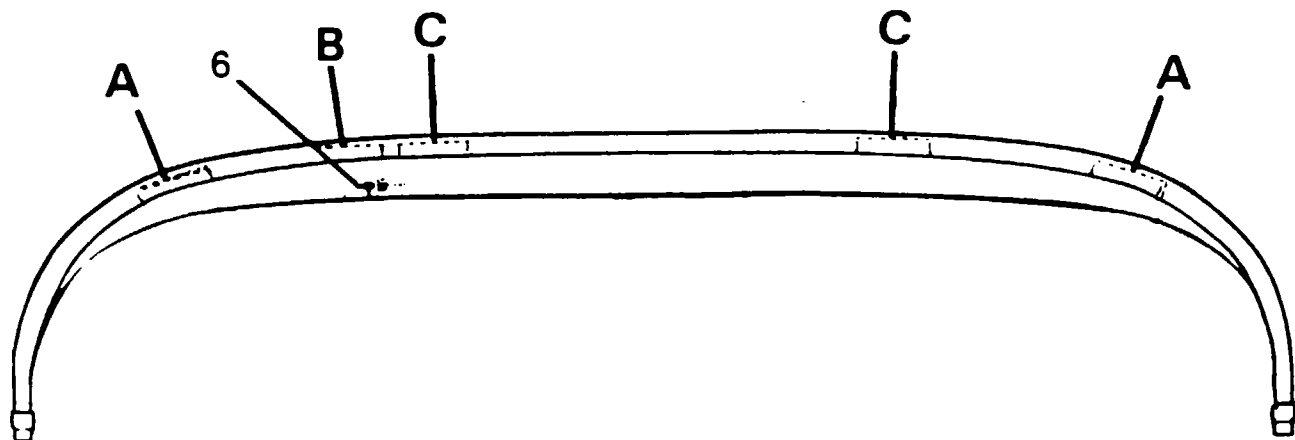
Detail C  
BEGINNING WITH R18201635

Figure 16-9. Overhead Console, Dome and Courtesy Light Installation (Sheet 4 of 4)

## MODEL R182 AND TR182 SERVICE MANUAL

- 16-84. CONTROL WHEEL MAP LIGHT.
- 16-85. DESCRIPTION. The control wheel map light is internally mounted in the control wheel. A rheostat located on the lower right hand side of the wheel controls the light.
- 16-86. REMOVAL AND INSTALLATION. (See figure 16-12.) To remove, push upward on the lamp and turn. The lamp and reflector are replaced as a unit.
- 16-87. LANDING GEAR INDICATOR LIGHTS.
- 16-88. DESCRIPTION. Thru 1982 models, the position of the landing gear is indicated by two press-to-test lamp assemblies mounted on the right side of the switch panel. The green light is on when all three gears are down and locked, the amber is on when all three gears are up and locked. If any gear assumes an intermediate position of neither up and locked or down and locked, both lights will be dark. The hood of each light is removable for bulb replacement, and has a dimming shutter. Beginning with 1983 models, the gear indicating lights are red and green, press-to-test light assemblies. The green light indicates that all three gears are down and locked. The red light indicates that the gears are in transition. The red light goes out when the gears are fully retracted or extended. The red light will illuminate when the gears are fully retracted should the system pressure drop below 1000 PSI, except when the nose gear squat switch is open. It is possible to have both lights on at the same time. Under normal circumstances, this will occur only momentarily. However, anytime both lights stay on or the red light does not go out, a malfunction has occurred.
- 16-89. REMOVAL AND INSTALLATION.
- Remove the hood on either light by unscrewing counterclockwise. The lamp is in the hood and may be replaced by pulling it out and inserting a new lamp.
  - To remove the lamp socket assembly, remove the nut from the assembly on the front side of the panel.
  - Tag and unsolder the wires from the socket assembly.
  - To replace a lamp socket assembly, reverse the above procedure.
- 16-90. COMPASS AND RADIO DIAL LIGHTS.
- 16-91. DESCRIPTION. The compass and radio dial lights are contained within the individual units. The light intensity is controlled by the instrument light-dimming rheostat mounted on the lower left side of the instrument panel.
- 16-92. PEDESTAL LIGHTING.
- 16-93. DESCRIPTION. The pedestal lighting consists of two lights: one on the upper portion of the pedestal for lighting of the trim wheels and the cowl flap control, and one on the lower portion for lighting of the fuel selector. Light dimming is controlled by the transistorized light dimming circuit.
- 16-94. REMOVAL AND INSTALLATION. For removal and installation of the lamps, see figure 16-13.
- 16-95. STALL WARNING UNIT.
- 16-96. DESCRIPTION. A solid state warning unit is installed on the left hand root rib. The warning signal is transmitted through the radio speaker in the overhead console.

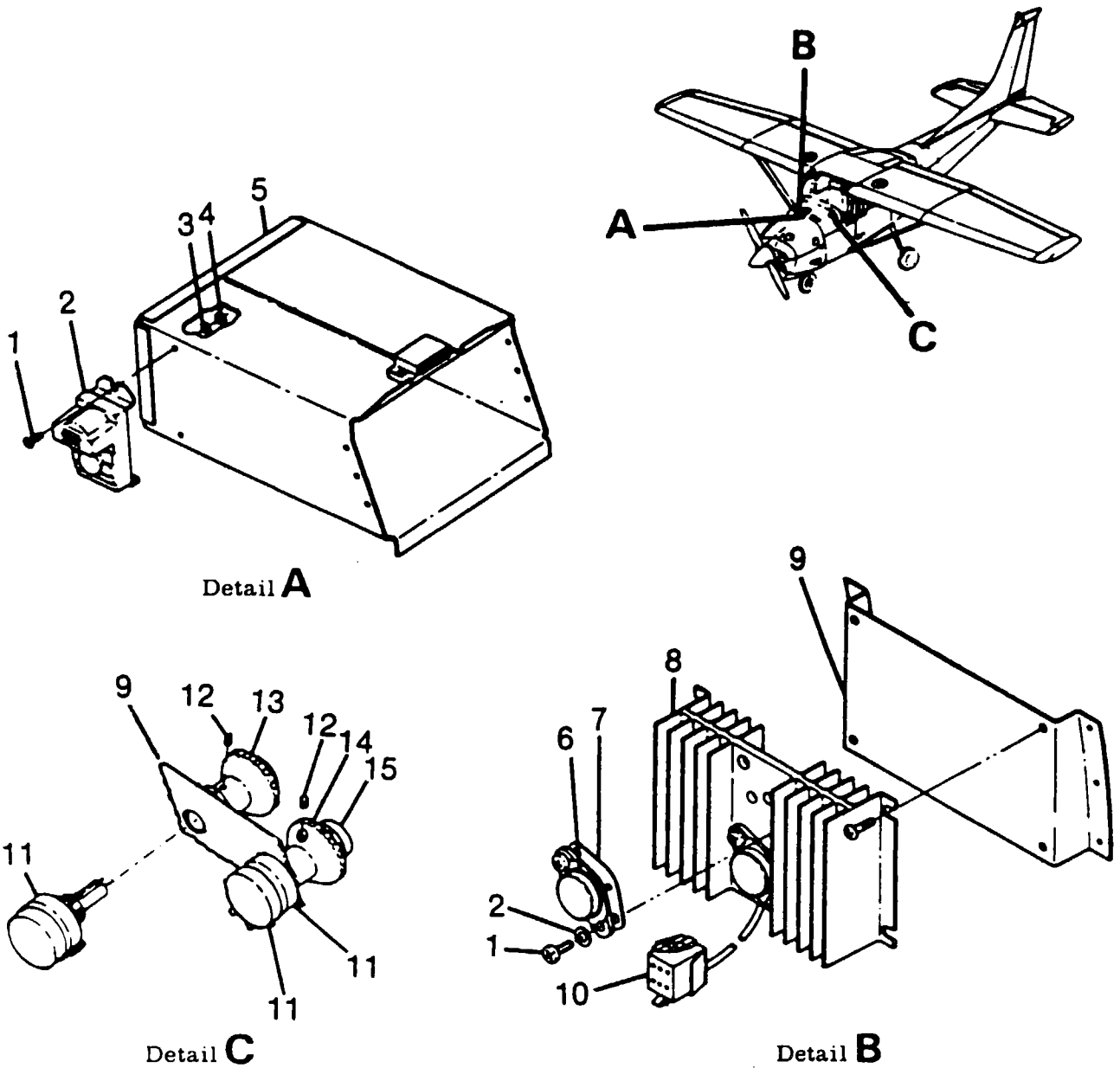
MODEL R182 AND TR182 SERVICE MANUAL



- 1. Cover
- 2. Light Housing
- 3. Nutplate
- 4. Shield
- 5. Screw
- 6. Switch - Map Light

Figure 16-10. Instrument Panel Glareshield Lighting Installation

# MODEL R182 AND TR182 SERVICE MANUAL

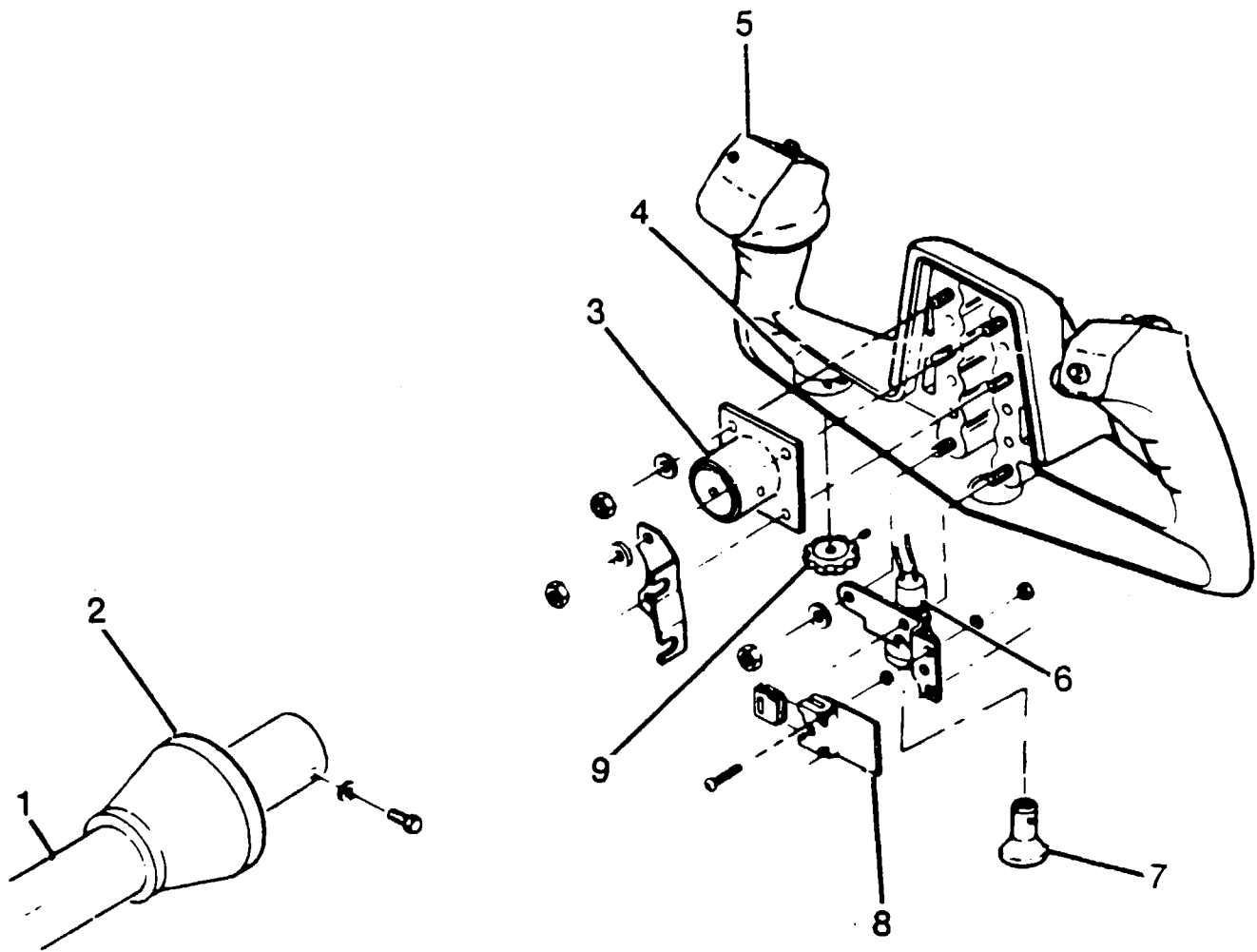


- |                |   |
|----------------|---|
| 1. Screw       | 9. Mounting Bracket                           |
| 2. Inverter    | 10. Housing - Socket                          |
| 3. Washer      | 11. Rheostat                                  |
| 4. Nut         | 12. Set Screw                                 |
| 5. Glove Box   | 13. Control - Instrument Lighting.            |
| 6. Transistor  | 14. Control - Engine Inst. and Radio Lighting |
| 7. Mica Washer | 15. Control - Lower Panel Lighting            |
| 8. Heat Sink   |   |

Figure 16-11. Transistorized Light Dimming and Electroluminescent Light Inverter Installations



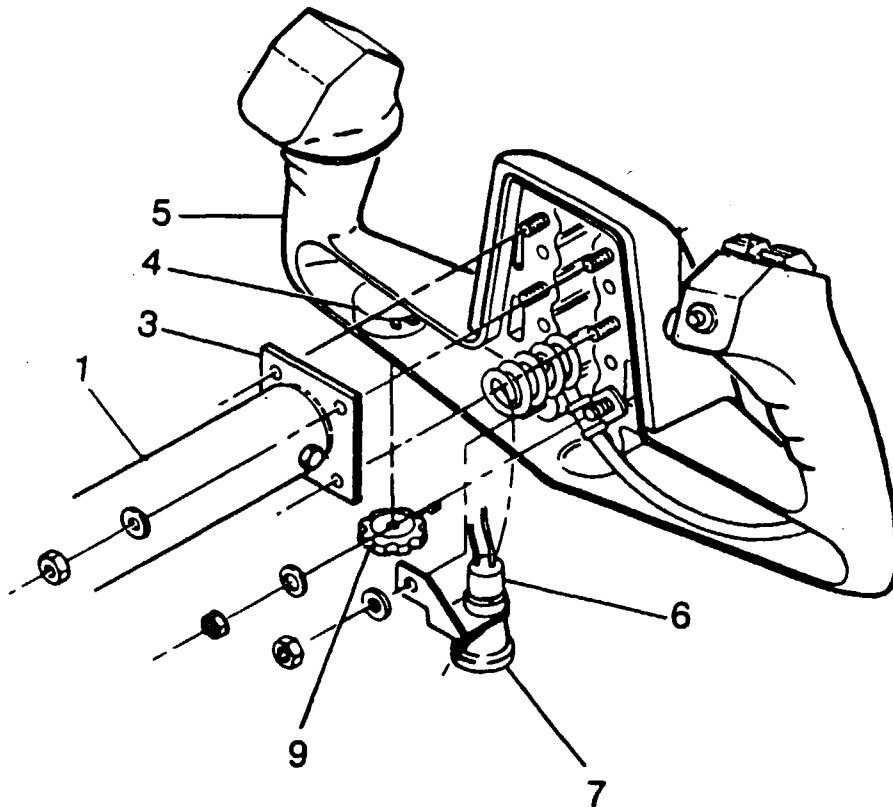
# MODEL R182 AND TR182 SERVICE MANUAL



## THRU 1980 MODELS

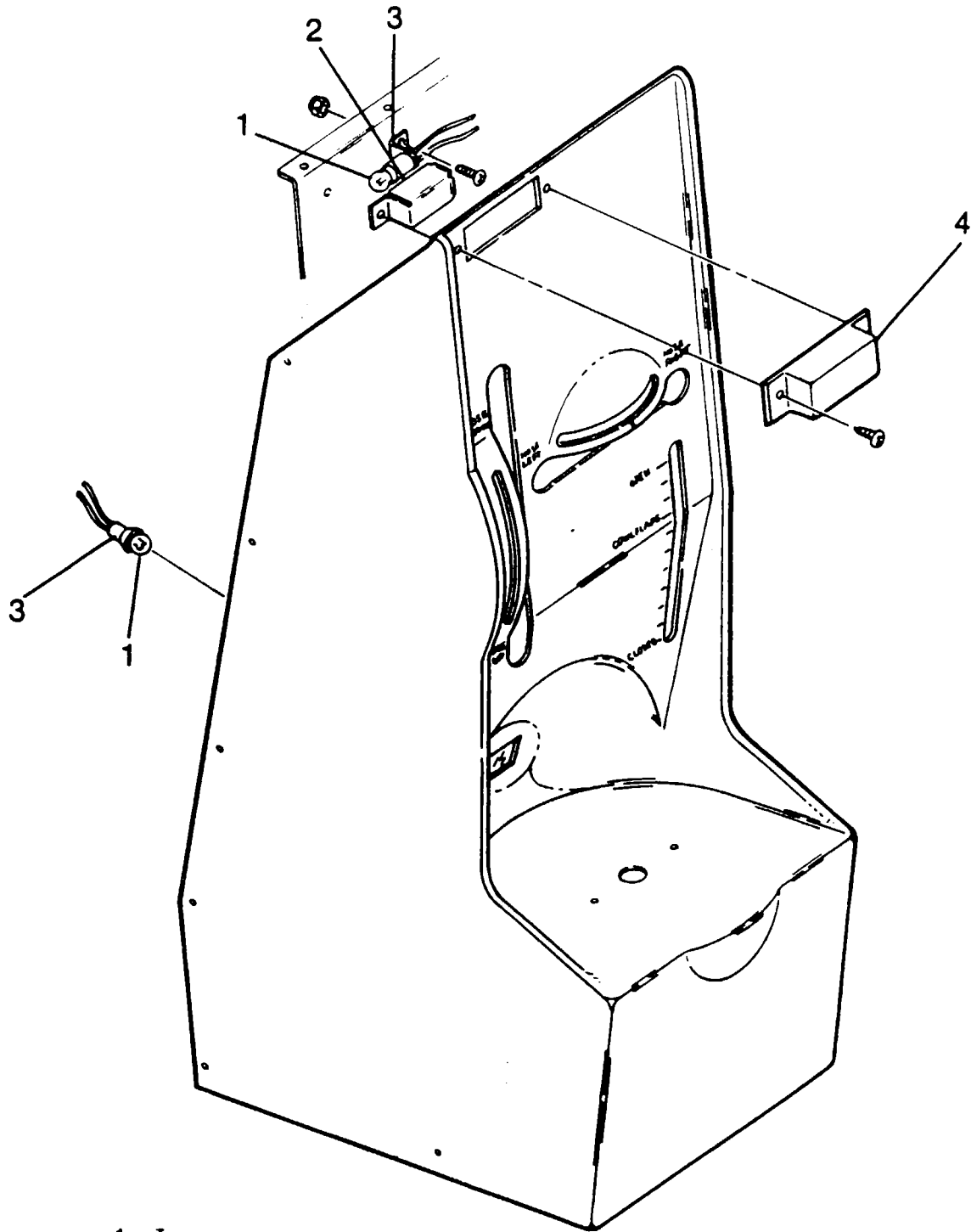
1. Control Tube Assembly
2. Cover
3. Adapter
4. Map Light Rheostat
5. Control Wheel
6. Map Light Socket
7. Lamp Assembly
8. Connector Circuit Board
9. Knob (Map Light)

Figure 16-12. Control Wheel Map Light Installation (Sheet 1 of 2)



BEGINNING WITH 1981 MODELS

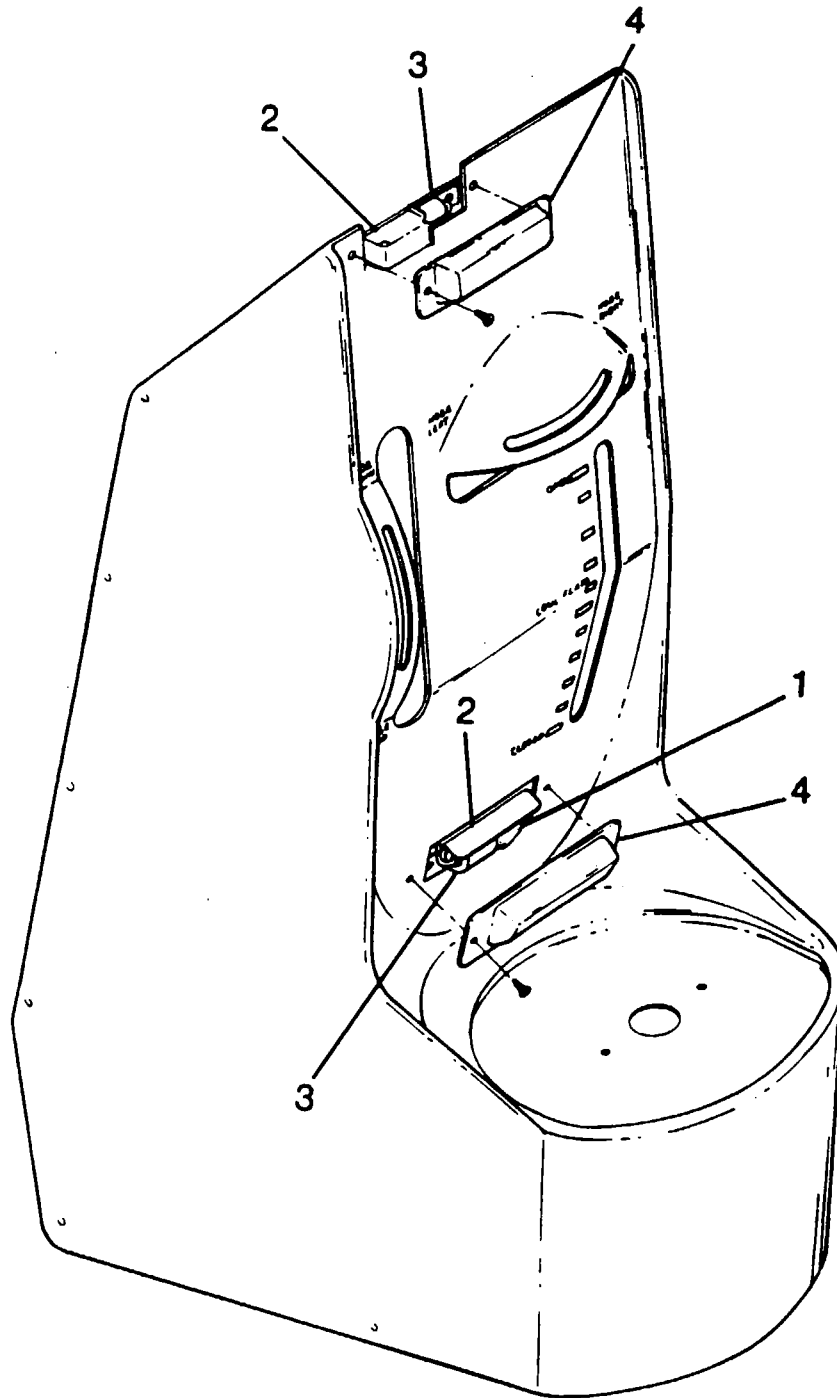
Figure 16-12. Control Wheel Map Light Installation (Sheet 2 of 2)



- 1. Lamp
- 2. Shield
- 3. Socket
- 4. Cover

THRU 1981 MODELS

Figure 16-13. Pedestal Lighting (Sheet 1 of 2)



BEGINNING WITH 1982 MODELS

Figure 16-13. Pedestal Lighting (Sheet 2 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

## NOTE

If false signals are experienced, refer to Cessna Single-engine Service Letter SE78-50, dated August 7, 1978.

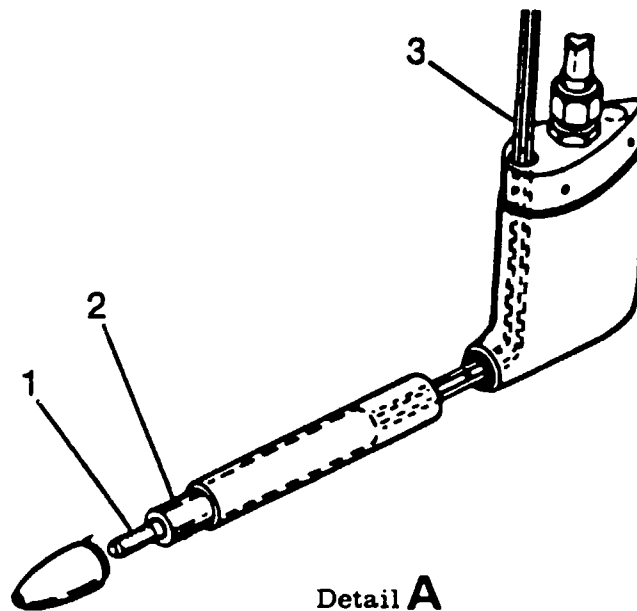
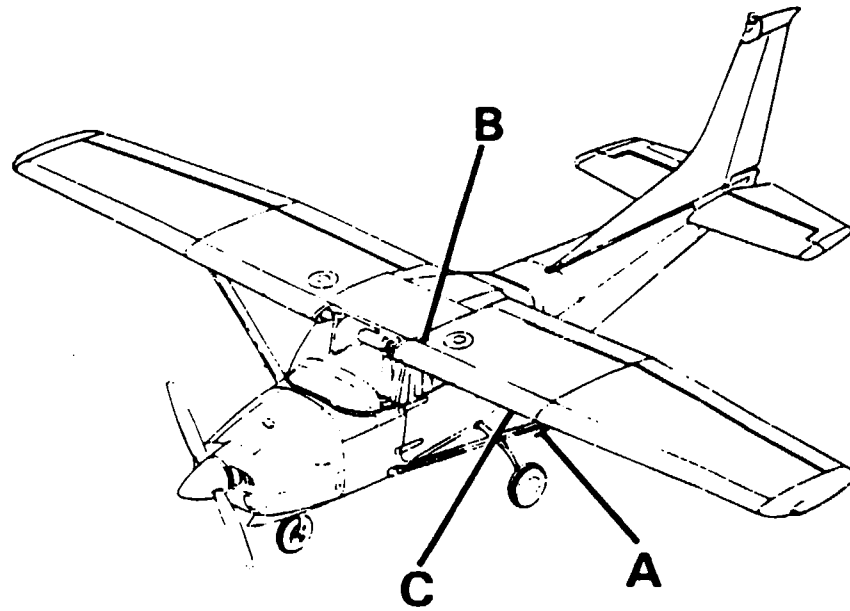
- 16-97. REMOVAL AND INSTALLATION. (See figure 16-14.)
- 16-98. STALL WARNING SWITCH.
- 16-99. DESCRIPTION. The stall warning switch is installed in the leading edge of the left wing and is actuated by airflow over the surface of the wing. The switch will close as a stall condition is approached, actuating the stall warning horn. The horn should sound at approximately five to ten miles per hour above actual stall speed. Initial installation of the switch should be with the lip of the warning switch approximately one sixteenth of an inch below the center line of the wing skin cutout. Test-fly the aircraft to determine if the horn sounds at the desired speed. If the horn sounds too soon, move the unit down slightly; if too late, move the unit up slightly.
- 16-100. REMOVAL AND INSTALLATION. (See figure 16-14.)
- 16-101. COURTESY LIGHTS.
- 16-102. DESCRIPTION. The lights consist of one light located on the under side of each wing to provide ground lighting around the cabin area. The courtesy lights have clear lenses and are controlled by a single slide switch labeled "Utility Lights", located on the left rear door post.
- 16-103. REMOVAL AND INSTALLATION. (See figure 16-9.)
- 16-104. PITOT AND STALL WARNING HEATERS.
- 16-105. DESCRIPTION. Electrical heater units are incorporated in some pitot tubes and stall warning switch units. The heaters offset the possibility of ice formations on the pitot tube and stall warning actuator switch. The heaters are integrally mounted in the pitot tube and the stall warning actuator switch. Both heaters are operated by the pitot heat switch.
- 16-106. CIGAR LIGHTER. (THRU R18201798.)
- 16-107. DESCRIPTION. The cigar lighter (located on the instrument panel) is equipped with a thermal-actuated circuit breaker which is attached to the rear of the cigar lighter. The circuit breaker will open if the lighter becomes jammed in the socket or held in position too long. The circuit breaker may be reset by inserting a small probe into the .078 diameter hole in the back of the circuit breaker and pushing lightly until a click is heard.

## CAUTION

Make sure the master switch is OFF before inserting probe into the circuit breaker on cigar lighter to reset.

- 16-108. REMOVAL AND INSTALLATION. (See figure 16-15.)
- Ensure that the master switch is OFF.
  - Remove the cigar lighter element.
  - Disconnect wire on back of lighter.
  - Remove shell that screws on socket back of panel.
  - The socket will then be free for removal.
  - To install a cigar lighter, reverse this procedure.

# MODEL R182 AND TR182 SERVICE MANUAL



Detail A

1. Pitot Tube
2. Heater Assembly
3. Electrical Leads
4. Screw
5. Stall Warning Assembly
6. Cover
7. Rib
8. Wing Leading Edge
9. Stall Warning Actuator
10. Tinnerman Nut

Figure 16-14. Pitot Heat and Stall Warning Installation (Sheet 1 of 2)

MODEL R182 AND TR182 SERVICE MANUAL

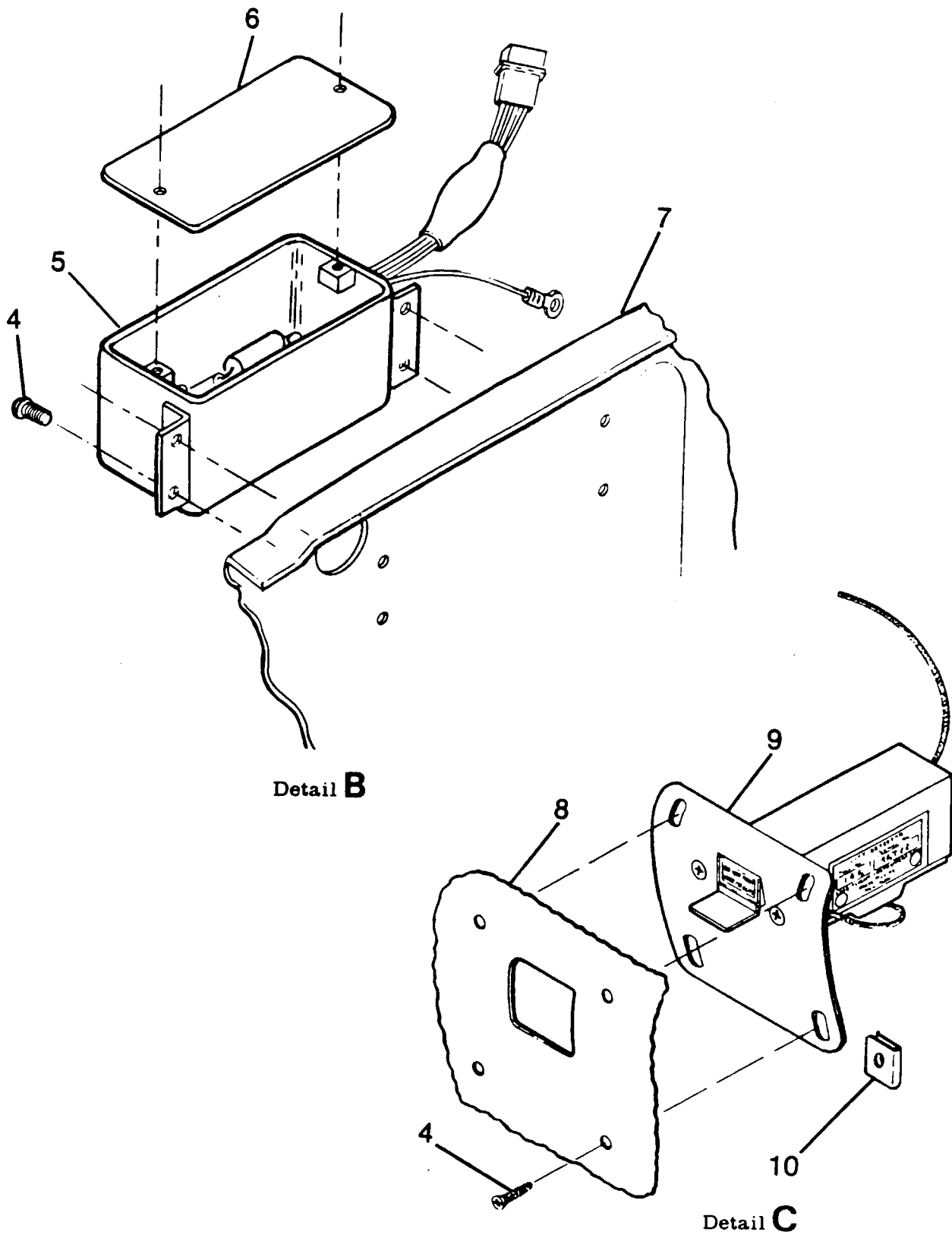
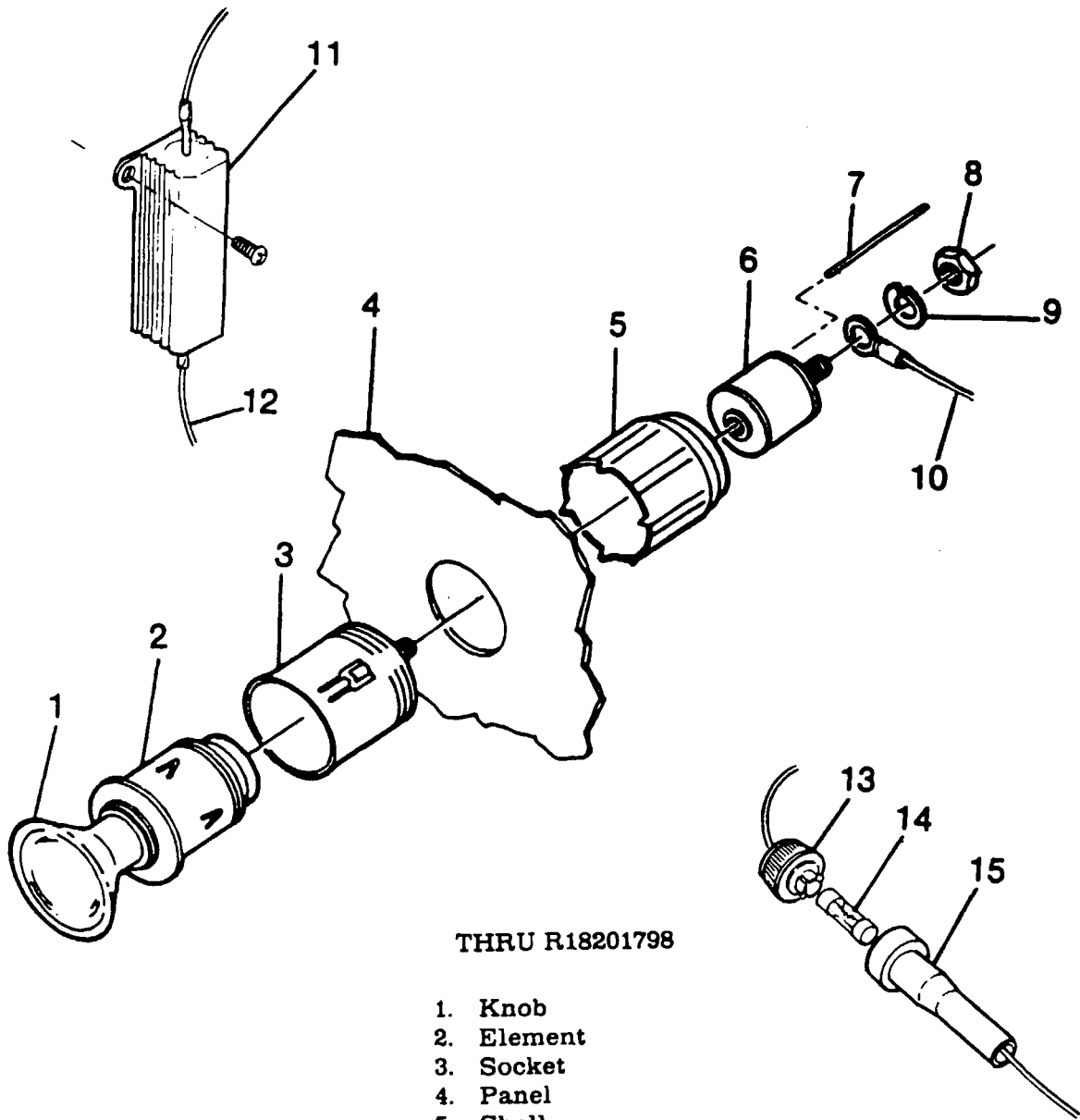


Figure 16-14. Pitot Heat and Stall Warning Installation (Sheet 2 of 2)

MODEL R182 AND TR182 SERVICE MANUAL



THRU R18201798

1. Knob
2. Element
3. Socket
4. Panel
5. Shell
6. Circuit Breaker
7. Probe
8. Nut
9. Lockwasher
10. Wire (to Resistor)
11. Resistor
12. Wire (to Fuse)
13. Fuse Holder Cap
14. Fuse
15. Fuse Holder
16. Wire (to Circuit Breaker)

Figure 16-15. Cigar Lighter Installation



## MODEL R182 AND TR182 SERVICE MANUAL

- 16-109. EMERGENCY LOCATOR TRANSMITTER.
- 16-110. DESCRIPTION. The ELT is a self-contained, solid state unit, having its own power supply, with an externally mounted antenna. The unit is mounted in the tailcone, aft of the baggage curtain on the left hand side. The transmitters are designed to provide a broadcast tone that is audio modulated in a swept manner over the range of 1600 to 300 Hz in a distinct, easily recognizable distress signal for reception by search and rescue personnel and others monitoring the emergency frequencies. The ELT exhibits line of sight transmission characteristics which correspond approximately to 100 miles at a search altitude of 10,000 feet. The C589511-0103 transmitter, and the C589511-0104 transmitter on aircraft with Canadian registry, are used thru R18200583. The C589511-0117 transmitter, and the C589511-0113 transmitter on aircraft with Canadian registry, are used thru R18200584 thru R18201933. Beginning with R18201934 the C589512-0103 transmitter is used on all aircraft.

The C589511-0104 transmits on 121.5 MHz at 25 mw rated power output for 100 continuous hours in the temperature range of -40°F (-40°C to +55°C). The C589511-0113 transmits on 121.5 MHz at 25 mw rated power output for 100 continuous hours in the temperature range of -4°F to +131°F (-20°C to +55°C). The C589511-0103 transmits on 121.5 and 243.0 MHz simultaneously at 75 mw rated power output for 48 continuous hours in the temperature range of -40°F to +131°F (-40°C to +55°C). The C589511-0117 and C589512-0103 transmits on 121.5 and 343.0 MHz at 75 mw rated power output for 48 continuous hours in the temperature range of -4°F to +131°F (-20°C to +55°C).

Power is supplied to the transmitter by a battery-pack. The C589511-0104 and C589511-0103 ELT's equipped with a lithium battery-pack must be modified by SK185-20 as outlined in Avionics Service Letter AV78-31, dated 20 November 1981, to incorporate alkaline battery-packs. The C589511-0114 alkaline battery-packs have the service life of the battery-pack stamped on the battery pack, on the end of the transmitter below the switch and on top of the transmitter. The C589512-0107 alkaline battery-packs have the replacement date and date of installation on the battery-pack and the replacement date on the top of the transmitter.

- 16-111. OPERATION. A three-position switch on the forward end of the unit controls operation. Placing the switch in the ON position will energize the unit to start transmitting emergency signals. In the OFF position, the unit is inoperative. Placing the switch in the ARM position will set the unit to start transmitting emergency signals only after the unit has received a 5g (tolerances are +2g and -0g) impact force, for a duration of 11-16 milliseconds.

### CAUTION

Do not leave the emergency locator transmitter in the ON position longer than 1 second (3 sweeps of the warble tone) or you may activate downed aircraft procedures by CAP, DOT or FAA personnel.

- 16-112. CHECKOUT INTERVAL:

100 HOURS OR THREE MONTHS, WHICHEVER COMES FIRST.

- a. Turn aircraft master switch ON.
- b. Turn aircraft transceiver ON and set frequency on receiver to 121.5 MHz.
- c. Remove the ELT's antenna cable from the ELT unit.

## MODEL R182 AND TR182 SERVICE MANUAL

- d. Place the ELT's function selector switch in the ON position for 1 second or less. Immediately replace the ELT function selector switch in the ARM position after testing ELT.
- e. Test should be conducted only within the time period made up of the first five minutes after any hour.

### CAUTION

Tests with the antenna connected should be approved and confirmed by the nearest control tower. The FAA/DOT allows free space transmission tests from the aircraft any time within five minutes after each hour. The test time allowed is generally three sweeps of the warble tone, or approximately one second. The control tower should be notified that a test is about to be performed.

### NOTE

Without its antenna connected, the ELT will produce sufficient signal to reach your receiver, yet it will not disturb other communications or damage output circuitry.

### NOTE

After accumulated test or operation time equals 1 hour, battery-pack replacement is required.

- f. Check calendar date for replacement of battery-pack. This date is supplied on a sticker attached to the outside of the ELT case and to each battery.

#### 16-113. REMOVAL AND INSTALLATION OF TRANSMITTER. (See figure 16-16.)

- a. Remove baggage curtain to gain access to the transmitter and antenna.
- b. Disconnect co-axial cable from end of transmitter.
- c. Remove the two #10 screws from the baseplate of the ELT and remove ELT.
- d. To reinstall transmitter, reverse preceding steps.

### CAUTION

Ensure that the direction of flight arrows (placarded on the transmitter) are pointing towards the nose of the aircraft.

#### 16-114. REMOVAL AND INSTALLATION OF ANTENNA. (See figure 16-16.)

- a. Disconnect co-axial cable from base of antenna.
- b. Remove the nut and lockwasher attaching the antenna base to the fuselage and the antenna will be free for removal.
- c. To reinstall the antenna, reverse the preceding steps.

### NOTE

Upon reinstallation of antenna, cement rubber boot (14) using RTV102, General Electric Co. or equivalent, to antenna whip only; do not apply adhesive to fuselage skin or damage to paint may result.

# MODEL R182 AND TR182 SERVICE MANUAL

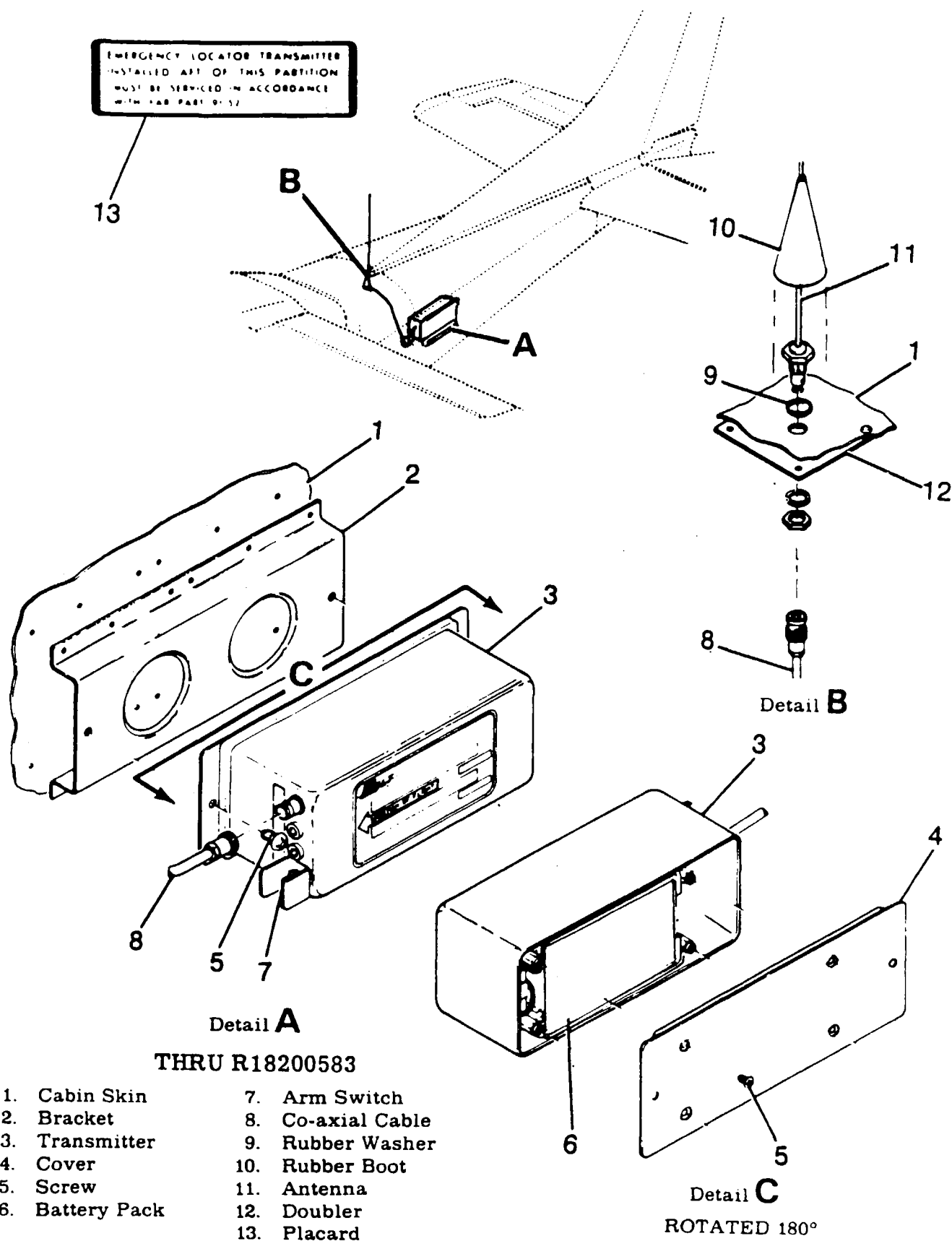


Figure 16-16. Emergency Locator Transmitter Installation (Sheet 1 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

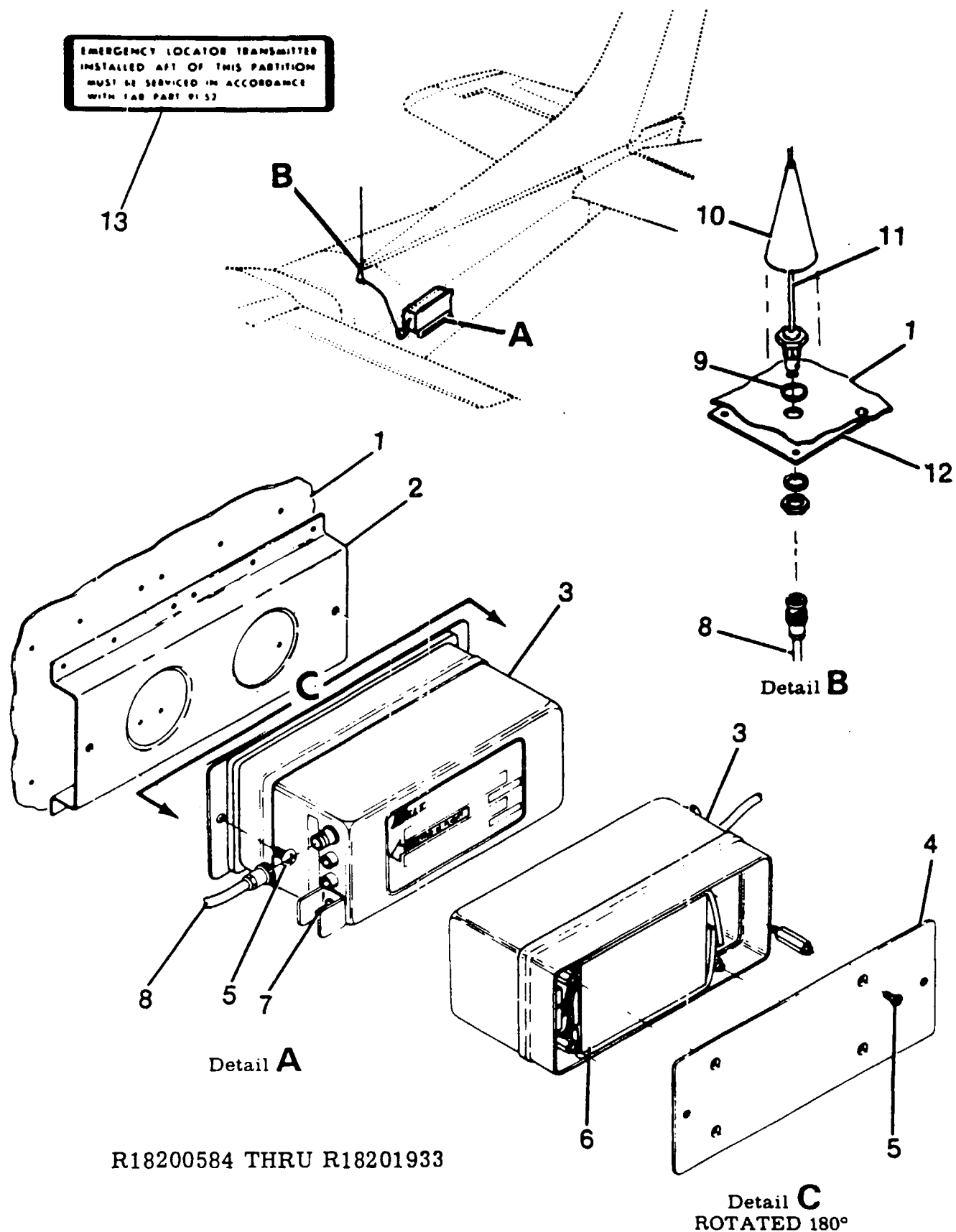


Figure 16-16. Emergency Locator Transmitter Installation (Sheet 2 of 3)

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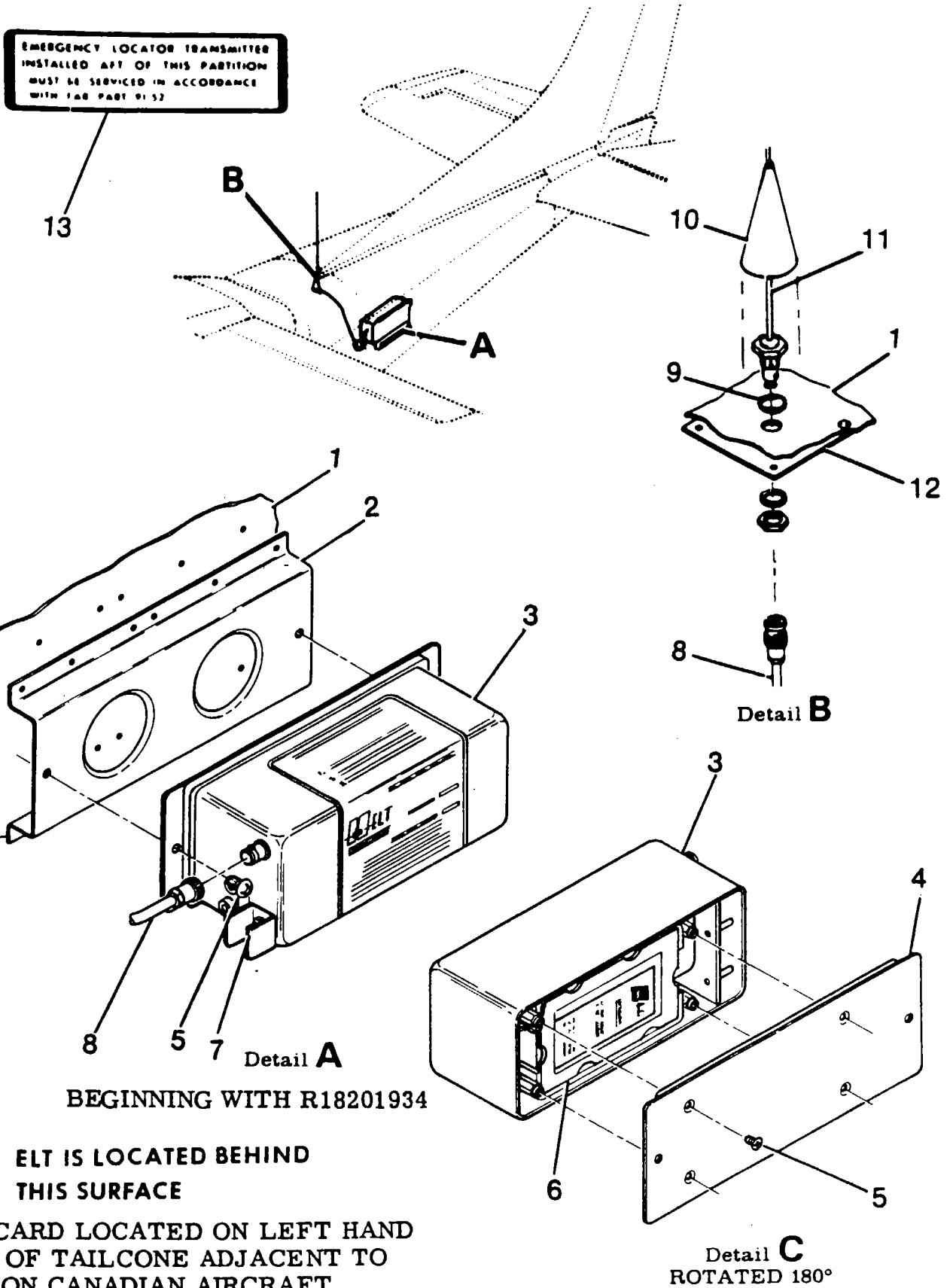


Figure 16-16. Emergency Locator Transmitter Installation (Sheet 3 of 3)

# MODEL R182 AND TR182 SERVICE MANUAL

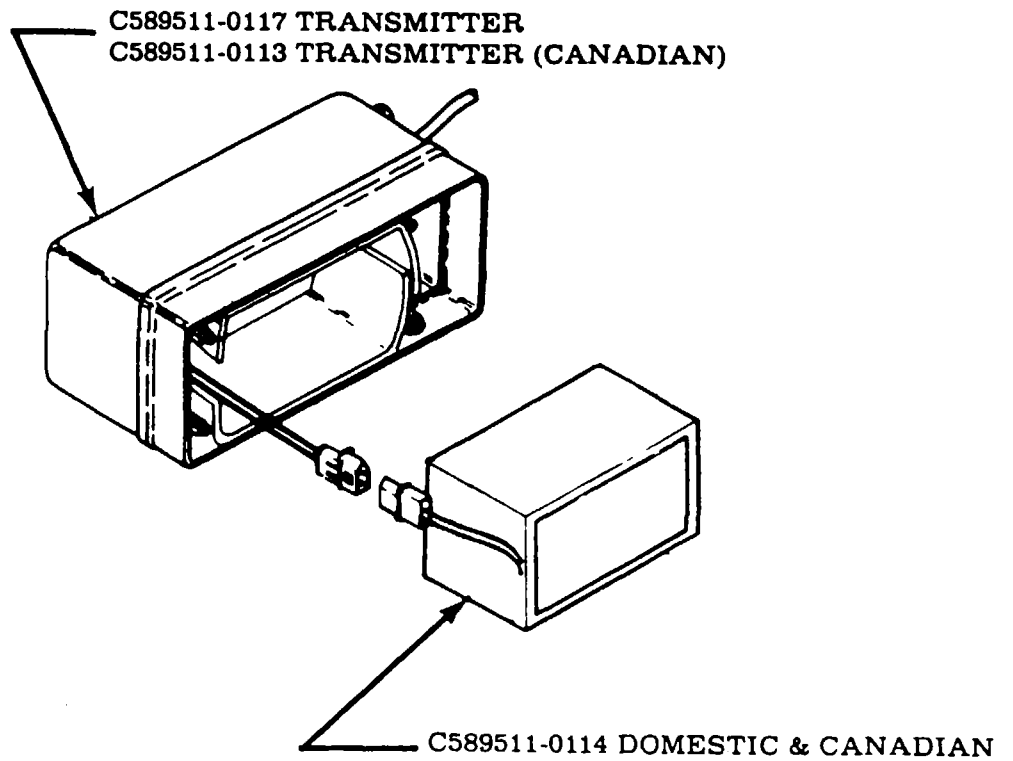
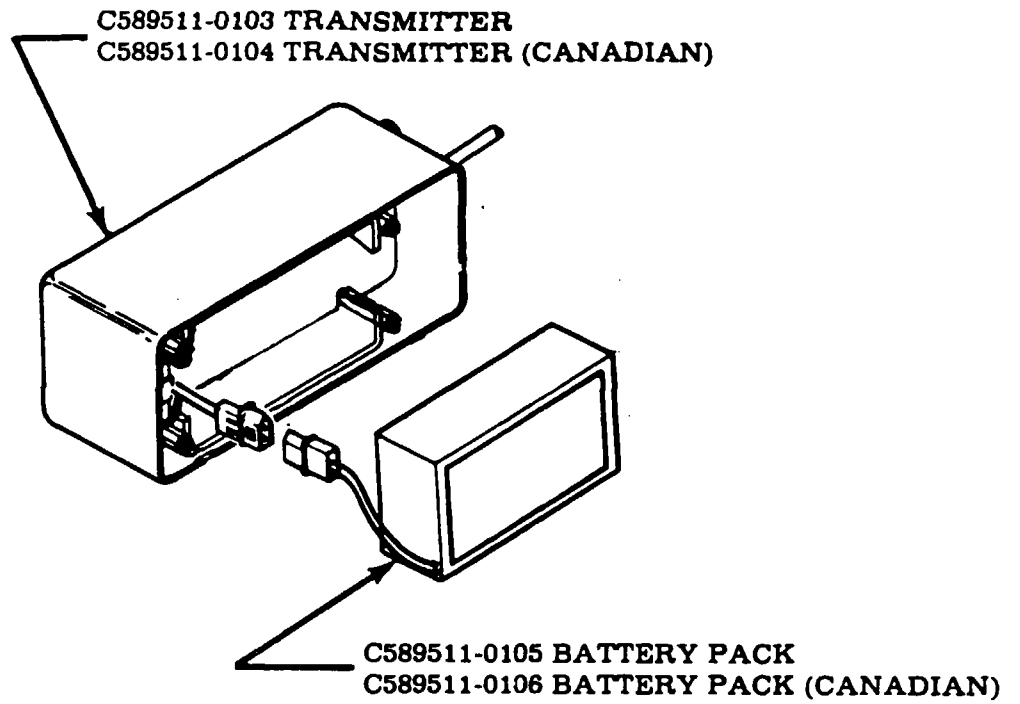


Figure 16-17. Battery Pack Installation

## MODEL R182 AND TR182 SERVICE MANUAL

### CAUTION

The C589511-0111 and C589511-0119 co-axial cable must be installed as indicated on the cable sleeve. Cable end marked "TO ANT" must be connected to the ELT antenna, and the end marked "TO ELT" must be connected to the C589511-0113/-0117 and C589511-0103/-0104 transmitters.

16-115. REMOVAL AND INSTALLATION OF BATTERY-PACK. (See figure 16-17).

### CAUTION

Lithium battery-pack must be replaced with alkaline battery-packs per SK185-20.

### NOTE

Transmitters equipped with the C589511-0105 or C589511-0106 battery-packs can only be replaced with another C589511-0114 after modification by SK185-20 has been completed.

- a. After the transmitter has been removed from aircraft in accordance with para 16-113, place the transmitter switch in the OFF position.
- b. Remove the four screws attaching the cover to the case and then remove the cover to gain access to the battery-pack.
- c. Disconnect the battery-pack electrical connector and remove battery-pack.
- d. Place new battery-pack in the transmitter with four batteries as shown in the case in figure 16-17.
- e. Connect the electrical connector as shown in figure 16-17.

### NOTE

Before installing the battery pack, check to ensure that its voltage is 7.5 volts or greater.

- f. Replace the transmitter baseplate on the unit and pressing the baseplate and unit together attach baseplate with four Nylok patch screws.
- g. Stamp the new replacement date on the outside of the ELT. The date should be noted on the switching nameplate on the side of the unit as well as on the instruction nameplate on top of the unit.

### WARNING

The battery-pack has pressurized contents. Do not recharge, short circuit or dispose of in fire.

### CAUTION

Be sure to enter the new battery-pack expiration date in the aircraft records. It is also recommended this date be placed in your ELT Owner's Manual for quick reference.

# MODEL R182 & TR182 SERIES SERVICE MANUAL

## 16-116. G SWITCH OPERATIONAL CHECK.

- a. Remove emergency locator beacon transmitter from airplane in accordance with paragraph 16-113.
- b. While holding transmitter in one hand, sharply strike the end of the case in the direction of activation indicated on the case of the transmitter.
  1. Verify that the G switch has been activated.
- c. Reset the G switch.
- d. Reinstall transmitter in airplane in accordance with paragraph 16-113.

16-117. **TROUBLE SHOOTING.** Should your Emergency Locating Transmitter fail the 100 Hours performance checks, it is possible to a limited degree to isolate the fault to a particular area of the equipment. In performing the following trouble shooting procedures to test peak effective radiated power, you will be able to determine if battery replacement is necessary or if your unit should be returned to your dealer for repair.

TROUBLE	PROBABLE CAUSE	REMEDY
★POWER LOW	Low battery voltage.	<ol style="list-style-type: none"> <li>1. Set toggle switch to off.</li> <li>2. Disconnect the battery pack from the transmitter and connect a Simpson 260 model voltmeter and measure voltage. If the battery pack is 7.5 volts or less, the battery pack is below specification.</li> </ol>
	Faulty transmitter.	<ol style="list-style-type: none"> <li>3. If the battery pack voltage meets the specifications in step 2., the battery pack is ok. If the battery pack is ok, check the transmitter as follows:                             <ol style="list-style-type: none"> <li>a. Reconnect battery pack to the transmitter.</li> <li>b. By means of E.F. Johnson 105-0303-001 jackplugs and 3 inch maximum long leads, connect a Simpson Model 1223 ammeter to the jack.</li> <li>c. Set the toggle switch to AUTO and observe the ammeter current drain. If the current drain is in the 15-25 ma range, the transmitter or the coaxial cable is faulty.</li> </ol> </li> </ol>
	Faulty coaxial antenna cable.	<ol style="list-style-type: none"> <li>4. Check coaxial antenna cable for high resistance joints. If this is found to be the case, the cable should be replaced.</li> </ol>

★This test should be carried out with the coaxial cable provided with your unit.



# MODEL R182 AND TR182 SERVICE MANUAL

## ELECTRICAL LOAD ANALYSIS CHART

### STANDARD EQUIPMENT (Running Load)

	AMPS REQD								
	1978	1979	1980	1981	1982	1983	1984	1985	1986
Instruments (Engine) .....	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Instrument Lights .....	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Position Lights .....	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Battery Contactor .....	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fuel Quantity Indicators .....	0.10	0.10	0.10	0.10					
Turn Coordinator .....	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Clock .....	†	†	†	†	†	†	†	†	†
Carb Air Temp Indicator .....	0.03								

### OPTIONAL EQUIPMENT (Running Load)

Prop Anti-Ice (3-Blade) .....					12.0	12.0	12.0	12.0	12.0
Prop Anti-Ice (2-Blade) .....			10.5	10.5	10.5	11.5	11.5	11.5	11.5
Turn and Bank Indicator .....	0.2			0.2					
Heated Pitot and Stall Warning .....	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Strobe Lights .....	2.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0
Cessna 200A Navomatic (Type AF-295B) .....	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Cessna 300 ADF (Type R-546E) .....	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cessna 300 Transponder (Type RT-359A) .....	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Cessna 300A Navomatic (Type AF-395A) .....	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
With Unslaved HSI (IG-832C) .....	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Cessna 300 Nav/Com (Type RT-385A) .....	1.0●	1.0●	1.0●	1.0●	1.0●	1.0●	1.0●	1.0●	1.0●
	2.3★	2.3★	2.3★	2.3★	2.3★	2.3★	2.3★	2.3★	2.3★
Cessna 400 Nav/Com (Type RT-485A/B) .....	1.6●	1.6●	1.6●	1.6●	1.6●	1.6●	1.6●	1.6●	1.6●
	4.0★	4.0★	4.0★	4.0★	4.0★	4.0★	4.0★	4.0★	4.0★
Cessna 400 ADF (Type R-446A) .....	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Cessna 400 Glide Slope (Type R-443B) .....	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Cessna 400 Transponder (Type RT-459A) .....	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Cessna 400 Marker Beacon (Type R-402A) .....	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cessna 400 DME (Type RT-476A) .....	2.5			2.5	2.5	2.5	2.5	2.5	
Cessna RNAV (Type RN-478A) .....	0.5			0.5	0.5	0.5	0.5		
Sunair SSB Transceiver (Type ASB-125) .....	2.5●	2.5●	2.5●	2.5●	2.5●	2.5●	2.5●	2.5●	2.5●
	7.5★	7.5★	7.5★	7.5★	7.5★	7.5★	7.5★	7.5★	7.5★
Flashing Beacon .....	6.0	6.0	6.0	6.0	6.0	6.0	6.0	7.0	7.0
Narco 190 DME .....	2.9	2.9	2.9	2.9					
Pantronics PT10-A HF Transceiver .....	1.0●	1.0●		1.0●					
	9.0★	9.0★	9.0★						
Pitot Tube De-Ice .....				2.9					
Wing De-Ice .....			1.6	1.5					
Post Lights .....	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
EL Panel .....	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Bendix Marker Beacon (Type GM-247A) .....	0.1								
Blind Encoder .....	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cessna Encoding Altimeter (Type EA-401A) .....	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Foster RNAV 511 .....		1.0	1.0	1.0					
Pitot Tube De-Ice .....			2.9						
Windshield De-Ice .....			4.4	4.4	4.4	4.4	4.4	4.4	4.4
EC-100 Stereo .....					†	†	†	†	†

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ELECTRICAL LOAD ANALYSIS CHART

OPTIONAL EQUIPMENT (Running Load)	AMPS REQD									
	1978	1979	1980	1981	1982	1983	1984	1985	1986	
Sperry RT-377A DME .....								0.3	0.3	
Sperry RT-477A DME .....							1.5	1.5	1.5	
Sperry RN-479A RNAV .....							1.0	1.0	1.0	
Weather Radar (RDR-160XD Color) .....					3.5	3.5	3.5	3.5	3.5	
Weather Radar (RDR-160 B&W) .....								3.5	3.5	
Weather Radar (Primus 100) .....								2.0	2.0	
Avionics Cooling Fan .....				1.0	1.0	1.0	1.0	1.0		
Cessna 400B Autopilot (AF-550) .....				5.0	5.0	5.0	5.0	5.0	3.6	
With Slaved Directional Gyro (G-504) .....				5.2	5.2	5.2	5.2	5.2	3.8	
With Unslaved HSI (IG-832C) .....				5.3	5.3	5.3	5.3	5.3	3.8	
With Slaved HSI (IG-832A) .....				5.8	5.8	5.8	5.8	5.8	4.0	
DME 451 .....				1.2	1.2	1.2				
RNAV ANS-351 .....				0.65	0.65	0.65				
Interphone System .....				†	†	†	†	†	†	
ITEMS NOT CONSIDERED AS PART OF RUNNING LOAD										
Cigarette Lighter .....	7.0	7.0	7.0	7.0						
Stall Warning Horn .....	0.25	0.25	0.25	0.25	0.4					
Wing Courtesy Lights and Cabin Lights .....	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
Auxiliary Fuel Pump .....	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Electrohydraulic Power Pack (Landing Gear) .....	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	
Flap Motor .....	10.0	10.0	10.0	8.5	8.5	8.5	8.5	1.8	1.8	
Landing Lights (Dual) .....	3.6ea	3.6ea	3.6ea	3.6ea	3.6ea	3.6ea	3.6ea	3.6ea	3.6ea	
Electric Elevator Trim .....	0.7	0.7	0.7	0.7	0.7	0.7	0.7			
Map Light (Control Wheel) .....	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	
Air Conditioning .....				19.7	19.7	19.7	19.7	19.7	19.7	
Wing Detector Light .....					1.5	1.5	1.5	1.5	1.5	
Standby Vacuum System .....								13.0	13.0	

- † Negligible
- Receive
- ★ Transmit

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 17

### STRUCTURAL REPAIR

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17-1. **STRUCTURAL REPAIR.**

17-2. **REPAIR CRITERIA.** Although this section outlines repair permissible on structure of the aircraft, the decision of whether to repair or replace a major unit of structure will be influenced by such factors as time and labor available, and by a comparison of labor costs with the price of replacement assemblies. Past experience indicates that replacement, in many cases, is less costly than major repair. Certainly, when the aircraft must be restored to its airworthy condition in a limited length of time, replacement is preferable. Restoration of a damaged aircraft to its original design strength, shape, and alignment involves careful evaluation of the damage, followed by exacting workmanship in performing the repairs. This section suggests the extent of structural repair practicable on the aircraft, and supplements Federal Aviation Regulation, Part 43. Consult the factory when in doubt about a repair not specifically mentioned here.

17-3. **EQUIPMENT AND TOOLS.**

17-4. **SUPPORT STANDS.** Padded, reinforced sawhorse or tripod type support stands, sturdy enough to support any assembly placed upon them, must be used to store a removed wing or tailcone. Plans for local fabrication of support stands are contained in figure 17-1. The fuselage assembly, from the tailcone to the firewall, must NOT be supported from the underside, since the skin bulkheads are not designed for this purpose. Adapt support stands to fasten to the wing attach points or landing gear attach points when supporting a fuselage.

17-5. **FUSELAGE REPAIR JIGS.** Whenever a repair is to be made which could affect structural alignment, suitable jigs must be used to assure correct alignment of major points, such as fuselage, firewall, wing and landing gear. These fuselage repair jigs are obtainable from the factory.

17-6. **WING JIGS.** These jigs serve as a holding fixture during extensive repair of a damaged wing, and locates the root rib, leading edge and tip rib of the wing. These jigs are also obtainable from the factory.

17-7. **WING TWIST AND STABILIZER ANGLE-OF-INCIDENCE.** Wing twist (washout) and horizontal stabilizer angle of incidence are shown below. Stabilizers do not have twist. Wings have no twist from the root to the lift strut station. All twist in the wing panel occurs between this station and the tip rib. Refer to figure 17-2 for wing twist measurement.

WING	Twist (Washout)	3°
STABILIZER	Angle of Incidence	-3° 30'

17-8. **REPAIR MATERIALS.** Thickness of a material on which a repair is to be made can easily be determined by measuring with a micrometer. In general, material used in Cessna aircraft covered in this manual is made from 2024 aluminum alloy, heat treated to a -T3, -T4, or -T42 condition. If the type of material cannot readily be determined, 2024-T3 may be used in making repairs, since the strength of -T3 is greater than -T4 or -T42 (-T4 and -T42 may be used interchangeably, but they may not be substituted for -T3). When necessary to form a part

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with a smaller bend radius than the standard cold bending radius for 2024-T4, use 2024-0 and heat treat to 2024-T42 after forming. The repair material used in making a repair must equal the gauge of the material being replaced unless otherwise noted. It is often practical to cut repair pieces from service parts listed in the Parts Catalog. A few components (empennage tips, for example) are fabricated from thermo-formed plastic or glass-fiber constructed material.

### 17-9. WING.

17-10. DESCRIPTION. The wing assemblies are a semicantilever type employing semimoncoque type of structure. Basically, the internal structure consists of built-up front and rear spar assemblies, a formed auxiliary spar assembly and formed sheet metal nose, intermediate, and trailing edge ribs. Stressed skin, riveted to the rib and spar structures, completes the rigid structure. Access openings (hand holes with removable cover plates) are located in the underside of the wing between the wing root and tip section. These openings afford access to aileron bellcranks, flap bellcranks, electrical wiring, strut attach fittings, control cables and pulleys, and control disconnect points.

### 17-11. WING SKIN.

17-12. NEGLIGIBLE DAMAGE. Any smooth dents in the wing skin that are free from cracks, abrasions and sharp corners, which are not stress wrinkles and do not interfere with any internal structure or mechanism, may be considered as negligible damage. In areas of low stress intensity, cracks, deep scratches, or deep, sharp dents, which after trimming or stop-drilling can be enclosed by a two-inch circle, can be considered negligible if the damage area is at least one diameter of the enclosing circle away from all existing rivet lines and material edges. Stop drilling is considered a temporary repair and a permanent repair must be made as soon as practicable.

17-13. REPAIRABLE DAMAGE. Figure 17-4 outlines typical repair to be employed in patching skin. Before installing a patch, trim the damaged area to form a rectangular pattern, leaving at least a one-half inch radius at each corner, and de-burr. The sides of the hole should lie span-wise or chord-wise. A circular patch may also be used. If the patch is in an area where flush rivets are used, make a flush patch type of repair; if in an area where flush rivets are not used, make an overlapping type of repair. Where optimum appearance and airflow are desired, the flush patch may be used. Careful workmanship will eliminate gaps at butt-joints; however, an epoxy type filler may be used at such joints.

17-14. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If a skin is badly damaged, repair must be made by replacing an entire skin panel, from one structural member to the next. Repair seams must be made to lie along structural members and each seam must be made exactly the same in regard to rivet size, spacing and pattern as the manufactured seams at the edges of the original sheet. If the manufactured seams are different, the stronger must be copied. If the repair ends at a structural member where no seam is used, enough repair panel must be used to allow an extra row of staggered rivets, with sufficient edge margin, to be installed.

### 17-15. WING STRINGERS.

17-16. NEGLIGIBLE DAMAGE. (Refer to paragraph 17-13.)

17-17. REPAIRABLE DAMAGE. Figure 17-5 outlines a typical wing stringer repair. Two such repairs may be used to splice a new section of stringer material in position, without the filler material.

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- 17-18. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If a stringer is so badly damaged that more than one section must be spliced, replacement is recommended.
- 17-19. WING AUXILIARY SPARS.
- 17-20. NEGLIGIBLE DAMAGE. (Refer to paragraph 17-13.)
- 17-21. REPAIRABLE DAMAGE. Figure 17-8 illustrates a typical auxiliary spar repair.
- 17-22. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If damage to an auxiliary spar would require a repair which could not be made between adjacent ribs, the auxiliary spar must be replaced.
- 17-23. WING RIBS.
- 17-24. NEGLIGIBLE DAMAGE. (Refer to paragraph 17-13.)
- 17-25. REPAIRABLE DAMAGE. Figure 17-6 illustrates a typical wing rib repair.
- 17-26. DAMAGE NECESSITATING REPLACEMENT OF PARTS. Leading and trailing edge ribs that are extensively damaged can be replaced. However, due to the necessity of unfastening an excessive amount of skin in order to replace the rib, they should be repaired if practicable. Center ribs, between the front and rear spar should always be repaired if practicable.
- 17-27. WING SPARS.
- 17-28. NEGLIGIBLE DAMAGE. Due to the stress which wing spars encounter, very little damage can be considered negligible. All cracks, stress wrinkles, deep scratches, and sharp dents must be repaired. Smooth dents, light scratches and abrasions may be considered negligible.
- 17-29. REPAIRABLE DAMAGE. Figure 17-7, illustrates typical spar repairs. It is often practical to cut repair pieces from service parts listed in the Parts Catalog. Service Kits are available for certain types of spar repairs.
- 17-30. DAMAGE NECESSITATING REPLACEMENT OF PARTS. Damage so extensive that repair is not practicable requires replacement of a complete wing spar. Also refer to paragraph 17-2.
- 17-31. WING LEADING EDGES.
- 17-32. NEGLIGIBLE DAMAGE. (Refer to paragraph 17-12.)
- 17-33. REPAIRABLE DAMAGE. Wing skin repairs, outlined in paragraph 17-13, may be used to repair leading edge skins, although the flush-type patches should be used. To facilitate repair, extra access holes may be installed in locations noted in figure 17-13. If the damage would require a repair which could not be made between adjacent ribs, refer to the following paragraph.
- 17-34. DAMAGE NECESSITATING REPLACEMENT OF PARTS. Where extreme damage has occurred, complete leading edge skin panels should be replaced. Extra access holes may be installed (refer to figure 17-13) to facilitate replacement.
- 17-35. BONDED LEADING EDGES REPAIR.

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17-36. NEGLIGIBLE DAMAGE. (Refer to paragraph 17-12.)

17-37. REPAIRABLE DAMAGE. (Refer to figure 17-11.) Cut out damaged area, as shown, to the edge of undamaged ribs. Using a corresponding section from a new leading edge skin, overlap ribs and secure to wing using rivet pattern as shown in the figure.

17-37A. WING STRUT.

17-37B. REPAIRABLE DAMAGE.

- a. For grooves in wing strut caused by strut fairings, the following applies.
  1. If groove exceeds .010 inch in depth and is less than .75 inch from a rivet center, the strut should be replaced.
  2. If groove exceeds .025 inch in depth and is more than .75 inch from a rivet center, the strut should be replaced.
  3. If groove depth is less than .025 inch and is more than .75 inch from a rivet center, strut should be repaired by tapering gradually to the original surface and burnishing out to a smooth finish. The local area should be checked with dye penetrant to ensure that no crack has developed.
- b. The following applies to wing struts with grooves worn in the lower trailing edge. This type damage can occur after extensive cabin door usage with a missing or improperly adjusted door stop which allows the door to bang against the aft edge of the strut at the lower end.

### NOTE

Struts with a groove deeper than 50% of the original material thickness should be replaced. Lesser damage may be repaired as follows:

1. Without making the damage deeper, remove strut material on each side of groove to reduce notch effect of damage. Smooth and blend the surface to provide a gradual transition of strut tube material thickness in damaged area. The local area should be checked with dye penetrant to ensure that no crack has developed.
  2. Apply brush alodine or zink chromate primer and repaint area.
  3. Rerig the door stop and/or reform the lower portion of the door pan and skin inboard to prevent the door from rubbing the strut tube. If these actions prove to be ineffective, install some form of protective bumper, either on strut or lower portion of door, to prevent further damage. A short hard rubber strip bonded to the trailing edge of the strut where the door comes close to strut is a possibility.
- c. Tie-downs and attaching parts may be replaced. If a wing strut is badly dented, cracked or deformed, it should be replaced.

17-38. AILERONS.

17-39. NEGLIGIBLE DAMAGE. (Refer to paragraph 17-12.)

17-40. REPAIRABLE DAMAGE. The repair shown in figure 17-9 may be used to repair damage to aileron leading edge skins. Figure 17-4 may be used as a guide to repair damage to flat surface between corrugations, when damaged area includes corrugations refer to figure 17-12. It is recommended that material used for repair be cut from spare parts of the same gauge and corrugation spacing. Following repair the aileron must be balanced. Refer to paragraph 17-43 for balancing. If damage would require a repair which could not be made between adjacent ribs, refer to paragraph 17-41.

