Cessna
A Textron Company

Service Manual

1977 Thru 1981

MODEL R172 SERIES

Member of GAMA

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

REVISION 1 TO THE BASIC MANUAL INCORPORATES TEMPORARY REVISION I, DATED 3 OCTOBER, 1994.

D2027-1-13
(RGI-50-8/00)

21 APRIL 1980

REVISION 1

2 OCTOBER 1995

Cessna
A Textron Company

TEMPORARY REVISION NUMBER 5

DATE 5 April 2004

MANUAL TITLE	Model R172 Series 1977 Thru 1981 Service Manual
MANUAL NUMBER - PAPER COPY	D2027-1-13
MANUAL NUMBER - AEROFICHE	D2027-1-13AF
TEMPORARY REVISION NUMBER	D2027-1TR5

MANUAL DATE 21 April 1980 **REVISION NUMBER** 1 **DATE** 2 October 1995

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	24	1/B17			
2	27	1/B20			

REASON FOR TEMPORARY REVISION

1. To add the cleaning interval of the engine fuel injection nozzles.

FILING INSTRUCTIONS FOR THIS TEMPORARY REVISION

1. For Paper Publications, file this cover sheet behind the publication's title page to identify the inclusion of the Temporary Revision into the manual. Insert the new pages into the publication at the appropriate locations and remove and discard the superseded pages.

2. For Aerofiche Publications, draw a line with permanent red ink marker, through any aerofiche frame (page) affected by the Temporary Revision. This will be a visual identifier that the information on the frame (page) is no longer valid and the Temporary Revision should be referenced. For "added" pages in a Temporary Revision, draw a vertical line between the applicable frames. Line should be wide enough to show on the edges of the pages. Temporary Revisions should be collected and maintained in a notebook or binder near the aerofiche library for quick reference.

TEMPORARY REVISION NUMBER 4

DATE 7 October 2002

MANUAL TITLE Model R172 Series 1977 Thru 1981 Service Manual

MANUAL NUMBER - PAPER COPY D2027-1-13

MANUAL NUMBER - AEROFICHE D2027-1-13AF

TEMPORARY REVISION NUMBER D2027-1TR4

MANUAL DATE 21 April 1980 **REVISION NUMBER** 1 **DATE** 2 October 1995

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	24	1/B17			
2	24A/Deleted	NA			
2	27	1/B20			
2	28	Added			
2	29	Added			
2	30	Added			
15	24A	2/B02			
15	24B	2/B03			
15	24C	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

1. For Paper Publications, file this cover sheet behind the publication's title page to identify the inclusion of the Temporary Revision into the manual. Insert the new pages into the publication at the appropriate locations and remove and discard the superseded pages.

2. For Aerofiche Publications, draw a line with permanent red ink marker, through any aerofiche frame (page) affected by the Temporary Revision. This will be a visual identifier that the information on the frame (page) is no longer valid and the Temporary Revision should be referenced. For "added" pages in a Temporary Revision, draw a vertical line between the applicable frames. Line should be wide enough to show on the edges of the pages. Temporary Revisions should be collected and maintained in a notebook or binder near the aerofiche library for quick reference.

TEMPORARY REVISION NUMBER 3

DATED 7 January 2000

MANUAL TITLE MODEL R172 SERIES 1977 THRU 1981 SERVICE MANUAL

MANUAL NUMBER - PAPER COPY D2027-1-13 **AEROFICHE** D2027-1-13AF

TEMPORARY REVISION NUMBER PAPER COPY D2027-1TR3 **AEROFICHE** N/A

MANUAL DATE 21 APRIL 1980 **REVISION NUMBER** 1 **DATE** 2 OCTOBER 1995

This Temporary Revision consists of the following pages, which affect existing pages in the paper copy manual and supersede aerofiche information.

SECTION	PAGE	AEROFICHE FICHE/FRAME	SECTION	PAGE	AEROFICHE FICHE/FRAME
2	24A	Added			
2	28A	Added			
17	4A	Added			
17	4B	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

For Paper Publications:

File this cover sheet behind the publication's title page to identify the inclusion of the Temporary Revision into the manual. Insert the new pages into the publication at the appropriate locations. Draw a line, with a permanent red ink marker, through any superceded information.

For Aerofiche Publications:

Draw a line through any aerofiche frame (page) affected by the Temporary Revision with a permanent red ink marker. This will be a visual identifier that the information on the frame (page) is no longer valid and the Temporary Revision should be referenced. For "added" pages in a Temporary Revision, draw a vertical line between the applicable frames which is wide enough to show on the edges of the pages. Temporary Revisions should be collected and maintained in a notebook or binder near the aerofiche library for quick reference.

TEMPORARY REVISION NUMBER 2

DATED April 3, 1998

MANUAL TITLE Model R172 Series Service Manual (1977 Thru 1981)

MANUAL NUMBER - PAPER COPY D2027-1-13 **AEROFICHE** D2027-1-13AF

TEMPORARY REVISION NUMBER - PAPER COPY D2027-1TR2-13 **AEROFICHE** N/A

MANUAL DATE 21 April 1980 **REVISION NUMBER** 1 **DATE** 2 October 1995

This Temporary Revision consists of the following pages, which affect and replace existing pages in the paper copy manual and supersede aerofiche information.

CHAPTER/ SECTION/ SUBJECT	PAGE	AEROFICHE FICHE/FRAME	CHAPTER/ SECTION/ SUBJECT	PAGE	AEROFICHE FICHE/FRAME
1	1	1A08	1	17	Added
1	2	1A09	1	18	Added
1	3	1A10	1	19	Added
1	4	1A11	1	20	Added
1	5	1A12	1	21	Added
1	6	Added	1	22	Added
1	7	Added	1	23	Added
1	8	Added	13	1	1K18
1	9	Added	13	2	1K19
1	10	Added	13	3	1K20
1	11	Added	13	4	1K21
1	12	Added	13	5	1K22
1	13	Added	13	6	1K23
1	14	Added	13	7	1K24
1	15	Added	13	8	Added
1	16	Added			

REASON FOR TEMPORARY REVISION

1. To add wet torque values for McCauley propeller hub bolts and add standard torque value tables.

FILING INSTRUCTIONS FOR THIS TEMPORARY REVISION

For Paper Publications:
File this cover sheet behind the publication's title page to identify inclusion of the temporary revision in the manual. Insert the new pages in the publication at the appropriate locations and remove and discard the superseded pages.

For Aerofiche Publications:
Draw a line, with a permanent red ink marker, through any aerofiche frame (page) affected by the temporary revision. This will be a visual identifier that the information on the frame (page) is no longer valid and the temporary revision should be referenced. For "added" pages in a temporary revision, draw a vertical line between the applicable frames. Line should be wide enough to show on the edges of the pages. Temporary revisions should be collected and maintained in a notebook or binder near the aerofiche library for quick reference.

LIST OF EFFECTIVE PAGES

INSERT LATEST REVISED PAGES. DESTROY SUPERSEDED PAGES.

NOTE

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

Original	0	21 April 1980
Revision	1	2 October 1995

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 444.

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

Page No.	Revision No.
*Title	1
*A	1
*i thru iv	1
*1-1	1
1-2 thru 1-5	0
1-6 Blank	0
*2-1	1
2-2 thru 2-9	0
*2-10 thru 2-12	1
*2-12A	1
*2-12B Blank	1
2-13 thru 2-23	0
*2-24	1
2-25 thru 2-26	0
*2-27	1
2-28 Blank	0
3-1 thru 3-8	0
*3-9	1
3-10 thru 3-22	0
*3-23 thru 3-24	1
4-1 thru 4-8	0
*5-1	1
5-2 thru 5-5	0
*5-6	1
5-7 thru 5-18	0
*5-19	1
5-20 thru 5-30	0
*5-31	1
5-32	0
*5-33	1
*5-34 Blank	1
6-1 thru 6-7	0
6-8 Blank	0
7-1 thru 7-5	0
*7-6	1
7-7 thru 7-10	0
8-1 thru 8-3	0
*8-4	1
8-5 thru 8-6	0
9-1 thru 9-7	1
9-8 Blank	0
10-1 thru 10-8	0
11-1 thru 11-32	0
*11-33	1
11-34 thru 11-38	0
12-1 thru 12-5	0
*12-6 thru 12-7	1
12-8 thru 12-16	0
*12-17 thru 12-18	1
12-19 thru 12-23	0
12-24 Blank	0
13-1 thru 13-7	0
13-8 Blank	0
14-1 thru 14-5	0
14-6 Blank	0
*15-1	1
15-2 thru 15-9	0
*15-10	1
15-11 thru 15-14	0
*15-14A thru 15-14B	1
*15-15	1
15-16 thru 15-17	0
*15-18 thru 15-19	1
15-20 thru 15-22	0
*15-22A thru 15-22B	1
*15-23	1
15-24 thru 15-26	0
16-1 thru 16-54	0
17-1 thru 17-33	0
17-34 Blank	0
18-1 thru 18-5	0
18-6 Blank	0
19-1 thru 19-95	0
19-96 Blank	0

TABLE OF CONTENTS

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.

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

All aircraft, regardless of manufacturer, are certificated under model number designations. However, popular names are often used for marketing purposes. To provide a consistent method of referring to the various aircraft, model numbers will be used in this publication unless names are required 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 YEAR	MODEL	SERIALS BEGINNING	SERIALS ENDING
HAWK XP HAWK XP II	1977 1978	R172K R172K	R1722000 R1722725	R1722724 R1722929
REIMS/CESSNA HAWK XP REIMS/CESSNA HAWK XP II	1977 1978	FR172K FR172K	FR1720591 FR1720621	FR1720620 FR1720630
HAWK XP HAWK XP II	1979 1980	R172K R172K	R1720680, R1722930 R1723200	R1723199 R1723399 (except R1723398)
REIMS/CESSNA HAWK XP REIMS/CESSNA HAWK XP II	1979 1980	FR172K FR172K	FR1720631 FR1720656	FR1720655 FR1720665
HAWK XP HAWK XP II	1981	R172K	R1723400	R1723454
REIMS/ CESSNA HAWK XP REIMS/CESSNA HAWK XP II	1981	FR172K	FR1720666	FR1720675

INTRODUCTION

This manual contains factory-recommended procedures and instructions for ground handling, servicing, and maintaining Cessna R172 Series airplanes. Besides serving as a reference for the experienced mechanic, this manual also covers step-by-step procedures for the less experienced. If properly used, it will better enable the mechanic to maintain Cessna R172 Series airplanes and thereby establish a reputation for reliable service.

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.

WARNING: ALL INSPECTION INTERVALS, REPLACEMENT TIME LIMITS, OVERHAUL TIME LIMITS, THE METHOD OF INSPECTION, LIFE LIMITS, CYCLE LIMITS, ETC., RECOMMENDED BY CESSNA ARE SOLELY BASED ON THE USE OF NEW, REMANUFACTURED, OR OVERHAULED CESSNA APPROVED PARTS. IF PARTS ARE DESIGNED, MANUFACTURED, REMANUFACTURED, OVERHAULED, PURCHASED, AND/OR APPROVED BY ENTITIES OTHER THAN CESSNA, THEN THE DATA IN CESSNA'S MAINTENANCE/SERVICE MANUALS AND PARTS CATALOGS ARE NO LONGER APPLICABLE AND THE PURCHASER IS WARNED NOT TO RELY ON SUCH DATA FOR NON-CESSNA PARTS. ALL INSPECTION INTERVALS, REPLACEMENT TIME LIMITS, OVERHAUL TIME LIMITS, THE METHOD OF INSPECTION, LIFE LIMITS, CYCLE LIMITS, ETC., FOR SUCH NON-CESSNA PARTS MUST BE OBTAINED FROM THE MANUFACTURER AND/OR SELLER OF SUCH NON-CESSNA PARTS.

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 Service Station Organization.

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 CARE SUPPLIES AND PUBLICATIONS CATALOG

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.

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.

SECTION 1

GENERAL DESCRIPTION

TABLE OF CONTENTS

1-1. GENERAL DESCRIPTION.

1-2. MODEL R172 AND FR172 SERIES

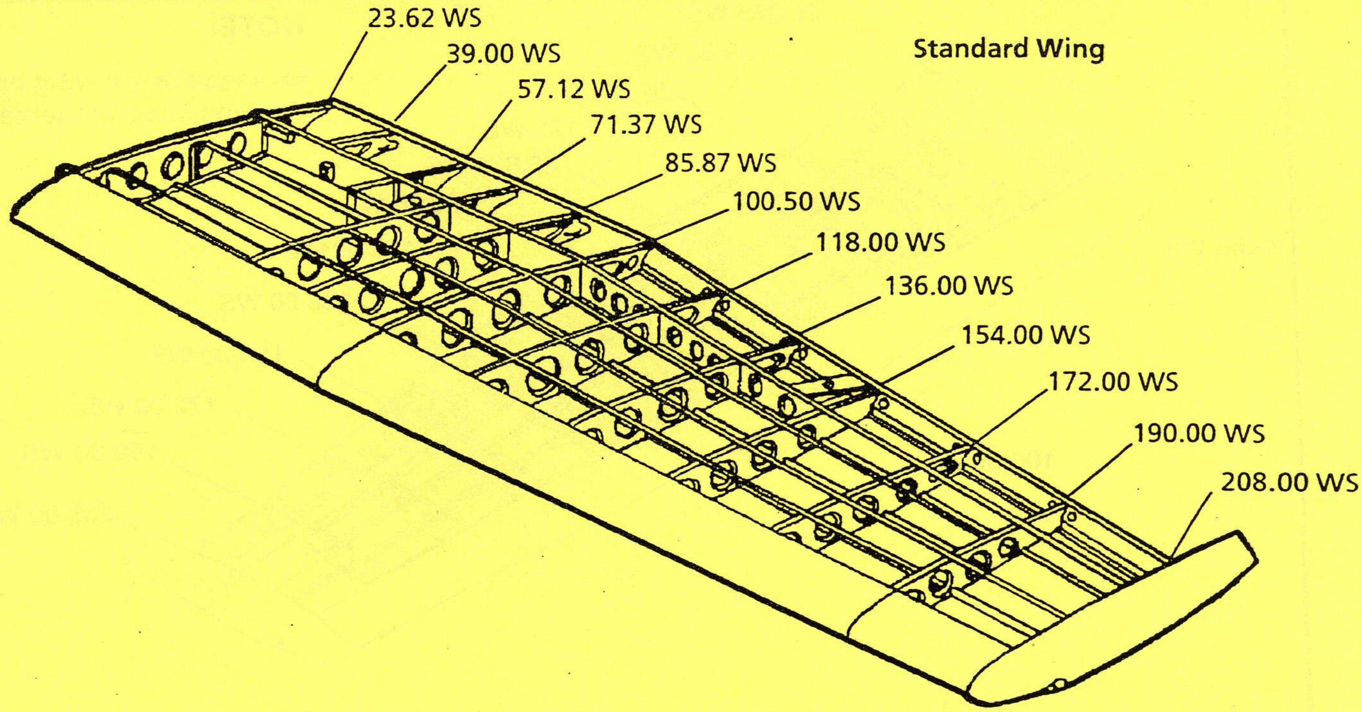
1-3. DESCRIPTION. Cessna Model R172 and FR172 Series aircraft, described in this manual, are high wing monoplanes of all metal, semimonocoque construction. These aircraft are equipped with a fixed tricycle landing gear with tubular spring-steel main gear struts. The steerable nose gear is equipped with an air-hydraulic fluid shock strut. Standard seating accommodations consist of individual reclining back pilot and copilot seats, and dual reclining back, bench type center seats. A fold-up auxiliary rear seat may be installed as optional equipment. A baggage area is provided aft of the center seats when the auxiliary seat is folded up. These aircraft are powered by a Continental six-cylinder, horizontally opposed, air cooled fuel injected engine, driving an all-metal, constant speed propeller. All aircraft feature rear side windows, a "wrap-around" rear window and a swept-back fin and rudder.

1-4. AIRCRAFT SPECIFICATIONS. Leading particulars of these airplanes, with dimensions based on gross weight, are given in Figure 1-1. If these dimensions are used for constructing a hanger or computing clearances, remember that such factors as nose gear strut inflation , tire pressures, tire sizes, and load distribution may result in some dimensions that are considerably different from those listed.

1-5. STATIONS. A station diagram is shown in figure 1-2 to assist in locating equipment when a written description is inadequate or impractical.

	R172	FR172
GROSS WEIGHT		
Normal Category	2550 Pounds	2550 Pounds
Utility Category	2200 Pounds	2200 Pounds
FUEL CAPACITY		
Total (Standard)	52 Gallons	52 Gallons
Usable (Standard)	49 Gallons	49 Gallons
Total (Extended Range)	68 Gallons	68 Gallons
Usable (Extended Range)	66 Gallons	66 Gallons
OIL CAPACITY		
(Without External Filter)	8 Quarts.	8 Quarts
(With External Filter)	9 Quarts	9 Quarts
ENGINE MODEL	CONTINENTAL IO-360	CONTINENTAL IO-360 SERIES
PROPELLER(Constant Speed)	76 Inch McCauley	76 Inch McCauley
MAIN WHEEL TIRE (Standard)	6.00 X 6, 6-Ply Rating	6.00 X 6, 6-Ply Rating
Pressure	38 PSI	38 PSI
NOSE WHEEL TIRE (Standard)	5.00 X 5, 6-Ply Rating	5.00 X 5, 6-Ply Rating
Pressure	45 PSI	45 PSI
NOSE GEAR STRUT PRESSURE		
(Strut Extended)	45 PSI	45 PSI
WHEEL ALIGNMENT (Aircraft Empty)		
Camber	3° ±1°	3° ±1°
Toe-In	0.0 to .18.0 Inch	0.0 to .18.0 Inch
AILERON TRAVEL		
Up	20° ±1°	20° ±1°
Down	15° ±1°	15° ±1°
WING FLAP TRAVEL	THRU R17203399 0° to 40° +0° -2° BEGINNING WITH R17203400 0° to 30° +0° -2°	THRU FR1720665 0° to 40° +0° -2° BEGINNING WITH FR1720666 0° to 30° +0° -2°
RUDDER TRAVEL (Parallel to Waterline)		
Right	16°10' ±1°	16°10' ±1°
Left	16°10' ±1°	16°10' ±1°
RUDDER TRAVEL (Perpendicular to Hinge Line)		
Right	17°44' ±1°	17°44' ±1°
Left	17°44' ±1°	17°44' ±1°
ELEVATOR TRAVEL		
Up	28°, +1° -0°	28°, +1° -0°
Down	23°, +1° -0°	23°, +1° -0°
ELEVATOR TRIM TAB TRAVEL		
Up (Thru 1980 Model Year)	28°, +1° -0°	28°, +1° -0°
Down (Thru 1980 Model Year)	13°, +1° -0°	13°, +1° -0°
Up (Beginning 1981 Model Year)	22°, +1° -0°	22°, +1° -0°
Down (Beginning 1981 Model Year)	19°, +1° -0°	19°, +1° -0°
PRINCIPAL DIMENSIONS		
Wing Span (With Strobe Lights)	429.84 Inches	429.84 Inches
Track Width (Tubular Spring)	97.6 Inches	97.6 Inches
Tail Span	135.14 Inches	135.14 Inches
Length	327.14 Inches	327.14 Inches
Fin Height (Maximum With Nose Gear Depressed and Flashing Beacon Installed on Fin)	105.48 Inches	105.48 Inches
BATTERY LOCATION	Aft of Baggage Area	Aft of Baggage Area

Figure 1-1. Aircraft Specifications



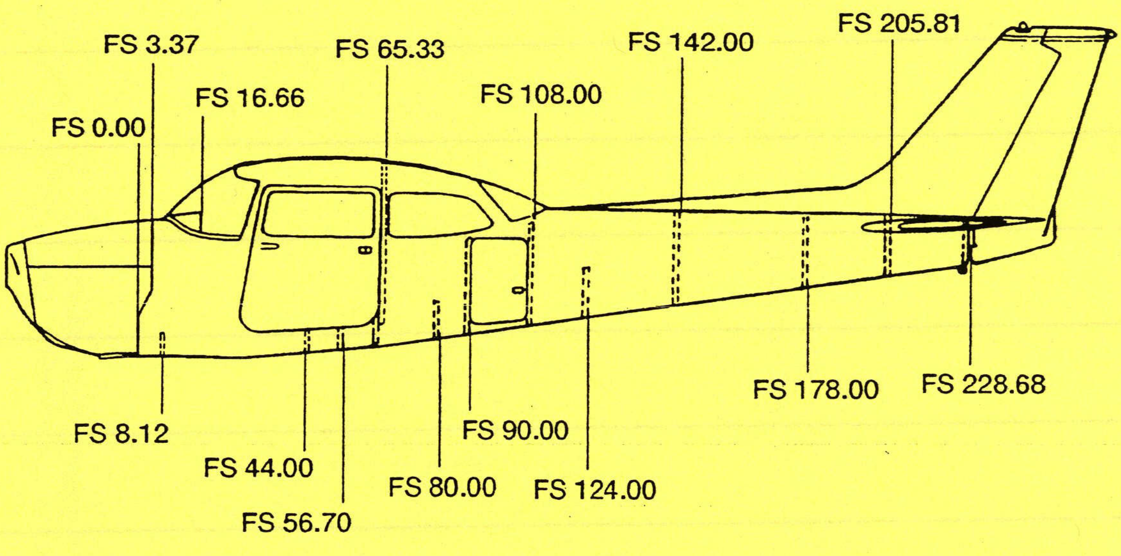
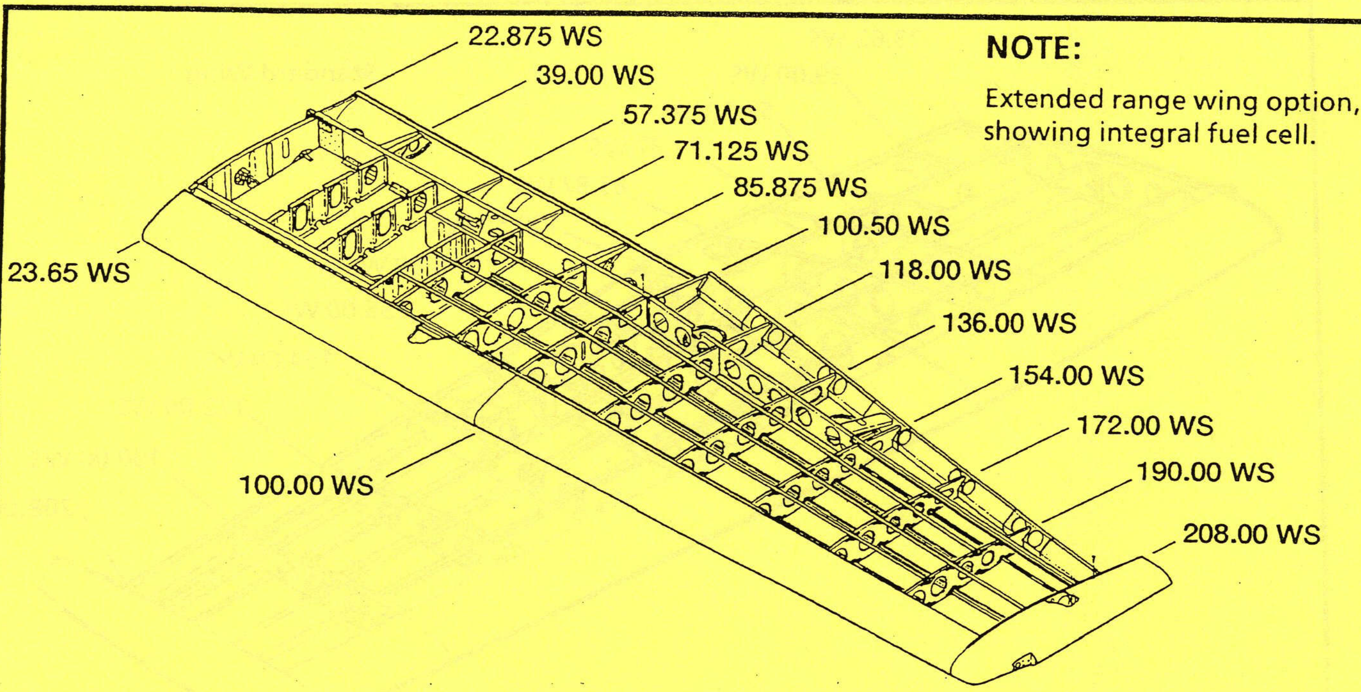


Figure 1-2. Reference Stations (Sheet 1 of 2)



NOTE:

Extended range wing option, showing integral fuel cell.

Figure 1-2. Reference Stations (Sheet 2 of 2)

SHOP NOTES:

1-6. MATERIAL AND TOOL CAUTIONS - GENERAL

A. Mercury

CAUTION

THERMOMETERS AND OTHER TEST EQUIPMENT CONTAINING MERCURY, MUST NOT BE USED ON THE AIRPLANE.

Mercury, by the amalgamation process, can penetrate any break in the finish, paint or sealing coating of a metal structural element. An oxide coating on a dry metallic surface will tend to inhibit an immediate action while a bright, polished, shining or scratched surface will hasten the process. Moisture will also promote the amalgamation process. Soils, greases or other inert contaminants, present on the metal surfaces, will prevent the start of the action. The corrosion and embrittlement which results from an initial penetration, can be extremely rapid in structural members under load. Once it has begun, there is no known method of stopping it. Complete destruction of the load carrying capacity of the metal will result.

b. Maintenance Precautions

WARNING

DURING MAINTENANCE, REPAIR AND SERVICING OF THE AIRPLANE, MANY SUBSTANCES AND ENVIRONMENTS ENCOUNTERED MAY CAUSE INJURY IF PROPER PRECAUTIONS ARE NOT OBSERVED.

Carefully read and follow all instructions, and especially adhere to all cautions and warnings provided by the manufacturer of the product being used. Use appropriate safety equipment as required including goggles, face shields, breathing apparatus, protective clothing and gloves. Fuel, engine oil, solvents, volatile chemicals, adhesives, paints and strong cleaning agents may cause injury when contacting the skin or eyes, or when vapors are breathed. When sanding composites or metals or otherwise working in an area where dust particles may be produced, the area should be ventilated and the appropriate respirator must be used.

c. General Usage Solvents

General usage solvents include the following:

- Methyl Propyl Ketone
- Toluene
- Isopropyl Alcohol
- Acetone
- Methylene Chloride
- 1,1,1-Trichloroethane
- Naptha
- Trichloroethylene

These chemicals/solvents are generally colorless, evaporate quicker than water, and tend to give off vapors in higher quantities as their temperature increases. The vapors are generally heavier than air, which causes them to collect in low lying areas or push normal oxygen and air out of a confined area. This situation can lead to oxygen deficient atmospheres. Many general usage solvents are also flammable.