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- 17-41. **DAMAGE NECESSITATING REPLACEMENT OF PARTS.** If the damage would require a repair which could not be made between adjacent ribs, complete skin panels must be replaced. Ribs and spars may be repaired, but replacement is generally preferable. Where extensive damage has occurred, replacement of the aileron assembly is recommended. After repair and/or replacement, balance aileron in accordance with paragraph 17-42 and figure 17-3.
- 17-42. **AILERON BALANCING.** Following repair, replacement or painting, the aileron must be balanced. A flight control surface balancing fixture kit is available (P N 5180002-1). See figure 17-3 for procedures pertaining to the use of this kit.
- 17-43. **WING FLAPS.**
- 17-44. **NEGLIGIBLE DAMAGE.** (Refer to paragraph 17-12.)
- 17-45. **REPAIRABLE DAMAGE.** Flap repairs should be similar to aileron repairs discussed in paragraph 17-41. Since the flap is not considered a movable control surface, no balancing is required.
- 17-46. **DAMAGE NECESSITATING REPLACEMENT OF PARTS.** Flap repairs which require replacement of parts should be similar to aileron repairs discussed in paragraph 17-41. Since the flap is not considered a movable control surface, no balancing is required.
- 17-47. **ELEVATORS AND RUDDER.**
- 17-48. **NEGLIGIBLE DAMAGE.** Refer to paragraph 17-12. The exception to negligible damage on the elevator surfaces is the front spar, where a crack appearing in the web at the hinge fittings or in the structure which supports the overhanging balance weight is not considered negligible. Cracks in the overhanging tip rib, in the area at the front spar intersection with the web of the rib, also cannot be considered negligible.
- 17-49. **REPAIRABLE DAMAGE.** Skin patches illustrated in figure 17-4 may be used to repair skin damage between corrugations. For skin damage which includes corrugations refer to figure 17-12. Following repair the elevator/rudder must be balanced. Refer to figure 17-3 for balancing. If damage would require a repair which could not be made between adjacent ribs, see paragraph 17-50.



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### 17-39A. CRACKS IN CORRUGATED AILERON SKINS (Continued from page 17-5)

1. It is permissible to stop drill crack(s) that originate at the trailing edge of the control surface provided the crack is not more than 2 inches in length.
2. Stop drill crack using a #30 (.128 inch) drill.
3. A crack may only be stop drilled once.

**NOTE:** A crack that passes through a trailing edge rivet and does not extend to the trailing edge of the skin may be stop drilled at both ends of the crack.

4. Any control surface that has a crack that progresses past a stop drilled hole shall be repaired. Refer to paragraphs 17-39, -40, and -41 as applicable for repair information.
5. A control surface that has any of the following conditions shall have a repair made as soon as practicable:
  - A. A crack that is longer than 2 inches.
  - B. A crack that does not originate from the trailing edge or a trailing edge rivet.
  - C. Cracks in more than six trailing edge rivet locations per skin.

Refer to paragraphs 17-39, -40, and -41 as applicable for repair information.

6. Affected control surfaces with corrugated skins and having a stop drilled crack that does not extend past the stop drilled hole, may remain in service without additional repair.

### 17-44A. CRACKS IN CORRUGATED FLAP SKINS (Continued from page 17-6)

1. It is permissible to stop drill crack(s) that originate at the trailing edge of the control surface provided the crack is not more than 2 inches in length.
2. Stop drill crack using a #30 (.128 inch) drill.
3. A crack may only be stop drilled once.

**NOTE:** A crack that passes through a trailing edge rivet and does not extend to the trailing edge of the skin may be stop drilled at both ends of the crack.

4. Any control surface that has a crack that progresses past a stop drilled hole shall be repaired. Refer to paragraphs 17-44, -45, and -46 as applicable for repair information.
5. A control surface that has any of the following conditions shall have a repair made as soon as practicable:
  - A. A crack that is longer than 2 inches.
  - B. A crack that does not originate from the trailing edge or a trailing edge rivet.
  - C. Cracks in more than six trailing edge rivet locations per skin.

Refer to paragraphs 17-44, -45, and -46 as applicable for repair information.

6. Affected control surfaces with corrugated skins and having a stop drilled crack that does not extend past the stop drilled hole, may remain in service without additional repair.

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## 17-48A. CRACKS IN CORRUGATED ELEVATOR SKINS (Continued from page 17-6)

1. It is permissible to stop drill crack(s) that originate at the trailing edge of the control surface provided the crack is not more than 2 inches in length.
2. Stop drill crack using a #30 (.128 inch) drill.
3. A crack may only be stop drilled once.

**NOTE:** A crack that passes through a trailing edge rivet and does not extend to the trailing edge of the skin may be stop drilled at both ends of the crack.

4. Any control surface that has a crack that progresses past a stop drilled hole shall be repaired. Refer to paragraphs 17-48, -49, and -50 as applicable for repair information.
5. A control surface that has any of the following conditions shall have a repair made as soon as practicable:
  - A. A crack that is longer than 2 inches.
  - B. A crack that does not originate from the trailing edge or a trailing edge rivet.
  - C. Cracks in more than six trailing edge rivet locations per skin.

Refer to paragraphs 17-48, -49, and -50 as applicable for repair information.

6. Affected control surfaces with corrugated skins and having a stop drilled crack that does not extend past the stop drilled hole, may remain in service without additional repair.

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- 17-50. **DAMAGE NECESSITATING REPLACEMENT OF PARTS.** If the damaged area would require a repair which could not be made between adjacent ribs, complete skin panels must be replaced. Ribs and spars may be repaired, but replacement is generally preferable. Where extensive damage has occurred, replacement of the entire assembly is recommended. After repair and/or replacement, balance elevators and rudder in accordance with paragraph 17-51 and figure 17-3.
- 17-51. **ELEVATOR AND RUDDER BALANCING.** Following repair, replacement or painting, the elevators and rudder must be balanced. A flight control surface balancing fixture kit is available (P N 5180002-1). See figure 17-3 for procedures pertaining to the use of this kit.
- 17-52. **FIN AND STABILIZER.**
- 17-53. **NEGLIGIBLE DAMAGE.** (Refer to paragraph 17-12.)
- 17-54. **REPAIRABLE DAMAGE.** Skin patches illustrated in figure 17-4 may be used to repair skin damage. Access to the dorsal area of the fin may be gained by removing the horizontal closing rib at the bottom of the fin. Access to the internal fin structure is best gained by removing skin attaching rivets on one side of the rear spar and ribs, and springing back the skin. Access to the stabilizer structure may be gained by removing skin attaching rivets on one side of the rear spar and ribs, and springing back the skin. If the damaged area would require a repair which could not be made between adjacent ribs, or a repair would be located in an area with compound curves, see the following paragraph.
- 17-55. **DAMAGE NECESSITATING REPLACEMENT OF PARTS.** If the damaged area would require a repair which could not be made between adjacent ribs, or the repair would be located in an area with compound curves, complete skin panels must be replaced. Ribs and spars may be repaired, but replacement is generally preferable. Where damage is extensive, replacement of the entire assembly is recommended.
- 17-56. **FUSELAGE.**
- 17-57. **DESCRIPTION.** The fuselage is of semimonocoque construction, consisting of formed bulkheads, longitudinal stringer, reinforcing channels, and skin panels.
- 17-58. **NEGLIGIBLE DAMAGE.** Refer to paragraph 17-12. Mild corrosion appearing upon alclad surfaces does not necessarily indicate incipient failure of the base metal. However, corrosion of all types must be carefully considered, and approved remedial action taken. Small cans appear in the skin structure of all metal aircraft. It is strongly recommended however, that wrinkles which appear to have originated from other sources, or which do not follow the general appearance of the remainder of the skin panels, be thoroughly investigated. Except in the landing gear bulkhead areas, wrinkles occurring over stringers which disappear when the rivet pattern is removed, may be considered negligible. However, the stringer rivet holes may not align perfectly with the skin holes because of a permanent "set" in the stringer. If this is apparent, replacement of the stringer will usually restore the original strength characteristics of the area.

### NOTE

Wrinkles occurring in the skin of the main landing gear bulkhead areas must not be considered negligible. The skin panel must be opened sufficiently to permit thorough examination of the lower portion of the landing gear bulkhead and its tie-in structure.

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Wrinkles occurring in open areas which disappear when the rivets at the edge of the sheet are removed, or a wrinkle which is hand removable, may often be repaired by the addition of a 1 2 × 1 2 × .060 inch 2024-T4 extruded angle, riveted over the wrinkle and extended to within 1 16 to 1 8 inch of the nearest structural members. Rivet pattern should be identical to existing manufactured seam at edge of sheet. Negligible damage to stringers, formed skin flanges, bulkhead channels, and like parts is similar to that for the wing skin, given in paragraph 17-12.

- 17-59. **REPAIRABLE DAMAGE.** Fuselage skin repairs may be accomplished in the same manner as wing skin repairs outlined in paragraph 17-13. Stringers, formed skin flanges, bulkhead channels and similar parts may be repaired as shown in figure 17-5.
- 17-60. **DAMAGE NECESSITATING REPLACEMENT OF PARTS.** Fuselage skin major repairs may be accomplished in the same manner as the wing repairs outlined in paragraph 17-13. Damaged fittings must be replaced. Seat rails serve as structural parts of the fuselage and must be replaced if damaged.
- 17-61. **BONDED DOORS.**
- 17-62. **REPAIRABLE DAMAGE.** Bonded doors may be repaired by the same methods used for riveted structure. Rivets are a satisfactory substitute for bonded seams on these assemblies. The strength of the bonded seams in doors may be replaced by a single 3/32, 2117-AD rivet per running inch of bond seam. The standard repair procedures outlined in AC43.13-1 are also applicable to bonded doors.
- 17-63. **BULKHEADS.**
- 17-64. **LANDING GEAR BULKHEADS.** Since these bulkheads are highly stressed members, irregularly formed to provide clearance for control cables, fuel lines, etc., the patch-type repairs will be, for the most part, impractical. Minor damage, consisting of small nicks or scratches, may be repaired by dressing out the damaged area, or by replacement of rivets. Any other damage must be repaired by replacing the landing gear support assembly as an aligned unit.
- 17-65. **REPAIR AFTER HARD LANDING.** Buckled skin or floorboards, and loose or sheared rivets in the area of the main gear support will give evidence of damage to the structure from an extremely hard landing. When such evidence is present, the entire support structure must be examined, and all support forgings must be checked for cracks, using a dye penetrant and proper magnification. Bulkheads in the damaged area must be checked for alignment, and deformation of the bulkhead webs must be determined with the aid of a straightedge. Damaged support structure, buckled floorboards and skins, and damaged or questionable forgings must be replaced.
- 17-66. **FIREWALL DAMAGE.** Firewall sheets may be repaired by removing the damaged material (.018-inch aluminumized iron sheet), and splicing in a new section. The new portion must be lapped over the old material, sealed with Pro-Seal No. 700 (Coast Pro-Seal Co., Chemical Division, 2235 Beverly Blvd., Los Angeles, California), compound or equivalent, and secured with MS16535 (steel) or MS20613 (corrosion-resistant steel) rivets. The heater valve assembly is attached with MS16535 and MS20613 rivets. Carburetor heat and mixture control doubler, firewall plates, firewall doublers and nutplates are attached to the firewall with MS20470 (aluminum) rivets.

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- 17-67. **FASTENERS.** Fasteners used in the aircraft are generally solid aluminum rivets, blind rivets, and steel-threaded fasteners. Usage of each is primarily a function of the loads to be carried, accessibility, and frequency of removal. Rivets used in aircraft construction are usually fabricated from aluminum alloys. In special cases, monel, corrosion-resistant steel and mild steel, copper, and iron rivets are used.
- 17-67A. **RIVETS.** Standard solid-shank MS rivets are those generally used in aircraft construction. They are fabricated in the following head types: roundhead, flathead, countersunk head, and brazier head. Flathead rivets are generally used in the aircraft interior where head clearance is required. MS20426 countersunk head rivets are used on the exterior surfaces of the aircraft to minimize turbulent airflow. MS20470 brazier head rivets are used on the exterior surfaces of the aircraft where strength requirements necessitate a stronger rivet head than that of the countersunk head rivet. Both the brazier head and the countersunk head rivets are used on the exterior of the aircraft where head clearance is required. Hi-shear rivets are special, patented rivets having a hi-shear strength equivalent to that of standard AN bolts. They are used in special cases in locations where hi-shear loads are present, such as in spars, wings, and in heavy bulkhead ribs. This rivet consists of a cadmium-plated pin of alloy steel. Some have a collar of aluminum alloy. Some of these rivets can be readily identified by the presence of the attached collar in place of the formed head on standard rivets. Blind rivets are used, where strength requirements permit, where one side of the structure is inaccessible, making it impossible or impractical to drive standard solid-shank rivets.
- 17-67B. **REPLACEMENT OF HI-SHEAR RIVETS.** Replacement of hi-shear rivets with close-tolerance bolts or other commercial fasteners of equivalent strength properties is permissible. Holes must not be elongated, and the hi-shear substitute must be a smooth, push-fit. Field replacement of main landing gear forgings on bulkheads may be accomplished by using the following fasteners.
- NAS464P-\* bolt, MS21042-\* nut and AN960-\* washer in place of Hi-shear rivets for forgings with machined flat surfaces around attachment holes.
  - NAS464P-\* bolt, ESNA2935-\* mating base washer and ESNA RM52LH2935-\* self-aligning nut for forgings (with draft angle of up to a maximum of 8°) without machined flat surfaces around attachment holes.

\*Dash numbers to be determined according to the size of the holes and the grip lengths required. Bolt grip length should be chosen so that no threads remain in the bearing area.

- 17-67C. **SUBSTITUTION OF RIVETS.**
- Solid-shank rivets (MS20426AD and MS20470AD). When placing rivets in installations which require raised head rivets, it is desirable to use rivets identical to the type of rivet removed. Countersunk-head rivets (MS20426) are to be replaced by rivets of the same type and degree of countersink. When rivet holes become enlarged, deformed, or otherwise damaged, use the next larger size rivet as a replacement. Replacement shall not be made with rivets of lower strength material.
  - Hi-shear Rivets. When hi-shear rivets are not available, replacement of sizes 3/16-inch or greater rivets shall be made with bolts of equal or greater strength than the rivet being replaced, and with self-locking nuts of the same diameter
  - The following pages contain approved solid-shank and hi-shear rivet substitutions.

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Replace	In thickness (or thicker)	With
MS20470AD3	.025	NAS1398B4, NAS1398D4
	.020	NAS1738B4, NAS1738D4, NAS1768D4, CR3213-4, CR3243-4
MS20470AD4	.050	NAS1398B4, NAS1398D4
	.040	NAS1398B5, NAS1398D5, NAS1738B4, NAS1738E4, NAS1768D4, CR3213-4
	.032	NAS1738B5, NAS1738E5, NAS1768D5, CR3213-5, CR3243-4
	.025	CR3243-5
MS20470AD5	.063	NAS1398B5, NAS1398D5
	.050	NAS1398B6, NAS1398D6, NAS1398B5, NAS1738E5, CR3213-5
	.040	NAS1738B6, NAS1738E6, NAS1768D5, CR3213-6, CR3243-5
	.032	CR3243-6
MS20470AD6	.080	NAS1398B6
	.071	NAS1398D6
	.063	NAS1738B6, NAS1738D6, NAS1768D6, CR3213-6
	.050	CR3243-6
MS20426AD3 (Countersunk)	.063	NAS1399B4, NAS1399D4
	.040	NAS1769D4, CR3212-4
(See Note 1)	.025	NAS1769B4, NAS1739E4, CR3242-4

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Replace	In thickness (or thicker)	With
MS20426AD4 (Countersunk)	.080	NAS1399B4, NAS1399D4
	.063	NAS1739B4, NAS1739D4, CR3212-4
	.050	NAS1769D4
	.040	CR3242-4
(See Note 1)	.050	CR3212-5
	.040	NAS1739B5, NAS1739D5, NAS1769D4
	.032	CR3242-5
MS20426AD4 (Dimpled)	.063	NAS1739B4, NAS1739D4
MS20426AD5 (Countersunk)	.090	NAS1399B5, NAS1399D5
	.080	CR3212-5
	.071	NAS1739B5, NAS1739E5
	.063	NAS1769D5
	.050	CR3242-5
(See Note 1)	.063	NAS1739B6, NAS1739D6, NAS1769D6, CR3212-6
	.040	CR3242-6
	.032	AN509-10 Screw with MS20365 Nut
MS20426AD5 (Dimpled)	.071	NAS1739B5, NAS1739D5
	.090	NAS1739B6, NAS1739D6, CR3212-6
MS20426AD6 (Countersunk)	.071	NAS1769D6
	.063	CR3242-6
	.032	AN509-10 Screw with MS20365 Nut
MS20426AD6 (Dimpled)	.090	NAS1739B6, NAS1739D6
	.032	AN509-10 Screw with MS20365 Nut

NOTE 1: Rework required. Countersink oversize to accommodate oversize rivet.

NOTE 2: Do not use blind rivets in high-vibration areas or to pull heavy sheets or extrusions together. High-vibration areas include the nacelle or engine compartment including the firewall. Heavy sheets or extrusions include spar caps.

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REPLACE		DIAMETER	WITH	
Fastener	Collar		Fastener	Collar
<ul style="list-style-type: none"> <li>● NAS178</li> </ul>	<ul style="list-style-type: none"> <li>NAS179</li> </ul>	<ul style="list-style-type: none"> <li>(See Note 1)</li> <li>(See Note 1)</li> <li>(See Note 1)</li> <li>(See Notes 1 and 2)</li> <li>(See Note 1)</li> <li>(See Note 1)</li> </ul>	<ul style="list-style-type: none"> <li>● NAS1054</li> <li>● NAS14XX</li> <li>● NAS529</li> <li>★ NAS1446</li> <li>★ NAS7034</li> <li>□ NAS464</li> <li>□ NAS1103</li> <li>□ NAS1303</li> <li>□ NAS6203</li> <li>□ AN173</li> </ul>	<ul style="list-style-type: none"> <li>NAS179, NAS528</li> <li>NAS1080C, NAS1080E, NAS1080G</li> <li>NAS524A</li> <li>NAS1080C, NAS1080A6</li> <li>NAS1080K</li> <li>AN364, MS20364, MS21042</li> <li>AN305, MS20305, MS21044, MS21045</li> </ul>
<ul style="list-style-type: none"> <li>● NAS1054</li> </ul>	<ul style="list-style-type: none"> <li>NAS179, NAS528</li> </ul>	<ul style="list-style-type: none"> <li>(See Note 2)</li> </ul>	<ul style="list-style-type: none"> <li>● NAS14XX</li> <li>● NAS529</li> <li>★ NAS1446</li> <li>★ NAS7034</li> <li>□ NAS464</li> <li>□ NAS1103</li> <li>□ NAS1305</li> <li>□ NAS6203</li> </ul>	<ul style="list-style-type: none"> <li>NAS1080C, NAS1080E</li> <li>NAS524A</li> <li>NAS1080C, NAS1080A6</li> <li>NAS1080K</li> <li>AN364, MS20304, MS21042</li> </ul>
<ul style="list-style-type: none"> <li>● NAS14XX</li> </ul>	<ul style="list-style-type: none"> <li>NAS1080C</li> <li>NAS1080E</li> <li>NAS1080G</li> </ul>		<ul style="list-style-type: none"> <li>● NAS529</li> <li>★ NAS1446</li> <li>★ NAS7034</li> <li>□ NAS464</li> <li>□ NAS1103</li> <li>□ NAS1303</li> <li>□ NAS6203</li> </ul>	<ul style="list-style-type: none"> <li>NAS524A</li> <li>NAS1080C, NAS1080A6</li> <li>NAS1080K</li> <li>AN364, MS20364, MS21042</li> </ul>
<ul style="list-style-type: none"> <li>● NAS529</li> </ul>	<ul style="list-style-type: none"> <li>NAS524A</li> </ul>	<ul style="list-style-type: none"> <li>(See Note 3)</li> </ul>	<ul style="list-style-type: none"> <li>□ NAS1446</li> </ul>	<ul style="list-style-type: none"> <li>NAS1080C, NAS1080A6</li> </ul>

NOTE 1: See appropriate tables for nominal diameters available.

NOTE 2: Available in oversize for repair of elongated holes. Ream holes to provide a .001 inch interference fit.

NOTE 3: NAS1446 oversize only permitted as a replacement for NAS529.

● Steel shank fastener designed for drive-on collars.

★ Steel shank fastener designed for squeeze-on collars. Installation requires sufficient space for the tool and extended shank of the fastener.

□ Threaded fastener.



## MODEL R182 AND TR182 SERVICE MANUAL

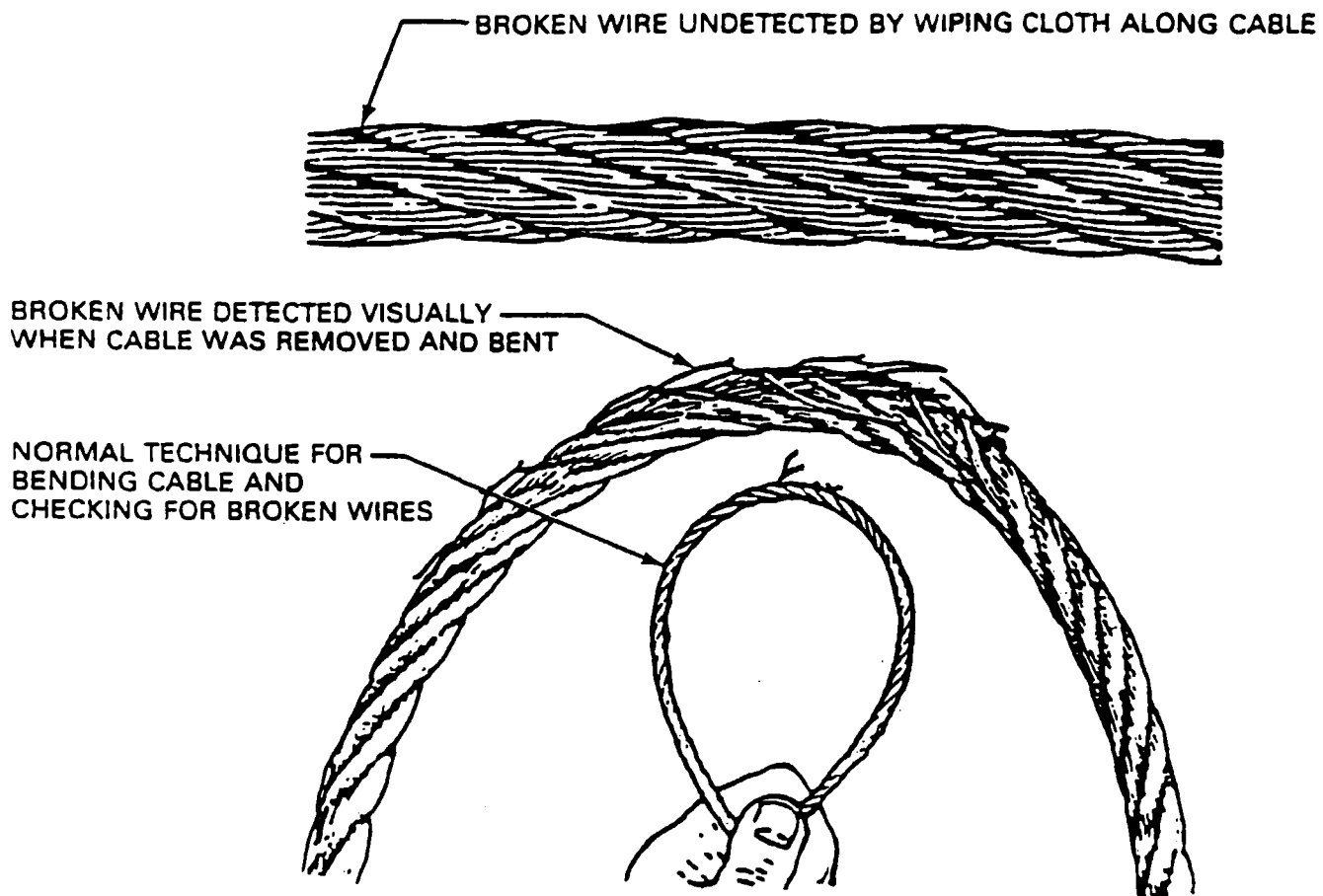
- 17-68. **ENGINE MOUNT.**
- 17-69. **DESCRIPTION.** The engine mount is constructed of 4130 chrome molybdenum steel tubing. The mount is composed of sections of steel tubing, welded together and reinforced with gussets. The mount is fastened to the fuselage at four points. Refer to Section 11.
- 17-70. **GENERAL CONSIDERATIONS.** All welding on the engine mount must be of the highest quality since the tendency of vibration is to accentuate any minor defect present and cause fatigue cracks. Engine mount members are preferably repaired by using a larger diameter replacement tube, telescoped over the stub of the original member using fishmouth and rosette type welds. However, reinforced 30-degree scarf welds in place of the fishmouth welds are considered satisfactory for engine mount repair work.
- 17-71. **ENGINE MOUNT RADIAL SUPPORT DAMAGE.** Minor damage such as a crack adjacent to an engine attaching lug may be repaired by rewelding the support tube and extending a gusset past the damaged area. Extensively damaged parts must be replaced.
- 17-72. **DAMAGE INVOLVING ENGINE MOUNTING LUGS AND ENGINE MOUNT TO FUSELAGE ATTACHING FITTINGS.** Engine mounting lugs and engine mount-to-fuselage attaching fittings should not be repaired but must be replaced. Refer to Section 18 for painting engine mount.
- 17-73. **BAFFLES.** Baffles ordinarily require replacement if damaged or cracked. However, small plate reinforcements riveted to the baffle will often prove satisfactory both to the strength and cooling requirements of the unit.
- 17-74. **ENGINE COWLING.**
- 17-75. **REPAIR OF COWLING SKINS.** If extensively damaged, complete sections of cowling must be replaced. Standard insert-type skin patches, however, may be used if repair parts are formed to fit. Small cracks may be stop-drilled and dents straightened if they are reinforced on the inner side with a doubler of the same material.
- 17-76. **REPAIR OF REINFORCEMENT ANGLES.** Cowl reinforcement angles, if damaged, must be replaced. Due to their small size they are easier to replace than to repair.
- 17-77. **REPAIR OF GLASS-FIBER CONSTRUCTED COMPONENTS.** Glass-fiber constructed components on the aircraft may be repaired as stipulated in instructions furnished in Service Kit SK182-12. Observe the resin manufacturer's recommendations concerning mixing and application of the resin. Epoxy resins are preferable for making repairs, since epoxy compounds are usually more stable and predictable than polyester and, in addition, give better adhesion. In addition, repair kits are also available for the repair of cracks in ABS, PBC, PVPC, graphite and fiberglass material. These kits P/N's 51543 thru 51548 are available from the Cessna Supply Division.
- 17-78. **CORROSION AND CORROSION CONTROL.**

### NOTE

For information on corrosion and corrosion control for aircraft, refer to FAA Advisory Circular AC43-4.

## MODEL R182 AND TR182 SERVICE MANUAL

- 17-79. CONTROL CABLE WIRE BREAKAGE AND CORROSION LIMITATIONS. Control cable assemblies are subject to a variety of environmental and forms of deterioration that ultimately may be easy to recognize such as wire/strand breakage, or the not so readily visible types of deterioration including corrosion and/or distortion. The following information will aid in detecting these cable condition.
- a. Examine cables for broken wires by passing a cloth along length of cable. This will detect broken wires, if cloth snags on cable. Critical areas for wire breakage are those sections of cable which pass through fairleads, across rub blocks, and around pulleys. If no snags are found, then no further inspection is required. If snags are found or broken wires are suspected, then loop to confirm broken wires (refer to Figure 17-1). Loosen or remove cable to allow it to be bent in a loop as shown. While rotating cable, inspect bent area for broken wires.
  - b. Wire breakage criteria for cables in flap, aileron, rudder, and elevator systems are, individual broken wires are acceptable in primary and secondary control cables at random locations when there are no more than six broken wires in any given ten-inch cable length.
  - c. Carefully examine any cable for corrosion that has a broken wire in a section not in contact with wear-producing airframe components such as pulleys, fairleads, rub blocks, ect. It may be necessary to remove and bend cable to properly inspect it for internal strand corrosion as this condition is usually not evident on outer surface of cable. Replace cable if internal corrosion is found. If a cable has been wiped clean of its corrosion-preventive lubricant and metal-brightened, the cable shall be examined closely for corrosion. For description of control cable corrosion, refer to Chapter 17, Corrosion and Corrosion Control.



DO NOT BEND INTO LOOP SMALLER THAN 50 CABLE DIAMETERS

Figure 17-1. Cable Broken Wire Inspection

# MODEL R182 AND TR182 SERVICE MANUAL

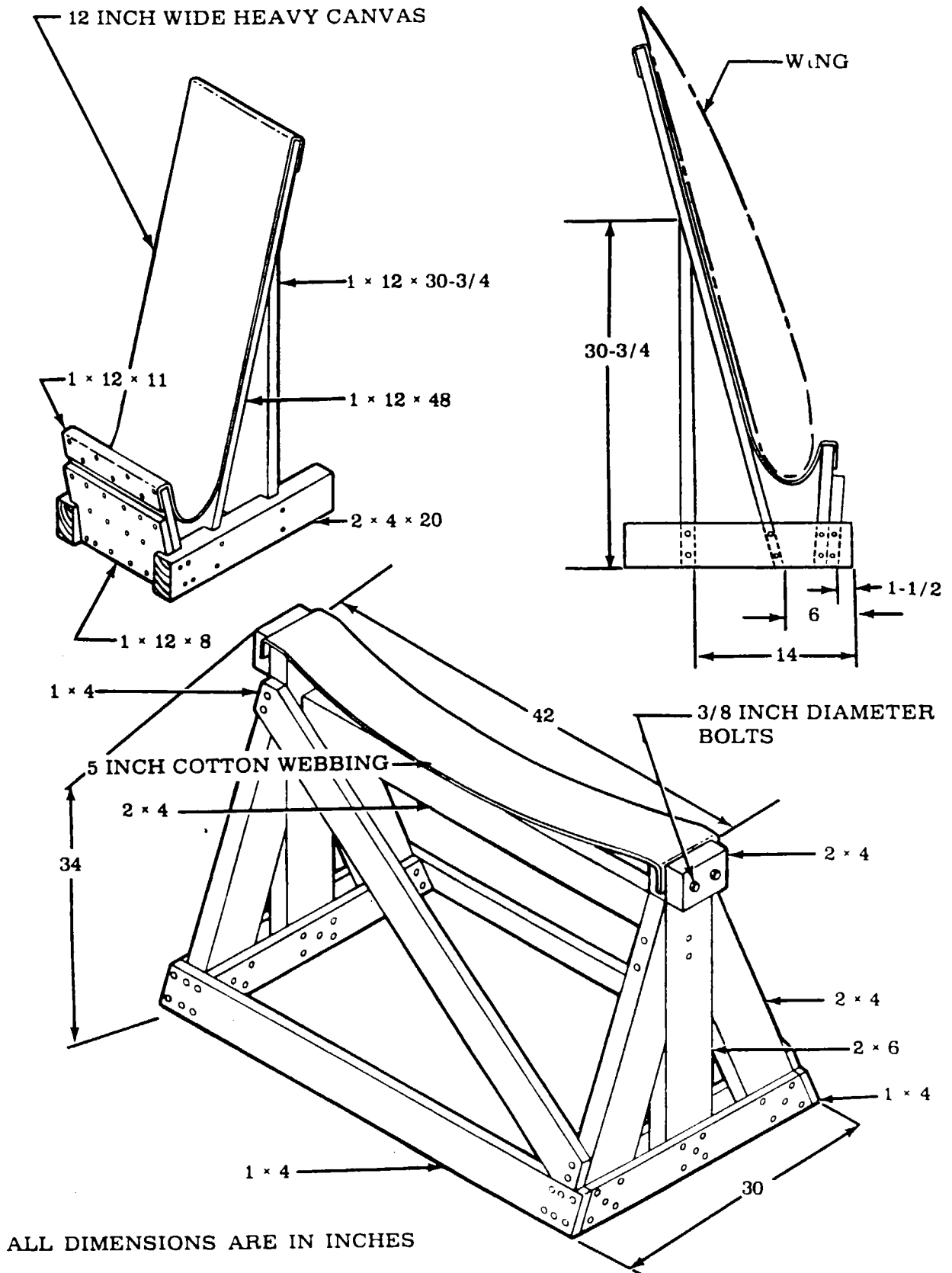
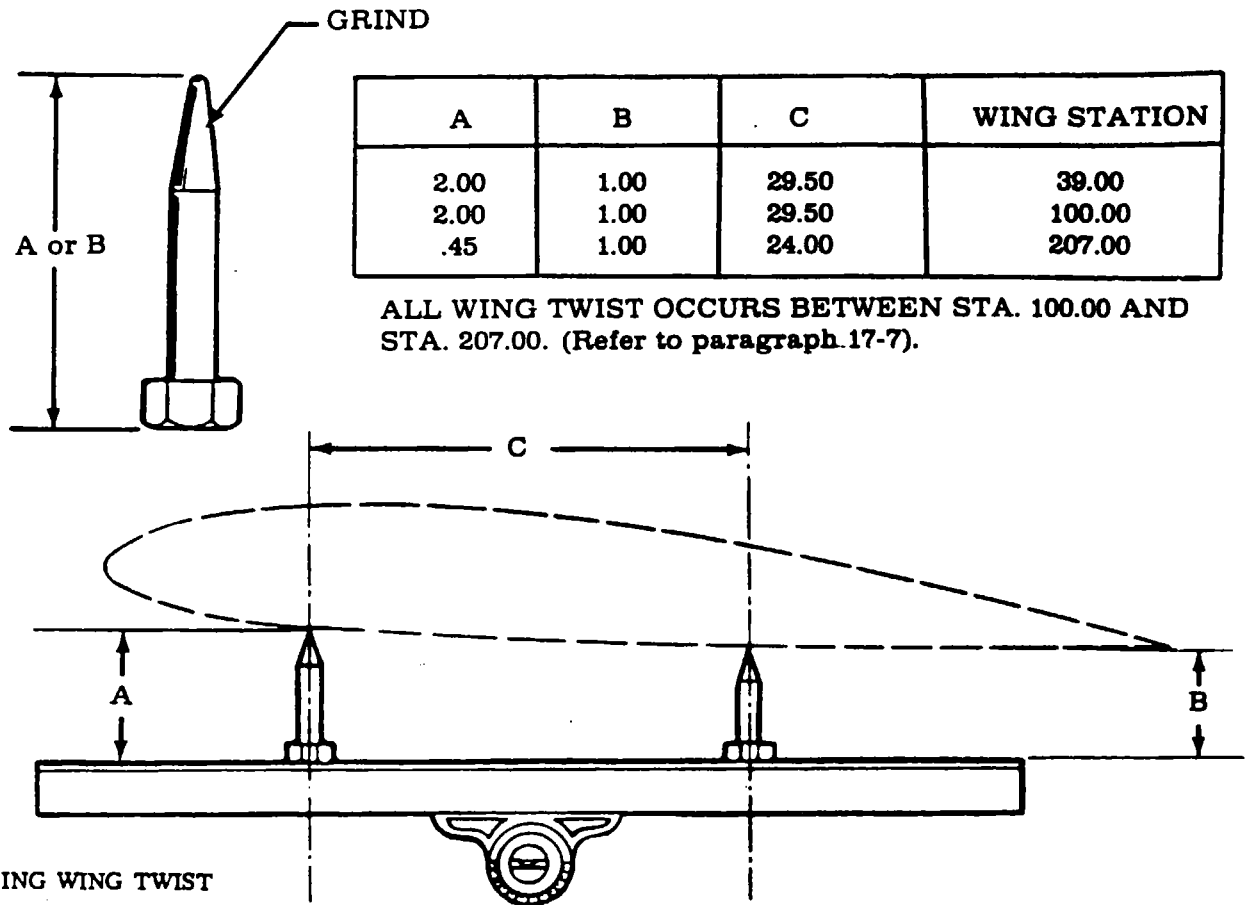


Figure 17-1A. Wing and Fuselage Support Stands

## MODEL R182 AND TR182 SERVICE MANUAL



If damage has occurred to a wing, it is advisable to check the twist. The following method can be used with a minimum of equipment, which includes a straightedge (32" minimum length of angle, or equivalent), three modified bolts for a specific wing, and a protractor head with level.

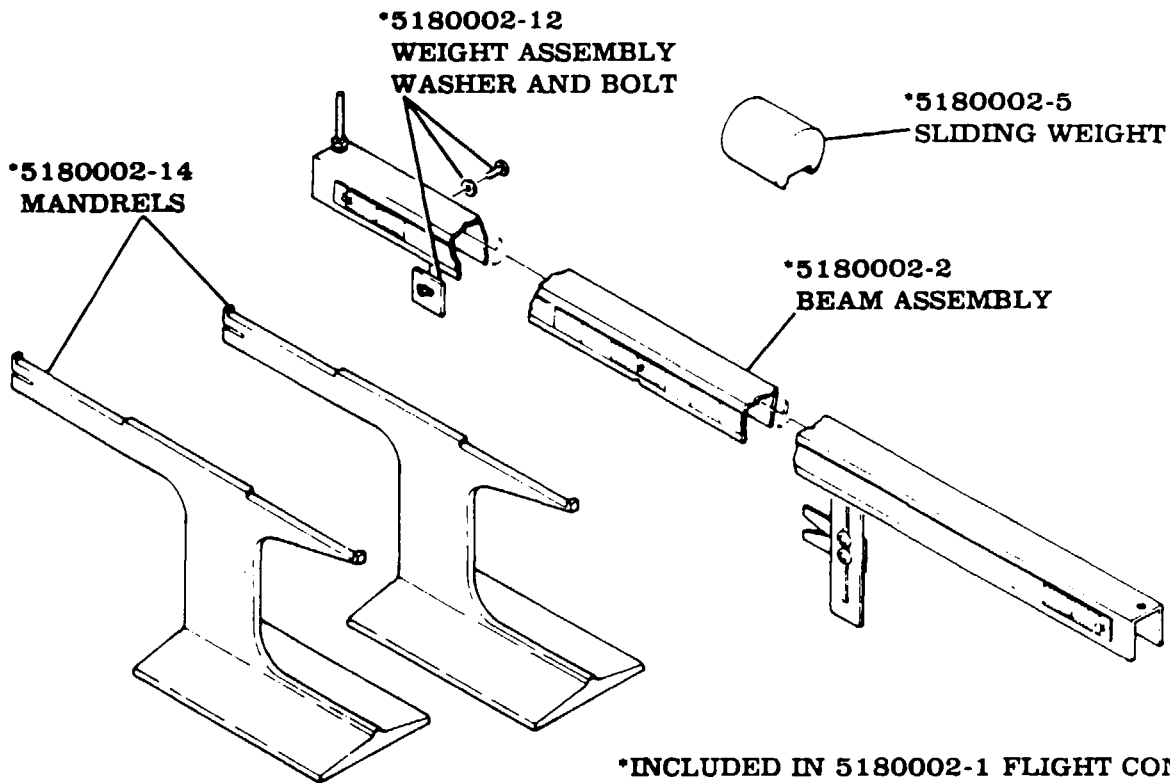
1. Check chart for applicable dimension for bolt length (A or B).
2. Grind bolt to a rounded point as illustrated, checking length periodically.
3. Tape two bolts to straightedge according to dimension C.
4. Locate inboard wing station to be checked and make a pencil mark approximately one-half inch aft of the lateral row of rivets in the wing leading edge spar flange.
5. Holding straightedge parallel to wing station (staying as clear as possible from "cans"), place longer bolt on pencil mark and set protractor head against lower edge of straightedge.
6. Set bubble in level to center and lock protractor to hold this reading.
7. Omitting step 6, repeat procedure for each wing station, using dimensions specified in chart. Check to see that protractor bubble is still centered.
8. Proper twist is present in wing if protractor readings are the same (parallel). Forward or aft bolt may be lowered from wing .10 inch maximum to attain parallelism.

Figure 17-2. Checking Wing Twist

# MODEL R182 AND TR182 SERVICE MANUAL

## FLIGHT CONTROL SURFACE BALANCING FIXTURE KIT

USED FOR BALANCING AILERONS, ELEVATORS AND RUDDERS  
ON ALL CESSNA SINGLE AND MULTIENGINE AIRPLANES



\*INCLUDED IN 5180002-1 FLIGHT CONTROL  
SURFACE BALANCING FIXTURE KIT.

### GENERAL NOTES

1. Balance control surfaces in a draft-free area.
2. Place hinge bolts through control surface hinges and position on knife edge balancing mandrels. Be sure hinge bolt shank rests on knife edge.
3. make sure all control surfaces are in their approved flight configurations: painted (if applicable), trim tabs installed, all foreign matter removed from inside of control surface, elevator trim tab push-pull rod installed and all tips installed.
4. Place balancing mandrels on a table or other suitable flat surface.
5. Adjust trailing edge support to fit control surface being balanced while center of balancing beam is directly over hinge line. Remove balancing beam and balance the beam itself by moving the adjustable weight (fastened by bolt and washer). Fine balance may be accomplished by use of washers at long screw on end of beam.
6. When positioning balancing beam on control surface. Avoid rivets to provide a smooth surface for the beam and keep the beam 90° to the hinge line of the control surface.

Figure 17-3. Control Surface Balancing (Sheet 1 of 5)

## MODEL R182 AND TR182 SERVICE MANUAL

7. Paint is a considerable weight factor. In order to keep balance weight to a minimum, it is recommended that existing paint be removed before adding paint to a control surface. Increase in balance weight will also be limited by the amount of space available and clearance with adjacent parts. Good workmanship and standard repair practices should not result in unreasonable balance weight.
8. The approximate amount of weight needed may be determined by taping loose weight at the balance weight area.
9. Lighten balance weight by drilling off part of weight.
10. Make balance weight heavier by fusing bar stock solder to weight after removal from control surface. The ailerons should have balance weight increased by ordering additional weight listed in applicable Parts Catalog and installing next to existing in-board weight the minimum length necessary for correct balance.

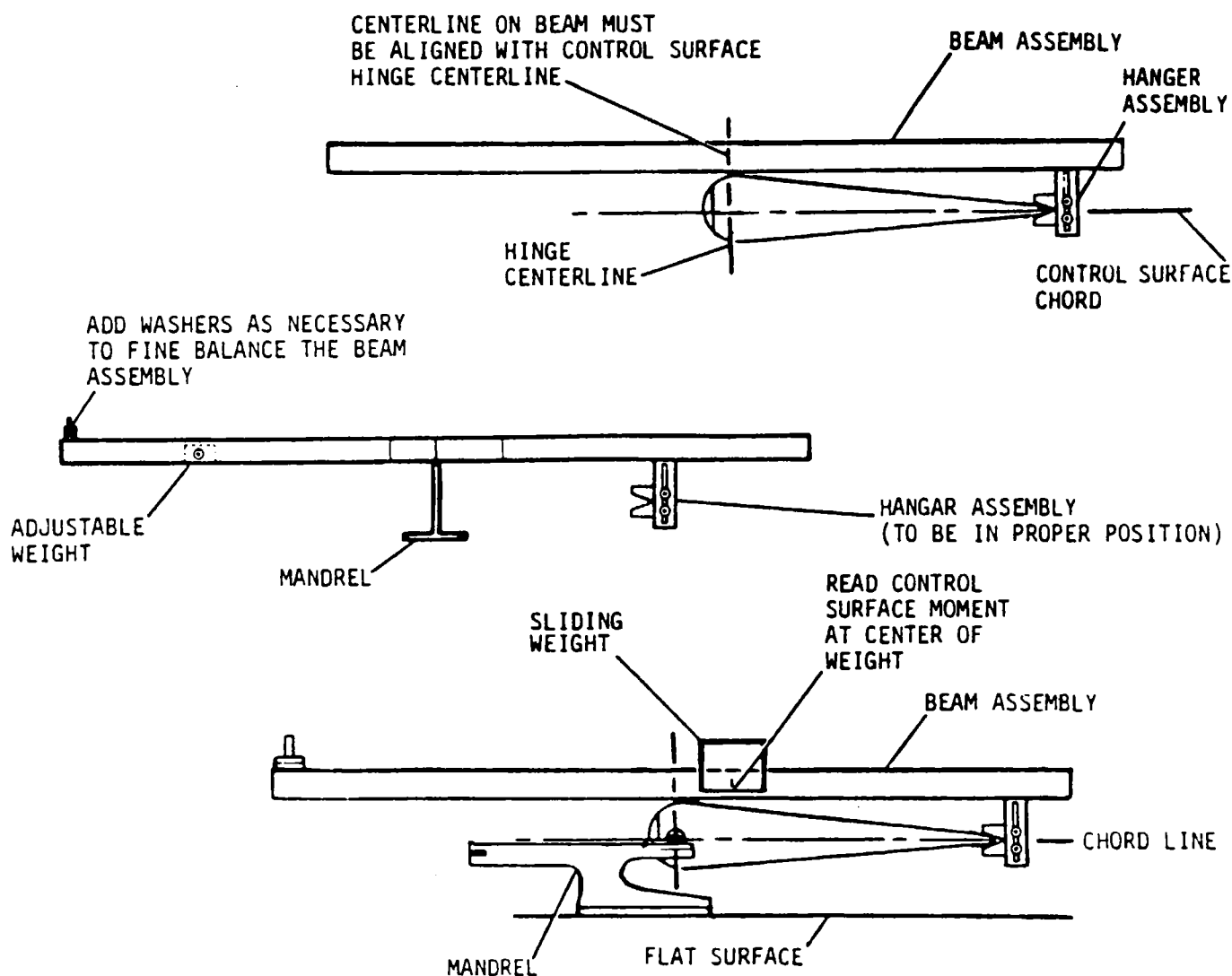


Figure 17-3. Control Surface Balancing (Sheet 2 of 5)

# MODEL R182 AND TR182 SERVICE MANUAL

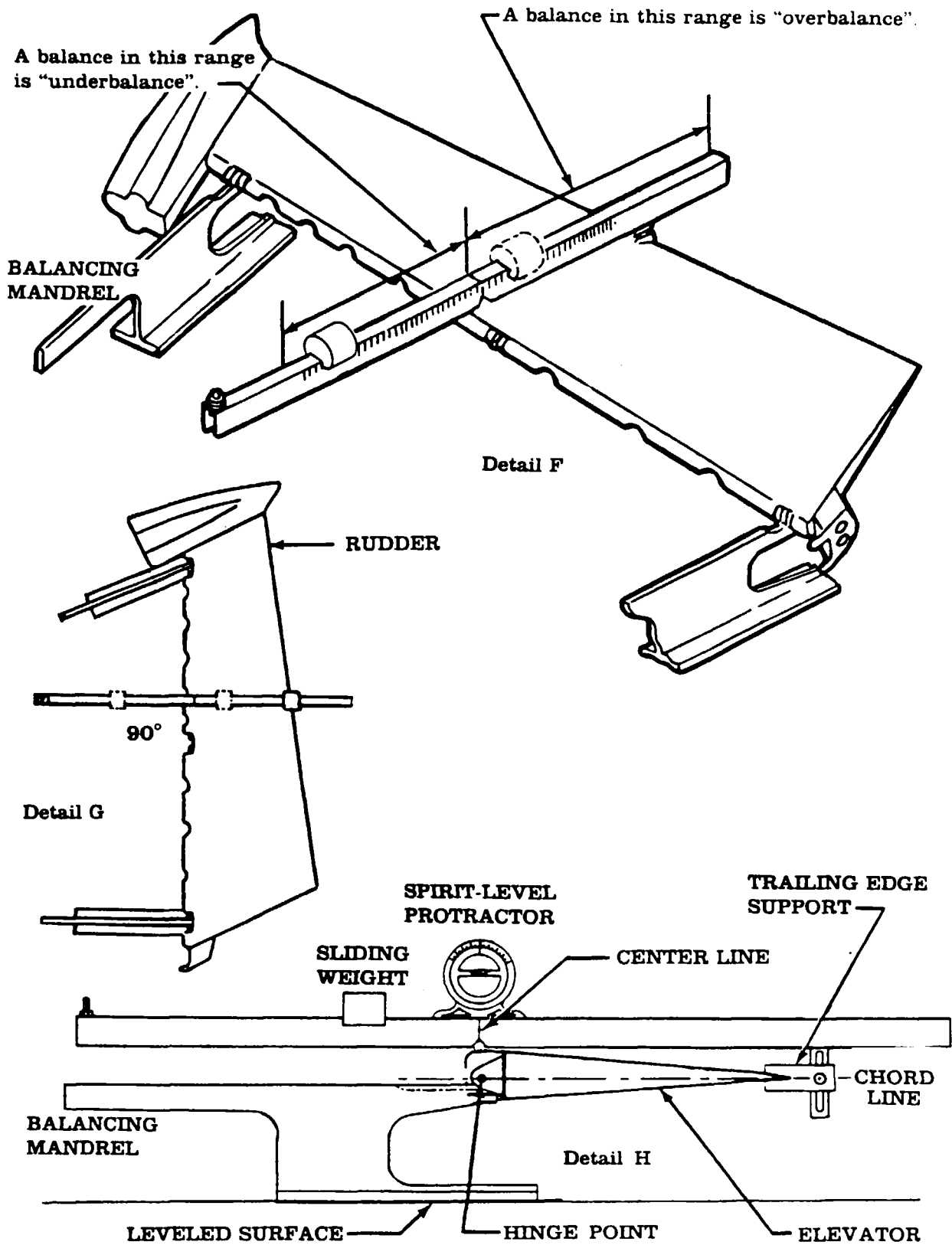


Figure 17-3. Control Surface Balancing (Sheet 3 of 5)



MODEL R182 AND TR182 SERVICE MANUAL

AILERONS

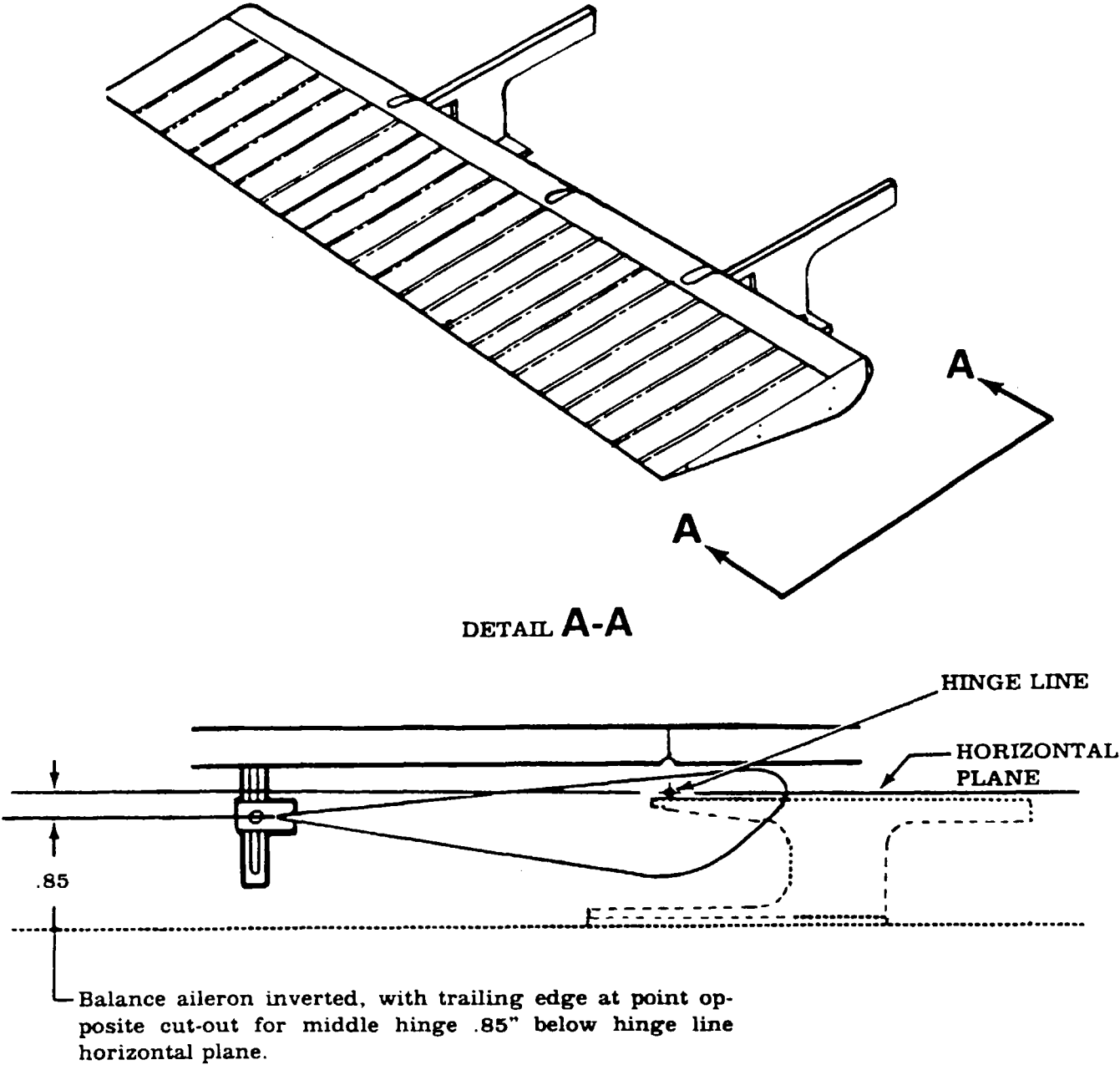


Figure 17-3. Control Surface Balancing (Sheet 4 of 5)

# MODEL R182 AND TR182 SERVICE MANUAL

## CONTROL SURFACE BALANCE REQUIREMENTS

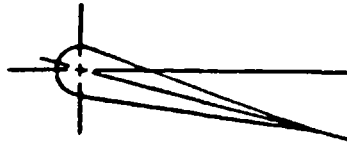
### NOTE

Balance limits for control surfaces are expressed for "Approved Flight" configuration. "Approved Flight" configuration is that condition of the control surface as prepared for flight of the airplane whether it be painted or unpainted.

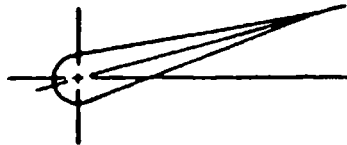
"Approved Flight" limits must never be exceeded when the surface is in its final configuration for flight.

### DEFINITIONS:

**UNDERBALANCE** is defined as the condition that exists when surface is trailing edge heavy and is defined by a symbol (+). If the balance beam sliding weight must be on the leading edge side of the hinge line (to balance the control surface), the control surface is considered to be underbalanced.



**OVERBALANCE** is defined as the condition that exists when surface is leading edge heavy and is defined by a symbol (-). If the balance beam sliding weight must be on the trailing edge side of the hinge line (to balance the control surface), the control surface is considered to be overbalanced.



### CONTROL SURFACE BALANCE LIMITS (Inch-Pounds)

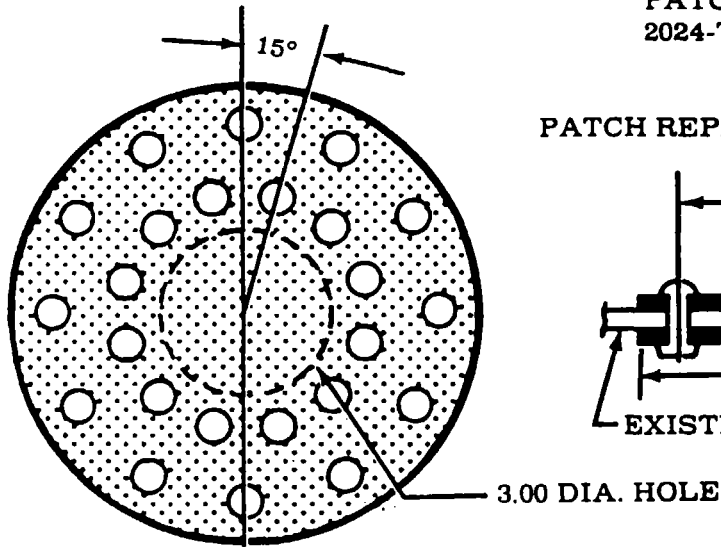
### APPROVED FLIGHT CONFIGURATION

<b>AILERON</b>	<b>0.0 to 9.64</b>
<b>RUDDER</b>	<b>0.0 to 6.0</b>
<b>RIGHT ELEVATOR</b>	<b>0.0 to 20.47</b>
<b>LEFT ELEVATOR</b>	<b>0.0 to 20.47</b>

Figure 17-3. Control Surface Balancing (Sheet 5 of 5)

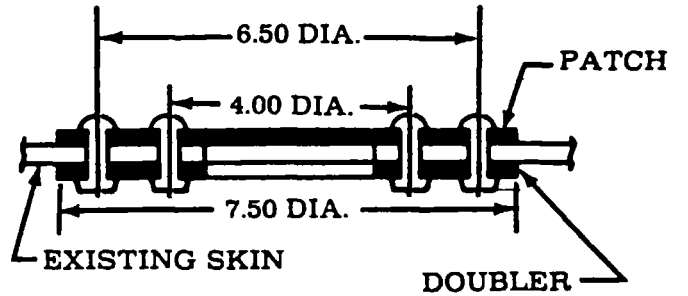
# MODEL R182 AND TR182 SERVICE MANUAL

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24 REQD

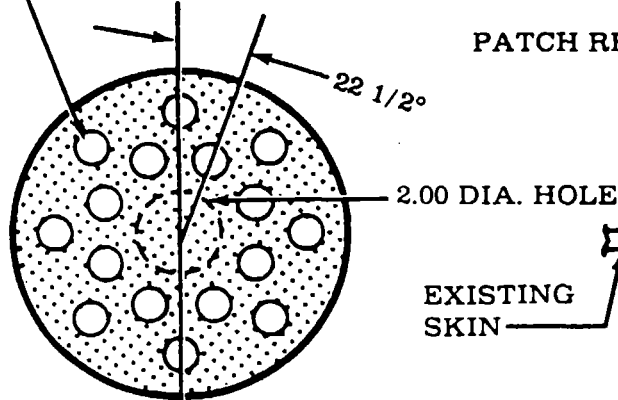


PATCHES AND DOUBLERS-  
2024-T3 ALCLAD

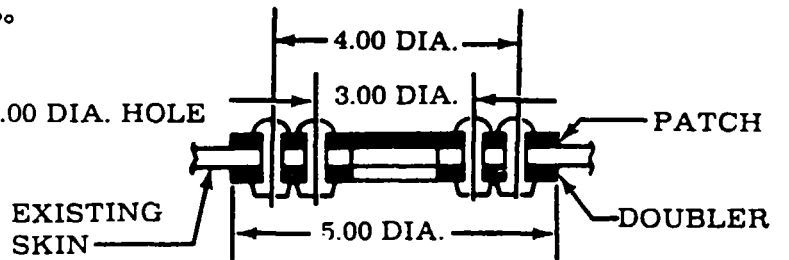
PATCH REPAIR FOR 3 INCH DIAMETER HOLE



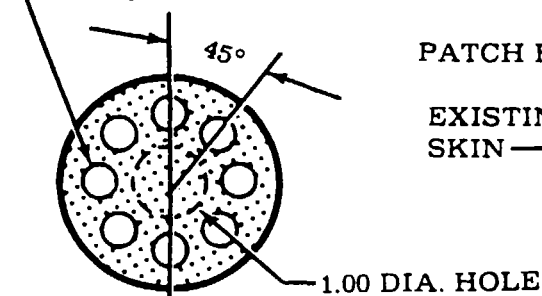
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16 REQD



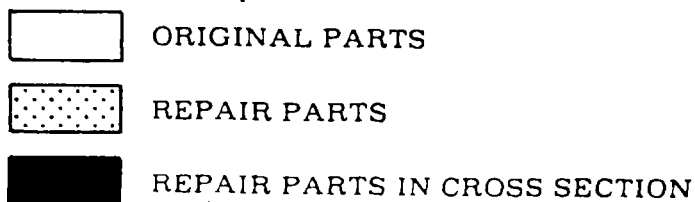
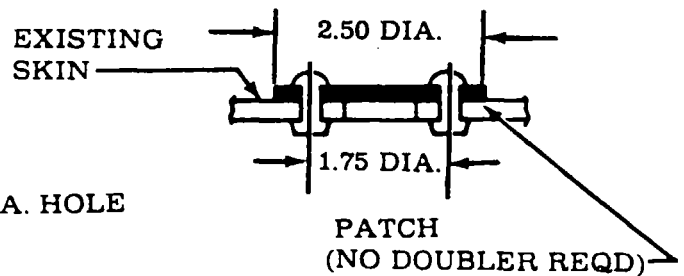
PATCH REPAIR FOR 2 INCH DIAMETER HOLE



MS20470AD4 RIVETS  
8 REQD



PATCH REPAIR FOR 1 INCH DIAMETER HOLE



OVERLAPPING  
CIRCULAR PATCH

Figure 17-4. Skin Repair (Sheet 1 of 6)

# MODEL R182 AND TR182 SERVICE MANUAL

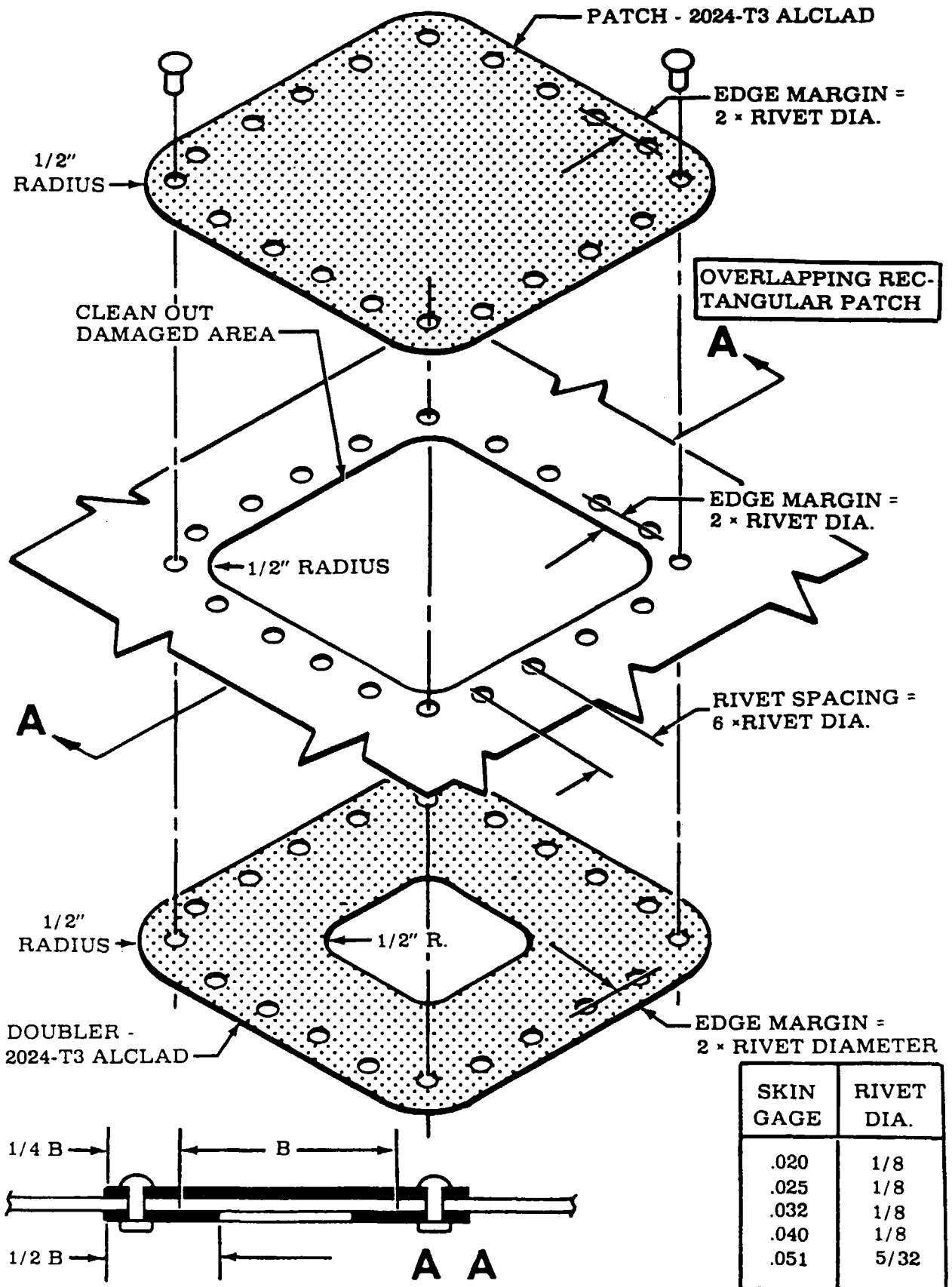
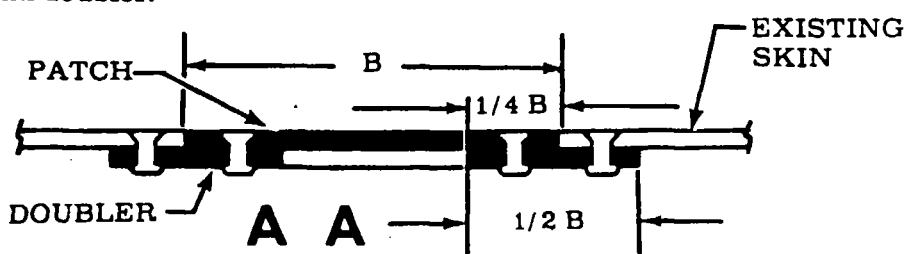
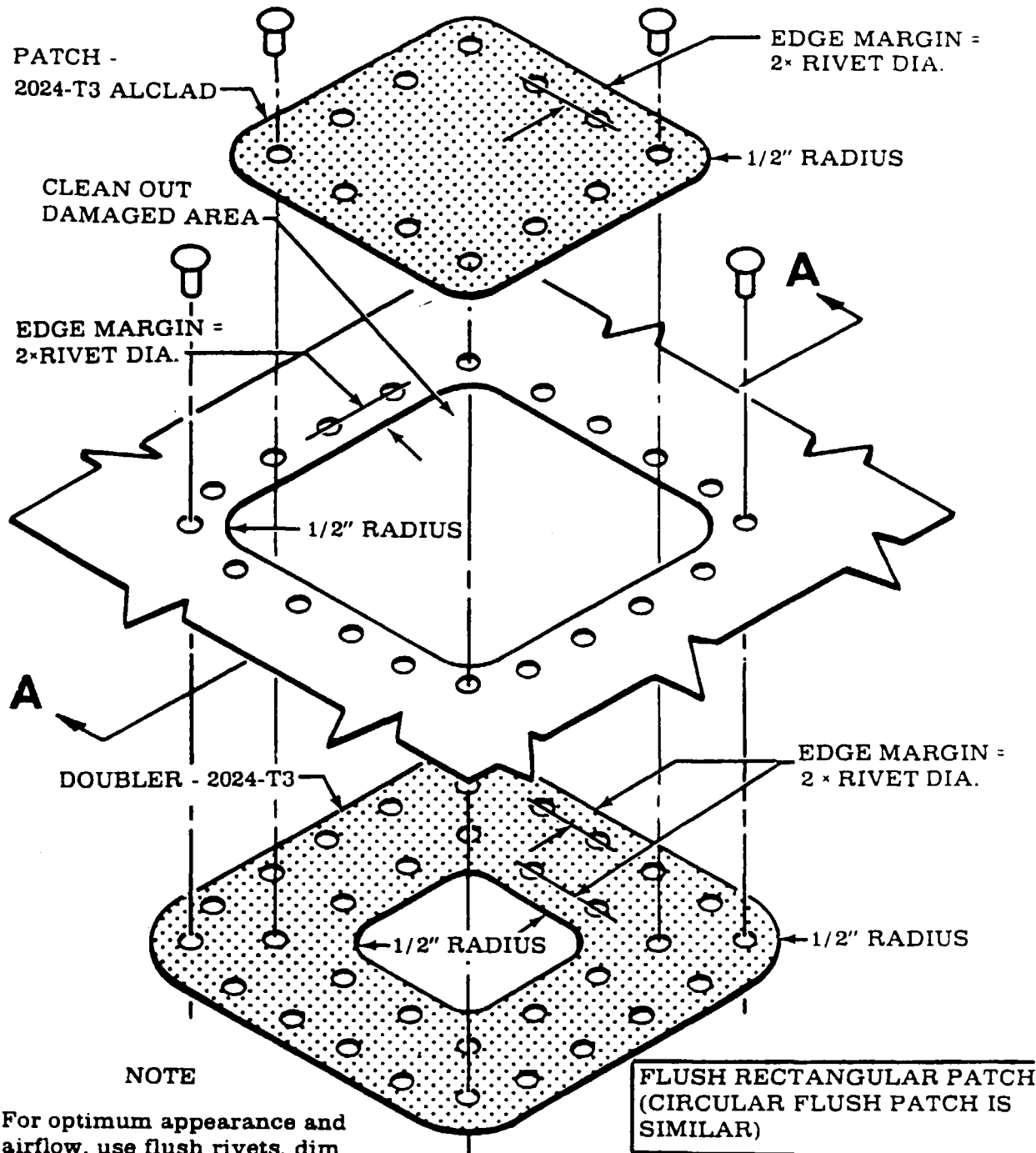


Figure 17-4. Skin Repair (Sheet 2 of 6)

# MODEL R182 AND TR182 SERVICE MANUAL



SKIN GAGE	RIVET DIA.
.020	1/8
.025	1/8
.032	1/8
.040	1/8
.051	5/32

Figure 17-4. Skin Repair (Sheet 3 of 6)

# MODEL R182 AND TR182 SERVICE MANUAL

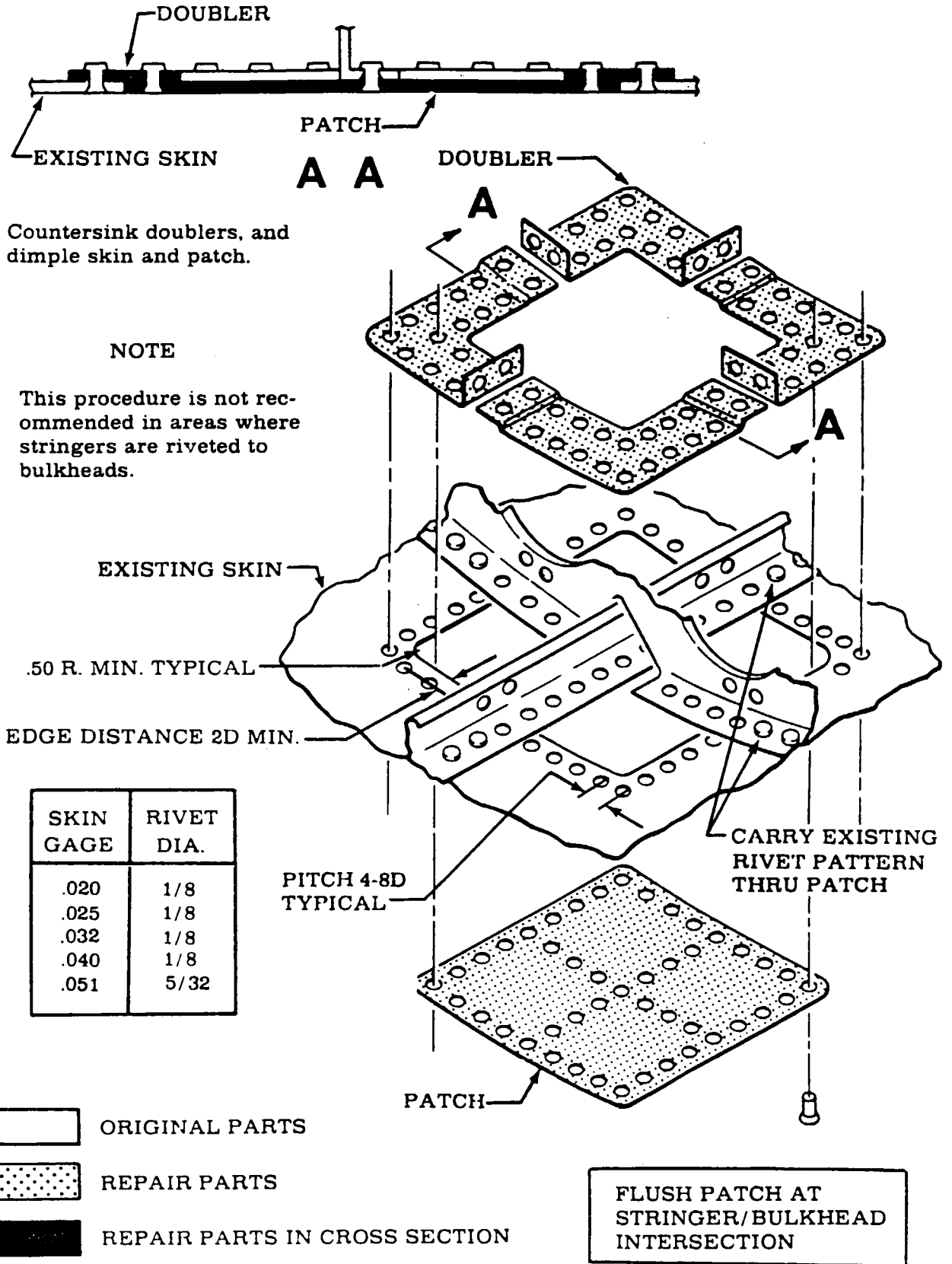


Figure 17-4. Skin Repair (Sheet 4 of 6)

# MODEL R182 AND TR182 SERVICE MANUAL

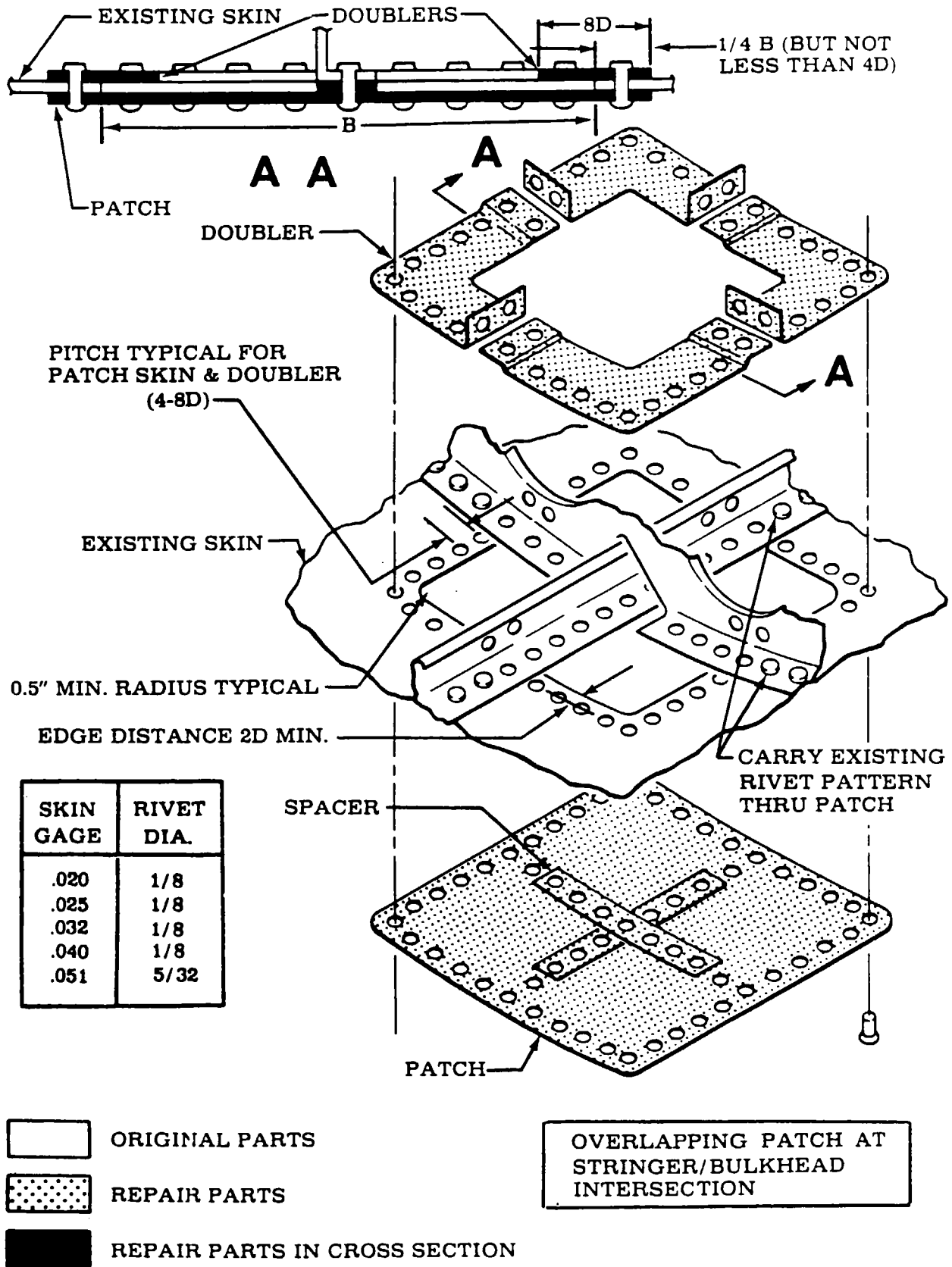
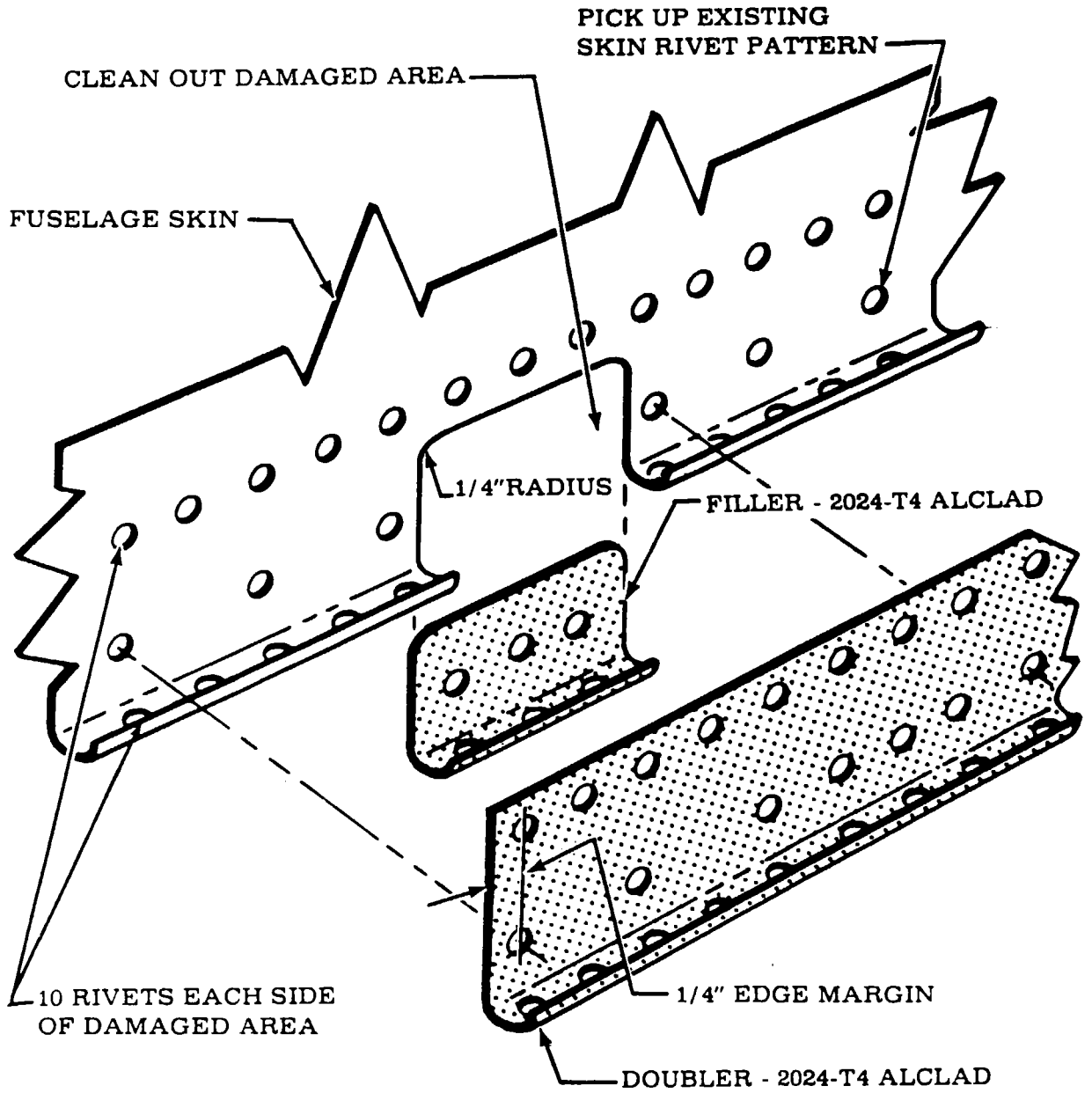