Solvents are hazardous to work with because of their flammability, rate of evaporation and reaction to oxidizers. Solvents can also be an irritant to the skin and eyes.

A single spark, a smoldering cigarette, or even atmospheric conditions can ignite solvent vapors. The lower the flash point of the chemical, the more likely it is to become flammable. Generally, flash points of less than 100°F (37.8°C) are considered flammables. Examples of solvent flash points are shown below:

SOLVENT	FLASH-POINT
Methyl Propyl Ketone	45°F (7.2° C)
Isopropyl Alcohol	53.6°F (12° C)
Touluene	39°F (3.9° C)
Acetone	1.4° (-17°C)

The rate of evaporation is closely tied to flammability, because normally the vapors must be present to ignite the liquid. Vaporization also allows solvents, even those that are not flammable, to get into the air and into the body's blood stream through the lungs.

Solvents can also react explosively with oxidizers (chemicals which release oxygen). A very violent and uncontrollable reaction takes place which generates heat rapidly. For this reason, it is very important for each person to be aware of specific chemicals in use in the work area, and to adhere to the labeling of containers. Chemical manufacturers are required to label each container with a diamond shaped symbol: red for flammable and yellow for oxidizers.

Solvents can also damage the hands and skin. Solvents dry out skin and dissolve the natural oils. The condition can develop into an irritation, or if left untreated with continuous exposure, it may progress to a dermatitis. Damaged skin allows other contaminants to worsen the condition, because the contaminants have easier access to the deeper levels of the skin. In serious cases, blood poisoning is also possible.

The best defense against skin irritation is not to be exposed. If exposure is unavoidable, steps should be taken to limit exposure times. Prolonged exposure to these irritants can lead to long term liver damage.

1-7. TORQUE DATA - MAINTENANCE PRACTICES

To ensure security of installation and prevent over stressing of components during installation, the torque values outlined in this section and other applicable chapters of this manual should be used during installation and repair of components.

The torque value tables, listed in this section, are standard torque values for the nut and bolt combinations shown. If a component requires special torque values, those values will be listed in the applicable maintenance practices section.

Torque is typically applied and measured using a torque wrench. Different adapters, used in conjunction with the torque wrench, may produce an actual torque to the nut or bolt which is different from the torque reading. Figure 1-3 is provided to help calculate actual torque in relation to specific adaptors used with the torque wrench.

Free Running Torque Value

Free running torque (friction torque) value is the torque value required to rotate a nut on a threaded shaft, without tightening. Free running torque value does not represent the torque values listed in the tables of this section. Torque values listed in the tables represent the torque values above free running torque.

EXAMPLE

If final torque required is to be 150 inch-pounds and the free running torque is 25 inch-pounds, then the free running torque must be added to the required torque to achieve final torque of 150 + 25 = 175 inch-pounds.

Breakaway torque value is the value of torque required to start a nut rotating on a threaded shaft, and does not represent free running torque value. It should be noted that on some installations the breakaway torque value cannot be measured.

General Torquing Notes:

CAUTION

DO NOT REUSE SELF-LOCKING NUTS.

a. These requirements do not apply to threaded parts used for adjustment, such as turnbuckles and rod ends.

b. Torque values shown are for clean, nonlubricated parts. Threads should be free of dust, metal filings, etc. Lubricants, other than that on the nut as purchased, should not be used on any bolt installation unless specified.

c. Assembly of threaded fasteners, such as bolts, screws and nuts, should conform to torque values shown in Table 1-1.

d. When necessary to tighten from the bolt head, increase maximum torque value by an amount equal to shank friction. Measure shank friction with a torque wrench.

e. Sheet metal screws should be tightened firmly, but not to a specific torque value.

f. Countersunk washers used with close tolerance bolts must be installed correctly to ensure proper torquing (refer to Figure 1-4).

g. There is no satisfactory method of determining the torque previously applied to a threaded fastener. When retorquing, always back off approximately 1/4 turn or more before reapplying torque.

h. Tighten accessible nuts to torque values per Table 1-1. Screws attached to nutplates, or screws with threads not listed in Table 201 should be tightened firmly, but not to a specific torque value. Screws used with dimpled washers should not be drawn tight enough to eliminate the washer crown.

i. Table 1-1 is not applicable to bolts, nuts and screws used in control systems or installations where the required torque would cause binding or would interfere with proper operation of parts. On these installations, the assembly should be firm but not binding.

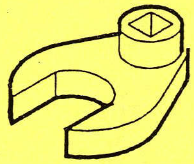
j. Castellated Nuts.

Self-locking and non self-locking castellated nuts, except MS17826, require cotter pins and should be tightened to the minimum torque value shown in Table 1-1. The torque may be increased to install the cotter pin, but this increase must not exceed the alternate torque values.

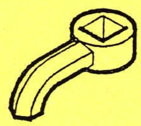
MS17826 self-locking, castellated nuts shall be torqued per Table 1-1.

The end of the bolt or screw should extend through the nut at least two full threads including the chamfer.

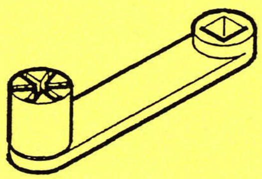
NOTE: WHEN USING A TORQUE WRENCH ADAPTER WHICH CHANGES THE DISTANCE FROM THE TORQUE WRENCH DRIVE TO THE ADAPTER DRIVE, APPLY THE FOLLOWING FORMULAS TO OBTAIN THE CORRECTED TORQUE READING.



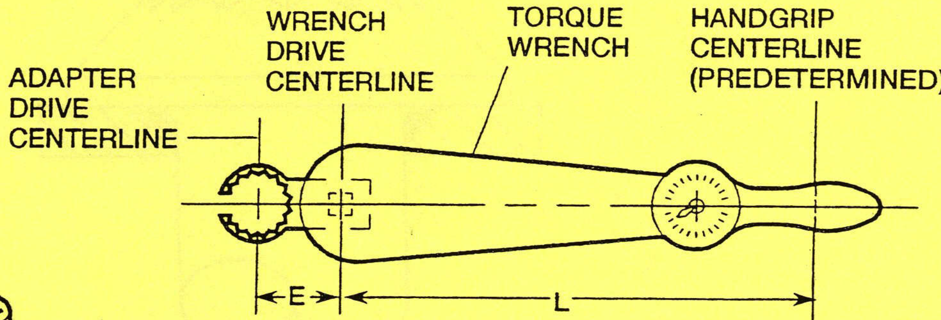
SHORT OPEN END ADAPTER



SETSCREW ADAPTER



HOSE CLAMP ADAPTER



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

EXAMPLE (WITH "E" AS PLUS DIMENSION)

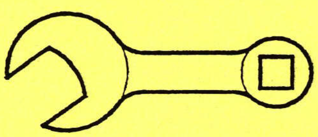
T = 135 IN-LB
Y = UNKNOWN
E = 1.5 IN
L = 10.0 IN

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

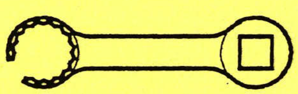
Y = 117 IN-LB

LEGEND

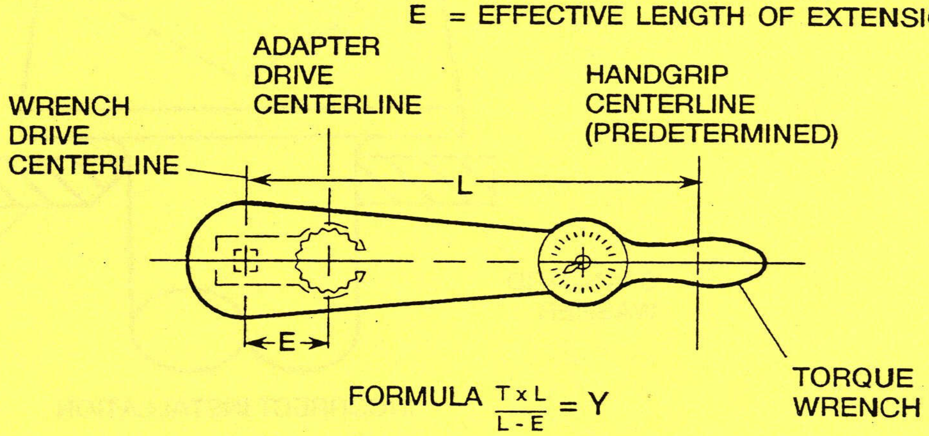
T = ACTUAL (DESIRED) TORQUE
Y = APPARENT (INDICATED) TORQUE
L = EFFECTIVE LENGTH LEVER
E = EFFECTIVE LENGTH OF EXTENSION



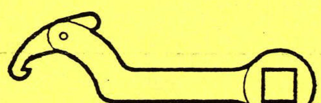
OPEN-END WRENCH ADAPTER



FLARE NUT WRENCH ADAPTER



FORMULA $\frac{T \times L}{L - E} = Y$



SPANNER WRENCH ADAPTER

EXAMPLE (WITH "E" AS MINUS DIMENSION)

T = 135 IN-LB
Y = UNKNOWN
L = 10.0 IN
E = 1.5 IN

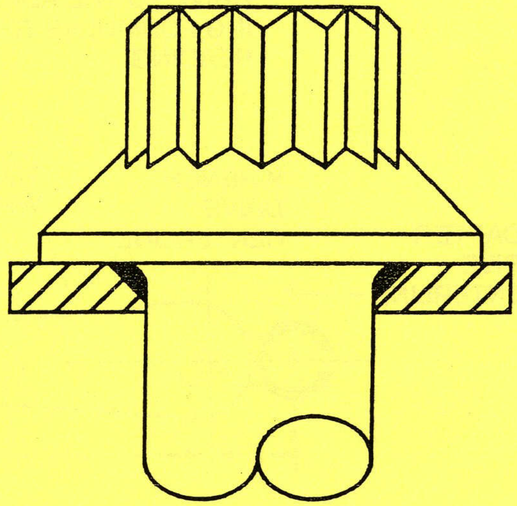
$Y = \frac{135 \times 10}{10 - 1.5} = \frac{1350}{8.5} = 158.82$

Y = 159 IN-LB

5598C2005

Torque Wrench and Adapter Formulas
Figure 1-3 Sheet 1

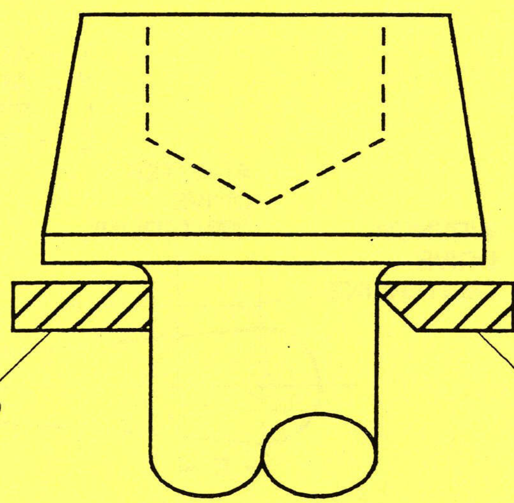
EXTERNAL WRENCHING HEAD



CORRECT INSTALLATION

INSTALL WASHER WITH COUNTERSUNK
FACE NEXT TO BOLT HEAD RADIUS

INTERNAL WRENCHING HEAD



INCORRECT INSTALLATION

CAUTION: NEVER INSTALL STANDARD WASHER OR COUNTERSUNK WASHER IN REVERSE WHEN USING BOLTS WITH RADIUS UNDER THE HEAD

5598C1004
5598C1004A

Washer Installation Close Tolerance Bolts
Figure 1-4 Sheet 1

Table 1-1: Torque Requirements For Steel Bolts, Screws and Nuts (Inch-Pounds)

FINE THREADED SERIES			COARSE THREADED SERIES		
Size	TENSION TYPE NUTS Standard Torque	SHEAR TYPE NUTS EXCEPT MS17826 Standard Torque	Size	TENSION TYPE NUTS Standard Torque	SHEAR TYPE NUTS Standard Torque
8-36	12 to 15	7 to 9	8-32	12 to 15	7 to 9
10-32	20 to 25	12 to 15	10-24	20 to 25	12 to 15
1/4-28	50 to 70	30 to 40	1/4-20	40 to 50	25 to 30
5/16-24	100 to 140	60 to 85	5/16-18	80 to 90	48 to 55
3/8-24	160 to 190	95 to 110	3/8-16	160 to 185	95 to 110
7/16-20	450 to 500	270 to 300	7/16-14	235 to 255	140 to 155
1/2-20	480 to 690	290 to 410	1/2-13	400 to 480	240 to 290
9/16-18	800 to 1000	480 to 600	9/16-12	500 to 700	300 to 420
5/8-18	1100 to 1300	660 to 780	5/8-11	700 to 900	420 to 540
3/4-16	2300 to 2500	1300 to 1500	3/4-10	1150 to 1600	700 to 950
7/8-14	2500 to 3000	1500 to 1800	7/8-9	2200 to 3000	1300 to 1800
1-14	3700 to 4500	2200 to 3300	1-8	3700 to 5000	2200 to 3000
1-1/8-12	5000 to 7000	3000 to 4200	1-1/8-8	5500 to 6500	3300 to 4000
1-1/4-12	9000 to 11000	5400 to 6600	1-1/4-8	6500 to 8000	4000 to 5000

Fine Thread Tension application nuts include: AN310, AN315, AN345, MS17825, MS20365, MS21044 through MS21048, MS21078, NAS679, NAS1291.

Fine Thread Shear application nuts include: AN316, AN320, MS21025, MS21042, MS21043, MS21083, MS21245, NAS1022, S1117.

Coarse Thread application nuts include: AN340, MS20341, MS20365, MS35649.

SELF-LOCKING CASTELLATED MS17826 NUT (Shear Nut)			ALTERNATE TORQUE LIMITS FOR CASTELLATED STEEL NUTS	
Size	Standard Torque	Alternate Torque	TENSION NUTS Alternate Torque	SHEAR NUTS Alternate Torque
8-36	--	--	--	--
10-32	12 to 15	12 to 20	20 to 28	12 to 19
1/4-28	30 to 40	30 to 45	50 to 75	30 to 48
5/16-24	60 to 80	60 to 90	100 to 150	60 to 100
3/8-24	95 to 110	95 to 125	160 to 260	95 to 170
7/16-20	180 to 210	180 to 225	450 to 560	270 to 390
1/2-20	240 to 280	240 to 300	480 to 730	290 to 500
9/16-18	320 to 370	320 to 400	800 to 1070	480 to 750
5/8-18	480 to 550	480 to 600	1100 to 1600	660 to 1060
3/4-16	880 to 1010	880 to 1100	2300 to 3350	1300 to 2200
7/8-14	1500 to 1750	1500 to 1900	2500 to 4650	1500 to 2900
1-14	2200 to 2700	2200 to 3000	3700 to 6650	2200 to 4400
1-1/8-12	3200 to 4200	3200 to 5000	5000 to 10000	3000 to 6300
1-1/4-12	5900 to 6400	5900 to 7000	9000 to 16700	5400 to 10000

Castellated steel tension application nuts include: AN310, MS17825.

Castellated steel shear application nuts include: AN320.

NOTE: Use alternate torque values only if alignment between the bolt and nut cotter pin slots can not be reached using the standard torque values.

The torque values contained in this table are recommended for all installation procedures contained in this manual, except were other values are stipulated. These torque values are not to used for checking the tightness of of installed parts during service.

Table 1-1: Torque Values Nuts, Bolts and Screws (Newton Meters)

FINE THREADED SERIES

Size	TENSION TYPE NUTS Standard Torque	SHEAR TYPE NUTS EXCEPT MS17826 Standard Torque
8-36	1.4 to 1.7	0.8 to 1.0
10-32	2.3 to 2.8	1.4 to 1.7
1/4-28	5.6 to 7.9	3.4 to 4.5
5/16-24	11.3 to 15.8	6.8 to 9.6
3/8-24	18.1 to 21.5	10.7 to 12.4
7/16-20	50.8 to 56-5	30.5 to 33.9
1/2-20	54.2 to 78.0	32.8 to 46.3
9/16-18	90.4 to 113.0	54.2 to 67.8
5/8-18	124.3 to 146.9	74.6 to 88.1
3/4-16	259.9 to 282.5	146.9 to 169.5
7/8-14	282.5 to 339.0	169.5 to 203.4
1-14	418.0 to 508.4	248.6 to 372.9
1-1/8-12	564.9 to 790.9	339.0 to 474.5
1-1/4-12	1016.9 to 1242.8	610.1 to 745.7

COARSE THREADED SERIES

Size	TENSION TYPE NUTS Standard Torque	SHEAR TYPE NUTS Standard Torque
8-32	1.4 to 1.7	0.8 to 1.0
10-24	2.3 to 2.8	1.4 to 1.7
1/4-20	4.5 to 5.6	2.8 to 3.4
5/16-18	9.0 to 10.1	5.4 to 6.2
3/8-16	18.1 to 20.9	10.7 to 12.4
7/16-14	26.6 to 28.8	15.8 to 17.5
1/2-13	45.2 to 54.2	27.1 to 32.8
9/16-12	56.5 to 54.2	33.9 to 47.4
5/8-11	79.1 to 101.7	47.5 to 61.0
3/4-10	129.9 to 180.8	79.1 to 107.3
7/8-9	248.7 to 338.9	146.9 to 203.3
1-8	418.0 to 564.9	248.6 to 338.9
1-1/8-8	621.4 to 734.4	372.9 to 451.9
1-1/4-8	734.4 to 903.9	451.9 to 564.9

Fine Thread Tension application nuts include: AN310, AN315, AN345, MS17825, MS20365, MS21044 through MS21048, MS21078, NAS679, NAS1291.

Fine Thread Shear application nuts include: AN316, AN320, MS21025, MS21042, MS21043, MS21083, MS21245, NAS1022, S1117.

Coarse Thread application nuts include: AN340, MS20341, MS20365, MS35649.

SELF-LOCKING CASTELLATED MS17826 NUT (Shear Nut)

Size	Standard Torque	Alternate Torque
8-36	--	--
10-32	1.4 to 1.7	1.4 to 2.3
1/4-28	3.4 to 4.5	3.4 to 5.1
5/16-24	6.8 to 9.0	6.8 to 10.1
3/8-24	10.7 to 12.4	10.7 to 14.1
7/16-20	20.3 to 23.7	20.3 to 25.4
1/2-20	2 7.1 to 31.6	27.1 to 33.9
9/16-18	36.2 to 41.8	36.2 to 45.2
5/8-18	4.2 to 62.1	54.2 to 67.8
3/4-16	99.4 to 114.1	99.4 to 124.3
7/8-14	169.5 to 197.7	169.5 to 214.7
1-14	248.6 to 305.1	248.6 to 339.0
1-1/8-12	361.6 to 474.5	361.6 to 564.9
1-1/4-12	666.6 to 723.1	666.6 to 790.9

ALTERNATE TORQUE LIMITS FOR CASTELLATED STEEL NUTS

Size	TENSION NUTS Alternate Torque	SHEAR NUTS Alternate Torque
8-36	---	--
10-32	2.3 to 3.2	1.4 to 2.1
1/4-28	5.6 to 8.5	3.4 to 5.4
5/16-24	11.3 to 16.9	6.8 to 11.3
3/8-24	18.1 to 29.4	10.7 to 19.2
7/16-20	50.8 to 63.3	30.5 to 44.1
1/2-20	54.2 to 82.5	32.8 to 56.5
9/16-18	90.4 to 120.9	54.2 to 84.7
5/8-18	124.3 to 180.8	74.6 to 119.8
3/4-16	259.9 to 378.5	146.9 to 248.6
7/8-14	282.5 to 525.4	169.5 to 327.7
1-14	418.0 to 751.3	248.6 to 497.1
1-1/8-12	564.9 to 1129.9	339.0 to 711.8
1-1/4-12	1016.9 to 1886.9	610.1 to 1129.9

Castellated steel tension application nuts include: AN310, MS17825.

Castellated steel shear application nuts include: AN320.

NOTE: Use alternate torque values only if alignment between the bolt and nut cotter pin slots can not be reached using the standard torque values.

The torque values contained in this table are recommended for all installation procedures contained in this manual, except were other values are stipulated. These torque values are not to used for checking the tightness of of installed parts during service.

Torque Requirements for Hi-Lok Fasteners

Use Table 1-2 to determine torque requirements for Hi-Lok fasteners.

NOTE: This table is used in conjunction with MS21042 self-locking nuts.

Table 1-2. Torque Values Hi-Lok Fasteners (Used with MS21042 Self-Locking Nuts)

NOMINAL FASTENER DIAMETER	ALLOY STEEL 180 - 200 KSI (INCH POUNDS)	ALLOY STEEL 180 - 200 KSI (NEWTON METERS)
6-32	8 to 10	0.9 to 1.1
8-32	12 to 15	1.4 to 1.7
10-32	20 to 25	2.3 to 2.8
1/4-28	50 to 70	5.6 to 7.9
5/16-24	100 to 140	11.3 to 15.8
3/8-24	160 to 190	18.1 to 21.5
7/16-20	450 to 500	50.8 to 56.5
1/2-20	480 to 690	54.2 to 78.0

Torque Requirements for Electrical Current Carrying And Airframe Ground Fasteners

Use Table 1-3 to determine torque requirements for threaded electrical current carrying fasteners.

Torque values shown are clean, nonlubricated parts. Threads shall be free of dust and metal filings. Lubricants, other than on the nut as purchased, shall not be used on any bolt installations unless specified in the applicable chapters of this manual.

All threaded electrical current carrying fasteners for relay terminals, shunt terminals, fuse limiter mount block terminals and bus bar attaching hardware shall be torqued per Table 1-3.

NOTE: There is no satisfactory method of determining the torque previously applied to a threaded fastener. When retorquing, always back off approximately 1/4 turn or more before reapplying torque.

Use Table 1-4 to determine torque requirements for threaded fasteners used as airframe electrical ground terminals.

Table 1-3. Torque Values Electrical Current Carrying Fasteners

FASTENER DIAMETER	TORQUE VALUE (INCH POUNDS)	TORQUE VALUE (NEWTON METERS)
6-32	8 to 12	0.9 to 1.4
8-32	13 to 17	1.5 to 1.9
10-32	20 to 30	2.3 to 3.4
3/16	20 to 30	2.3 to 3.4
1/4	40 to 60	4.5 to 6.8
5/16	80 to 100	9.0 to 11.3
3/8	105 to 125	11.9 to 14.1
1/2	130 to 150	14.7 to 16.9

Table 1-4. Torque Values Airframe Electrical Ground Terminals

FASTENER DIAMETER	TORQUE VALUE (INCH POUNDS)	TORQUE VALUE (NEWTON METERS)
5/16	130 to 150	14.7 to 16.9
3/8	160 to 190	18.1 to 21.5

Torque Requirements for Rigid Tubing and Hoses

Use Table 1-5 to determine torque requirements for tubes and hoses.

Table 1-5. Tubing/Hose Torque Limits (Inch-Pounds)

Hose Size	Tubing O.D.	Flared or Flareless Fitting with Aluminum or Annealed Stainless Steel Tubing, and Hose with Aluminum Inserts		Flared or Flareless Fitting with Steel Tubing, and Hose with Steel Inserts	
		Min	Max	Min	Max
-2	1/8	45	55	65	75
-3	3/16	75	85	95	105
-4	1/4	105	115	135	150
-5	5/16	135	145	180	200
-6	3/8	160	175	260	285
-8	1/2	265	290	475	525
-10	5/8	340	375	665	735
-12	3/4	425	470	855	945
-16	1	710	785	1140	1260

Table 1-5. Tubing/Hose Torque Limits (Newton Meters)

Hose Size	Tubing O.D.	Flared or Flareless Fitting with Aluminum or Annealed Stainless Steel Tubing, and Hose with Aluminum Inserts		Flared or Flareless Fitting with Steel Tubing, and Hose with Steel Inserts	
		Min	Max	Min	Max
-2	1/8	5.1	6.2	7.3	8.5
-3	3/16	8.5	9.6	10.7	11.9
-4	1/4	11.5	13.0	15.3	16.9
-5	5/16	15.3	16.4	20.3	22.6
-6	3/8	18.1	19.8	29.4	32.2
-8	1/2	29.9	32.8	53.7	59.3
-10	5/8	38.4	42.4	75.1	83.0
-12	3/4	48.0	53.1	96.6	106.8
-16	1	80.2	88.7	128.8	142.4

1-8. SAFETYING - MAINTENANCE PRACTICES

Safety Wire Inconel (Uncoated), Monel (Uncoated).

Used for general safety wiring purposes. Safety wiring is the application of wire to prevent relative movement of structural or other critical components subjected to vibration, tension, torque, etc. Monel to be used at temperatures up to 700°F (370°C) and inconel to be used at temperatures up to 1500°F (815°C). Identified by the color of the finish, monel and inconel color is natural wire color.

Copper, is cadmium plated and dyed yellow in accordance with FED-STD 595.

This wire will be used for shear and seal wiring applications. Shear applications are those where it is necessary to purposely break or shear the wire to permit operation or actuation of emergency devices. Seal applications are those where the wire is used with a lead seal to prevent tampering or use of a device without indication. Identified by the color of the finish, copper wire is dyed yellow.

Aluminum Alloy (Alclad 5056), is anodized and dyed blue in accordance with FED-STD 595.

This wire will be used exclusively for safety wiring magnesium parts.

NOTE

Surface treatments which obscure visual identification of safety wire is prohibited.

Inconel or monel, wire can be substituted for same diameter and length of carbon steel or corrosion resistant wire.

Wires are visually identifiable by their colors: natural for inconel and monel, yellow for copper, and blue for aluminum.

Cotter Pin.

The selection of material shall be in accordance with temperature, atmosphere and service limitations.

Safety Wire.

The size of the safety wire shall be in accordance with the requirements of Table 1-6.