Figure 17-4. Skin Repair (Sheet 5 of 6)

# MODEL R182 AND TR182 SERVICE MANUAL





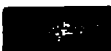
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-  REPAIR PARTS
-  REPAIR PARTS IN CROSS SECTION

Figure 17-4. Skin Repair (Sheet 6 of 6)



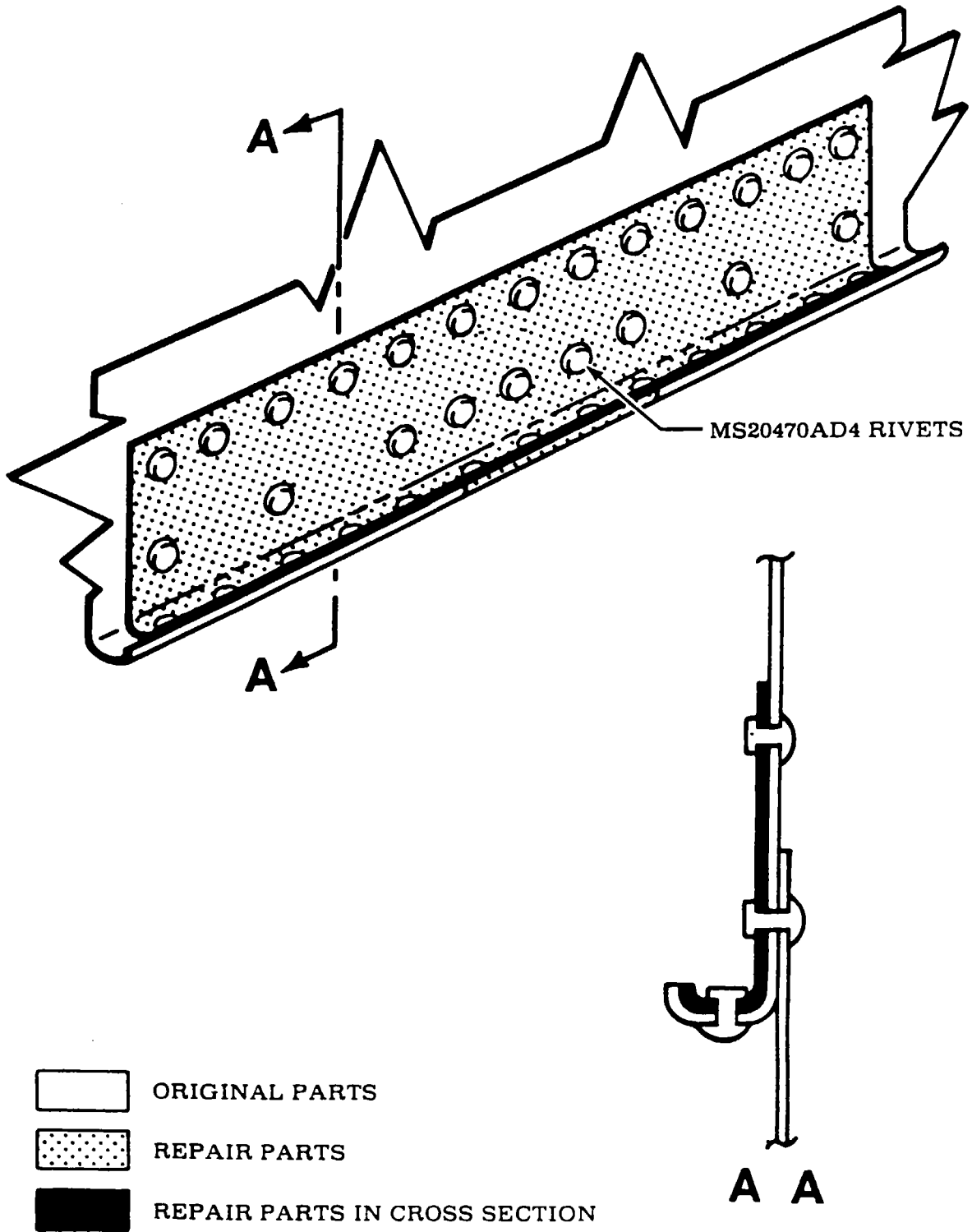


Figure 17-4. Skin Repair (Sheet 6 of 6 continued)

# MODEL R182 AND TR182 SERVICE MANUAL

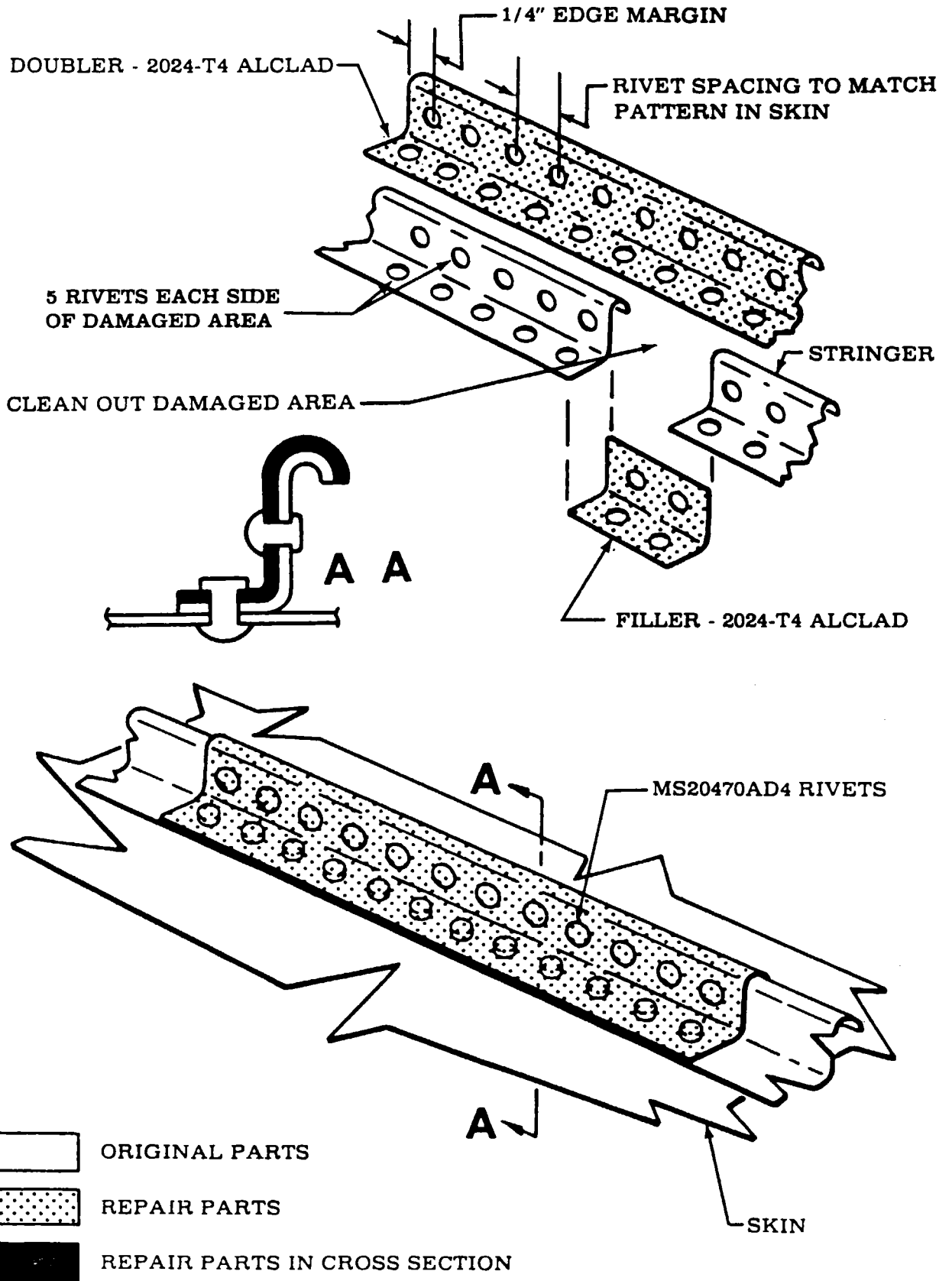


Figure 17-5. Stringer and Channel Repair (Sheet 1 of 4)

# MODEL R182 AND TR182 SERVICE MANUAL

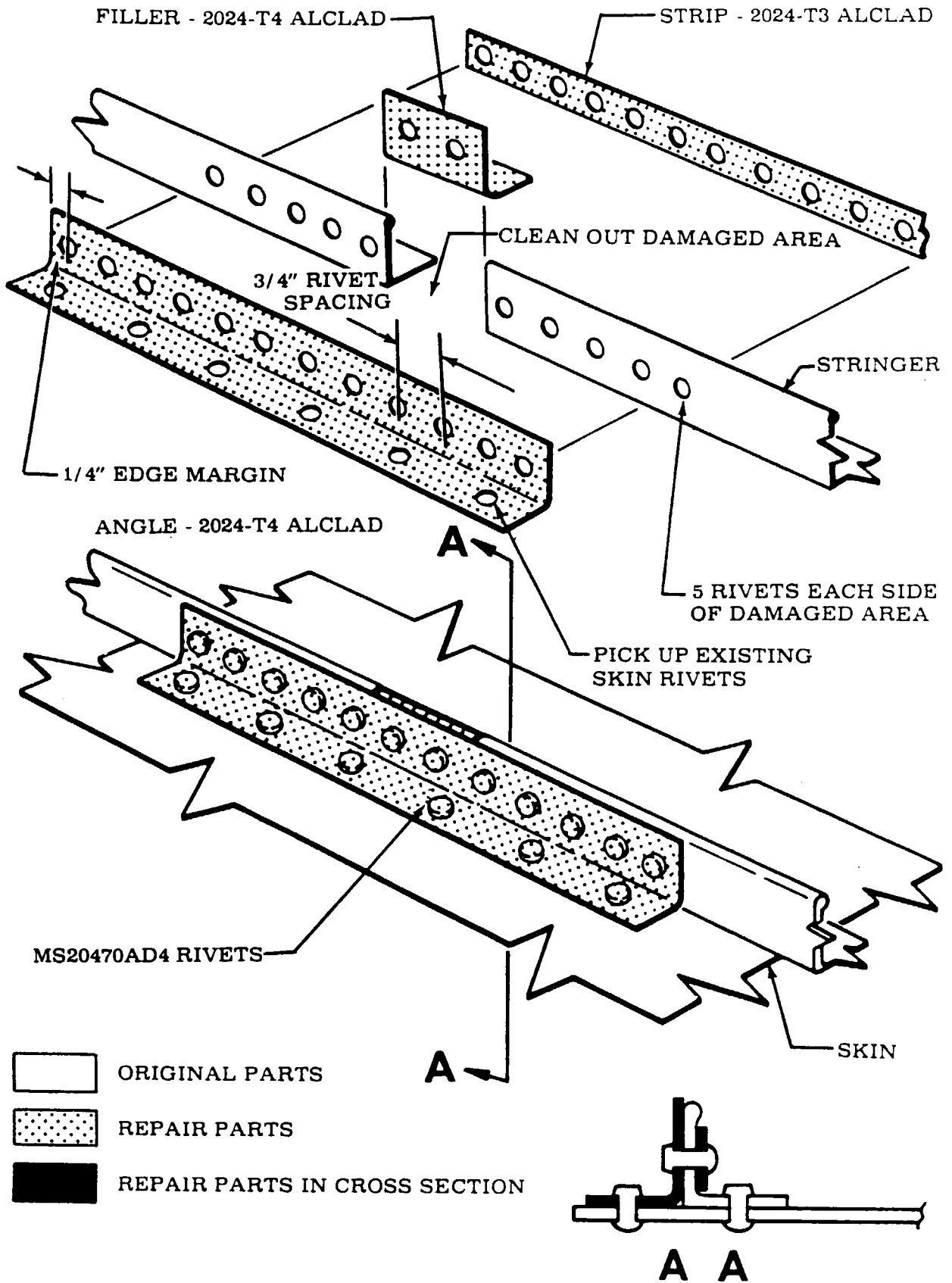


Figure 17-5. Stringer and Channel Repair (Sheet 2 of 4)

MODEL R182 AND TR182 SERVICE MANUAL

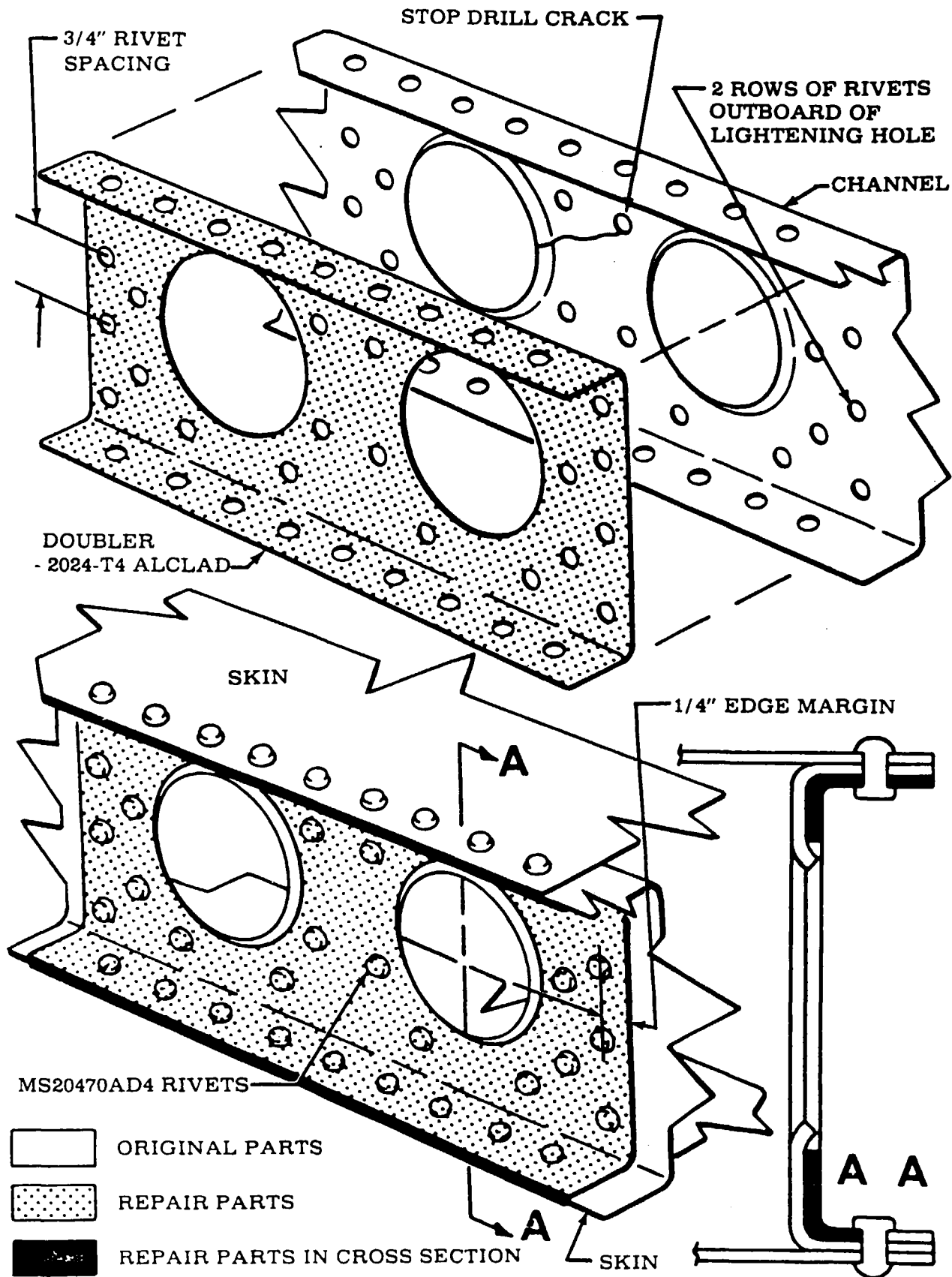


Figure 17-5. Stringer and Channel Repair (Sheet 3 of 4)

MODEL R182 AND TR182 SERVICE MANUAL

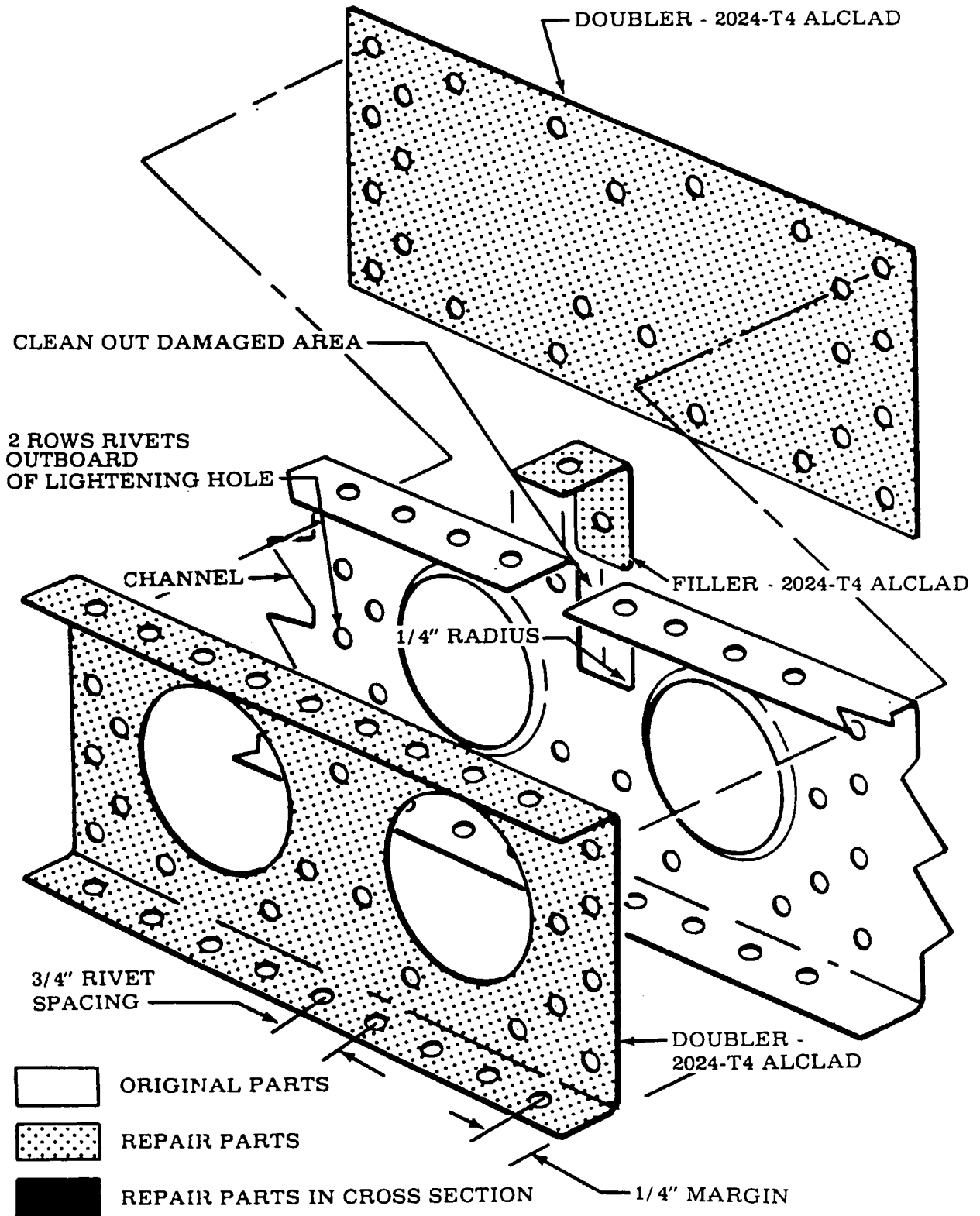


Figure 17-5. Stringer and Channel Repair (Sheet 4 of 4)

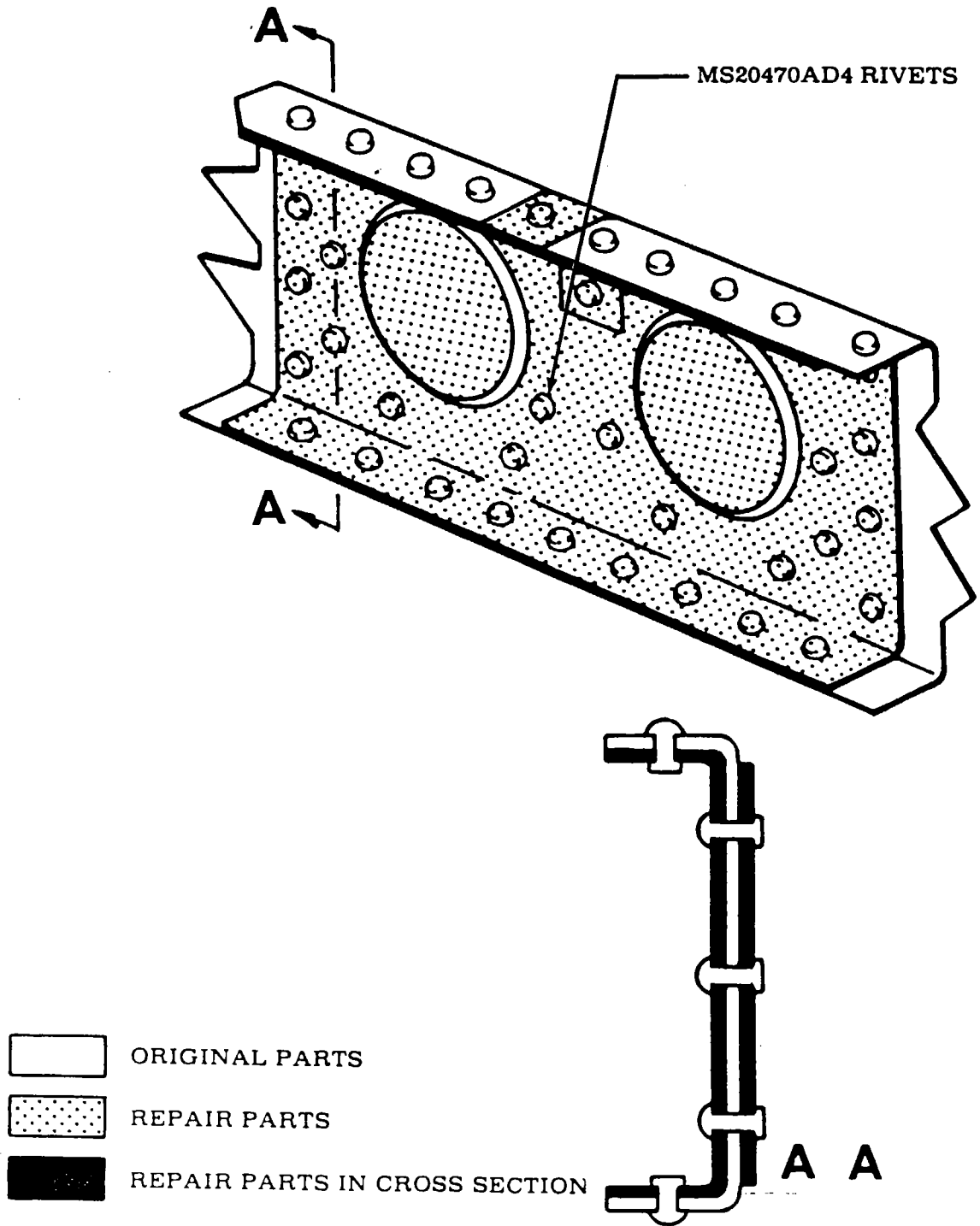
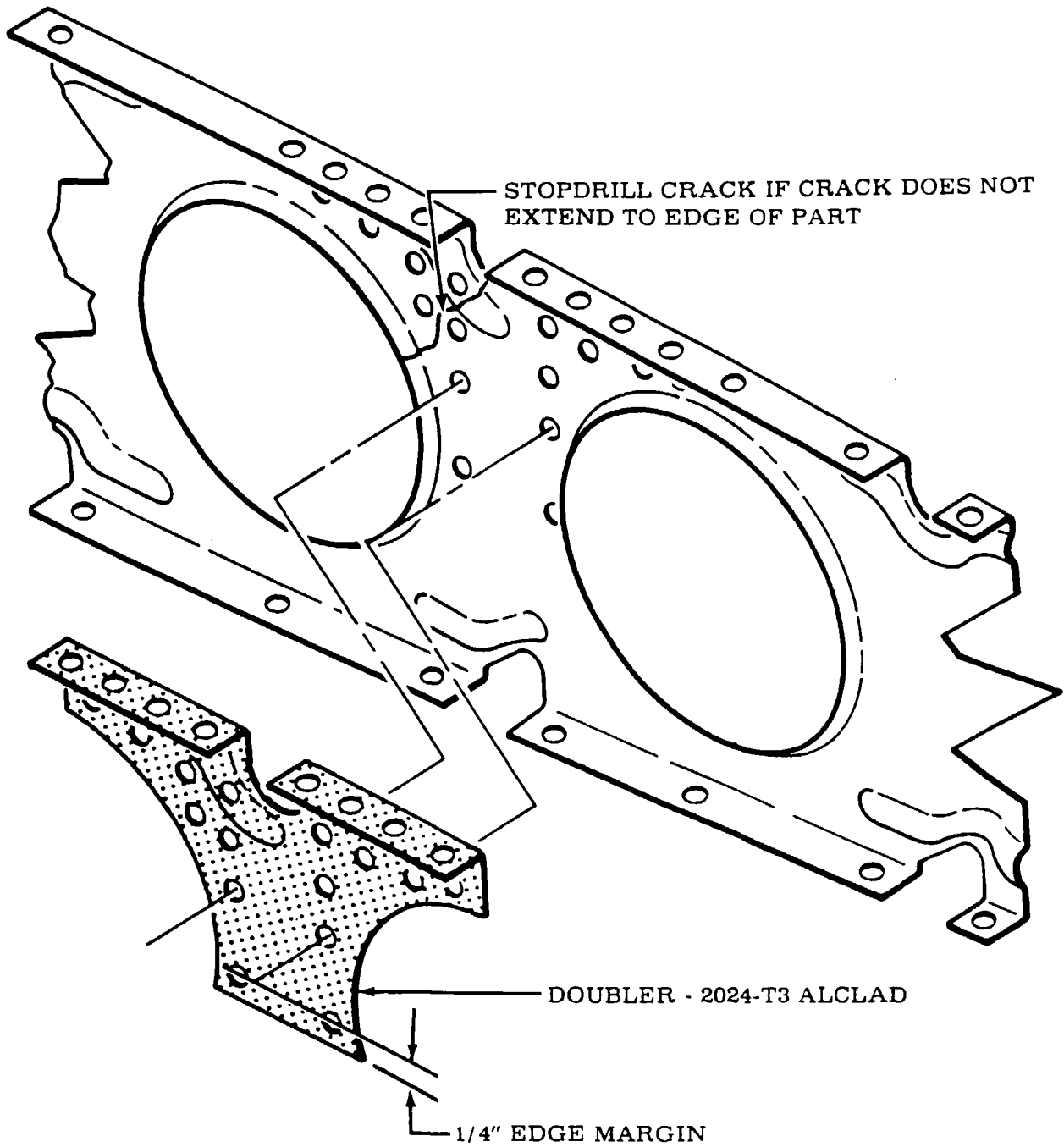


Figure 17-5. Stringer and Channel Repair (Sheet 4 of 4 continued)

MODEL R182 AND TR182 SERVICE MANUAL



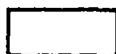
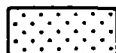

-  ORIGINAL PARTS
-  REPAIR PARTS
-  REPAIR PARTS IN CROSS SECTION

Figure 17-6. Rib Repair (Sheet 1 of 2)

MODEL R182 AND TR182 SERVICE MANUAL

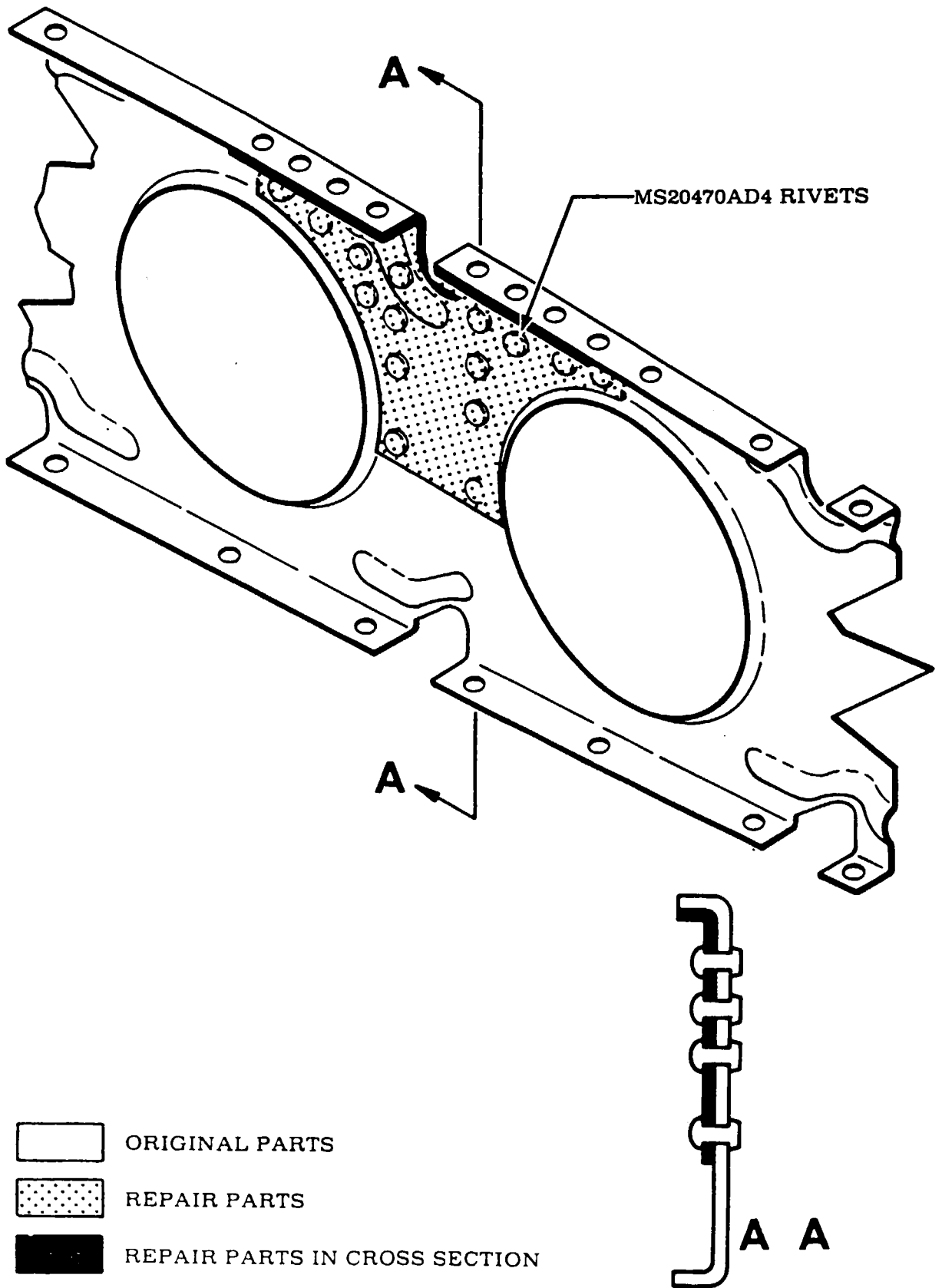


Figure 17-6. Rib Repair (Sheet 1 of 2 continued)



MODEL R182 AND TR182 SERVICE MANUAL

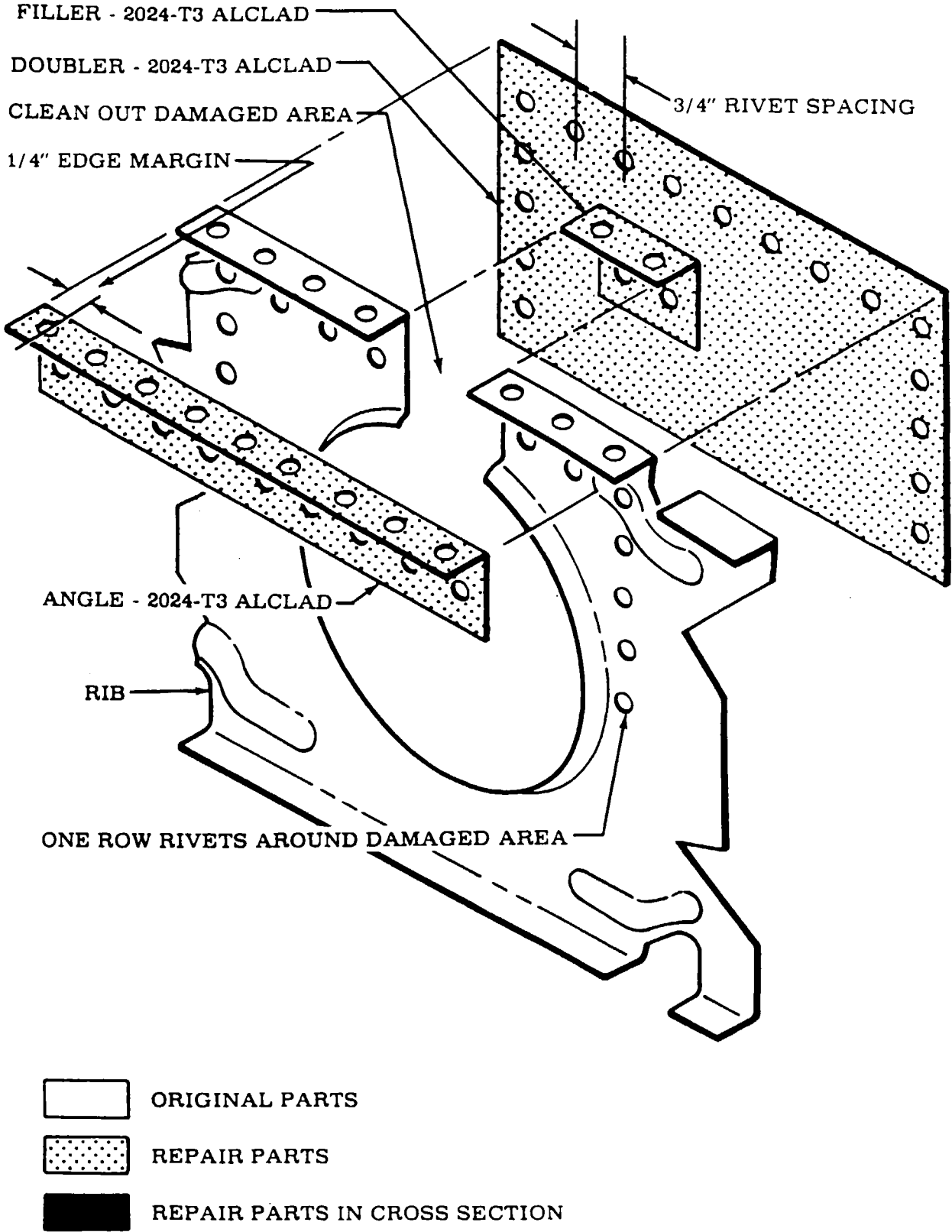


Figure 17-6.Rib Repair (Sheet 2 of 2)

MODEL R182 AND TR182 SERVICE MANUAL

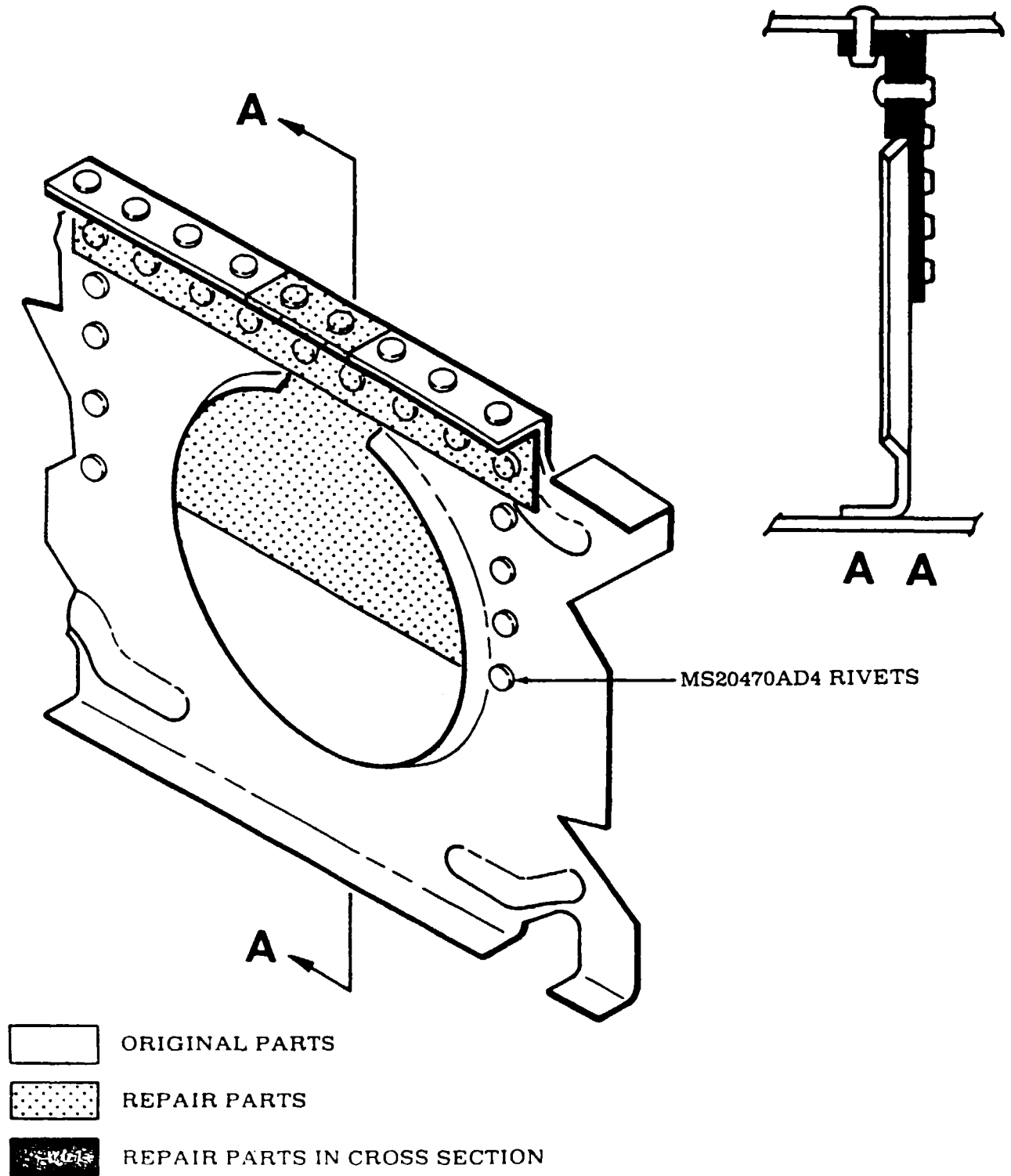


Figure 17-6. Rib Repair (Sheet 2 of 2 continued)

MODEL R182 AND TR182 SERVICE MANUAL

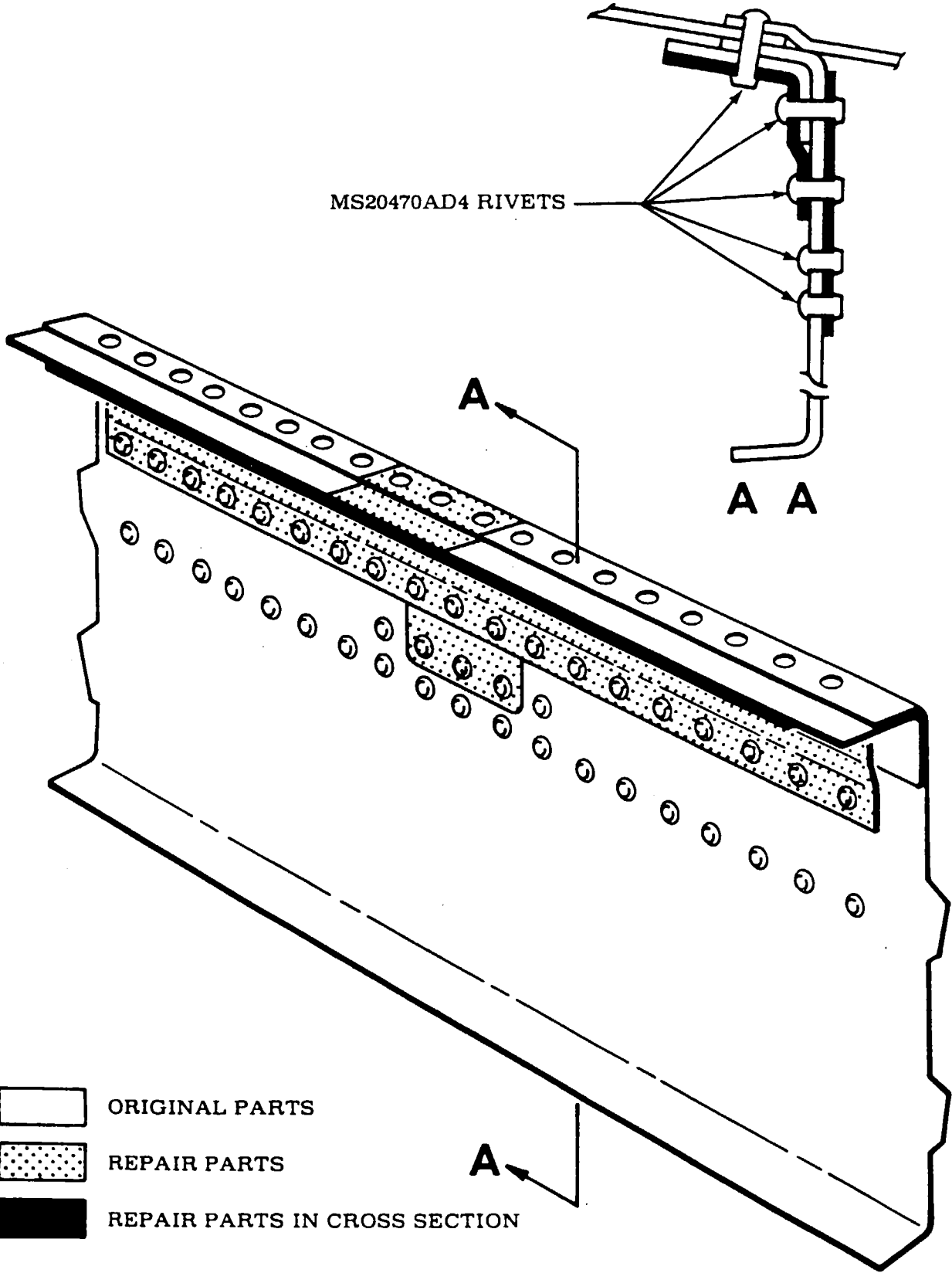


Figure 17-7. Wing Spar Repair (Sheet 1 of 4)

# MODEL R182 AND TR182 SERVICE MANUAL

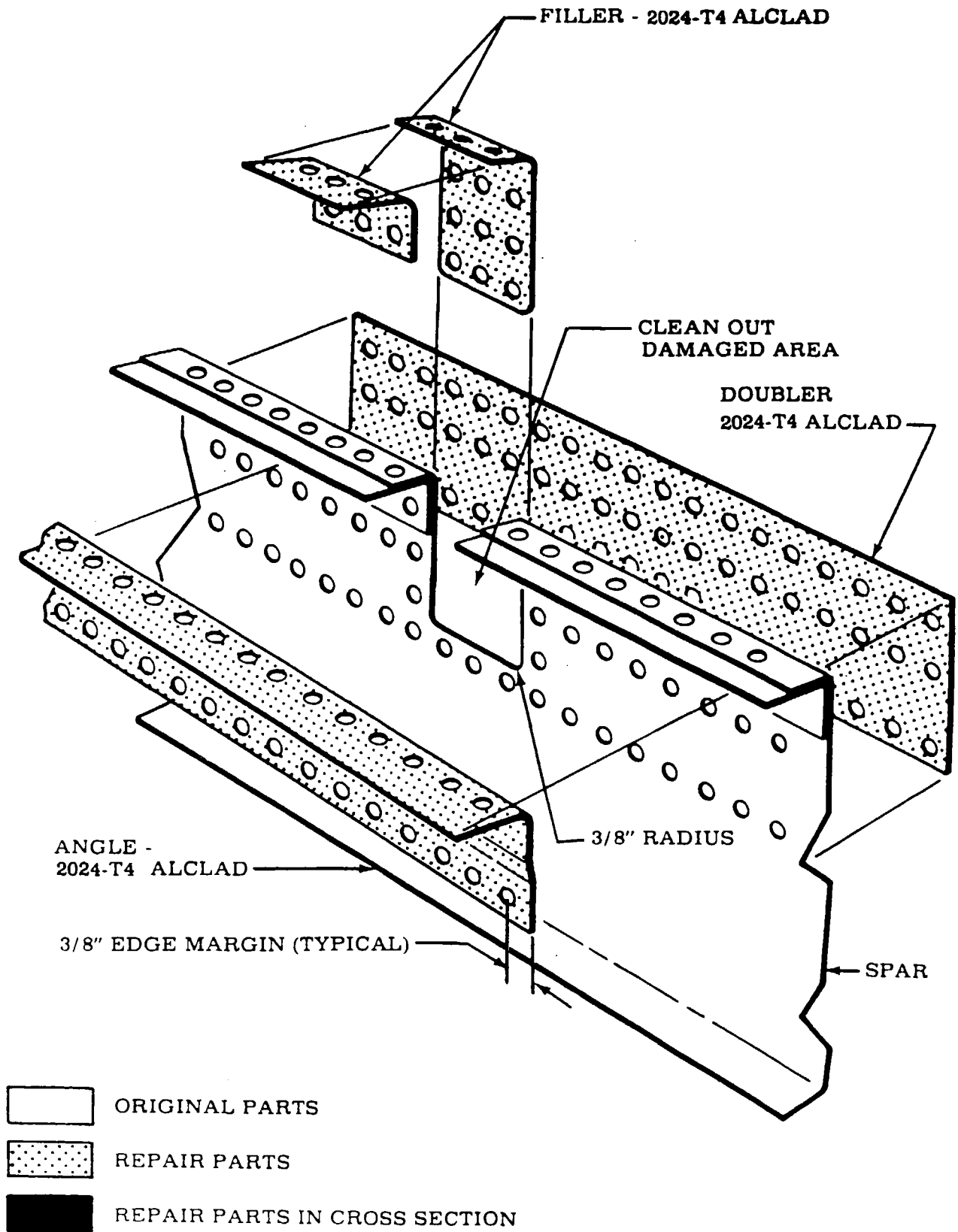





Figure 17-7. Wing Spar Repair (Sheet 1 of 4 continued)

# MODEL R182 AND TR182 SERVICE MANUAL

-  ORIGINAL PARTS
-  REPAIR PARTS
-  REPAIR PARTS IN CROSS SECTION

This repair applies to either front or rear spar if the spar is a single channel.

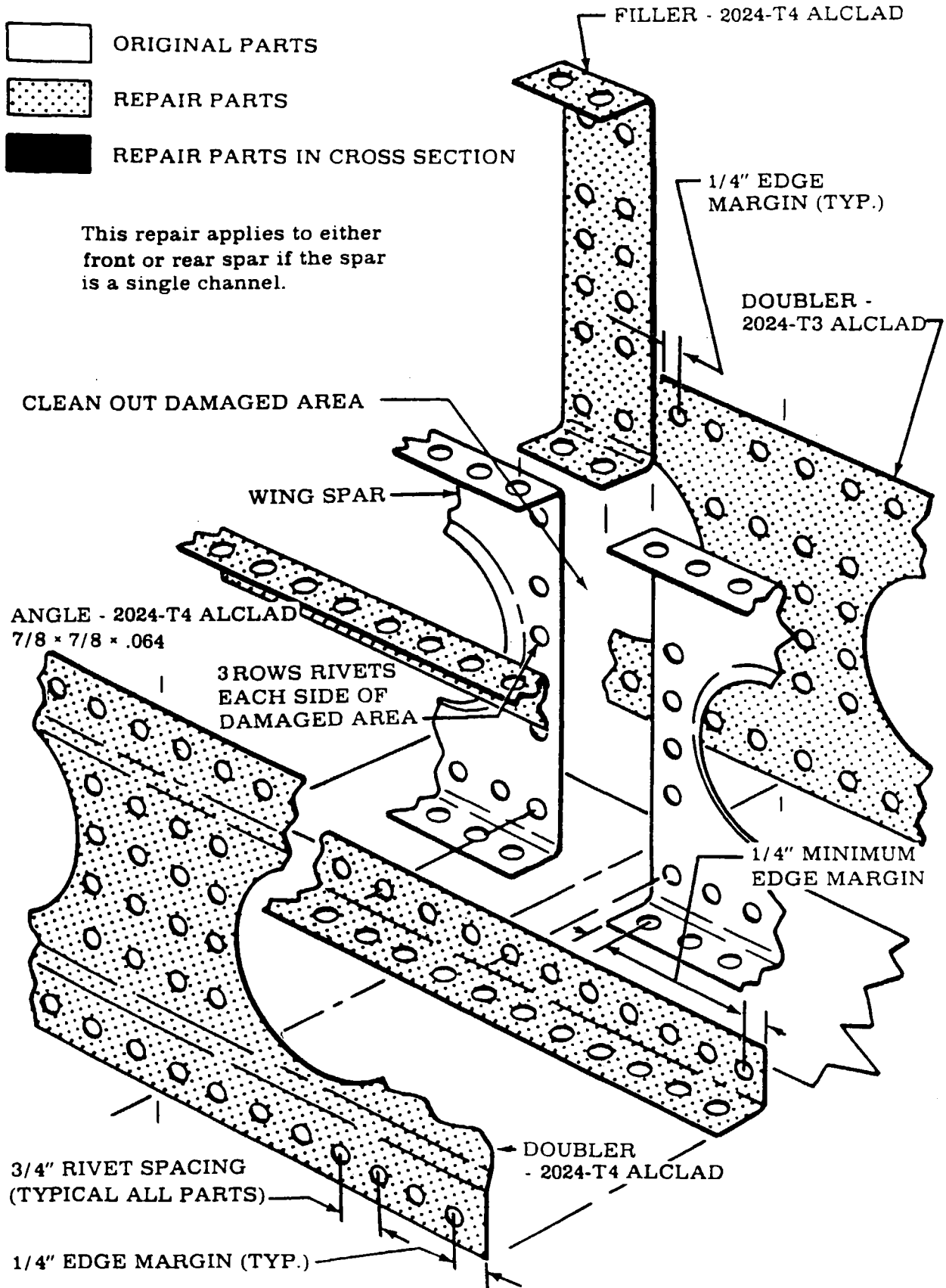


Figure 17-7. Wing Spar Repair (Sheet 2 of 4)

MODEL R182 AND TR182 SERVICE MANUAL

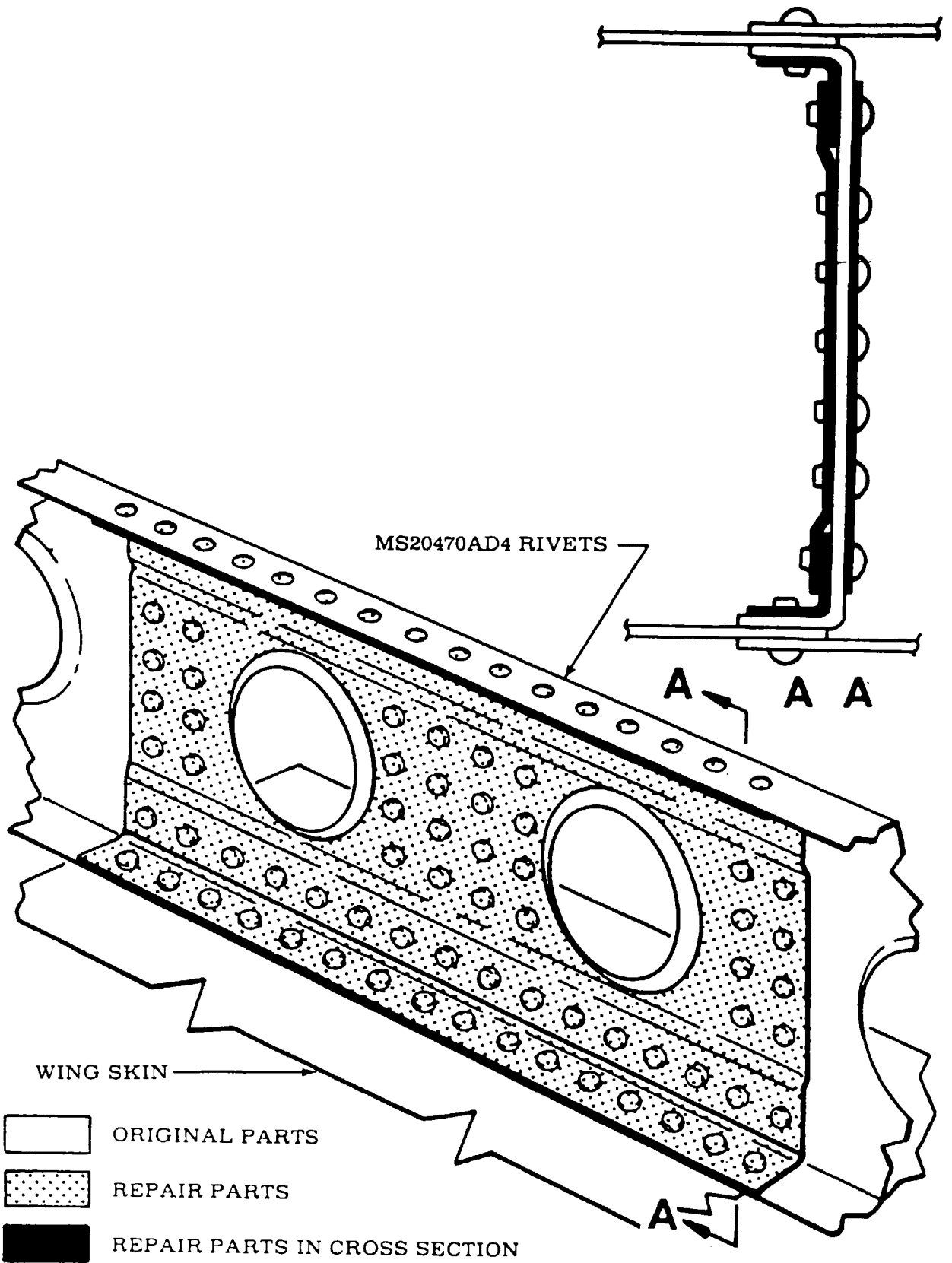


Figure 17-7. Wing Spar Repair (Sheet 2 of 4 continued)

MODEL R182 AND TR182 SERVICE MANUAL

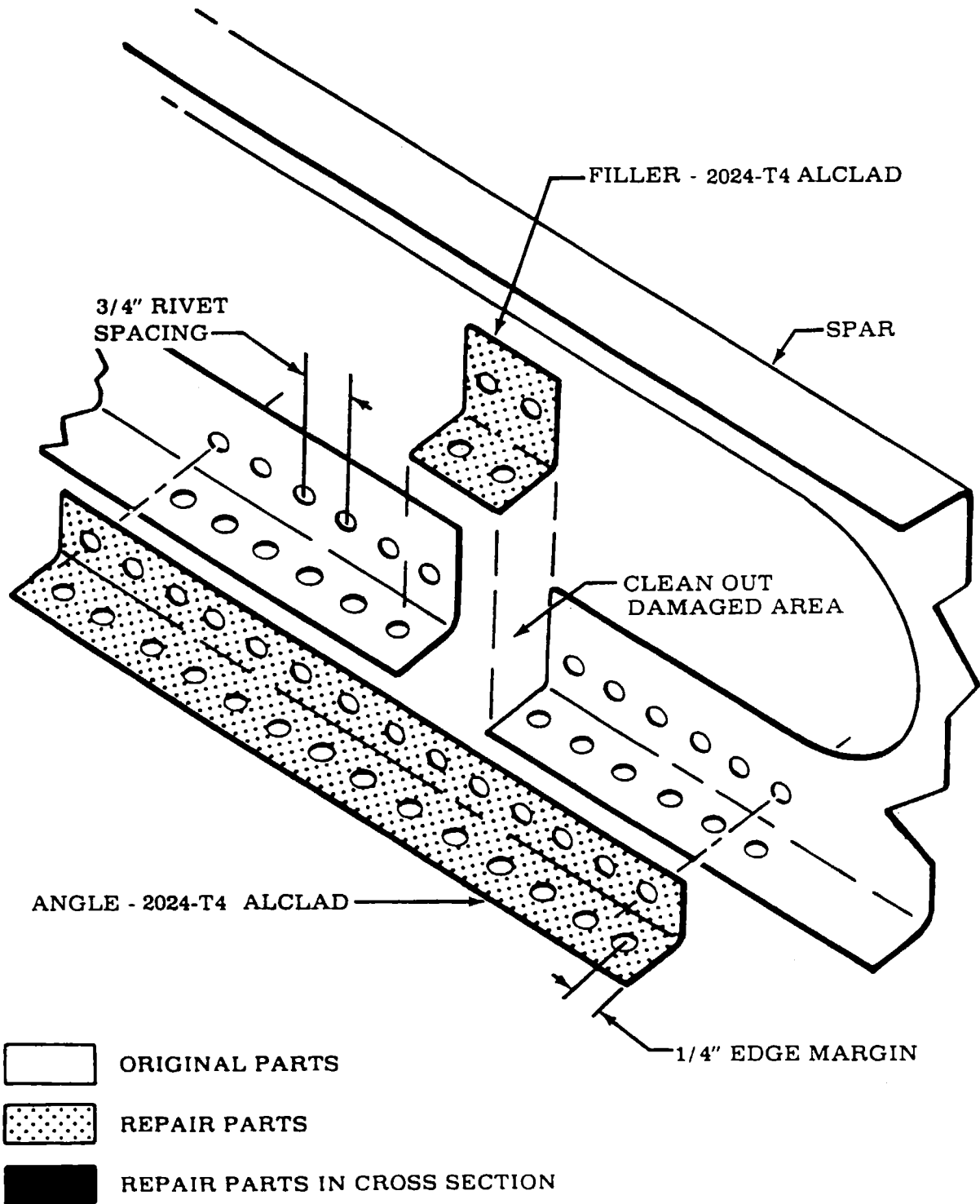


Figure 17-7. Wing Spar Repair (Sheet 3 of 4)

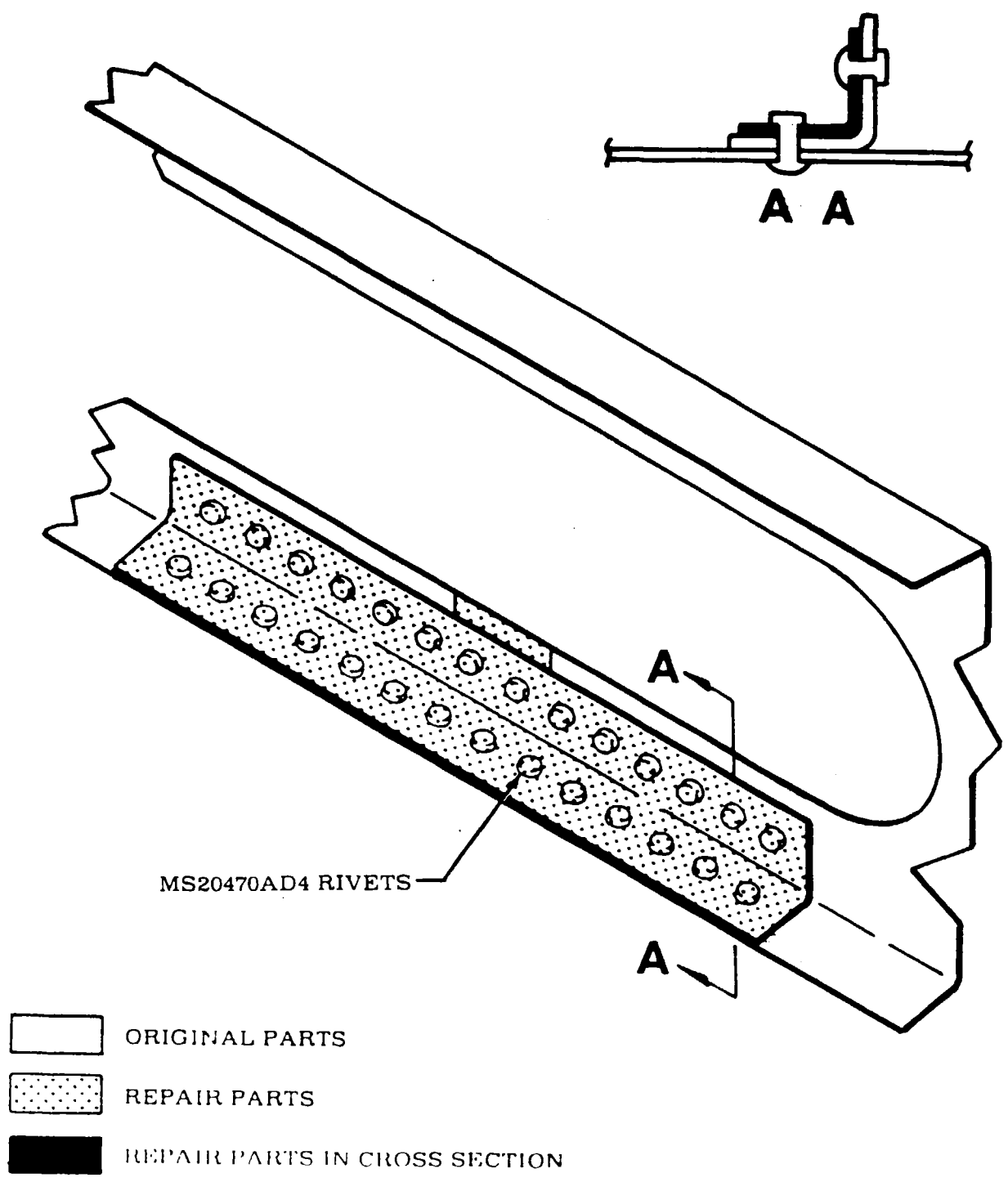
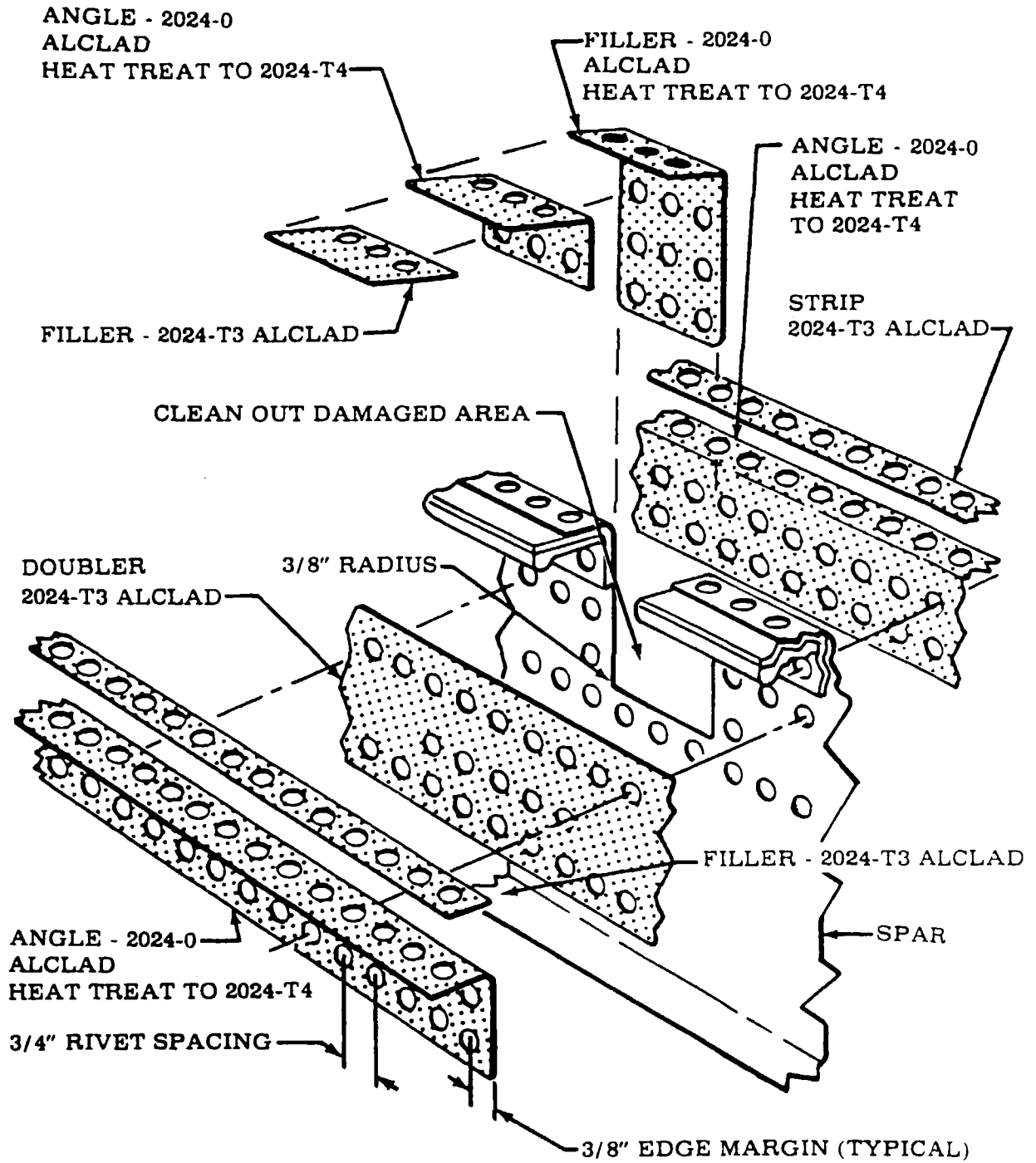


Figure 17-7. Wing Spar Repair (Sheet 3 of 4 continued)



# MODEL R182 AND TR182 SERVICE MANUAL



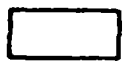


-  ORIGINAL PARTS
-  REPAIR PARTS
-  REPAIR PARTS IN CROSS SECTION

Figure 17-7. Wing Spar Repair (Sheet 4 of 4)

MODEL R182 AND TR182 SERVICE MANUAL

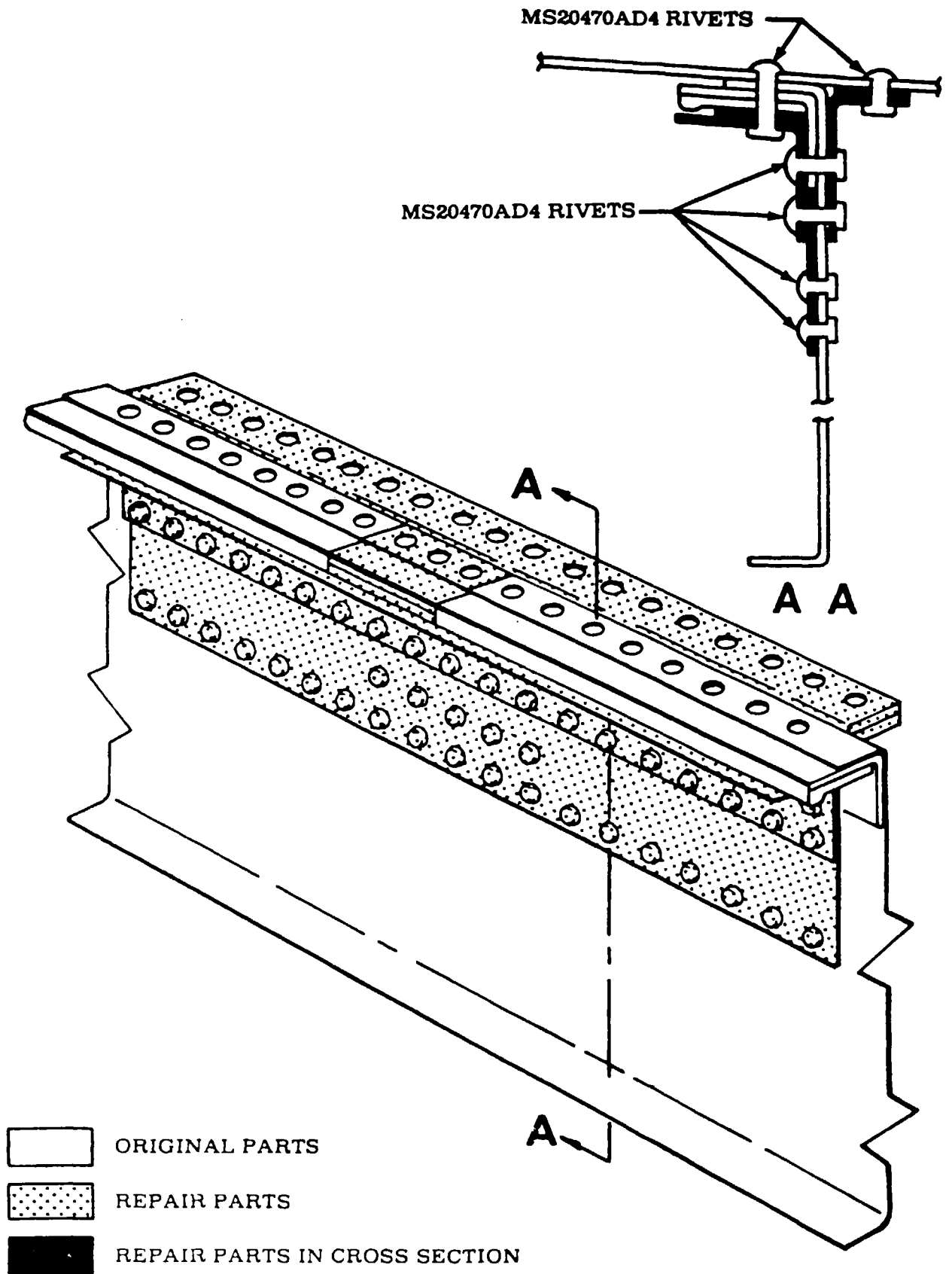


Figure 17-7. Wing Spar Repair (Sheet 4 of 4 continued)

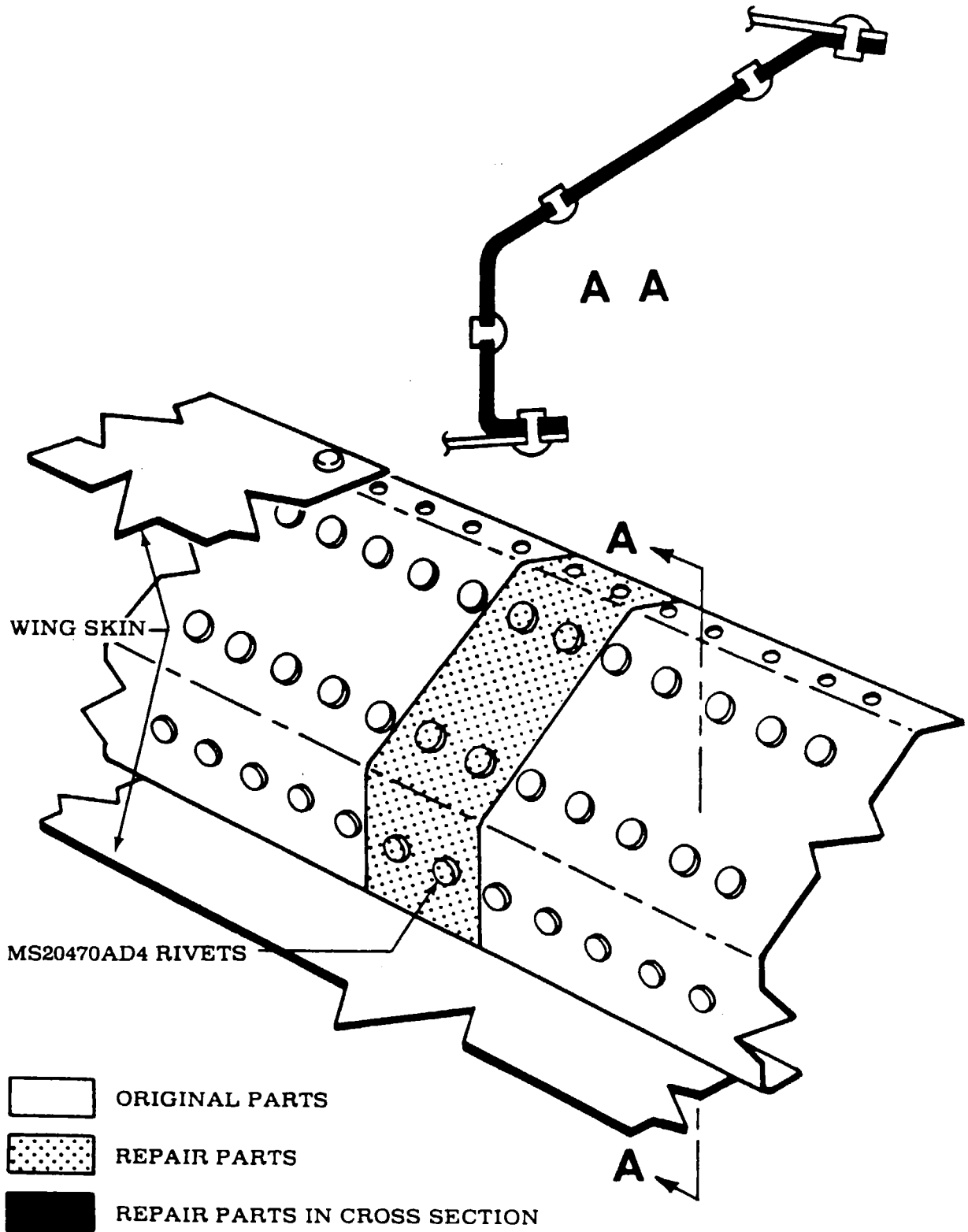


Figure 17-8. Auxiliary Spar Repair

# MODEL R182 AND TR182 SERVICE MANUAL

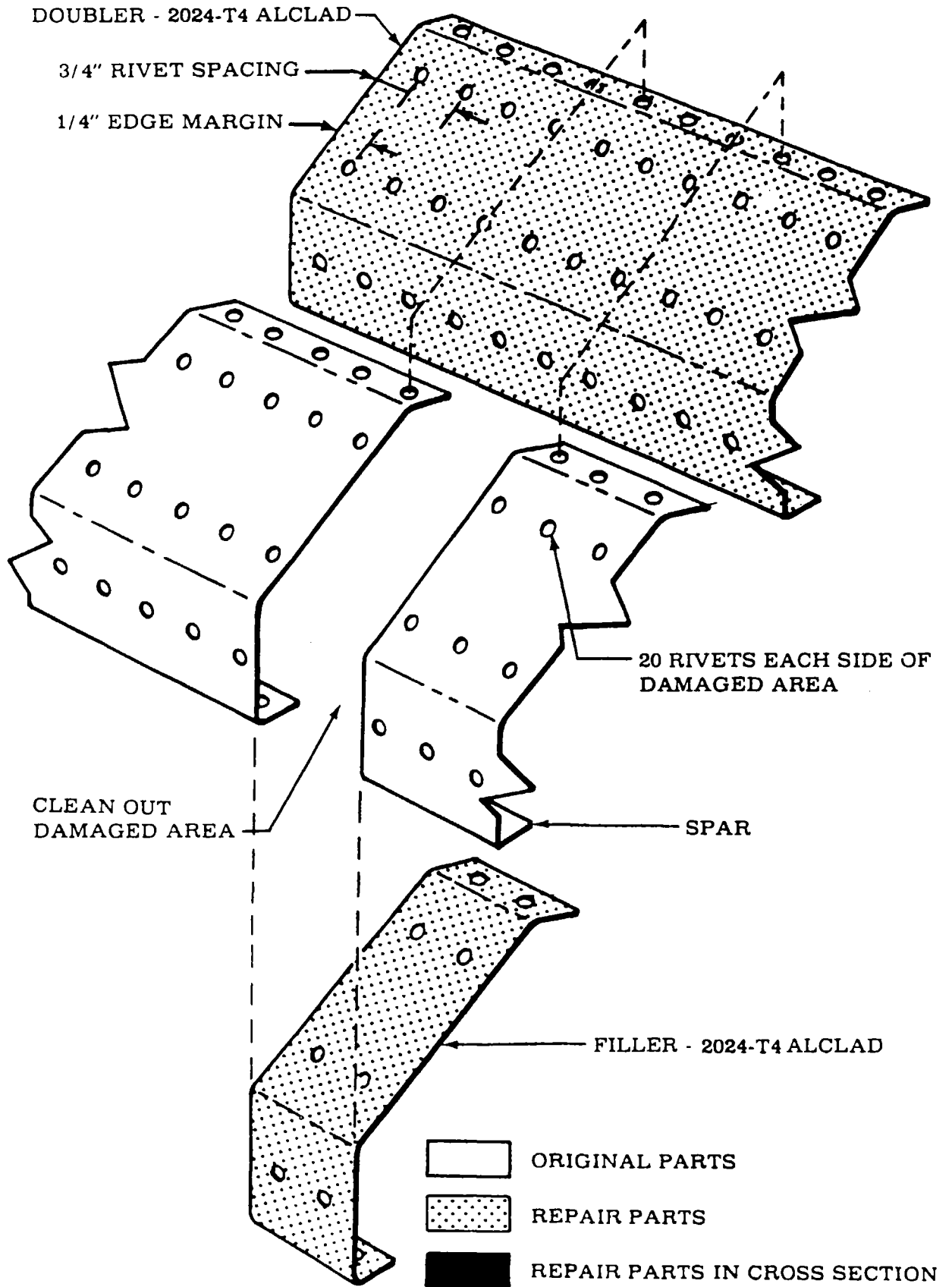


Figure 17-8. Auxiliary Spar Repair (continued)

## MODEL R182 AND TR182 SERVICE MANUAL

### NOTES:

1. Dimple leading edge skin and filler material; countersink the doubler.
2. Use MS20426AD4 rivets to install doubler.
3. Use MS20426AD4 rivets to install filler, except where bucking is impossible. Use CR162-4 Cherry (blind) rivets where regular rivets cannot be bucked.
4. Contour must be maintained; after repair has been completed, use epoxy filler as necessary and sand smooth before painting.
5. Vertical size is limited by ability to install doubler clear of front spar.
6. Lateral size is limited to seven inches across trimmed out area.
7. Number of repairs is limited to one in each bay.