0.032 inch diameter safety wire is for general purpose use; however, 0.020 inch diameter safety wire may be used on parts having a nominal hole diameter of less than 0.045 inch, on parts having a nominal hole diameter between 0.045 and 0.062 inch with spacing between parts of less than two inches, or on closely spaced screws and bolts of 0.25 inch diameter and smaller.

0.020 inch diameter copper wire shall be used for shear and seal wire applications.

When employing the single wire method of locking, the largest nominal size wire for the applicable material or part in which the hole will accommodate shall be used.

Safety Wire Installation (Refer to Figure 1-5).

CAUTION

SCREWS IN CLOSELY SPACED GEOMETRIC PATTERNS WHICH SECURE HYDRAULIC OR AIR SEALS, HOLD HYDRAULIC PRESSURE, OR USED IN CRITICAL AREAS SHOULD USE THE DOUBLE TWIST METHOD OF SAFETY WIRING.

Single wire method of safety wiring shall use the largest nominal size wire listed in Table 1-6, which will fit the hole.

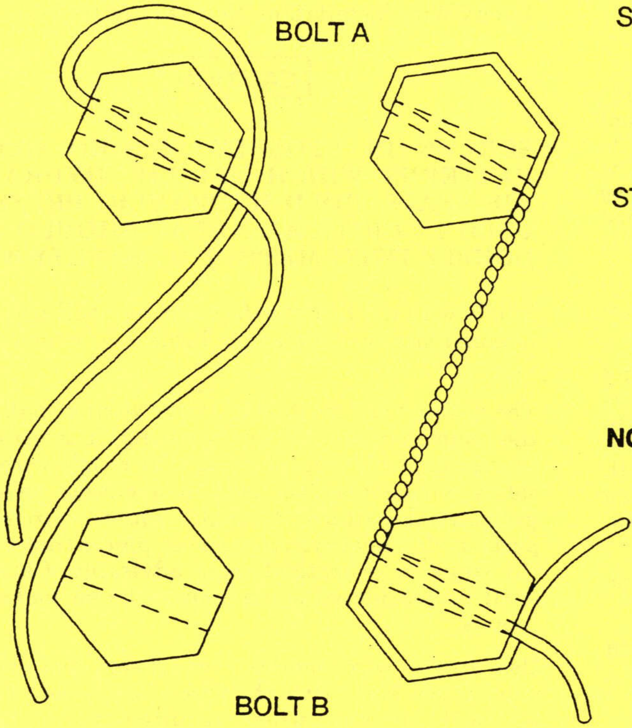
The double twist method of safety wiring shall be used as the common method of safety wiring. It is really one wire twisted on itself several times. The single wire method of safety wiring may be used in a closely spaced, closed geometrical pattern (triangle, square, circle, etc.), on parts in electrical systems, and in places that would make the single wire method more advisable. Closely spaced shall be considered a maximum of two inches between centers.

Use single wire method for shear and seal wiring application. Make sure the wire is installed so that it can be easily broken when required in an emergency situation. For securing emergency devices where it is necessary to break the wire quickly, use copper only.

Safety wiring by the double twist method shall be done as follows:

One end of the safety wire shall be inserted through one set of safety wire holes in the bolt head. The other end of the safety wire shall preferably be looped firmly around the head to the next set of safety wire holes in the same unit and inserted through this set of safety wire holes. The "other end" may go over the head when the clearances around the head are obstructed by adjacent parts.

The strands, while taut, shall be twisted until the twisted part is just short of the nearest safety wire hole in the next unit. The twisted portion shall be within 1/8 inch of the holes in each unit. The actual number of twists will depend upon the wire diameter, with smaller diameters being able to have more twists than larger diameters. The twisting shall keep the wire taut without over stressing or allowing it to become nicked, kinked or mutilated. Abrasions from commercially available twist pliers shall be acceptable.

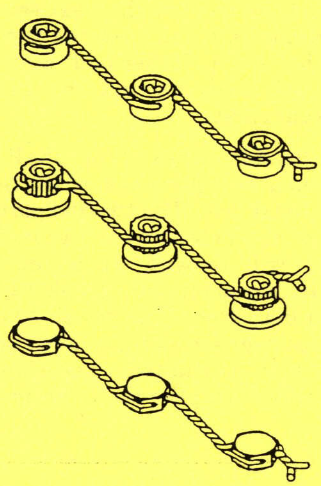


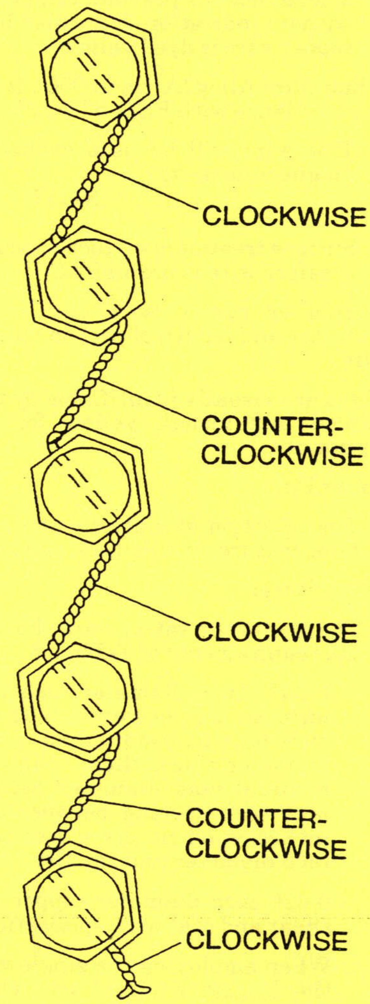
DOUBLE-WIRE SAFETYING

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.

NOTE: RIGHT THREADED PARTS SHOWN: REVERSE DIRECTIONS FOR LEFT PARTS.

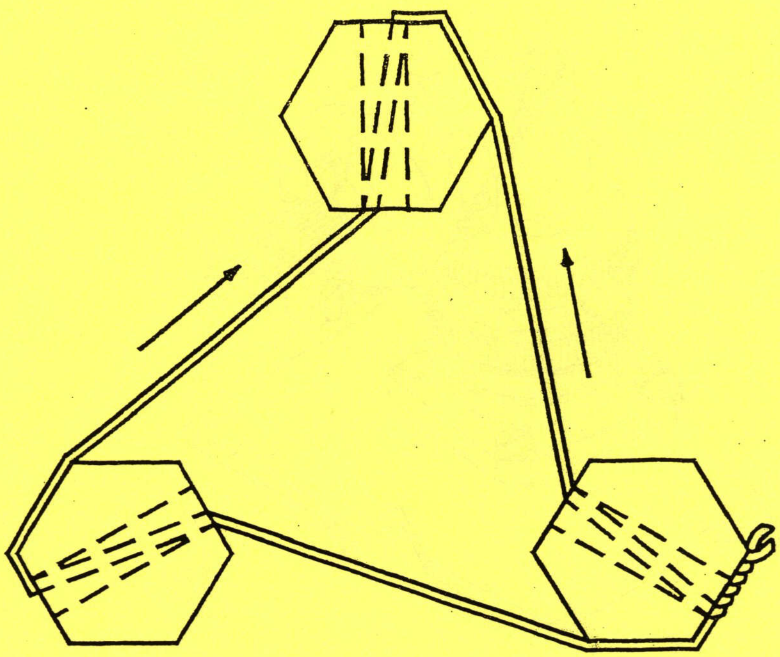

MULTIPLE FASTENER APPLICATION DOUBLE TWIST - MULTIPLE HOLE METHOD.



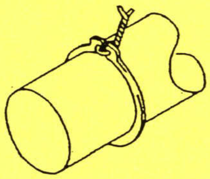
DOUBLE-TWIST SAFETYING SINGLE HOLE METHOD

5598C2001
5599C2001
6598C1029

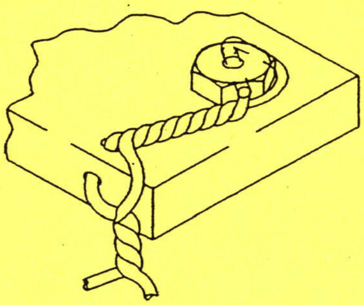
Lockwire Safetying
Figure 1-5, Sheet 1



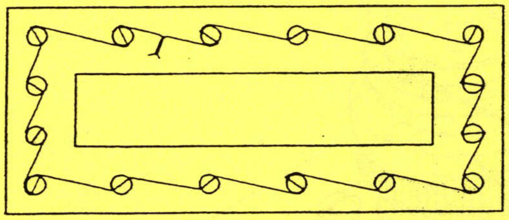
BOLTS IN CLOSELY SPACED, CLOSED GEOMETRICAL PATTERN, SINGLE WIRE METHOD



EXTERNAL SNAP RING SINGLE-WIRE METHOD



SINGLE FASTENER APPLICATION DOUBLE-TWIST METHOD



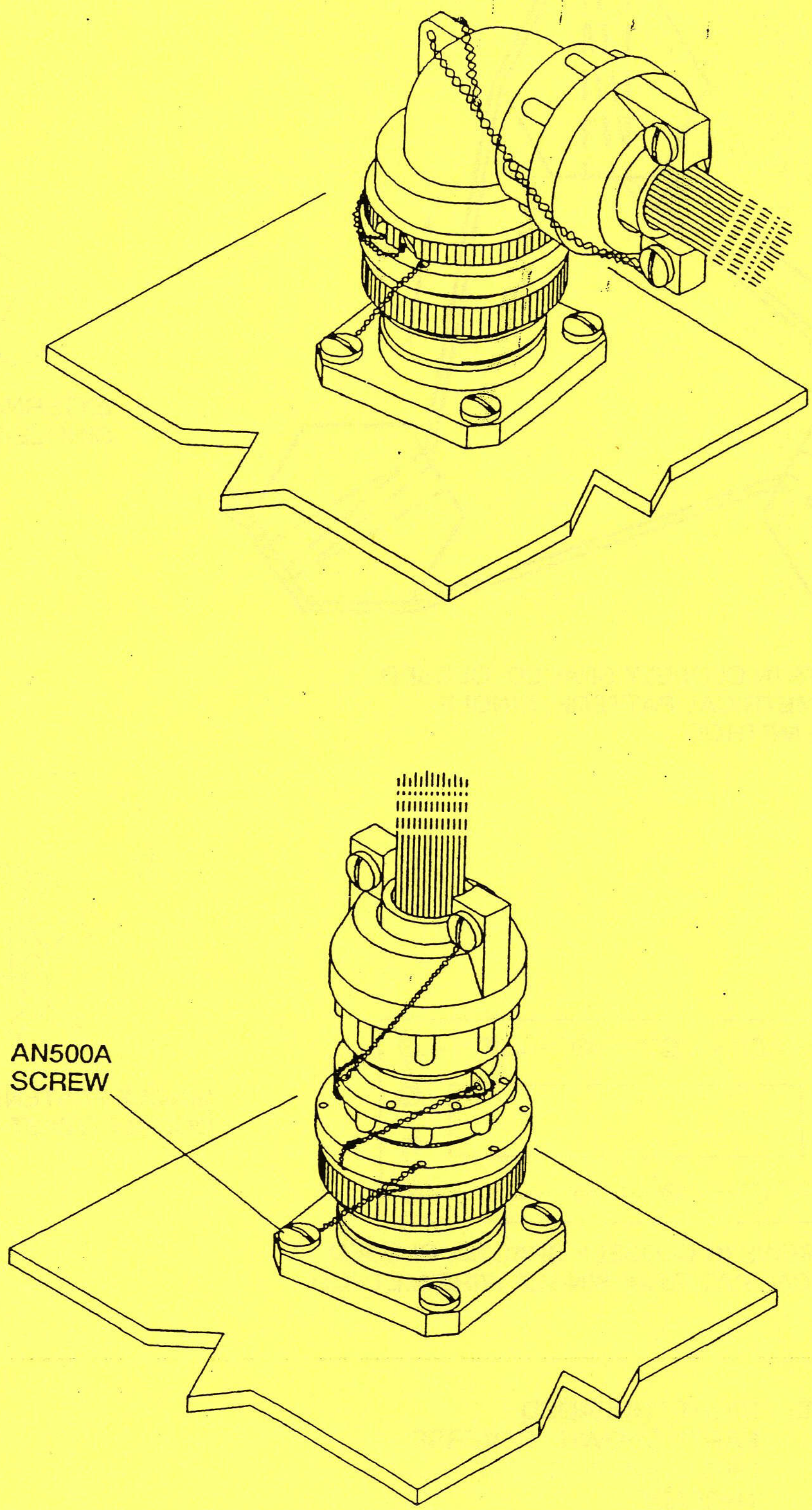
SMALL SCREWS IN CLOSELY SPACED, CLOSED GEOMETRICAL PATTERN, SINGLE WIRE METHOD

NOTE: RIGHT THREADED PARTS SHOWN. REVERSE DIRECTION FOR LEFT THREADS

5598C1003
5598C1024
5598C1024
5598C1024

Lockwire Safetying

Figure 1-5, Sheet 2



5598C1001
5598C1001

Lockwire Safetying
Figure 1-5, Sheet 3

Table 1-6. Safety Wire

MATERIAL	SIZE AND NUMBER (MS20995-XXX)							
	0.015	0.020	0.032	0.040	0.041	0.047	0.051	0.091
Ni-Cu Alloy (Monel)	—	NC20	NC32	NC40	—	—	NC51	NC91
Ni-Cr-Fe Alloy (Inconel)	—	N20	N32	N40	—	—	N51	N91
Carbon Steel	—	F20	F32	—	F41	F47	—	F91
Corrosion Resistant Steel	C15	C20	C32	—	C41	C47	—	C91
Aluminum Alloy (Blue)	—	AB20	AB32	—	AB41	AB47	—	AB91
Copper (Yellow)	CY15	CY20	—	—	—	—	—	—

The wire shall be twisted to form a pigtail of 3 to 5 twists after wiring the last unit. The excess wire shall be cut off. The pigtail shall be bent toward the part to prevent it from becoming a snag. Safety wiring multiple groups by the double twist double hole method shall be the same as the previous double twist single hole method except the twist direction between subsequent fasteners may be clockwise or counterclockwise.

Spacing

When safety wiring widely spaced multiple groups by the double twist method, three units shall be the maximum number in a series.

When safety wiring closely spaced multiple groups, the number of units that can be safety wired by a twenty four inch length of wire shall be the maximum number in a series.

Widely spaced multiple groups shall mean those in which the fastenings are from four to six inches apart. Safety wiring 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 the span of the safety wire to less than six inches.

Tension

Parts shall be safety wired in such a manner that the safety wire shall be put in tension when the part tends to loosen. The safety wire should always be installed and twisted so that the loop around the head stays down and does not tend to come up over the bolt head and leave a slack loop.

NOTE

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

Care shall be exercised when installing safety wire to ensure that it is tight but not over stressed.

Usage

A pigtail of 0.25 to 0.50 inch (3 to 5 twists) shall be made at the end of the wiring. This pigtail shall be bent back or under to prevent it from becoming a snag.

Safety wire shall be new upon each application.

When castellated nuts are to be secured with safety wire, tighten the nut to the low side of the selected torque range, unless otherwise specified, and if necessary, continue tightening until a slot aligns with the hole.

In blind tapped hole applications of bolts or castellated nuts on studs, the safety wiring shall be as described in these instructions.

Hollow head bolts are safetied in the manner prescribed for regular bolts.

Drain plugs and pet cocks may be safetied to a bolt, nut or other part having a free lock hole in accordance with the instructions described in this text.

External snap rings may be locked, if necessary, in accordance with the general locking principles as described and illustrated. Internal snap rings shall not be safety wired.

When safety wiring is required on electrical connectors which use threaded coupling rings, or on plugs which employ screws or rings to fasten the individual parts of the plug together, they shall be safety wired with 0.020 inch diameter wire in accordance with the safety wiring principles as described and illustrated. It is preferable to safety wire all electrical connectors individually. Do not safety wire one connector to another unless it is necessary to do so.

Drilled head bolts and screws need not be safety wired if installed into self-locking nuts or installed with lock washers. Castellated nuts with cotter pins or safety wire are preferred on bolts or studs with drilled shanks but self-locking nuts are permissible within the limitations of MS33588.

Larger assemblies, such as hydraulic cylinder heads for which safety wiring is required but not specified, shall be safety wired as described in these instructions.

Safety wire shall not be used to secure nor shall safety wire be dependent upon fracture as the basis for operation of emergency devices such as handles, switches, guards covering handles, etc., that operate emergency mechanism 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 require shear wire to secure equipment while not in use, but which are dependent upon shearing or breaking of the safety wire for successful emergency operation of equipment, particular care shall be exercised to that wiring under these circumstances shall not prevent emergency operations of these devices.

Cotter Pin Installation

General instruction for the selection and application of cotter pins (Refer to Figure 1-6).

Select cotter pin material in accordance with temperature, atmosphere and service limitations.

Cotter pins shall be new upon each application.

When nuts are to be secured to the fastener with cotter pins, tighten the nut to the low side (minimum) of the applicable specified or selected torque range, unless otherwise specified, and if necessary, continue tightening until the slot aligns with the hole. In no case shall the high side (maximum) torque range be exceeded.

Castellated nuts mounted on bolts may be safetied with cotter pins or safety wire. The preferred method is with the cotter pin. An alternate method where the cotter pin is mounted normal to the axis of the bolt may be used where the cotter pin in the preferred method is apt to become a snag.

In the event of more than 50 percent of the cotter pin diameter is above the nut castellation, a washer should be used under the nut or a shorter fastener should be used. A maximum of two washers may be permitted under a nut.

The largest nominal diameter cotter pin listed in MS24665, which the hole and slots will accommodate, shall be used; but in no application to a nut, bolt or screw shall the pin size be less than the sizes described in Figure 1-6.

Install the cotter pin with the head firmly in the slot of the nut with the axis of the eye at right angles to the bolt shank, and bend prongs so that the head and upper prong are firmly seated against the bolt.

In the pin applications, install the cotter pin with the axis of the eye parallel to the shank of the clevis pin or rod end. Bend the prongs around the shank of the pin or rod end.

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

Safetying Turnbuckles

Use of Safety Wire.

Some turnbuckles are secured using safety wire. These safetying procedures are detailed and illustrated in Federal Publication AC 43-13.1A, Safety Methods For Turnbuckles.

Use of Locking Clips

General instruction for the selection and application of locking clips (Refer to Figures 1-7 and 1-8).

Prior to safetying, both threaded terminals should be screwed an equal distance into the turnbuckle barrel, and should be screwed in, at a minimum, so no more than three threads of any terminal are exposed outside the body.

After the turnbuckle has been adjusted to its locking position, with the groove on terminals and slot indicator notch on barrel aligned, insert the end of the locking clip into the terminal and barrel until the "U" curved end of the locking clip is over the hole in the center of the barrel.

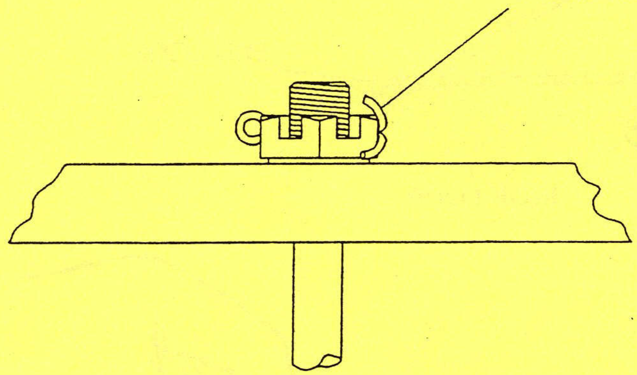
a. Press the locking clip into the hole to its full extent.
b. The curved end of the locking clip will latch in the hole in the barrel.
c. To check proper seating of locking clip, attempt to remove pressed "U" end from barrel hole with fingers only.

NOTE

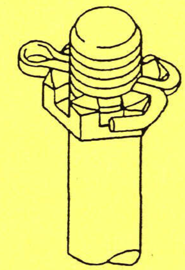
Do not use a tool as the locking clip could be distorted.

Locking clips are for one time use only and should not be reused.

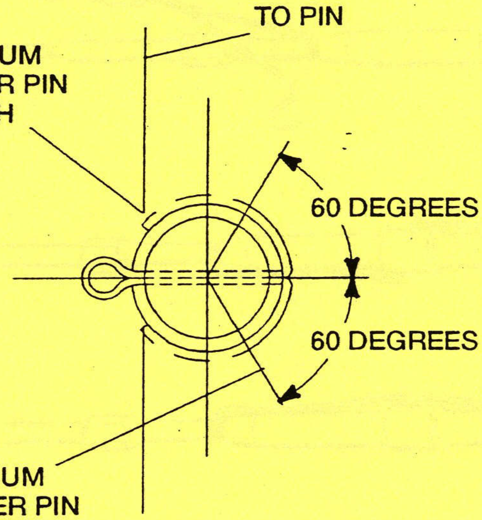
Both locking clips may be inserted in the same hole of the turnbuckle barrel or in opposite holes of the turnbuckle barrel.



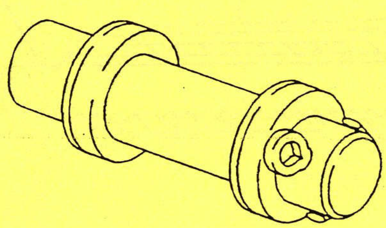
CASTELLATED NUT ON BOLT
PREFERRED METHOD



CASTELLATED NUT ON BOLT
ALTERNATE METHOD



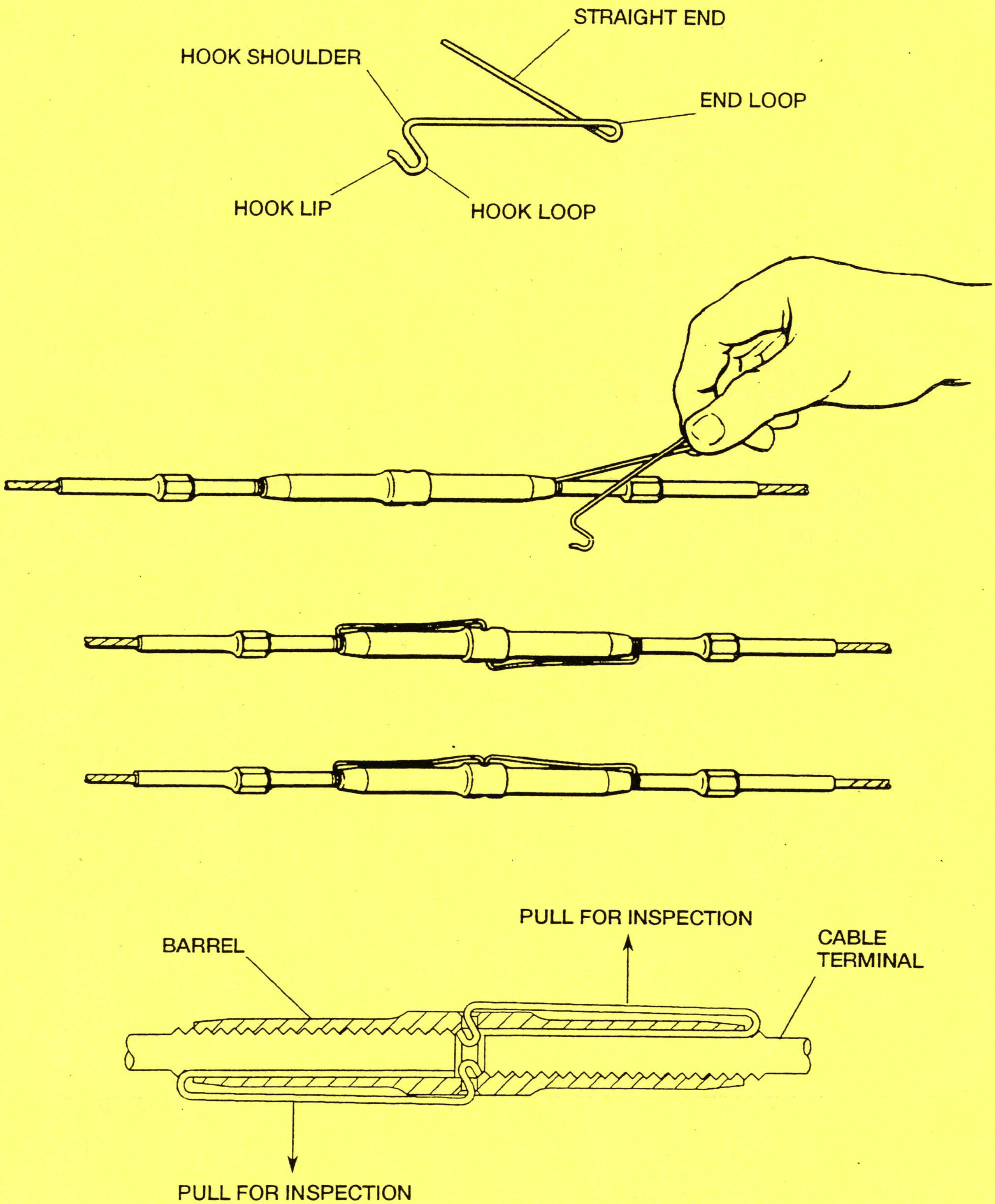
THREAD SIZE	MINIMUM PIN SIZE (INCH)
6	0.028
8	0.044
10	0.044
1/4	0.044
5/16	0.044
3/8	0.072
7/16	0.072
1/2	0.072
9/16	0.086
5/8	0.086
3/4	0.086
7/8	0.086
1	0.086
1 1/8	0.116
1 1/4	0.116
1 3/8	0.116
1 1/2	0.116



PIN APPLICATION

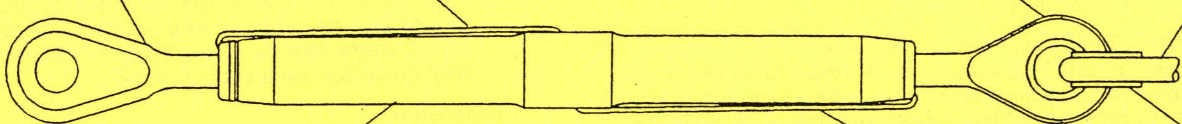
5598C1025
5598C1025
5598C1025
5598C1025

Cotter Pin Safetying
Figure 1-6, Sheet 1

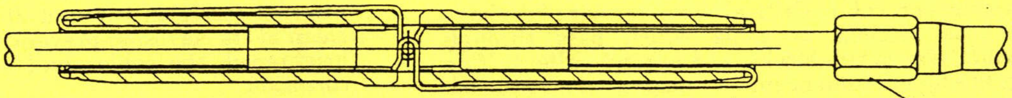


55982002
6280C1004

Safetying Turnbuckle Assemblies
Figure 1-7, Sheet 1



TYPICAL TURNBUCKLE ASSEMBLY



METHOD OF ASSEMBLING LOCKING CLIPS, TURNBUCKLE BARREL AND TERMINALS

NOMINAL CABLE DIA.	THREAD UNF-3	LOCKING CLIP MS21256 **(NOTE 1)**	TURNBUCKLE BODY MS21251
1/16	No. 6-40	-1	-2S
3/32	No. 10-32	-1	-3S
		-2	-3L
		-1	-4S
1/8		-2	-4L
5/32	1/4-28	-1	-5S
		-2	-5L
		-1	-6S
3/16	5/16-24	-2	-6L
7/32		-2	-7L
1/4	3/8-24	-2	-8L
9/32	7/16-20	-3	-9L
5/16	1/2-20	-3	-10L

NOTE 1: TWO LOCKING CLIPS REQUIRED FOR EACH TURNBUCKLE.