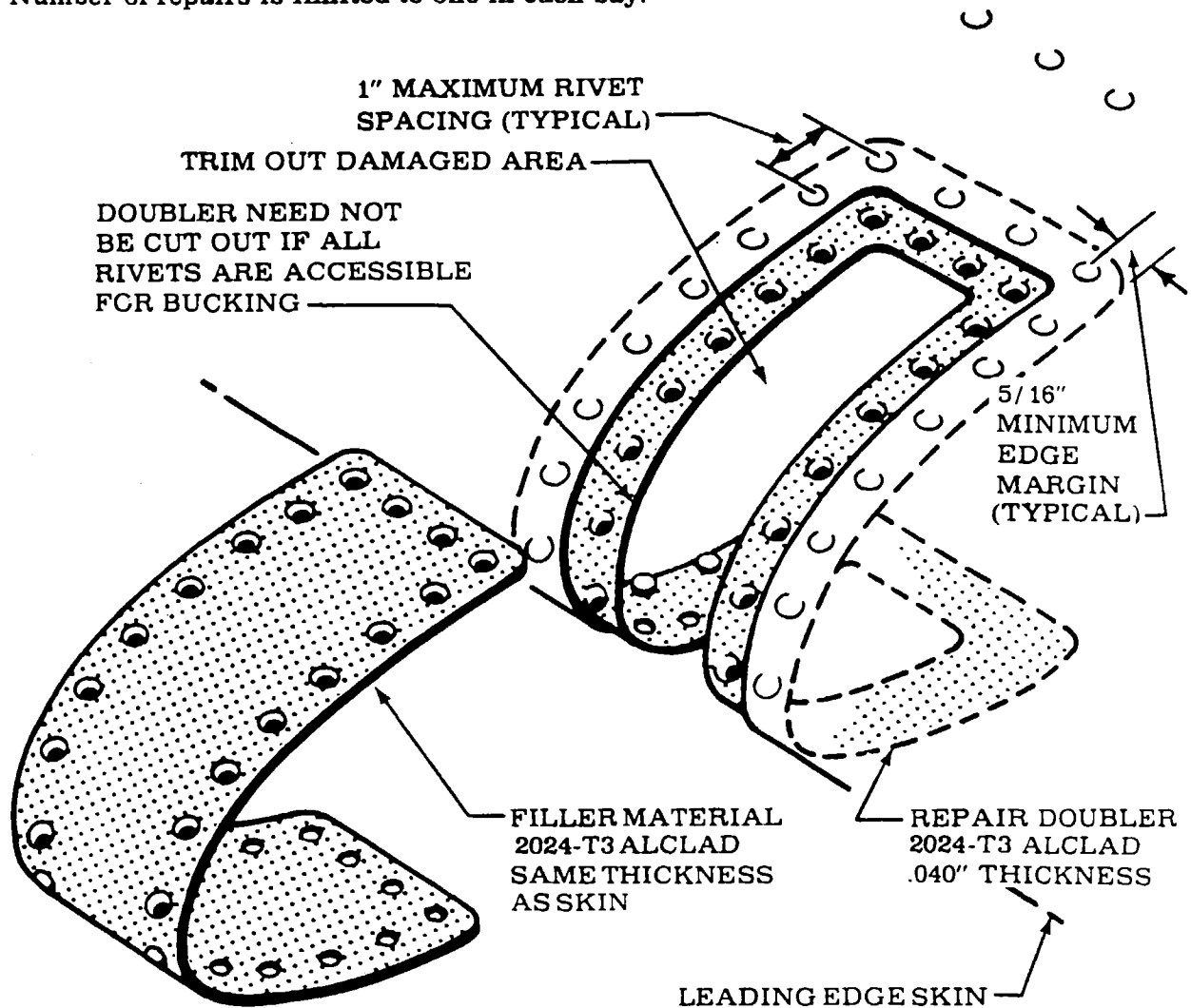


Figure 17-9. Leading Edge Repair

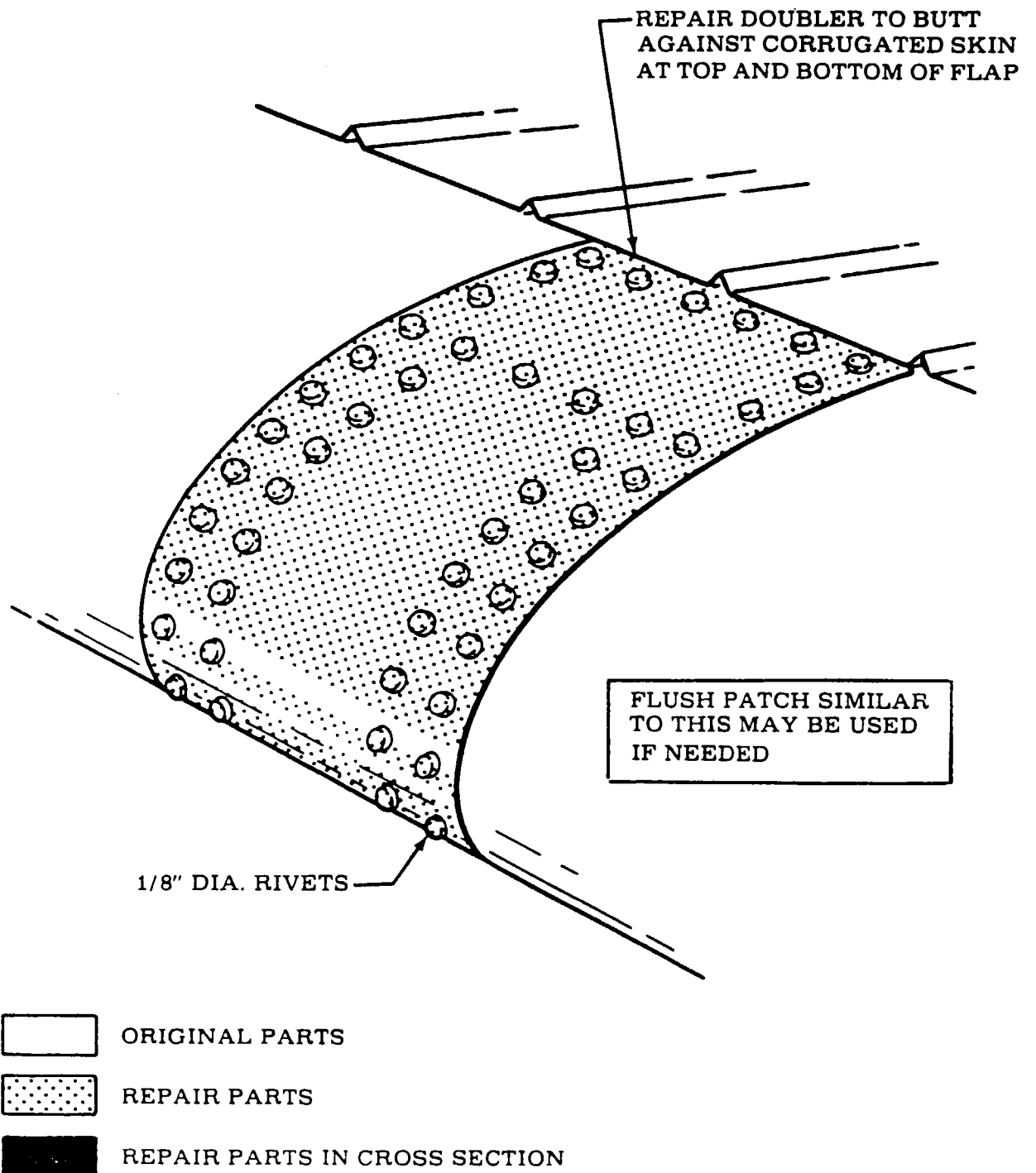


Figure 17-10. Flap Leading Edge Repair

MODEL R182 AND TR182 SERVICE MANUAL

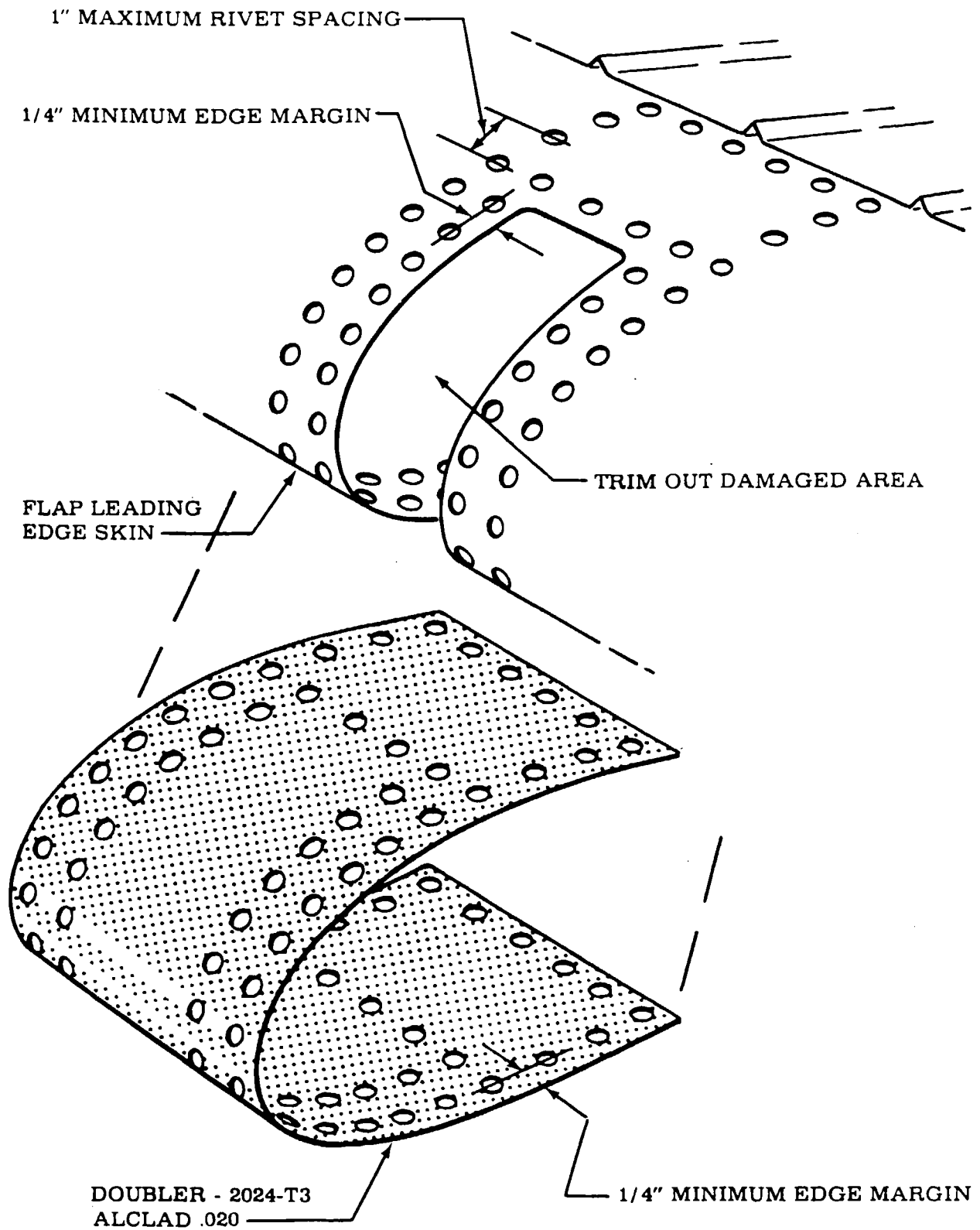


Figure 17-10. Flap Leading Edge Repair (continued)

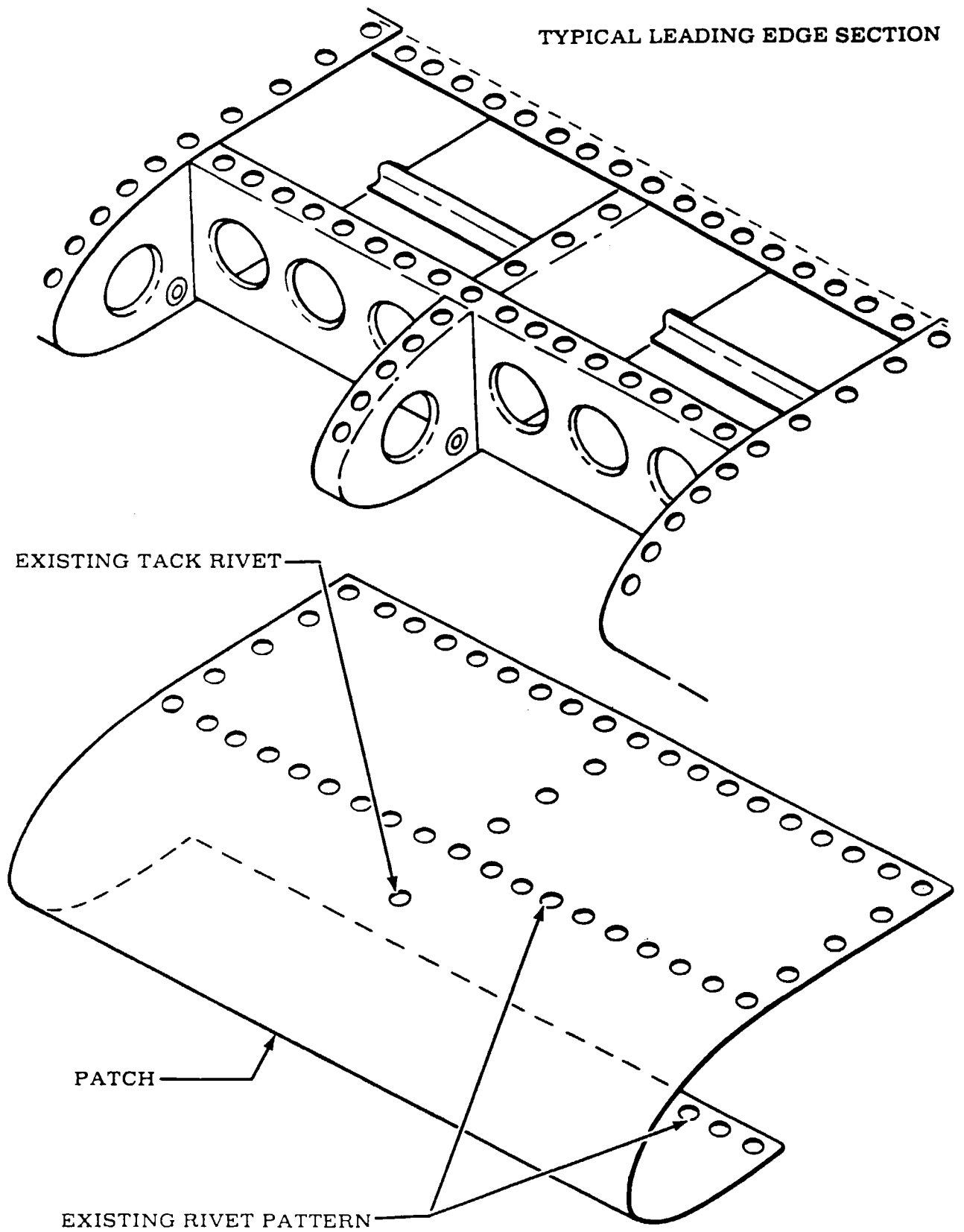
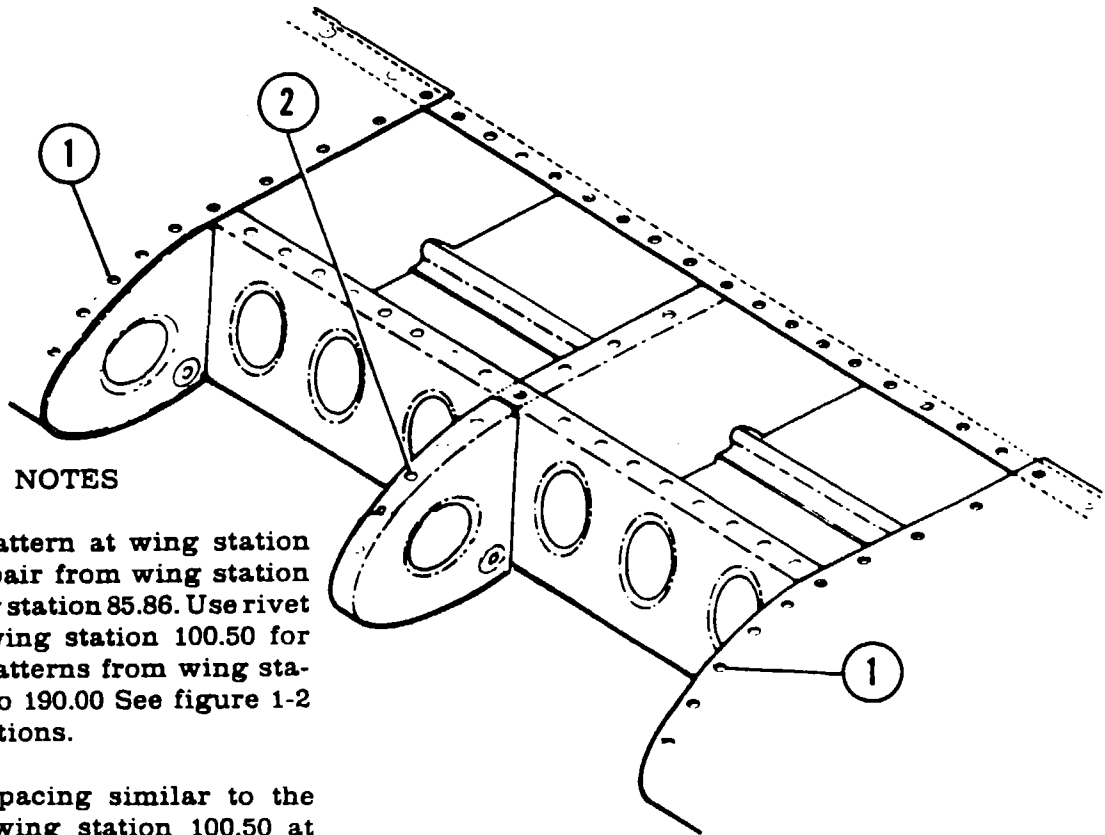


Figure 17-11. Bonded Leading Edge Repair



# MODEL R182 AND TR182 SERVICE MANUAL



## NOTES

- ① Use rivet pattern at wing station 23.62 for repair from wing station 23.62 to wing station 85.86. Use rivet pattern at wing station 100.50 for lap splice patterns from wing station 100.50 to 190.00 See figure 1-2 for wing stations.
- ② Use rivet spacing similar to the pattern at wing station 100.50 at leading edge ribs between lap splices.

Select number of flush rivets to be used at each wing station leading edge rib from table.

## NUMBER OF FLUSH RIVETS IN DIMPLED SKIN REQUIRED IN REPLACEMENT LEADING EDGE SKIN

### RIBS AND STRINGERS:

Blind rivets may be substituted for solid rivets in proportionally increased numbers in accordance with the above table.

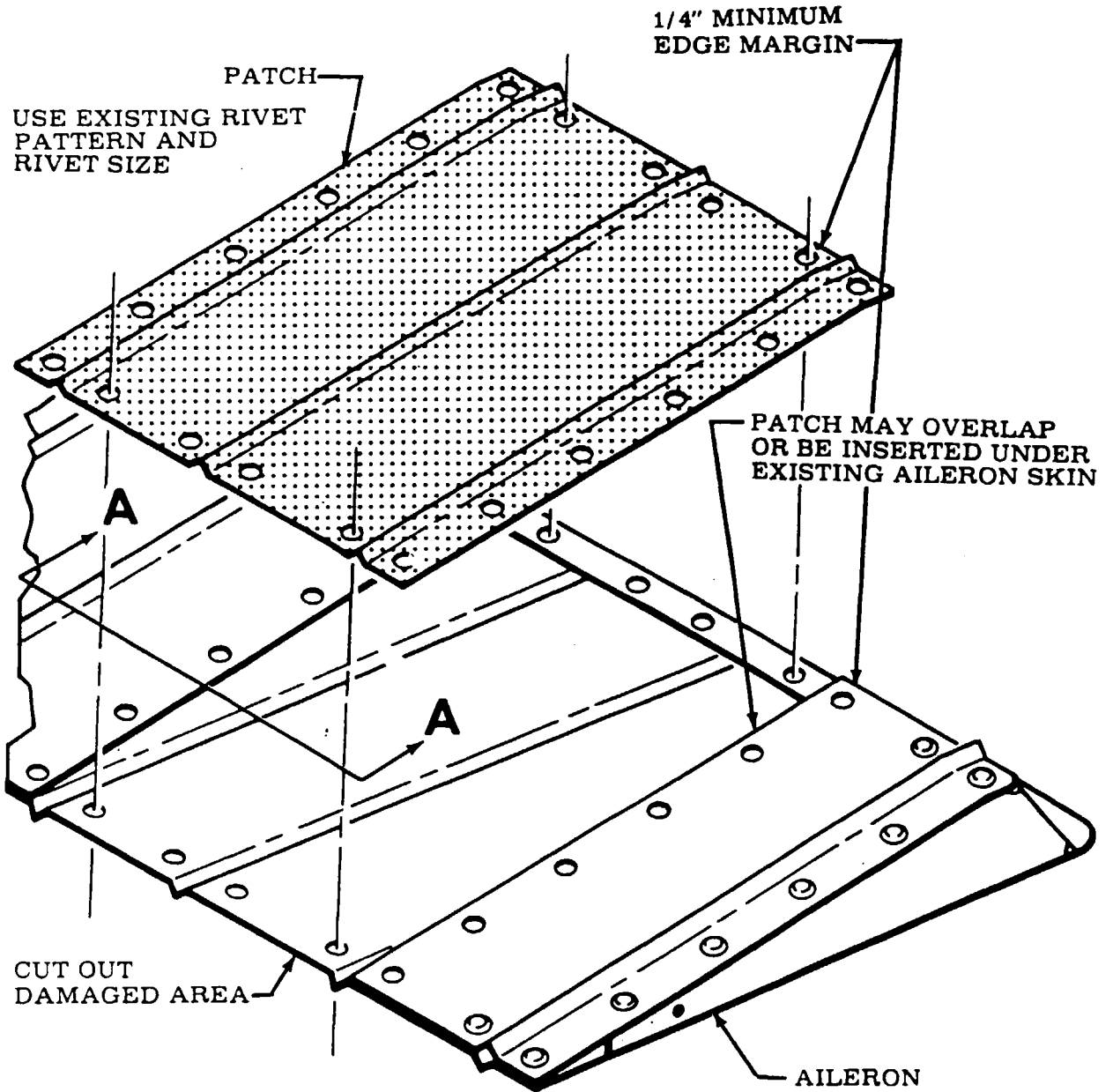
### SPARS:

Blind rivets may be installed in wing spars only in those locations where blind rivets were used during original manufacture, ie fuel bay area of front spars on aircraft with integral fuel bays.

WING STATION RIB	SOLID MS20426-4	BLIND CR2248-4
118	18	22
136	15	18
154	11	13
172	10	12
190	10	12

Figure 17-11. Bonded Leading Edge Repair (continued)

# MODEL R182 AND TR182 SERVICE MANUAL



CUT OUT  
DAMAGED AREA

1/4" MINIMUM  
EDGE MARGIN

PATCH  
USE EXISTING RIVET  
PATTERN AND  
RIVET SIZE

PATCH MAY OVERLAP  
OR BE INSERTED UNDER  
EXISTING AILERON SKIN

AILERON



A A

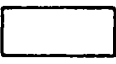
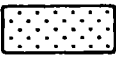

-  ORIGINAL PARTS
-  REPAIR PARTS
-  REPAIR PARTS IN CROSS SECTION

Figure 17-12. Corrugated Skin Repair

## MODEL R182 AND TR182 SERVICE MANUAL

Establish exact location for inspection cover and inscribe centerlines.

Determine position of doubler on wing skin and center over centerlines. Mark the ten rivet hole locations and drill to size shown.

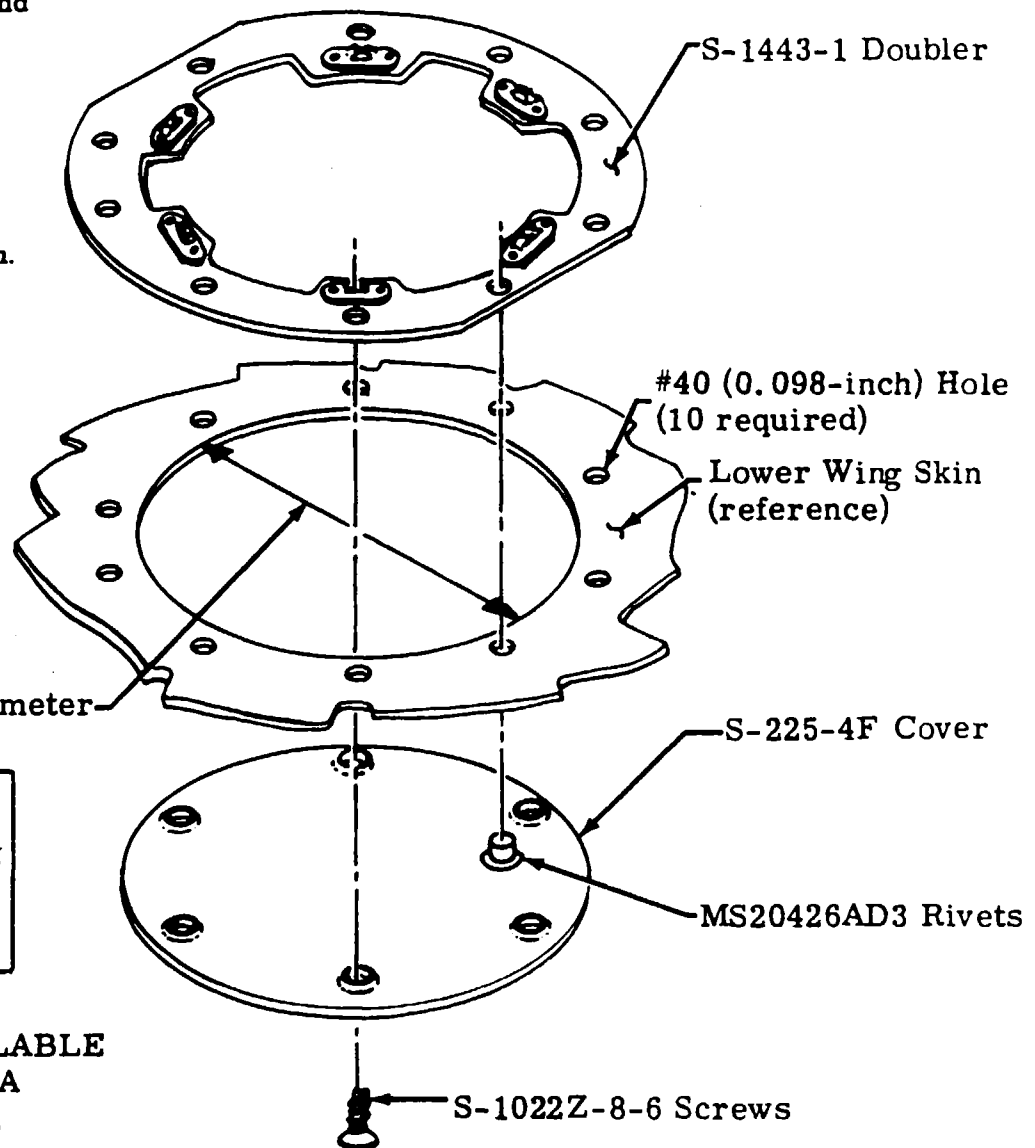
Cut out access hole, using dimensions shown.

Flex doubler and insert through access hole, and rivet in place.

Position cover and secure, using screws as shown.

5.062-inch Diameter

VIEWS FROM  
INSIDE WING  
LOOKING DOWN  
AT TOP OF  
LOWER WING  
SKIN.



PARTS ARE AVAILABLE  
FROM THE CESSNA  
SUPPLY DIVISION.

1. Add the minimum number of access holes necessary.
2. Any circular or rectangular access hole which is used with approved optional equipment installations may be added in lieu of the access hole illustrated.
3. Use landing light installations instead of adding access holes where possible. Do not add access holes at outboard end of wing; remove wing tip instead.
4. Do not add an access hole in the same bay where one is already located.
5. Locate new access holes near the center of a bay (spanwise).
6. Locate new access holes forward of the front spars as close to the front spar as practicable.
7. Locate new access holes aft of the front spar between the first and second stringers aft of the spar. When installing the doubler, rotate it so the two straight edges are closest to the stringers.
8. Alternate bays, with new access holes staggered forward and aft of the front spar, are preferable.
9. A maximum of five new access holes in each wing is permissible; if more is required, contact the Cessna Service Department.
10. When a complete leading edge skin is being replaced, the wing should be supported in such a manner so that wing alignment is maintained.

Figure 17-13. Access Hole Installation

# MODEL R182 AND TR182 SERVICE MANUAL

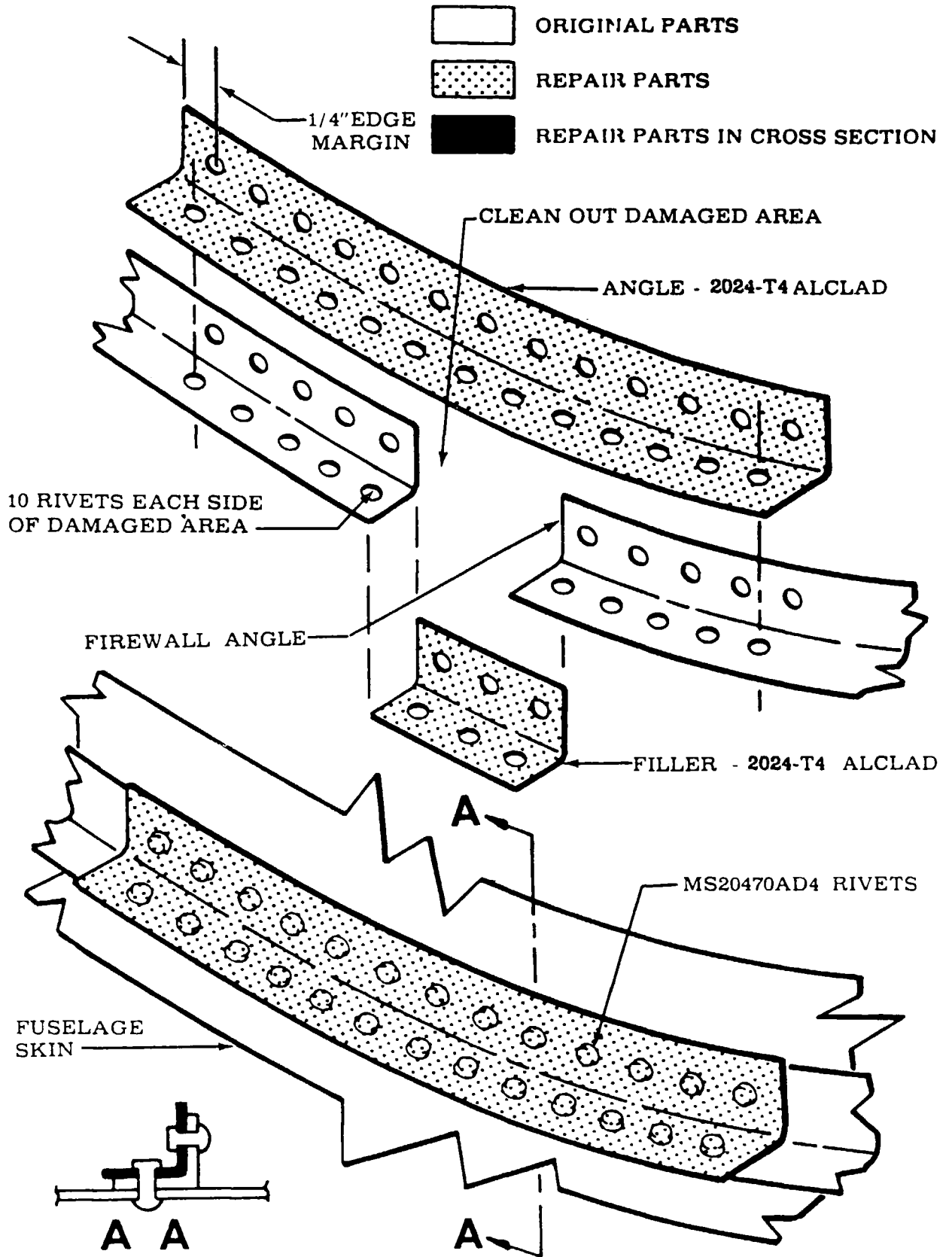
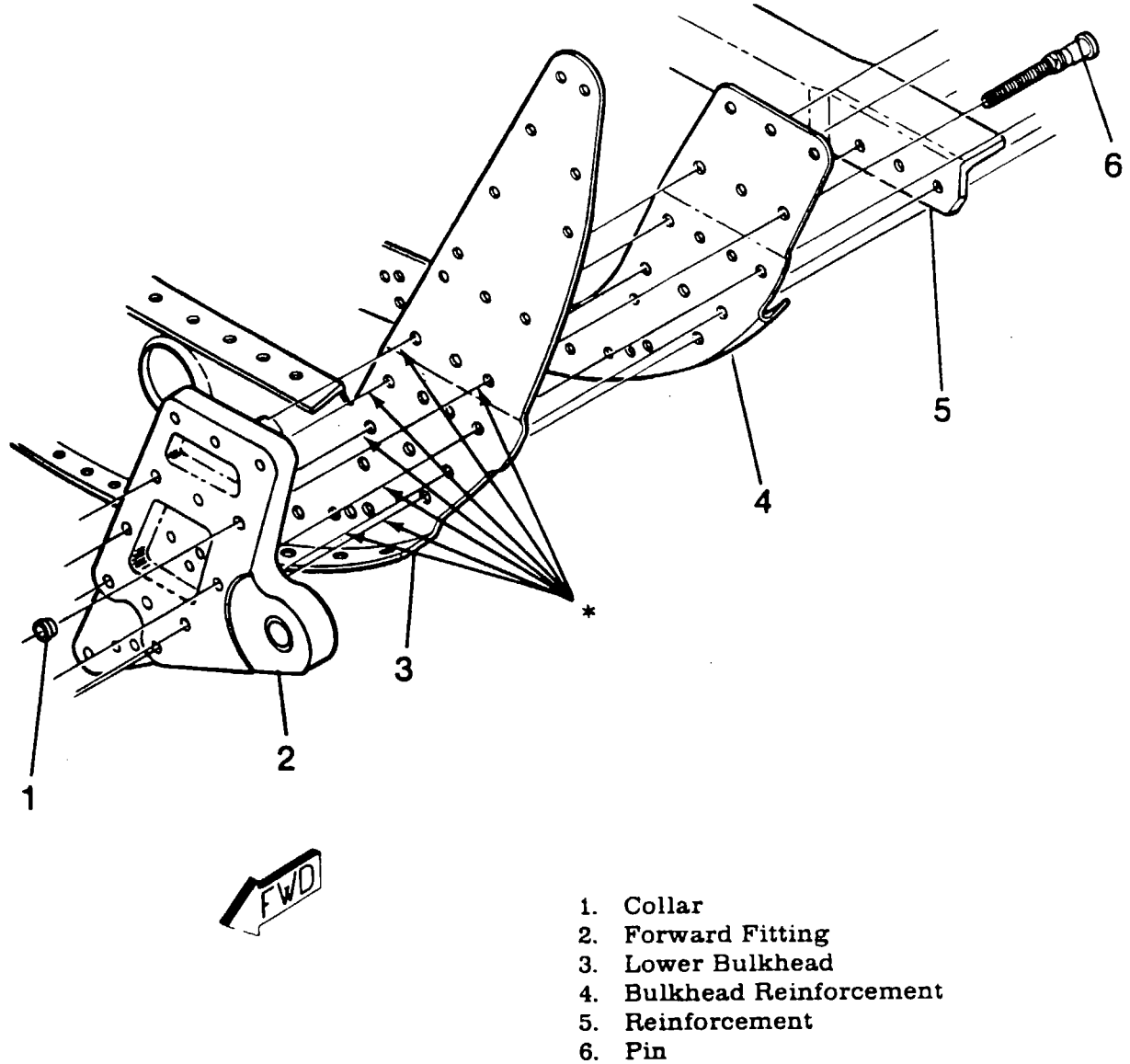


Figure 17-14. Firewall Angle Repair

# MODEL R182 AND TR182 SERVICE MANUAL



NAS1448 pins and NAS1080C8 collars maybe used in place of NAS1054-8 rivets and NAS179-3 collars in the holes indicated by (\*). The alternate pin must have the same grip as the rivet.

Figure 17-15. Forward Doorpost Bulkhead Rivet Replacement

# MODEL R182 AND TR182 SERVICE MANUAL

## SECTION 18

### PAINT

TABLE OF CONTENTS	Page No. Aerofiche/ Manual		
Facility .....	4C18/18-2	Painting Overall .....	4C20/18-4
Clean-up .....	4C19/18-3	Masking .....	4C20/18-4
Prepriming .....	4C19/18-3	Touch-up .....	4C21/18-5
Priming .....	4C19/18-3	Repair of Dents .....	4C21/18-5
Prepainting .....	4C20/18-4	Refinishing Eng. Mounts .....	4C21/18-5

#### NOTE

This section contains standard factory materials listing and area of application. For paint number and color, refer to Aircraft Trim Plate and Parts Catalog. In all cases determine the type of paint on the aircraft as some types of paint are not compatible. Materials may be obtained from the Cessna Supply Division.

#### NOTE

Do not paint pitot tube, gas caps, or aileron gap seals. Also do not paint antenna covers which were not painted at the factory.

#### IMRON MODIFIED URETHANE

MATERIAL	NO/TYPE	AREA OF APPLICATION
PAINT	IMRON ENAMEL	Used as corrosion proof topcoat
	IMRON 192S Activator	Catalyst for Imron Enamel
PRIMER	WASH PRIMER P60G2	Used to prime aircraft for Imron Enamel
REDUCER/ THINNER	IMRON Y8485S Reducer	Used to thin Imron Enamel
	Catalyst Reducer R7K44	Used to reduce P60G2

# MODEL R182 AND TR182 SERVICE MANUAL

## REQUIRED MATERIALS

MATERIAL	NO/TYPE	AREA OF APPLICATION
STRIPPER	Strypeeze Stripper	Used to strip primer overspray
CLEANER	Technical Materials Form Tech AC Cleaner	Used to clean aircraft exterior, plexiglas windows and to remove grease, bug stains, etc.
	Klad Polish	Used to clean aluminum finish
	808 Polishing Compound	Used to rub out overspray
SOLVENT	(MEK) Methyl Ethyl Ketone	Used to tack aircraft prior to topcoat
CLOTH	HEX Wiping Cloth	Used with solvent to clean aircraft exterior
FILLER	White Streak	Used to fill small dents
MASKING	Class A Solvent Proof Paper	Used to mask areas not to be painted
	Tape Y218	Used for masking small areas
	Tape Y231	Used for masking small areas

- 18-1. **FACILITY.** Painting facilities must include the ability to maintain environmental control to a minimum temperature of 65°F., and a positive pressure inside to preclude the possibility of foreign material damage. All paint equipment must be clean, and accurate measuring containers available for mixing protective coatings. Modified Urethane has a pot life of four to eight hours, depending on ambient temperature and relative humidity. Use of approved respirators while painting is a must, for personal safety. All solvent containers should be grounded to prevent static build-up. Catalyst materials are toxic, therefore, breathing fumes or allowing contact with skin can cause serious irritation. Material stock should be rotated to allow use of older materials first, because its useful life is limited. All supplies should be stored in an area where temperature is higher than 50°F., but lower than 90°F. Storage at 90°F. is allowable for no more than sixty days providing it is returned to room temperature for mixing and use.
- Modified urethane paint requires a minimum of seven days to cure under normal conditions, if humidity and temperature are lower, curing time will be extended to a maximum of 14 days. During the curing period, indiscriminate use of masking tape, abrasive polishes, or cleaners can cause damage to finish. Desirable curing temperature for modified urethane is 60°F. for a resulting satisfactory finish.

## MODEL R182 AND TR182 SERVICE MANUAL

### 18-2. CLEAN UP.

- a. Inspect airplane for any surface defects, such as dents or unsatisfactory previous repairs, and correct according to Paragraph 18-9.
- b. Wipe excess sealer from around windows and skin laps using TM-AC solvent. Mask windows, ABS parts, and any other areas not to be primed, with 3M tape and Class A Solvent Proof Paper. Care must be exercised to avoid cuts, scratches or gouges by metal objects to all plexiglass surfaces, because cuts and scratches may contribute to crazing and failure of plexiglass windows. Do not use Methyl Ethyl Ketone (MEK) on windows.
- c. Methyl Ethyl Ketone (MEK) solvent should be used for final cleaning of airplanes prior to painting. The wiping cloths shall be contaminant and lint free HEX. Saturate cloth in the solvent and wring out so it does not drip. Wipe the airplane surface with the solvent saturated cloth in one hand, and immediately dry with a clean cloth in the other hand. It is important to wipe dry solvent before it evaporates.

When an airplane has paint or zinc chromate overspray on the exterior, stripper may be used to remove the overspray. The stripper may be applied by brush and will require a few minutes to soften the overspray. Heavy coatings may require more than one application of the stripper. Use extreme care to prevent stripper from running into faying surfaces on corrosion proofed airplanes. After surfaces of the overspray, clean the airplane with Methyl Ethyl Ketone (MEK) solvent in the prescribed manner.

### WARNING

Use explosion proof containers for storing wash solvents and other flammable materials.

### 18-3. PRE-PRIMING.

- a. Aircraft will receive Sherwin-Williams Wash Primer P60G2, DuPont Imron Enamel for overall color and stripes. Mix one part P60G2 primer with one and one half R7K44 catalyst reducer by volume. Mix only in stainless steel or lined containers. After mixing, allow thirty (30) minutes set time for primer before spraying. Pot life of mixed primer is six hours, therefore, all mixed material must be discarded at this time limit. Pot pressure for spraying should be approximately  $10 \pm 1$  psi. Air pressure should be 40 to 50 psi at the gun. Blow loose contaminant from airplane surface with a jet of clean, dry air. Check all tapes to insure adhesion. Cover flap tracks and nose gear strut and tape wheels and shimmy dampener rod ends. ABS parts and other pre-primed parts do not receive wash primer.

### WARNING

AIRCRAFT SHOULD BE GROUNDED PRIOR TO PAINTING TO PREVENT STATIC ELECTRICITY BUILD-UP AND DISCHARGE.

### 18-4. PRIMING.

- a. Apply primer in one wet even coat. Dry film thickness to be .0003 to .0005 inches. Do not topcoat until sufficiently cured. When scratching with firm pressure of the fingernail does not penetrate the coating, the primer is cured. Primer should be topcoated within four hours after application.



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### 18-5. PREPAINTING.

- a. Thoroughly mix the required amount of Imron with Imron 192S Activator in a three to one ratio. Imron should be sprayed immediately, because there is no induction time. Imron shall be thinned with Y8485S Imron Reducer to obtain a spraying viscosity of 18 to 22 seconds on a No. 2 Zahn Cup. Viscosity should be checked after four hours, and adjusted if necessary.
- b. When applying modified urethane finishes, the painter should wear an approved respirator, which has a dust filter and organic vapor cartridge, or an air supplied respirator. All modified urethane finishes contain some isocyanate, which may cause irritation to the respiratory tract or an allergic reaction. Individuals may become sensitized to isocyanates.
- c. The pot life of the mixture is approximately 6-8 hours at 75°F. Pot pressure should be approximately 12 psi during application. Air pressure at the gun should be 40 to 50 psi.
- d. Scuff sand the primer only where runs or dirt particles are evident. Minor roughness or grit may be removed by rubbing the surface with brown Kraft paper which has been thoroughly wrinkled. Unmask ABS and other preprimed parts and check tapes. Clean surface with a jet of low pressure-dry air.

### 18-6. PAINTING ALL-OVER WHITE OR COLOR.

- a. Complete painting of the plane should be done with 2 or 3 wet, even coats. Dry coats will not reflow, and will leave a grainy appearance.
- b. Allow 5 minute period for the finish to flash off before moving aircraft to the oven.
- c. Move to the force dry oven and dry for approximately 1 1/2 hours at 120°F to 140°F.
- d. Dry film thickness of the overall color should be between 1.3 and 2.0 mils. Films in excess of 3.0 mils are not desirable.

### 18-7. MASKING FOR STRIPES.

- a. Remove airplane from the oven. Allow airplane to cool to room temperature before masking.
- b. Mask stripe area using 3M Tape Y231 or 3M Tape Y218 and Class A solvent proof paper. Double tape all skin laps to prevent blow by.
- c. Airplanes which will have a stripe only configuration shall be masked, cleaned, and primed, in stripe area only.
- d. If the base coat is not over 72 hours old, the stripe area does not require sanding. If sanding is necessary because of age or to remove surface defects, use #400 or #600 sandpaper. Course paper will leave sand marks which will decrease gloss and depth of gloss of the finish. The use of power sanders should be held to a minimum; but if used, exercise care to preclude sanding through the white base coat. Wipe surface to be striped with a tack cloth and check all tapes.
- e. Stripe colors to be Imron Enamel, mixed as directed in paragraph 18-5.
- f. Painting of the stripe should be done with 2 or 3 wet-even coats. Dry coats will not reflow, and will leave a grainy appearance. Stripes may be force dried or air dried. Film thickness of a stripe is approximately 1.0 mil.
- g. Do not remove masking tape and paper until the paint has dried to a "dry to touch" condition. Care should be exercised in removal of the masking to prevent damage to the finish.
- h. Modified urethane finishes are sensitive to moisture, therefore, should be stored out of rain until cured.

## MODEL R182 AND TR182 SERVICE MANUAL

### 18-8. TOUCH-UP.

When necessary to touch up or refinish an area, the defect should be sanded with #400 and followed by #600 sandpaper. Avoid, if possible, sanding through the primer. If the primer is penetrated over an area 1/2 inch square or larger, repriming is necessary. Avoid spraying primer on the adjacent paint as much as possible. Since urethane finishes cannot be "spotted in", repairs should be in sections extending to skin tape or stripe lines.

- a. Dry overspray and rough areas may be compounded out with DuPont #808 rubbing compound.
- b. Grease, bug stains, etc., may be removed from painted surfaces with DX440 Wax and Grease Remover or Imperial Cleaner. Klad Polish may be used on bare aluminum to remove stains, oxides, etc.
- c. Rework areas, where paint or primer removal is required, may be stripped with Strypeeze Paint Remover. All traces of stripper must be removed before refinishing.

### 18-9. REPAIR OF DENTS.

- a. To repair dents, use White Streak Filler or equivalent. Mix White Streak in the correct proportion as recommended by the manufacturer.
- b. Do not apply White Streak Filler over paint. All paint shall be removed in the repair area and the aluminum surface sanded lightly to increase adhesion. Apply the White Streak to a level slightly above the surrounding skin. After drying for 10-15 minutes, sand the filler flush with the skin surface, using care to feather the edges.

18-10. REFINISHING ENGINE MOUNTS. After completing a repair as directed in Section 17, refinish with P/N CES1054-215, Heat Resistant Enamel, Black. Degrease and scuff sand or grit blast entire area to bare metal. Spray enamel to a dry film thickness of 0.001" to 0.0013," and cure at 250°F for 15 minutes. Part can be handled as soon as it cools to touch.

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## SECTION 19

### WIRING DIAGRAMS

TABLE OF CONTENTS	Page No. Aerofiche/ Manual		Page No.
Circuit Function Specific Circuit		Navigation Lights . . . . .	4E19/19-38
Code Letters . . . . .	4D6/19-2	Flashing Beacon Light . . . . .	4E20/19-39
<b>D.C. POWER</b>		Electroluminescent Panel . . . . .	4E21/19-40
Ground Service Receptacle . . . . .	4D8/19-4	Instrument Lights . . . . .	4E22/19-41
Battery Circuit . . . . .	4D9/19-5	Instrument Lights . . . . .	4E23/19-42
Alternator System, 60 AMP . . . . .	4D10/19-6	Instrument Lights . . . . .	4F1/19-44
Circuit Breakers . . . . .	4D11/19-7	Control Wheel Map Light . . . . .	4F2/19-45
Circuit Breakers . . . . .	4D13/19-9	Strobe Lights . . . . .	4F3/19-46
Alternator System, 60 AMP . . . . .	4D14/19-10	Landing Lights . . . . .	4F4/19-47
Alternator System, 60 AMP . . . . .	4D15/19-10A	Post Lighting . . . . .	4F5/19-48
Battery Circuit . . . . .	3H5/19-11	Post Lighting . . . . .	4F6/19-49
Ground Service Receptacle . . . . .	4D17/19-12	Landing Lights . . . . .	4F7/19-50
Circuit Breakers . . . . .	4D18/19-13	Ice Detector Light . . . . .	4F8/19-51
Circuit Breakers . . . . .	4D19/19-14	Map Light Control Wheel . . . . .	4F9/19-52
Battery Circuit . . . . .	4D20/19-15	Map Light Control Wheel . . . . .	4F10/19-52A
Ground Service Receptacle . . . . .	4D21/19-16	<b>LANDING GEAR</b>	
Ground Service Receptacle . . . . .	4D22/19-17	Landing Gear System . . . . .	4F12/19-53
Alternator System, 95 AMP . . . . .	4D23/19-18	Landing Gear System . . . . .	4F13/19-54
Circuit Breakers . . . . .	4D24/19-19	Landing Gear System . . . . .	4F14/19-55
Circuit Breakers . . . . .	4E1/19-20	Landing Gear System . . . . .	4F15/19-56
<b>IGNITION</b>		Landing Gear System . . . . .	4F16/19-57
Ignition System . . . . .	4E2/19-21	<b>HEATING, VENTILATION AND</b>	
<b>ENGINE CONTROL</b>		<b>DE-ICING</b>	
Starter System . . . . .	4E4/19-23	Cigar Lighter . . . . .	4F17/19-58
Starter System . . . . .	4E5/19-24	Heated Pitot/Stall Warning . . . . .	4F18/19-59
<b>FUEL &amp; OIL</b>		Prop Anti-Ice . . . . .	4F19/19-60
Fuel Pump . . . . .	4E6/19-25	Prop Anti-Ice . . . . .	4F20/19-61
Electric Primer (TR182) . . . . .	4E7/19-26	Wing & Stabilizer De-Ice . . . . .	4F21/19-62
<b>ENGINE INSTRUMENTS</b>		Windshield Anti-Ice . . . . .	4F22/19-63
Cylinder Head Temperature		Air Conditioner . . . . .	4F23/19-64
Indicator . . . . .	4E8/19-27	Air Conditioner . . . . .	4F24/19-65
Fuel Quantity Indicator . . . . .	4E9/19-28	Prop Anti-Icing 3 Blade . . . . .	4G1/19-66
Carburetor Air Temperature		<b>CONTROL SURFACES</b>	
Indicator . . . . .	4E10/19-29	Wing Flaps . . . . .	4G2/19-67
Hourmeter . . . . .	4E11/19-30	Electric Trim . . . . .	4G3/19-68
Cylinder Head Temperature		Wing Flaps . . . . .	4G5/19-70
Oil Temperature . . . . .	4E13/19-32	Electric Trim . . . . .	4G6/19-71
Fuel Quantity Indicators . . . . .	4E14/19-33	Electric Trim . . . . .	4G7/19-72
<b>FLIGHT INSTRUMENTS</b>		Electric Trim . . . . .	4G8/19-73
Turn Coordinator, Turn and		Electric Trim . . . . .	4G9/19-74
Bank Indicator . . . . .	4E15/19-34	Electric Trim . . . . .	4G10/19-74A
<b>MISCELLANEOUS INSTRUMENTS</b>		Electric Trim . . . . .	4G11/19-74B
Clock . . . . .	4E16/19-35	<b>WARNING AND EMERGENCY</b>	
Digital Clock . . . . .	4E17/19-36	Landing Gear & Stall Warning	
<b>LIGHTING</b>		System . . . . .	4G12/19-75
Dome Courtesy Lights . . . . .	4E18/19-37	Schematic Dual Warning Unit . . . . .	4G14/19-77
		Schematic Dual Warning Unit . . . . .	4G16/19-79
		Vacuum Out Warning . . . . .	4G18/19-81
		Standby Vacuum Pump . . . . .	4G19/19-82

#### NOTE

Effectivity of diagrams is designated as follows: Eff thru ser (SRXXXX) denotes effectivity to the serial number prior to the (SRXXXX) serial. Ser (SRXXXX) & on denotes effectivity for the (SRXXXX) serial and on. Diagrams and/or portions of, may be individually serialized and not designated by a (SRXXXX) number.

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## CIRCUIT FUNCTION AND SPECIFIC CIRCUIT CODE LETTERS

- A - Armament
- B - Photographic
- C - Control Surface
  - CA - Automatic Pilot
  - CC - Wing Flaps
  - CD - Elevator Trim
- D - Instrument (Other Than Flight or Engine Instrument)
  - DA - Ammeter
  - DB - Flap Position Indicator
  - DC - Clock
  - DD - Voltmeter
  - DE - Outside Air Temperature
  - DF - Flight Hour Meter
- E - Engine Instrument
  - EA - Carburetor Air Temperature
  - EB - Fuel Quantity Gage and Transmitter
  - EC - Cylinder Head Temperature
  - ED - Oil Pressure
  - EE - Oil Temperature
  - EF - Fuel Pressure
  - EG - Tachometer
  - EH - Torque Indicator
  - EJ - Instrument Cluster
- F - Flight Instrument
  - FA - Bank and Turn
  - FB - Pitot Static Tube Heater and Stall Warning Heater
  - FC - Stall Warning
  - FD - Speed Control System
  - FE - Indicator Lights
- G - Landing Gear
  - GA - Actuator
  - GB - Retraction
  - GC - Warning Device (Horn)
  - GD - Light Switches
  - GE - Indicator Lights
- H - Heating, Ventilating and De-Icing
  - HA - Anti-icing
  - HB - Cabin Heater
  - HC - Cigar Lighter
  - HD - De-ice
  - HE - Air Conditioners
  - HF - Cabin Ventilation
- J - Ignition
  - JA - Magneto
- K - Engine Control
  - KA - Starter Control
  - KB - Propeller Synchronizer
- L - Lighting
  - LA - Cabin
- LB - Instrument
- LC - Landing
- LD - Navigation
- LE - Taxi
- LF - Rotating Beacon
- LG - Radio
- LH - De-ice
- LJ - Fuel Selector
- LK - Tail Floodlight
- M - Miscellaneous
  - MA - Cowl Flaps
  - MB - Electrically Operated Seats
  - MC - Smoke Generator
  - MD - Spray Equipment
  - ME - Cabin Pressurization Equipment
  - MF - Chem O<sub>2</sub> - Indicator
- P - D.C. Power
  - PA - Battery Circuit
  - PB - Generator Circuits
  - PC - External Power Source
- Q - Fuel and Oil
  - QA - Auxiliary Fuel Pump
  - QB - Oil Dilution
  - QC - Engine Primer
  - QD - Main Fuel Pumps
  - QE - Fuel Valves
- R - Radio (Navigation and Communication)
  - RA - Instrument Landing
  - RB - Command
  - RC - Radio Direction Finding
  - RD - VHF
  - RE - Homing
  - RF - Marker Beacon
  - RG - Navigation
  - RH - High Frequency
  - RJ - Interphone
  - RK - UHF
  - RL - Low Frequency
  - RM - Frequency Modulation
  - RP - Audio System and Audio Amplifier
  - RR - Distance Measuring Equipment (DME)
  - RS - Airborne Public Address System
- S - Radar
- U - Miscellaneous Electronic
  - UA - Identification - Friend or Foe
- W - Warning and Emergency
  - WA - Flare Release
  - WB - Chip Detector
  - WC - Fire Detection System
- X - A.C. Power

# MODEL R182 AND TR182 SERVICE MANUAL

FUNCTION CIRCUITS	GAUGE	BASE COLOR (or solid)	STRIPE COLOR
A + Power	16	Red	None
	18	Red	Black
		Red	White
	20	Red	Green
	22	Red	Yellow
Ground	16	Black	None
	18	Black	White
Mike Ground	22	Black	None
Radio Lights Dim	18	Yellow	None
Mike Audio	22	Tan	None
		Tan (Shielded)	None
Mike Key	22	White	Black
Radio Speaker	20	Green	None
Headphones	22	Blue	None
Dev + •	22	Gray	Red
Dev - •	22	Gray	Green

- "Dev+" and "Dev-" circuits are for use in Nav-o-matic 300 autopilots and any associated omni indicator circuit to which it connects.

### NOTE

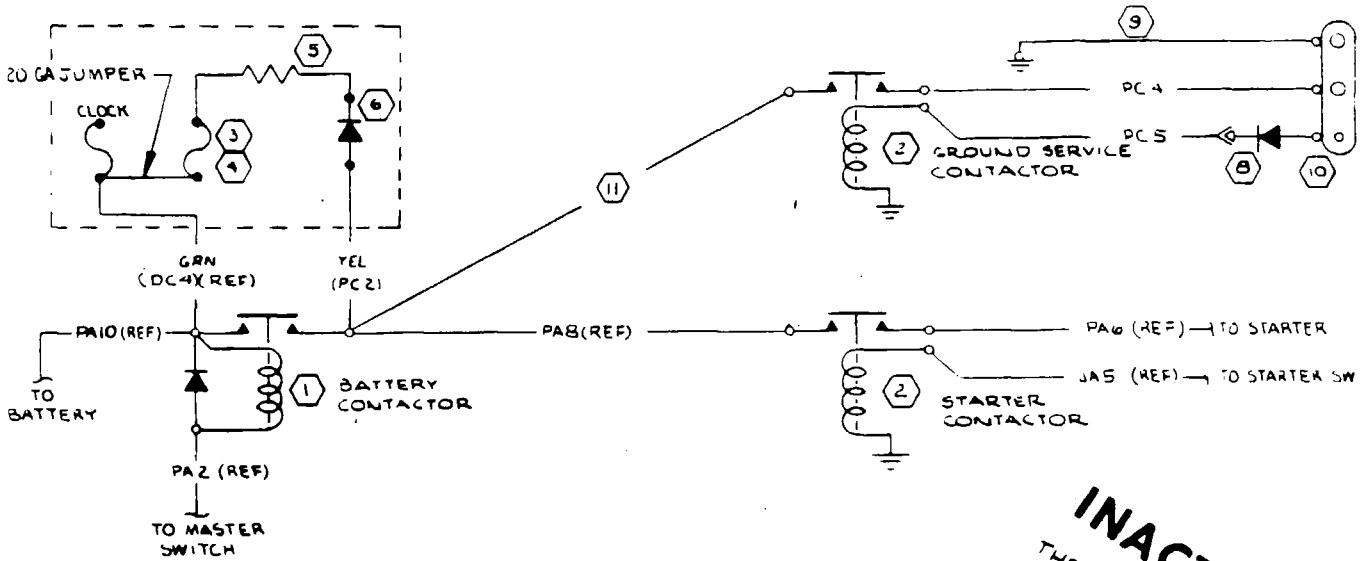
All other color coded wires are for general use in multi-conductor radio and autopilot harness assemblies.

### CROSS REFERENCE LISTING OF SERIAL REQUEST NUMBERS LISTED ON DIAGRAMS VS. AIRCRAFT SERIAL NUMBERS.

SR. NO.	AIRCRAFT SERIAL NO.	SR. NO.	AIRCRAFT SERIAL NO.
SR8462	R18200001 - FR18200001	SR9554	R18201470
SR8782	R18200584 - FR18200026	SR9583	R18201230
SR8970	R18200004 - FR18200001	SR9632	R18201629
SR8982	R18200584	SR9738	R18201542
SR8995	R18200428 - FR18200021	SR9799	R18201629 - TR1822006
SR9087	R18200508	SR9828	R18201752
SR9112	R18201314 - FR18200046	SR9853	R18201696
SR9140	R18200509	SR9951	R18201799
SR9187	R18200584	SR10003	R18201799
SR9195	R18200670	SR10068	R18201799
SR9215	R18201090 - FR18200046	SR10099	R18201929
SR9369	R18204520 - FR18200021	SR10122	R18201799
SR9429	R18200961	SR10152	R18201799
SR9437	R18200800 - FR18200046	SR10213	R18201809
		SR10415	R18202000
		SR10837	R18202009

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: PA10(REF) WAS PA1(REF) (SR 8782)	CS 8-3-78	JAS 0116 11/9/78



INACTIVE

THRU SEA (SA 9215)  
DD HAYN  
38001 JAS  
12-11-78

QTY	PART NO.	DESCRIPTION
1	1553112	BUS BAR ASSY
10	MS 3506-1	RECEPTACLE
9	0312153	GND STRAP
8	1570043	DIODE BOARD ASSY
6	20H3P	DIODE
5	1-26263	.75 Ω RESISTOR
4	S-1090-2	FUSE HOLDER
3	S-1091-5	FUSE
2	S-1577-1	CONTACTOR
1	S-1580-1	CONTACTOR

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
PC 5	22				
PC 4	4	S-1562-4-9		51367-10 S-1493-1	
PC 2	22	22-4		51367-6-4 S-1367-6-13	
				SOLDER S-361-113	

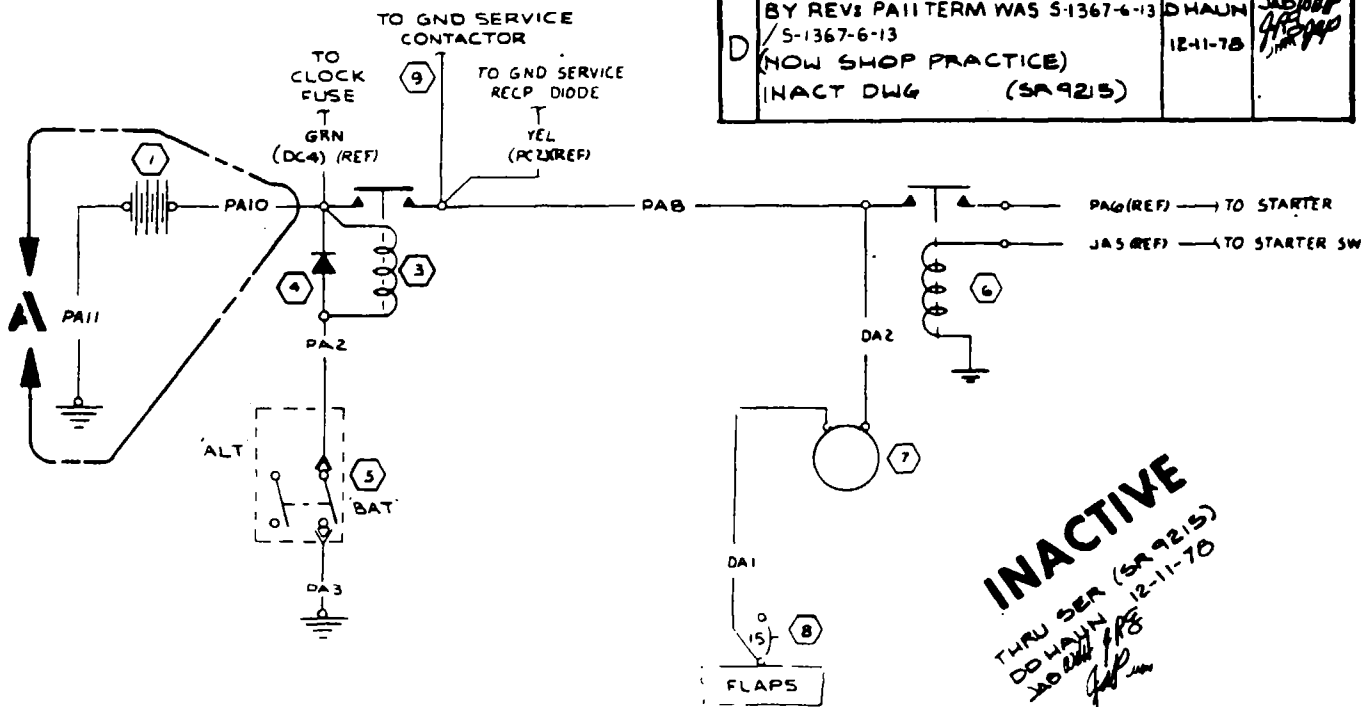
**EQUIPMENT TABLE**

CEB-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CEB-1000-CEBNA SPEC. NO.  
S-1000 OR CM1000-CEBNA  
STD. NO.

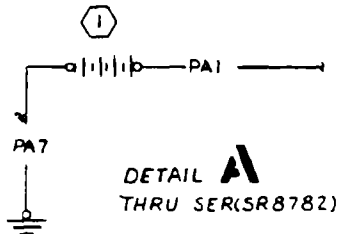
CONTRACT NO.			Cessna AIRCRAFT CO.			PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS		
DESIGN	NAME	DATE	TITLE					
	SPENCER	3-28-77	WIRING DIAGRAM - GROUND SERVICE RECEPTACLE (OPT)					
GROUP	W. H. Anderson	4-13-77						
DRAWN	R. SWANSON	3-6-77						
CHECK	J. TOUPEL	3-18-77						
STRESS								
PROJ	J. J. MOORE	4-14-77	SIZE	CODE IDENT. NO.	DWG NO.			
APPRO	JAS		C	71379	2270001			
OTHER			SCALE: NONE	(SR 8942)	PAGE: 4.1			

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: S-1360-15L WAS S-1232-30L ; ADD PAB, 155311Z WAS ON S-1577-1 ; S-1367-4-B/DA1 WAS S-1367-4-16 ; C669543-0102 WAS C669502-0211 (SR 8462)(REF) (SR 8782) C614001-0105 WAS -0101 (SR9087)	DLP 2-15-78  CRS	JAS JAS
B	BY REV: C614002-0101 WAS C614001-0105 (SR9087)	CRS 4-25-78	JAS JAS
C	BY REV: ADD DETAIL 'A' ; SER, PA10 ; PA11 (SR8782)	CS 8-3-78	JAS JAS
D	BY REV: PA11 TERM WAS S-1367-4-13 /S-1367-6-13 (NOW SHOP PRACTICE) (INACT DWG (SR9215)	DHAUN 12-11-78	JAS JAS



**INACTIVE**  
THRU SER (SR 9215)  
DHAUN 12-11-78  
JAS



ITEM NO	PART NO.	DESCRIPTION
9	155311Z	BUS BAR ASSY
8	S-1360-15L	CNT BXR
7	C669543-0102	INST CLUSTER
6	S-1577-1	STARTER CONTACTOR
5	S-1994-1-1	SWITCH
4	077072B	DUDE ASSY
3	S-580-1	BAT. CONTACTOR
2		
1	C614002-0101	BATTERY ASSY

CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES-XXXX-CESNA SPEC. NO  
S-XXX OR CMXXXX-CESNA  
STD. NO.

SUPERSEDES:  
  
SUPERSEDED BY:  
2270001 PA.6

WIRE CODE NO.	G.A.	MATERIAL	LG	TERMINALS	SERIALS
PA11	4	S-1562-4-9	9	S-1367-4-13 S-1367-4-12	SER(SR8782) & ON
PA10	4	S-1562-4-9	72	S-1367-4-13 S-1367-6-13	SER(SR8782) & ON
PAB	4	S-1562-4-9	9	S-1367-6-13 S-1367-6-13	
PA7	4	S-1562-4-9	24	S-1367-6-13 S-1367-6-13	THRU SER(SR8782)
PA2	22		89	S-1493-1 S-1367-1-8	
PA1	4	S-1562-4-9	16	S-1367-4-10 S-1367-4-13	THRU SER(SR8782)
DA2	8	S-1562-4-9	72	S-1367-4-10 S-1367-4-10	
DA1	8	S-1562-4-9	41	S-1367-4-10 S-1367-4-8	

CONTRACT NO.			Cessna AIRCRAFT CO.		PAWNEE DIVISION 3800 E PAWNEE WICHITA, KANSAS
DESIGN	NAME	DATE	TITLE		
	SPENCER	3-28-77	WIRING DIAGRAM — BATTERY CIRCUIT		
GROUP	D. H. ...				
DRAWN	SCHIFFELBEIN				
CHECK	J. YOUSEL				
STRESS					
PROJ	1 MODUC		SIZE	CODE IDENT NO	DWG NO
APPD	JRS		C	71379	2270001
OTHER			SCALE: NONE	(SR 8462)	PAGE: 4 2

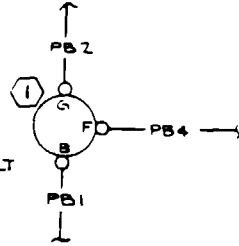
# MODEL R182 AND TR182 SERVICE MANUAL

NOTE:

THIS CAPACITOR IS TO BE ADDED ONLY WHEN REQD TO PREVENT OVERVOLT SENSOR TRIP-OUT DURING GEAR CYCLING AND IS TO BE INSTALLED ONLY WITH THE C593003-0101 OVERVOLT SENSOR

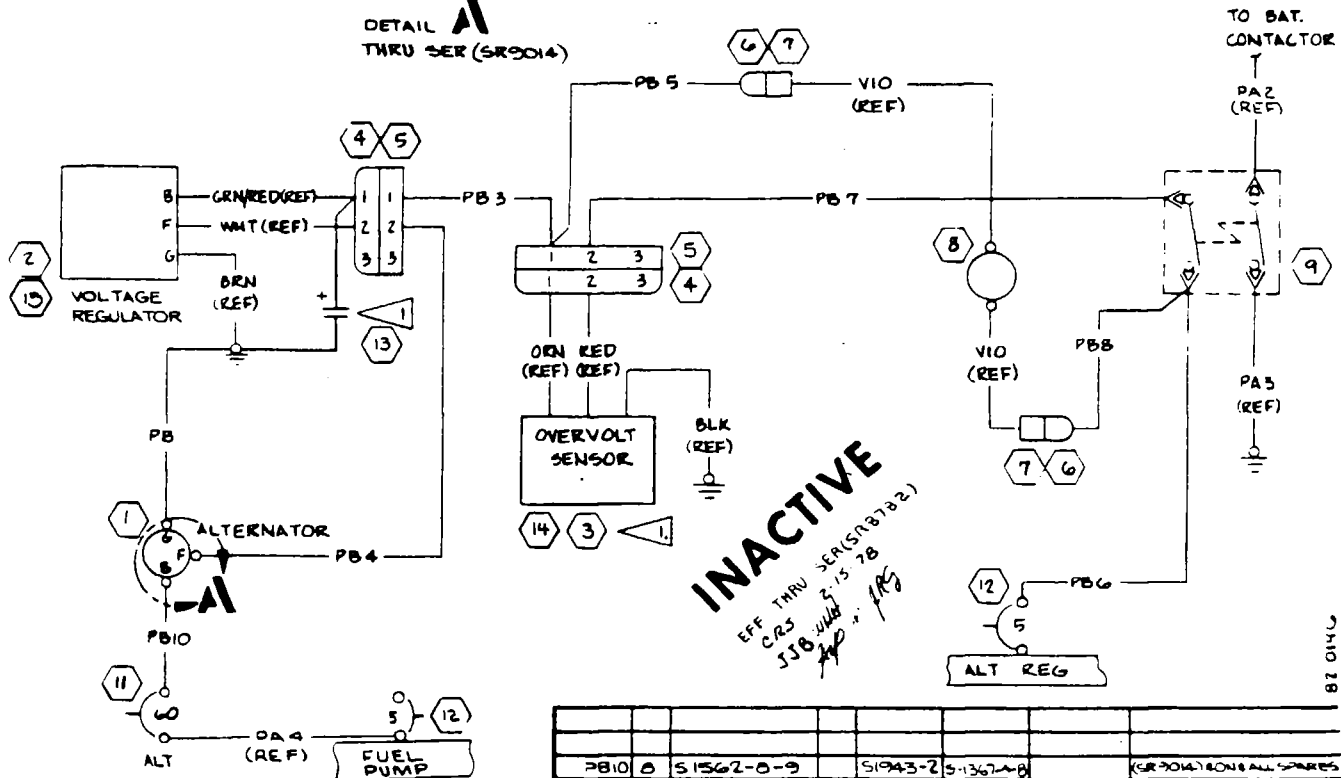
NOTE:

THIS CAPACITOR IS TO BE ADDED ONLY WHEN REQD TO PREVENT OVERVOLT SENSOR TRIP-OUT DURING GEAR CYCLING AND IS TO BE INSTALLED ONLY WITH THE C593003-0101 OVERVOLT SENSOR.