5598C1023
5598C1023

Safetying Turnbuckle Assemblies
Figure 1-8, Sheet 1

1-9. CONTROL CABLE WIRE BREAKAGE AND CORROSION LIMITATIONS

Examination of Control Cables.

Control cable assemblies are subject to a variety of environmental conditions and forms of deterioration. Some deterioration, such as wire or strand breakage, is easy to recognize. Other deterioration, such as internal corrosion or cable distortion, is harder to identify. The following information will aid in detecting these cable conditions.

Broken Wire Examination (Refer to Figure 1-8).

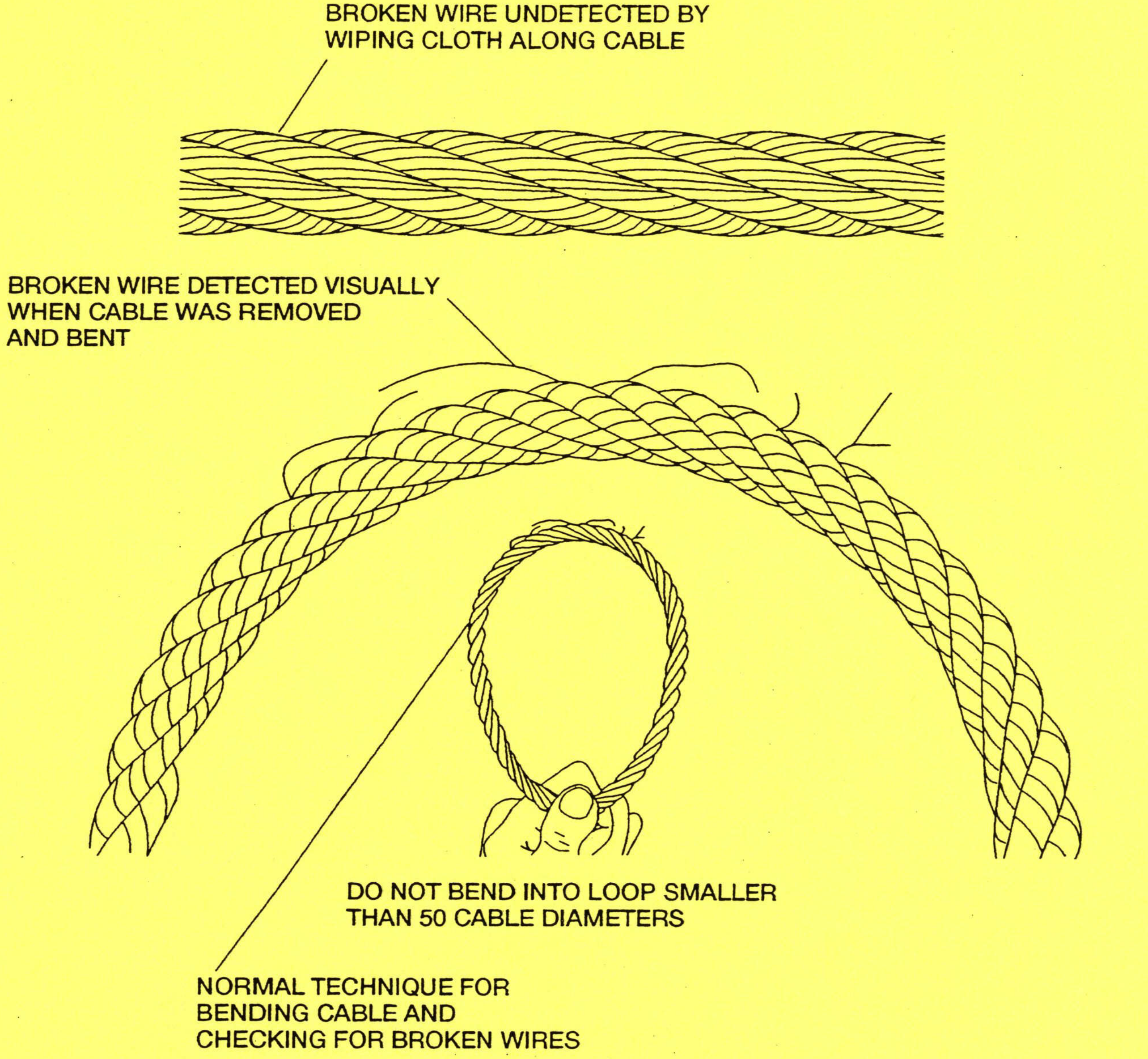
Examine cables for broken wires by passing a cloth along length of cable. This will detect broken wires, if cloth snags on cable. Critical areas for wire breakage are those sections of cable which pass through fairleads, across rub blocks, and around pulleys. If no snags are found, then no further inspection is required. If snags are found or broken wires are suspected, then a more detailed inspection is necessary, which requires that the cable be bent in a loop to confirm broken wires. Loosen or remove cable to allow it to be bent in a loop as shown. While rotating cable, inspect bent area for broken wires.

Wire breakage criteria for cables in flap, aileron, rudder, and elevator systems are as follows:

Individual broken wires at random locations are acceptable in primary and secondary control cables when there are no more than six broken wires in any given ten-inch cable length.

Corrosion.

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, etc. 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.



Cable Broken Wire Examination

Figure 1-8 Sheet 1

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.

TABLE OF CONTENTS

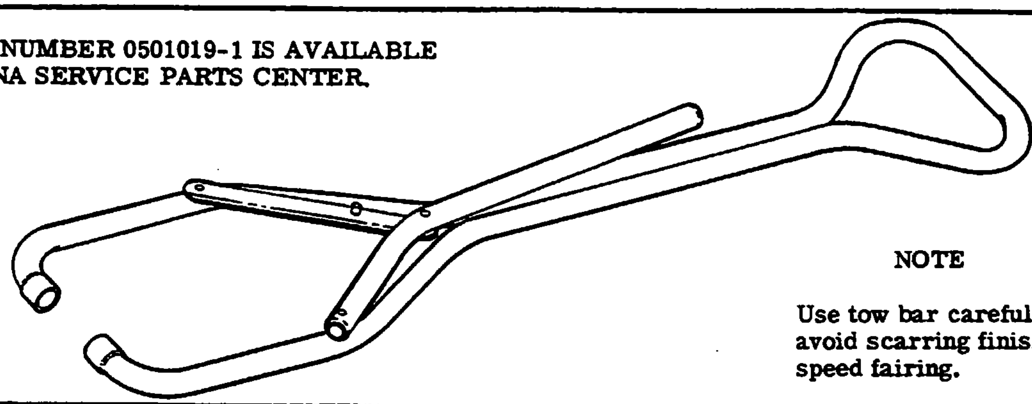
2-1. GROUND HANDLING.

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. When no tow bar is available, press down at the horizontal stabilizer front spar adjacent to the fuselage to raise the nose wheel off the ground. With the nose wheel clear of the ground, the aircraft can be turned by pivoting it about the main wheels.

CAUTION

When towing the aircraft, never turn the nose wheel more than 30 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.

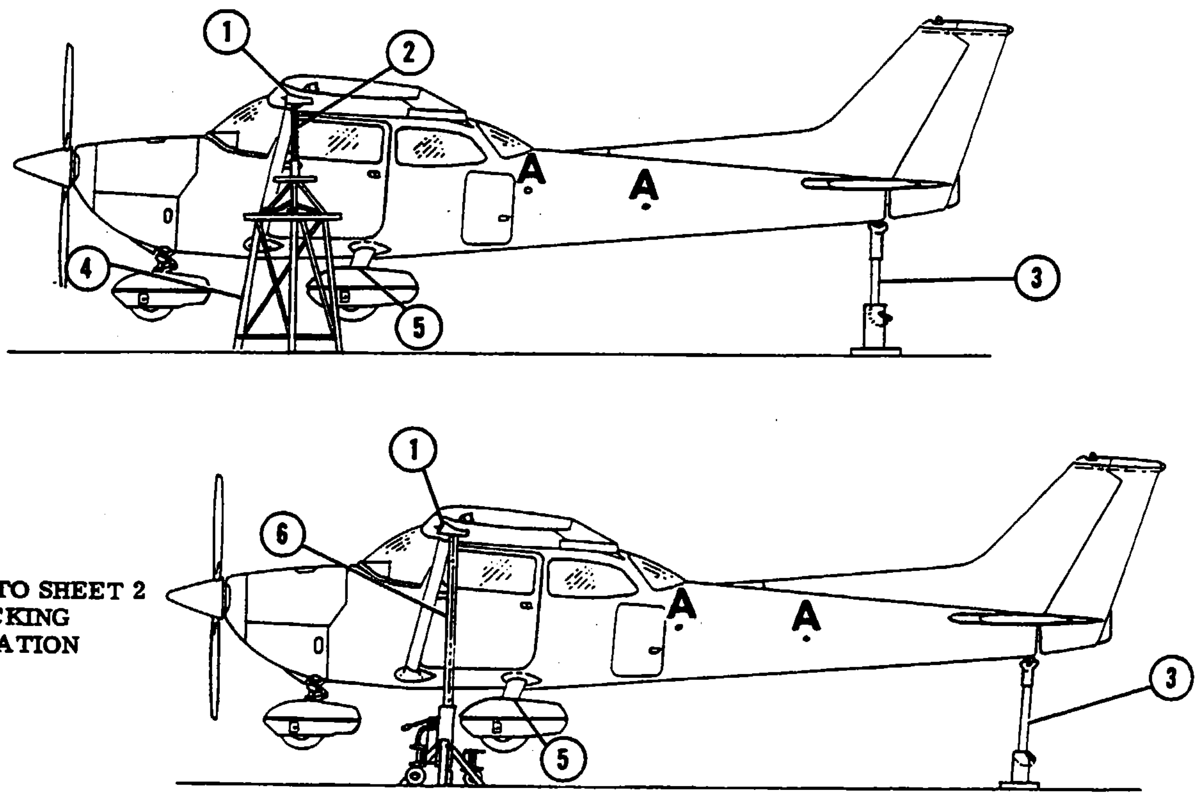
TOW BAR: PART NUMBER 0501019-1 IS AVAILABLE FROM THE CESSNA SERVICE PARTS CENTER.



NOTE

Use tow bar carefully to avoid scarring finish on speed fairing.

Figure 2-1. Tow Bar



REFER TO SHEET 2 FOR JACKING INFORMATION

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 at zero waterline. These are indicated in illustration by **A**.

(Also refer to paragraph 2-5)

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

JACKING INFORMATION

ITEM NUMBER	TYPE AND NUMBER	REMARKS
1	Block	1x4x4 padded with 1/4" rubber
2	Jack	Any short jack of capable capacity
3	Universal tail stand	Any tail stand of capable capacity
4	Cessna #SE-576 (41-1/2" high)	Universal jack stand (FOR USE WITH ITEM 2)
5	Built-in jack pad	Part of step bracket (SEE CAUTION)
6	#2-170 Basic jack (includes #2-71 Slide tube: Liftstroke 22-1/2") #2-70 Slide tube: Liftstroke 22-1/2" #2-64 Extension cap #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, and must extend far enough to raise wheels off ground, and must be of adequate strength.

2. Attach a suitable stand to the tie-down ring. Be sure tail stand weighs enough to keep tail down and under all conditions 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.

CAUTION

When using built-in jack pad, flexibility of the gear strut will cause the main wheel to slide inboard as the wheel is raised, tilting the jack. The jack must be lowered for a second operation. Jacking both wheels simultaneously at built-in jack pads is not recommended. Jack pad may be used to raise only one main wheel. DO NOT USE brake casting as a jack point.

4. Items (4) and (6) are available from the Cessna Service Parts Center.

Figure 2-2. 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. Refer to figure 2-2 for jacking procedures.

2-5. LEVELING. Corresponding points on both upper door sills may be used to level the aircraft laterally. The reference points for longitudinally leveling the aircraft are the two screws located on the left side of the tailcone. Refer to figure 2-2 for screw locations.

2-6. WEIGHING AIRCRAFT. Refer to Pilot's Operating Handbook.

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 during cold weather when accumulated moisture may freeze the brakes or when the brakes are overheated.

After completing the preceding, proceed to moor the aircraft as follows:

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 rope (no chains or cables) to forward mooring ring and secure opposite end 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 system 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 non-operational storage and/or the first 25 hours of intermittent engine operation.

NOTE

The aircraft is delivered from Cessna with a corrosion preventative aircraft engine oil (MIL-C-6529, Type II). This engine oil is a blend of aviation grade straight mineral oil and a corrosion preventative compound. This engine oil should be used for the first 25 hours of engine operation. In the event it is necessary to add oil during the first 25 hours of operation, use only aviation grade straight mineral oil of the correct viscosity.

During the 30 day non-operational 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 pre-flight inspection. At the end of the first 25 hours of engine operation, drain engine oil and clean oil screens (or change spin on filter). Service engine with correct grade and quantity of engine oil. Refer to figure 2-5 and paragraph 2-22 for correct grade of engine oil.

2-11. TEMPORARY STORAGE. Temporary storage is defined as aircraft in a non-operational 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 with correct grade of gasoline.

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 change supporting points and 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.

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 the battery periodically and charge as required.

NOTE

An engine treated in accordance with the following may be considered 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 be Lubricating Oil - Contact and Volatile, Corrosion Inhibited, MIL-L-46002, Grade 1 or equivalent.

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 propeller so that blades 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 and remove dust collections as frequently as possible. Clean and wax as required.
b. Inspect the interior of at least one cylinder through the spark plug hole for corrosion at least once a month.

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, again perform 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 and check tires for proper inflation. Check for proper nose gear strut inflation. (Refer to Section 1.)
b. Check and install battery.
c. Check oil sump for 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. Torque spark plugs to value specified in Section 11 and connect spark plug leads.
i. Check fuel strainer. Remove and clean filter screen if necessary. Check fuel tanks and fuel lines for moisture and sediment. Drain enough fuel to eliminate moisture and sediment. Torque bottom nut of strainer to 25-30 lb-in and safety wire to top assembly of strainer. Wire must have right-hand wrap, at least 45 degrees.
j. Perform a thorough pre-flight inspection, then start and warm-up engine.

2-14. INDEFINITE STORAGE. Indefinite storage is defined as aircraft in a non-operational 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 then reinstall and safety drain plug.
b. Fill oil sump to normal operating capacity with corrosion preventative mixture which has been thoroughly mixed and pre-heated (221°F to 250°F) at the time it is added to the engine.

NOTE

Corrosion preventative mixture consists of one part compound MIL-C-6529, Type I, mixed with three parts new lubricating oil of the grade recommended for service. During all spraying operation corrosion mixture is pre-heated to 221° to 250°F.

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

CAUTION

Injecting corrosion-preventative mixture too fast can cause a hydrostatic lock.

e. Do not rotate propeller after completing step "d."
f. Remove all spark plugs and spray corrosion-preventative mixture, which has been pre-heated (221° to 250°F,) into all spark plug holes to thoroughly cover interior surfaces of cylinders.

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.

g. Install lower spark plugs or install solid plugs, and install dehydrator plugs in upper spark plug holes. Be sure that dehydrator plugs are blue in color when installed.
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 carburetor intake and seal opening with moisture resistant paper and tape.
j. Place a bag of desiccant in the exhaust tail-pipe(s) and seal openings with moisture resistant tape.
k. Seal cold air inlet to the heater muff with moisture resistant tape.
l. Seal engine breather by inserting a protex plug in the 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 place plugs or tape is installed. Either attach red streamers outside of 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 and reinstall drain plug.

NOTE

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 7 days.
b. Change protex plugs if their color indicates an unsafe condition.
c. If the dehydrator plugs have changed color in one half of the cylinders, all desiccant material in the engine shall be replaced with new material.
d. Every 6 months respray the cylinder interiors with corrosion-preventative mixture 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 and check tires for correct inflation. Check for correct nose gear strut inflation.
b. Check battery and install.
c. Remove all materials used to seal and cover openings.
d. Remove warning placards posted at throttle and propeller.
e. Remove and clean engine oil screen, then re-install and safety. On aircraft that are equipped with an external oil filter, install new filter element.
f. Remove oil sump drain plug (or open quick-drain valve) and drain oil sump. Install and safety drain plug (or close quick-drain valve) and service engine with oil per figure 2-5.

NOTE

The corrosion-preventative mixture will mix with the engine lubricating oil, so flushing the oil system is not necessary. Draining the oil sump is sufficient.

g. Service and install the induction air filter.
h. Remove dehydrator plugs and spark plugs or plugs installed in spark plug holes and rotate propeller by hand several revolutions to clear corrosion-preventative mixture from cylinders.
i. Clean, gap, and install spark plugs. Torque plugs to the value listed in Section 11.
j. Check fuel strainer. Remove and clean filter screen. Check fuel tanks and fuel lines for moisture and sediment, and drain enough fuel to eliminate.
k. Perform a thorough pre-flight inspection, then start and warm-up engine.
l. Thoroughly clean aircraft and flight test aircraft.

2-17. SERVICING.

2-18. Requirements are shown in figure 2-5. The following supplements this figure by adding details.

2-19. FUEL. Fill tanks immediately after flight to lessen condensation. Fuel capacities are listed in Section 1 and fuel grades are shown in figure 2-5.

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.

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 ethyelene glycol monomethyl ether (EGME) compound to the fuel supply. See Figure 2-3 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 fuel nozzle.

2. An alternate method that may be used is to premix the complete alco ol 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.

Prolonged storage of the airplane will result in a water buildup 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 at various places throughout the fuel system. Refer to Section 12 for location of the various drains in the system. 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 the intervals specified in figure 2-5. Also, during daily inspection of the fuel strainer or fuel tanks, if water is found in the fuel system, all fuel drain plugs should be removed and all water drained from the system.

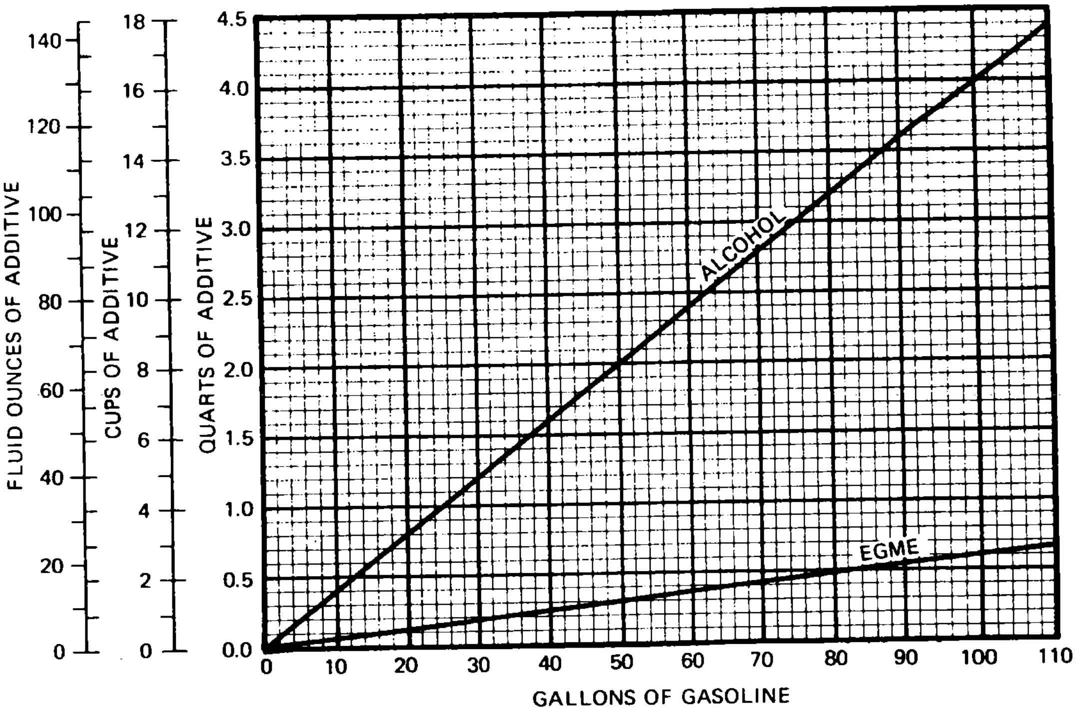


Figure 2-3. Fuel Additive Mixing Ratio Chart

2-22. ENGINE OIL. Check engine lubricating oil with the dipstick five to ten minutes after the engine has been stopped. The aircraft 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 aircraft should be raised slightly for more positive draining of any sludge which may have collected in the engine oil sump. Engine oil should be changed every six months, even though less than the specific hours have accumulated. Reduce these intervals for prolonged operations in dusty areas, in cold climates where sludging conditions exist, or where short flights and long idle periods are encountered, which cause sludging conditions. Always change oil and clean oil screens (when no full-flow oil filter is installed) whenever oil on the dipstick appears dirty. Ashless dispersant oil, conforming to Continental Motors Specification No. MHS-24 shall be used in these engines. Multi-viscosity oil may be used to extend the operating temperature range, improve cold engine starting and lubrication of the engine during the critical warm-up period, thus permitting flight through wider ranges of climate change without the necessity of changing oil. The multi-viscosity grades are recommended for aircraft engines subjected to wide variations in ambient air temperatures when cold starting of the engine must be accomplished at temperatures below 30°F.

NOTE

The aircraft is delivered from Cessna with a corrosion preventative aircraft engine oil (MIL-C-6529, Type II). If oil must be added during the first 25 hours, use only aviation grade straight mineral oil conforming to Specification MIL-L-6082. After the first 25 hours of operation, drain engine oil sump and clean both the oil suction strainer and the oil pressure screen if an optional full-flow oil filter is not installed. If an optional full-flow oil filter is installed, change the spin on oil filter. Refill sump with aviation grade straight mineral oil and use until a total of 50 hours has accumulated or oil consumption has stabilized, then change to ashless dispersant oil.

Newly-overhauled engines should also be operated on aviation grade straight mineral oil until a total of 50 hours has accumulated or oil consumption has stabilized.

When changing engine oil, remove and clean oil screens if aircraft is not equipped with an optional external oil filter. If aircraft is equipped with external oil filter, install new filter and clean suction screen. Refer to Section 11 for filter removal and installation. An oil quick-drain valve may be installed in the oil drain port of the oil sump. This valve provides a quicker and cleaner method of draining engine oil. Drain the engine oil as follows:

a. Operate engine until oil temperature is at normal operating temperature.
b. (With Quick-Drain Valve.) Attach a hose to the quick-drain valve in oil sump. Push up on quick-drain valve until it locks open, and allow oil to drain through hose into container.
c. (Without Quick-Drain Valve.) Remove oil drain plug from oil sump and allow oil to drain into a container.
d. After oil has drained, close quick-drain valve as shown in figure 2-4 and remove hose or reinstall and safety oil drain plug.

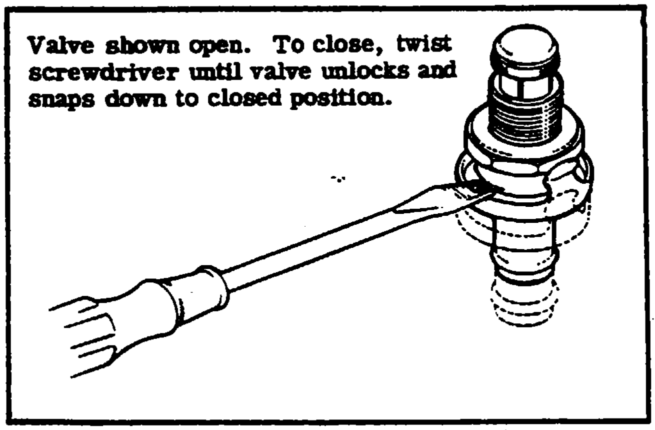


Figure 2-4. Quick-Drain Valve

e. Remove and clean oil screens. If optional oil filter is installed, change filter and clean suction screen.
f. Service engine with correct quantity and grade of engine oil. Refer to figure 2-5 and Section 2.

2-23. ENGINE INDUCTION AIR FILTER. The engine induction air filter keeps dust and dirt from entering the induction system. The value of maintaining the induction air filter in a good clean condition can never be overstressed. More engine wear is caused through the use of dirty and/or damaged air filters than is generally believed. The frequency with which the filter should be removed and cleaned will be determined primarily by the airplane operating conditions. A good general rule, however, is to remove, clean, and inspect filters at least every 50 hours of engine operating time and more frequently if warranted by operating conditions. Under extremely dusty conditions, daily servicing of the filters is recommended.
a. Remove filter from airplane as outlined in Section 11.
b. Clean filter by blowing with compressed air (not over 100 psi) from direction opposite of normal air flow. Normal air flow for the cylindrical filter is from outside to inside.

NOTE

Use care to prevent damage to filter element when cleaning with compressed air. Never use air pressure greater than 100 psi to clean filter.

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

CAUTION

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

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. The filter should be replaced after 500 hours of engine operation or one year, whichever should occur first. However, the filter should be replaced anytime it is damaged. A damaged filter may have the perforated band broken on the inside or the outside of the filter, or the filtering media may have sharp or broken edges. However, any filter that appears doubtful should be replaced.

d. After washing, rinse filter in clean water until rinse water runs clear from filter. 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. Be sure induction air box and air inlet ducts to the engine are clean, inspect and replace filter if it is damaged.
f. Install filter as outlined in Section 11.