DETAIL A  
THRU SER (SR2014)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADDED DETAILS SER IN PBD (PB10, SER OUT PB1-PB2 (SR2014)) S-1493-1/PB6 WAS S-1493-2 S-1367-4-12/PB2 WAS S-1367-4-10 (NOW SHOP PRACTICE) R182 E0655 DWG BECOMES INACT (SR 8782)	2-15-78	JJB CRS
B	BY REV: ADDED NOTE 1 & TVA 1315, S-1636-1/PB7 WAS S-1635-1, S-1636-2/PB3, PB5 WAS S-1635-2, S-1638-2/C593003-0101 WAS S-1638-1 (NOW SHOP PRACTICE) (MER182-E0653) ADDED C593003-0103 (ALT), C611004-0101 (ALT) (REF) (SR 9140)	4-12-78	JJB CRS LSS



**INACTIVE**  
EFF THRU SER(SR8782)  
CRS  
JJB 3/15/78  
APD

ITEM NO	PART NO.	DESCRIPTION
15	C611004-0101	VOLTAGE REGULATOR (ALT)
14	C593003-0103	OVERVOLT SENSOR (ALT)
13	TVA 1315	CAPACITOR
12	S-1360-5L	CIRCUIT BREAKER
11	S-1707-60	CIRCUIT BREAKER
9	S-1494-1-1	MASTER SWITCH
8	S-2135-2	LAMP ASSY
7	S-1637-2	HOUSING
6	S-1637-1	HOUSING
5	S-1638-1	HOUSING
4	S-1638-2	HOUSING
3	C593003-0101	OVERVOLT SENSOR
2	C611002-0105	VOLTAGE REGULATOR
1	C611503-0102	ALTERNATOR

PART NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
PB10	8	S-1562-8-9	S-1943-2	S-1367-4-10	(SR2014) NONE ALL SPARES
PB9	8	S-1562-8-9	S-1943-3	S-1367-4-12	(SR2014) NONE ALL SPARES
PB8	22		SEE PB6	S-1635-1	
PB7	1		S-1493-1	S-1636-1	THRU (SR 8782)
PB6	1		S-1367-1-6	S-1493-1	
PB5	1		SEE PB3	S-1635-1	THRU (SR 8782)
PB4	1		S-1636-1	S-1367-1-10	
PB3	22		S-1636-2	S-1636-1	THRU (SR 8782)
PB2	8	S-1362-8-9	S-1367-4-10	S-1367-4-12	THRU (SR 2014)
PB1	8	S-1562-8-9	S-1367-4-12	S-1367-4-10	THRU (SR 2014)

CONTRACT NO:			Cessna AIRCRAFT CO.	
DESIGN	NAME	DATE	TITLE	
	SPENCER	3-28-77	WIRING DIAGRAM - ALTERNATOR SYSTEM, 60 AMP	
GROUP	D. H. HANCOCK	6-13-77		
DRAWN	HARVEY	3-16-77		
CHECK	J. YOUEL	3-18-77		
STRESS				

EQUIPMENT TABLE		SUPERSEDES:		PROJ	DATE	SIZE	CODE IDENT.	DWG NO
C611004-0101				L.H. MOORE	4-14-77	C	71379	2270001
C593003-0103				APPD				
TVA 1315				OTHER				
S-1636-1								
S-1636-2								
C593003-0101		SUPERSEDED BY: 2270001 PG 4.5						
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
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S-1636-2								
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C611503-0102								
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TVA 1315								
S-1636-1								
S-1636-2								
C593003-0101								
C611002-0105								
C611503-0102								
C611004-0101								
C593003-0103								
TVA 1315								
S-1636-1								
S-1636-2								



# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV GEAR PUMP BKR WAS ON BUS BAR, ADD PAS DAI WAS TO "GEAR PUMP" BKR; S-1367-4-B/PAS WAS S-1367-4-6; S-1367-3-B/PAS WAS S-1367-3-10 (SR8462)(REP)	DLP 0-18-77	JAB <i>with</i> JRS JRS
B	BY REV: NOTE 1 WAS "INSTALL 18.0 IN OF IMPERIAL EASTMAN (80327) POLY-FLO TUBING 66-P-3/8 (NOW SHOP PRACTICE)	RLY 4-25-78	JAB <i>with</i> JRS
C	BY REV: ADD DETAIL A 4 SHT 4.4.1. (SR 8982)	PSA 2-19-79	JRS <i>with</i> JRS

**NOTES:**

- 1. INSTALL S-1071-3-18.0 TUBING OVER PAS WIRE BEFORE INSTALLING TERMINALS

INACTIVE

EFF THRU SER(SR 9112)  
DJA 2-19-79  
JAB *with* JRS 1044

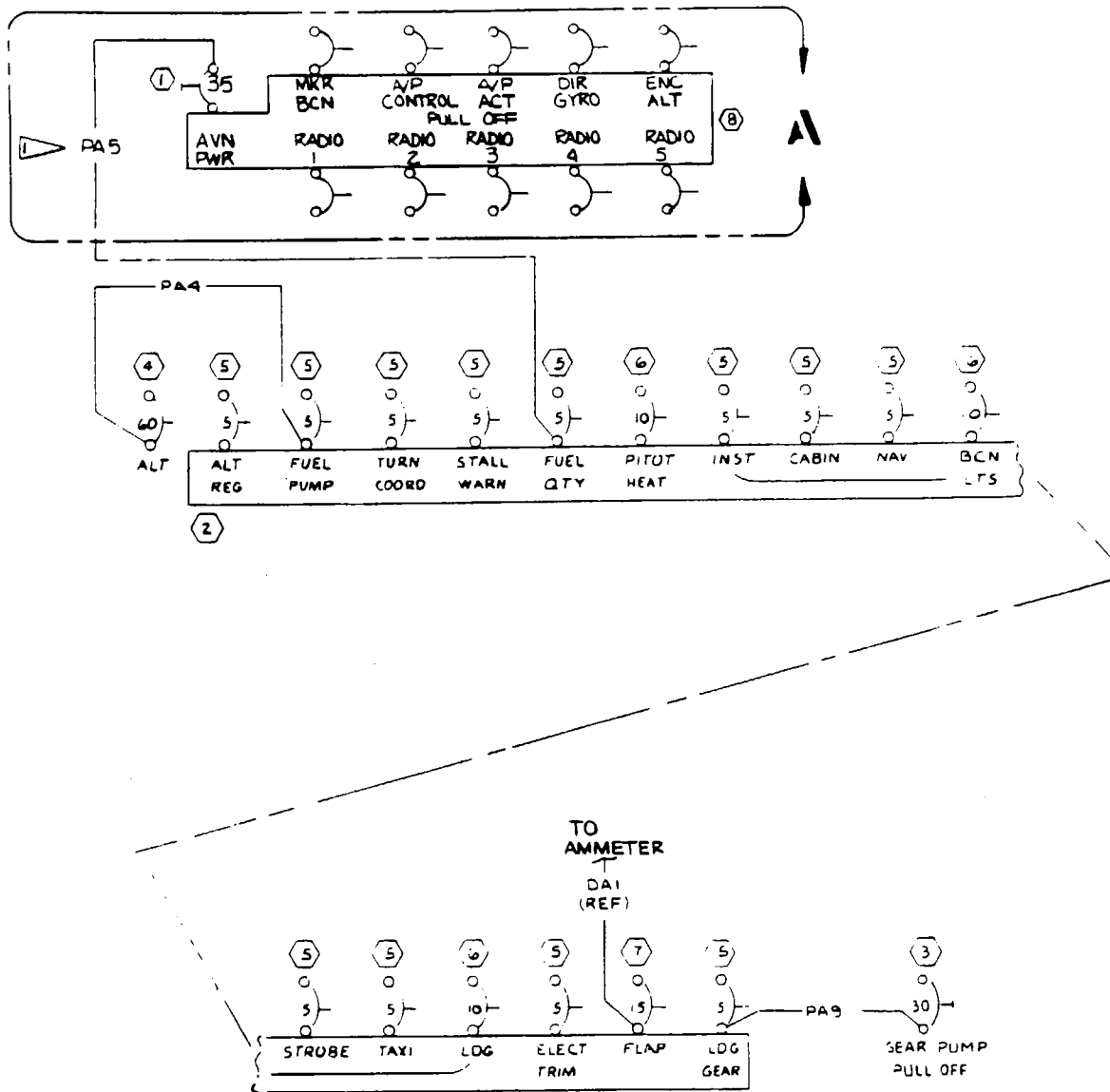
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
PA9	12			S-1367-3-B S-367-3-6	
PA4	8	S-1562-B-9	2	S-1367-3-B S-1367-4-6	
PA5	10	S-1562-0-9	16	S-1367-3-B S-1367-3-8	

QTY	PART NO	DESCRIPTION	REMARKS
3	22700-0	BUS BAR	
7	S-1360-15L	CIRCUIT BREAKER	
6	S-1360-10L	CIRCUIT BREAKER	
5	S-1360-5L	CIRCUIT BREAKER	
4	S-1707-60	CIRCUIT BREAKER	
3	S-1232-30L	CIRCUIT BREAKER	
2	270B31	BUS BAR	
1	S-22B1-1	SWITCH	

WIRE TABLE		
CONTRACT NO		<b>Cessna AIRCRAFT CO.</b> <small>PAWNEE DIVISION 3800 E PAWNEE WICHITA KANSAS</small>
DESIGN	NAME	
GROUP	DATE	
DRAWN		
CHECK		
STRESS		TITLE
PROJ		WIRING DIAGRAM —
APPD		CIRCUIT BREAKERS
OTHER		SIZE
		CODE IDENT
		DWG NO
		C 71379 - 2270001
		SCALE
		(SR 3462) PAGE

EQUIPMENT TABLE	
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES XXXX-CESSNA SPEC. NO. S-XXX OR CMXXXX-CESSNA STD. NO.	SUPERSEDES.  SUPERSEDED BY: 4808481

# MODEL R182 AND TR182 SERVICE MANUAL

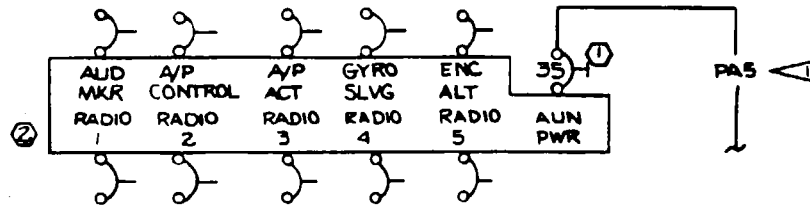


CONTRACT NO:			Cessna AIRCRAFT CO. PAWNEE DIVISION 2800 E. PAWNEE WICHITA, KANSAS		
NAME	DATE	TITLE			
DESIGN	SPENCER	3-28-77	<b>WIRING DIAGRAM —</b> <b>CIRCUIT BREAKERS</b>		
GROUP	<i>W. H. H. H.</i>	1-13-77			
DRAWN	SCHIFFELBEIN	3-16-77			
CHECK	J. YOWEL	3-18-77			
STRESS			SIZE	CODE IDENT.	DWG NO
PROJ	J. H. MOORE	4-11-77	C	71379	2270001
APPO	<i>URS</i>		SCALE: NONE (SR B462) PAGE: 24		
OTHER					

Circuit Breakers (Sheet 2 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD



DETAIL A  
EFF THRU SER (SR8982)

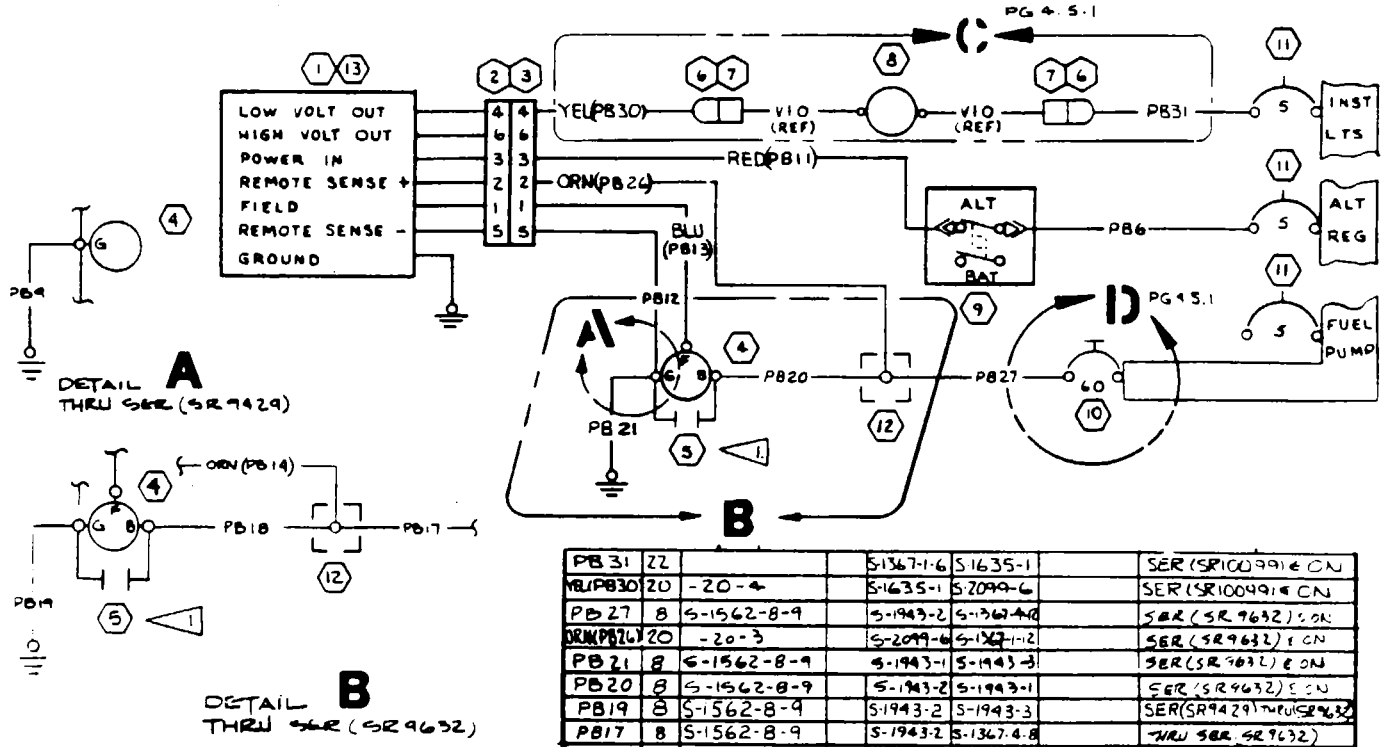
CONTRACT NO.		PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS	
NAME	DATE	Cessna AIRCRAFT CO.	
DESIGN	SPENCER 2-27-79	TITLE	
GROUP	<i>D. Hasler</i> 3-3-79	CIRCUIT BREAKERS	
DRAWN	P. MAYFIELD 2-19-79		
CHECK	YOUNGERS 2-20-79		
STRESS			
PROJ	J. F. MOORE 3-6-79	SIZE	CODE IDENT
APPD	<i>JRS</i>	C	71379
OTHER		DWG NO.	2270001
		SCALE	NONE (SR 8982) PAGE: 4 4.1

# MODEL R182 AND TR182 SERVICE MANUAL

E		BY REV. ADD C611005-0102 (NOW SHOP PRACTICE) DELETE PA4(REF)		SEB	AS BLD JRS JMS	REVISION				
		ADD DETAIL B: PB 20, PB 21, ORN(PB 27) & PB 27 (SR9632)		RAO		LET	DESCRIPTION	DATE	APPO	
T		BY REV. ADD PAGE 4-5 SER IN PB 30 & PB 31; SER OUT PB 15 & PB 16 R 82EO.030 (SR10099)(REF)		REH	GLS	A	BY REV: S-1943-2 WAS S-1943-1 (SR8782)	ELY	4-10-78	JRS JMS
		SEE PAGE 4-5 FOR CONTINUATION REV B		221-80	2-21-83	B	BY REV: ADD DETAIL A, PB19 & SER (SR9429)	SFU	11-2-78	JRS JMS
						C	BY REV: S-1232-60 WAS S-1707-60 (SR912)	PSM	2-20-79	JRS JMS
						D	BY REV: 20GA WAS 22GA/PB11, PB12, PB18 16GA WAS 22GA/PB13 S-2099-8 WAS S-2099-6, S-1367-2-10 WAS S-1367-1-10 (NOW SHOP PRACTICE) YEL(PB15) WAS PB15, RED(PB11) WAS PB11, ORN(PB14) WAS PB14, BLU(PB13) WAS PB13 (USE EXISTING STOCK)	RLK	9-5-79	JRS JMS

**NOTES:**

1. PART OF BASIC AVIONICS KIT



PART NO.	DESCRIPTION	QUANTITY	GA	MATERIAL	LG	TERMINALS	SERIALS
PB 31	22			S-1367-1-6	S-1635-1		SER (SR10099) & CN
YEL(PB30)	20 -20-4			S-1635-1	S-2099-6		SER (SR10099) & CN
PB 27	8 S-1562-8-9			S-1943-2	S-1493-1		SER (SR9632) & CN
ORN(PB24)	20 -20-3			S-2099-6	S-1367-1-2		SER (SR9632) & CN
PB 21	8 S-1562-8-9			S-1943-1	S-1943-3		SER (SR9632) & CN
PB 20	8 S-1562-8-9			S-1943-2	S-1943-1		SER (SR9632) & CN
PB 19	8 S-1562-8-9			S-1943-2	S-1943-3		SER (SR9429) & SER (SR9632)
PB 17	8 S-1562-8-9			S-1943-2	S-1367-4-8		THRU SER (SR9632)
PB 16	22			S-1367-1-6	S-1635-1		THRU SER (SR10099)
YEL(PB15)	20 20-4			S-1635-1	S-2099-6		THRU SER (SR10099)
ORN(PB14)	20 -20-3			S-2099-6	S-1367-1-2		THRU SER (SR9632)
BLU(PB13)	16 -16-6			S-2099-8	S-1367-2-10		
PB 12	20			S-2099-6	S-1367-1-10		
RED(PB11)	20 -20-2			S-2099-6	S-1493-1		
PB 18	8 S-1562-8-9			S-1943-2	S-1943-2		THRU SER (SR9632)
PB 9	8 S-1562-8-9			S-1943-3	S-1367-4-12		THRU SER (SR9429)
PB 6	22			S-1367-1-6	S-1493-1		

PART NO.	DESCRIPTION	QUANTITY	GA	MATERIAL	LG	TERMINALS	SERIALS
13	C611005 0102	ALT CONTROL UNIT	(ALT)				
12	0570314	TERMINAL BOARD					
11	S-1360-5L	CIRCUIT BREAKER					
10	S-1232-60	CIRCUIT BREAKER					
9	S-1994-1-1	MASTER SWITCH					
8	S-2135-2	LAMP ASSY					
7	S-1637-2	HOUSING					
6	S-1637-1	HOUSING					
5	S-1915-1	CAPACITOR					
4	C611503-0102	ALTERNATOR ASSY					
3	S-2373-2	CONNECTOR					
2	S-2373-1	CONNECTOR					
1	C611005-0101	ALT CONTROL UNIT					

**WIRE TABLE**

CONTRACT NO: \_\_\_\_\_

Cessna AIRCRAFT CO.      PAWNEE DIVISION  
1800 E. PAWNEE      WICHITA, KANSAS

**WIRING DIAGRAM —  
ALTERNATOR SYSTEM  
60 AMP**

DESIGN	SPENCER	2-21-78	TITLE	
GROUP	W. H. ...	3-1-78		
DRAWN	SHAVER	2-15-78		
CHECK	J. BLISS	2-16-78		
STRESS				
PROJ	J. MOORE	3-2-78	SIZE	C
APPO			CODE IDENT NO.	71379
OTHER			DWG NO.	2270001
			SCALE: NONE	(SR8782)
				PAGE: 4,5

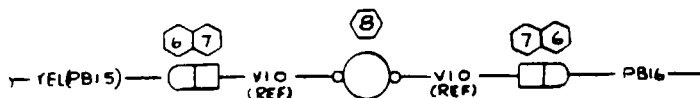
CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES-XXXX-CESNA SPEC. NO.  
S-XXX OR CMXXXX-CESNA  
STD. NO.

SUPERSEDES:  
2270001 P 4.3

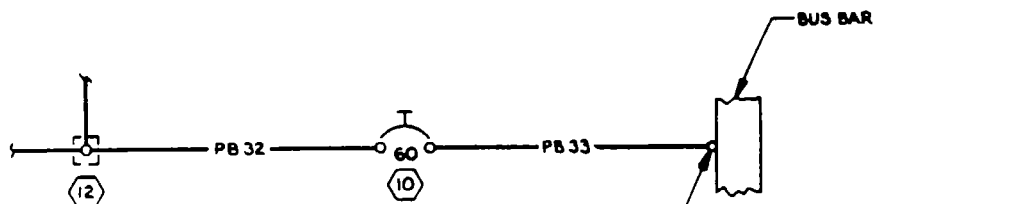
SUPERSEDED BY:

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
G	BY REV: ADD DETAIL "D" (SR 10415)	KWL 10-18-84	<i>[Signature]</i>



**DETAIL C** PG 4.5  
(THRU SER (SR10099))



**DETAIL D** PG 4.5  
APPLIES WHEN  
STANDBY VACUUM PUMP  
IS INSTALLED  
SER (SR10415) FOR

15-00916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
PB 33	8			5-1367-4-B 5-1367-4-10	SER (SR10415) FOR
PB 32	8			5-1943-2 5-1367-4-B	SER (SR10415) FOR

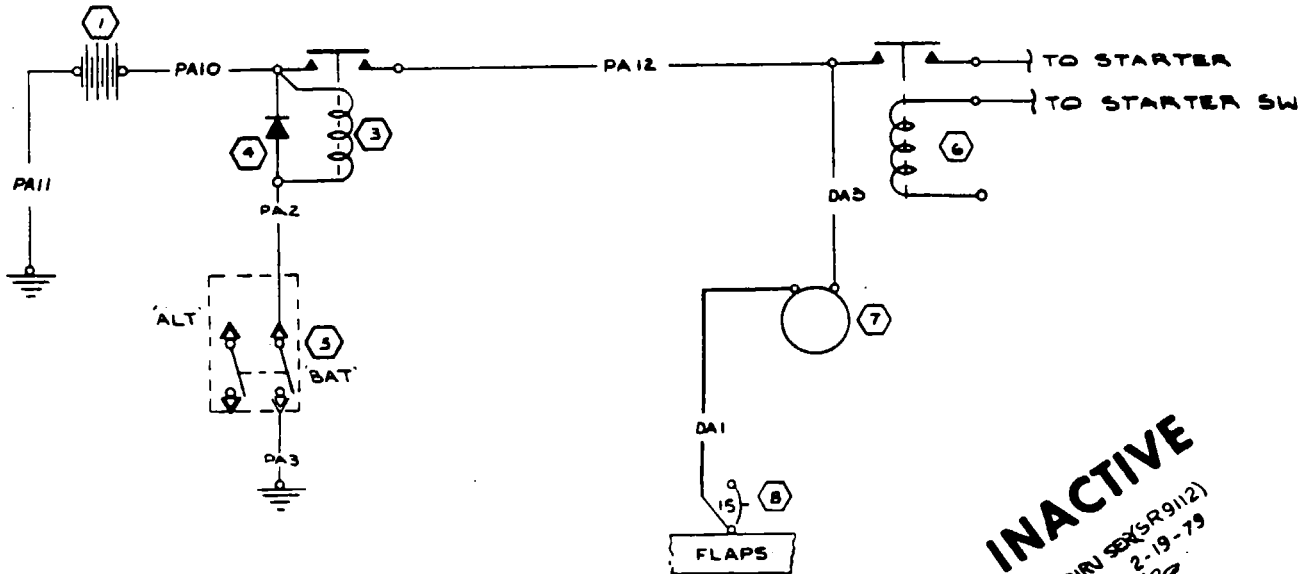
**WIRE TABLE**

CONTRACT NO:		Cessna AIRCRAFT CO.		PAWNEE DIVISION 1800 E PAWNEE WICHITA, KANSAS	
DESIGN	G STAMM	DATE	6/21/83	TITLE	
GROUP	William J. [Signature]		7/20/83	WIRING DIAGRAM — ALTERNATOR SYSTEM 60 AMP	
DRAWN	G STAMM		6/21/83	SIZE	CODE IDENT
CHECK	R.E. [Signature]		6/23/83	C	71379
STRESS				DWG NO	2270001
PROJ	W.S. [Signature]			SR10099	
APPD	[Signature]			PAGE: 4.5.1	
OTHER					

PART NO.	DESCRIPTION
<b>EQUIPMENT TABLE</b>	
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO. S-XXX OR CMXXX-CESSNA STD. NO.	
SUPERSEDES	
SUPERSEDED BY:	

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD



INACTIVE

EFF THRU SER(SR9112)  
HMG  
JAB W/WH/PPZ  
JMM

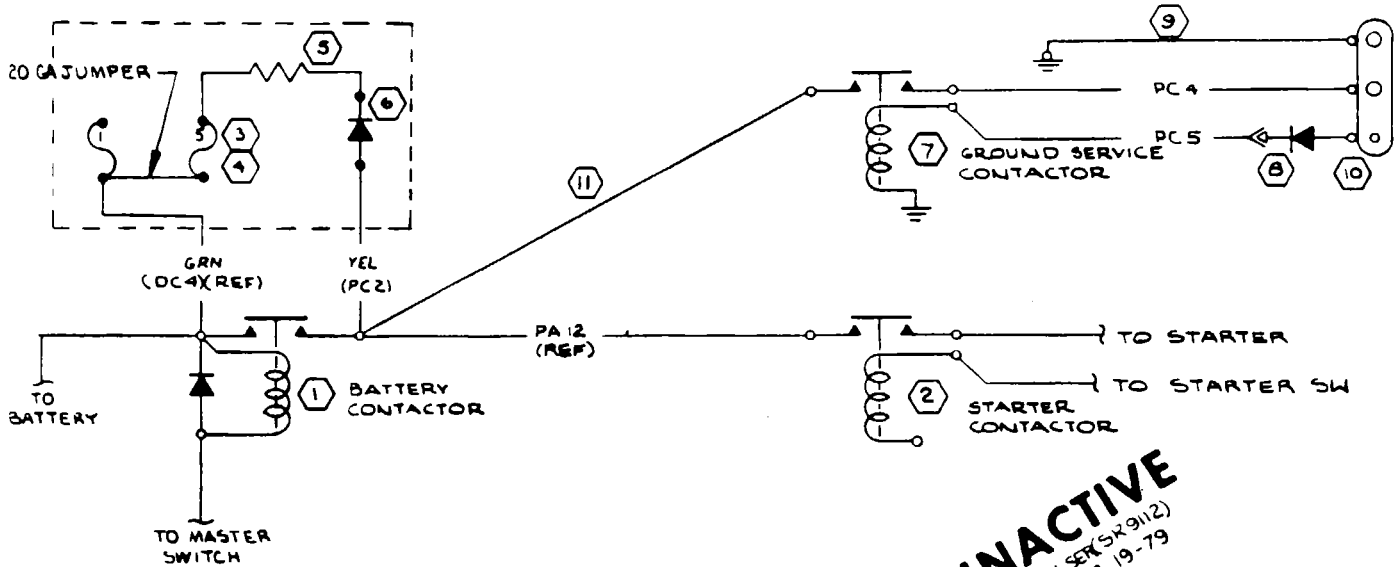
EQUIPMENT TABLE			WIRE TABLE					
PART NO.	DESCRIPTION		WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
B	5-1360-15L	CKT BKR						
7	C669545	INST CLUSTER						
6	5-2443-1	STARTER CONTACTOR						
5	5-1994-1-1	SWITCH						
4	077072B	DIODE ASSY						
3	5-1580-1	BAT. CONTACTOR						
2								
1	C61400Z	BATTERY ASSY						
PA11	4	5-1562-4-9	5-1367-4-13	5-1367-4-12				
PA10	4	5-1562-4-9	5-1367-6-13	5-1367-6-14				
PA12	4	5-1562-4-9	5-1367-6-13	5-2447-4				
PA3	22		5-1493-1	5-1367-1-8				
PA2	22		5-1367-1-10	5-1493-1				
DA3	8	5-1562-8-9	5-1367-4-10	5-2447-8				
DA1	8	5-1562-8-9	5-1367-4-10	5-1367-4-8				

CONTRACT NO:		 <b>Cessna AIRCRAFT CO.</b> PAWNEE DIVISION 3800 E PAWNEE WICHITA, KANSAS
DESIGN	WHITSEN 12-4-78	
GROUP	W/Handman 12-20-78	
DRAWN	DD HAUN 12-11-78	
CHECK	KORLESKE 12-12-78	
STRESS		
TITLE		<b>WIRING DIAGRAM —</b> <b>BATTERY CIRCUIT</b>
PROJ	110-2 12-1-78	SIZE
APPD	WRS/gd	CODE IDENT. NO.
OTHER		C 71379
		DWG NO
		2270001
		SCALE NONE
		(SR 92.5)
		PAGE: 4.0

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPO



**INACTIVE**  
 EFF THRU SER(SR9112)  
 HHG 2-19-79  
 JAP

EQUIPMENT TABLE			WIRE TABLE					
PART NO.	DESCRIPTION		WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
11	1953112	BUS BAR ASSY	PC 5	22			5-1367-1-10	5-1493-1
10	MS-3506-1	RECEPTACLE	PC 4	4	5-1562-4-9		5-1367-6-19	5-1367-6-13
9	0312155	GND STRAP	YEL (PC 2)	22	22-4		SOLDER	5-1367-1-13
8	1570045	DIODE BOARD ASSY						
7	51577-1	CONTACTOR						
6	20H3P	DIODE						
5	1-26263	.75 ohm RESISTOR						
4	5-1090-2	FUSE HOLDER						
3	5-1091-5	FUSE						
2	5-2443-1	CONTACTOR						
1	5-1580-1	CONTACTOR						

CONTRACT NO.			Cessna AIRCRAFT CO.		PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS	
DESIGN	NAME	DATE	TITLE			
GROUP	W. H. HANSEN	2-4-78	WIRING DIAGRAM -			
DRAWN	DD HAUN	12-20-78	GROUND SERVICE RECEPTACLE			
CHECK	BORLESKE	12-12-78	(OPT)			
STRESS			SIZE	CODE IDENT	DWG NO	
PROJ	J-1001-E	2-75	C	71379	2270001	
APPO	JAP		SCALE: NONE		(SR 9215) PAGE: 4, 7	
OTHER						

# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

- 1 ▷ INSTALL S-1071-3-18.0 TUBING OVER PA5 & PA18 WIRE BEFORE INSTALLING TERMINALS.
- 2 ▷ S-1360-15L CIRCUIT BREAKER REQUIRED WITH 2 BLADED PROP. S-1360-20L CIRCUIT BREAKER REQUIRED WITH 3 BLADED PROP.

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL "A", "B", "C", PA19, S-1232-5, S-2326-1, 2270019, 2270020, SER (SR9632)	RAO 3-11-80	RAO 1/89 APP APP
B	BY REV: ADD NOTE Z (SR9632)	GLS 8/15/80	GLS 1/89 APP
C	BY REV: ADD PA18, DELETE PA19 (SR9632)(REF) ADD DETAIL "A" & S1232-35 (SR10122)	MKT 10-31-80 GW 2-13-81	MKT 1/89 APP
D	BY REV: ADD S-1232-2 CKT BKR, 2 AMP CKT BKR WAS 5 AMP CKT BKR FOR ELECTRIC TRIM (SR9632)(REF)	GLS 6-3-81	GLS 1/89 APP

INACTIVE

THRU SER (SR10099)  
REV 1-15-82  
BY MDP/PPG

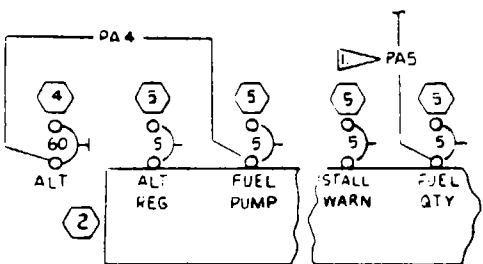
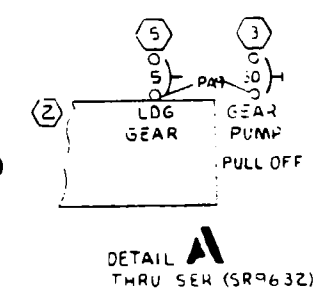
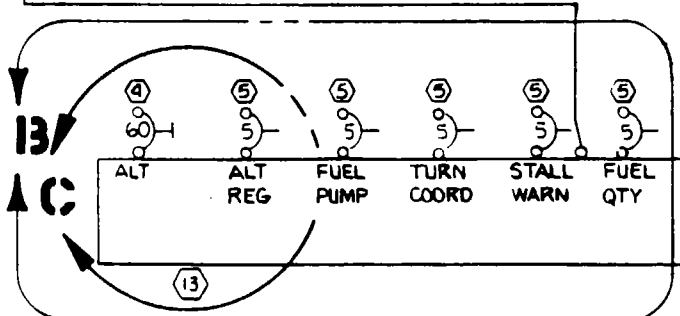
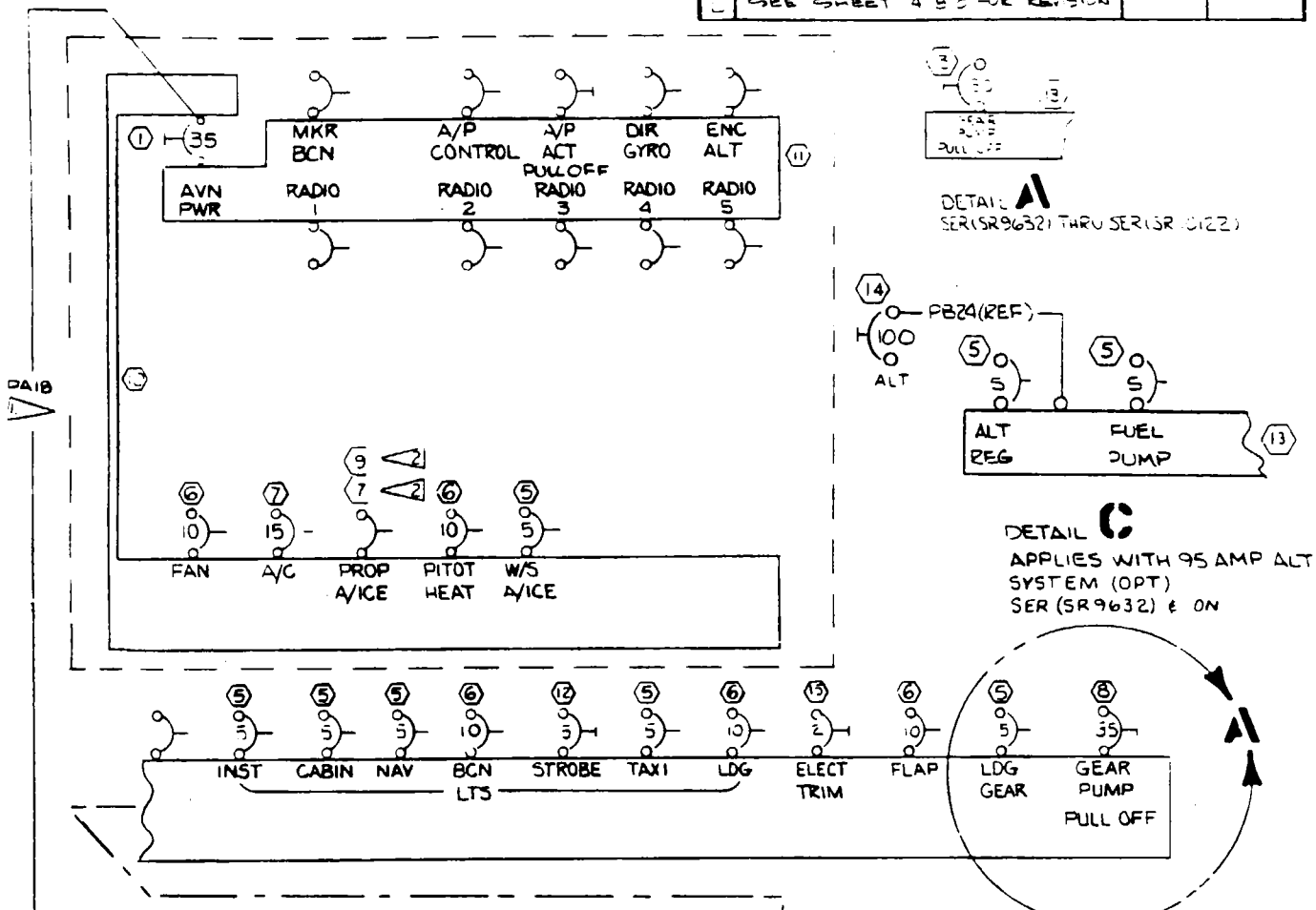
91600-01

15	S-1232-2	CIRCUIT BREAKER					
14	S-2326-1	CIRCUIT BREAKER					
13	2270020	BUS BAR					
12	S-1232-5	CIRCUIT BREAKER	PA18	8	S-1562-B-9	S-1367-4-B-S-1367-4-8	THRU SER (SR9632) & ON
11	2270009	BUS BAR					
10	2270014	BUS BAR	PA9	12		S-1367-3-B-S-1367-3-6	THRU SER (SR9632)
9	S-1360-20L	CIRCUIT BREAKER	PA5	10	S-1562-0-9	S-1367-3-B-S-1367-3-6	THRU SER (SR9632)
8	S-1360-35	CIRCUIT BREAKER	PA4	8	S-1562-B-9	S-1367-4-B-S-1367-4-8	THRU SER (SR9632)
7	S-1360-15L	CIRCUIT BREAKER	WIRE CODE NO	GA	MATERIAL	LG	TERMINALS SERIALS
6	S-1360-10L	CIRCUIT BREAKER					
5	S-1360-5L	CIRCUIT BREAKER					
4	S-1232-60	CIRCUIT BREAKER					
3	S-1232-30	CIRCUIT BREAKER					
2	1270831	BUS BAR					
1	S-2281-1	SWITCH					
EQUIPMENT TABLE			WIRE TABLE				
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC NO S-XXX OR CMXXXX-CESSNA STD. NO.			CONTRACT NO.		Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS		
			DESIGN	NAME			
SUPERSEDES PG 44 SUPERSEDED BY: PG 4130 & 4131			GROUP	W. H. MOORE	3-27-79	WIRING DIAGRAM - CIRCUIT BREAKERS	
			DRAWN	P. MAYFIELD	2-19-79		
SIZE C CODE IDENT NO. 71379 DWG NO. 2270001			CHECK	YOUNGERS	2-20-79	SCALE NONE (SR9112) PAGE: 4.8.0.	
			STRESS				
PROJ J. H. MOORE 3-6-79			APPD	APP		OTHER	
			OTHER				



# MODEL R182 AND TR182 SERVICE MANUAL

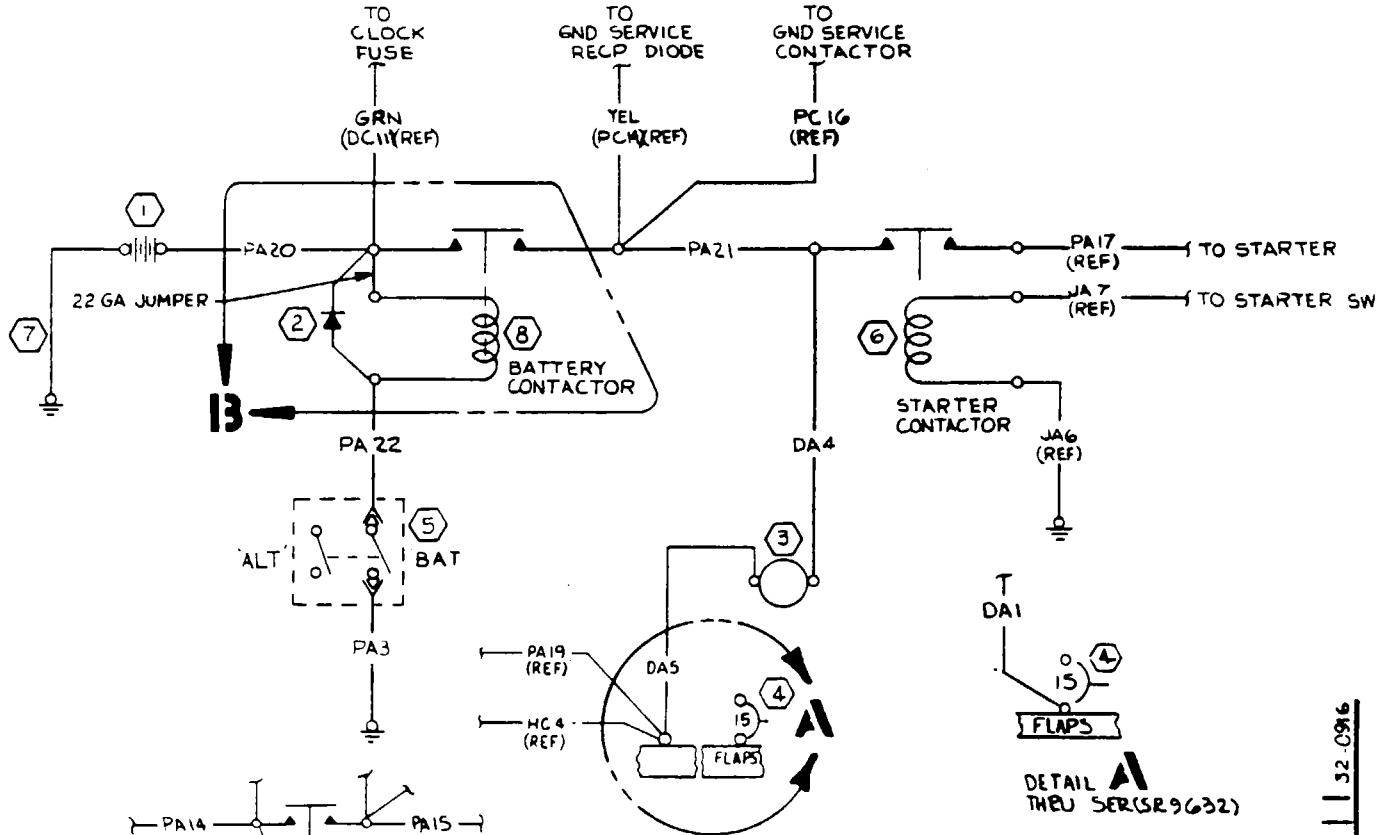
REVISION			
LET	DESCRIPTION	DATE	APPC
1	SEE SHEET 450 FOR REVISION		



CONTRACT NO.		PAWNEE DIVISION 3800 E PAWNEE WICHITA KANSAS	
DESIGN	SPENCER	DATE	2-27-79
GROUP	W. Williams	DATE	3-3-79
DRAWN	P. MAYFIELD	DATE	2-19-79
CHECK	YOUNGERS	DATE	2-20-79
STRESS			
PROJ	J. H. MOORE	DATE	3-6-79
APPC	JES	SIZE	C
OTHER		CODE IDENT NO	71379
		DWG NO	2270001
		SCALE	NONE
		(SR912)	PAGE 481

# MODEL R182 AND TR182 SERVICE MANUAL

BY REV: ADD DETAIL 'B' (SR10152)		GW 5-1-81	JAB JRS	REVISION			
LET	DESCRIPTION	DATE	APPRO				
E	BY REV: S-2443-2 WAS S-2443-1; S-2475-2 WAS S-2475-1 (SR10213)	REK 8-31-81	JRS	A	BY REV: S2447-4 WAS S-1367-6-13/PA14 & PA15 (MER R182 E0778)	NTL 3-2-79	JAB JRS
				B	BY REV: ADD S-2475-1 (SR9112)	HHG 6-18-79	JRS JRS
				C	BY REV: PC11 (REF) WAS PC7 (REF)  ADD DETAIL 'A', DA5, HC4 (REF) & PA19 (REF)	NTL 3-14-80	JAB JRS



**DETAIL 13**  
LEFT THRU SER(SR10152)

8	S-2475-2	CONTACTOR	
7	S-242007	GND STRAP	
6	S-2443-2	CONTACTOR	
5	S-1394-1	SWITCH	
4	S-1360-15L	CKT BKR	
3	C669545	NST CLUSTER	
2	C770728	DIODE ASSY	
1	C614002-201	BATTERY ASSY	

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
PA22	22			S1367-110 S1493-1	SER(SR10152) & ON
PA21	4	S-1562-4-9		S1367-613 S2447-4	SER(SR10152) & ON
PA20	4	S-1562-4-9	15	S2447-4 S2447-4	SER(SR10152) & ON
DA5	8	S-1562-8-9		S-1367-4-10 S-1367-4-10	SER(SR9632) & ON
DA4	8	S-1562-8-9		S2447-4 S1367-6-13	
DA1	8	S-1562-8-9		S-1367-4-10 S-1367-4-10	THRU SER(SR9632)
PA16	22			S-1367-110 S-1493-1	THRU SER(SR10152)
PA15	4	S-1562-4-9		S-2447-4 S2447-4	THRU SER(SR10152)
PA14	4	S-1562-4-9		S-2447-4 S1367-6-13	THRU SER(SR10152)
PA3	22			S-1493-1 S-1367-4-10	

**EQUIPMENT TABLE**

PART NO.	DESCRIPTION	

**WIRE TABLE**

CONTRACT NO:			Cessna AIRCRAFT CO.		
			PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS		
DESIGN	SPENCER	2-27-79	<b>WIRING DIAGRAM - BATTERY CIRCUIT</b>		
GROUP	D. Henderson	2-24-79			
DRAWN	H. GHAZARIAN	2-19-79			
CHECK	BORLESKE	2-20-79			
STRESS					
PROJ	J. H. MOORE	3-6-79	SIZE	CODE IDENT NO	DWG NO
APPRO	JRS		C	71379	2270001
OTHER			SCALE NONE		(SR9112) PAGE: 6.9

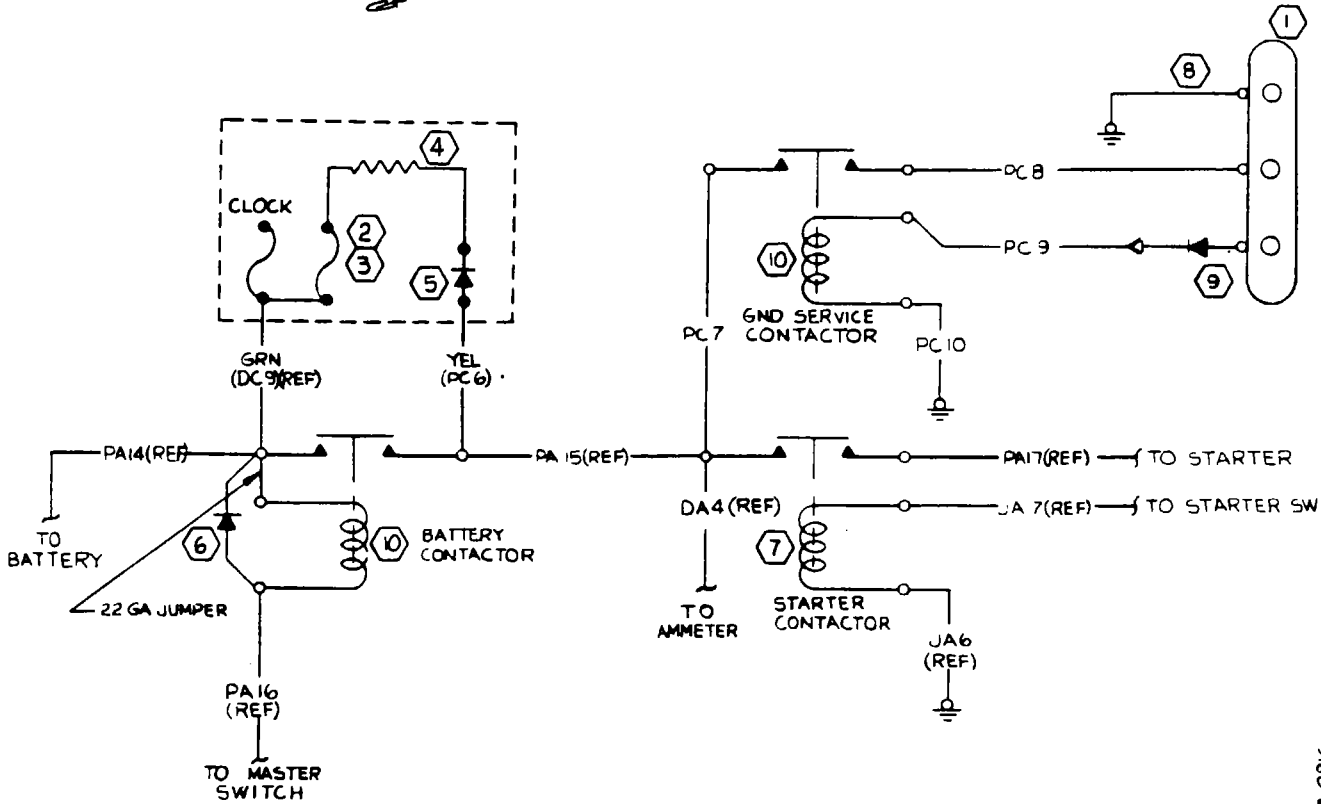
**SUPERSEDES**

2270001 P 4.6	
<b>SUPERSEDED BY:</b>	

# MODEL R182 AND TR182 SERVICE MANUAL

**INACTIVE**  
 THRU SER (SR9638)  
 NTL W/AD /RQ 2-25-80  
 AB  
 CF

REVISION			
LET	DESCRIPTION	DATE	APPO
A	BY REV: S2447-4 S2447-4 WAS S-2447-4 S1367-6-13/PC7: S1367-6-4 S2447-4 WAS S1367-6-4 S1367-6-13/PC8 (MER R182 E0779)	NTL 5-2-79	<i>[Signature]</i>
B	BY REV: ADD S-2475-1 (SR9112)	H HG 6-18-79	<i>[Signature]</i> RIS



9160-PC

ITEM NO.	PART NO.	DESCRIPTION	WIRE CODE NO.	GA.	MATERIAL	LG.	TERMINALS	SERIALS
10	S-2475-1	CONTACTOR						
9	1570043	DIODE BOARD ASSY						
8	0312155	GND STRAP						
7	S-2443-1	CONTACTOR						
6	0770728	DIODE ASSY						
5	20H3P	DIODE						
4	X-26263	.75 Ω RESISTOR						
3	S-1090-2	FUSE HOLDER						
2	S-1091-5	FUSE						
1	M5 3506-1	RECEPTACLE						

EQUIPMENT TABLE			
ITEM NO.	PART NO.	DESCRIPTION	WIRE CODE NO.

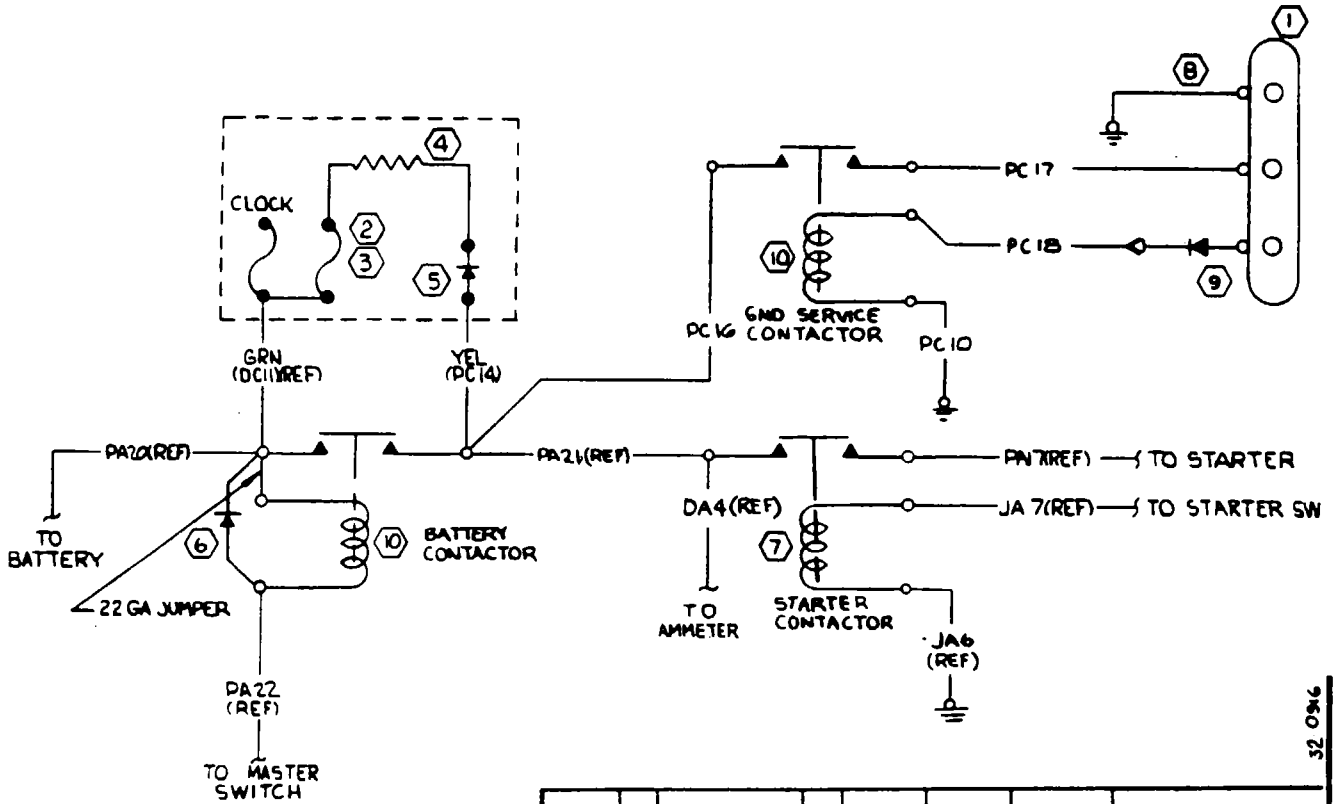
WIRE TABLE			
WIRE CODE NO.	GA.	MATERIAL	LG.
PC10	22		
PC9	22		
PC8	4	S-1562-4-9	
PC7	4	S-1562-4-9	
YEL(PC6)	22	-22-4	

CONTRACT NO.			Cessna AIRCRAFT CO.		
DESIGN	NAME	DATE	PAWNEE DIVISION 3800 E. PAWNEE WICHITA, KANSAS		
	SPENCER	2-27-79	<b>WIRING DIAGRAM — GROUND SERVICE RECEPTACLE (OPT)</b>		
GROUP	<i>[Signature]</i>	2-24-79			
DRAWN	H. HAZARIAN	2-19-79			
CHECK	BORLESKE	2-20-79			
STRESS			SIZE	CODE IDENT NO.	DWG NO.
PROJ	J. H. MOORE	3-6-79	C	71379	2270001
APPO	<i>[Signature]</i>		SCALE: NONE	(SR 9112)	PAGE: 2/10
OTHER	<i>[Signature]</i>				

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: PC12 WAS PC8, PC13 WAS PC9 MER182 EOBT1 (SR9632)(REF)	GLS 8/15/80	JAB/MS MS
B	BY REV: PC14 WAS PC6, PC16 WAS PC11, PC17 WAS PC12, PC18 WAS PC13, (SR10152)	GW 5-1-81	JAB/MS MS
C	BY REV: S-2443-2 WAS S-2443-1; S-2475-2 WAS S-2475-1 (SR10213)	RLK 8-31-81	JAB MS MS



QTY	PART NO.	DESCRIPTION
10	S-2475-2	CONTACTOR
9	1570043	DIODE BOARD ASSY
8	0553010	GND STRAP
7	S-2443-2	CONTACTOR
6	077072B	DIODE ASSY
5	20H3P	DIODE
4	X-26263	.75 Ω RESISTOR
3	S-1090-2	FUSE HOLDER
2	S-1091-5	FUSE
1	MS3506-1	RECEPTACLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS	
PC18	22		10	S1367-110	S1493-1	SER(SR10152) & ON
PC17	4	S-1562-4-9	9	S1367-614	S2447-4	SER(SR10152) & ON
PC16	4	S-1562-4-9	67	S1367-613	S2447-4	SER(SR10152) & ON
YEL(PC14)	22	-22-4	11	SOLDER	S-1367-H3	SER(SR10152) & ON
PC10	22			S-1367-H10	S-1367-H10	THRU SER(SR10152)
PC13	22			S-1367-H10	S-1493-1	THRU SER(SR10152)
PC12	4	S-1562-4-9		S-1367-614	S2447-4	THRU SER(SR10152)
PC11	4	S-1562-4-9		S-2447-4	S2447-4	THRU SER(SR10152)
YEL(PC6)	22	-22-4		SOLDER	S-1367-H3	THRU SER(SR10152)

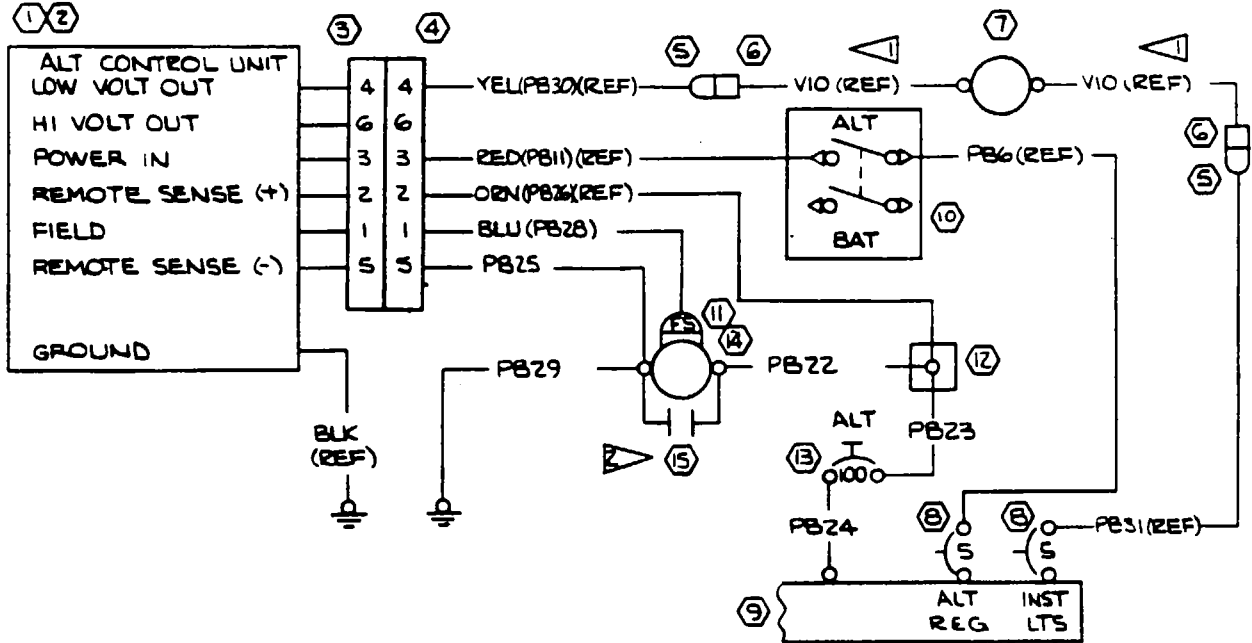
EQUIPMENT TABLE		WIRE TABLE		CONTRACT NO:		Cessna AIRCRAFT CO.	
CEB-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC NO. S-XXX OR CMXXXX-CESSNA STD NO.		SUPERSEDES: 2270001 P 4.10 SUPERSEDED BY:		DESIGN G STAMM 3-5-80 GROUP W. W. WOODS 3-6-80 DRAWN LANCASTER 2-25-80 CHECK BOLESKE 2-25-80 STRESS		TITLE <b>WIRING DIAGRAM —                      GROUND SERVICE                      RECEPTACLE (OPT)</b>	
PROJ CEFICKEL 3-8-80 APPD JAB OTHER JAB		SIZE C CODE IDENT NO. 71379 DWG NO 2270001 SCALE: NONE (SR9632)		PAGE: 4/11			

# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

- ▷ TERMINATE VENDOR FURNISHED WIRES WITH S-1636-1 PIN
- ▷ PART OF BASIC AVIONICS KIT, INSTALLED WITH FIRST RADIO

REVISION			
LET	DESCRIPTION	DATE	APPO
A	BY REV: YEL(PB30)(REF) WAS YEL(PB15)(REF), PB31(REF) WAS PB16(REF) R:182E01030 (SR:0099)(REF)	GLS 6/21/83	REF W/HT 1/8 AP



15	S-1915-1	CAPACITOR	
14	C611005-0101	ALT ASSY	
13	S-2326-1	CIRCUIT BREAKER	PB25 20 S-2099-6 S-1367-1-10
12	S-070315	TERMINAL BLOCK	PB24 4 S-1562-4-9 S-2402-2 S-2402-1
11	D208-14489-KA	CONNECTOR	PB23 4 S-1562-4-9 S-2402-7 S-1367-6-12
10	S-1994-1-1	MASTER SWITCH	PB22 4 S-1562-4-9 S-2402-7 S-2402-2
9	2270020	BUS BAR	PB29 4 S-1562-4-9 S-2402-7 S-2402-1
8	S-1360-5L	CIRCUIT BREAKER	(PB25) 18 -18-6 S-2099-8 S-2376-1
7	S-2135-2	LAMP ASSY	
6	S-1637-2	HOUSING	
5	S-1637-1	HOUSING	
4	S-2373-2	CONNECTOR	
3	S-2373-1	CONNECTOR	
2	C611005-0102	ALT CONTROL UNIT	
1	C611005-0101	ALT CONTROL UNIT	

WIRE TABLE			
WIRE CODE NO.	GA.	MATERIAL	LO. TERMINALS

CONTRACT NO.:		PAWNEE DIVISION 3800 E. PAWNEE WICHITA, KANSAS	
DESIGN	NAME	DATE	TITLE
	G STAMM	3-12-80	<b>WIRING DIAGRAM — ALTERNATOR SYSTEM, 95 AMP (OPT)</b>
GROUP	V.H. H. H. H.	3-15-80	
DRAWN	R. YOUNGERS	3-11-80	
CHECK	R. E. HAIR	3-11-80	
STRESS			
PROJ	REFICKEL	3-17-80	SIZE
APPO			CODE IDENT
OTHER			NO.
		<b>C 71379 - 2270001</b>	
		NONE (SR9632) PAGE 4-12	

EQUIPMENT TABLE	SUPERSEDES:
PART NO. DESCRIPTION	

CESS-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CESS-XXXX-CESSNA SPEC. NO.  
S-XXX OR CXXXX-CESSNA  
STD. NO.

# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

- 1 ▷ INSTALL S-1071-3-180 TUBING OVER PA24 WIRE BEFORE INSTALLING TERMINALS.
- 2 ▷ S-1360-15L CIRCUIT BREAKER REQUIRED WITH 2 BLADED PROP. S-1360-20L CIRCUIT BREAKER REQUIRED WITH 3 BLADED PROP.
- 3 ▷ WIRE NEEDED ONLY WHEN 2270014 BUS BAR INSTALLED.

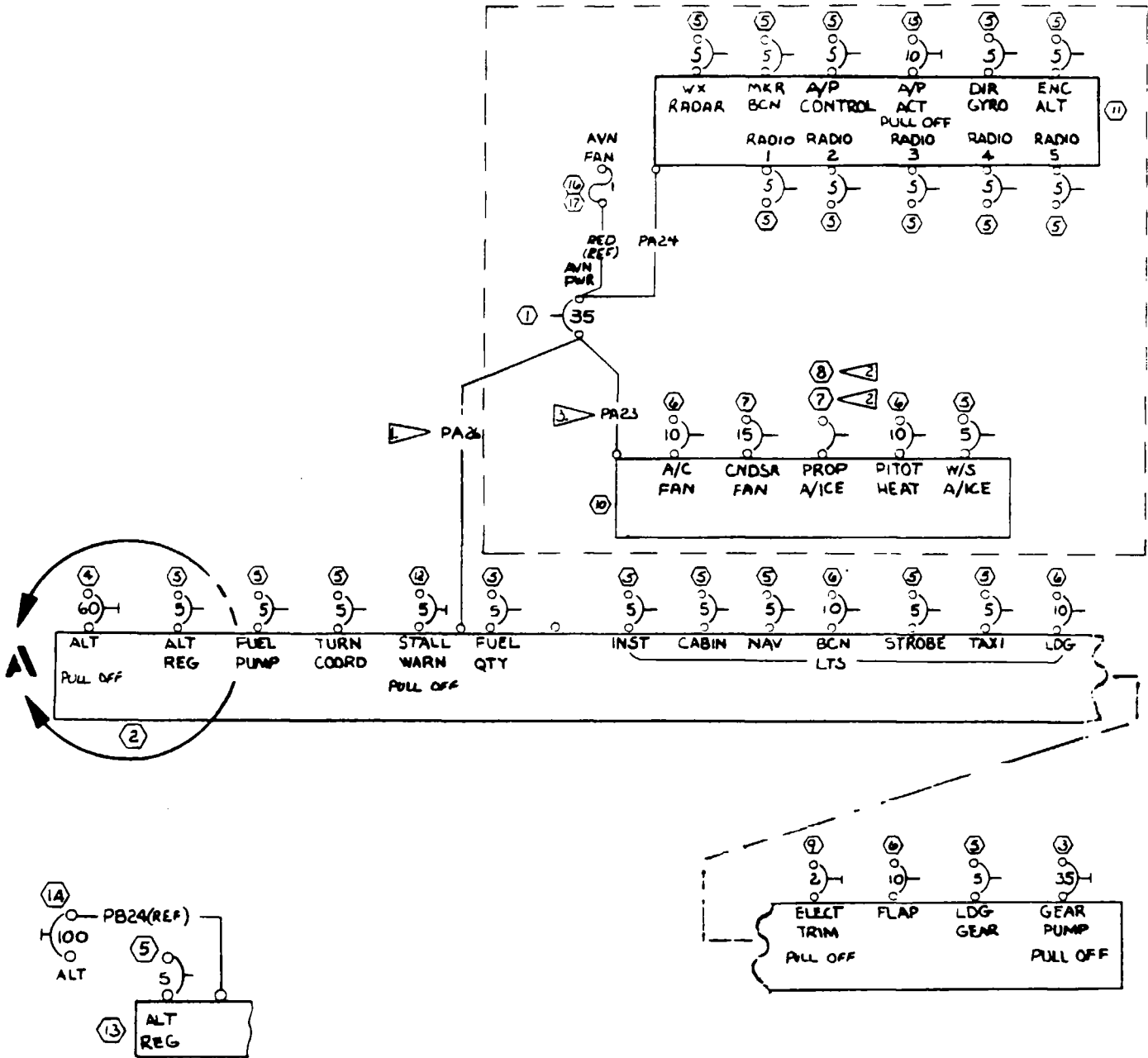
REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: ADD NOTE J (SR10099)	REK 4-12-82	REK ADD CSP
B	BY REV: DELETE PA25; ADD RED(REF) SR10099)	GW 7-2-82	GW ADD CSP

99-00916

7	S-2582-1	FUSE								
10	S-2582-1	FUSEHOLDER								
15	S-1232-10	CIRCUIT BREAKER								
14	S-2326-1	CIRCUIT BREAKER								
13	2270020	BUS BAR								
12	S-1232-5	CIRCUIT BREAKER								
11	2270019	BUS BAR								
10	2270014	BUS BAR	PA24	8	S-1562-8-9	S-1367-4-8	S-1367-4-6			
9	S-1232	CIRCUIT BREAKER	PA23	8	S-1562-8-9	S-1367-4-8	S-1367-4-6			
8	S-1360-20L	CIRCUIT BREAKER	PA26	8	S-1562-8-9	S-1367-4-8	S-1367-4-8 (STD)			
7	S-1360-15L	CIRCUIT BREAKER	WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS	
6	S-1360-10L	CIRCUIT BREAKER								
5	S-1360-5L	CIRCUIT BREAKER								
4	S-1232-60	CIRCUIT BREAKER								
3	S-232-35	CIRCUIT BREAKER								
2	2270020	BUS BAR								
1	S-2281-1	SWITCH								
<b>EQUIPMENT TABLE</b>			<b>WIRE TABLE</b>			CONTRACT NO: _____ Cessna AIRCRAFT CO. <span style="float: right;">PAWNEE DIVISION 3800 E. PAWNEE WICHITA, KANSAS</span>				
ITEM NO	PART NO.	DESCRIPTION	DESIGN	NAME	DATE	TITLE				
						WIRING DIAGRAM —				
						CIRCUIT BREAKERS				
CES-1000 IS APPLICABLE VENDOR CODES PER S-400 CES-XXXX-CESSNA SPEC. NO. S-XXX OR CMXXXX-CESSNA STD. NO.			SUPERSEDES: PG 4.80 & 4.8.1 SUPERSEDED BY:			PROJ	CODE IDENT.	DWG NO		
						C	71379	2270001		
						NONE		(SR10099)	PAGE: 4.13.0	

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPO
B	SEE SHEET 14.30 FOR REVISION		

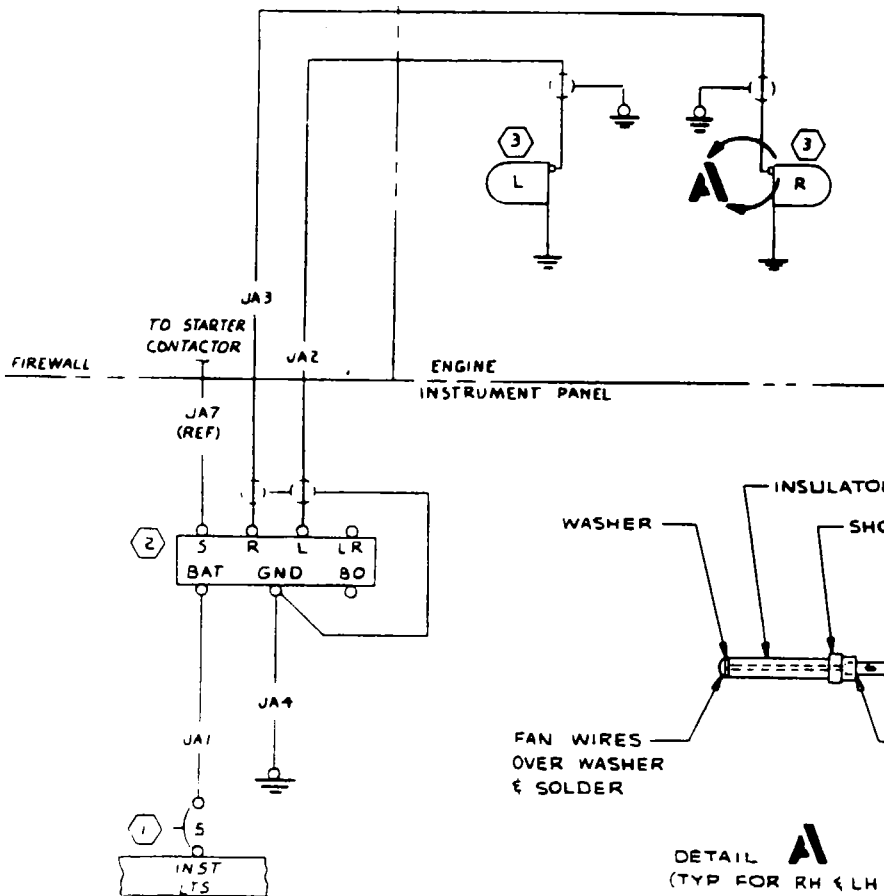


**DETAIL A**  
 APPLIES WITH 95 AMP ALT SYSTEM (OPT)

CONTRACT NO		PAWNEE DIVISION 5800 E. PAWNEE WICHITA KANSAS	
DESIGN	KLEIN	DATE	10-21-81
GROUP	M. PAINE	DATE	1-20-82
DRAWN	KLEIN	DATE	10-21-81
CHECK	BORLESKE	DATE	1-18-82
STRESS			
PROJ	W. S. ...	DATE	1-21-82
APPO			
OTHER			
Cessna AIRCRAFT CO.		TITLE WIRING DIAGRAM - CIRCUIT BREAKERS	
SIZE	C	CODE IDENT NO.	71379
DWG NO.	2270001		
SCALE	NONE		(SR10099)
		PAGE:	4/13/1

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: NOTE 2 WAS 'S-1367-1-10 & S-1367-3-10', ADD DETAIL A (SRB462) (REF)	DLP 10-18-77	JAS/JWA APB
B	BY REV: JA7(REF) WAS JAS(REF) (SR 9112)	HMG 2-19-79	JAS/JWA APB



**NOTES:**

- 1. S-1367-1-6 FOR CENTER CONDUCTOR  
S-1367-2-6 FOR SHIELDING
- 2. TERMINALS SUPPLIED WITH ENGINE

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
JA4	20		10	S-1367-1-6 S-1367-1-B	
JA3	18S		55	1 2	
JA2	18S		55	1 2	
JA1	20		11	S-1367-1-6 S-1367-1-6	

**WIRE TABLE**

PART NO.	DESCRIPTION
3	D6LN-2031 MAGNETO
2	C292501-D105 IGNITION SWITCH
1	S-1360-5L CIRCUIT BREAKER

**EQUIPMENT TABLE**

CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES-XXXX-CESSNA SPEC. NO.  
S-XXX OR CMXXXX-CESSNA  
STD. NO.

SUPERSEDES.

SUPERSEDED BY.

CONTRACT NO:	
NAME	DATE
DESIGN SPENCER	3-28-77
GROUP <i>W. Hurd</i>	4-13-77
DRAWN SCHIFFELBEIN	3-16-77
CHECK J. YOUNG	3-18-77
STRESS	
PROJ. <i>J. MOORE</i>	4-4-77
APPD. <i>APB</i>	
OTHER	

**Cessna AIRCRAFT CO.** PAWNEE DIVISION  
3800 E. PAWNEE WICHITA, KANSAS

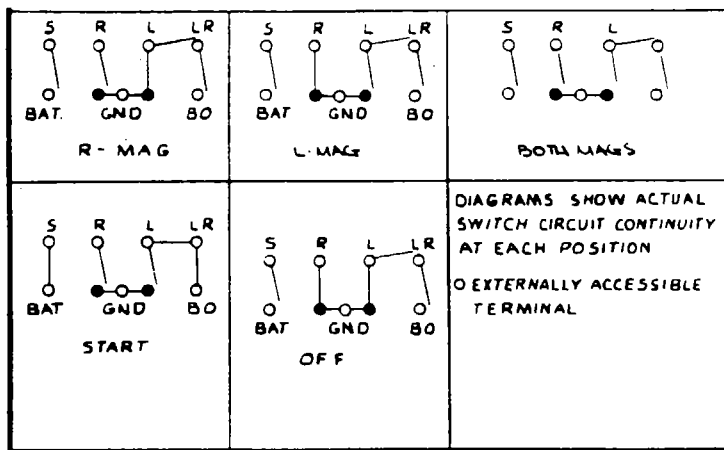
TITLE: **WIRING DIAGRAM — IGNITION SYSTEM**

SIZE: C CODE IDENT. NO: **71379** DWG NO: **2270001**

SCALE: NONE (SRB462) PAGE: 5.1



# MODEL R182 AND TR182 SERVICE MANUAL

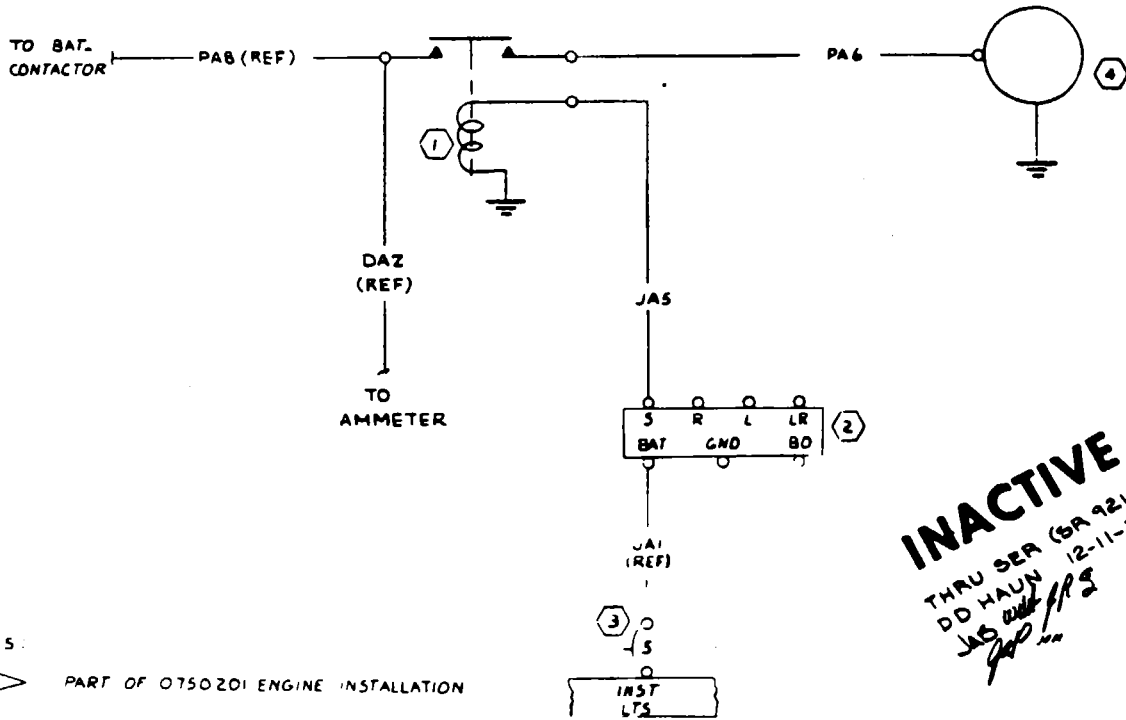


CONTRACT NO:					PAWNEE DIVISION 3800 E. PAWNEE WICHITA, KANSAS	
NAME	DATE	TITLE				
DESIGN	SPENCER	3-28-77	<b>WIRING DIAGRAM — IGNITION SYSTEM</b>			
GROUP	<i>W. H. Hudson</i>	8-13-77				
DRAWN	SCHIFFELBEIN	2-16-77				
CHECK	J. YOUNG	3-18-77				
STRESS						
PROJ	<i>J. H. Moore</i>	2-24-77	SIZE	CODE IDENT. NO.	DWG NO.	
APPD	<i>ARS</i>		C	71379	2270001	
OTHER			SCALE: NONE		(SR8462)   PAGE: 5.1	

Ignition System (Sheet 2 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV PAB (REF) WAS 1553112 ; ADD DAZ (REF) ; 5-1367-6-13 / PA6 WAS 5-1367-6-14 (SR8462)(REF)	DLP 10-18-77	JAS ARS 10/18/77



NOTES:

1. PART OF OT50201 ENGINE INSTALLATION

**INACTIVE**  
THRU SER (SR 9215)  
DD HAUN 12-11-78  
JAS  
ARS

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
PA6	4	5-1362-4-9	92	5-1367-6-13 5-1367-6-13	
JAS	22		86	5-1367-1-6 5-1367-1-10	

### WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
4		STARTER
3	5-1360-5L	CIRCUIT BREAKER
2	C292501-0105	IGNITION SWITCH
1	5-1577-1	STARTER CONTACTOR

### EQUIPMENT TABLE

CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES-XXXX-CESSNA SPEC. NO.  
S-XXX OR CMXXXX-CESSNA  
STD. NO.

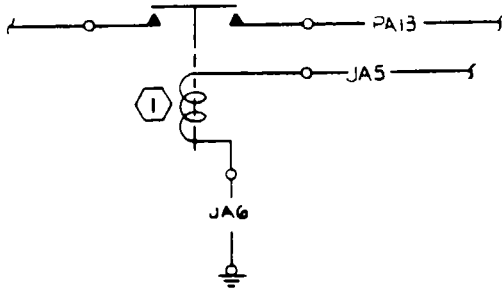
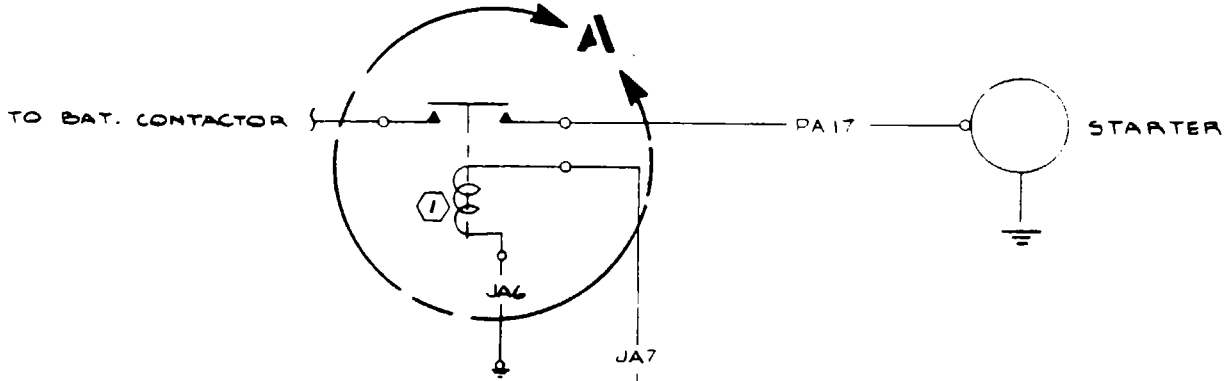
SUPERSEDES  
SUPERSEDED BY:  
2270001 P.2

CONTRACT NO.	
DESIGN	SPENCER 3-28-77
GROUP	W. Haslam 4-13-77
DRAWN	SCHIFFELBEIN 3-16-77
CHECK	J. Youel 3-18-77
STRESS	
PROJ	J.E. MOORE 4-14-77
APPD	ARS
OTHER	

Cessna AIRCRAFT CO.		PAWNEE DIVISION 3800 E. PAWNEE WICHITA, KANSAS	
TITLE		WIRING DIAGRAM - STARTER SYSTEM	
SIZE	CODE IDENT. NO.	DWG NO.	
C	71379	2270001	
SCALE: NONE		(SR8462)	PAGE: 6 1

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: ADD DETAIL A (S-2443-2)	HGG 2-19-79	<i>[Signature]</i>
B	BY REV: S-2443-2 WAS S-2443-1 (SR10213)	REK 8-21-81	<i>[Signature]</i>



DETAIL A  
EFF THRU SER(SR9112)

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
JA7	22			S-1367-1-6 S-1367-1-10	SER(SR9112) 1 ON
PA17	4	S-1562-4-9		S-1367-6-13 S-2447-4	SER(SR9112) 1 ON
JAG	22			S-1367-1-6 S-1367-1-10	
PA13	4	S-1562-4-9		S-1367-6-13 S-2447-4	THRU SER(SR9112)
JAS	22			S-1367-1-6 S-1367-1-10	THRU SER(SR9112)

## WIRE TABLE

PART NO.	DESCRIPTION
3	S-1360-5L CIRCUIT BREAKER
2	C 292 501 IGNITION SWITCH
1	S-2443-2 STARTER CONTACTOR

## EQUIPMENT TABLE

CONTRACT NO:		
DESIGN	NAME	DATE
GROUP		
DRAWN		
CHECK		
STRESS		
PROJ		
APPRO		
OTHER		

CESSNA AIRCRAFT CO. PAWNEE DIVISION  
3600 E. PAWNEE WICHITA, KANSAS

TITLE  
**WIRING DIAGRAM — STARTER SYSTEM**

CES-1000 IS APPLICABLE  
VENDOR CODES PER S-400  
CES-XXXX-CESSNA SPEC. NO.  
S-XXX OR CHXXXX-CESSNA  
STD. NO.

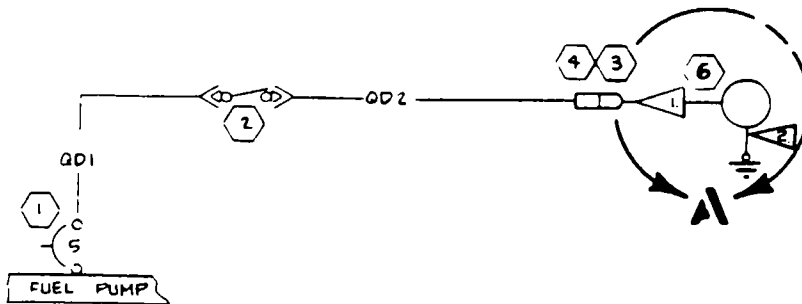
SUPERSEDES:  
**2270001 P 6.1**

SUPERSEDED BY:

SIZE: **C** CODE IDENT. NO.: **71379** DWG NO.: **2270001**  
SCALE: NONE (SR 9215) PAGE: 0.2

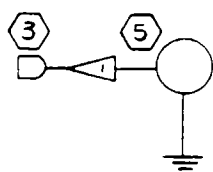
# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD FLAGNOTE 2, DETAIL A; C291504-0201 (SR8782)	CMK 7-13-78	JAS 11/13/78 JRS
B	BY REV: C291504 WAS C291504-0201, C291506 WAS C291506-0101 (SR 9799)	MRM 9-25-80	JAS 11/13/78 JRS

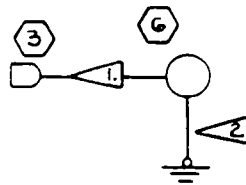


NOTES.

- 1 TERMINATE WITH S-1635-1 PM
- 2 TERMINATE WITH S-1367-1-10



DETAIL A  
APPLIES TO R182 INSTL  
THRU (SR9799)



DETAIL B  
APPLIES TO TR182 INSTLS

EQUIPMENT TABLE		WIRE TABLE					
PART NO.	DESCRIPTION	WIRE CODE NO.	GA.	MATERIAL	LG.	TERMINALS	SERIALS
6	C291504 FUEL PUMP	QD 2	22			S 1493 1 S-1635-1	
5	C291506 FUEL PUMP	QD 1	22			S-1367-1 S-1493-1	
4	S-1637-2 HOUSING						
3	S-1637-1 HOUSING						
2	S-2160-1 SWITCH						
	S-1360-5L CIRCUIT BREAKER						

CONTRACT NO:		Cessna AIRCRAFT CO.		PAWNEE DIVISION 3800 E PAWNEE WICHITA, KANSAS	
DESIGN	SPENCER	3-28-77	TITLE	WIRING DIAGRAM - FUEL PUMP	
GROUP	W.H. HANSEN	1-13-77	SIZE	CODE IDENT NO.	DWG NO
DRAWN	HARVEY	3-16-77	C-71379	71379	2270001
CHECK	J. YOEUL	3-18-77	SCALE: NONE	SR 84-2	PAGE: 11
STRESS					
PROJ	S-11070E	4-11-77			
APPD	JRS				
OTHER					

CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES XXXX-CESSNA SPEC. NO.  
S-XXX OR CMXXX-CESSNA  
STD. NO.