2-24. VACUUM SYSTEM FILTER. The vacuum system central air filter keeps dust and dirt from entering the vacuum operated instruments. Inspect filter every 200 hours for damage. Change central air filter element every 500 hours of operating time and whenever suction gage reading drops 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 gyros.

2-25. 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 off and 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. Distilled water, not acid or "rejuvenators", should be used to maintain electrolyte level. Check the battery every 50 hours (or at least every 30 days) oftener in hot weather. See Section 16 for detailed battery removal, installation and testing.

2-26. TIRES. Maintain tire pressure at the air pressures specified in Section 1. When checking tire pressure, examine tires for wear, cuts, bruises and slippage. Remove oil, grease and mud from tires with soap and water.

NOTE

Recomended 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.

2-27. 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 cap and release all air.
b. Remove valve housing assembly.
c. Compress strut completely (stops in contact with outer barrel hub).
d. Oil level.
    1. Fluid used should comply with specification MIL-H-5606.
    2. Fill strut to bottom of valve installation hole.
    3. Maintain oil level at bottom of valve installation hole.
e. Fully extend strut.
f. Replace valve housing assembly.
g. With strut fully extended and nose wheel clear of ground, inflate strut to 45 PSI.

NOTE

The nose landing gear shock strut will normally require only a minimum amount of service. Maintain the strut extension pressure as shown in Section 1. Lubricate landing gear as shown in figure 2-6. Check the landing gear daily for general cleanliness, security of mounting and for hydraulic fluid leakage. Keep machined surfaces wiped free of dirt and dust, using a clean, lint-free cloth saturated with MIL-H-5606 hydraulic fluid or kerosene. All surfaces should be wiped free of excess hydraulic fluid.

2-28. NOSE GEAR SHIMMY DAMPENER. The shimmy dampener should be serviced at least every 50 hours. The shimmy dampener must be filled completely with fluid, free of entrapped air, to serve it's purpose. To service the shimmy dampener, proceed as follows:

a. Remove shimmy dampener from aircraft.
b. While holding the dampener in a vertical position with fitting end pointed downward, pull fitting end of the dampener shaft to its limit of travel.
c. While holding dampener in this position, fill dampener through open end of cylinder with hydraulic fluid.
d. Push the shaft upward slowly to seal off the filler hole.
e. Clean dampener with solvent. Be sure to keep the shaft protruding through the filler hole until dampener is installed on the aircraft.

NOTE

Keep the 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 MIL-H-5606 hydraulic fluid or kerosene. All surfaces should be wiped free of excess hydraulic fluid.

2-29. HYDRAULIC BRAKE SYSTEMS. Check brake master cylinders and refill with MIL-H-5606 hydraulic fluid 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 brakes.

2-30. CLEANING.

2-31. 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.

2-32. CLEANING WINDSHIELD AND WINDOWS.

2-32A. 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.

2-32A. MATERIALS REQUIRED (CONT).

NAME	MANUFACTURER	USE
*Polishing Wax.		Waxing acrylic windshields and windows.
Turtle Wax.	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	
Soft cloth, such as:		Applying and removing wax and polish.
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 impoper 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 excercised to prevent scratching surface.)

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 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, laquer thinners, commercial or household window cleaning sprays.

2-32B. 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 tends 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 soft cloth.

2-32C. 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. 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, laquer thinners, commercial or household window cleaning sprays, paint strippers, or other types of solvents.
d. 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 inner ply of multiple ply windshields.

2-33. PLASTIC TRIM. The instrument panel, plastic trim, and control knobs need only be wiped with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with Stoddard solvent. Volatile solvents, such as mentioned in paragraph 2-32, must never be used since they soften and craze the plastic.

2-34. PAINTED SURFACES. The painted exterior surfaces of the aircraft, under normal conditions, require a minimum of polishing and buffing. Approximately 15 days are required for acrylic or laquer paint to cure completely; in most cases, the curing period will have been completed prior to delivery of the aircraft. In the event that polishing or buffing is required within the curing period, it is recommended that the work be done by an experienced painter. 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 chamois. Harsh or abrasive soaps or detergents which could cause corrosion or make scratches should never be used. Remove stubborn oil and grease with a cloth moistened with Stoddard solvent. After the curing period, the aircraft may be waxed with a good automotive wax. A heavier coating of wax on the leading edges of the wing and tail and on the engine nose cap will help reduce the abrasion encountered in these areas.

2-35. 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 non-alkaline 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.

2-36. ENGINE AND ENGINE COMPARTMENT. The engine should be kept clean and dry since dirty cooling fins and baffle plates can cause overheating of the engine. Also, cleaning is essential to minimize any danger of fire and provide for easier inspection of components. The entire engine cowling may be removed to facilitate engine and interior cowl cleaning. Wash down the engine and components with a suitable solvent, such as Stoddard solvent or equvalent, then dry thoroughly with compressed air.

CAUTION

Particular care should be given to electrical equipment before cleaning. Solvent should not be allowed to enter magnetos, starters, alternators, voltage regulators and the like. Hence, these components should be protected before saturating the engine with solvent. Any fuel, oil and air openings should be covered before washing the engine with solvent. Caustic cleaning solutions should not be used. After cleaning the engine, re-lubricate all control arms and moving parts.

2-37. UPHOLSTERY AND INTERIOR. Keeping the upholstery and interior trim clean prolongs upholstery fabric and interior trim life. 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 the 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.

2-38. PROPELLER. Wash hub and blade with a soft cloth and Stoddard cleaning solvent or equivalent, then dry thoroughly with compressed air. The propeller should be wiped occasionally with an oily cloth, then wiped with a dry cloth. In salt water areas this will assist in corrosion proofing the propeller.

2-39. 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.

2-40. LUBRICATION.

2-41. Lubrication requirements are shown in figure 2-6. Before adding grease to grease fittings, wipe dirt from fitting. Lubricate until grease appears around parts being lubricated, and wipe excess grease from parts. The following paragraphs supplement figure 2-6 by adding details.

2-42. TACHOMETER DRIVE SHAFT. Refer to Sections 11 and 15.

2-43. 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 take-offs 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.

2-44. NOSE GEAR TORQUE LINKS. Lubricate nose gear torque links every 50 hours. When operating in dusty conditions, more frequent lubrication is required.

2-45. 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.

2-46. FUEL SELECTOR VALVE. At each 100 hour inspection, check the fuel selector valve and drive shaft for the following:

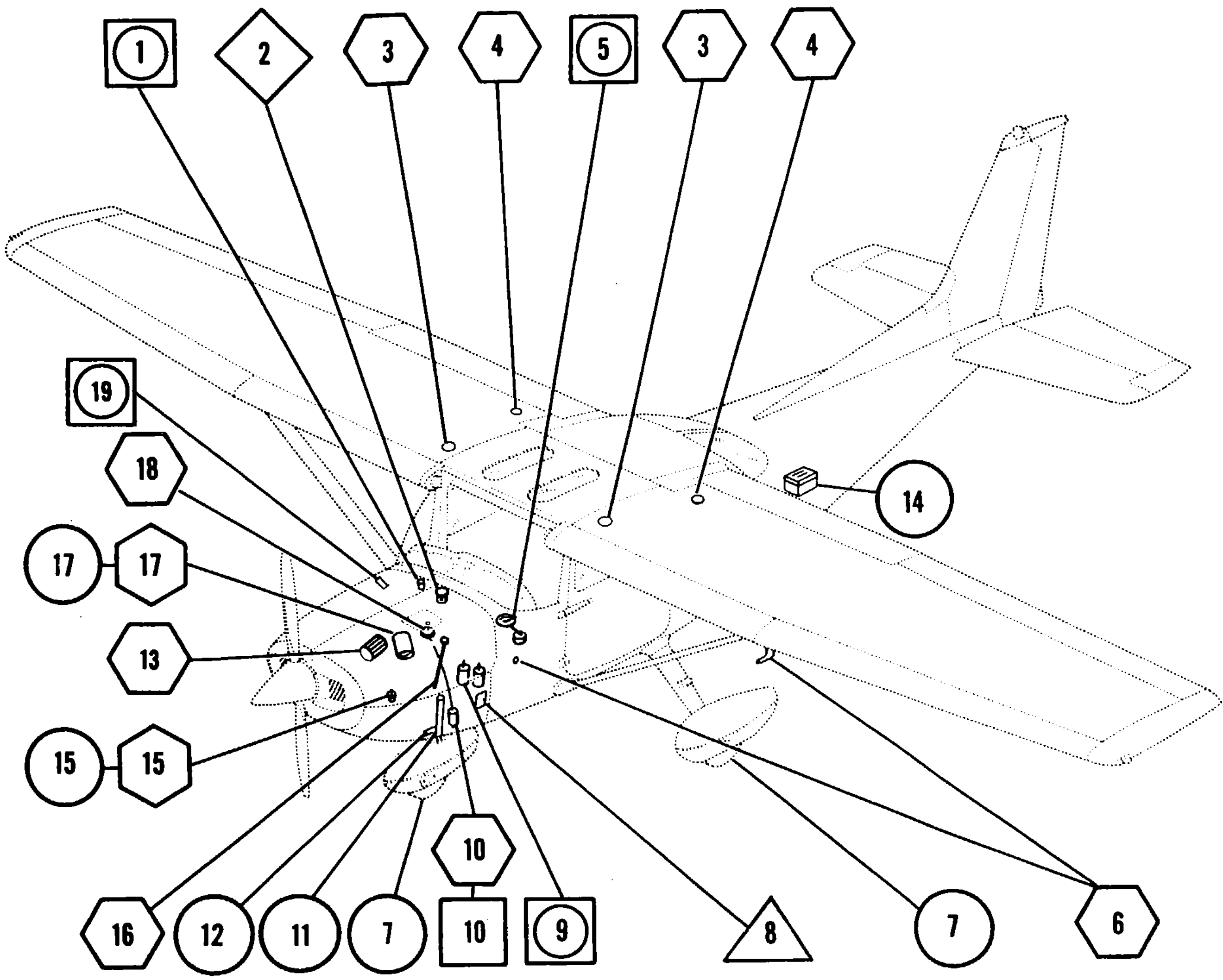
a. Valve control detent plate for cleanliness and excessive wear. Dirt accumulation on this plate can cause binding, poor detent feel and rapid wear of the plate.

b. All drive shaft attach points for security, binding, excessive wear and lubrication, if required.

c. Operate valve handle through all positions and check for proper operation, detent feel and freedom of movement.

2-47. 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.

SHOP NOTES:



NOTE

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

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

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

SPECIFIED AVIATION GRADE FUELS.

WARNING

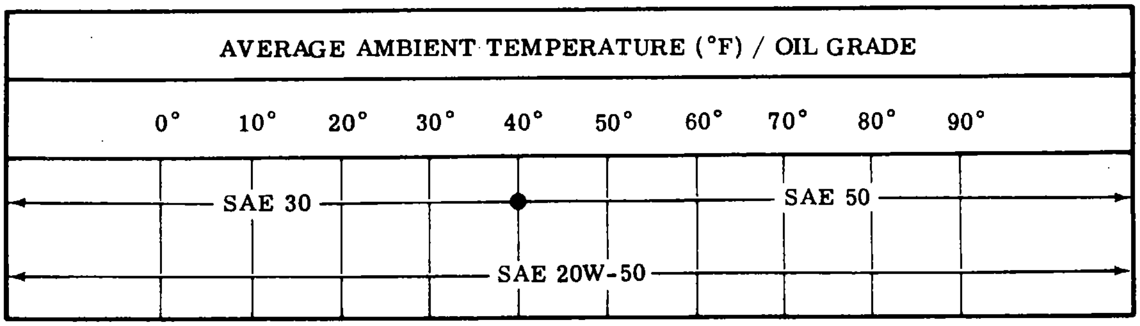
ONLY AVIATION GRADE FUELS ARE APPROVED FOR USE.

ENGINE MODEL	APPROVED FUEL GRADES	NOTE
CONTINENTAL IO-360-K	100LL (blue)	1
	100 (green) (formerly 100/130)	1

NOTE

1. Compliance with Continental Aircraft Engine Service Bulletin M77-3, and all supplements or revisions thereto, must be accomplished.

SPECIFIED AVIATION GRADE OIL:



Aviation Grade ashless dispersant oil, conforming to Continental Motors Specification MHS-24 and all revisions and supplements thereto, must be used except as noted in paragraph 2-22, herein. Refer to Continental Engine Service Bulletin M75-2, and any other superseding bulletins, revisions or supplements thereto, for further recommendations.

NOTE

Oil capacities for the aircraft are given in the following chart. To minimize loss of oil through the breather, fill to specified oil level on dipstick for normal operation (flight of less than three hours duration). For extended flight, fill to FULL mark on dipstick. Do not operate with less than MINIMUM-FOR-FLIGHT quantities listed. If an external oil filter is installed, one additional quart of oil is required when filter element is changed.

CAPACITY (TOTAL)	CAPACITY (TOTAL WITH FILTER)	NORMAL OPERATION	MINIMUM FOR FLIGHT
8	9	7	6

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

DAILY

3 FUEL TANK FILLER
Service after each flight. Keep full to retard condensation. Refer to paragraph 2-19 for details.

4 FUEL TANK SUMP DRAINS
Drain off any water and sediment before first flight of the day.

6 PITOT AND STATIC PORTS
Check for obstructions before first flight of the day.

10 FUEL STRAINER
Drain off any water and sediment before the first flight of the day. Refer to paragraph 2-21 for details.

13 INDUCTION AIR FILTER
Inspect and service under dusty conditions. Refer to paragraph 2-23 for details.

16 OIL DIPSTICK
Check oil on preflight. Add oil as necessary. Refer to paragraph 2-22 for details.

18 OIL FILLER CAP
Whenever oil is added, check that filler cap is tight and oil filler door is secure.

FIRST 25 HOURS

15 17 ENGINE OIL SYSTEM
Refill with straight mineral oil, non-detergent, and use until a total of 50 hours has accumulated or oil consumption has stabilized, then change to ashless dispersant oil.

50 HOURS

13 INDUCTION AIR FILTER
Clean filter per paragraph 2-23. Replace as required.

14 BATTERY
Check electrolyte level and clean battery compartment each 50 hours or each 30 days.

15 17 ENGINE OIL SYSTEM
Change oil each 50 hours if engine is NOT equipped with external oil filter; if equipped with external oil filter, change filter element each 50 hours and oil at each 100 hours, or every 6 months.

12 SHIMMY DAMPENER
Check fluid level and refill as required with hydraulic fluid. Refer to paragraph 2-28.

7 TIRES
Maintain correct tire pressure as listed in chart of Section 1. Also refer to paragraph 2-26 for details.

Figure 2-5. Servicing (Sheet 3 of 4)

50 HOURS (Cont)

11 NOSE GEAR SHOCK STRUT
Keep strut filled and inflate to correct pressure. Refer to paragraph 2-27 for details.

19 SPARK PLUGS
Rotate from top to bottom. Refer to Section 11.

100 HOURS

10 FUEL STRAINER
Disassembly and clean strainer bowl and screen.

19 SPARK PLUGS
Rotate from top to bottom. Refer to Section 11.

200 HOURS

1 VACUUM RELIEF FILTER
Change each 1000 hours, or to coincide with engine overhauls.

5 SELECTOR VALVE DRAIN
Remove plug and drain off any water or sediment. Also refer to paragraph 2-21.

9 BRAKE MASTER CYLINDERS
Check fluid level and refill as required with hydraulic fluid. Refer to paragraph 2-29.

500 HOURS

2 VACUUM SYSTEM CENTRAL AIR FILTER
Replace every 500 hours.

AS REQUIRED

8 GROUND SERVICE RECEPTACLE
Connect to 24-volt DC, negative-ground power unit. Refer to Section 11 for details.

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

FREQUENCY (HOURS)

50 100 500 1000

METHOD OF APPLICATION

HAND GREASE GUN OIL CAN SYRINGE (FOR POWDERED GRAPHITE)

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	MOLYBDENUM DISLULFIDE GREASE
OG —	MIL-L-7870A	GENERAL PURPOSE OIL
PL —	VV-P-236	PETROLATUM
GS —	MIL-S-8660	DC4 DOW CORNING
GP —		NO. 10-WEIGHT, NON-DETERGENT OIL
OL —	VV-L-800A	LIGHT OIL

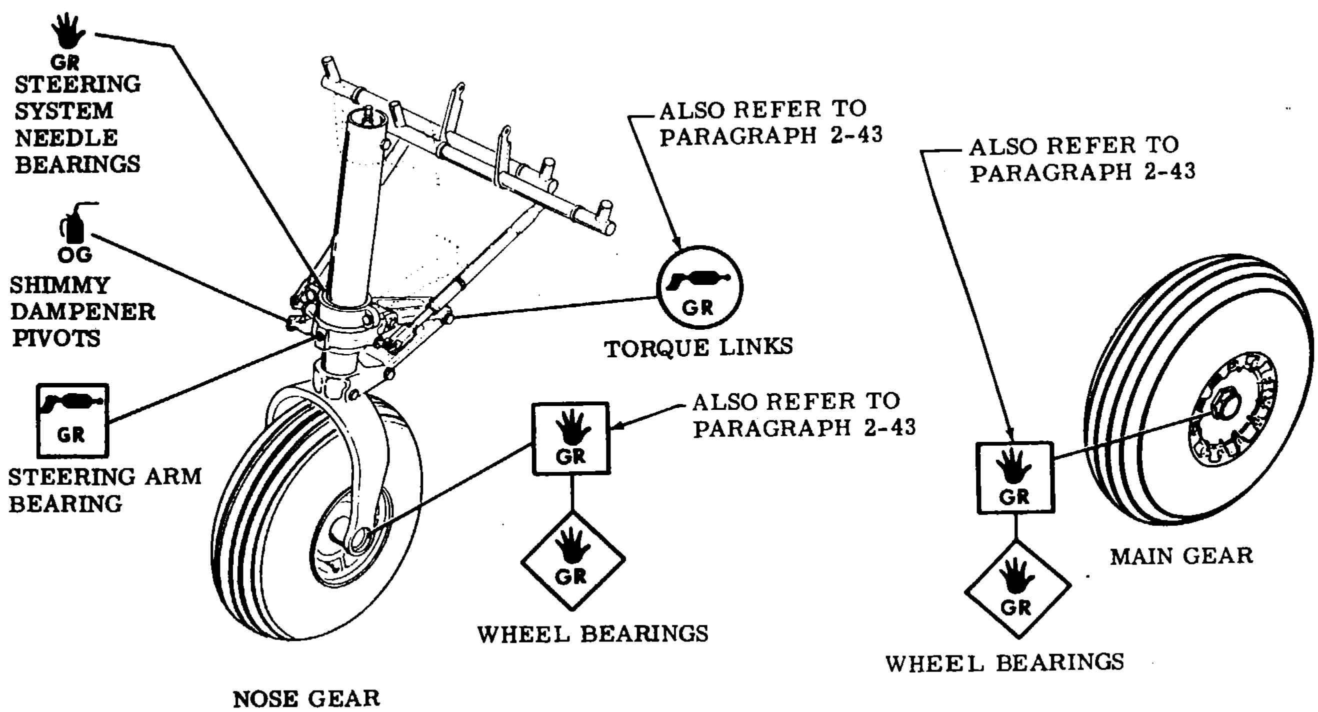


Figure 2-6. Lubrication (Sheet 1 of 3)

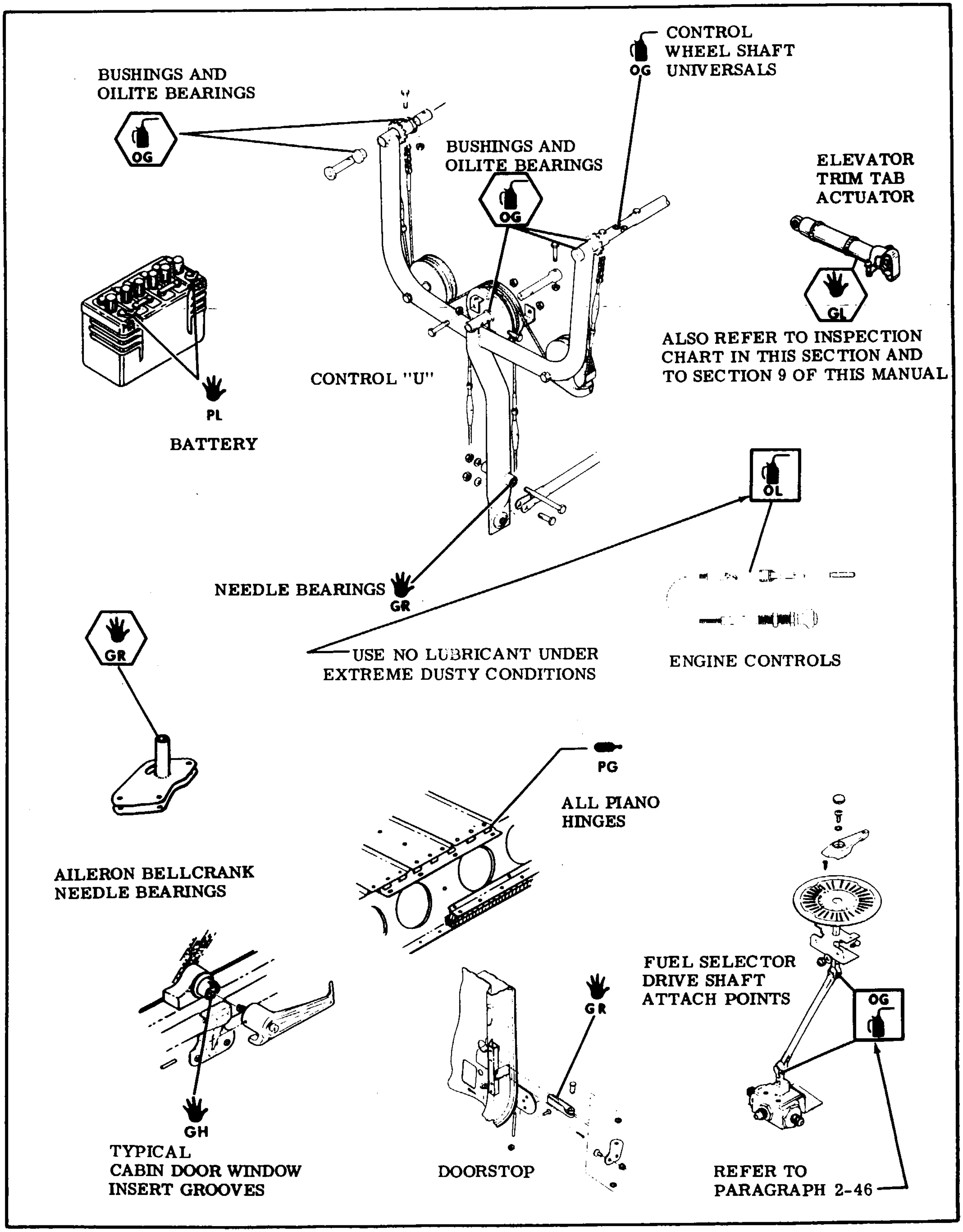
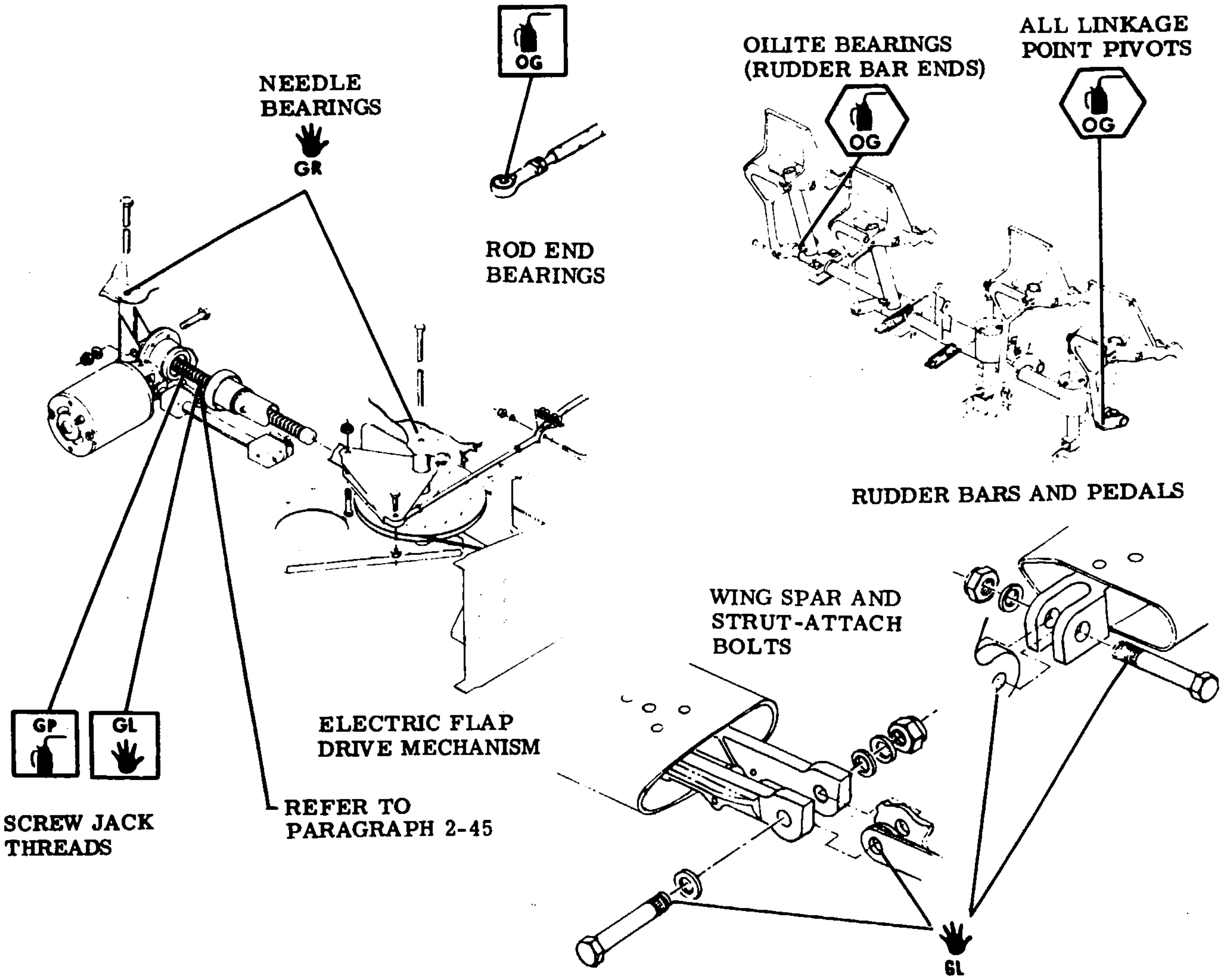


Figure 2-6. Lubrication (Sheet 2 of 3)



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 fore 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 2-6. Lubrication (Sheet 3 of 3)

I INSPECTION REQUIREMENTS.

As required by Federal Aviation Regulations, all civil aircraft of U.S. registry must undergo a COMPLETE INSPECTION (ANNUAL) each twelve calendar months. In addition to the required ANNUAL inspection, aircraft operated commercially (for hire) must also have a COMPLETE AIRCRAFT INSPECTION every 100 hours of operation.

In lieu of the above requirements, an aircraft may be inspected in accordance with a progressive inspection schedule, which allows the work load to be divided into smaller operations that can be accomplished in shorter time periods.

Therefore, the Cessna Aircraft Company recommends PROGRESSIVE CARE for aircraft that are being flown 200 hours or more per year, and the 100 HOUR inspection for all other aircraft.

II INSPECTION CHARTS.

The following charts show the recommended intervals at which items are to be inspected.

As shown in the charts, there are items to be checked each 50 hours, each 100 hours, each 200 hours, and also Special Inspection items which require servicing or inspection at intervals other than 50, 100 or 200 hours.

a. When conducting an inspection at 50 hours, all items marked under EACH 50 HOURS would be inspected, serviced or otherwise accomplished as necessary to insure continuous airworthiness.

b. At each 100 hours, the 50 hour items would be accomplished in addition to the items marked under EACH 100 HOURS as necessary to insure continuous airworthiness.

c. An inspection conducted at 200 hour intervals would likewise include the 50 hour items and 100 hour items in addition to those at EACH 200 HOURS.

d. The numbers appearing in the SPECIAL INSPECTION ITEMS column refer to data listed at the end of the inspection charts. These items should be checked at each inspection interval to insure that applicable servicing and inspection requirements are accomplished at the specified intervals.

e. A COMPLETE AIRCRAFT INSPECTION includes all 50, 100 and 200 hour items plus those Special Inspection Items which are due at the time of the inspection.

III INSPECTION PROGRAM SELECTION.

AS A GUIDE FOR SELECTING THE INSPECTION PROGRAM THAT BEST SUITS THE OPERATION OF THE AIRCRAFT, THE FOLLOWING IS PROVIDED.

1. **IF THE AIRCRAFT IS FLOWN LESS THAN 200 HOURS ANNUALLY.**

a. IF FLOWN FOR HIRE

An aircraft operating in this category must have a COMPLETE AIRCRAFT INSPECTION each 100 hours and each 12 calendar months of operation. A COMPLETE AIRCRAFT INSPECTION consists of all 50, 100, 200 and Special Inspection Items shown in the inspection charts as defined in paragraph II above.

b. IF NOT FLOWN FOR HIRE

An aircraft operating in this category must have a COMPLETE AIRCRAFT INSPECTION each 12 calendar months (ANNUAL). A COMPLETE AIRCRAFT INSPECTION consists of all 50, 100, 200 and Special Inspection Items shown in the inspection charts as defined in paragraph II above. In addition, it is recommended that between annual inspections, all items be inspected at the intervals specified in the inspection charts.

2. IF THE AIRCRAFT IS FLOWN MORE THAN 200 HOURS ANNUALLY.
Whether flown for hire or not, it is recommended that aircraft operating in this category be placed on the CESSNA PROGRESSIVE CARE PROGRAM. However, if not placed on Progressive Care, the inspection requirements for aircraft in this category are the same as those defined under paragraph III 1. (a) and (b).

Cessna Progressive Care may be utilized as a total concept program which insures that the inspection intervals in the inspection charts are not exceeded. Manuals and forms which are required for conducting Progressive Care inspections are available from the Cessna Service Parts Center.

IV INSPECTION GUIDE LINES.

(a) MOVABLE PARTS 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.

(b) FLUID LINES AND HOSES for: leaks, cracks, dents, kinks, chafing, proper radius, security, corrosion, deterioration, obstruction and foreign matter.

(c) METAL PARTS for: security of attachment, cracks, metal distortion, broken spotwelds, corrosion, condition of paint and any other apparent damage.

(d) WIRING for: security, chafing, burning, defective insulation, loose or broken terminals, heat deterioration and corroded terminals.

(e) BOLTS IN CRITICAL AREAS for: correct torque in accordance with torque values given in the chart in Section 1, when installed or when visual inspection indicates the need for a torque check.

NOTE

Torque values listed in Section 1 are derived from oil-free cadmium-plated threads, and are recommended for all installation procedures contained in this book except where other values are stipulated. They are not to be used for checking tightness of installed parts during service.

(f) FILTERS, SCREENS & FLUIDS for: cleanliness, contamination and/or replacement at specified intervals.

(g) AIRCRAFT FILE.

Miscellaneous data, information and licenses are a part of the aircraft 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 United States Federal Aviation Regulations. Since the regulations of other nations may require other documents and data, owners of exported aircraft should check with their own aviation officials to determine their individual requirements.

To be displayed in the aircraft at all times:
1. Aircraft Airworthiness Certificate (FAA Form 8100-2).
2. Aircraft Registration Certificate (FAA Form 8050-3).
3. Aircraft Radio Station License, if transmitter is installed (FCC Form 556).

To be carried in the aircraft at all times:
1. Weight and Balance, and associated papers (Latest copy of the Repair and Alteration Form, FAA Form 337, if applicable).
2. Aircraft Equipment List.
3. Pilot's Operating Handbook.

To be made available upon request:
1. Aircraft Log Book and Engine Log Book.

(h) ENGINE RUN-UP.

Before beginning the step-by-step inspection, start, run up and shut down the engine in accordance with instructions in the Pilot's Operating Handbook. During the run-up observe the following, making note of any discrepancies or abnormalities:

1. Engine temperatures and pressures.
2. Static RPM. (Also refer to Section 11 of this Manual.)
3. Magneto drop. (Also refer to Section 11 of this Manual.)
4. Engine response to changes in power.
5. Any unusual engine noises.
6. Fuel selector and/or shut-off valve; operate engine(s) on each tank (or cell) position and OFF position long enough to ensure shut-off and/or selector valve functions properly.
7. Idling speed and mixture; proper idle cut-off.
8. Alternator and ammeter.
9. Suction gage.
10. Fuel flow indicator.

After the inspection has been completed, an engine run-up should again be performed to determine that any discrepancies or abnormalities have been corrected.

SHOP NOTES:

IMPORTANT

READ ALL INSPECTION REQUIREMENTS PARAGRAPHS PRIOR TO USING THESE CHARTS.

Item	EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTION ITEM
PROPELLER				
1. Spinner	●			
2. Spinner bulkhead			●	
3. Blades	●			
4. Bolts and/or nuts			●	
5. Hub			●	
6. Governor and control			●	16
ENGINE COMPARTMENT				
Check for evidence of oil and fuel leaks, then clean entire engine and compartment, if needed, prior to inspection.				
1. Engine oil, filler cap, dipstick, drain plug and oil screen or external full-flow oil filter	●			1
2. Oil cooler		●		
3. Induction air filter	●			2
4. Induction airbox, air valves, doors and controls		●		
5. Cold and hot air hoses			●	
6. Engine baffles	●			
7. Cylinders, rocker box covers and push rod housings		●		
8. Crankcase, oil sump, accessory section and front crankshaft seal		●		
9. Hoses, metal lines and fittings	●			3
10. Intake and exhaust systems	●			4
11. Ignition harness		●		
12. Spark plugs	●			18
13. Compression check			●	
14. Crankcase and vacuum system breather lines			●	
15. Electrical wiring		●		
16. Vacuum pump and oil separator		●		
17. Vacuum relief valve filter (cabin area)			●	5
18. Engine controls and linkage	●			6
19. Engine shock mounts, mount structure and ground straps			●	

Item	EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTION ITEM
20. Cabin heat valves, doors and controls			•	
21. Starter, solenoid and electrical connections		•		
22. Starter brushes, brush leads and commutator			•	21
23. Alternator and electrical connections		•		19
24. Alternator brushes, brush leads, commutator or slip ring				7
25. Voltage regulator mounting and electrical leads		•		
26. Magnetos (external) and electrical connections		•		
27. Magneto timing				8
28. Firewall			•	
29. Fuel-air (metering) control unit		•		
30. Fuel injection system	•			
31. Auxiliary fuel pump		•		22
32. Engine-driven fuel pump		•		
33. Engine cowling and cowl flap	•			
FUEL SYSTEM				
1. Fuel strainer, drain valve and control	•			
2. Fuel strainer screen and bowl		•		
3. Fuel tank vents, caps and placards	•			
4. Fuel tanks, sump drains and fuel line drains			•	
5. Drain fuel and check tank interior attachment and outlet screens				5
6. Fuel vent valves			•	
7. Fuel vent line drain			•	
8. Fuel shut-off valve and placard	•			
9. Fuel selector valve and placard	•			
10. Engine primer		•		
11. Perform a fuel quantity indicating system operational test. Refer to Section 15 for detailed accomplishment instructions.				23
12. Fuel injection nozzles				24
LANDING GEAR				
1. Main gear wheels and fairings	•			17
2. Nose gear wheel, torque links, steering tubes, boots, fairing	•			17
3. Wheel bearings				9

Item	EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTION ITEM
4. Nose gear strut and shimmy dampener (service as required)	●			
5. Tires	●			
6. Brake fluid, lines and hoses, linings, discs, brake assemblies and master cylinders			●	20
7. Parking brake system			●	
8. Main gear springs			●	
9. Nose gear steering arm lubrication		●		
10. Torque link lubrication	●			
11. Park brake and toe brakes - operational test	●			
AIRFRAME				
1. Aircraft exterior	●			
2. Aircraft structure			●	
3. Windows, windshield, doors and seals	●			
4. Seat belts and shoulder harnesses	●			
5. Seat stops, seat rails, upholstery, structure and mounting			●	
6. Control "U" bearings, sprockets, pulleys, cables, chains and turnbuckles			●	
7. Control lock, control wheel and control "U" mechanism			●	
8. Instruments and markings	●			
9. Gyros central air filter			●	10
10. Magnetic compass compensation				5
11. Instrument wiring and plumbing			●	
12. Instrument panel, shockmounts, ground straps, cover, decals and labeling			●	
13. Defrosting, heating and ventilation system controls	●			
14. Cabin upholstery, trim, sunvisors and ash trays			●	
15. Area beneath floor, lines, hoses, wires and control cables			●	
16. Lights, switches, circuit breakers, fuses and spare fuses	●			
17. Exterior lights	●			
18. Pitot and Static Systems			●	
19. Stall warning system			●	

Item	EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTION ITEM
20. Radios, radio controls, avionics and flight instruments	●			
21. Antennas and cables			●	
22. Battery, battery box and battery cables	●			
23. Battery electrolyte				11
24. Emergency locator transmitter		●		12

CONTROL SYSTEMS

In addition to the items listed below, always check for correct direction of movement, correct travel and correct cable tension.

Item	EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTION ITEM
1. Cable, terminals, pulleys, pulley brackets, cable guards, turnbuckles and fairleads			●	
2. Chains, terminals, sprockets and chain guards			●	
3. Trim control wheels, indicators, actuator and bungee	●			
4. Travel stops			●	
5. Decals and labeling			●	
6. Flap control switch, flap rollers and tracks and flap indicator	●			
7. Flap motor, transmission, limit switches, structure, linkage, bellcranks, etc.			●	
8. Elevator and trim tab hinges, tips and control rods	●			
9. Elevator trim tab actuator lubrication				13
10. Elevator trim tab free-play inspection		●		14
11. Rudder pedal assemblies and linkage			●	
12. Skins (external) of control surfaces and tabs	●			
13. Internal structure of control surfaces			●	
14. Balance weight attachment			●	
15. Flap actuator jack screw threads				15
16. Ailerons, hinges and push/pull rods	●			

SPECIAL INSPECTION ITEM

1. First 25 hours: refill with straight mineral oil and use until a total of 50 hours have accumulated or oil consumption has stabilized, then change to ashless dispersant oil. Change oil each 50 hours if engine is NOT equipped with external oil filter; if equipped with external oil filter, change filter each 50 hours and oil at each 100 hours; or every six months, whichever comes first.
2. Clean filter per paragraph 2-23. Replace if required.
3. Replace engine compartment rubber hoses (Cessna-installed only) every 5 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 replaced within 120 days after receiving the new hose(s) from Cessna. Replace drain hoses on condition. For engine flexible hoses (Continental Motors-installed) refer to Continental Motors Maintenance Manual and Continental Motors Engine Service Bulletins.
4. General inspection every 50 hours. Refer to Section 11 for 100 hour inspection.
5. Each 1000 hours, or to coincide with engine overhauls.
6. Each 100 hours for freedom of movement, general condition. These controls are not repairable and must be replaced at engine overhaul.
7. Each 500 hours.
8. Internal timing and magneto-to-engine timing are described in detail in Section 11.
9. First 100 hours and each 500 hours thereafter. More often if operated under prevailing wet or dusty conditions.
10. Replace each 500 hours.
11. Check electrolyte level and clean battery compartment each 50 hours or each 30 days.
12. Refer to Section 16.
13. Lubrication for the actuator is required each 1000 hours or 3 years, whichever comes first. Refer to Figure 2-5 for grease specifications.
14. Refer to Section 9 for free-play limits, inspection, replacement and/or repair.
15. Refer to paragraph 2-45 for detailed instructions.
16. If leakage is evident, refer to McCauley Service Manual.
17. If aircraft is flown from surfaces with mud, snow or ice, the speed fairings should be checked to be sure that there is no accumulation which could prevent normal tire rotation.
18. Rotate spark plugs every 50 hours of operation and clean and rotate every 100 hours.
19. Following the first 25 hours of operation, check alternator belt tension in accordance with procedures outlined in Section 17.
20. Each 5 years, replace all hoses, packings, and backup rings in the brake system.
21. For Prestolite starters only, inspect the commutator and brushes every 1500 hours.
22. Each 10 years, replace or overhaul the auxiliary fuel pump in accordance with Dukes Inc. Service Bulletin No. 003.
23. Fuel quantity indicating system operational test is required every 12 months. Refer to Section 15 for detailed accomplishment instructions.
24. At the first 100-hour inspection on new, rebuilt or overhauled engines, remove and clean the fuel injection nozzles. Thereafter, the fuel injection nozzles must be cleaned at 300-hour intervals or more frequently if fuel stains are found.

2-48. 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: The terms overhaul and replacement as used within this section are defined as follows:

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

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 which must be overhauled or replaced at specific time limits. Table 1 lists those items which Cessna has mandated must be overhauled or replaced at specific time limits. Table 2 lists component time limits which have been established by an outside supplier on their 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 The 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

SPECIAL INSPECTION ITEMS (Continued from page 2-27)

23. Fuel quantity indicating system accuracy test is required every 12 months. Refer to Cessna Service Bulletin SEB99-18, Fuel Quantity Indicating System Inspection (or latest revision) for detailed accomplishment instructions.

COMPONENT	REPLACEMENT TIME	OVERHAUL
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
Engine Air Filter	500 hours or 36 months, whichever occurs first (Note 9)	NO
Engine Mixture, Throttle, and Propeller Controls	At engine TBO	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 10)	NO
Standby Dry Vacuum Pump	500 hours or 10 years, whichever occurs first (Note 10)	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 (TCM-Installed)	(Note 2)	NO
Auxiliary Electric Fuel Pump	(Note 7)	YES
Propeller	(Note 8)	YES

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 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: Refer to Teledyne Continental Service Bulletin SB97-6, or latest revision.

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: Refer to Teledyne Continental Service Information Letter SIL98-9, 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 overservice the air filter, overservicing 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 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.

SECTION 3

FUSELAGE

TABLE OF CONTENTS — Page No. Aerofiche/Manual

3-1. FUSELAGE.

3-2. WINDSHIELD AND WINDOWS. (See figures 3-1 and 3-2.)

3-3. DESCRIPTION. The windshield and windows are single-piece, acrylic panels, set in sealing strips and held by formed retaining strips, secured to the fuselage with screws and rivets. No. 579.6 sealer (Inmont Corp., St. Louis, Missouri) is applied to all edges of the windshield and windows, with exception of wing root area. The wing root fairing has a heavy felt strip that completes the windshield sealing.

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

3-5. WAXING. Waxing will fill in minor scratches in clear plastic and help protect the surface from further abrasion. Use a good grade of commercial wax applied in a thin, even coat. Bring wax to a high polish by rubbing lightly with a clean, dry flannel cloth.

3-6. REPAIR. (See figure 3-1.)

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 crack and prevents 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

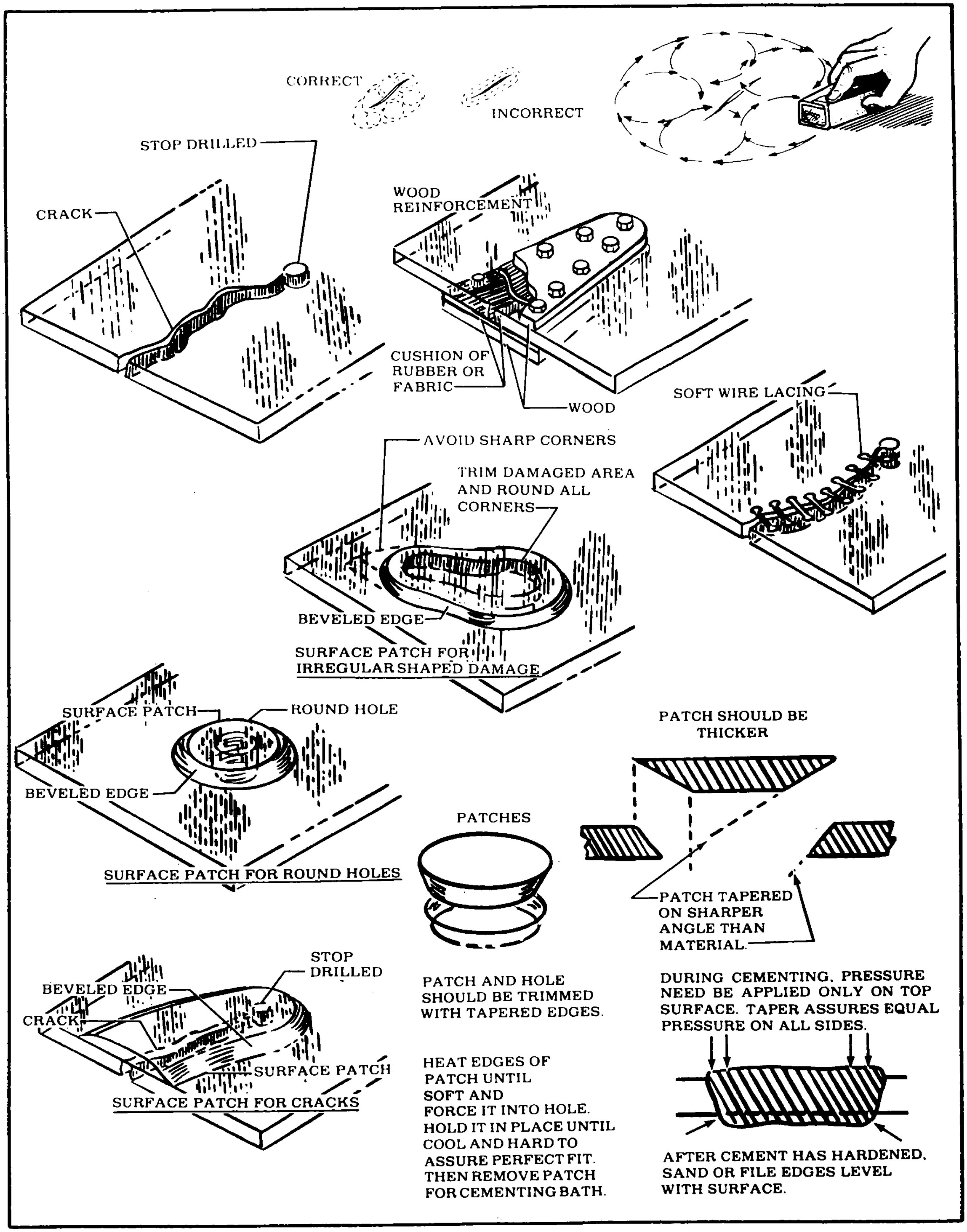


Figure 3-1. Repair of Windshield and Windows

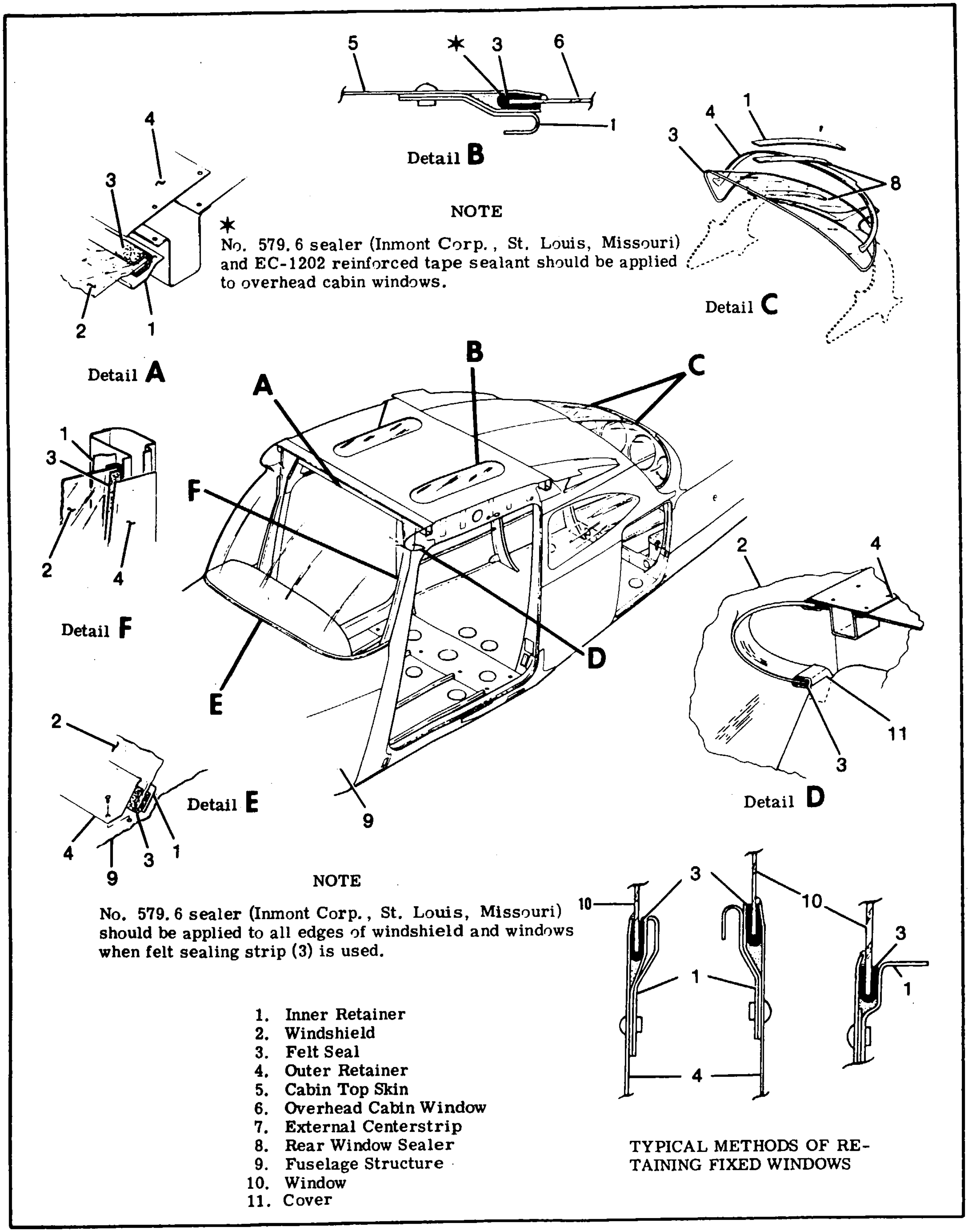


Figure 3-2. Windshield and Fixed Window Installation

place immediately over the hole. Maintain a uniform pressure of from 5 to 10 psi on the patch for a minimum of three 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 procedure 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 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 further. Use minimum pressure and cover an area large enough to prevent formation of "bull's-eyes" or other optical distortions.

CAUTION

Do not use a coarse grade of abrasive. No. 320 is of maximum coarseness.

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

Polishing can be accomplished by hand but will require a considerably longer period of time to attain the same result as produced by a buffing wheel.

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.

3-8. CRACKS. (See figure 3-1.)

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 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 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. (See figure 3-2.)

a. Drill out rivets securing front retainer strip.

b. Remove wing fairings over windshield edges.

c. Pull windshield straight forward, out of side and top retainers. Remove top retainer if necessary.

3-11. INSTALLATION. (See figure 3-2.)

a. Apply felt strip and sealing compound or sealing tape to all edges of windshield to prevent leaks.

b. Reverse steps in preceding paragraph for installation.

c. When installing a new windshield, check fit and carefully file or grind away excess plastic.

d. Use care not to crack windshield when installing. If not previously removed, top retainer may be removed if necessary. Starting at upper corner and gradually working windshield into position is recommended.

NOTE

Screws and self-locking nuts may be used instead of rivets which fasten front retaining strip to cowl deck. If at least No. 6 screws are used, no loss of strength will result.

3-12. WINDOWS. (See figure 3-2.)

3-13. MOVABLE. (See figure 3-3.) A standard movable window, hinged at the top, is installed in the left cabin door. An optional movable window is available for installation in the right cabin door.