SUPERSEDES:  
SUPERSEDED BY:



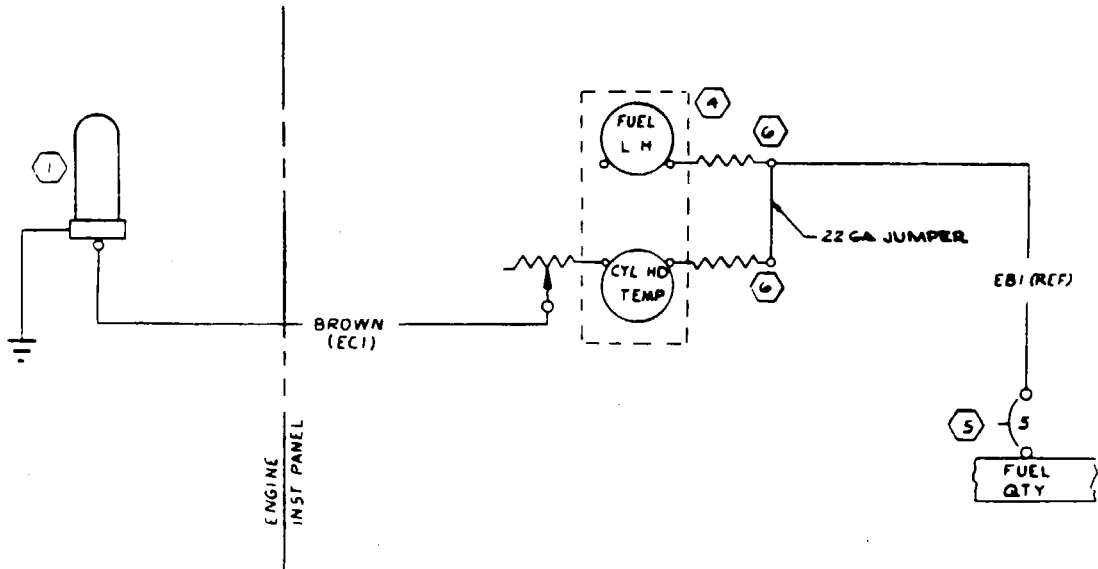
# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: DELETE NOTE 2 F S-1637-4; S-1367-1-4 WAS S-1636-5 (SRB462)	CM 9-25-77	JAS [Signature]
B	BY REV: DELETE 071360Z INACTIVATE DWG (SRB462)(REF)	DLP 10-18-77	JAS [Signature]

**NOTES:**

1. MATERIAL IS ALPHA 5B57-7 (VENDOR CODE 92194)  
OR BELDEN B3C09-1 (VENDOR CODE 70903)

~~CRIMP S-1636-5 TERMINAL AROUND WIRE INSULATION  
SEND 25 OF STRIPPED WIRE BACK OVER CRIMP &  
SOLDER PER CES 1000 USE MOLEX M3-12  
CRIMPING TOOL ONLY.~~



**INACTIVE**  
THRU SERIAL 87821  
CS 2-15-78  
JSS [Signature]

BRN (EC1)	WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
18	1				S-1367-1-B S-1367-1-4	

PART NO.	DESCRIPTION
6	D19210 RESISTOR ASSY
5	S-1360-5L CIRCUIT BREAKER
4	C649502-0211 INST CLUSTER
1	S-1372-1 SEND NG UNIT-CYL HD TEMP

**EQUIPMENT TABLE**

CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES-XXXX-CESSNA SPEC. NO.  
S-XXX OR CMXXXX-CESSNA  
STD. NQ.

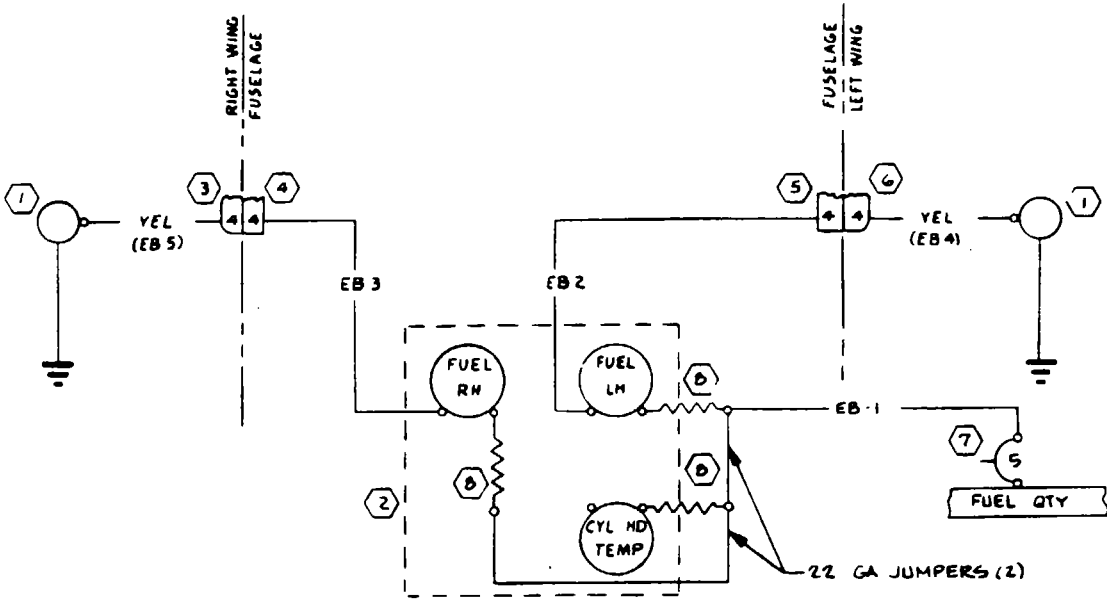
**SUPERSEDES:**

**SUPERSEDED BY:**  
2270001 PG. 8.5

CONTRACT NO:			TITLE		
DESIGN	NAME	DATE	Cessna AIRCRAFT CO.		
GROUP	W.D. Handley	4-13-77	PAWNEE DIVISION 3800 E PAWNEE WICHITA, KANSAS		
DRAWN	SCHIFFELBEIN	8-16-77	<b>WIRING DIAGRAM —</b>		
CHECK	J. YOUEL	3-18-77	<b>CYLINDER HEAD TEMPERATURE</b>		
STRESS			SIZE	CODE IDENT. NO.	DWG NO.
PROJ	J. MOORE	4-14-77	C	71379	2270001
APPD	JRS		SCALE	NONE	(SRB462)
OTHER			PAGE:	8 1	

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: S-1367-1-6 WAS S-1367-1-8, S-1367-1-10 WAS S-1367-1-8/EB1 (NOW SHOP PRACTICE) R182 E0655 DWG BECOMES INAC (SR8782)	C.R.S. 2-15-78	JJB <i>[Signature]</i>



**INACTIVE**  
 THRU SERIALS R182-1  
 C.R.S. 2-15-78  
 JJB *[Signature]*

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
YEL (EB 5)	22	-22-4		5-1367-1-10	5-1635-1
YEL (EB 4)	22	-22-4		5-1367-1-10	5-1635-1
EB 3	22			5-1367-1-10	5-1636-1
EB 2	22			5-1367-1-10	5-1636-1
EB 1	22			5-1367-1-6	5-1367-1-10

PART NO.	DESCRIPTION
8	B19210 RESISTOR ASSY
7	S-1360-5L CIRCUIT BREAKER
6	S-1640-6 HOUSING
5	S-1641-6 HOUSING
4	S-1641-9 HOUSING
3	S-1640-9 HOUSING
2	C669502-0211 INST CLUSTER
1	0726110 YMTR FUEL LEVEL

CONTRACT NO:			Cessna AIRCRAFT CO.			PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS		
DESIGN	SPENCER	3-28-77	TITLE					
GROUP	W.H. W. [Signature]	4-13-77	WIRING DIAGRAM —					
DRAWN	SCHIFFELBEIN	3-16-77	FUEL QUANTITY INDICATOR					
CHECK	J. YOUDEL	3-18-77	EQUIPMENT TABLE					
STRESS			SUPERSEDES:					
PROJ	J.L. MOORE	4-11-77	SUPERSEDED BY:					
APPO	JJB		227001 PG 8.4					
OTHER			SIZE	CODE IDENT. NO.	DWG NO.			
			C	71379	2270001			
			SCALE: NONE	(SR8962)	PAGE: 8.2			

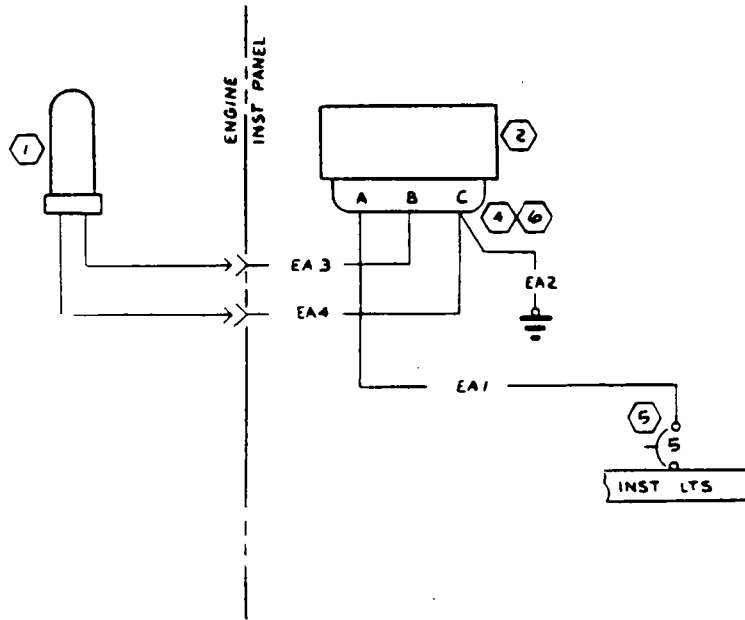
# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: "INST LTS BKR" WAS "FUEL QUANTITY" (SR846Z)(REF)	DLP 10 18 77	<i>JAB/DLP</i> 1/85

**NOTES:**



BURNDY YZ14-H FURNISHED WITH 0550209 SENDING UNIT



WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
EA4	22	SOLDER	YZ14-H		
EA3	22	SOLDER	YZ14-H		
EA2	22	SOLDER	5136T-1-B		
EA1	22	SOLDER	5136T-1-B		

ITEM NO.	PART NO.	DESCRIPTION
6	M53057-6A	CLAMP
5	S-1360 5L	CIRCUIT BREAKER
4	M53106A-145-75	PLUG
3	C669502-0211	INST CLUSTER
2	S-311-4	INDICATOR
1	0550209	SENDING UNIT-CARB AIR

WIRE TABLE				
CONTRACT NO.		<div style="display: flex; justify-content: space-between;"> <div style="font-size: 2em; font-weight: bold;">Cessna</div> <div style="text-align: right; font-size: 0.8em;">                     AIRCRAFT CO.                      PAWNEE DIVISION                      3800 E. PAWNEE                      WICHITA, KANSAS                 </div> </div> <div style="text-align: center; margin-top: 10px;"> <h3 style="margin: 0;">WIRING DIAGRAM —</h3> <h3 style="margin: 0;">CARBURETOR AIR TEMP</h3> <p style="margin: 0;">(OPT)</p> </div>		
DESIGN	SPENCER 3-28-77			
GROUP	<i>W. Handley</i> 4-13-77			
DRAWN	SCHIFFELBEIN 3-16-77			
CHECK	YOUDEL 3-18-77			
STRESS				
PROJ	<i>H. MOORE</i> 4-4-77	SIZE	CODE IDENT. NO.	DWG NO.
APPD	<i>JAB</i>	C	71379	2270001
OTHER		SCALE	NONE	(SR846Z) PAGE: 8.3

CES-1000 IS APPLICABLE  
 VENDOR CODES PER S-1400  
 CES-XXXX-CESSNA SPEC. NO.  
 S-XXX OR CMXXX-CESSNA  
 STD. NO.

SUPERSEDES:  
 SUPERSEDED BY:

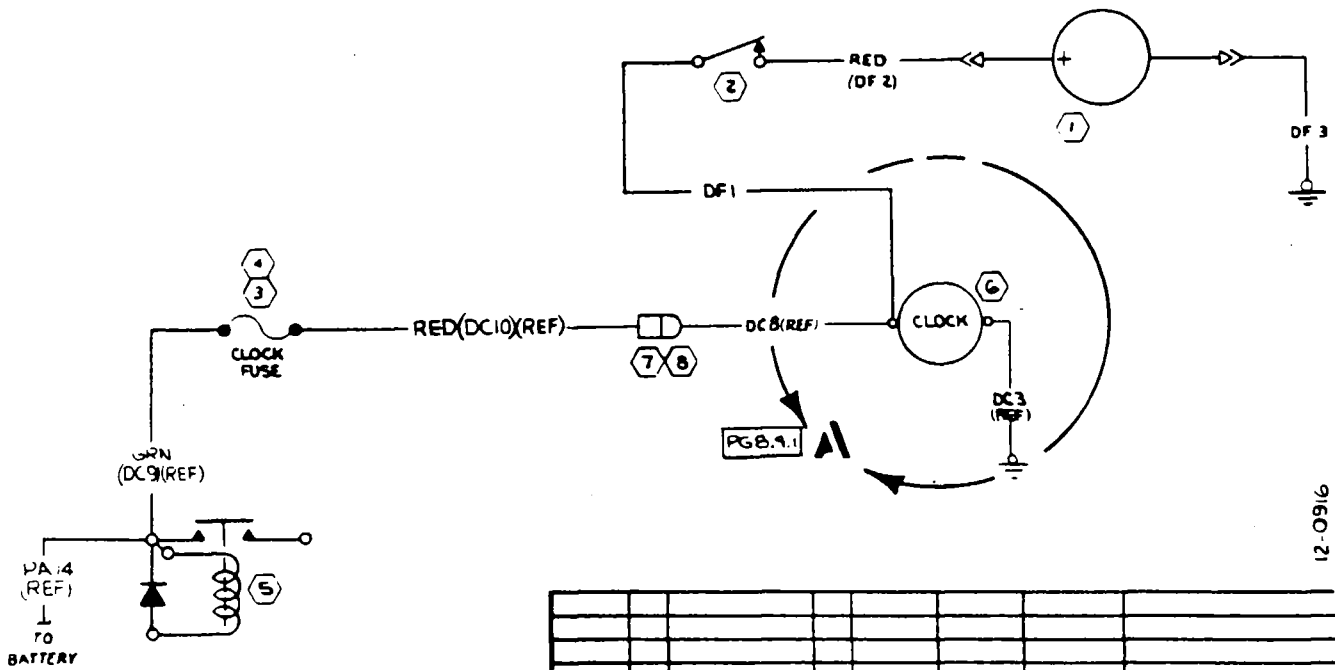


# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

▷ REQD ONLY WHEN OPTIONAL DIGITAL CLOCK C664511 IS INSTALLED

REVISION			
LET	DESCRIPTION	DATE	APPO
A	BY REV: S-1367-1-B/DF1 WAS S-1367-1-C, S-1367-1-B/DF2 WAS S-1367-1-C (NOW SHOP PRACTICE) R182EO655	C/R/S 12-14-77	JAS/RS JPM
B	BY REV: ADD NOTE 1, RED(DFA), S1360-5L, C664511-0101, DETAIL A & PG B.9.1 C664503-0101 WAS C664502 (SR9080)(REF)(SR9187)	CMK 7-13-78	JAS/RS JPM
C	BY REV: S-2443-1 WAS S-1580-1, PA14 REF WAS PA1(REF), GRN(DC9)(REF) WAS GRN(DC4)(REF), RED(DC10)(REF) WAS RED(DC1)(REF) (SR9112)	HHG 2-19-79	JAS/RS JPM
D	BY REV: S-2475-1 WAS S-2443-1 DCB(REF) WAS DC2(REF), C664508-0102 WAS C664508-0101 SR 9112	HHG 6-18-79	JAS/RS JPM
E	BY REV: ADD REV B & C664511-0102 (SR 9583)	HHG 2-13-80	JAS/RS JPM



12-0916


PART NO.	DESCRIPTION	QUANTITY
11	C664511-0102 DIGITAL CLOCK	1
10	C664511-0101 DIGITAL CLOCK	1
9	S-1360-5L CIRCUIT BREAKER	1
8	S-11637-1 HOUSING	1
7	S-11637-2 HOUSING	1
6	C664508-0102 CLOCK ASSY	1
5	S-2475-1 BATTERY CONTACTOR	1
4	S-1090-2 FUSEHOLDER	1
3	S-1091-1 FUSE	1
2	S-1711-1 OIL PRESSURE SWITCH	1
1	C664503-0101 HOURMETER	1

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS

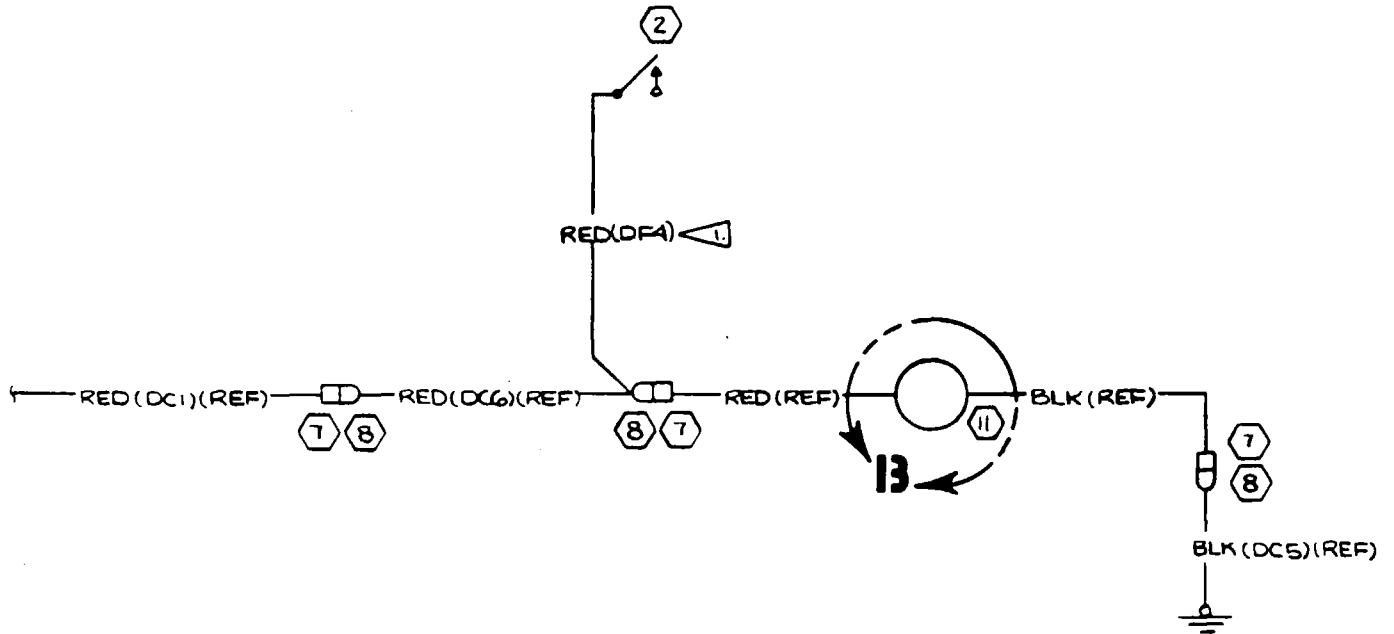
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESNA SPEC. NO. S-XXX OR CMXXXX-CESNA STD. NO.

SUPERSEDES:  
 SUPERSEDED BY:

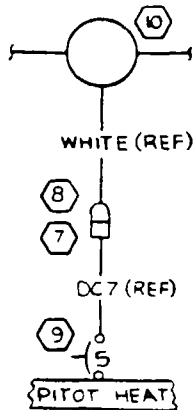
<b>WIRE TABLE</b>			<b>Cessna AIRCRAFT CO.</b> PAWNEE DIVISION 1800 E. PAWNEE WICHITA, KANSAS		
CONTRACT NO:		<b>WIRING DIAGRAM - HOURMETER (OPT)</b>			
DESIGN: SPENCER GROUP: J. H. MOORE DRAWN: SCHIFFELBEIN CHECK: J. YOUNG STRESS:	DATE: 3-18-77 DATE: 6-13-77 DATE: 3-16-77 DATE: 3-18-77	TITLE:			
PROJ: J. H. MOORE APPO: JRS OTHER:	SIZE: C CODE IDENT NO: 71379	DWG NO: 2270001	SCALE: NONE (SR BAGZ)		
PAGE: 29 (1)		(SR BAGZ)			

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
E	SEE PG. 8.4.0 FOR REVISION		



DETAIL **A** PG 8.4.0  
 (REQD WHEN OPT DIGITAL  
 CLOCK IS INSTALLED)



DETAIL **13**  
 THRU SER. SR9583)

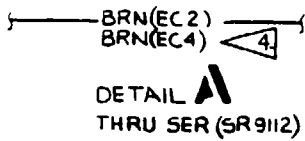
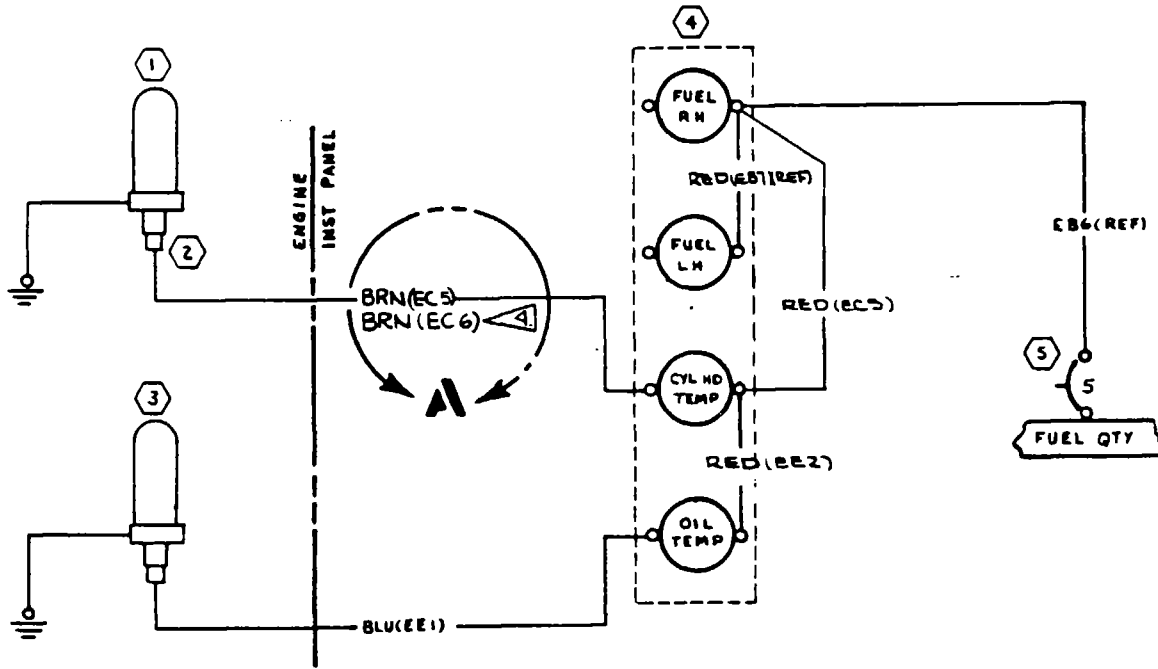
CONTRACT NO			PAWNEE DIVISION 8800 E PAWNEE WICHITA KANSAS		
NAME			Cessna AIRCRAFT CO.		
DATE			TITLE		
DESIGN	G STAMMA	7-20-78	WIRING DIAGRAM - HOURMETER (OPT)		
GROUP	W.P. G... (handwritten)	7-24-78			
DRAWN	C KING	7-13-78			
CHECK	BORLESKE	7-19-78			
STRESS					
PROJ	J.H. MOORE	7-24-78	SIZE	CODE IDENT	DWG NO
APPD			C	71379	2270001
OTHER			SCALE	NONE	(SR9187)
			PAGE 4.1		

# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

1. MATERIAL IS ALPHA 5857-7 (VENDOR CODE 92194) OR BELDEN 83009-1 (VENDOR CODE 70903)
2. MATERIAL IS ALPHA 5857-6 (VENDOR CODE 92194) OR BELDEN 83009-6 (VENDOR CODE 70903)
3. CRIMP S-1636-5 TERMINAL AROUND WIRE INSULATION. BEND 1/25 OF STRIPPED WIRE BACK OVER CRIMP AND SOLDER PER SECTION. USE MOVEY HT-1921 CRIMPING TOOL ONLY.
4. REQD ON TR182 INSTALLATIONS

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: S-1367-1-10 WAS S-1636-5 ADD RED (EC 3), RED (EC 2), RED (EC 1) (SR 8782)	RLY 4-10-78	JAB/JHM JPS
B	BY REV: S-2334-2 WAS S-2334-1 (SR 8782)	LSS 5-2-78	JAB/JHM JPS
C	BY REV: ADD BRN (EC 4) & FLAGNOTE 4; DELETE FLAGNOTE 3; S-1367-1- 9 WAS S-1636-5/BRN (EC 2) (NOW SHOP PRACTICE) (SR 8782)	CMK 7-13-78	JAB/JHM JPS
D	BY REV: S-2334-1 WAS S-2334-2 (NOW SHOP PRACTICE)	HGG 2-16-79	JAB/JHM JPS
E	BY REV: ADD DETAIL "A" (SR 9112)	HGG 5-24-79	JAB/JHM JPS



WIRE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
BRN (EC 18)	1	S-1367-1-10	S-1367-1-4	4	SER (SR 9112) 1 ON
BRN (EC 5 18)	1	S-1367-1-10	S-1367-1-4	4	SER (SR 9112) 1 ON
BRN (EC 4 18)	1	S-1367-1-10	S-1367-1-4	4	THRU SER (SR 9112)
RED (EC 2 22)	22-2	S-1367-1-10	S-1367-1-10		
RED (EC 3 22)	22-2	S-1367-1-10	S-1367-1-10		
BRN (EC 2 18)	1	S-1367-1-9	S-1367-1-10		THRU SER (SR 9112)
BLUE (E 1 18)	1	S-1367-1-10	S-1367-1-10		

ITEM NO	PART NO.	DESCRIPTION
5	S-1360-5L	CIRCUIT BREAKER
4	C669545-0102	INST CLUSTER
3	S-2335-1	SENDING UNIT
2	S-1637-4	HOUSING - PLUG
1	S-2334-1	SENDING UNIT

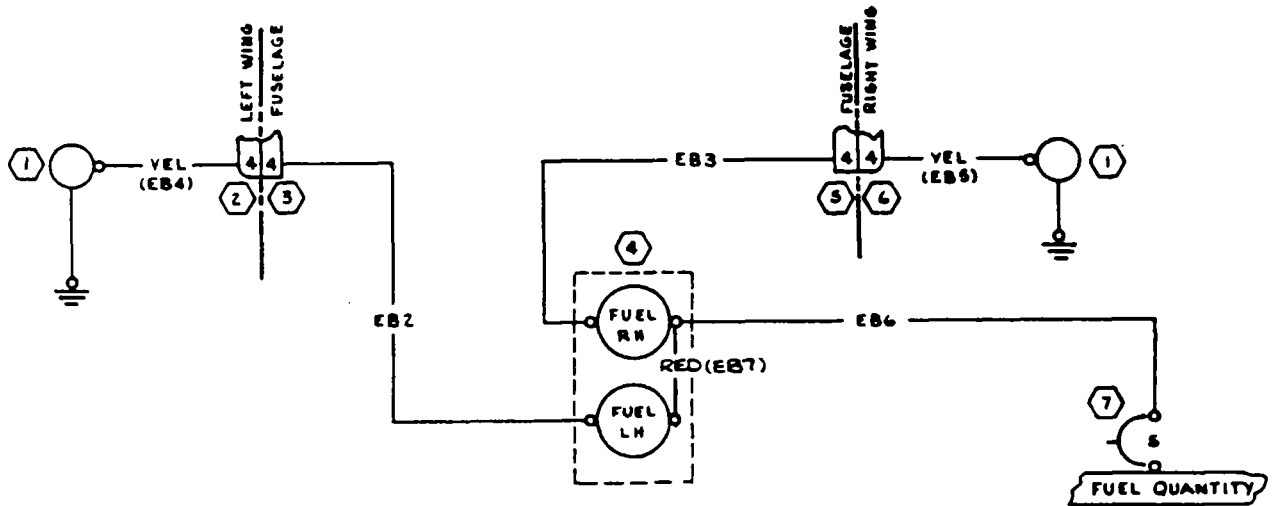
WIRE TABLE			
CONTRACT NO:		<div style="display: flex; justify-content: space-between;"> <div style="font-size: 2em; font-weight: bold;">Cessna</div> <div style="text-align: right;"> <small>PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS</small> </div> </div> <div style="text-align: center; margin-top: 10px;"> <h2 style="margin: 0;">WIRING DIAGRAM —</h2> <h3 style="margin: 0;">CYLINDER HEAD TEMP &amp; OIL TEMPERATURE</h3> </div>	
DESIGN	SPENCER 2-21-78		
GROUP	W. H. Barber 3-1-78		
DRAWN	SHAWER 2-15-78		
CHECK	J. BLISS 2-16-78		
STRESS			
PROJ	MOORE 2-78	SIZE	C
APPRO		CODE IDENT NO.	71379
OTHER		DWG NO	2270001
		SCALE: NONE	(SR 8782)
		PAGE:	8,5

CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES-XXXX-CESNA SPEC. NO.  
S-XXX OR CNXXXX-CESNA  
STD. NO.

SUPERSEDES:  
2270001 P 8.1  
SUPERSEDED BY:

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: ADD RED(EB7); DELETE 22 GA JUMPER (3), OIL TEMP & CYL HD TEMP INDICATORS (SR182)	CMK 5-5-78	<i>[Signature]</i> JRS



EQUIPMENT TABLE			WIRE TABLE					
ITEM NO	PART NO.	DESCRIPTION	WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
7	S-1360-5L	CIRCUIT BREAKER						
6	S-1640-9	HOUSING						
5	S-1641-9	HOUSING						
4	C669545-0102	INST CLUSTER						
3	S-1641-6	HOUSING						
2	S-1640-6	HOUSING						
1	C668050	FUEL LEVEL YMTR						
			RED(EB7)	22			5-1367-1-10	5-1367-1-10
			EB6	22			5-1367-1-10	5-1367-1-8
			EBS(YEL)	22			5-1367-1-10	5-1635-1
			EB4(YEL)	22			5-1367-1-10	5-1635-1
			EB3	22			5-1367-1-10	5-1636-1
			EB2	22			5-1367-1-10	5-1636-1

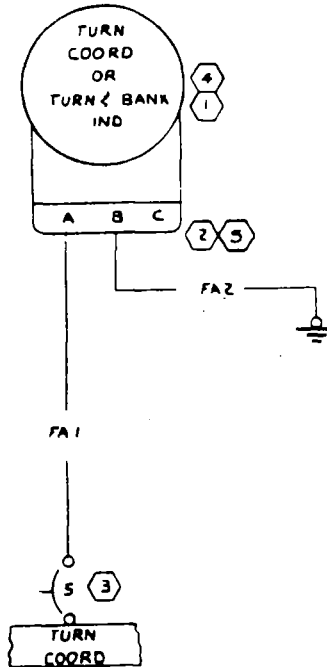
CONTRACT NO.			<b>Cessna AIRCRAFT CO.</b>		
DESIGN	NAME	DATE	TITLE <b>WIRING DIAGRAM —                  FUEL QUANTITY INDICATORS</b>		
GROUP	<i>W. H. Anderson</i>	3-1-78			
DRAWN	<i>S. SAUER</i>	2-15-78			
CHECK	J. BLISS	2-16-78			
STRESS					
PROJ	J. M. JOHNSON	3-27-78	SIZE	CODE IDENT NO.	DWG NO.
APPD			C	71379	2270001
OTHER			SCALE: NONE	(SR 8782)	PAGE: 8,6

CES-1000 IS APPLICABLE  
 VENDOR CODES PER S-1400  
 CES-XXXX-CESSNA SPEC NO.  
 S-XXX OR CMXXXX-CESSNA  
 STD. NO.

SUPERSEDES:  
 2270001 P 8.2  
 SUPERSEDED BY:

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD



WIRE CODE NO.	GA	MATERIAL	LG	TERMPALS	SERIALS
FA2	22			SOLDER 5-1367-1-B	
FA1	22			5-1367-1-6 SOLDER	

PART NO.	DESCRIPTION
5 MS 3057-4A	CLAMP
4 5-1303-2	INDICATOR, T & B
3 5-1360-5L	CIRCUIT BREAKER
2 MS3106A10SL35	CONNECTOR
1 C661003-0505	TURN COORDINATOR

### EQUIPMENT TABLE

CESS-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CESS-XXXX-CESSNA SPEC. NO.  
S-XXXX OR CXXXX-CESSNA  
STD. NO.

SUPERSEDES:  
SUPERSEDED BY:

CONTRACT NO.:	NAME	DATE
	SPENCER	3-28-77
	W. H. [Signature]	4-13-77
	SCHIFFELBEIN	3-16-77
	J. YUCEL	3-18-77
	J. H. MOORE	4-14-77

**WIRE TABLE**

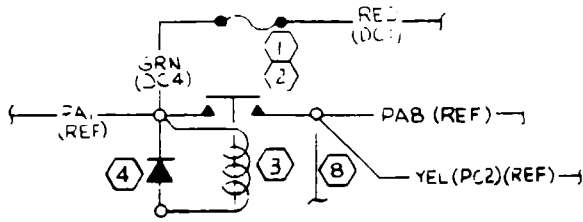
**Cessna AIRCRAFT CO.**  
FAWNEE DIVISION  
3600 E. FAWNEE  
WICHITA, KANSAS

**TITLE**  
WIRING DIAGRAM —  
TURN COORDINATOR (STD)  
TURN & BANK INDICATOR (OPT)

**SIZE** C    **CODE IDENT. NO.** 71379    **DWG NO.** 2270001

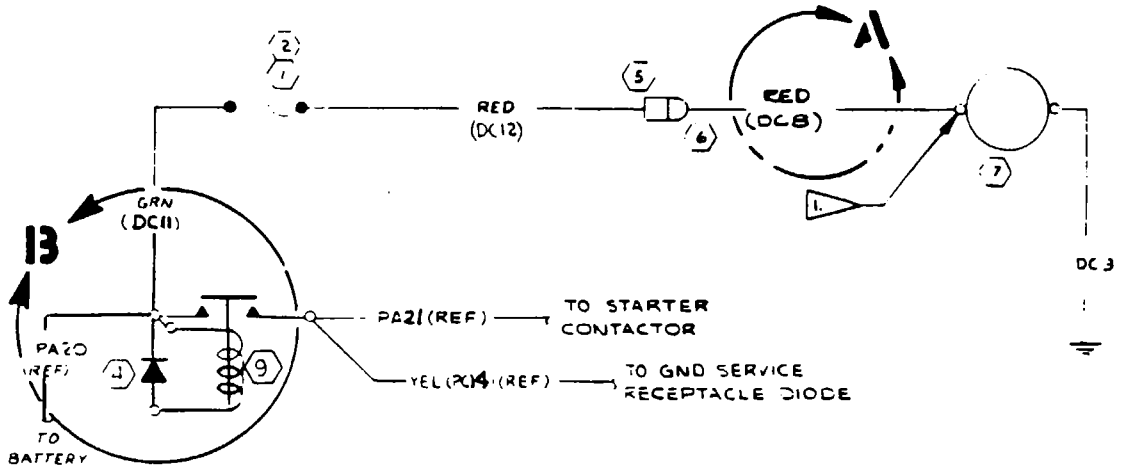
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# MODEL R182 AND TR182 SERVICE MANUAL



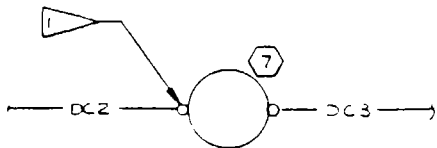
**DETAIL B**  
EFF THRU SER(SR9112)

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV 1553112 WAS TO STARTER CONTACTOR ADD PAB (REF) & PC2 (REF) (SR846Z)(REF)	JLP 10-18-77	JAB/WH JRS
B	BY REV: ADD RED DC8(NOTE); DETAIL A (SER, C664508-0102 WAS C664508-0101 (SR9195)(REF)	BGK 10-6-78	JAB/WH JRS
C	BY REV: ADD DETAIL B (SR9112)	HHG 2-19-79	JAB/WH JRS
D	BY REV: S-2475-1 WAS S-2443-1 (SR9112)	HHG 6-18-79	JRS
E	BY REV: DC12 WAS DC10, DC11 WAS DC9 (SR1015Z)	GW 5-1-81	JAB/WH JRS



**NOTES:**

- 1 CAUTION: POWER WIRE MUST BE CONNECTED TO "BATT" TERMINAL OF CLOCK OTHERWISE INTERNAL DAMAGE TO UNIT WILL RESULT



**DETAIL A**  
THRU SER(SR9195)

ITEM NO	PART NO.	DESCRIPTION
9	S-2475-1	CONTACTOR
8	1553112	FLS BAR ASSY
7	C664508-0102	CLOCK ASSY
6	S-1637-1	HOUSING
5	S-1637-2	HOUSING
4	077072B	DIODE ASSY
3	S-1580-1	BATTERY CONTACTOR
2	S-1090-22	FUSE HOLDER
1	S-1091	FUSE

EQUIPMENT TABLE	
PART NO.	DESCRIPTION

SUPERSEDES.	
PART NO.	DESCRIPTION
SUPERSEDED BY	

CES-1000 IS APPLICABLE  
 VENDOR CODES PER S-1400  
 CES-XXXX-CESSNA SPEC. NO  
 S-XXX OR CMXXXX-CESSNA  
 STD. NO.

ITEM NO	QTY	DESCRIPTION	TERMINALS	SERIALS
GRN(DC11)	22	-22-5	2 S-1367-1-B	SOLDER SER(SR1015Z) ON
RED(DC7)	22	-22-2	S-1636-1	SOLDER SER(SR1015Z) ON
REF(DC9)	22	-22-2	S-1636-1	SOLDER SR9112 THRU(SR1015Z)
GRN(DC4)	22	-22-5	S-1367-1-B	SOLDER (SR9112) THRU(SR1015Z)
RED(DC8)	22	-22-2	S-1635-1	S-1367-1-B SER(SR9195, DC9 THRU SER(SR9112)
RED(DC12)	22	-22-5	S-1367-1-B	SOLDER THRU SER(SR9112)
DC3	22		S-1367-1-B	S-1367-1-B
DC2	22		S-1635-1	S-1367-1-B THRU SER(SR9195)
RED(DC1)	22	-22-2	S-1636-1	SOLDER THRU SER(SR9112)

WIRE TABLE			
WIRE CODE NO	Gauge	MATERIAL	TERMINALS

CONTRACT NO:		PAWNEE DIVISION 3800 E PAWNEE WICHITA KANSAS	
DESIGN	SPENCER	DATE	3-28-77
GROUP	0244	DATE	4-15-77
DRAWN	SCHIFFELBEIN	DATE	3-16-77
CHECK	J. YOUSEL	DATE	5-18-77
STRESS			
PROJ	4 MODE	DATE	4-11-77
APPD	JRS		
OTHER			

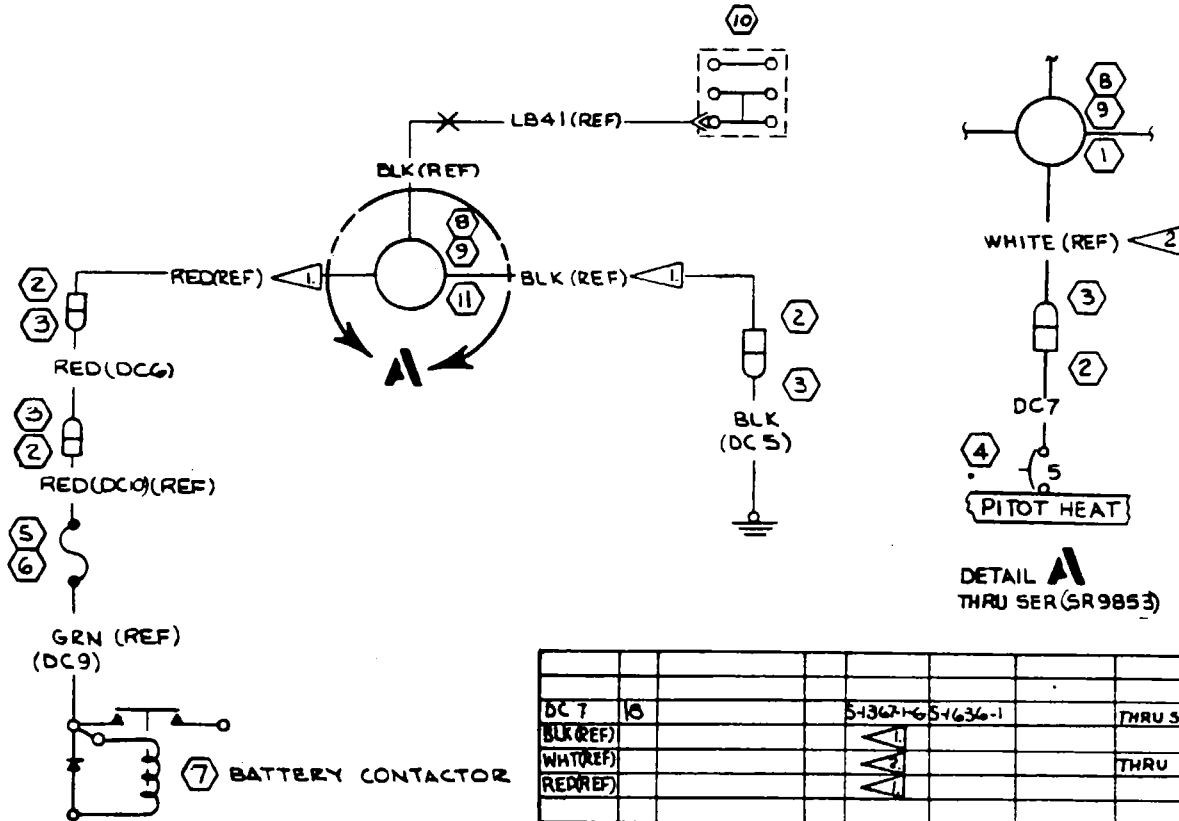
<b>Cessna AIRCRAFT CO.</b>		
<b>WIRING DIAGRAM —</b>		
<b>CLOCK</b>		
SIZE	CODE IDENT NO.	DWG NO.
C	71379	2270001
SCALE	NOVE	(SR846Z)
PAGE:		

# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

- ▷ INSTALL S-1636-1 ON VENDOR WIRE
- ▷ INSTALL S-1635-1 ON VENDOR WIRE

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: GRN (DC4)(REF) WAS GRN (DC9) WHITE (REF) WAS RED (REF), RED (REF) WAS BLU (REF) & RED (DC6) WAS BLU (DC6) (SR 9187)	CMK	JAS 1/83 JH
B	BY REV: S-2443-1 WAS S-1580-1, RED (DC10)(REF) WAS RED (DC1)(REF), GRN (DC9)(REF) WAS GRN (DC4)(REF) (SR 9112)	HHG 2-19-79	JAS 1/83 JH
C	BY REV: S-2475-1 WAS 2443-1 (SR 9112)	HHG 6-18-79	JAS 1/83 JH
D	BY REV: ADD DETAIL A & C664511-0102 (SR 9583)	HHG 2-13-80	JAS 1/83 JH



12-0916

ITEM NO	PART NO.	DESCRIPTION
11	C664511-0102	DIGITAL CLOCK
10	34003-817	TERMINAL BLOCK
9	9-2413-1	SOCKET
8	M925231-1819	LIGHT
7	S-2475-1	CONTACTOR
6	S-1091-1	FUSE
5	S-1090-22	FUSEHOLDER
4	S-1360-SL	CIRCUIT BREAKER
3	S-1637-1	HOUSING
2	S-1637-2	HOUSING
1	C664511-0101	DIGITAL CLOCK

WIRE CODE NO	G.A.	MATERIAL	L.G.	TERMINALS	SERIALS
DC 7	10			S-1636-1 S-1636-1	THRU SER (SR9583)
BLK(REF)					THRU SER (SR9583)
WHY(REF)					THRU SER (SR9583)
RED(REF)					
RED	22	-22-6		S-1635-1 S-1635-1	
(DC 6)					
BLK	10	-10-0		S-1635-1 S-1637-1	
(DC 5)					

**WIRE TABLE**

CONTRACT NO: \_\_\_\_\_

Cessna AIRCRAFT CO. PAWNEE DIVISION  
3808 E. PAWNEE  
WICHITA, KANSAS

**WIRING DIAGRAM —  
DIGITAL CLOCK (OPT)**

DRAWN: R. YOUNGERS 4-11-78  
CHECK: BORLESKE 4-11-78  
STRESS: \_\_\_\_\_

PROJ: J. J. MOORE 4-14-78  
APPRO: JRS JH  
OTHER: \_\_\_\_\_

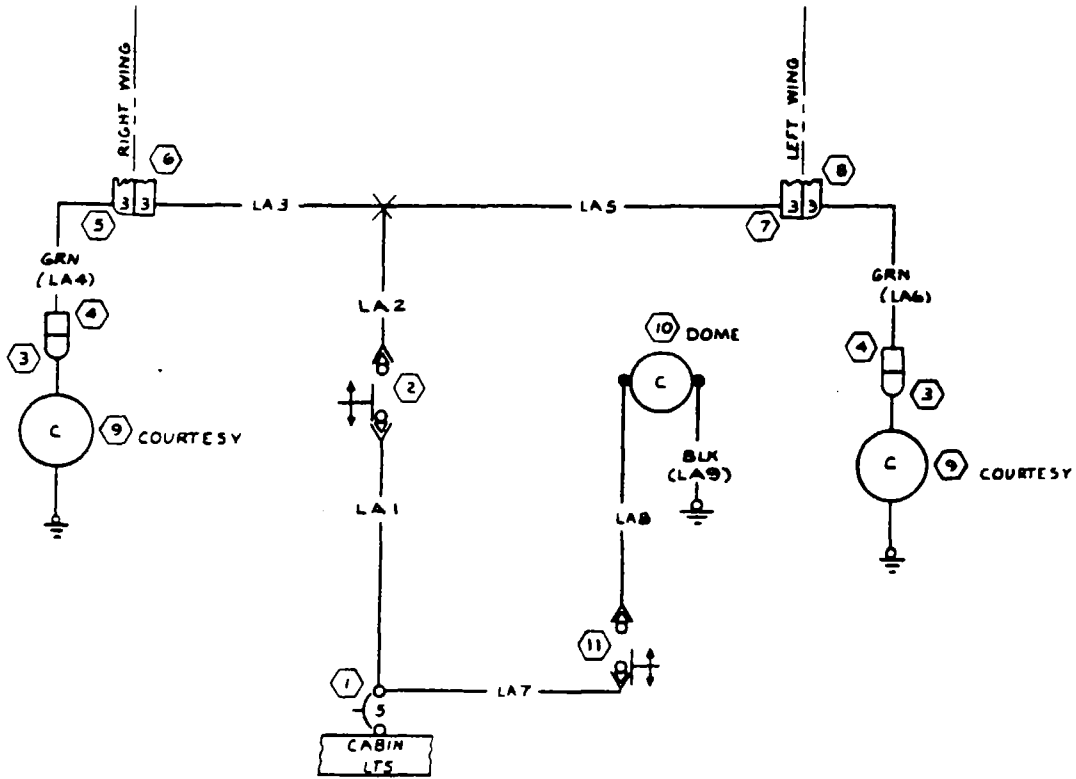
SIZE: C    CODE IDENT: 71379    DWG NO: 2270001  
SCALE: NONE    (SR9187)    PAGE: 10.2

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO. S-XXX OR CMXXXX-CESSNA STD. NO.

SUPERSEDES: \_\_\_\_\_  
SUPERSEDED BY: \_\_\_\_\_

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV 5-1370-1 WAS 5-1370-2/LA2 MS25231-313 WAS GE182/ (NOW SHOP PRACTICE) (MER R182EQ655)	CRS 12-16-77	JAS DORR 1/13/78
B	BY REV. ADD 5-2160-1 SWITCH ITEM 11; 5-2160-1 WAS 5-1831-1 SWITCH PER DOME LT SWITCH; 5-1493-1 WAS 5-1830-1 TERMINAL ON LA7 & LAB WIRES (SR2420) (REF)	GLS 6/23/81	JAS DORR 9/8/81



ITEM NO	PART NO.	DESCRIPTION	WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
11	5-2160-1	SWITCH						
10	MS25231-313	LAMP						
9	MS155B4 B	LAMP						
8	5-1640-6	HOUSING - PIN						
7	5-1641-6	HOUSING - SOCKET						
6	5-1641-9	HOUSING - SOCKET						
5	5-1640-9	HOUSING - PIN						
4	5-1637-2	HOUSING						
3	5-1637-1	HOUSING						
2	5-1831-1	SWITCH						
1	5-1360-5L	CIRCUIT-BREAKER						
			BLK (LA9)	22	-22-0		SOLDER 5-1367-1-6 (STD)	
			LAB	22			5-1493-1 SOLDER	
			LA7	22			5-1367-1-6 5-1493-1	
			GRN (LA6)	22	-22-5		5-1635-1 5-1636-1	
			LA5	22			SEE LA2 5-1636-1	
			GRN (LA4)	22	-22-5		5-1635-1 5-1636-1	
			LA3	22			SEE LA2 5-1636-1	
			LA2	22			5-1830-1 5-1370-1	
			LA1	22			5-1367-1-6 5-1830-1 (STD)	

CONTRACT NO.				NAME		DATE	TITLE	
				Cessna			FAWNEE DIVISION 3800 E FAWNEE WICHITA, KANSAS	
				DESIGN	SPENCER	3-28-77	WIRING DIAGRAM - DOME LIGHT (STD) & COURTESY LIGHTS (OPT)	
				GROUP	W.H. Gundersen	4-13-77		
				DRAWN	SCHIFFELBEIN	3-16-77		
				CHECK	J. YOEUL	3-18-77		
				STRESS				
				PROJ	J.H. MOORE	4-14-77	SIZE	CODE IDENT NO
				APPO	JAS		C	71379
				OTHER			DWG NO	2270001
							SCALE: NONE	(SR2420)   PAGE: 11

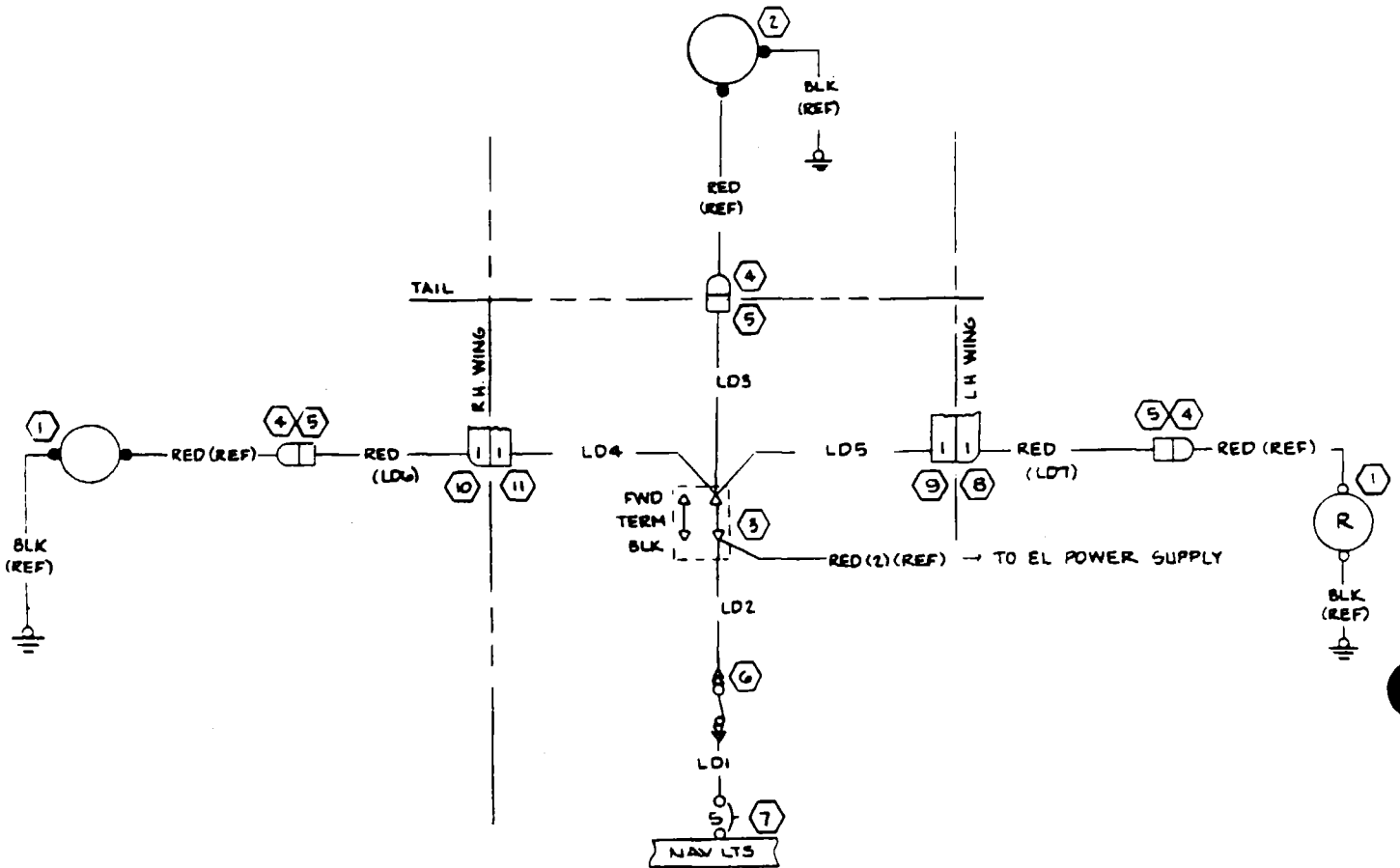
EQUIPMENT TABLE		SUPERSEDES:	
		SUPERSEDED BY:	

CES-1000 IS APPLICABLE  
 VENDOR CODES PER 5-1400  
 CES-XXXX-CESSNA SPEC. NO.  
 5-XXX OR CMXXXX-CESSNA  
 STD. NO.



# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPO



WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
20	20	-20	-2	5-1635-1	5-1636-1
20	20	-20	-2	5-1635-1	5-1636-1
22				5-1636-1	5-1829-1
				5-1636-1	5-1829-1
				5-1829-1	5-1493-1
22				5-1367-1	5-1493-1

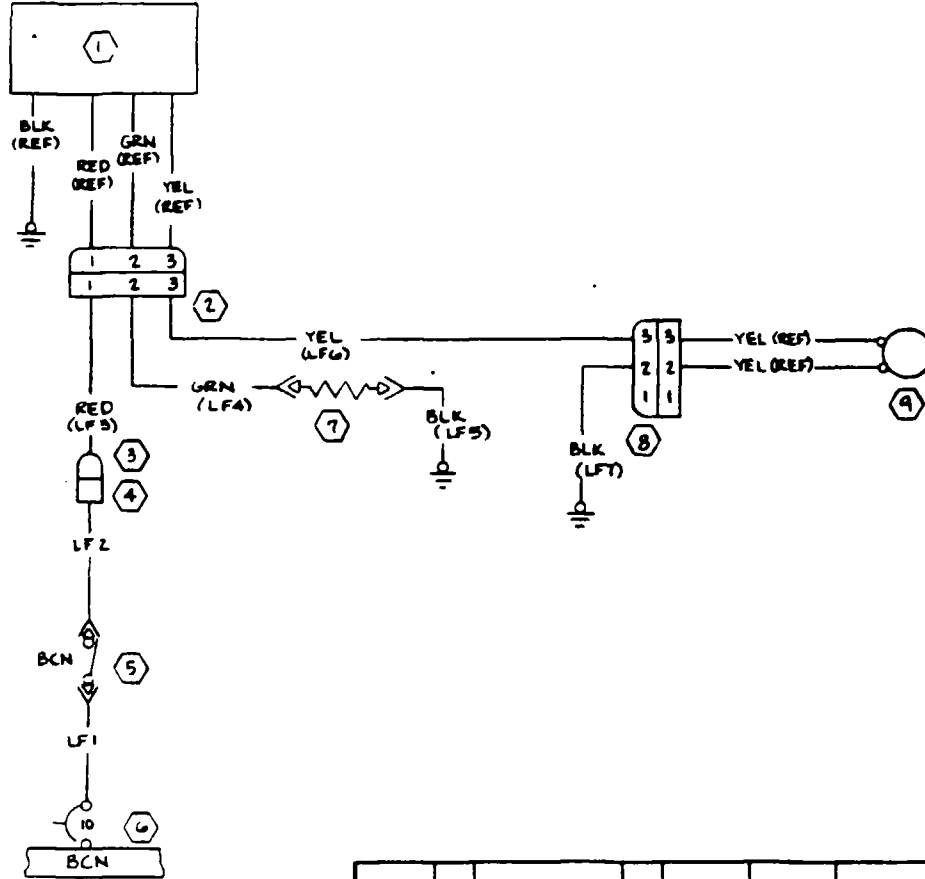
PART NO.	DESCRIPTION
11	5-1641-9 HOUSING
10	5-1640-9 HOUSING
9	5-1641-6 HOUSING
8	5-1640-6 HOUSING
7	9-1360-5L CIRCUIT BREAKER
6	5-2160-1 SWITCH
5	5-1637-2 HOUSING
4	6-1637-1 HOUSING
3	34002-59 TERM BLOCK
2	C622001-0401 LIGHT ASSY
1	C622001-0202 LIGHT ASSY

WIRE TABLE			CONTRACT NO:		
DESIGN	SPENCER	3-28-77	Cessna AIRCRAFT CO.		
GROUP	W.H. HENDERSON	4-13-77	PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS		
DRAWN	HARVEY	3-16-77	TITLE <b>WIRING DIAGRAM - NAVIGATION LIGHTS</b>		
CHECK	J. YOWEL	3-16-77			
STRESS			SIZE CODE IDENT NO. DWG NO		
PROJ	J.H. MOORE	4-14-77	C	71379	2270001
APPO	JHS		SCALE: NONE (SR 2462) PAGE: 11, 2		
OTHER					

EQUIPMENT TABLE	
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESBNA SPEC. NO. S-XXX OR CMXXX-CESBNA STD. NO.	SUPERSEDES:  SUPERSEDED BY:

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD



QTY	PART NO.	DESCRIPTION	WIRE NO.	GA.	MATERIAL	LG.	TERMINALS	SERIALS
1	621001 0102	LIGHT ASSY						
4	51635-2	HOUSING						
7	OR95-6	RESISTOR						
6	51360-10L	CIRCUIT BREAKER						
5	52160-1	SWITCH						
4	51637-2	HOUSING						
3	51637-1	HOUSING						
2	51638-1	HOUSING						
1	CS94502 0102	FLASHER ASSY						

WIRE CODE NO.	GA.	MATERIAL	LG.	TERMINALS	SERIALS
BLK (LF7)	18	-18-0		51635-1	51367-1 B
YEL (LFG)	18	-18-4		51636-1	51635-1
BLK (LFS)	18	-18-0		51493-1	51367-1 B
GRN (LFA)	18	-18-5		51636-1	51493-1
RED (LFS)	18	-18-2		51635-1	51636-1
LF2	18			51493-1	51636-1
LF1	18			51367-1 G	51493-1

EQUIPMENT TABLE			WIRE TABLE		
CONTRACT NO.			<b>Cessna AIRCRAFT CO.</b>		
DESIGN	NAME	DATE	PAWNEE DIVISION 3800 E. PAWNEE WICHITA, KANSAS		
GROUP			TITLE		
DRAWN	HARVEY	5-16-77	<b>WIRING DIAGRAM -</b>		
CHECK	J. YOEEL	5-18-77	<b>FLASHING BEACON</b>		
STRESS			<b>LIGHT (OPT)</b>		
PROJ	H. MOORE	4-14-77	SIZE	CODE IDENT	DWG NO
APPD			C	71379	2270001
OTHER			SCALE	NONE	(SRB462)

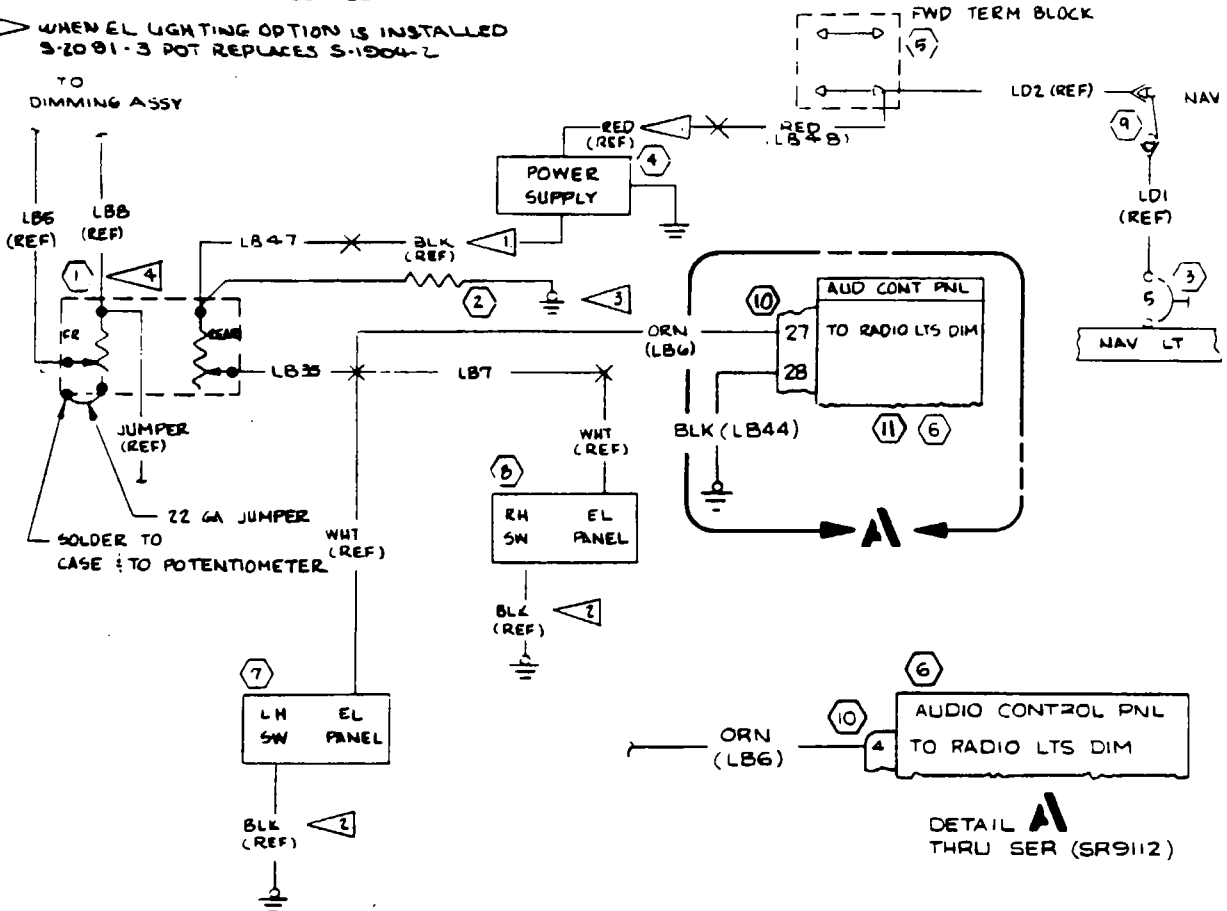
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO. S-XXX OR CMXXXX-CESSNA STD. NO.	SUPERSEDES.  SUPERSEDED BY.
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# MODEL R182 AND TR182 SERVICE MANUAL

## NOTES

- 1 TO BE RETAINED IN TERMINAL WIRE MUST BE STRIPPED DOUBLED & TWISTED
- 2 TERMINATE VENDOR FURNISHED WIRE WITH S-1367-114
- 3 THIS END OF RESISTOR TERMINATED WITH S-1367-114 TERMINAL - INSTALLED ON BUSHING OF TANDEM POT ASSY DUE TO HEAT DISSIPATION RESISTOR MUST BE KEPT FROM WIRE BUNDLE
- 4 WHEN EL LIGHTING OPTION IS INSTALLED S-2091-3 POT REPLACES S-1367-114

REVISION			
LET	DESCRIPTION	DATE	APPO
A	BY REV ADD DETAIL A, LB44E SER (SR9112)	DLP 2-20-79	DJ [Signature]
B	BY REV: LB47 WAS LB33, LB48 WAS LB34 (SR9951)	GLS 2/9/81	BEIN [Signature]



DETAIL A  
THRU SER (SR9112)

EQUIPMENT TABLE		WIRE TABLE	
PART NO.	DESCRIPTION	CONTRACT NO.	PAWNEE DIVISION 3800 E PAWNEE WICHITA, KANSAS
11	2470003	AUD CONTROL PNL	
10	87144 1	CONNECTOR	
9	5-21601	SWITCH	
8	1213363-11	EL PANEL	
7	2213039-1	EL PANEL	
6	0570442	AUDIO CONTROL PNL	
5	34002-55	TERMINAL BOARD	
4	6613001 0101	POWER SUPPLY	
3	5-1360-5L	CIRCUIT BREAKER	
2	VAL 5 6000	RESISTOR	
1	5-2091-3	POT ASSY	

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS	
RED (LB48)	22			S-1829-1	S-1370-1	SER (SR9951) & ON
LB4-7	22			S-1370-1	SOLDER	SER (SR9951) & ON
BLK (LB44)	22	22-0		85969-6	S136718	SER (SR9112) & ON
LB35	22				SOLDER SEE LB7	
LB33				S-1370-1	SOLDER	THRU SER (SR9951)
ORN (LB6)		-22-3		SEE LB7	85969-6	
LB7				S-1370-2	S-1370-1	
RED (LB48)	22	-22-2		S-1829-1	S-1370-1	THRU SER (SR9951)

DESIGN	NAME	DATE	TITLE
SPENCER		3-28-77	<b>WIRING DIAGRAM - ELECTRO LUMINESCENT PANEL (OPT)</b>
W. [Signature]		4-15-77	
HARVEY		3-16-77	
J. YOWEL		3-18-77	

PROJ	NO.	DATE	SIZE	CODE IDENT.	DWG NO
J.H. MOORE		4-14-77	C	71379	2270001

SCALE	PAGE
NONE	4

# MODEL R182 AND TR182 SERVICE MANUAL

G	BY REV: ADD DETAIL B: SERIAL OUT BLK (LB29) WIRE (SR9951)	CLS 5-6-81	2nd OIL 1RS LMP

**NOTES:**

1. INSTALL 5-1635-1 TERMINAL ON VENDOR FURNISHED LEAD AS INDICATED
2. INSTALL 5-1367-1 G TERMINAL ON VENDOR FURNISHED WIRES AS INDICATED
3. THIS PCT IS PART OF 5-2091-7 DUAL POT ASSY WHEN OPTIONAL EL LIGHTING IS INSTALLED
4. WHEN POST LIGHT OPTION IS INSTALLED 570331-1 DIMMING ASSY. REPLACES 570166 & 52091-3 POTENTIOMETER ASSY REPLACES 51909-2.
5. REQD ONLY WHEN OPTIONAL DIGITAL CLOCK C649511 IS INSTALLED
6. OXYGEN CONSOLE WIRING IS STANDARD ON TR182 OPTIONAL ON R182

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: MS25231-1829 WAS 1829 (SR9462)	JCS 6-27-77	JCS
B	BY REV: DELETE LB27 WIRE; DELETE 5-1637-1 & 5-1637-2/PEDESTAL LTS; ADD RED/WHT TO LB13; 5-2093-7 WAS 5-2093-3/NOTE 3; ADD DETAIL A; NOW SHOP PRACTICE R182-E0655 (SR8782)	CES 2-15-78	JAB
C	BY REV: ADD LB41, NOTES 5, 52413-1 & MS25231-1819 (SR9187)	CMK 7-13-78	JAB
D	BY REV: ADD NOTE 6, 5-1899 LIGHT ASSY, 22 GA JUMPER (S) WAS (3), LB16, LB17, RED/BLU (LB42), BLK (LB43) (SR8782)	LSS 8-23-78	JAB
E	BY REV: ADD DETAIL A 1 SER, C669545-0105 (SR9437)	HMG 9-25-78	JAB
F	BY REV: ADD RED (LB44) BLK (LB45), RED (LB46), BLK (REF) & WHT (REF); DELETE RED/WHT (LB13) & BLK (LB30); 5-1636-1 WAS SOLDER/LB16 & LB17, RED/WHT WAS RED/LB32, SOLDER WAS 5-1829-1/LB32, SOLDER WAS 5-1829-1/LB31 & 5-1370-1 WAS 5-1636-1/LB31 MER 210E0667, MER R182E0717 (NOW SHOP PRACTICE)	DSM HMG 2-21-79	JAB

51-00-15

RED (LB45)	22	-22-2	5-1635-1	SOLDER	
BLK (LB44)	22	-22-0	SOLDER	5-1635-1	
RED (LB46)	22	-22-2	5-1370-1	SEE LB9	
LB41	22		5-1829-1	5-1370-1	<5
LB40	22		5-1829-1	5-1367-1-B	SER SR8782 THRU (SR9437)
LB8	22		5-1635-2	SOLDER	
LB5	22		5-1635-1	SOLDER	
LB4	22		5-1635-1	SOLDER	
LB3	18		5-1635-1	5-1829-1	
LB2	18		5-1635-1	5-1829-1	
LB1	18		5-1367-1-B	SEE L08	
LB9	22		5-1370-1	5-1829-1	
LB10			5-1370-1	5-1367-1-B	
LB11			5-1636-1	5-1829-1	
LB12			5-1829-1	5-1636-1	

ITEM NO	PART NO.	DESCRIPTION	QUANTITY	WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
23	C669545-0105	CLUSTER							
22	52413-1	SOCKET	5						
21	MS25231-1819	LIGHT	5						
20	C669545-0102	INSTRUMENT CLUSTER							
19	570166	DIMMING ASSY							
18	51360 5L	CIRCUIT BREAKER							
17	5-2000C201J	RESISTOR							
16	5-1404-2	POT ASSY							
5	51640 6	HOUSING							
14	51641-6	HOUSING							
3	MS25231-1829	LAMP							
12	MS15584 8	MINIATURE LAMP							
11	551320E	SOCKET							
10	5-2095-1	HOUSING							THRU SER (SR9951)
9	5-2095-2	HOUSING							
8	C660501-0102	COMPASS ASSY							
7	5-1637-1	HOUSING							
6	5-1637-2	HOUSING							
5	5-1645-2	SWITCH							
4	34003 817	TERMINAL BLOCK							
3	5-1899	LIGHT ASSY							
2	1270479	LIGHT ASSY							
1	1213319	LIGHT ASSY							

EQUIPMENT TABLE			
ITEM NO	PART NO.	DESCRIPTION	QUANTITY
23	C669545-0105	CLUSTER	
22	52413-1	SOCKET	5
21	MS25231-1819	LIGHT	5
20	C669545-0102	INSTRUMENT CLUSTER	
19	570166	DIMMING ASSY	
18	51360 5L	CIRCUIT BREAKER	
17	5-2000C201J	RESISTOR	
16	5-1404-2	POT ASSY	
5	51640 6	HOUSING	
14	51641-6	HOUSING	
3	MS25231-1829	LAMP	
12	MS15584 8	MINIATURE LAMP	
11	551320E	SOCKET	
10	5-2095-1	HOUSING	
9	5-2095-2	HOUSING	
8	C660501-0102	COMPASS ASSY	
7	5-1637-1	HOUSING	
6	5-1637-2	HOUSING	
5	5-1645-2	SWITCH	
4	34003 817	TERMINAL BLOCK	
3	5-1899	LIGHT ASSY	
2	1270479	LIGHT ASSY	
1	1213319	LIGHT ASSY	

WIRE TABLE			
CONTRACT NO.	NAME	DATE	TITLE
	SPENCER	3-28-77	WIRING DIAGRAM
	W. H. Anderson	4-15-77	INSTRUMENT LIGHTS
	HARVEY	3-16-77	
	J. YOUNG	3-16-77	

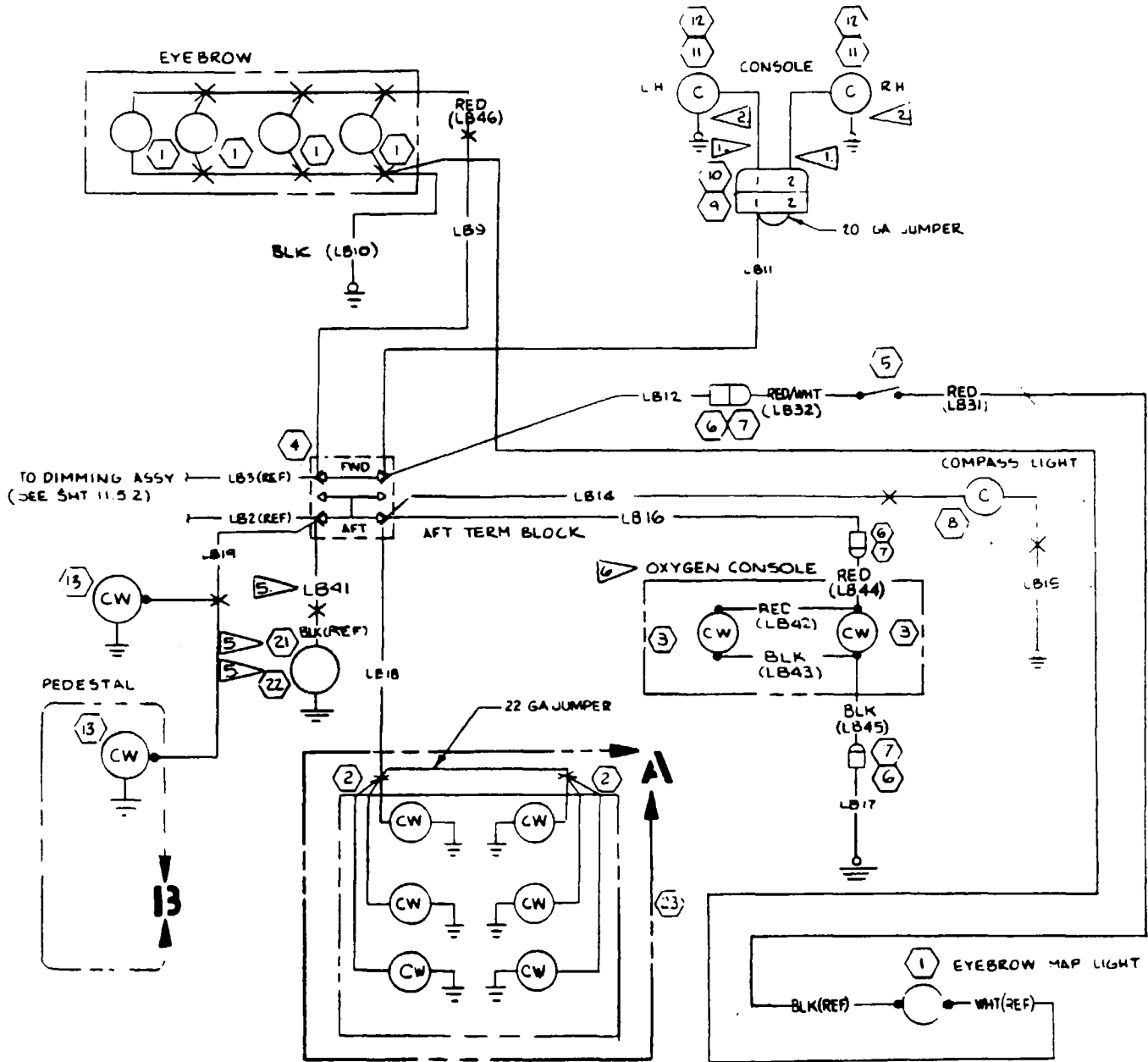
PROJ	APPD	OTHER	SIZE	CODE IDENT NO	DWG NO
1100E	JJY.T		C	71379	2270001

SCALE	PAGE
NONE	11 5/11

# MODEL R182 AND TR182 SERVICE MANUAL

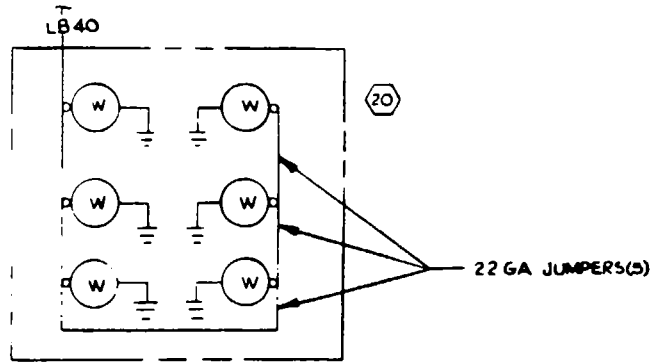
REVISION			
LET	DESCRIPTION	DATE	APPO
1	SEE PG 1150 FOR REV		



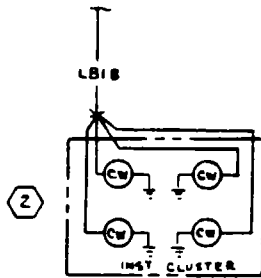
CONTRACT NO.			Cessna AIRCRAFT CO.		PAWNEE DIVISION 5900 E. PAWNEE WICHITA, KANSAS	
DESIGN	NAME	DATE	TITLE			
GROUP	SPENCER	3-28-77	WIRING DIAGRAM - INSTRUMENT LIGHTS			
DRAWN	W. H. HARVEY	4-13-77				
CHECK	HARVEY	3-16-77				
STRESS	J. YOUEL	3-16-77				
PROJ	J. H. MOORE	4-14-77	SIZE	CODE IDENT	DWG NO	
APPO	JAC		C	71379	2270001	
OTHER			SCALE	NONE	OR 2462	PAGE: 151

Instrument Lights (Sheet 1 of 2)

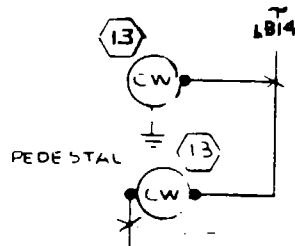
# MODEL R182 AND TR182 SERVICE MANUAL



DETAIL **A**  
SER(SR8782) THRU(SR9437)



DETAIL **A**  
THRU SER(SR8782)