3-14. REMOVAL AND INSTALLATION. (See figure 3-3.)

a. Disconnect window stop (5).

b. Remove pins from window hinges (6).

c. Reverse preceding steps for installation. 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. (See figure 3-2.) 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. (See figure 3-2.)

a. Remove external centerstrip (7).

b. Remove upholstery as necessary to expose retainer strips inside cabin.

c. Drill out rivets as necessary to remove outer retainer strip along aft edge of window.

d. Remove window by lifting aft edge and pulling window aft. If difficulty is encountered, rivets securing retainer strips inside cabin may also be drilled out and retainer strips loosened or removed.

e. Reverse preceding steps for installation. 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.

3-17. 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. (See figure 3-2.)

a. Remove headliner and trim panels.

b. Drill out rivets as necessary to remove retainer strips.

c. Reverse preceding steps for installation. 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. DESCRIPTION. A cabin door is installed on each side of the aircraft consisting of a sheet outer skin chemically bonded to a formed inner pan assembly. To this rigid structure are attached the door latch assembly, a remote inside handle, a pair of external hinges and an integral doorstop assembly. A openable window is installed on the LH door and may also be optionally installed on the RH door.

3-22. REMOVAL AND INSTALLATION. (See figure 3-3.) Removal of cabin doors is accomplished either by removing screws attaching door hinges or by removing hinge pins.

NOTE

Ensure clevis pin (index 21, figure 3-3) is removed before removing door.

During reinstallation permanent-type hinge pins may be replaced with clevis pins secured with cotter pins.

3-23. ADJUSTMENT. Cabin doors should be adjusted so that door skin fairs smoothly with fuselage skin. Slots at door latch plate permit re-positioning of latch assembly and hence bolt engagement with rotary clutch on door post. If fitting a new door assembly, some trimming of door flange may be necessary but gap between door skin and fuselage skin should be .09 inch or less.

CAUTION

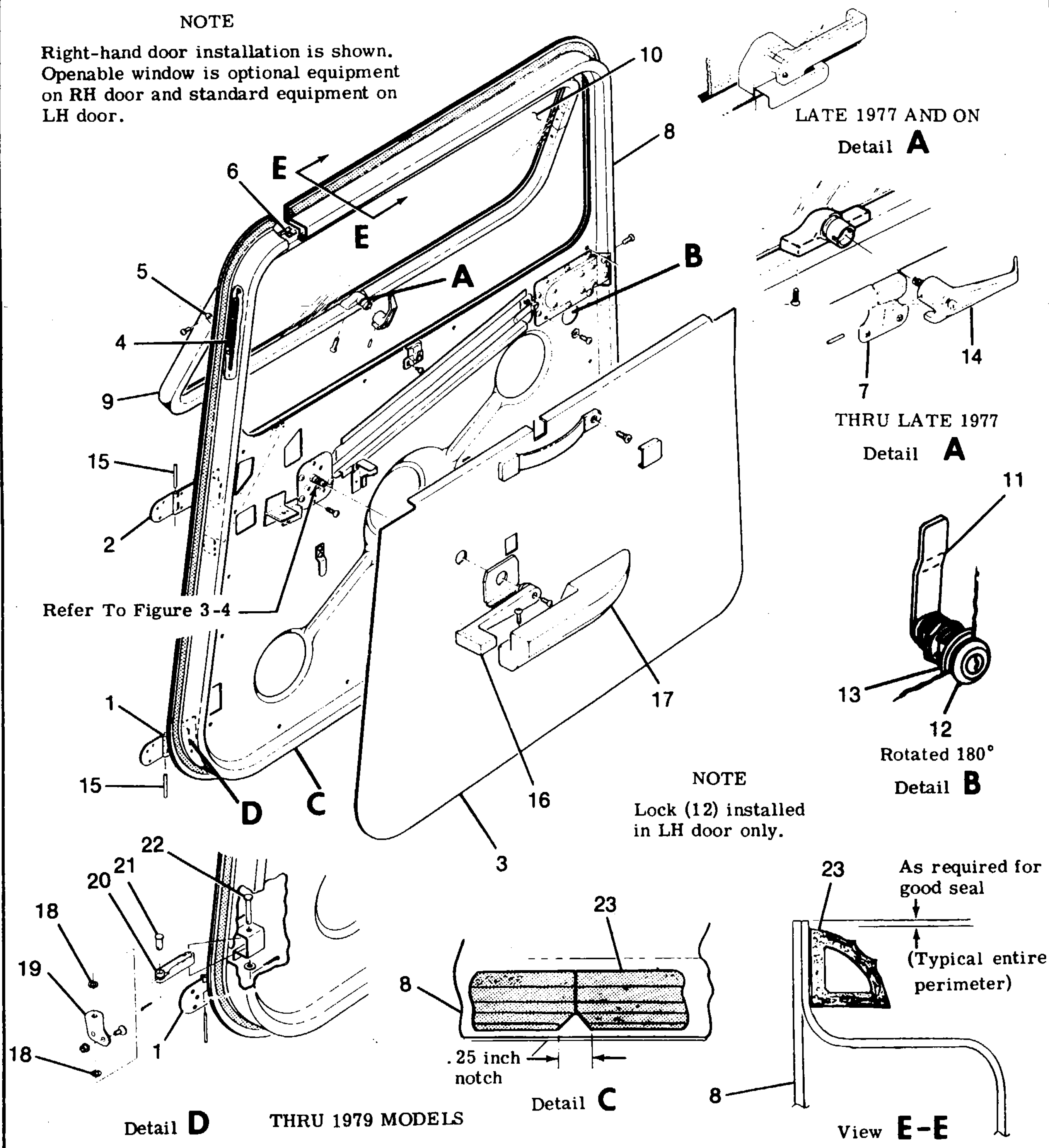
Reforming of bonded door flange by striking with soft mallet etc. is NOT permissible due to possible damage to bonded areas.

3-24. 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 splice with notch at door low point and apply a thin, even coat of EC-880 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.

3-25. DOOR LATCHES. (See figure 3-4.)

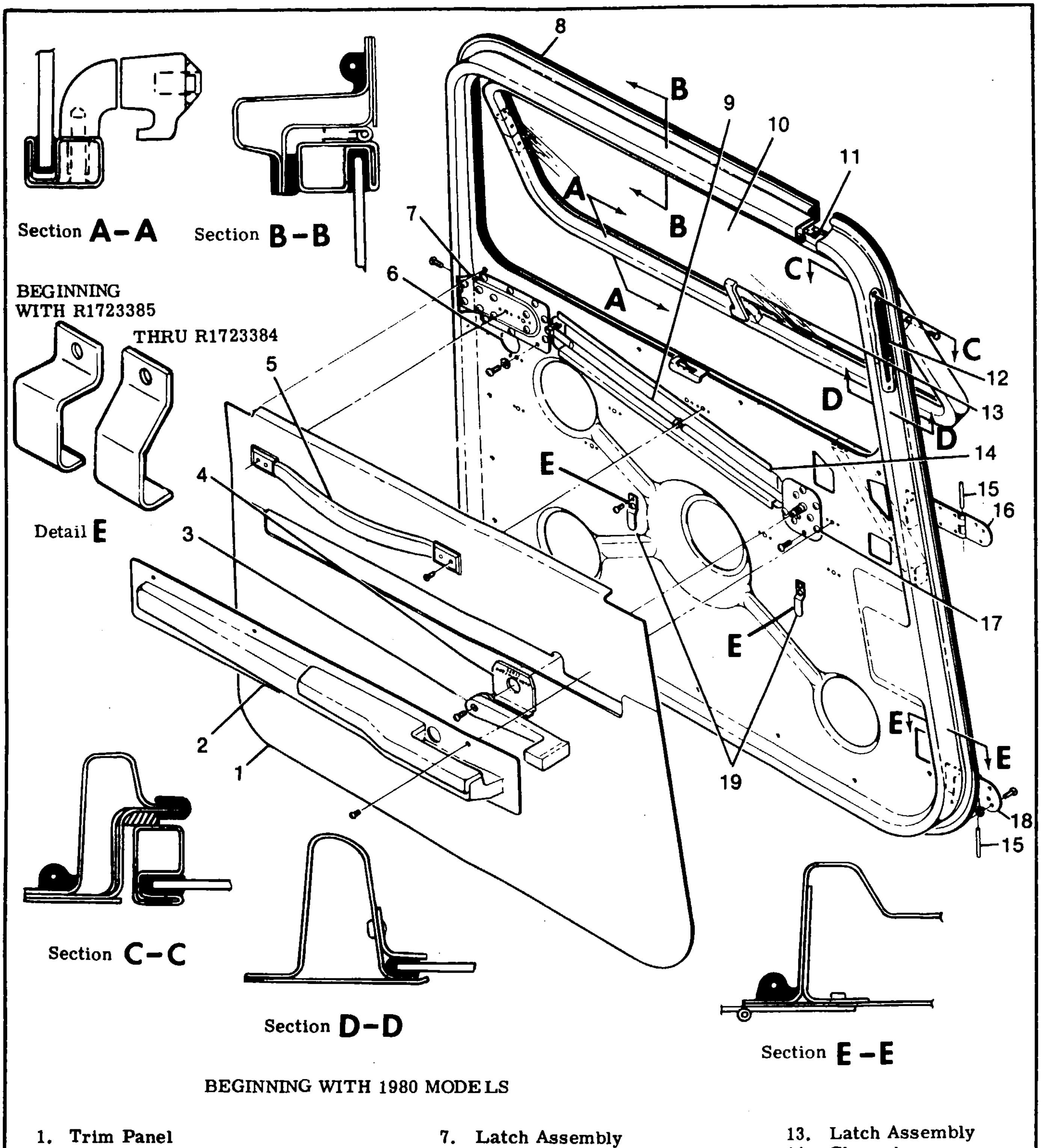
3-26. DESCRIPTION. The cabin door latch is a push-pull bolt type, utilizing a rotary clutch for positive bolt engagement. As door is closed, teeth on underside of bolt engage gear teeth on clutch. The clutch gear rotates in one direction only and holds door until handle is moved to LOCK position, driving bolt into slot.

3-27. ADJUSTMENT. Adjustment of latch or clutch cover is afforded by oversize and/or slotted holes. This adjustment ensures sufficient gear-to-bolt engagement and proper alignment.



1. Lower Hinge	7. Latch Striker Plate	13. Washer	19. Doorstop Bracket
2. Upper Hinge	8. Door Structure	14. Latch Handle	20. Doorstop Spring
3. Upholstery Panel	9. Window Frame	15. Hinge Pin	21. Clevis Pin
4. Spring	10. Window	16. Inside Handle	22. Clevis Pin
5. Window Stop	11. Cam	17. Armrest	23. Weatherstrip
6. Window Hinge	12. Lock Assembly	18. Washer	

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



1. Trim Panel
2. Arm Rest
3. Inside Handle
4. Escutcheon
5. Door Pull Assembly
6. Lock Assembly Mounting Hole
7. Latch Assembly
8. Weatherstrip
9. Push-Pull Rod
10. Window Assembly
11. Hinge Assembly
12. Spring
13. Latch Assembly
14. Channel
15. Hinge Pin
16. Upper Hinge
17. Base Plate
18. Lower Hinge
19. Upholstery Clip

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

NOTE

Door bolt adjustment thru 1977 and some early 1978 models is accomplished with adjustable push-pull rod (4). On some early 1978 models and on adjustment is made with pivot base plate (19) which incorporates elongated mounting holes.

1. Bearing Assembly
2. Nut
3. Spacer
4. Push-Pull Rod
5. Base Plate
6. Roll Pin
7. Bolt
8. Housing
9. Outside Handle
10. Spring
11. Support
12. Shaft Assembly
13. Screw
14. Upholstery Panel
15. Armrest
16. Screw
17. Inside Handle
18. Placard
19. Pivot Base Plate

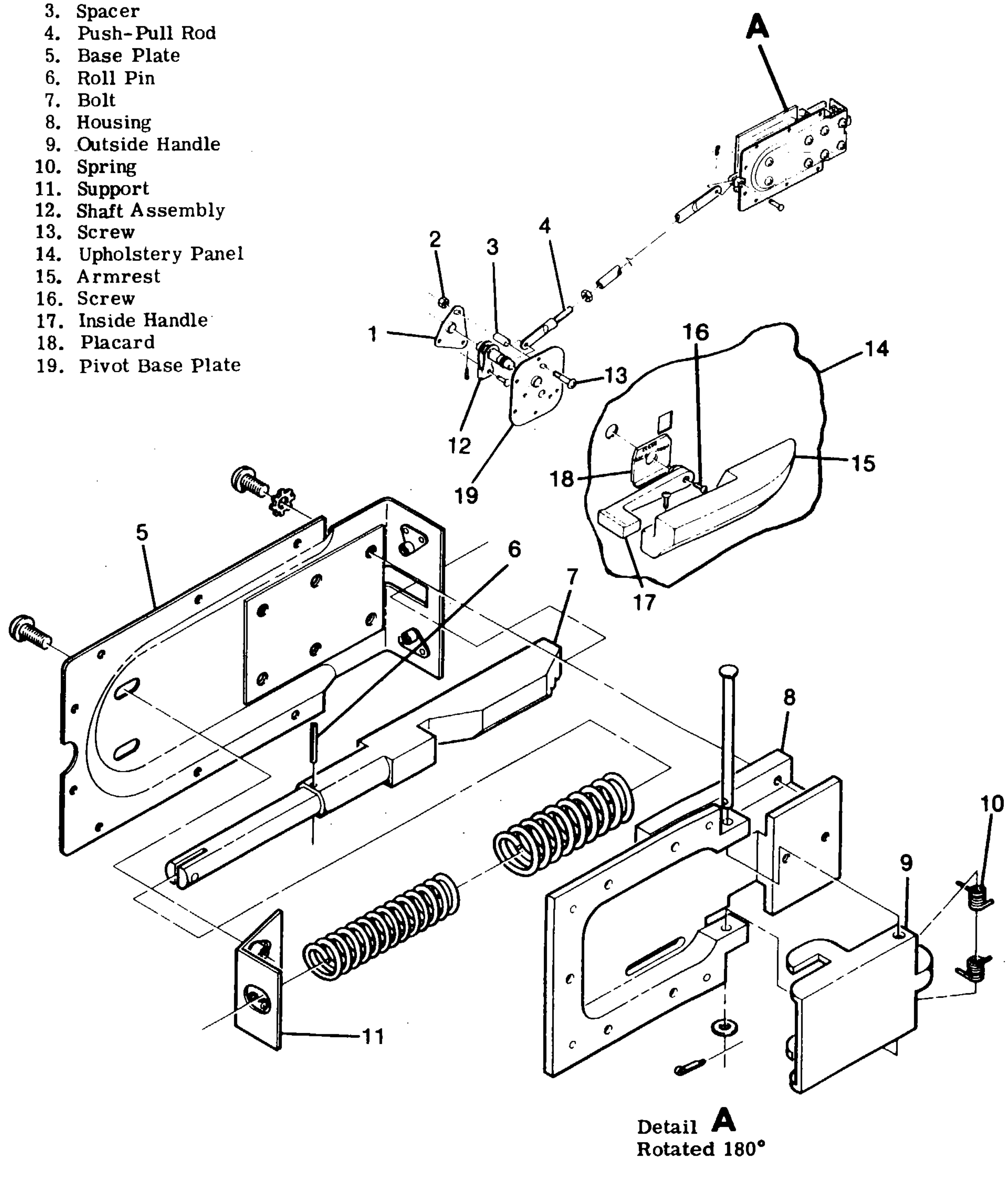
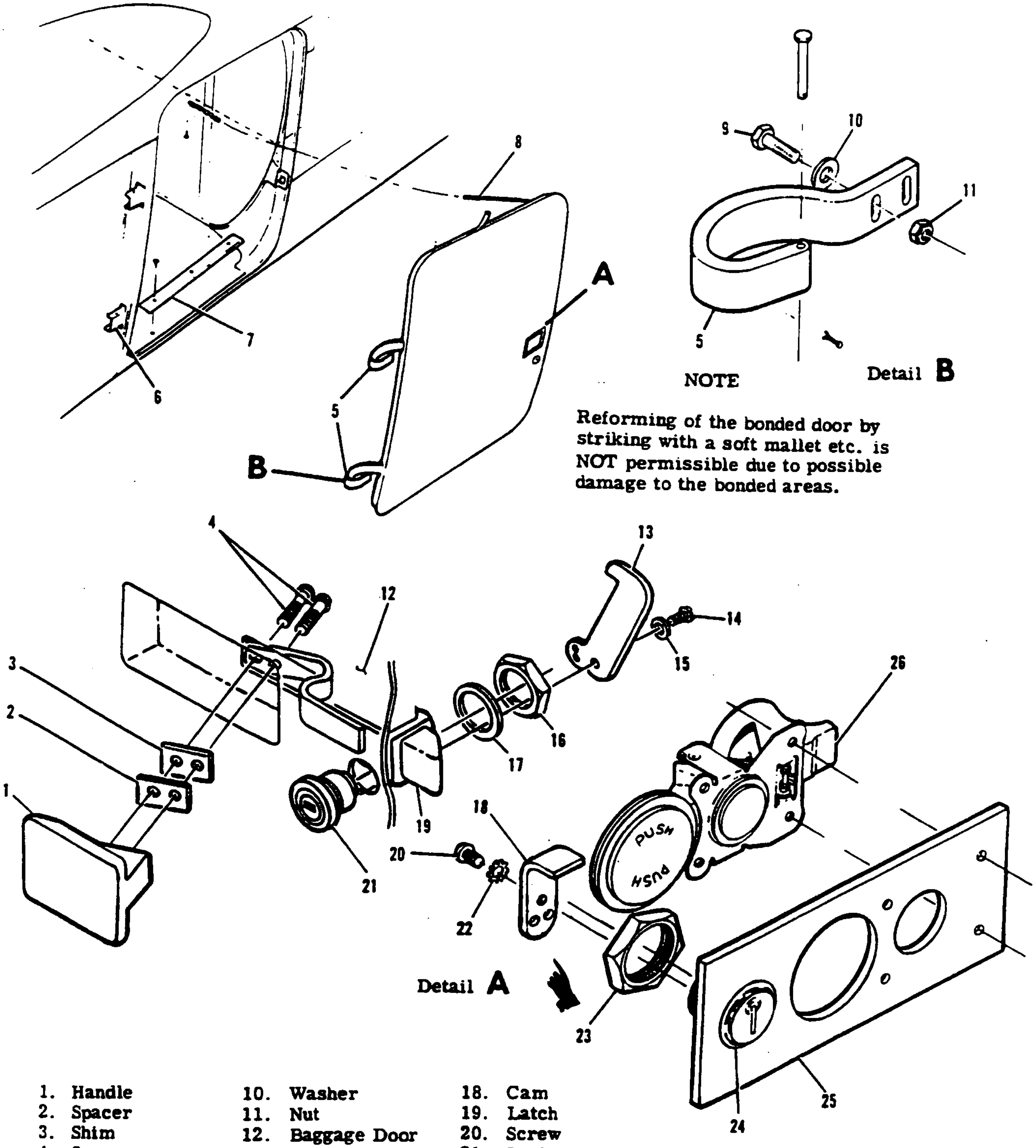


Figure 3-4. Door Latch Installation



NOTE

Reforming of the bonded door by striking with a soft mallet etc. is NOT permissible due to possible damage to the bonded areas.

1. Handle
2. Spacer
3. Shim
4. Screws
5. Hinge
6. Hinge Bracket
7. Scuff Plate
8. Chain
9. Bolt
10. Washer
11. Nut
12. Baggage Door
13. Cam
14. Screw
15. Washer
16. Nut
17. Washer
18. Cam
19. Latch
20. Screw
21. Lock Assembly
22. Washer
23. Nut
24. Lock Assembly
25. Mounting Pad
26. Latch Assembly

Figure 3-5. Baggage Door Installation

NOTE

Lubricate door latch per Section 2. No lubrication is recommended for rotary clutch.

3-28. LOCK. In addition to interior locks, a cylinder and key type lock is installed on left door. If lock is to be replaced, the new one may be modified to accept the original key. This is desirable, as the same key is used for ignition switch and cabin door lock. After removing old lock from door, proceed as follows:

a. Remove lock cylinder from new housing.
b. Insert original key into new cylinder and file off any protruding tumblers flush with cylinder. Without removing key, check that cylinder rotates freely in housing.
c. Install lock assembly in door and check lock operation with door open.
d. Destroy new key and disregard code number on cylinder.

3-29. INDEXING INSIDE HANDLE. (See figure 3-4.) When inside handle is removed, reinstall in relation to position of bolt (7) which is spring-loaded to CLOSE position. The following procedure may be used.

a. Temporarily install handle (17) on shaft assembly (12) approximately vertical.
b. Move handle (17) back and forth until handle centers in spring-loaded position.
c. Without rotating shaft assembly (12), remove handle (17) and install placard (18) with CLOSE index at top.
d. Install handle (17) to align with CLOSE index on placard (18), using screw (16).
e. Install arm rest (15) on upholstery panel (14).

3-30. BAGGAGE DOOR. (See figure 3-5.)

3-31. REMOVAL AND INSTALLATION. (See figure 3-5.)

a. Remove door-pull handle.
b. Disconnect door-stop chain (8).
c. Remove buttons securing upholstery panel and remove panel.
d. Remove bolts (90 securing door to hinges.
e. Reverse preceding steps for installation.

CAUTION

Reforming of bonded door flange by striking with soft mallet etc. is NOT permissible due to possible damage to bonded areas.

3-32. BAGGAGE DOOR WEATHERSTRIP. A rubber weatherstrip is cemented around the edge of the baggage door and seals the door to the fuselage structure when the door is closed. A new seal can be installed after carefully cleaning door and weatherstrip contact surfaces. Apply a thin even coat of EC-880 adhesive, (3M Co.) or equivalent and allow to dry until tacky before pressing into place.

3-33. SEATS. (See figure 3-6.)

3-34. PILOT AND COPILOT. (See figure 3-6.)

a. RECLINGING BACK/FORE-AND-AFT ADJUST.
b. ARTICULATING RECLINE/VERTICAL ADJUST.

3-35. DESCRIPTION. These seats are manually-operated throughout their full range of operation. Seat stops are provided to limit fore-and-aft travel.

3-36. REMOVAL AND INSTALLATION. (See figure 3-6.)

a. Remove seat stops from rails.
b. Slide seat fore-and-aft to disengage seat rollers from rails.
c. Lift seat out.
d. Reverse preceding steps for installation. Ensure all seat stops are reinstalled.

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.

3-37. CENTER. (See figure 3-6.)

a. DOUBLE-WIDTH BOTTOM AND BACK/SINGLE RECLINING BACK.
b. DOUBLE-WIDTH BOTTOM/INDIVIDUAL RECLINGING BACKS.

3-38. DESCRIPTION. These seats are permanently bolted to the cabin structure and incorporate no adjustment provisions other than manually-adjustable three position backs.

3-39. REMOVAL AND INSTALLATION. (See figure 3-6.)

a. Remove bolts securing seat to cabin structure.
b. Lift seat out.
c. Reverse preceding steps for installation.

3-40. AUXILIARY. (See figure 3-6.)

a. FOLD-UP.

3-41. DESCRIPTION. These seats are permanently bolted to the cabin structure and have no adjustment provisions. The seat structure is mounted on hinge brackets with pivot bolts, thus allowing seat to be pivoted upward to acquire more baggage area.

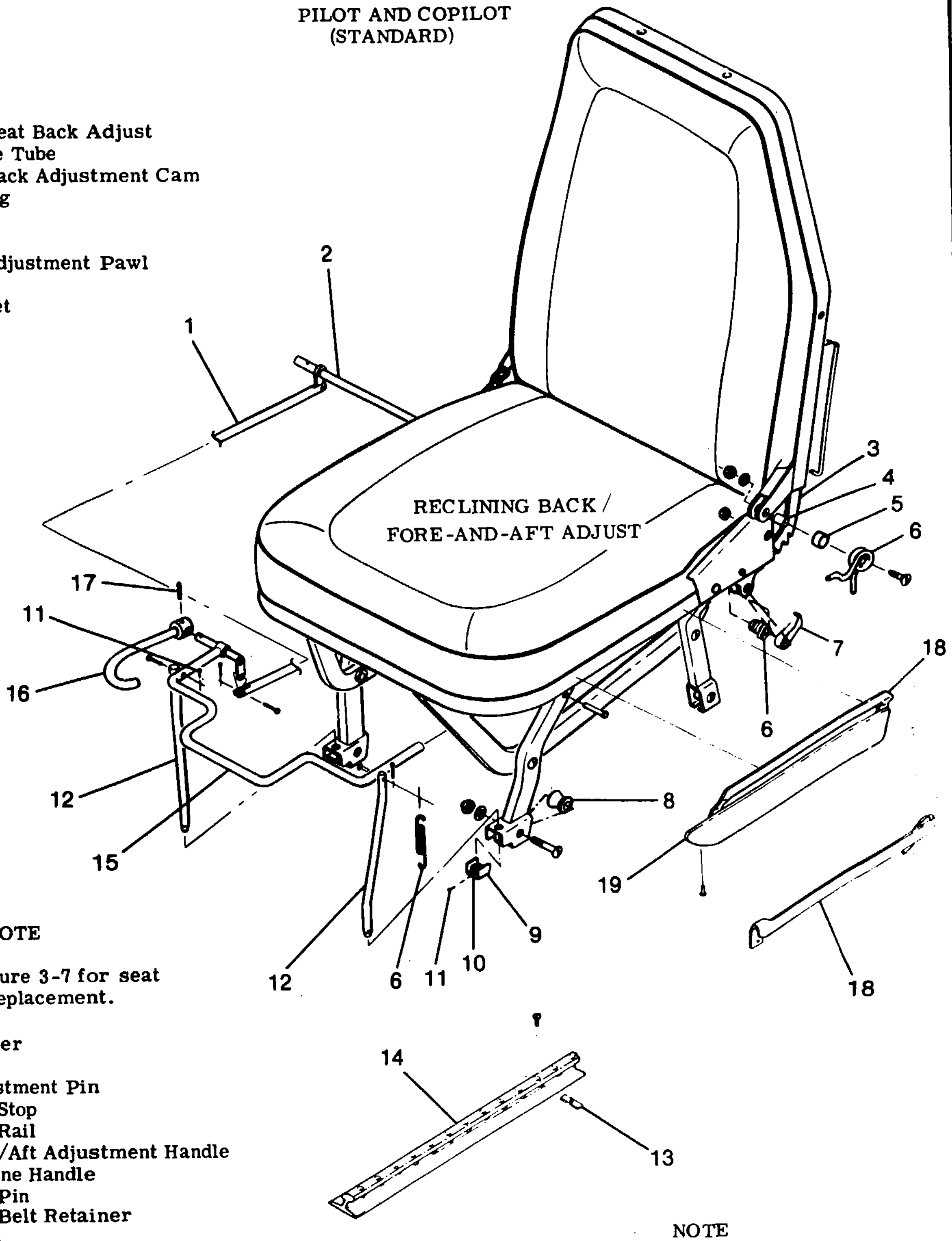
3-42. REMOVAL AND INSTALLATION. (See figure 3-6.)

a. Remove bolts securing seat structure to hinge brackets.
b. Lift seat out.
c. Reverse preceding steps for installation.