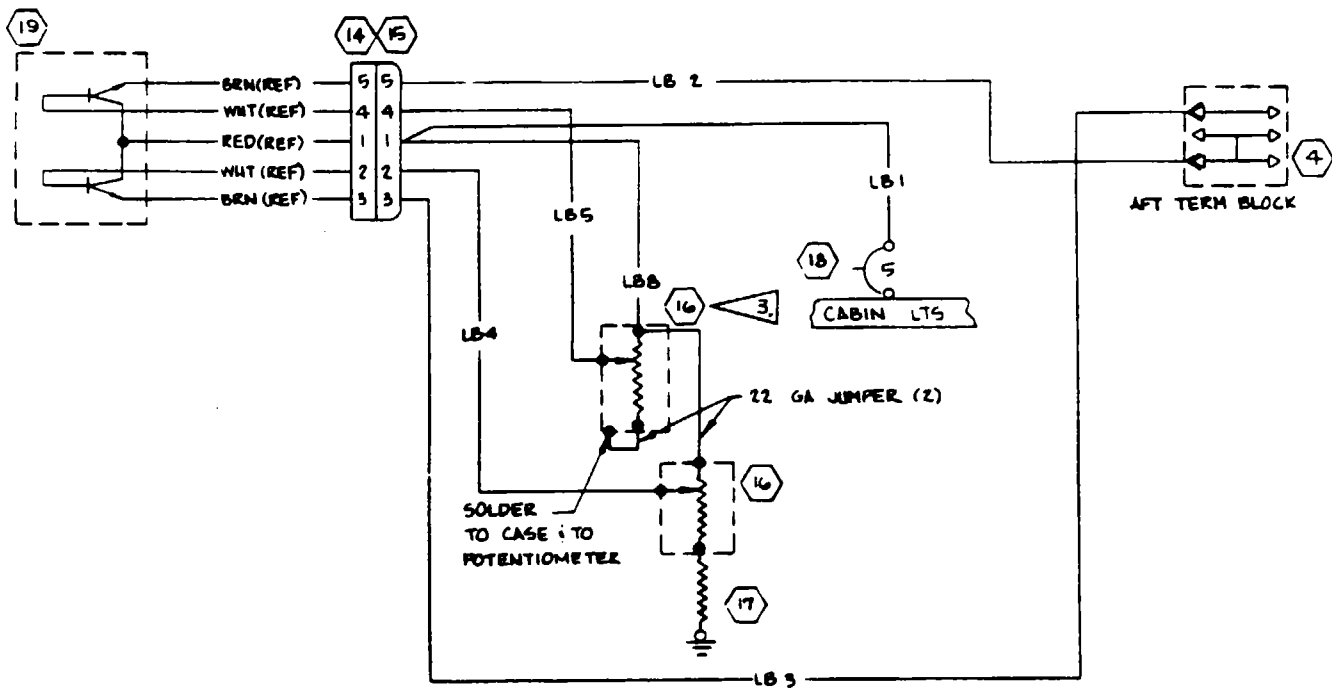


BLK (LB29)  
DETAIL **B**  
THRU SER(SR9951)

CONTRACT NO.			PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS		
DESIGN	NAME	DATE			
GROUP	SPENCER	3-28-77	WIRING DIAGRAM - INSTRUMENT LIGHTS		
DRAWN	<i>Del Henderson</i>	4-13-77			
CHECK	HARVEY	3-16-77			
STRESS	YOUDEL	3-18-77			
PROJ			SIZE	CODE IDENT NO	DWG NO
APPD			C	71379	2270001
OTHER			SCALE	NONE	(SR 2462)
					PAGE 116

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD



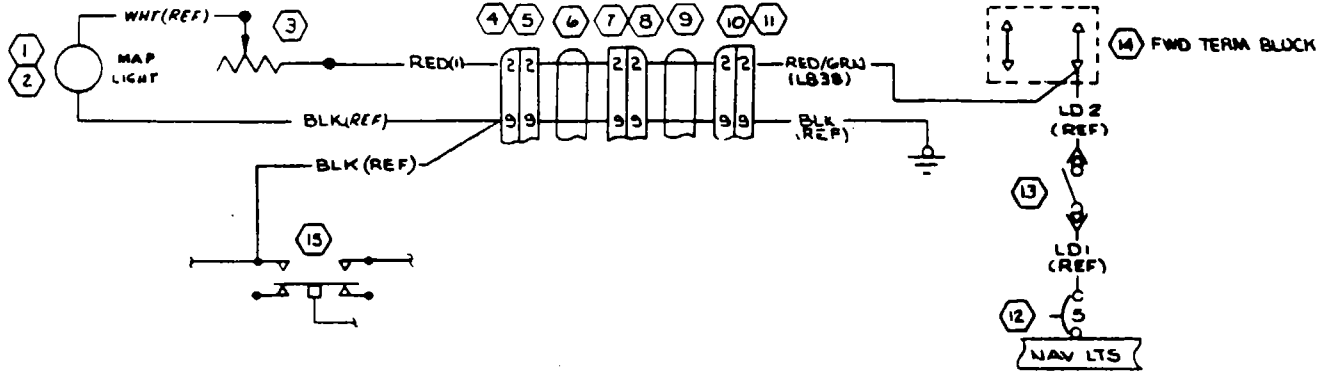
CONTRACT NO:			PAWNEE DIVISION 8800 E. PAWNEE WICHITA, KANSAS		
DESIGN	NAME	DATE			
GROUP	W. J. HANCOCK	4-15-77	TITLE <b>WIRING DIAGRAM -          INSTRUMENT LIGHTS</b>		
DRAWN	HARVEY	3-16-77			
CHECK	J. YOUNG	3-18-77			
BY					
PROJ	J. L. MOORE	4-14-77	SIZE	CODE IDENT NO.	DWG NO.
APPD	JRS		C	71379	2270001
OTHER			SCALE: NONE		(SRB462) PAGE: 11.5 2

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD 5-1985-1, BLK(REF) WAS BLK, WHF(REF) WAS RED(2) (SR8462)(REF)	CRS 11-21-77	JAS JRS 11/27
B	BY REV: BLK(REF) WAS BLK (LB39) (NOW SHOP PRACTICE) (MER182-EO-0829)	DFS 8-5-80	JAS JRS 11/27

**NOTES:**

- FOR INTERCONNECTION WITH ELECTRIC ELEVATOR TRIM SEE PAGE 14.2



**INACTIVE**  
THRU SER(SR9632)  
IN MKG  
JRS  
5-19-80

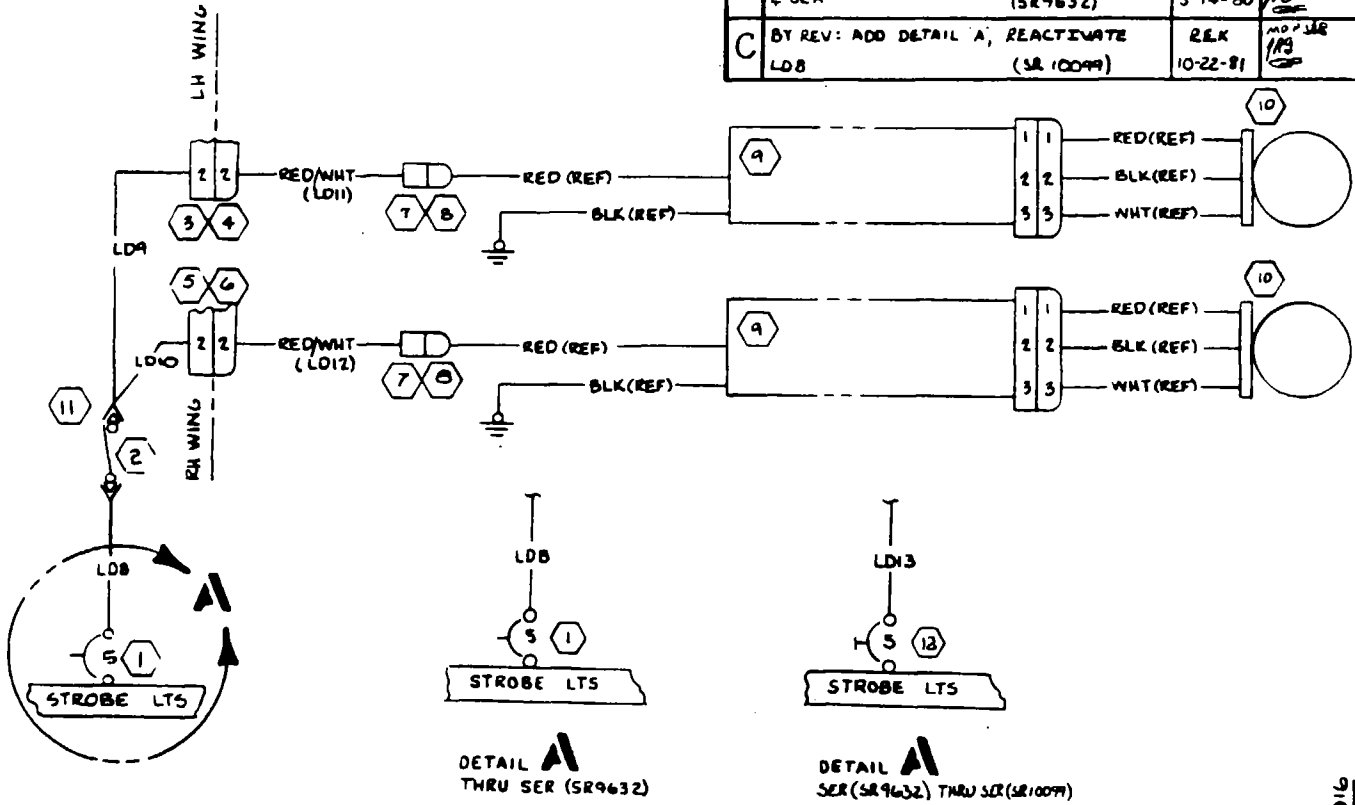
32-0916

15	5-1985-1	MIKE SWITCH	
14	34002-55	TERMINAL BLOCK	
13	5-2160-1	SWITCH	
12	5-1360-5L	CIRCUIT BREAKER	
11	5-1961-2-0	HOUSING	
10	5-1961-1-0	HOUSING	
9	1570307	CABLE	RED(1) 22 856B-2 SOLDER SOLDER
8	1570307	CONNECTOR ASSY	RED(1) 22 22-2-5 S-1963-2 S-1829-1
7	3421-0000	CONNECTOR SOCKET	WIRE CODE NO GA MATERIAL LG TERMINALS SERIALS
6	1270844	CABLE	
5	3473-3000	CONNECTOR SOCKET	
4	1270842	CONNECTOR ASSY	
3	3859A161152A	RHEOSTAT	
2	24RB	LAMP	
1	4157-001	SOCKET	
<b>WIRE TABLE</b>			
CONTRACT NO:		Cessna AIRCRAFT CO. PAWNEE DIVISION 3800 E PAWNEE WICHITA, KANSAS	
DESIGN	NAME	DATE	TITLE
GROUP	W. H. Moore	3-28-77	WIRING DIAGRAM -
DRAWN	STORBY	3-16-77	MAP LIGHT CONTROL WHEEL
CHECK	J. YUCEL	3-18-77	(OPT)
STRESS			
PROJ	J. H. MOORE	4-14-77	SIZE CODE IDENT NO. DWG NO
APPD	JRS		C 71379 2270001
OTHER			SCALE NONE (SR8462) PAGE: 11 G
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO. S-XXX OR CMXXXX-CESSNA STD. NO.		SUPERSEDES:  SUPERSEDED BY: P 11.12	
<b>EQUIPMENT TABLE</b>			



# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV CGZZ008-0102 WAS CGZZ007-0103; CGZZ006-0107 WAS -0101 (SR9632)(REF)	OLP 10-18-77	JAD/UMH JRS
B	BY REV: ADD DETAIL 'A', 5-1232-5, LD13 & SER (SR9632)	RAO 3-14-80	RAO/UMH JRS LWF
C	BY REV: ADD DETAIL 'A', REACTIVATE LDB (SR 10099)	REL 10-22-81	REL/UMH JRS



99-00016

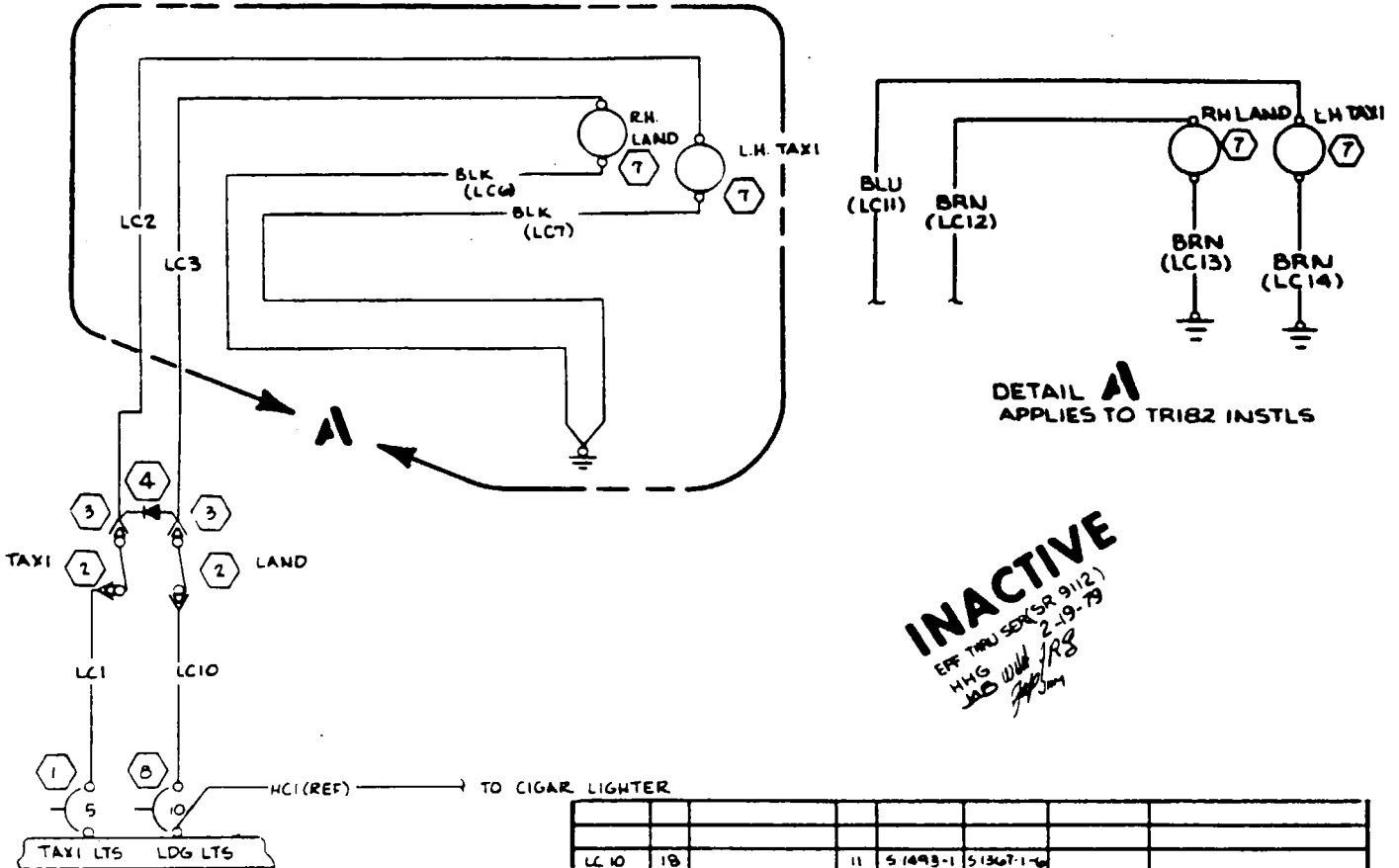
EQUIPMENT TABLE		WIRE TABLE	
PART NO.	DESCRIPTION	CONTRACT NO.	TITLE
12	5-1232-5 CIRCUIT BREAKER	LD13 22	5-1367-1-2 5-1493-1
11	5-2023-1 TERMINAL ADAPTOR	LD10 20 -20-2-9	5-1636-1 5-1635-1 (STD)
10	CGZZ006-0107 LAMP ASSY	LD10 22	5-1493-1 5-1636-1 (STD)
9	CGZZ008-0102 POWER SUPPLY	LD9 22	5-1493-1 5-1636-1 (STD)
8	5-1637-1 HOUSING	LDB 22	5-1367-1-6 5-1493-1
7	5-1637-2 HOUSING	WIRE CODE NO	GA MATERIAL LG TERMINALS SERIALS
6	5-1640-9 HOUSING	<b>WIRE TABLE</b> CONTRACT NO: _____ NAME: _____ DATE: _____ DESIGN: SPENCER 3-28-77 TITLE: _____ GROUP: <i>OK/Headman</i> 4-13-77 DRAWN: HARVEY 3-16-77 CHECK: J. YOUNG 3-18-77 STRESS: _____ PROJ: J.H. MOORE 4-4-77 APPD: JRS OTHER: _____	
5	5-1641-9 HOUSING		
4	5-1640-6 HOUSING		
3	5-1641-6 HOUSING		
2	5-2160-1 SWITCH		
1	5-1360-5L CIRCUIT BREAKER	TITLE: <b>WIRING DIAGRAM - WING TIP STROBE LIGHTS (OPT)</b> SIZE: C CODE IDENT. NO: 71379 DWG NO: 2270001 SCALE: NONE (SR 9632) PAGE: 117	
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-1000-CESNA SPEC. NO. S-1011 OR CM1000-CESNA STD. NO.		PANHANDLE DIVISION 3800 E. PANHANDLE WICHITA, KANSAS	

# MODEL R182 AND TR182 SERVICE MANUAL

## NOTES.

- 1 MATERIAL IS ALPHA 5857-7 (VENDOR CODE 92194) OR BELDEN 83009-1 (VENDOR CODE 70903)
- 2 MATERIAL IS ALPHA 5857-6 (VENDOR CODE 92194) OR BELDEN 83009-6 (VENDOR CODE 70903)

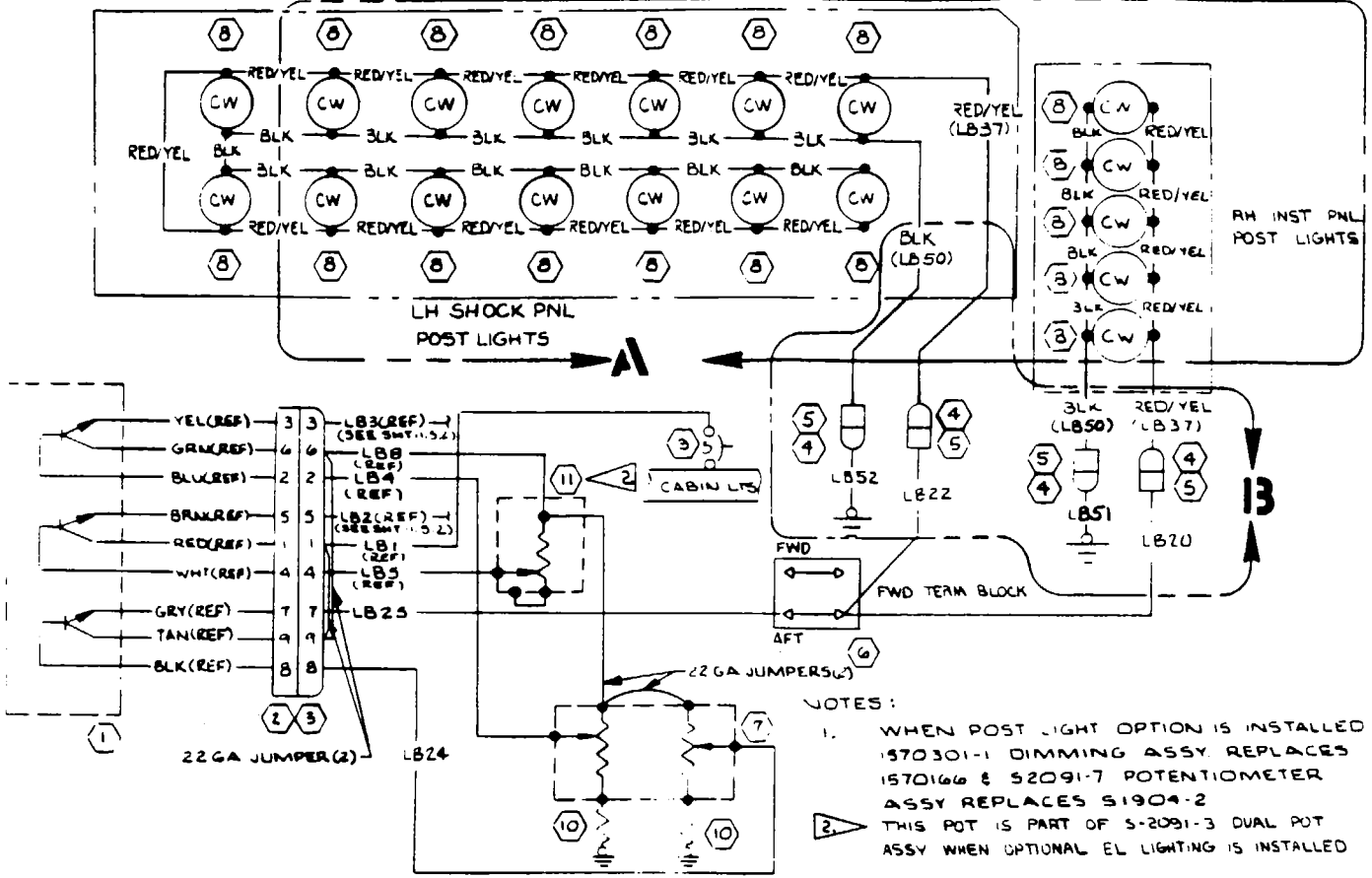
REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: DELETE S-1640-6, S-1641-6, LC4, LC5, LC8 & LC9; S-1367-1-0/LC2 & LC3 WAS S-1636-1, S-1367-1-12 WAS S-1635-1, S-1367-1-6/LC1 & LC10 WAS S-1367-1-0 (SR8462) (REF)	DLP 10-18-77	JAC/WLD APD
B	BY REV: ADD DETAIL 'A', NOTE 1 & 2, BLU (LC11), BRN (LC12), BRN (LC13) BRN (LC14) (SR8782)	LSS 8-14-78	JAC/WLD APD



QTY	PART NO.	DESCRIPTION	WIRE CODE NO.	MATERIAL	LG	TERMINALS	SERIALS	
8	S-1360-10L	CIRCUIT BREAKER						
7	4591	LIGHT						
4	12700B2	DIODE ASSY						
3	S-2023-1	TERM ADAPTER						
2	S-2160-1	SWITCH						
1	S-1360-5L	CIRCUIT BREAKER						
AT&T EQUIPMENT TABLE		SUPERSEDES: P 11:10		SUPERSEDED BY: P 11:10		CONTRACT NO: NAME: SPENCER DATE: 3-28-77 GROUP: M.H. HANSEN 4-13-77 DRAWN: HARVEY 3-16-77 CHECK: J. YUCEL 3-18-77 STRESS: PROJ: W. MOORE 4-14-77 APPD: JRS OTHER:		TITLE <b>WIRING DIAGRAM —                  LANDING LIGHTS</b>
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXX-CESNA SPEC. NO. S-XXX OR CMXXXX-CESNA STD NO.		SIZE: C CODE IDENT. NO.: 71379 DWG NO.: 2270001		PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS		SCALE: NONE (SR8462)   PAGE: 11 B		

# MODEL R182 AND TR182 SERVICE MANUAL

C		REV	DATE	REVISION			
BY REV: SER N LB49 LB50 & LB51 SER OUT LB21 LB23 & LB36 ADD DETAIL B & PAGE 11.91 (SR 0837)	9-4-84			LET	DESCRIPTION	DATE	APPRO
BY REV: LB52 WAS LB49 (SR 10837)	12-3-84	KWL		A	BY REV: S-2000C201J WAS S-2000B71J (SR0368) S-2091-7 WAS -3 (SR0462 (REF))	CRS 10-3-77	SR0368
				B	BY REV: ADD 1513837 (3) (DETAIL A (SR9112))	MDR 4-20-79	SR9112



- NOTES:
1. WHEN POST LIGHT OPTION IS INSTALLED 1570301-1 DIMMING ASSY REPLACES 1570166 & S2091-7 POTENTIOMETER ASSY REPLACES S1904-2
  2. THIS POT IS PART OF S-2091-3 DUAL POT ASSY WHEN OPTIONAL EL LIGHTING IS INSTALLED

WIRE NO	GA	MATERIAL	LG	TERMINALS	SERIALS	
LB51	22			5-1635-1	5-1367-1-B	SER (SR10837) / CN
BLK (LB50)	22	-22-0		SOLDER	5-1636-1	SER (SR 0837) / CN
LB52	22			5-1635-1	5-1367-1-B	SER (SR 0837) / CN
BLK	22	-22-0		SOLDER	SOLDER	
RED/YEL		-22-2-4		SOLDER	SOLDER	
RED/YEL (LB37)		-22-2-4		5-1635-1	SOLDER	
BLK (LB36)		-22-0		SOLDER	5-1635-1	THRU SER (SR10837)
LB20				5-1829-1	5-1636-1	
LB21				5-1636-1	5-1367-1-B	THRU SER (SR10837)
LB22				5-1829-1	5-1636-1	
LB23				5-1636-1	5-1367-1-B	THRU SER (SR10837)
LB24				5-1635-1	SOLDER	
LB25	22			5-1635-1	5-1829-1	

PART NO.	DESCRIPTION
11	S-1904-2 POT ASSY
10	S-2000C201J RESISTOR
9	5-1360 5L CIRCUIT BREAKER
8	1513837 LIGHT ASSY
7	S-2091-7 DUAL POT ASSY
6	3400Z 55 TERMINAL BLOCK
5	5-1637-2 HOUSING
4	5-1637-1 HOUSING
3	5-1640 9 HOUSING
2	5-1641-9 HOUSING
1	1570301 DIMMING ASSY

WIRE TABLE		
CONTRACT NO:		
DESIGN	NAME	DATE
GROUP	D. J. MOORE	3-28-77
DRAWN	HARVEY	3-16-77
CHECK	J. YOUEL	3-16-77
STRESS		
PROJ	J. MOORE	4/4/77
APPRO	JR	
OTHER		
<p>Cessna AIRCRAFT CO. PAWNEE DIVISION 1800 E. PAWNEE WICHITA, KANSAS</p> <p>TITLE <b>WIRING DIAGRAM — POST LIGHTS (OPT)</b></p>		
SIZE	CODE IDENT NO.	DWG NO.
C	71379	2270001
SCALE	NONE	(SR0462)
PAGE: 11.9		

EQUIPMENT TABLE	
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO. S-XXX OR CMXXXX-CESSNA STD. NO.	SUPERSEDES:  SUPERSEDED BY:

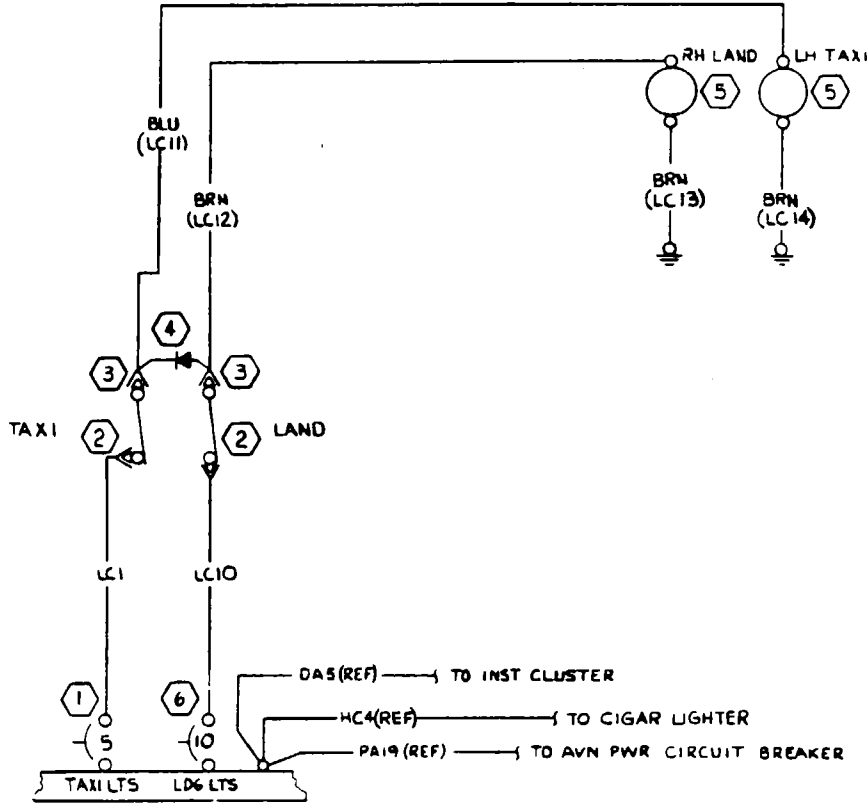


# MODEL R182 AND TR182 SERVICE MANUAL

NOTES:

- 1. MATERIAL IS ALPHA 5857-7 (VENDOR CODE 92194)  
OR BELDEN 33009-1 (VENDOR CODE 70903)
- 2. MATERIAL IS ALPHA 5857-6 (VENDOR CODE 92194)  
OR BELDEN 33003-6 (VENDOR CODE 70903)

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: HC4(REF) WAS HC1(REF) TO BUS BAR LDG LTS CKT BKR; ADD DAS(REF) & PA19(REF) (SR9632)	RAO 3-14-80	<i>RAO</i> <i>LWF</i>



32-0916

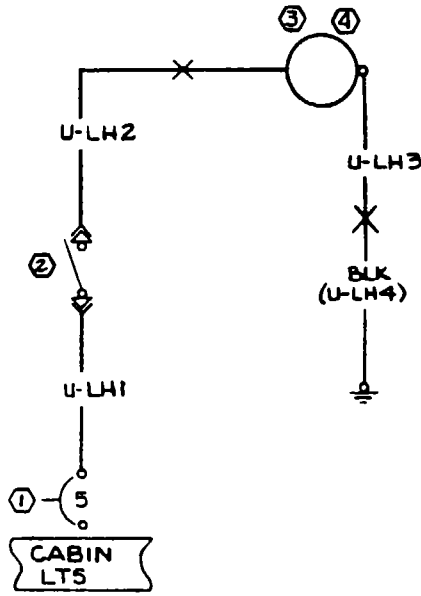
WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
BRN(LC14)	18		1	5-1367-8	5-1367-1-0
BRN(LC13)			2	5-1367-9	5-1367-1-0
BRN(LC12)			1	5-493-1	5-1367-1-0
BLU(LC11)			2	5-493-1	5-1367-1-3
LC10			11	5-493-1	5-1367-1-6
LC1	18		11	5-493-1	5-1367-1-6

PART NO.	DESCRIPTION
5-1360-10L	CIRCUIT BREAKER
4591	LIGHT
1270082	DIODE ASSY
5-2023-1	TERM. ADAPTER
5-2160-1	SWITCH
5-1360-5L	CIRCUIT BREAKER

EQUIPMENT TABLE			WIRE TABLE		
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-1000-CESNA SPEC. NO. S-100 OR CM1000-CESNA STD. NO.			CONTRACT NO:		
SUPERSEDES: P.11.8			NAME: SPENCER DATE: 2-27-79 GROUP: <i>D. Henderson</i> 3-3-79 DRAWN: H. GHAZARIAN 2-9-79 CHECK: BORLESKE 2-20-79 STRESS:		
SUPERSEDED BY:			TITLE: WIRING DIAGRAM - LANDING LIGHTS		
PROJ: S-1400R/E 3-6-79			CODE IDENT. NO.: 71379		
APPO: <i>RAO</i>			DWG NO: 2270001		
OTHER:			SCALE: NONE (R9112)		
PAGE: 11.0			PAGE: 11.0		

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: BLK(LH4) WAS 5-1367-1-4 U-LH3 ADD BLK(U-LH4) (MER R182E0776)	MDR 5-22-79	MS (LH) HP



9160-21

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
BLK (U-LH4)	22	-22-0		5-1367-1	5-1370-1
U-LH3	22			5-1367-4	SEE BLK (U-LH4)
U-LH2	22			5-1493-1	5-1370-1
U-LH1	22			5-1367-6	5-1493-1

QTY	PART NO.	DESCRIPTION	VENDOR
4	M525338-7079	LAMP	
3	11-225	LAMPHOLDER	95263
2	5-2160-3	SWITCH	
1	5-1360-5L	CIRCUIT BREAKER	

**EQUIPMENT TABLE**

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO. S-XXX OR CMXXXX-CESSNA STD. NO.

SUPERSEDES \_\_\_\_\_

SUPERSEDED BY: \_\_\_\_\_

**WIRE TABLE**

CONTRACT NO: \_\_\_\_\_

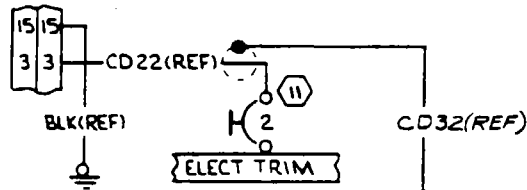
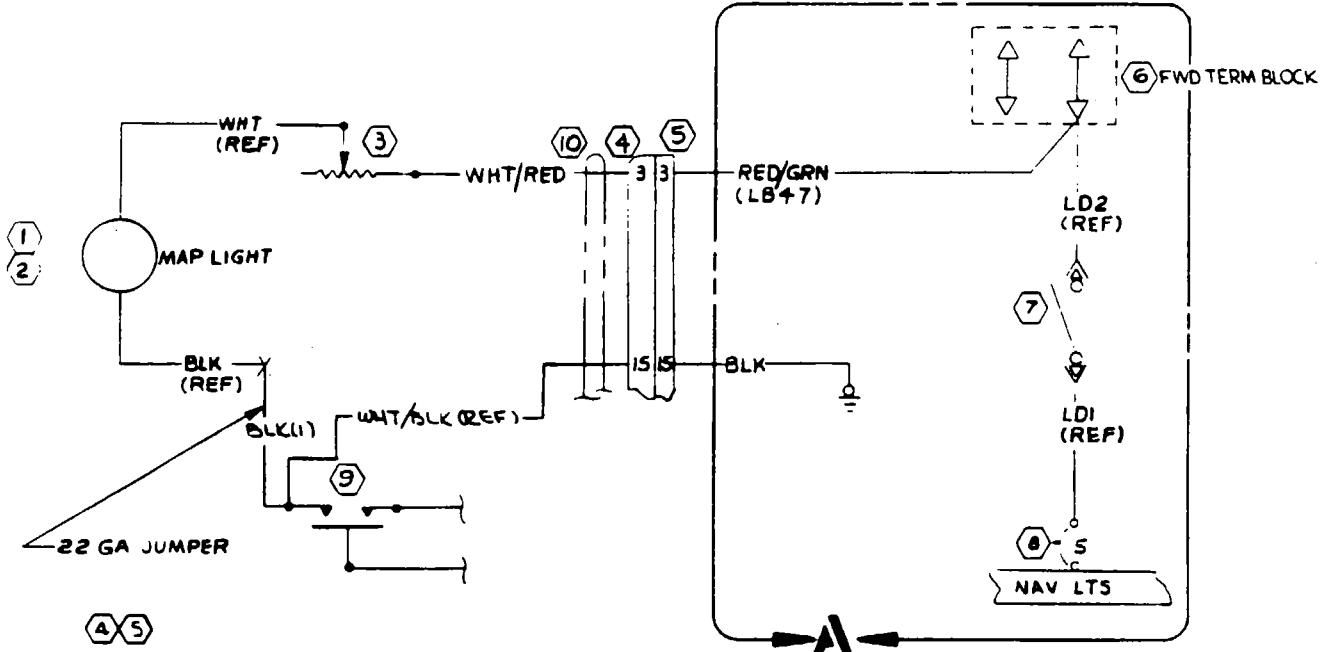
**Cessna AIRCRAFT CO.**  
PAWNEE DIVISION  
3800 E. PAWNEE  
WICHITA, KANSAS

DESIGN	NAME	DATE	TITLE
GROUP	W. J. Hasden	2-27-79	<b>WIRING DIAGRAM — ICE DETECTOR LIGHT (OPT)</b>
DRAWN	P. MAYFIELD	2-19-79	
CHECK	YOUNGERS	2-20-79	
STRESS			

PROJ	DATE	SIZE	CODE IDENT NO.	DWG NO.
L. H. MOORE	3-6-79	C	71379	2270001
APPD	JPA	SCALE NONE		(SR 9112)
OTHER				PAGE: 11.11

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPO
A	BY REV. RCF 5130B WAS RCF 5140 COIL CORD MATERIAL (SR10003)	GLS 4-30-81	JAS
B	BY REV ADD CD32 (REF) (SR9951)	MKT 7-14-81	JAS



**INACTIVE**  
EFF THRU SER (SR10713)  
TMS  
1-8-83  
JAS

91600-15

ITEM NO	PART NO.	DESCRIPTION	WIRE CODE NO.	GA.	MATERIAL	LG.	TERMINALS	SERIALS
11	S-1232-2	CIRCUIT BREAKER	BLK(1)	22	-22-0		SOLDER	S-1370-0
10	2270030	CABLE ASSY	BLK	22	-22-0		S-1963-2	S-1367-1-8
9	S-1985-1	MIKE SWITCH	WHT/GRN	22	-22-2-5		S-1963-3	S-1829-1
8	S-1360-5L	CIRCUIT BREAKER	WHT/RED	24	RCF 5130B		SOLDER	S-1963-1
7	S-2160-1	SWITCH						
6	34002-55	TERMINAL BLOCK						
5	S-1962-2-0	HOUSING						
4	S-1962-1-0	HOUSING						
3	3959AIG-152A	RHEOSTAT						
2	24RB	LAMP						
1	4157-001	SOCKET						

EQUIPMENT TABLE		
PART NO.	DESCRIPTION	

CONTRACT NO:		Cessna AIRCRAFT CO.		PAWNEE DIVISION 8800 E. PAWNEE WICHITA, KANSAS	
DESIGN	NAME	DATE	TITLE		
			WIRING DIAGRAM — MAP LIGHT CONTROL WHEEL		
GROUP	M. MARRIOTT	5-22-80			
DRAWN		5-20-80			
CHECK	BORLESKE	5-19-80			
STRESS					
PROJ	OFFICEL	7-25-80	SIZE	CODE IDENT.	DWG NO
APPO			C	71379	2270001
OTHER	LWF		SCALE	NONE	SR 9632 11.12

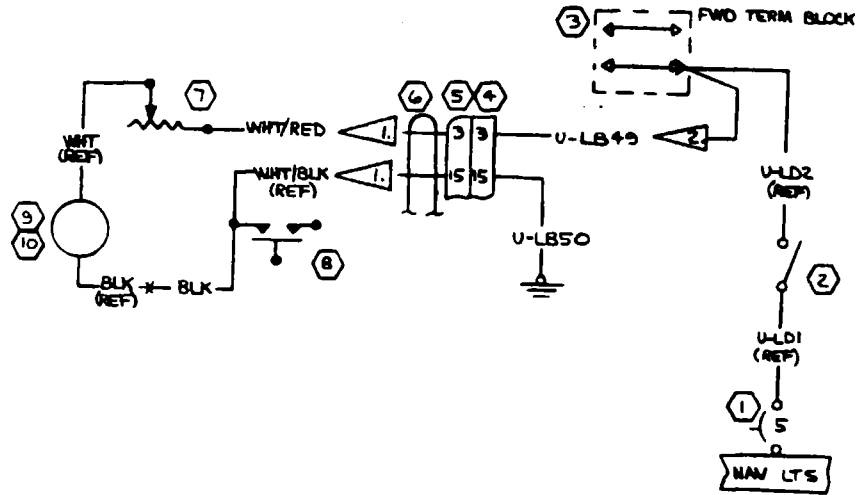
SUPERSEDES:	
2270001	PAGE 11.6
SUPERSEDED BY:	
PG. 11.13	

# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

- 1. MATERIAL IS RCF51308 COIL WLD, VENDOR CODE (086906)
- 2. NOT REQUIRED WHEN INSTALLED WITH OPT ELECTRIC TRIM. REFER TO PG. 14-6.0

REVISION			
LET	DESCRIPTION	DATE	APPD



EQUIPMENT TABLE		WIRE TABLE	
PART NO	DESCRIPTION	WIRE CODE NO	GA
10	4457-001 SOCKET	U-LB50	22
9	24R3 LAMP	U-LB49	22
8	S-1495-1 MIKE SWITCH	BLK	22
7	39574161-152A RHEOSTAT	WHT/RED	24
6	2270030 CABLE ASSY		
5	S-235D-3 HOUSING		
4	S-2349-1 HOUSING		
3	34022-55 TERMINAL BLOCK		
2	S-2160-1 SWITCH		
1	S-1360-5L CIRCUIT BREAKER		

CONTRACT NO:		NAME		DATE	
DESIGN	SPENCER	9-8-83		TITLE	
GROUP	W. Henderson	4-21-83		WIRING DIAGRAM -	
DRAWN	SPENCER	7-9-83		MAP LIGHT - CONTROL WHEEL	
CHECK	BEHAR	2-12-83			
STRESS					

SUPERSEDES		SIZE		CODE IDENT		DWG NO	
PG. 11-12		C		71379		2270001	
SUPERSEDED BY:		OTHER		SCALE NONE		PAGE: 11, 2	



# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPRO
F	BY REV: ADD DETAIL 'E' & S1232-35, PG 12.1.2 (SR9632XRF)(SR10122)	GW 2-13-81	JAB
G	BY REV: ADD DETAIL 'F' & GA11 WIRE (SR10254)	WHH 10-17-81	JAB

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: GAS WAS 22 GA; ADD PAD (REF); TERM. 3 WAS 2 (TERM. 2 WAS 3 / MS-25041-4 & VM920M-3; ADD DETAIL A & B PG 12.1.1; YZ-2RNTT WAS XE8038-YE (SR8462)(REF)(SR8995)(SR8782)	DLP 2-18-78	JAB
B	BY REV: ADD NOTE G, DETAIL C & SER (SR9183)	RLY 9-14-78	JAB
C	BY REV: ADD H11-1287 (SR9112)	NTL 7-12-79	JAB
D	BY REV: ADD DETAIL 'D', GAT, GAB & 9880710 (SR9738)	NTL 12-19-79	JAB
E	REACTIVATE DRAWING BY REV: S-1367-1-10 WAS S-1367-1-12/GAB (NOW SHOP PRACT) 9881141 WAS 988120-1 (SR8925)	DFS MKM 7-8-80	JAB

**NOTES:**

- 1 SYSTEM SHOWN WITH LDG GEAR DOWN & LOCKED, ACFT ON GROUND, & POWER OFF
- 2 PRESSURE SWITCH OPENS WHEN GEAR IS UP AND HYDRAULIC PRESSURE BUILDS UP TO PROPER LEVEL
- 3 INSTALL 1270717 DIODE ASSY WITH MARKING BAND ON DIODE TO POSITIVE TERMINAL ON PUMP MOTOR
- 4 TERMINATE VENDOR LEAD WITH S-1367-1-10
- 5 TERMINATE VENDOR LEAD WITH S-1636-1
- 6 TERMINATE VENDOR LEAD WITH S-1635-1
- 7 USE S-1639-S-O-B SHRINKABLE TUBING OVER S-1830-1 TERMINAL

INACTIVE

THRU SER (SR10099)  
REV 1-24-82  
JAB

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
GA11	10	S-1632-10-9	5-1367-3-12	5-1367-3-10	SER(SR0254) & ON
GA10	10	S-1632-10-9	S-1367-3-13	5-1367-3-12	SER(SR10122) & ON
GAB	10	S-1632-10-9	S-1367-3-8	5-1367-3-13	SER(SR10122) & ON
GD15	22	-22-6-4	5-1367-1-6	5-1830-1	SER(SR9738) & ON
GD14	22	-22-6-4	5-1636-1	5-1830-1	SER(SR9738) & ON
GD13	22		5-1636-1	5-1636-1	SER(SR9183) & ON
GD12	22		5-1636-1	5-1636-1	SER(SR9183) & ON
GD11	22		SEE G04	5-1635-1	SER(SR8995) & ON
GD10	22		5-1636-1	5-1636-1	
GD9	22		5-1635-1	5-1637-1-6	SER(SR8995) & ON
GA1	12		17	5-1367-3-8	THRU SER(SR10122)
GA2	12		6	5-1367-3-13	THRU SER(SR8782)
GA3	22		93	5-1636-1	
GA4	22		103	5-1635-1	
GA6	12			5-1367-3-13	SER(SR8782) THRU(SR10122)
GAS	12		6	5-1367-3-10	THRU SER(SR8782)
GD1	22		203	5-1367-1-6	THRU SER(SR8995)
GD2			12		
GD3			224	5-1367-1-6	THRU SER(SR8995)
GD4			203	5-1367-2-6	THRU SER(SR9183)
GD5			53	5-1367-1-6	THRU SER(SR9183)
GD6			230	5-1370-1	THRU SER(SR9183)
GD7			100	5-1370-1	SOLDER
GD8			85	5-1367-1-6	
GE1			8	5-1367-1-6	
GE2			4	SOLDER	SOLDER
GE3			8	SOLDER	5-1367-1-8
GE4			8	SOLDER	5-1367-1-8

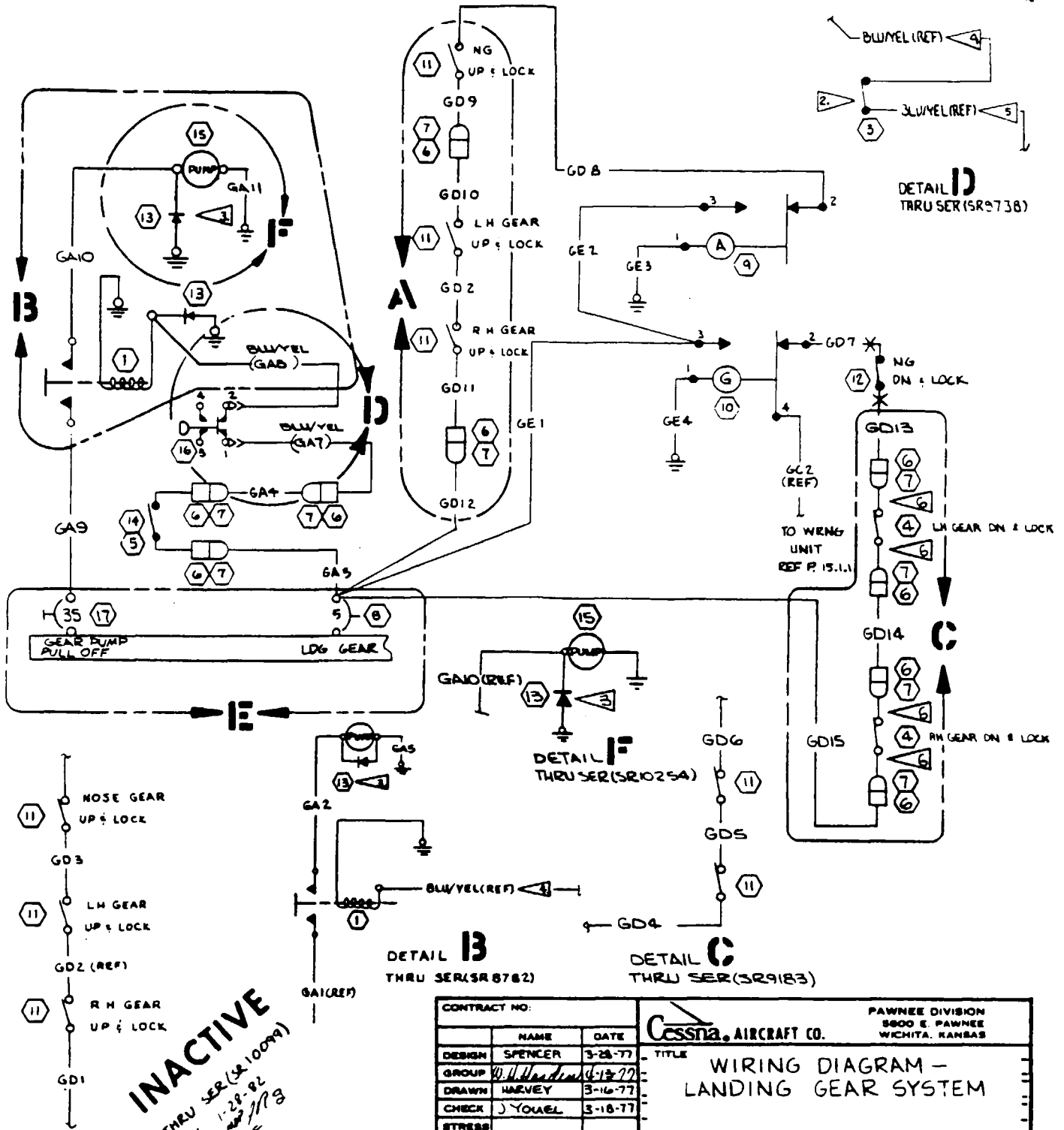
ITEM NO	PART NO.	DESCRIPTION
17	S-232-35	CIRCUIT BREAKER
16	9880710	PRESSURE SWITCH
15	9881141	MOTOR ASSY
14	602EN67-6B	SWITCH
13	1270717	DIODE ASSY
12	5-1577-1	SWITCH
11	YZ-2RNTT	SWITCH
10	VM920M-3	LIGHT
9	MS-25041-4	LIGHT ASSY
8	S-1360-3L	CIRCUIT BREAKER
7	S-1637-1	HOUSING
6	S-1637-2	HOUSING
5	H11-1287	SWITCH (ALT)
4	S-2088-1	SWITCH
3	9880700	HYD PRESS SWITCH
2	S-1232-30	CIRCUIT BREAKER
1	S-1577-1	PWR PACK CONTACTOR

WIRE TABLE		
CONTRACT NO:	Cessna AIRCRAFT CO.	
DESIGN	NAME	DATE
GROUP	W.H. HANCOCK	11-12-77
DRAWN	HARVEY	3-16-77
CHECK	J. YONEL	3-18-77
STRESS		
PROJ	J.H. MOORE	4-14-77
APPD	JAB	
OTHER		
SIZE	CODE IDENT NO.	DWG NO.
C	71379	2270001
SCALE: NONE		(SR8462)
PAGE: 12/10		

EQUIPMENT TABLE	
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO. S-XXX OR CMXXXX-CESSNA STD. NO.	SUPERSEDES PG 12.3.0 & 12.3.1

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPO
G	SEE P 2.1.0 FOR REVISION		



DETAIL A  
THRU SER (SR 8995)

DETAIL B  
THRU SER (SR 8782)

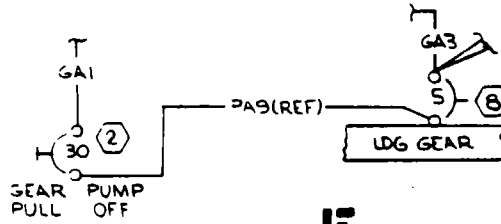
DETAIL C  
THRU SER (SR 9183)

**INACTIVE**  
THRU SER (SR 10099)  
REK 1-28-82  
JAB 4/17/83

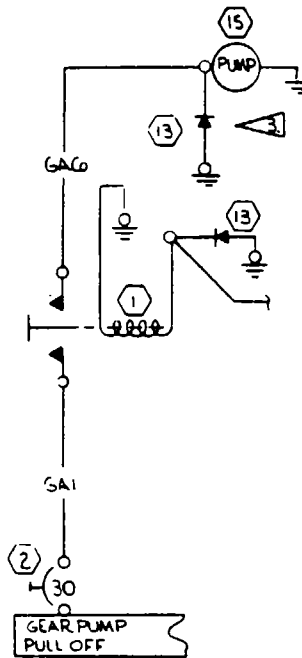
CONTRACT NO:			Cessna AIRCRAFT CO.		PAWNEE DIVISION 8800 E. PAWNEE WICHITA, KANSAS	
DESIGN	SPENCER	3-28-77	TITLE			
GROUP	D. H. Anderson 4-13-77		WIRING DIAGRAM - LANDING GEAR SYSTEM			
DRAWN	HARVEY	3-16-77				
CHECK	YOUEL	3-18-77				
STRESS						
PROJ	J. H. Moore	4-14-77	SIZE	CODE IDENT	OWG NO	
APPO	JAB		C	71379	2270001	
OTHER			SCALE	NONE	(SR 8462)	PAGE: 12 / 11

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
F	SEE PAGE 12.1.0 FOR REVISION		



DETAIL I  
THRU SER(SR9632)



DETAIL I  
SER(SR9632) THRU SER(SR1012)

**INACTIVE**  
THRU SER(SR10099)  
REK 1-28-82  
JAG MPP/112  
OF

CONTRACT NO		Cessna AIRCRAFT CO.		PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS	
DESIGN	NAME	DATE	TITLE		
GROUP	<i>W. H. H. H.</i>	<i>3-2-81</i>	WIRING DIAGRAM— LANDING GEAR SYSTEM		
DRAWN	<i>H. H. H.</i>	<i>2-13-81</i>			
CHECK	<i>B. P. L.</i>	<i>2-17-81</i>			
STRESS					
PROJ	<i>CF-111</i>	<i>3-3-81</i>	SIZE	CODE IDENT NO	DWG NO
APPD	<i>JAG</i>	<i>3-3-81</i>	<i>C</i>	<b>71379</b>	<b>2270001</b>
OTHER			SCALE NONE	SER(1012)	PAGE 10.12

# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

1. SYSTEM SHOWN WITH ACFT ON GROUND, GEAR DOWN & LOCKED, HYDRAULIC SYSTEM PRESSURIZED, POWER OFF.
2. TERMINATE VENDOR LEADS WITH S-1635-1 TERMINALS.
3. INSTALL S-1699-5-0.8 SHRINKABLE TUBING OVER S-1830-1 TERMINAL.
4. INSTALL 1270717 DIODE ASSY WITH MARKING BAND TO POSITIVE TERMINAL ON PUMP MOTOR.

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: ADDED CONNECTOR TO GEAR UP LOCK SWITCHES & CHG TERMINALS ON GD27, GD28, GD29 & GD33 WIRES TO AGREE. ADD GD35, GD36, GD37 & GD38 WIRES (SR10099)	WWW 7-15-82	R-1044 7/83 CAF

21	S-1640-6	HOUSING			S-1635-1	SEE GD30			71600-85	
20	S-1641-6	HOUSING			S-1635-1	SEE GD30				
19	MS25237-327	LAMP			S-1635-1	S167-1-6				
18	9881141	MOTOR ASSY			S-1635-1	S167-1-6				
17	1270717-	DIODE ASSY			S-1367-3-4	S-167-3-10				
16	S-1577-1	CONTACTOR			SEE GD 27	SEE GD 28				
15	1520043-	DIODE ASSY			S-1636-1	SOLDER				
14	MS25041-2	LIGHT ASSY			SEE GD 26	SEE GD 27				
13	VM920M-3	LIGHT ASSY			S167+6	SOLDER				
12	S-2586-1	SWITCH			S167-1-6	S167+6				
11	S-1638-1	HOUSING			S167+6	S1636-1				
10	S-1638-2	HOUSING			S1636-1	S1636-1				
9	S-2088-3	SWITCH			S1636-1	S1636-1				
8	S-1377-2	SWITCH			S1636-1	S167-1-6				
7	9880710	PRESSURE SWITCH			S1636-1	SOLDER				
6	S-2035-2	HOUSING			S1636-1	S1636-1				
5	S-2035-1	HOUSING			S1636-1	S1636-1				
4	H11-1287	SWITCH (ALT)			S167-1-6	S1636-1				
3	602ENG7-6B	SWITCH			S1493-1	SOLDER				
2	S-1232-35	CIRCUIT BREAKER			S1636-1	S167-1-6				
1	S-1360-5L	CIRCUIT BREAKER			S1635-1	S1830-1				
					S1635-1	S1830-1				
					S1636-1	S1636-1				
					S167-1-6	S1636-1				
					GA10	S-1562-10-9	S1367-3-13	S1367-3-12		
					GA9	S-1562-10-9	S1367-3-8	S1367-3-13		
					GE8	22	S1367-1-8	SOLDER		
					GE7	1	SOLDER	SOLDER		
					GE6	1	SOLDER	SOLDER		
					GE5	22	S1367-1-6	SOLDER		
					WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS

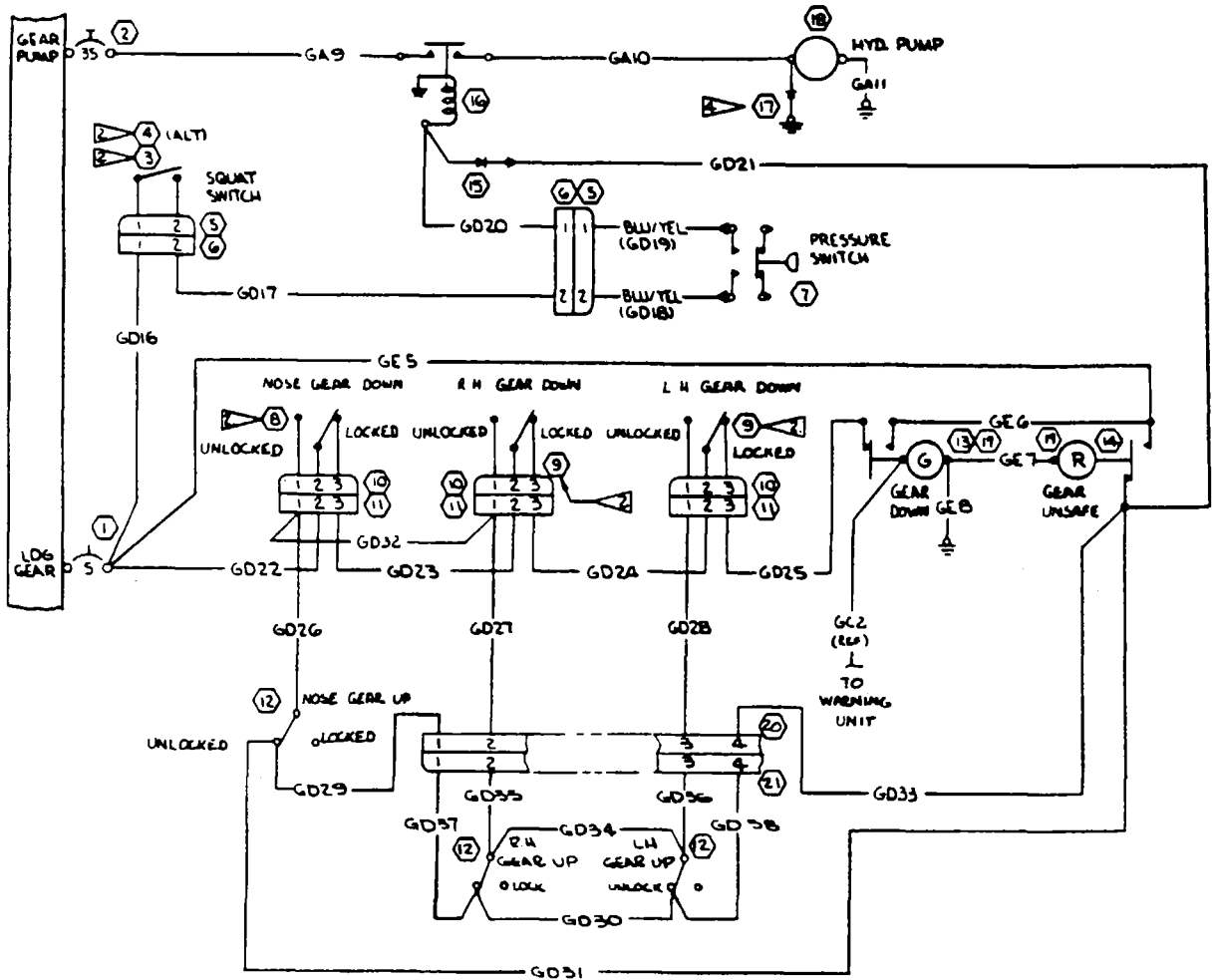
EQUIPMENT TABLE									
PART NO.	DESCRIPTION	SUPERSEDES:	REPLACED BY:	PROJ	APPRO	OTHER	SIZE	CODE IDENT	OWG NO
		RS 1210, 1211 & 1212		985	CAF		C	71379	2270001

WIRE TABLE									
CONTRACT NO.:				Cessna AIRCRAFT CO.			PAWNEE DIVISION 3800 E. PAWNEE WICHITA KANSAS		
DESIGN	NAME	DATE	TITLE						
R. KLEIN		1-29-82	WIRING DIAGRAM -						
M. PAINE		2-4-82	LANDING GEAR SYSTEM						
R. KLEIN		1-29-82							
BORLESKE		2-3-82							
				SCALE	NONE	(SR10099)	PAGE:	12	30

# MODEL R182 AND TR182 SERVICE MANUAL

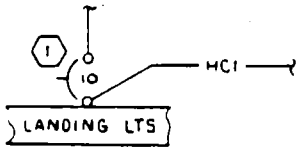
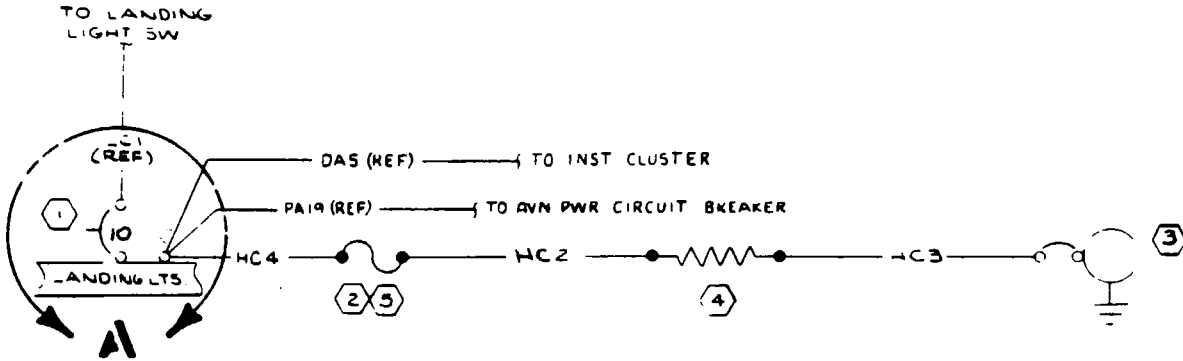
REVISION			
LET	DESCRIPTION	DATE	APPD
A	SEE REVISIONS ON SHEET 1		



CONTRACT NO		NAME		DATE	Cessna AIRCRAFT CO.	PAWNEE DIVISION 3800 E PAWNEE WICHITA KANSAS		
DESIGN	R KLEIN	1-21-82	GROUP	M PAINE		2-8-82	TITLE WIRING DIAGRAM- LANDING GEAR SYSTEM	
DRAWN	WHITSON	1-29-82	CHECK	BORLESKE	2-3-82			
STRESS								
PROJ		2-4-82	APPD		SIZE	CODE IDENT.	DWG NO	
OTHER					C	71379	2270001	
						SCALE NONE	(SR10099)	PAGE 12 3.1

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPO
A	BY REV: S-2374-7.5 WAS HHH-A, S-2375-7.5 WAS SFE-7.5 (S-1000 ENG) ADD 6 MAX/HCI	CS 10-4-79	<i>[Signature]</i>
B	BY REV. ADD DETAIL 'A', HC4, DAS(REF), PA19(REF) & SER (SR9632)	RAO 3-14-80	<i>[Signature]</i>



DETAIL A  
THRU SER (SR9632)

**INACTIVE**  
THRU SER (SR10068)  
GW 1-2-81  
JAS *[Signature]*

WIRE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
HC4	18			S-1367-1-10 SOLDER	SER (SR9632) & ON
HC3	18			SOLDER S-1367-1-6	
HC2	18			SOLDER SOLDER	
HC1	18			S-1367-1-6 SOLDER	THRU SER (SR9632)

ITEM NO	PART NO.	DESCRIPTION
5	S-2374-7.5	FUSEHOLDER
4	S-2041-50-16	RESISTOR
3	OS-13032	CIGAR LIGHTER ASSY
2	S-2375-7.5	FUSE
1	S-1360-10L	CIRCUIT BREAKER

CONTRACT NO:			TITLE		
DESIGN	SPENCER	3-28-77	Cessna AIRCRAFT CO.		
GROUP	<i>[Signature]</i>	4-13-77	PAWNEE DIVISION 3800 E. PAWNEE WICHITA, KANSAS		
DRAWN	HARVEY	3-16-77	<b>WIRING DIAGRAM -</b> CIGAR LIGHTER		
CHECK	J. YOUNG	3-18-77	DWG NO 2270001		
STRESS			SCALE: NONE		
PROJ	J. H. MORSE	4-11-77	R182		
APPO	<i>[Signature]</i>		PAGE: 13 1		
OTHER			(SR8462)		

CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES-XXXX-CESSNA SPEC. NO.  
S-XXX OR CXXXX-CESSNA  
STD. NO.

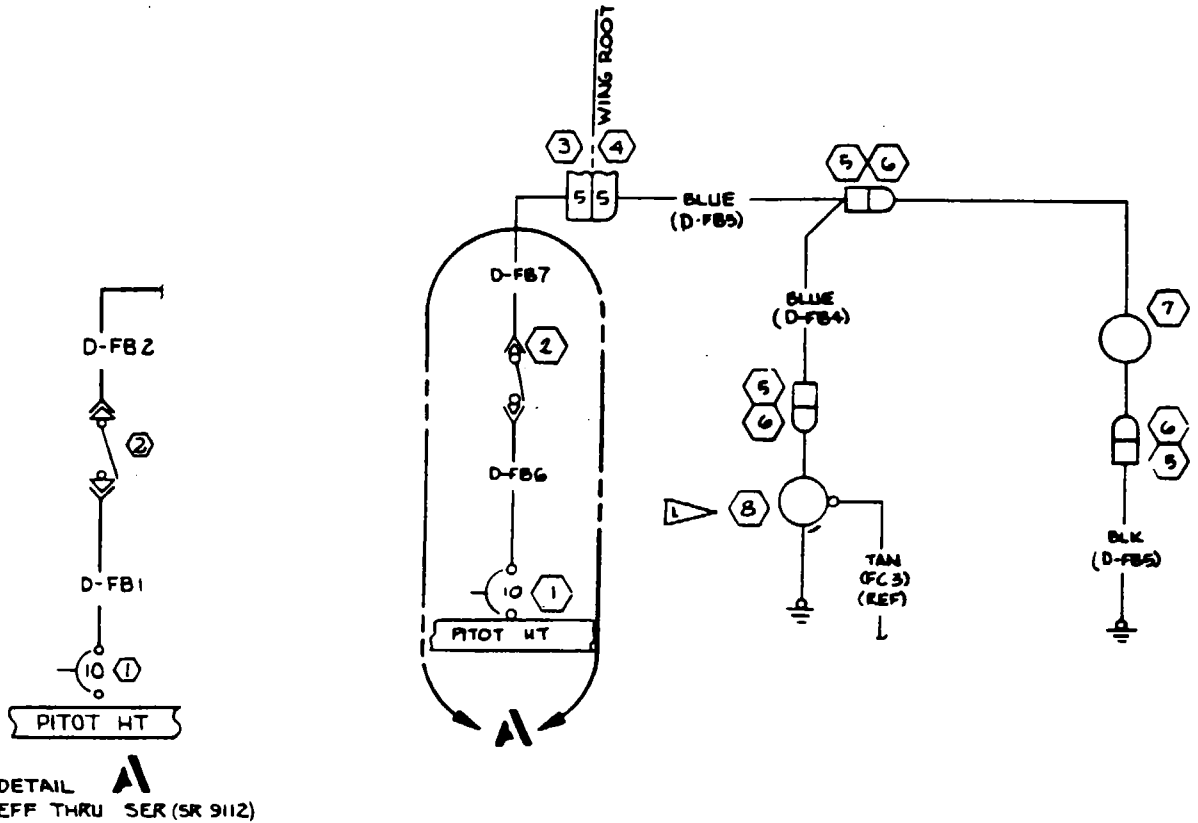
SUPERSEDES:  
SUPERSEDED BY:

# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

▲ ONLY HEATER CIRCUIT SHOWN, FOR STALL WARNING CIRCUIT SEE PAGE 13.1.0

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: 051106Z WAS S-1672-2 (SRB462)(REF)	DLP 10-18-77	JASLOVA
B	BY REV: ADD DETAIL 'A': (SR 9112)	PSM 2-18-79	JASLOVA



DETAIL ▲  
EFF THRU SER (SR 9112)

ITEM NO.	PART NO.	DESCRIPTION	WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
8	051106Z	STALL DETECTOR HTD						
7	0721105	PITOT TUBE HTD						
6	S-1637-1	HOUSING						
5	S-1637-2	HOUSING						
4	S-1640-6	HOUSING						
3	S-1641-6	HOUSING						
2	S-2160-1	SWITCH						
1	S-1360-10L	CIRCUIT BREAKER						
			U-FB 7	18			S-1493-1	S-1636-1 (STD)
			U-FB 6	18			S-1367-6	S-1493-1
			W (FB 5)	18	-18-0		S-1636-1	S-1367-18
			W (FB 4)	18	-18-6		SEE FB 5	S-1636-1 (STD)
			W (FB 2)	18	-18-6		S-1635-1	S-1636-2 (STD)
			FB 2	18			S-1493-1	S-1636-1 (STD)
			FB 1	18			S-1367-6	S-1493-1

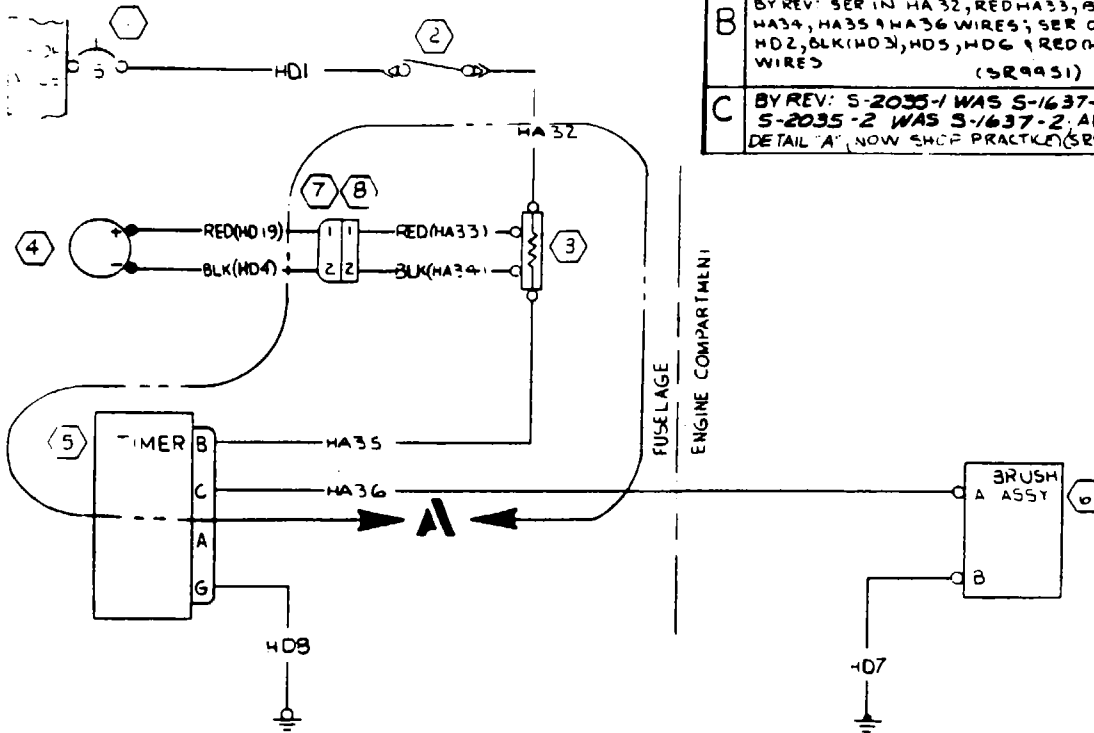
CONTRACT NO:			WIRE TABLE		
DESIGN	NAME	DATE	SIZE	CODE IDENT. NO.	DWG NO
			C	71379	2270001
Cessna AIRCRAFT CO.			PAWNEE DIVISION 3800 E. PAWNEE WICHITA, KANSAS		
TITLE			HEATED PITOT TUBE HEATED STALL WARNING (OPT)		
PROJ	J. MOORE	4-4-77	SCALE	NONE	(SR B462)
APPD	JRS		PAGE: 13 2		

EQUIPMENT TABLE		SUPERSEDES:	
ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO. S-XXX OR CMXXXX-CESSNA STD. NO.		SUPERSEDED BY:	

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPO
A	BY REV. CORRECT WIRE CODE NO ON DWG. TO AGREE WITH WIRE TABLE ADD 5-1637-2, 5-1637-1; BLK(HD3) WAS (HD3), BLK(HD4) WAS (HD4); ADD(HD18) (HD19) (SR 9112)	HAG 5-22-79	SP AC UNH JRS
B	BY REV. SER IN HA 32, RED HA 33, BLK HA 34, HA 35 & HA 36 WIRES; SER OUT HD 2, BLK(HD 3), HD 5, HD 6 & RED(HD 18) WIRES (SR 9951)	JLS 2/9/81	JLS UNH UNH
C	BY REV. S-2035-1 WAS S-1637-1 & S-2035-2 WAS S-1637-2, ADD DETAIL 'A', NOW SHCF PRACTICE (SR 9951)	MKT 7-14-81	AB UNH UNH



WIRE CODE NO	Gauge	MATERIAL	LG	TERMINALS	SERIALS
HA 32	16			5-1493-2 5-1367-2-12	SER (SR9951) ON
RED(HA33)	16			5-1367-2-B 5-1636-2	SER (SR9951) ON
BLK(HA34)	16			5-1367-2-B 5-1636-2	SER (SR9951) ON
HA 35	16			5-1367-2-12 5-1367-2-6	SER (SR9951) ON
HA 36	16			5-1367-2-6 5-1367-2-6	SER (SR9951) ON
RED(HD18)	16	-16-2		SOLDER 5-1635-2	
RED(HD19)	16	-16-2		5-1367-2-B 5-1636-2	THRU SER (SR9951)
HD 8	16			5-1367-2-6 5-1367-2-8	
HD 7	16			5-1367-2-6 5-1367-2-8	
HD 6	16			5-1367-2-6 5-1367-2-6	THRU SER (SR9951)
HD 5	16			5-1367-2-12 5-1367-2-6	THRU SER (SR9951)
BLK(HD4)	16	-16-0		SOLDER 5-1635-1	
BLK(HD3)	16	-16-0		5-1367-2-B 5-1636-2	THRU SER (SR9951)
HD 2	16			5-1493-2 5-1367-2-2	THRU SER (SR9951)
HD 1	16			5-1367-2-6 5-1493-2	

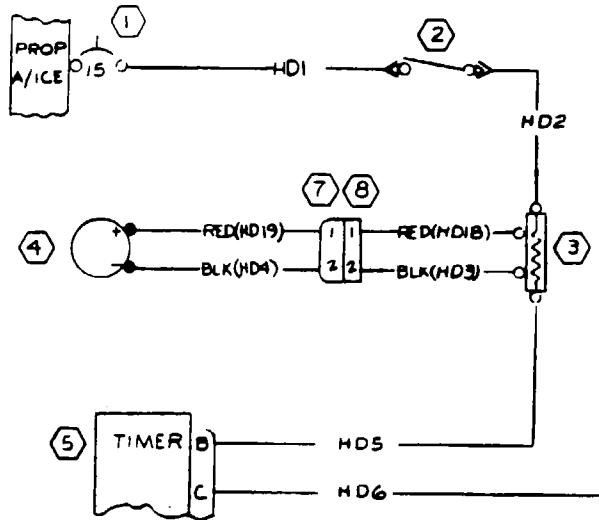
PART NO.	DESCRIPTION
8	S-2035-2 HOUSING
7	S-2035-1 HOUSING
6	3E 2071 MODULAR BRUSH ASSY
5	3E 1099-1 TIMER
4	CG 2533-0104 AMMETER
3	22-370-20 SHUNT
2	S-2160-1 SWITCH
1	S-1360-15L CKT BKR

EQUIPMENT TABLE			WIRE TABLE					
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESNA SPEC. NO. S-XXXX OR CMXXXX-CESNA STD. NO.			CONTRACT NO: NAME DATE DESIGN SPENCER 2-27-79 GROUP <i>W. J. Moore</i> 2-4-79 DRAWN H. G. ELMAN 2-19-79 CHECK BORLESKE 2-20-79 STRESS PROJ. J. H. MOORE 3-6-79 APPD. JRS OTHER:			Cessna AIRCRAFT CO. PAWNEE DIVISION 5880 E. PAWNEE WICHITA, KANSAS TITLE <b>WIRING DIAGRAM —</b> FRCF ANTI-ICE SYSTEM (OPT) TR 182		
SUPERSEDES: SUPERSEDED BY:			SIZE CODE IDENT. DWG NO C 71379 2270001 SCALE: NONE (SR9112) PAGE: 13.3.C					



# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
C	SEE PAGE 13.3.0 FOR REV		



DETAIL A  
(APPLIES THRU SER(SR9951))

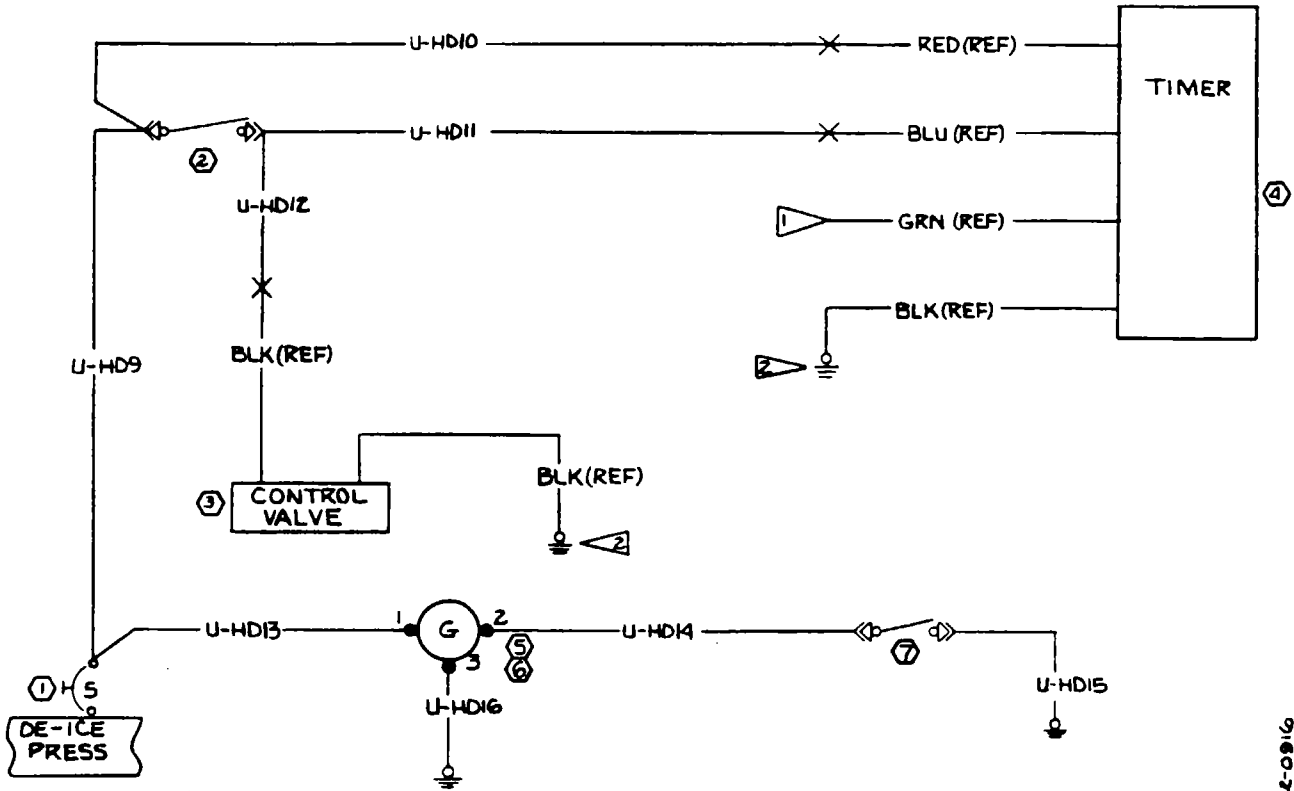
CONTRACT NO			PAWNEE DIVISION 3800 E. PAWNEE WICHITA KANSAS		
Cessna AIRCRAFT CO.			TITLE		
DESIGN	NAME	DATE	WIRING DIAGRAM - PROP ANTI-ICE SYSTEM (OPT) TR182		
GROUP					
DRAWN	M. THOMPSON	7-10-81			
CHECK	BORLESKE	7-14-81			
STRESS					
PROJ	SPICEL	7-27-81	SIZE	CODE IDENT NO	DWG NO
APPD	7/29		C	71379	22700C1
OTHER			SCALE	NONE	PAGE 13 31

# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

- ▷ TERMINATE VENDOR FURNISHED WIRE WITH S-1557-2 CAP.
- ▷ TERMINATE VENDOR FURNISHED WIRE WITH S-1367-1-10.

REVISION			
LET	DESCRIPTION	DATE	APPD



12-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
U-HD16	22	SOLDER		S-1367-1-B	
U-HD15	22	S-1493-1		S-1367-1-B	
U-HD14	22	SOLDER		S-1493-1	
U-HD13	22	S-1367-1-B		SOLDER	
U-HD12	20	SEE HD11		S-1370-1	
U-HD11	20	S-1493-2		S-1370-1	
U-HD10	20	SEE HD9		S-1370-1	
U-HD9	20	S-1367-1-B		S-1493-2	

7	1D1194-1	PRESSURE SWITCH
6	M\$25237-327	LAMP
5	M\$25041-3	INDICATOR LT.
4	3D2495-02	TIMER MODULE
3	3D2346-01	CONTROL VALVE
2	\$-2160-3	SWITCH
1	M\$24510-5	CIRCUIT BREAKER

PART NO.	DESCRIPTION

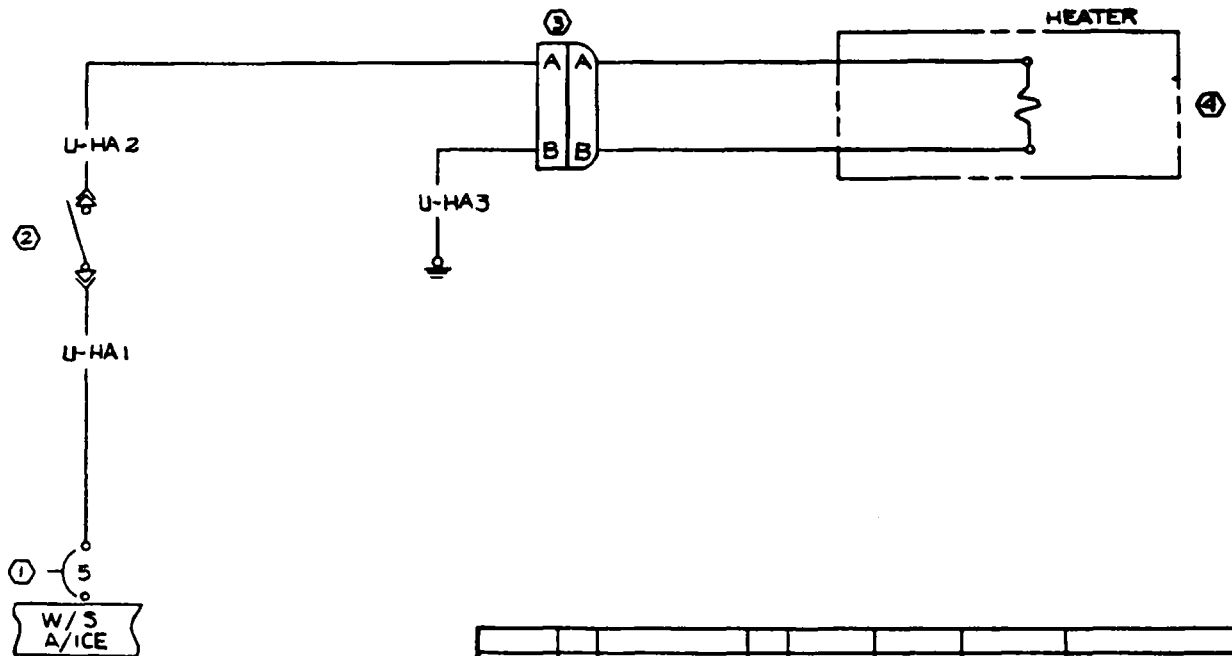
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESNA SPEC. NO. S-XXX OR CMXXX-CESNA STD. NO.

SUPERSEDES:  
SUPERSEDED BY:

CONTRACT NO:			WIRE TABLE		
DESIGN	NAME	DATE	TITLE		
GROUP	J.H. MARLB	2-27-79	Cessna AIRCRAFT CO. WIRING DIAGRAM - WING & STABILIZER DE-ICE SYSTEM (OPT)		
DRAWN	PWAYFIELD	2-19-79			
CHECK	YOUNGERS	2-20-79			
STRESS					
PROJ	J.H. MARLB	3-6-79	SIZE	CODE IDENT. NO.	OWG NO.
APPD	JRB		C	71379	2270001
OTHER			SCALE: NONE	(3R 5112)	PAGE: 134

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: S-1367-1-8 WAS S-1367-1-10 (SR 9112) (MER R182 EO 774)	HHG 4-19-79	<i>[Signature]</i> HRS



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
U-HA3	20			SOLDER	S-1367-1-8
U-HA2	20			SOLDER	S-1493-1
U-HA1	20			SOLDER	S-1367-1-6 S-1493-1

**WIRE TABLE**

ITEM NO	PART NO.	DESCRIPTION
4	1513460	HEATER
3	KPT07EB-23	RECEPTACLE
2	S-2160-1	SWITCH
1	S-1360-5L	CIRCUIT BREAKER

**EQUIPMENT TABLE**

CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES-XXXX-CESSNA SPEC. NO.  
S-XXX OR CMXXXX-CESSNA  
STD. NO.

SUPERSEDES:  
  
SUPERSEDED BY:

CONTRACT NO:		<b>Cessna AIRCRAFT CO.</b>		PAWNEE DIVISION 1600 E. PAWNEE WICHITA, KANSAS		
DESIGN	SPENCER	DATE	2-27-79	<b>WIRING DIAGRAM -- WINDSHIELD ANTI-ICE SYSTEM (OPT) TR182</b>		
GROUP	<i>W. J. Hadden</i>	DATE	3-8-79			
DRAWN	P. MAYFIELD	DATE	2-19-79			
CHECK	YOUNGERS	DATE	2-26-79			
STRESS				SIZE	CODE IDENT NO.	DWG NO
PROJ	<i>W. J. Hadden</i>	DATE	3-6-79	C	71379	2270001
APPD	<i>[Signature]</i>			SCALE NONE		(SR 9112)   PAGE: 135
OTHER						

# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

- ▶ REMOVE & DISCARD VENDOR FURNISHED TERMINALS, TERMINATE WITH S-1636-1 TERMINALS.
- ▶ TERMINATE VENDOR FURNISHED LEAD WITH S-1367-1-B.

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: S-1638-5 WAS S-1640-6, S-1638-4 WAS S-1641-6 (SR9554) IN TITLE BLOCK WAS(SH9112) (SR9554)	MHG 9-18-79	[Signature]
B	BY REV: ADD DETAIL A SER IN U-HE13, U-HE14, U-HE15, U-HE16 (SR10099)	REK 2-4-82	[Signature]
C	BY REV: SER IN HE17, HE18, HE19 & HE20; SER OUT HE2, HE3, HE4 & HE12, REVISE TERMINALS FOR HE13, HE14 HE15 & HE16, REVERSE PINS 1 & 2 ON BLOWER CONNECTORS SR (10099)	REK 3-19-82	[Signature]

U-HE20	18		S-1635-1	S-1367-8	
U-HE19	18		S-1635-2	S-1493-1	
U-HE18	18		S-1635-2	S-1493-1	
U-HE17	18		S-1635-2	S-1493-1	
U-HE16	18		SEE HE17	S-1635-1	SER (SR10099) & ON
U-HE15	18		SEE HE18	S-1635-1	SER (SR10099) & ON
U-HE14	18		SEE HE19	S-1635-1	SER (SR10099) & ON
U-HE13	18		S-1635-1	S-1367-1-B	SER (SR10099) & ON
U-HE12	18		S-1635-1	S-1367-8	THRU SER (SR10099)
U-HE11	16		S-1367-2-4	S-1493-2	
U-HE10	16		S-1635-2	S-1635-2	
U-HE9	16		SEE HE8	S-1635-2	
U-HE8	16		S-1493-3	S-1635-2	
U-HE7	18		S-1493-1	S-1367-8	
U-HE6	18		S-1493-1	S-1493-1	
U-HE5	18		S-1493-1	S-1493-1	
U-HE4	18		S-1635-1	S-1493-1	THRU SER (SR10099)
U-HE3	18		S-1635-1	S-1493-1	THRU SER (SR10099)
U-HE2	18		S-1635-1	S-1493-1	THRU SER (SR10099)
U-HE1	18		S-1367-6	S-1493-1	

15	S-1360-18L	CIRCUIT BREAKER
14	S-1360-10L	CIRCUIT BREAKER
13	0882862	HIGH PRESSURE SW
12	SD508	COMPRESSOR
11	S-1637-2	HOUSING
10	S-1637-1	HOUSING
9	S-2035-2	HOUSING
8	S-2035-1	HOUSING
7	6303-2	COOLING FAN
6	S-1917-2	RELAY
5	1247243	SWITCH (ARA)
4	0882590	SWITCH (ARA)
3	S-1638-5	HOUSING-PLUG
2	S-1638-4	HOUSING-CAP
1	1120059	BLOWER ASSY (ARA)

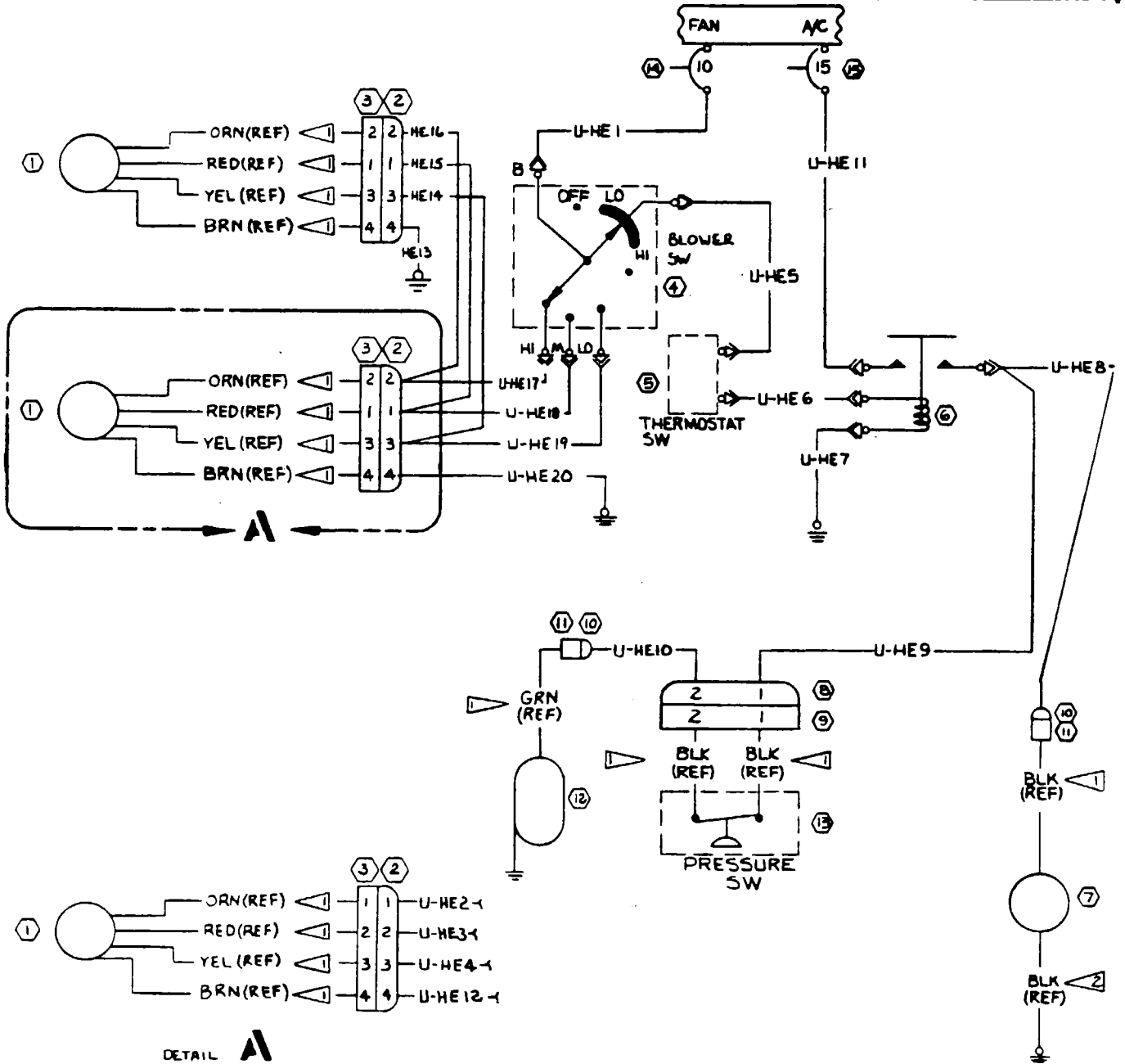
WIRE TABLE		CONTRACT NO.		Cessna AIRCRAFT CO.		PAWNEE DIVISION 3800 E. PAWNEE WICHITA, KANSAS	
WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS	TITLE	
						WIRING DIAGRAM -	
						AIR CONDITIONER (OPT)	
DESIGN				SPENCER	2-27-79	TITLE	
GROUP				D. H. Moore	3-5-79	WIRING DIAGRAM -	
DRAWN				PMAYFIELD	2-19-79	AIR CONDITIONER (OPT)	
CHECK				YOUNGERS	2-20-79		
STRESS							
PROJ				J.H. MOORE	3-6-79	SIZE	CODE IDENT
APPD				JRS		C	71379
OTHER						DWG NO.	2270001
						SCALE: NONE	(SR9554)   PAGE: 1360

EQUIPMENT TABLE		SUPERSEDES:	
PART NO.	DESCRIPTION	SUPERSEDED BY:	

CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES-XXXX-CESNA SPEC. NO.  
S-XXX OR CMIXX-CESNA  
STD. NO.

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
C	SEE PG. 13.6.0 FOR REV.		



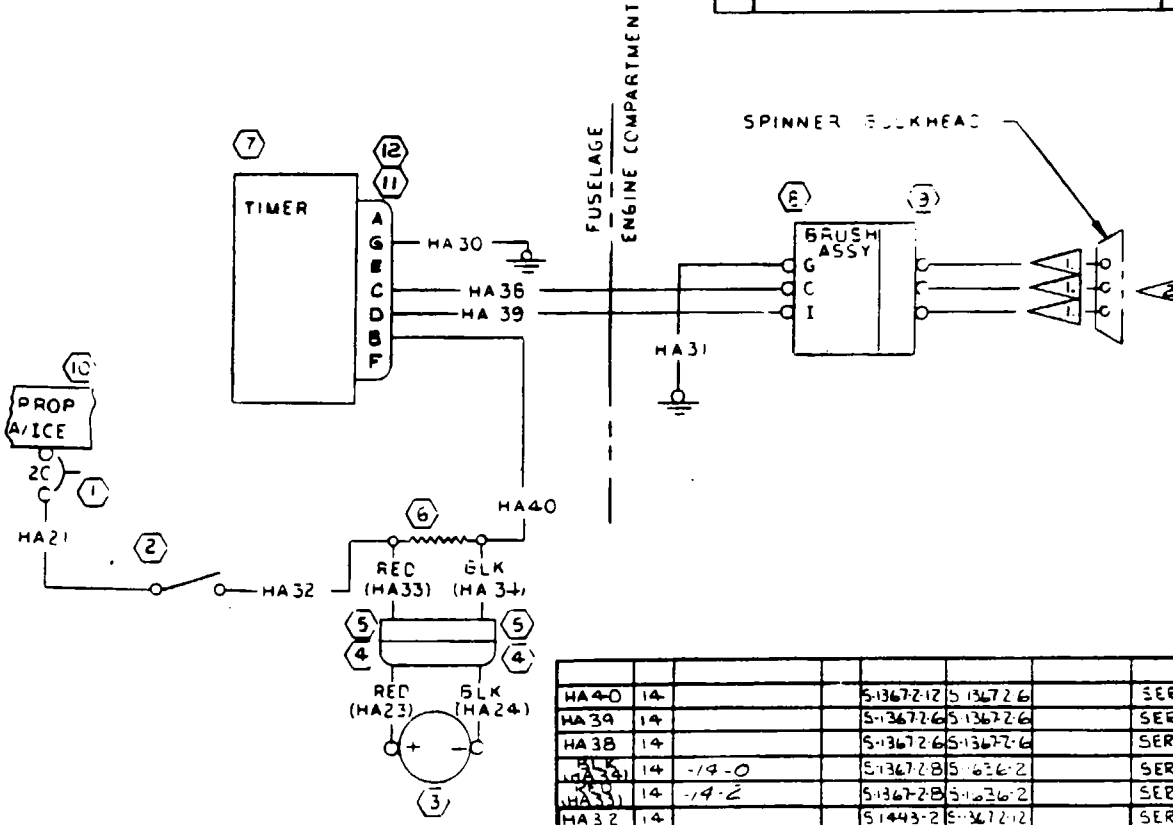
DETAIL **A**  
THRU SER (SR10099)

CONTRACT NO.		<b>Cessna AIRCRAFT CO.</b>		PAWNEE DIVISION 8800 E. PAWNEE WICHITA, KANSAS	
DESIGN	SPENCER	DATE	2-27-79	TITLE	
GROUP	<i>P.H. Handover</i>	DATE	3-5-79	AIR CONDITIONER (OPT)	
DRAWN	P. MAYFIELD	DATE	2-19-79		
CHECK	YOUNGERS	DATE	7-26-79		
STRESS					
PROJ	J.H. MOORE	DATE	3-6-79	SIZE	CODE IDENT
APPD	<i>JRS</i>			C	71379
OTHER				DWG NO.	2270001
				SCALE	NONE (SR 9554)
					PAGE 13.6.1

# MODEL R182 AND TR182 SERVICE MANUAL

- ▶ VENDOR FURNISHED WIRES
- ▶ FOR COMPLETE INSTL
- ▶ THREE EACH OF THESE WIRES ARE REQUIRED

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV ADD NOTE 2, MS 3057-12A, MS3106A20-155, C165020-0101 WAS C-40171 (SR9632)(CEF)	MKT 10-13-80	<i>[Signature]</i>
B	BY REV SER IN HA32, RED(HA33), BLK (HA34), HA38, HA39, HA40 WIRES; SER OUT HA22, RED(HA25), BLK(HA26), HA27, HA28, HA29 WIRES (SR9951)	GLS 2/19/81	<i>[Signature]</i>



WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
HA 40	14			5-13672-12 5-13672-6	SER (SR9951) ON
HA 39	14			5-13672-6 5-13672-6	SER (SR9951) ON
HA 38	14			5-13672-6 5-13672-6	SER (SR9951) ON
BLK (HA 34)	14	-14-0		5-13672-8 5-636-2	SER (SR9951) ON
HA 33	14	-14-2		5-13672-8 5-13672-2	SER (SR9951) ON
HA 32	14			5-1443-2 5-3672-12	SER (SR9951) ON
HA 31	14			5-13672-6 5-13672-6	
HA 30	14			5-13672-6 5-13672-6	
HA 29	14			5-13672-6 5-13672-6	THRU SER (SR9951)
HA 28	14			5-13672-6 5-13672-6	THRU SER (SR9951)
HA 27	14			5-13672-2 5-13672-6	THRU SER (SR9951)
BLK (HA 26)	14	-14-C		5-13672-8 5-636-2	THRU SER (SR9951)
HA 25	14	-14-2		5-13672-8 5-636-2	THRU SER (SR9951)
RED (HA 24)	14	-14-C		5-1635-2 SOLDER	
RED (HA 23)	14	-14-2		5-1635-2 SOLDER	
HA 22	14			5-1493-2 5-13672-12	THRU SER (SR9951)
HA 21	14			5-13672-6 5-1493-2	

PART NO.	DESCRIPTION
12	MS3057-12A CLAMP
11	MS3106A20-155 PLUG
10	2270C14 BUS BAR
3	C-40161 SLIP RING ASSY
E	C-40153 BRUSH BLOCK ASSY
7	C165020-0101 TIMER
6	22-37C-2C SHUNT
5	S-2035-2 HOUSING
4	S-2035-1 HOUSING
3	C662503 AMMETER
2	S-2160-1 SWITCH
1	S-1360-2CL CIRCUIT BREAKER

EQUIPMENT TABLE	
PART NO.	DESCRIPTION
12	MS3057-12A CLAMP
11	MS3106A20-155 PLUG
10	2270C14 BUS BAR
3	C-40161 SLIP RING ASSY
E	C-40153 BRUSH BLOCK ASSY
7	C165020-0101 TIMER
6	22-37C-2C SHUNT
5	S-2035-2 HOUSING
4	S-2035-1 HOUSING
3	C662503 AMMETER
2	S-2160-1 SWITCH
1	S-1360-2CL CIRCUIT BREAKER

CONTRACT NO:			WIRE TABLE		
DESIGN	NAME	DATE	SIZE	CODE IDENT. NO.	DWG NO.
	G. STAMM	5-15-80	C	71379	22700C1
GROUP					
DRAWN	G. STAMM	5-15-80			
CHECK	ALBRIGHT	5-15-80			
STRESS					
PROJ	GICKEL	5-15-80			
APPO	UMP/APP	5-15-80			
OTHER					

**Cessna AIRCRAFT CO.**  
 PAWNEE DIVISION  
 3800 E. PAWNEE  
 WICHITA, KANSAS

**WIRING DIAGRAM -**  
 PROP ANTI-ICING 3 BLADE  
 (OPTIONAL) TRI82

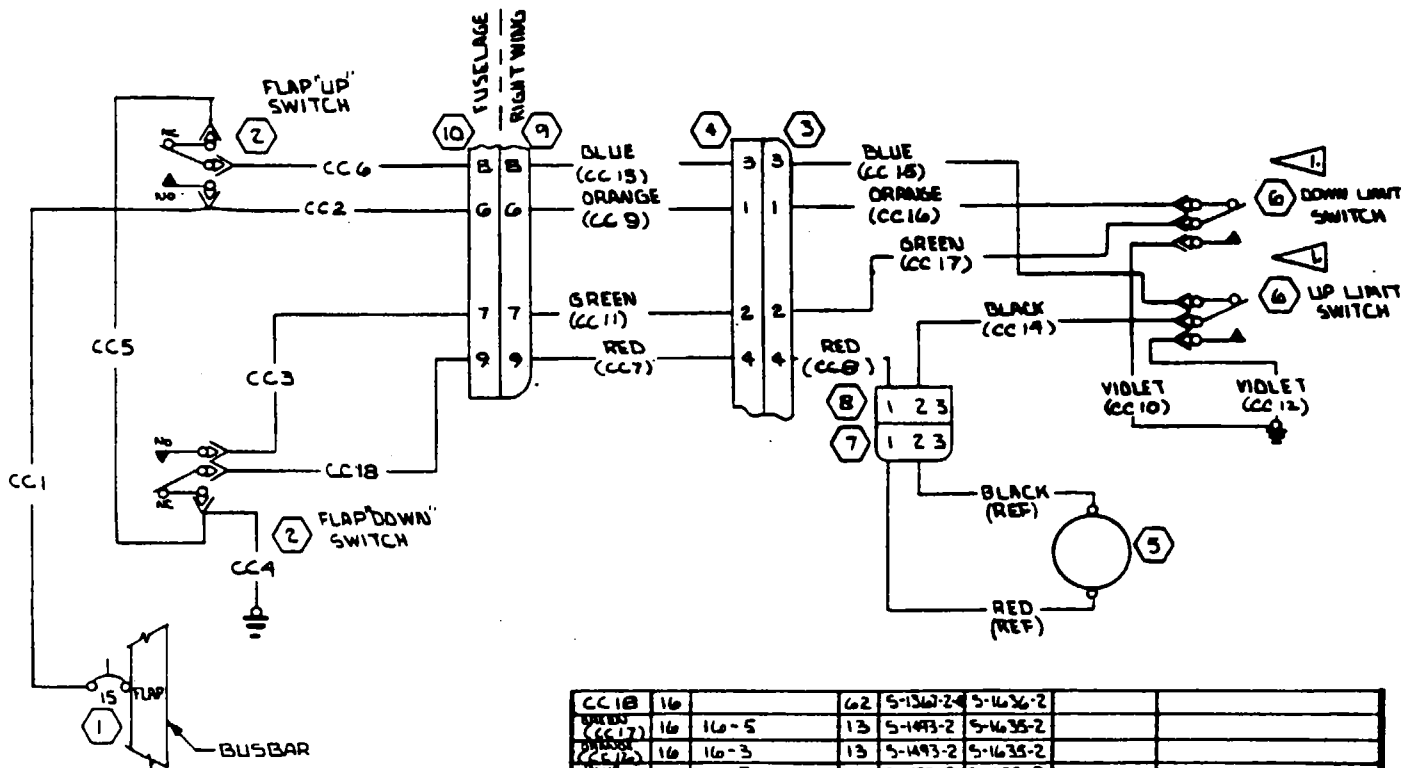
SIZE: NONE  
 CODE IDENT. NO.: (SR9112)  
 DWG NO.: 22700C1  
 PAGE: 13 OF 20

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD

**NOTES:**

1. THESE SWITCHES PART OF C301002-0102 ACTUATOR ASSY



**INACTIVE**  
 EFF THRU WIRE SENS 9112)  
 PSM 2-19-79  
 BLY DWA/PS  
 JHE JHM

ITEM NO	PART NO.	DESCRIPTION
10	S-1641-9	HOUSING - SOCKET
9	S-1640-9	HOUSING - PIN
8	S-1638-1	HOUSING - PLUG
7	S-1638-2	HOUSING - CAP
6	V3-1-D9	SWITCH
5	C301002-0102	ACTUATOR ASSY
4	S-1641-6	HOUSING - PLUG
3	S-1640-6	HOUSING - PIN
2	S-1906-1	SWITCH
1	S-1360-1SL	CIRCUIT BREAKER

**EQUIPMENT TABLE**

CES-1000 IS APPLICABLE  
 VENDOR CODES PER S-1400  
 CES-XXXX-CESNA SPEC. NO.  
 S-XXX OR CMXXXX-CESNA  
 STD. NO.

SUPERSEDES:

SUPERSEDED BY:  
 PG 14.3

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
CC18	16		62	S-1367-24	S-1636-2
GREEN (CC17)	16	16-5	13	S-1493-2	S-1635-2
ORANGE (CC16)	16	16-3	13	S-1493-2	S-1635-2
BLUE (CC15)	16	16-7	13	S-1493-2	S-1635-2
RED (CC14)	16	16-0	13	S-1636-2	S-1493-2
BLACK (CC13)	16	16-6	105	S-1635-2	S-1636-2
VIOLET (CC12)	16	16-7	19	S-1493-2	S-1367-2B
GREEN (CC11)	16	16-5	105	S-1635-2	S-1636-2
ORANGE (CC10)	16	16-7	19	S-1493-2	S-1367-2B
BLUE (CC9)	16	16-3	105	S-1635-2	S-1636-2
RED (CC8)	16	16-2	13	S-1635-2	S-1636-2
RED (CC7)	16	16-2	105	S-1636-2	S-1635-2
CC6	16		102	S-1367-24	S-1636-2
CC5	16		6	S-1367-24	S-1367-24
CC4	16		10	S-1367-24	S-1367-2B
CC3	16		62	S-1636-2	S-1367-24
CC2	16		62	S-1367-24	S-1636-2
CC1	16		36	S-1367-26	S-1367-24

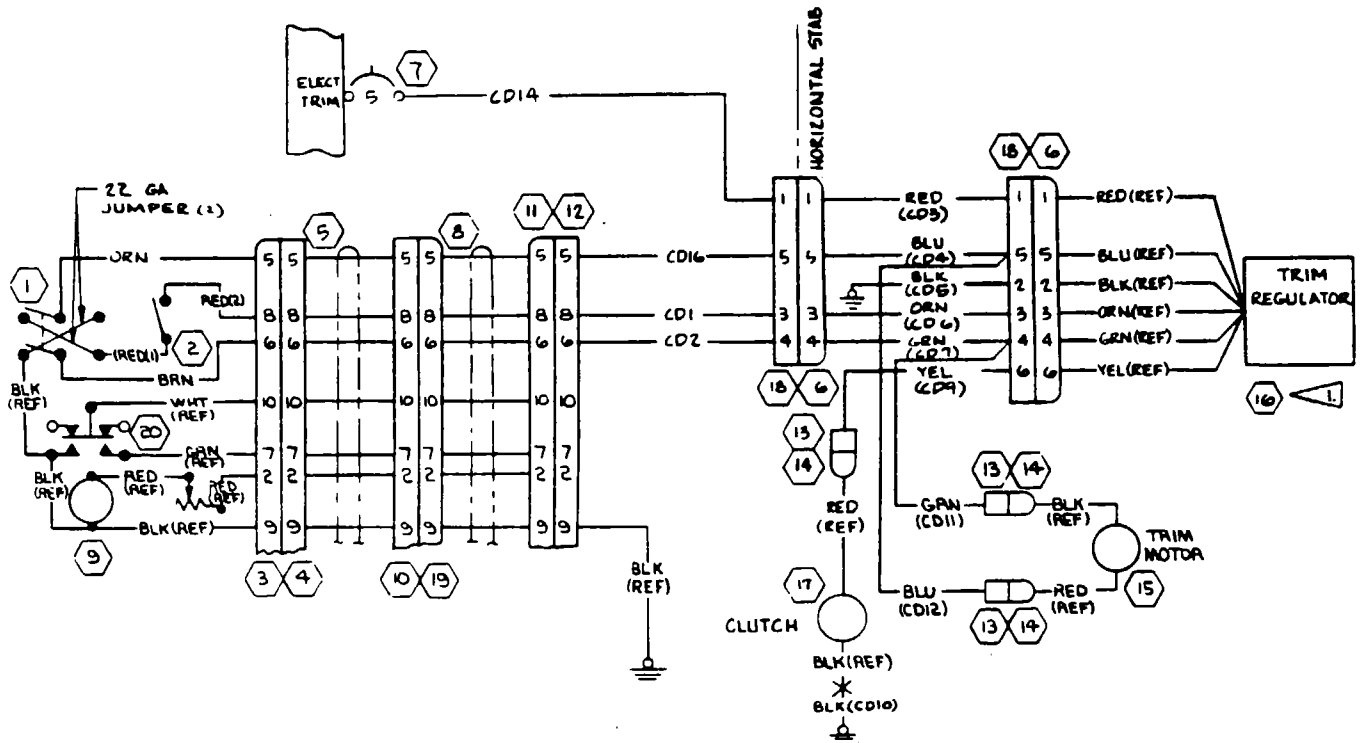
**WIRE TABLE**

CONTRACT NO.			COMMERCIAL AIRCRAFT DIV. 5800 E. PAV NEE WICHITA, KANSAS	
DESIGN	NAME	DATE	Cessna AIRCRAFT CO.	
GROUP			TITLE	
DRAWN			WIRING DIAGRAM -	
CHECK			WING FLAPS	
STRESS			SIZE	CODE IDENT.
PROJ	JH MOORE	4-4-77	C	71379
APPD	JHS		DWG NO	2270001
OTHER			SCALE: NONE	(SP. B962)
			PAGE:	14 1





# MODEL R182 AND TR182 SERVICE MANUAL



CONTRACT NO.			<b>Cessna AIRCRAFT CO.</b>		PAWNEE DIVISION 3886 E. PAWNEE WICHITA, KANSAS
DESIGN	SPENCER	3-28-77	<b>WIRING DIAGRAM — ELECTRIC TRIM (OPT)</b>		
GROUP	<i>D. H. Henderson</i>	1-13-77			
DRAWN	HARVEY	2-16-77			
CHECK	J. YOWEL	5-10-77			
STRESS					
PROJ	<i>J. H. MOORE</i>	1-14-77	SIZE	CODE IDENT NO	DWG NO
APPD	<i>J. H. MOORE</i>		C	71379	2270001
OTHER			SCALE: NONE	(28962)	PAGE: 142

Electric Trim (OPT) (Sheet 2 of 2)



# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

- ▷ MATERIAL IS RCF 5140 COIL CORD, VENDOR CODE (096906) THRU SER (SR10003)
- MATERIAL IS RCF 5130B COIL CORD VENDOR CODE (096906) SER (SR10003) \* ON

REVISION			
LET	DESCRIPTION	DATE	APP
A	BY REV: 44450-3257 WAS 44450-5025; ITEM 8 WAS 11; ITEM 9 WAS 12 (SR9632)	GLS 8/5/80	<i>[Signature]</i>
B	BY REV: ADD WIRE CALLOUTS U-CD25 THRU U-CD30; ADD NEW P/N NOTE 1 (SR9632)(REF) ADD DETAIL "A" (SR10003)	RCT 11-12-80	<i>[Signature]</i>
C	BY REV: PIN 6 WAS 7 AND PIN 7 WAS 6 / TRIM ACT CONNECTOR S-2349-1 (SR9632)(REF)	GLS 1/19/81	<i>[Signature]</i>
D	BY REV: RCF 5130B WAS RCF 5130A (COIL CORD PER NOTE 1 (SR10003))	GLS 4-30-81	<i>[Signature]</i>
E	BY REV: S-2099-9 WAS S-2099-6 / GRN (U-CD18), BLU (U-CD27), BLU-W-CO2914 (WHT/YEL-W-CO24) NOW SHOP PRACTICE	WHM 6-7-84	<i>[Signature]</i>

**INACTIVE**  
THRU 2-22-82 (SR9951)  
MKT  
JAN 1/88  
DWT

51-00916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
CD22	20			S-1963-2	S-1367-1-8
U-CD28 GRN		-20-5		S-2099-9	S-2099-8
U-CD27 BLU		-20-6		S-2099-9	S-2099-9
U-CD29 BLK	20	-20-0		S-2099-9	S-1367-1-8
U-CD30 BLK	22	-22-0		S-1963-2	S-1367-1-8
U-CD25 ORN	20	-20-4			S-2099-9
U-CD18 WHT/GRN	20	-20-9-3			S-2099-9
U-CD26 WHT/YEL	20	-20-9-4			S-2099-9
U-CD23 YEL	20	-20-4		S-1963-2	S-2099-9
RED	24			SOLDER	S-1963-3
WHT/ORN					
ORN					
WHT/YEL					
YEL					
BLK(2)	24			SOLDER	S-1963-3

ITEM NO	PART NO.	DESCRIPTION
10	S-1985-3	SWITCH
9	44450-3257	TRIM ACTUATOR
8	S-2349-1	CONNECTOR
7	S-1232-2	CIRCUIT BREAKER
6	S-1962-2-0	HOUSING
5	S-1962-1-0	HOUSING
4	2270030	CABLE ASSY
3	2270035	RELAY ASSY
2	S-2349-2	CONNECTOR
1	7205P4	SWITCH

**WIRE TABLE**

CONTRACT NO:

DESIGN	NAME	DATE
GROUP	<i>[Signature]</i>	7-27-80
DRAWN	WHITSON	7-22-80
CHECK	BORLESKE	7-23-80
STRESS		
PROJ	GFICHEL	7-25-80
APPD	<i>[Signature]</i>	
OTHER	LF	

Cessna AIRCRAFT CO. PAWNEE DIVISION  
3808 E PAWNEE WICHITA KANSAS

TITLE: **WIRING DIAGRAM - ELECTRIC TRIM (OPT)**

SIZE	CODE IDENT NO	DWG NO
C	71379	2270001

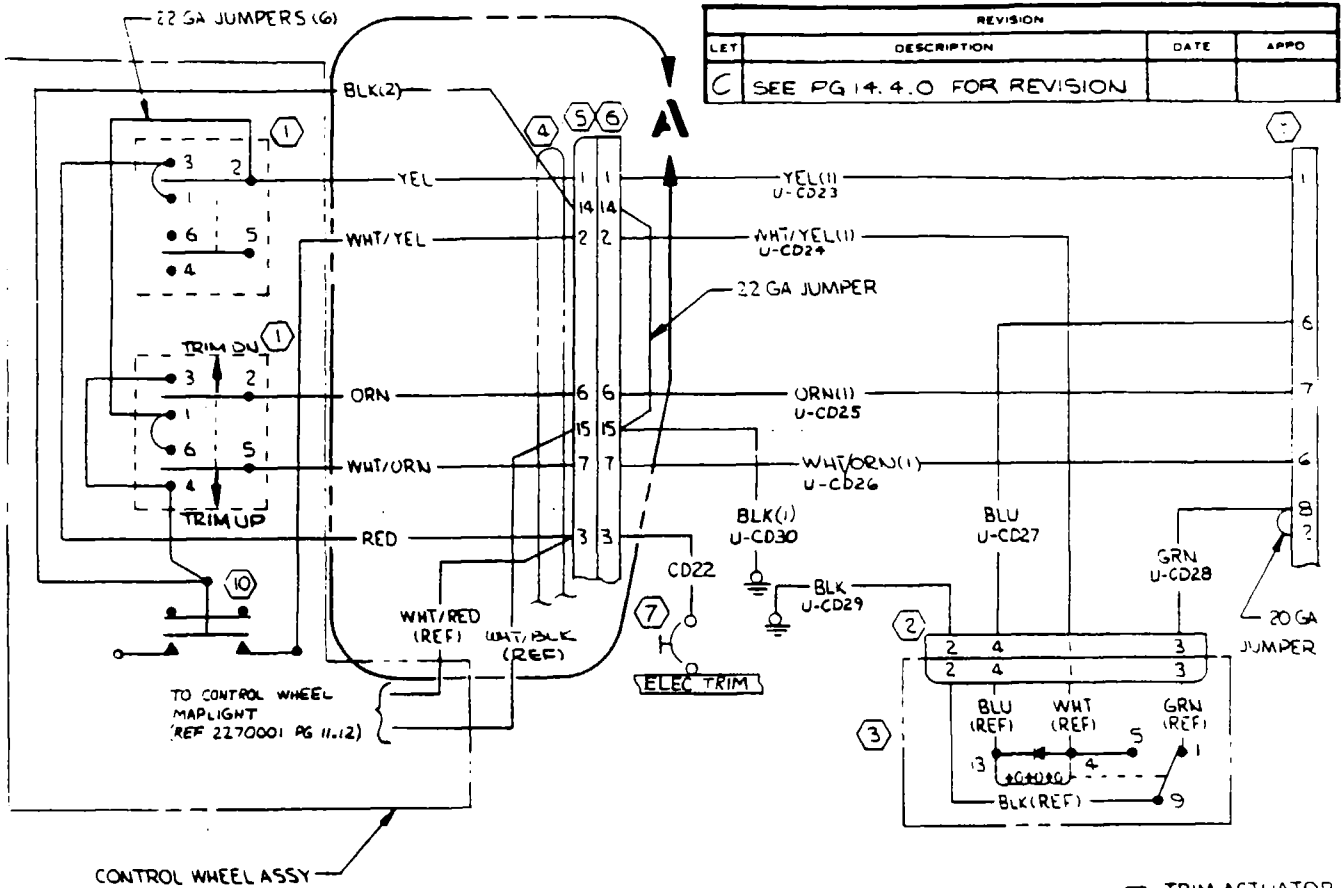
OTHER: NONE (SR9632) | PAGE: 4.4.0

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO S-XXX OR CMXXXX-CESSNA STD. NO.

SUPERSEDES: 2270001 PG 14.2

SUPERSEDED BY: 2270001 PG 14.5C 119.5.1

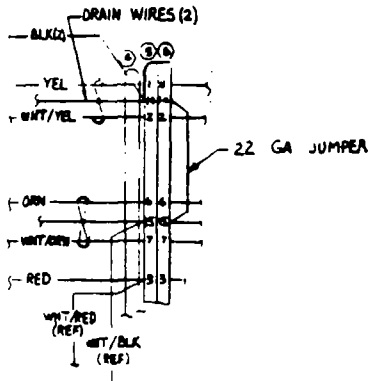
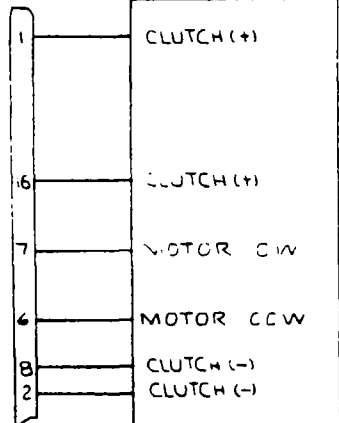
# MODEL R182 AND TR182 SERVICE MANUAL



REVISION			
LET	DESCRIPTION	DATE	APPO
C	SEE PG 14.4.0 FOR REVISION		

CONTROL WHEEL ASSY

⑨ TRIM ACTUATOR (TA-495A)



DETAIL A (APPLIES THRU SER(SR10003))

**INACTIVE**  
THRU SER(SR 9951)  
MAY 6-17-81  
JAW

CONTRACT NO.		Cessna AIRCRAFT CO.		PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS	
DESIGN	NAME	DATE	TITLE		
GROUP	WHITSON	7-22-80	WIRING DIAGRAM		
DRAWN	BORLESKE	7-23-80	ELECTRIC TRIM (OPT)		
CHECK					
STRESS					
PROJ	CEFFKEL	7-25-80	SIZE	CODE IDENT	DWG NO
APPO	APC		C	71379	2270001
OTHER			SCALE	NONE	SER(SR9632) PAGE 14 of 1

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD

**NOTES:**

- ▷ MATERIAL IS RCF 5140 COIL CORD, VENDOR CODE (096906) THRU SER (SR10003)
- MATERIAL IS RCF 5130B COIL CORD VENDOR CODE (096900) SER (SR10003) & ON

**INACTIVE**  
 EFF THRU SER (SR10713)  
 TMS 9-8-83  
 REH  
 JRS

51-00916

CD32	18		S1963-2	S1367-1-B	
CD31 BLK	18	-18-0	SOLDER	S1963-3	
V10	24	< 1	SOLDER	S1963-3	
CD22	185	S-1A6-V18-3	S1963-2	S1367-1-B	
UCR28 BRN	20	-20-5	S2099-6	S2099-8	
UCR27 BLU	20	-20-6	S2099-6	S2099-9	
UCR29 BLK	20	-20-0	S2099-6	S1367-1-B	
U-0030 BLK (L)	18	-18-0	S1963-2	S1367-1-B	
U-0030 BLK (R)	20	-20-4		S2099-9	
U-0030 WHT (L)	20	-20-9-3		S2099-9	
U-0030 WHT (R)	20	-20-9-4		S2099-6	
UCR23 YEL	20	-20-4	S1963-2	S2099-9	
RED	24	< 1	SOLDER	S1963-3	
WHT/ORN					
ORN					
WHT/YEL					
YEL					
BLK(L)	24	< 1	SOLDER	S1963-3	

10	S-1985-3	SWITCH	
9	44430-3257	TRIM ACTUATOR	
8	S-2349-1	CONNECTOR	
7	S-1232-2	CIRCUIT BREAKER	
6	S-1962-20	HOUSING	
5	S-1962-1-0	HOUSING	
4	2270030	CABLE ASSY	
3	2270035	RELAY ASSY	
2	S-2349-2	CONNECTOR	
1	7205P4	SWITCH	

PART NO.	DESCRIPTION
<b>EQUIPMENT TABLE</b>	

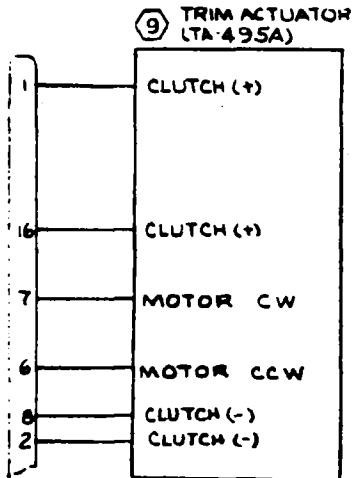
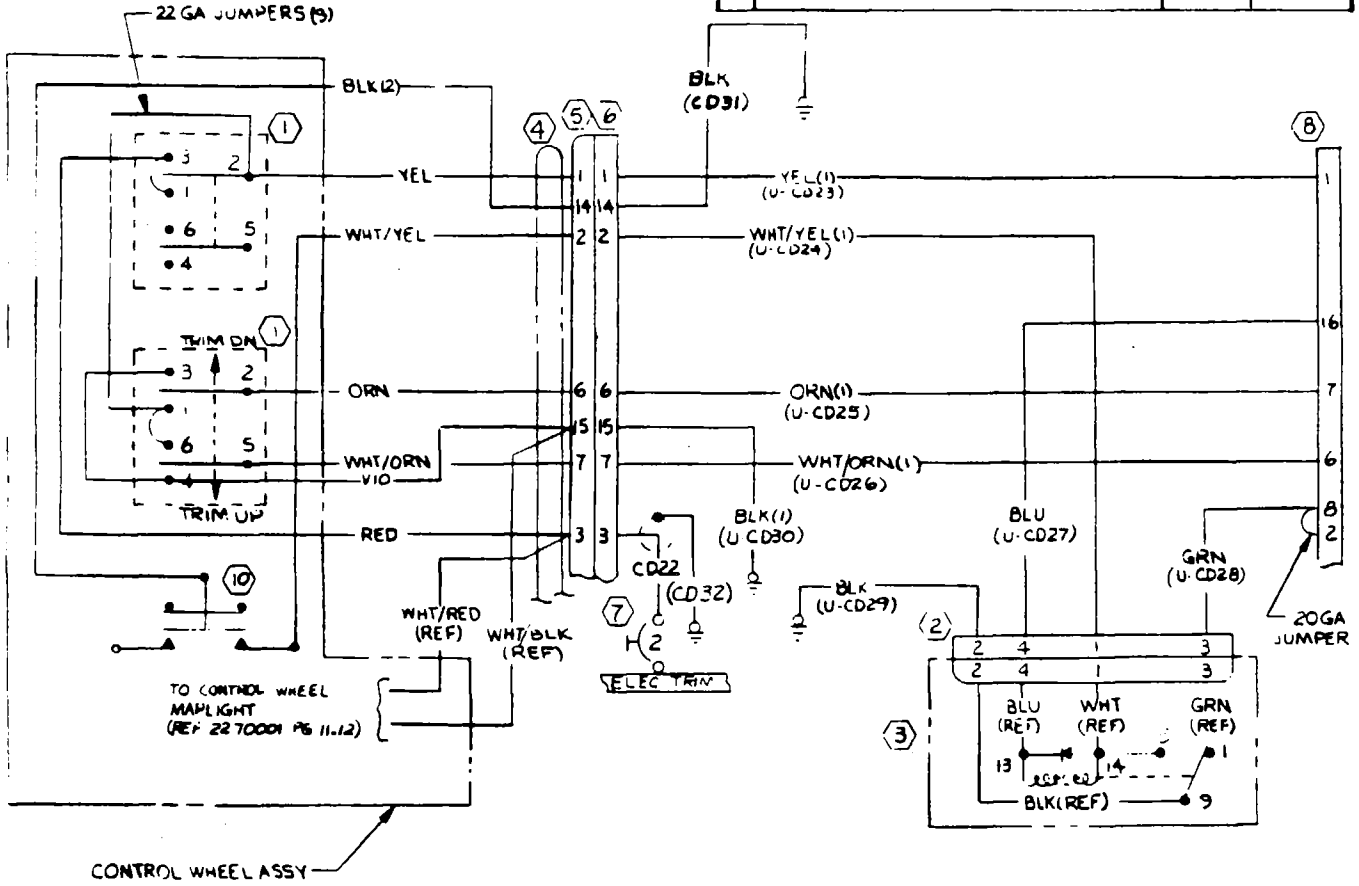
  

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESBNA SPEC. NO. S-XXX OR CMXXXX-CESBNA STD. NO.		SUPERSEDES 2270001 PG 1460/1491	
SUPERSEDED BY:		PG. 1460	

CONTRACT NO.			PAWNEE DIVISION 3800 E. PAWNEE WICHITA, KANSAS		
DESIGN	NAME	DATE	TITLE		
GROUP	W. Thompson	7-6-81	<b>Cessna AIRCRAFT CO.</b>  <b>WIRING DIAGRAM — ELECTRIC TRIM (OPT)</b>		
DRAWN	M. THOMPSON	7-13-81			
CHECK	BORLESKE	7-19-81			
STRESS					
PROJ	ZEPHCELE	7-14-81	SIZE	CODE IDENT NO.	DWG NO
APPD	JRS		C	71379	2270001
OTHER			SCALE	NONE	(SR9951) PAGE 1450

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPO
	SEE PAGE 14.5.D FOR REV		



**INACTIVE**  
 EFF THRU SER(SR10713)  
 TMS 7-8-83  
 REL  
 WEL  
 JRS

51-00916

CONTRACT NO.		Cessna AIRCRAFT CO.		PAWNEE DIVISION 3800 E PAWNEE WICHITA, KANSAS	
DESIGN	NAME	DATE	TITLE		
GROUP	WILSON	7-16-81	WIRING DIAGRAM		
DRAWN	M. THOMPSON	7-10-81	ELECTRIC TRIM (OPT)		
CHECK	BORLE, VE	7-13-81			
STRESS					
PROJ	OFFICEL	7-21-81	SIZE	CODE IDENT	DWG NO
APPO	APG		C	71379	2270001
OTHER			SCALE: NONE	(SR 9951)	PAGE: 14.5.1

# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

1. MATERIAL IS RCF5130B COIL CORD, (096906)

REVISION			
LET	DESCRIPTION	DATE	APPD

RED	24	1.	SOLDER	S-2353-2
VIO				
WHT/ORN				
ORN				
WHT/YEL				
YEL				
BLK	24	1.	SOLDER	S-2353-2
U-CD42	20		S-2099-9	S-2099-9
U-CD40	18		S-2099-8	S-1367-8
U-CD39	18		S-2099-8	S-1367-8
U-CD38	20		S-2099-6	S-1367-8
U-CD37	20		S-2099-6	S-2099-8
U-CD36	20		S-2099-6	S-2099-9
U-CD35	20		S-2099-9	S-2099-9
U-CD34	20		S-2099-9	S-2099-9
U-CD33	20		S-2099-9	S-2099-6
U-CD32	18		SOLDER	S-1367-8

QTY	PART NO.	DESCRIPTION
9	44430-3257	TRIM ACTUATOR
8	S-2399-1	CONNECTOR
7	S-1232-2	CIRCUIT BREAKER
6	S-385-3	SWITCH
5	S-2350-3	CONNECTOR
4	2270030	CABLE ASSY
3	2270035	RELAY ASSY
2	S-2349-2	CONNECTOR
1	7205F4	SWITCH

WIRE TABLE			SERIALS	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS

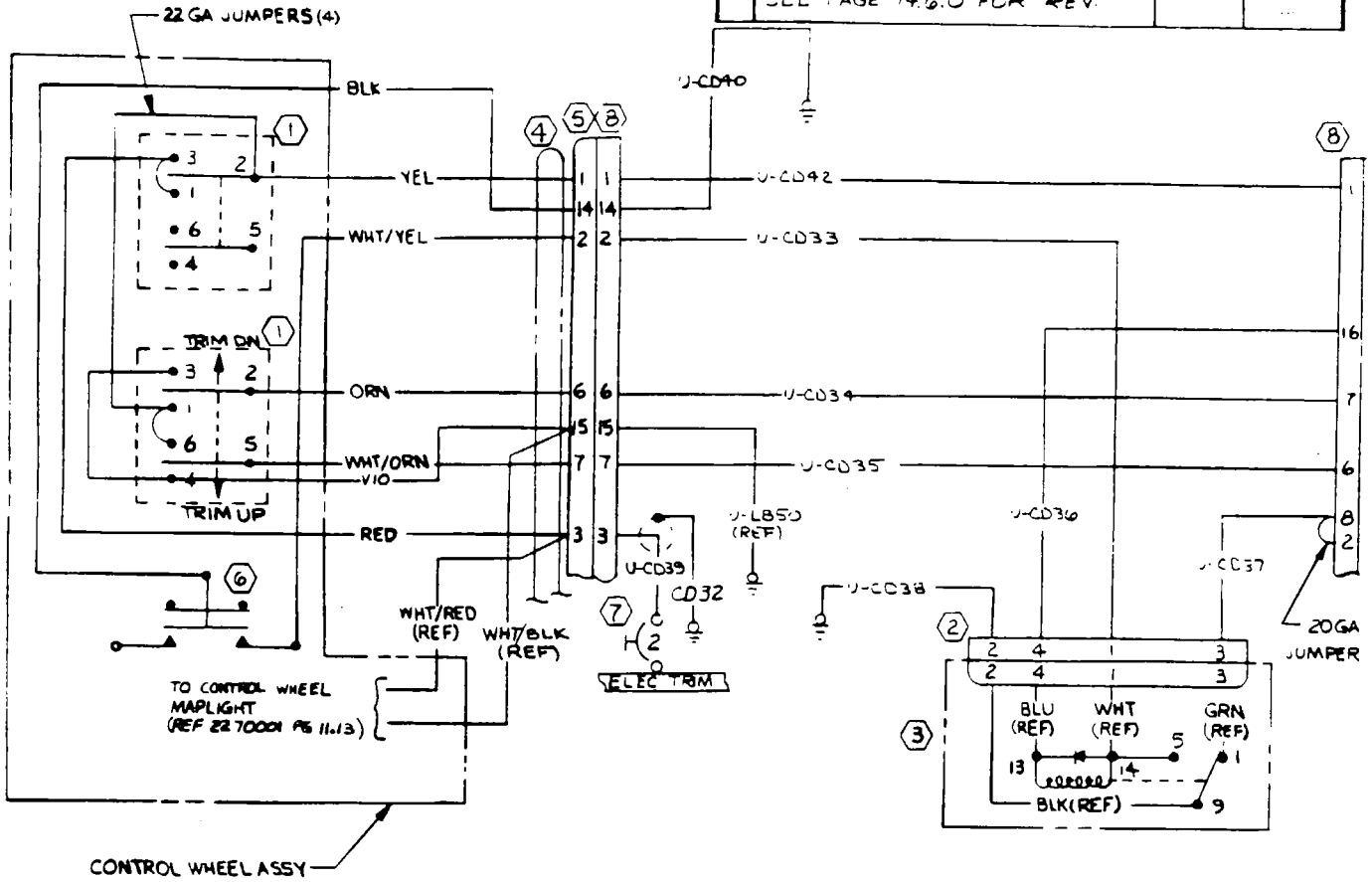
CONTRACT NO:		<b>Cessna AIRCRAFT CO.</b> <small>PAWNEE DIVISION 3800 E PAWNEE WICHITA KANSAS</small>		
DESIGN	NAME DATE			
GROUP	<i>W. H. H. H. H.</i> 4-21-83			
DRAWN	SPENCER 9-9-83			
CHECK	REHARF 9-12-83	<b>WIRING DIAGRAM -</b> <b>ELECTRIC TRIM (OPT)</b>		
STRESS				
PROJ	<i>R. S. H. H. H.</i> 10-2-83	SIZE	CODE IDENT NO.	DWG NO
APPD	<i>[Signature]</i>	<b>C</b>	<b>71379</b>	<b>2270001</b>
OTHER				

EQUIPMENT TABLE	
PART NO.	DESCRIPTION

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO S-XXX OR CMXXXX-CESSNA STD. NO.  
 SUPERSEDES: PG 14.5.0  
 SUPERSEDED BY:

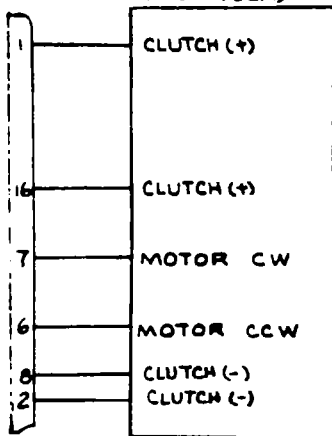
# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
	SEE PAGE 14.6.0 FOR REV.		



CONTROL WHEEL ASSY

9 TRIM ACTUATOR (TA-495A)



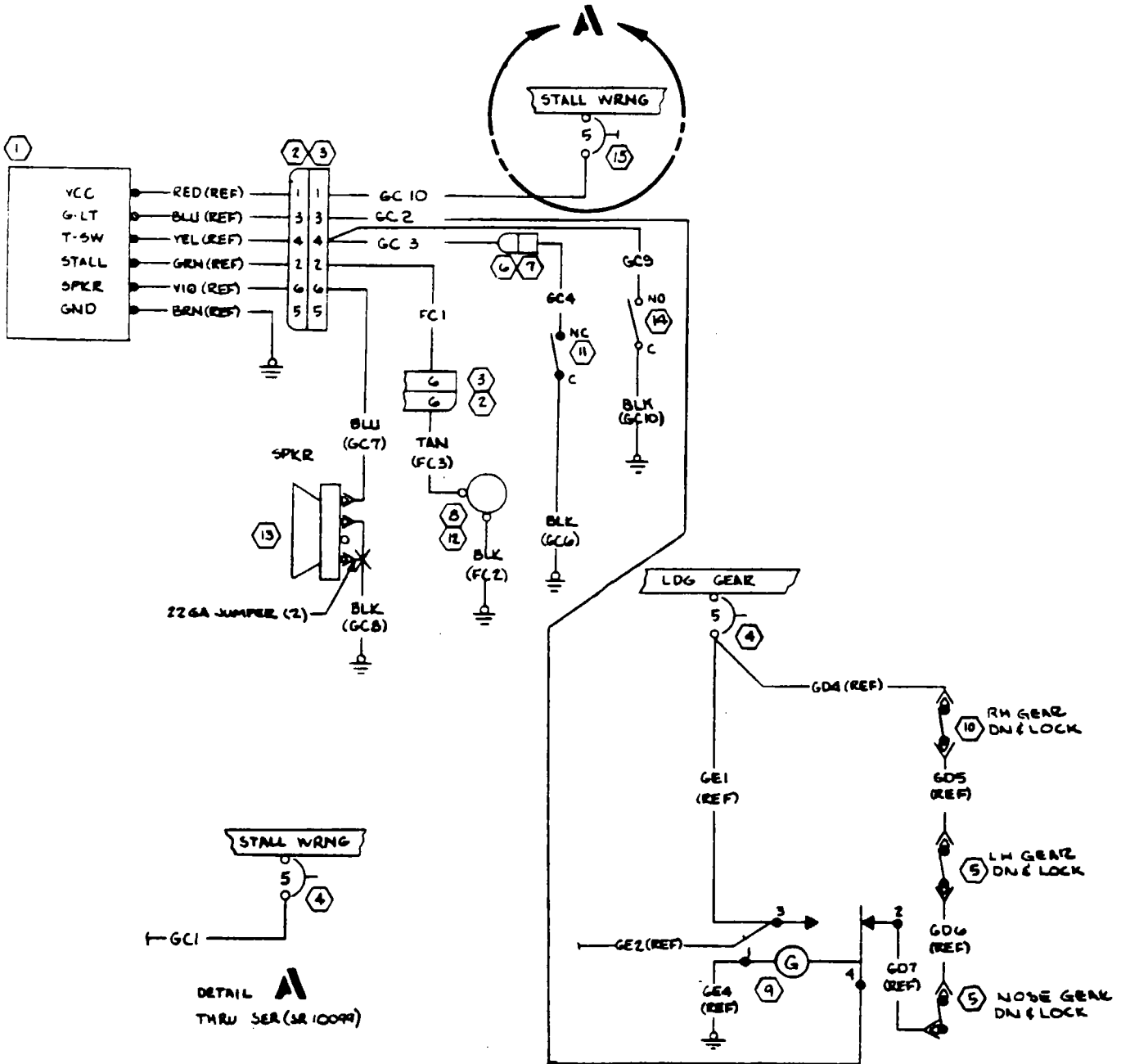
CONTRACT NO:		PAWNEE DIVISION 3800 E. PAWNEE WICHITA, KANSAS	
DESIGN	NAME	DATE	<b>Cessna AIRCRAFT CO.</b> TITLE WIRING DIAGRAM ELECTRIC TRIM (OPT)
GROUP	W. H. Spencer	9-8-83	
DRAWN	W. H. Spencer	11-21-83	
CHECK	R. E. Hartz	1-8-83	
STRESS			
PROJ	P. J. Spencer	10-3-83	SIZE
APPD			CODE IDENT.
OTHER			DWG NO.
			C
			71379
			2270001
			SCALE NONE
			(SR 0713)
			PAGE 14.6.1





# MODEL R182 AND TR182 SERVICE MANUAL

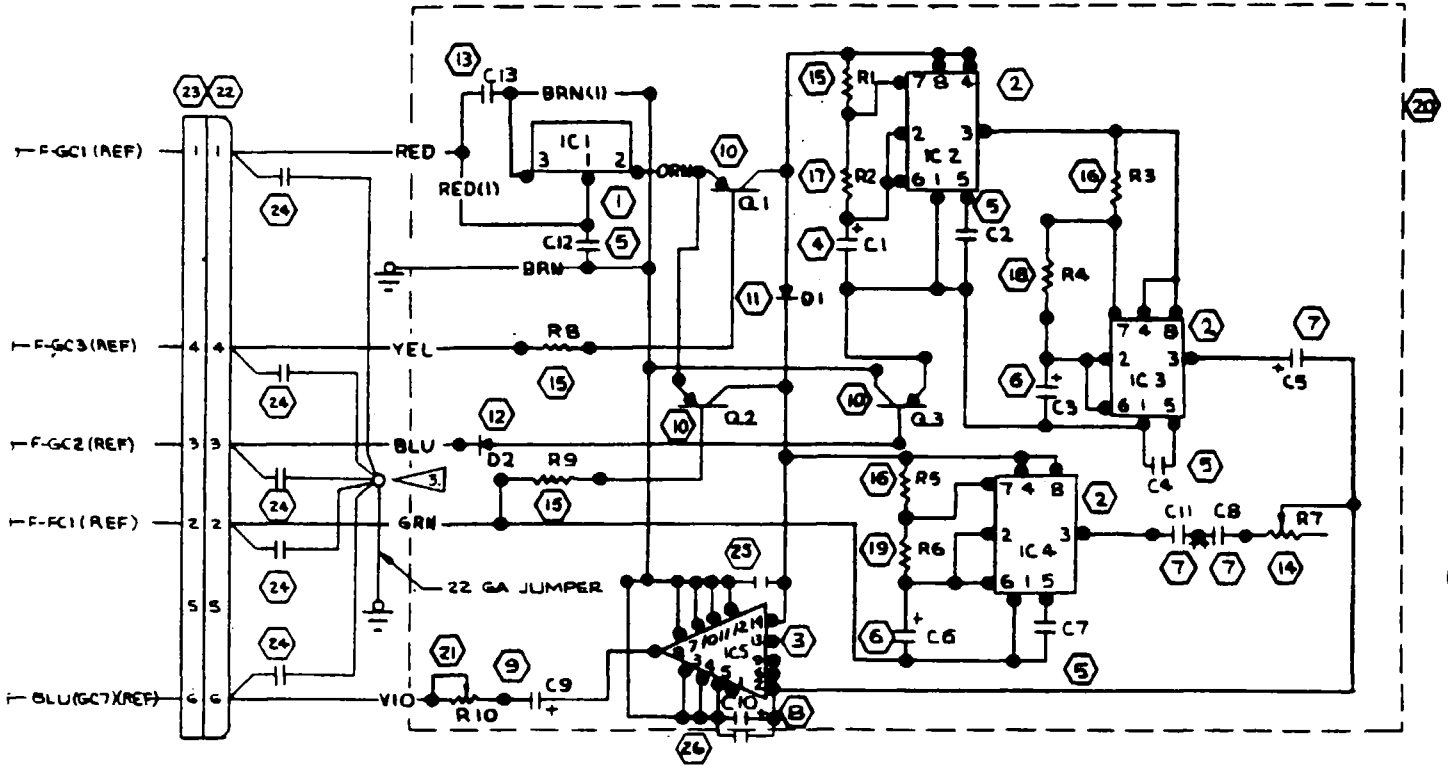
REVISION			
LET	DESCRIPTION	DATE	APPRO
C	SEE P. 5.1.0 FOR REVISION		



CONTRACT NO:			Cessna AIRCRAFT CO.			PAWNEE DIVISION 8000 E. PAWNEE WICHITA, KANSAS		
DESIGN	NAME	DATE	TITLE					
GROUP	<i>H. H. Handley</i>	<i>1-13-77</i>	WIRING DIAGRAM -					
DRAWN	HARVEY	3-16-77	LANDING GEAR & STALL					
CHECK	J. YOUNG	3-18-77	WARNING SYSTEM					
STRESS			SIZE	CODE IDENT. NO.	DWG. NO.			
PROJ	<i>J. L. Moore</i>	<i>4-14-77</i>	C	71379	2270001			
APPRO	<i>[Signature]</i>		SCALE: NONE		R182	PAGE: 15.1.1		
OTHER			(528462)					



# MODEL R182 AND TR182 SERVICE MANUAL



INACTIVE  
 EFF THRU SER (SR8970)  
 JJB 9-16-77  
 JAB/MS 2-8-78

CONTRACT NO:			COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS		
DESIGN	NAME	DATE	Cessna AIRCRAFT CO.		
GROUP	W. W. Hayden	3-28-77	TITLE		
DRAWN	HAEVEY	3-16-77	WIRING DIAGRAM —		
CHECK	J. YOUEL	3-18-77	SCHEMATIC DUAL WARNING		
STRESS			UNIT		
PROJ	W. W. Hayden	4-4-77	SIZE	CODE IDENT.	DWG NO
APPO	MS		C	71379	2270001
OTHER			SCALE NONE	(SR8962)	PAGE: 15 2

Schematic Dual Warning Unit (Sheet 2 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD C321C104MSUICA CAPACITOR C315C103MSUICA CAPACITOR (SR9465)	HTL 2-16-79	<i>[Signature]</i>
B	BY REV: S-2493-12 WAS MC7B12CP, S-2437-1 WAS MC1455PI (NOW SHOP PRACTKE)	RLY 1-25-80	<i>[Signature]</i>

**NOTES:**

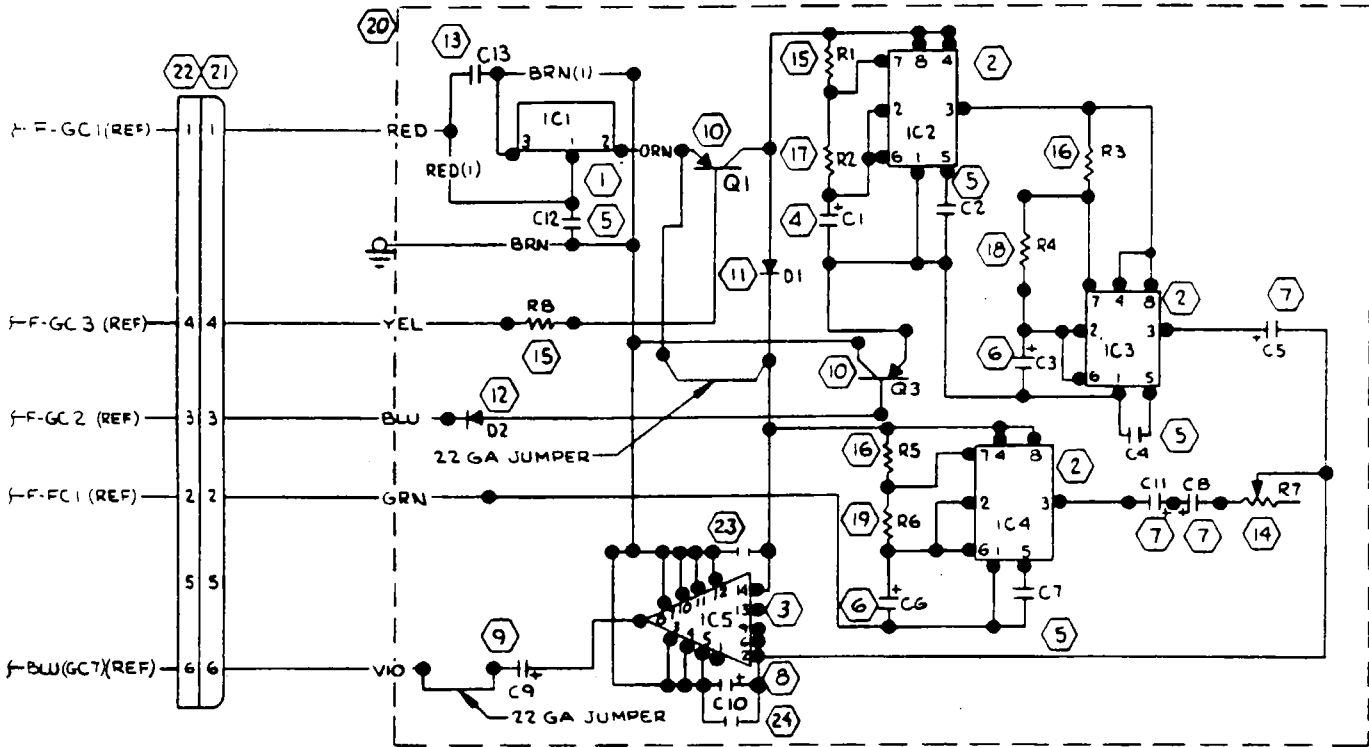
- 1. M340-12 VENDOR CODE 27014 MAY BE SUBSTITUTED FOR PN MC7B12-CP
- 2. 5G555CN VENDOR CODE 34333, LM555CN VENDOR CODE 27014, OR 5NT255SP VENDOR CODE 01295 MAY BE SUBSTITUTED FOR PN MC1455-PI

24	C315C103MSUICA	CAPACITOR
23	C321C104MSUICA	CAPACITOR
22	S-1641-6	HOUSING-SOCKET
21	S-1640-6	HOUSING-PIN
20	1270730	PC BOARD

19	52000A122J	RESISTOR							
18	52000A242J	RESISTOR							
17	52000A393J	RESISTOR							
16	52000A471J	RESISTOR	ORN	22	BELDEN 856B	SOLDER	SOLDER		
15	52000A102J	RESISTOR	RED(1)				SOLDER		
14	2322-410-03308	POT	BRN(1)				SOLDER		
13	ET470X063A6	CAPACITOR	VIO				S-1635-1		
12	1N2070	DIODE	RED				S-1635-1		
11	1N4001	DIODE	BRN				S-1361-2-4		
10	2N4918	TRANSISTOR	YEL				S-1635-1		
9	GE62F405	CAPACITOR	BLU				S-1635-1		
8	T310B225K035A5	CAPACITOR	GRN	22	BELDEN 856B	SOLDER	S-1635-1		
7	T330B104K035A5	CAPACITOR	WIRE						
6	T330B56AK035A5	CAPACITOR	CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS

EQUIPMENT TABLE		WIRE TABLE				
PART NO	DESCRIPTION	CONTRACT NO.				
<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>2</p> <p>1</p> </div> <div style="width: 55%;"> <p>DESIGN</p> <p>GROUP <i>W.D. Ho. div 10-3-77</i></p> <p>DRAWN BLISS 9-16-77</p> <p>CHECK BORLESKE 9-19-77</p> <p>STRESS</p> </div> </div>		<p>NAME</p> <p>DATE</p>		<p>COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS</p>		
		<p>TITLE</p> <h2 style="text-align: center;">WIRING DIAGRAM — SCHEMATIC DUAL WARNING UNIT</h2>				
		<p>CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO. S-XXX OR CNXXXX-CESSNA STD NO.</p>		<p>PROJ JUMMOPE 10-3-77</p> <p>APPD <i>[Signature]</i></p> <p>OTHER</p>		
		<p>SUPERSEDES PAGE 15.2</p> <p>SUPERSEDED BY:</p>		<p>SIZE</p> <p style="font-size: 2em; font-weight: bold;">C</p>	<p>CODE IDENT NO</p> <p style="font-size: 2em; font-weight: bold;">71379</p>	<p>DWG NO</p> <p style="font-size: 2em; font-weight: bold;">2270001</p>
				<p>SCALE: NONE</p>		<p>PAGE: 15.3</p> <p style="text-align: right;">(SR8970)</p>

# MODEL R182 AND TR182 SERVICE MANUAL



CONTRACT NO:			COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS		
DESIGN	NAME	DATE			
GROUP	<i>W.D. H. d.w.</i>	<i>10-3-77</i>	WIRING DIAGRAM —		
DRAWN	BLISS	9-16-77	SCHEMATIC DUAL WARNING		
CHECK	BORLESKE	9-13-77	UNIT		
STRESS					
PROJ	<i>J.W. MOORE</i>	<i>10-3-77</i>	SIZE	CODE IDENT NO	DWG NO
APPD	<i>JRS</i>		C	71379	2270001
OTHER			SCALE: NONE	R182	PAGE: 15.3
(SR8970)					

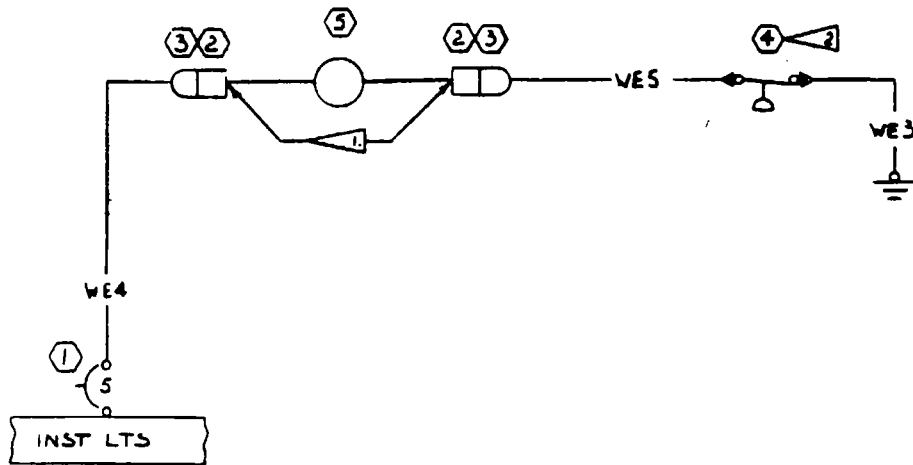
Schematic Dual Warning Unit (Sheet 2 of 2)

# MODEL R182 AND TR182 SERVICE MANUAL

**NOTES:**

- 1. TERMINATE VENDOR FURNISHED WIRES WITH S-1636-1 PIN.
- 2. VACUUM SWITCH CONTACTS ARE NORMALLY CLOSED; CONTACTS OPEN AT 3.5±1 INCHES OF MERCURY VACUUM.

REVISION			
LET	DESCRIPTION	DATE	APPD



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS
WE 5	22			S-1635-1 S-1493-1	
WE 4	22			S-1567-1-6 S-1635-1	
WE 3	22			S-1493-1 S-1567-1-8	

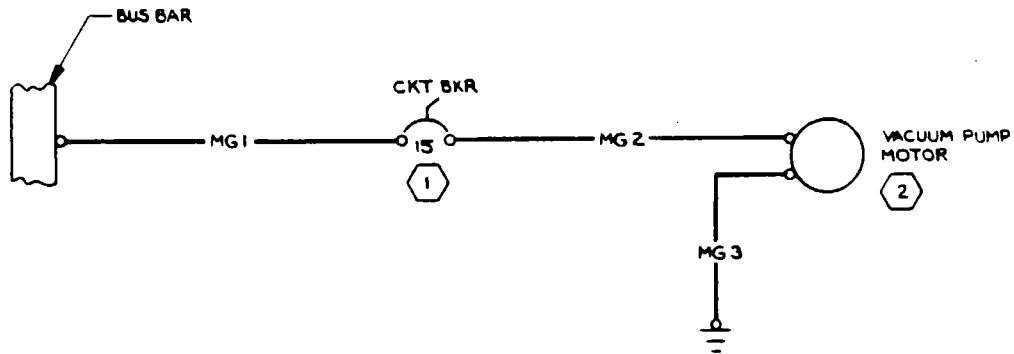
ITEM NO	PART NO	DESCRIPTION
5	S-2135-2	LAMP
4	S-2571-2	VACUUM SWITCH
3	S-1637-1	HOUSING
2	S-1637-2	HOUSING
	S-1360-5L	CIRCUIT BREAKER

CES-1000 IS APPLICABLE.  
 VENDOR CODES PER S-1400  
 CES-XXXX-CESBNA SPEC NO.  
 S-XXXX OR CMXXXX-CESBNA  
 STD. NO.

SUPERSEDES  
 SUPERSEDED BY:

CONTRACT NO:			WIRE TABLE		
DESIGN	R KLEIN	11-20-81	Cessna AIRCRAFT CO. PAWNEE DIVISION 1800 E. PAWNEE WICHITA KANSAS		
GROUP	W DALE	1-15-82	TITLE WIRING DIAGRAM - VACUUM OUT WARNING SYSTEM - R182, TR182		
DRAWN	R KLEIN	11-20-81	SIZE	CODE IDENT NO	DWG NO
CHECK	ROLESKE	1-13-82	C	71379	2270001
STRESS	BHOIL	1-8-82	SCALE	NONE	(S-10099)
PROJ	11-20-81				PAGE 15 5
APPD	CAF				
OTHER					

REVISION			
LET	DESCRIPTION	DATE	APPD



15-00816

WIRE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
MG3	16	3-2589		5-1367-2-8 5-1367-2-6	
MG2	16	5-2589		5-1367-2-8 5-1367-2-8	
MG1	16	5-2589		5-1367-2-8 5-1367-2-8	

**WIRE TABLE**

PART NO.	DESCRIPTION
2	CK3008-0101 VACUUM PUMP
1	CM3589-15 CKT BKR

**EQUIPMENT TABLE**

CS-1000 IS APPLICABLE  
 VENDOR CODES PER S-1400  
 CS-1000-CESNA SPEC. NO.  
 S-1001 OR CS1000-CESNA  
 STD. NO.

SUPERSEDED BY:  
 SUPERSEDED BY:

CONTRACT NO:		
DESIGN	NAME	DATE
GROUP		
DRAWN		
CHECK		
STRUCK		
PROJ		
APPD		
OTHER		

PASSENGER DIVISION  
 5000 E. PAWNEE  
 WICHITA, KANSAS

**Cessna AIRCRAFT CO.**

**WIRING DIAGRAM —  
 STANDBY VACUUM PUMP  
 MODEL R182**

SIZE	CODE IDENT NO.	DWG NO
C	71379	2270001

(SR 10415) Page: 16.1