3-43. 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-tube framework is 6061 aluminum, heat-treated to a T-6 condition. Use a heliarc weld on these seats, as torch welds will destroy heat-treatment of frame structure. Figure 3-7 outlines instructions for replacing defective cams on

PILOT AND COPILOT
(STANDARD)

1. Link Seat Back Adjust
2. Torque Tube
3. Seat Back Adjustment Cam
4. Bushing
5. Spacer
6. Spring
7. Seat Adjustment Pawl
8. Roller
9. Bracket



NOTE

Refer to figure 3-7 for seat back cam replacement.

10. Washer
11. Pin
12. Adjustment Pin
13. Seat Stop
14. Seat Rail
15. Fore/Aft Adjustment Handle
16. Recline Handle
17. Roll Pin
18. Seat Belt Retainer
19. Trim

NOTE

Install seat stop in eleventh hole from the front of the outboard seat rail.

NOTE

Beginning with late 1977 models, seat belt retainer (18) is separate from seat trim (19) and is attached directly to seat frame with four screws.

Figure 3-6. Seat Installation (Sheet 1 of 9)

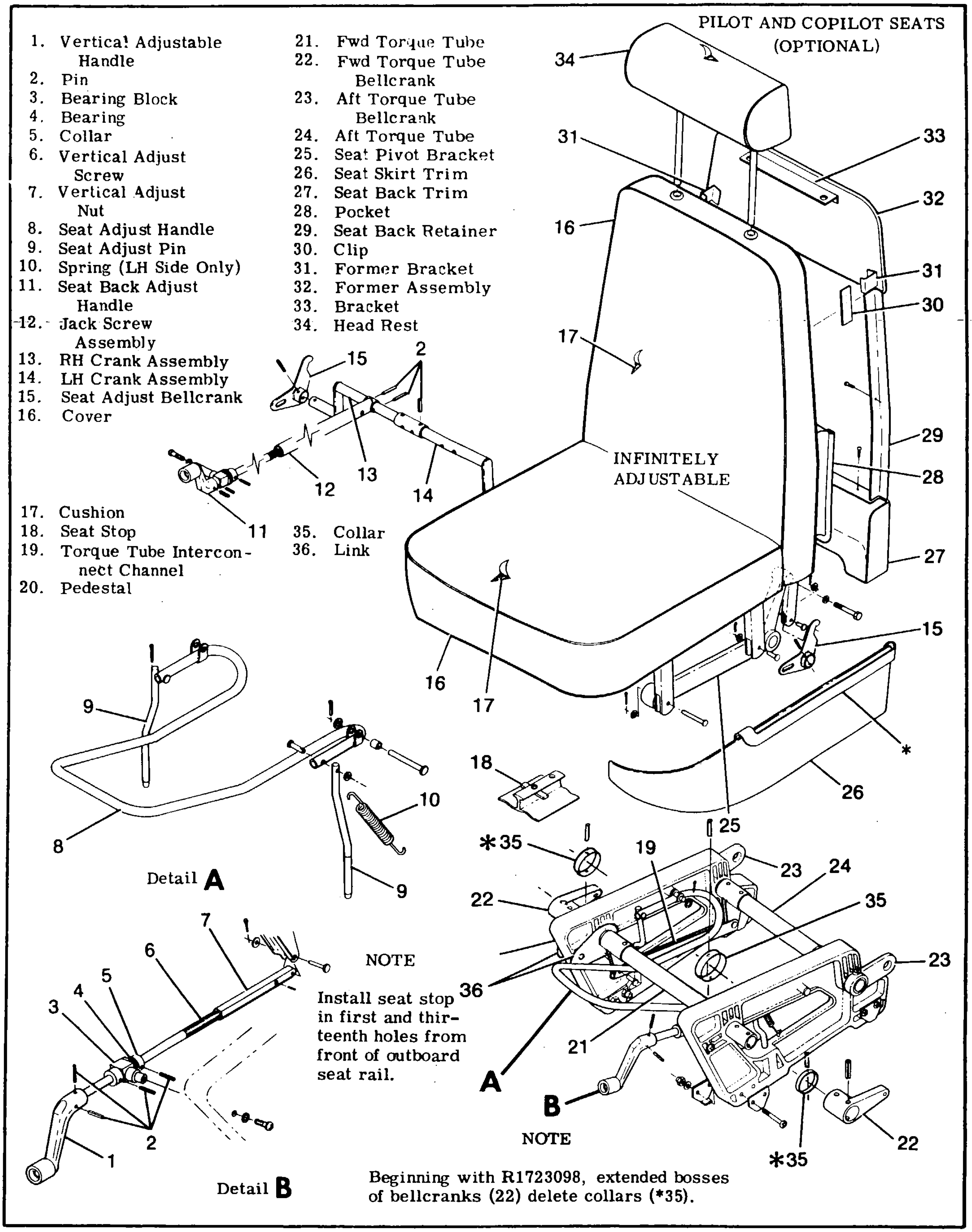
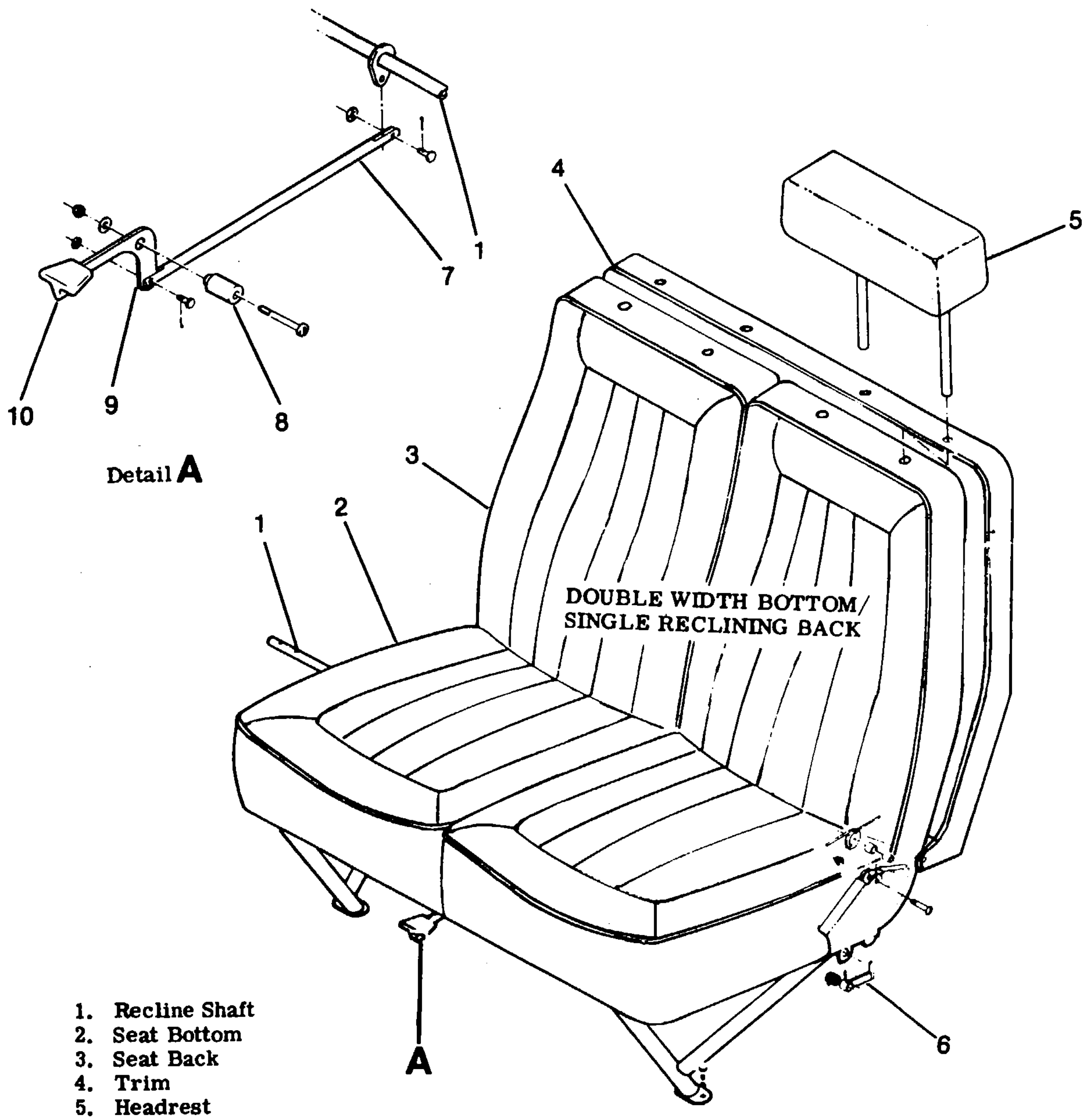


Figure 3-6. Seat Installation (Sheet 2 of 9)

CENTER SEAT
(STANDARD)



1. Recline Shaft
2. Seat Bottom
3. Seat Back
4. Trim
5. Headrest
6. Recline Pawl
7. Link
8. Bushing
9. Bellcrank
10. Knob

Figure 3-6. Seat Installation (Sheet 3 of 9)

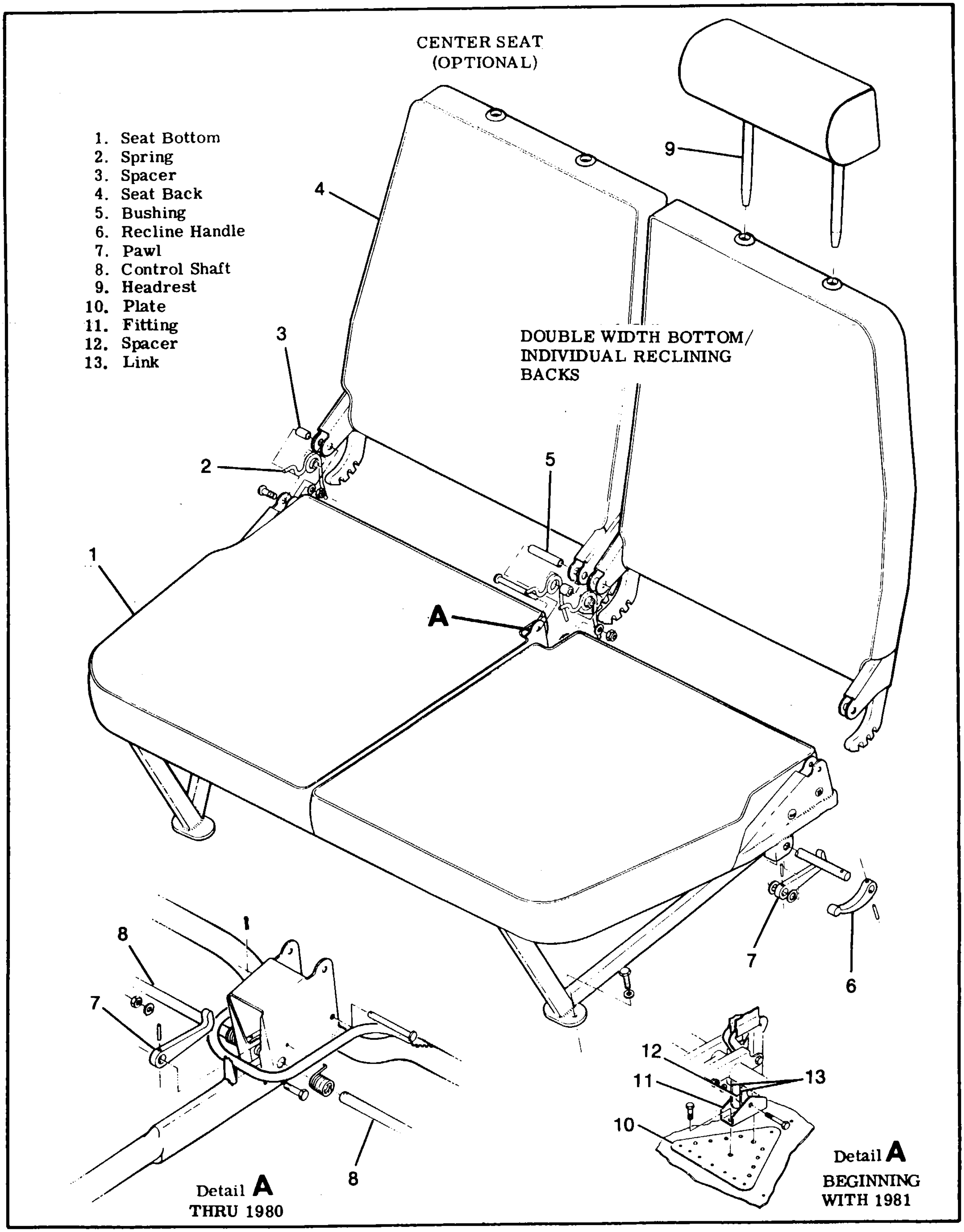


Figure 3-6. Seat Installation (Sheet 4 of 9)

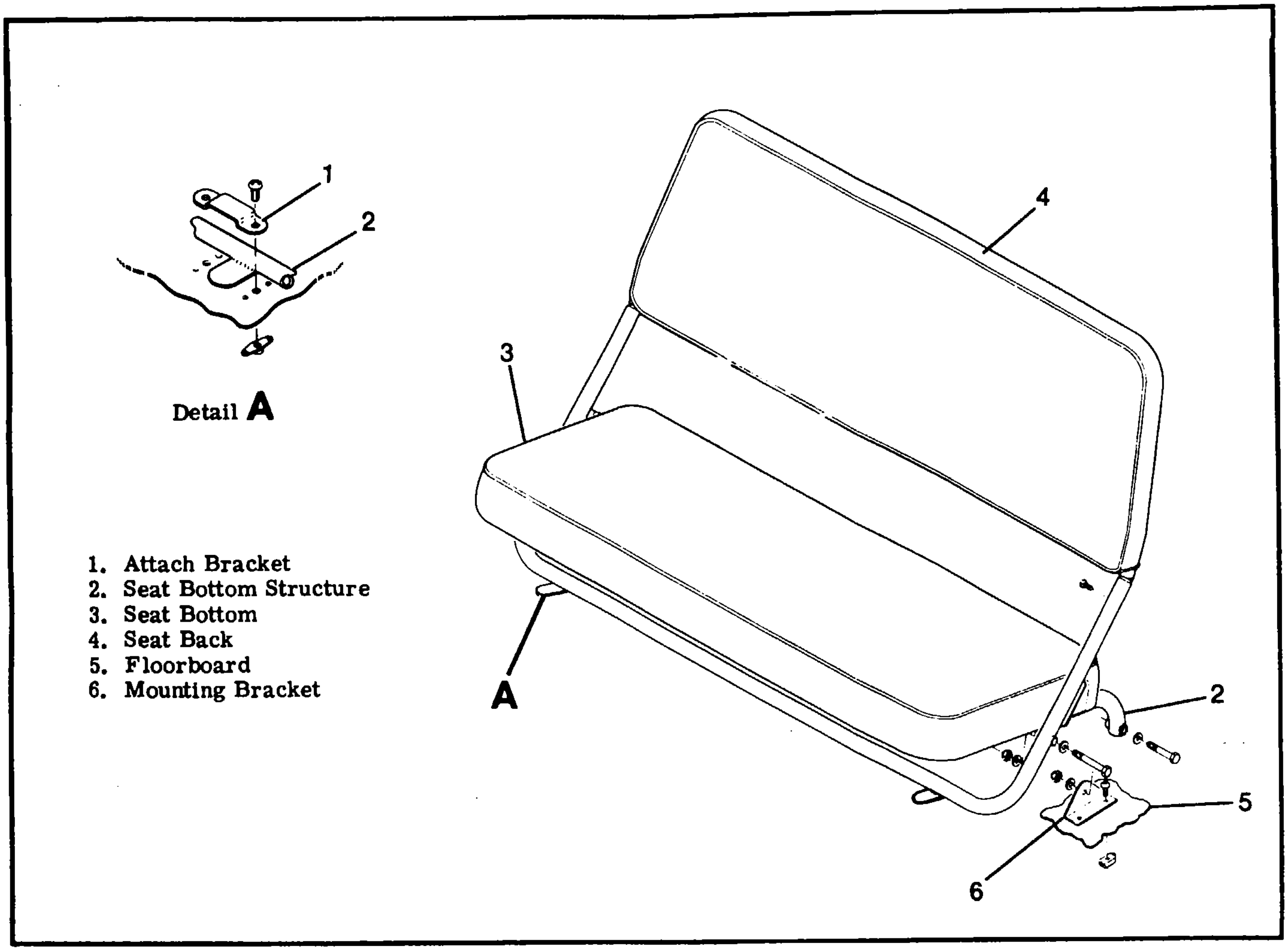


Figure 3-6. Seat Installation (Sheet 5 of 9)

reclining bench-type seat backs.

3-44. 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 unfamiliary with upholstery practices, the mechanic should make careful notes during removal of each item to facilitate replacement later.

3-45. 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 repair of glass-fiber constructed components.

3-46. SOUNDPROOFING. The aircraft is insulated with spun glass mat-type insulation and a sound deadener 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. A soundproofing panel is placed in gap between wing and fuselage and held in place by wing root fairings.

3-47. CABIN HEADLINERS. (See figure 3-8.)

3-48. REMOVAL AND INSTALLATION. (See figure 3-8.)

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.

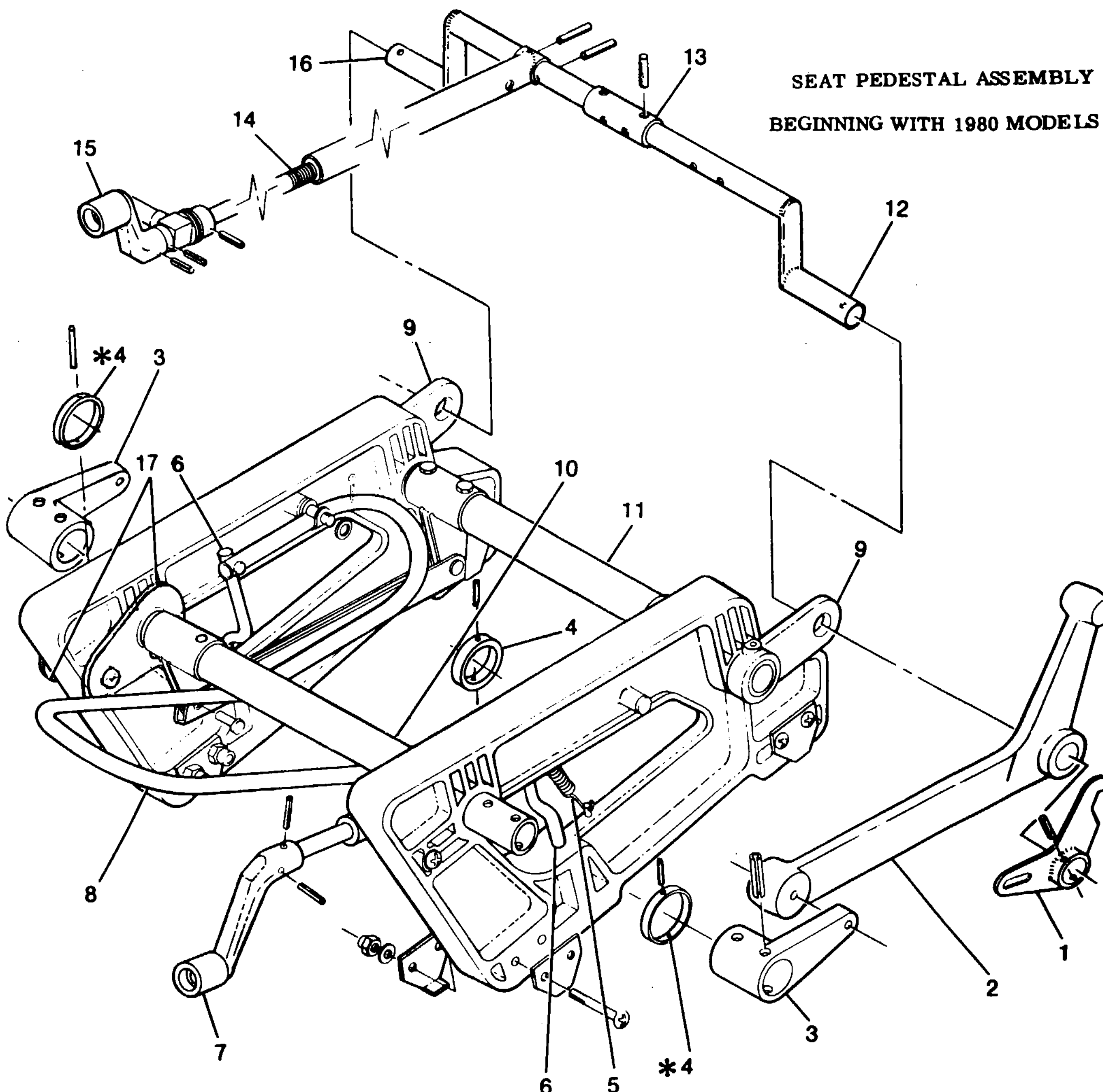
c. Remove screws securing headliner and carefully take down headliner.

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 installation. 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.

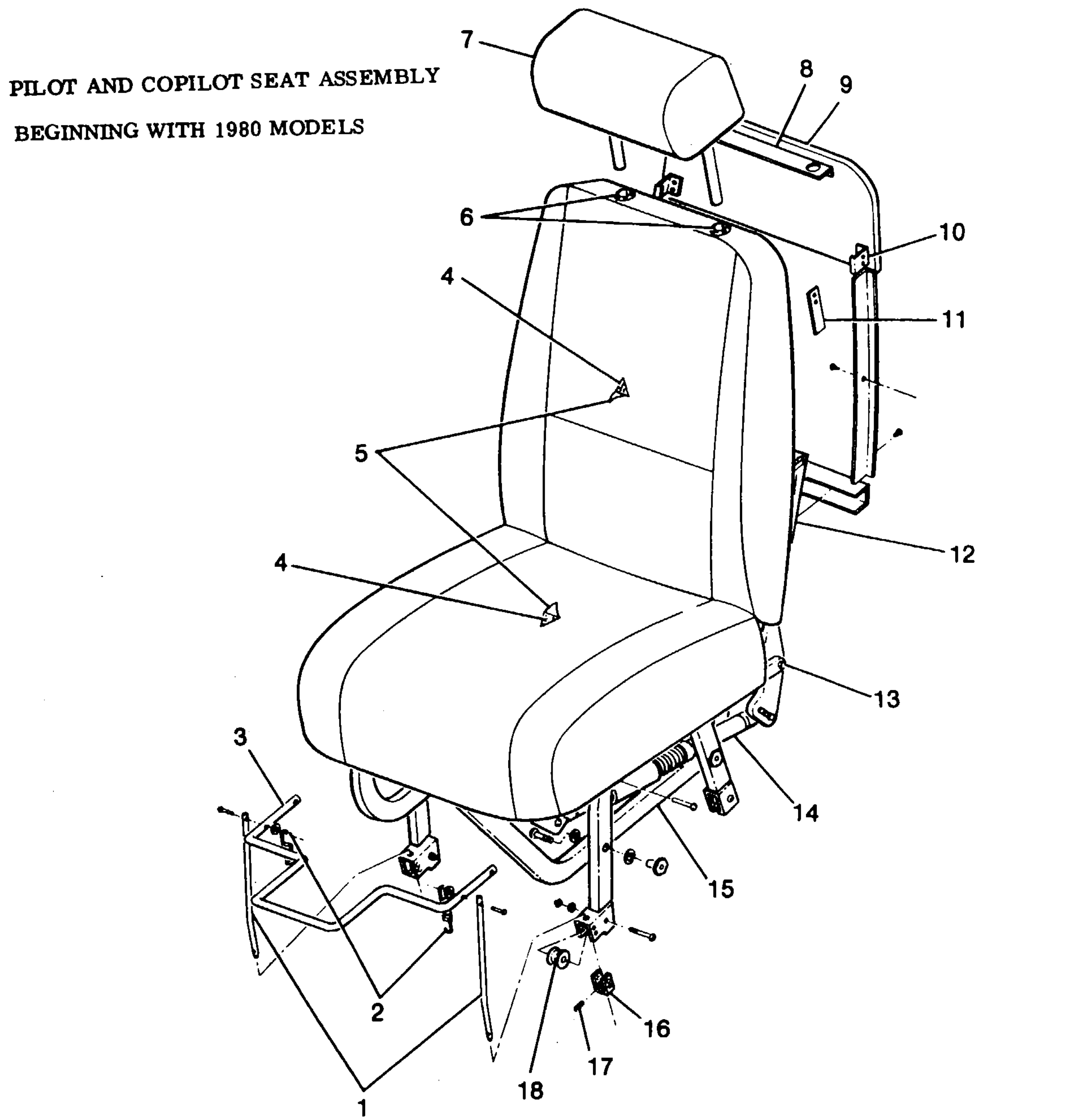


NOTE

Beginning with R1723098, extended bosses of bellcranks (3) delete collars (*4).

1. Seat Back Adjust Bellcrank
2. Pivot Bracket
3. Bellcrank
4. Spacer
5. Spring
6. Seat Adjust Pin
7. Vertical Adjust Handle
8. Seat Adjust Handle
9. Torque Tube Bellcrank
10. Forward Torque Tube
11. Aft Torque Tube
12. LH Crank Assembly
13. Splice
14. Jack Screw
15. Seat Back Adjust
16. Handles
17. Link

Figure 3-6. Seat Installation (Sheet 6 of 9)

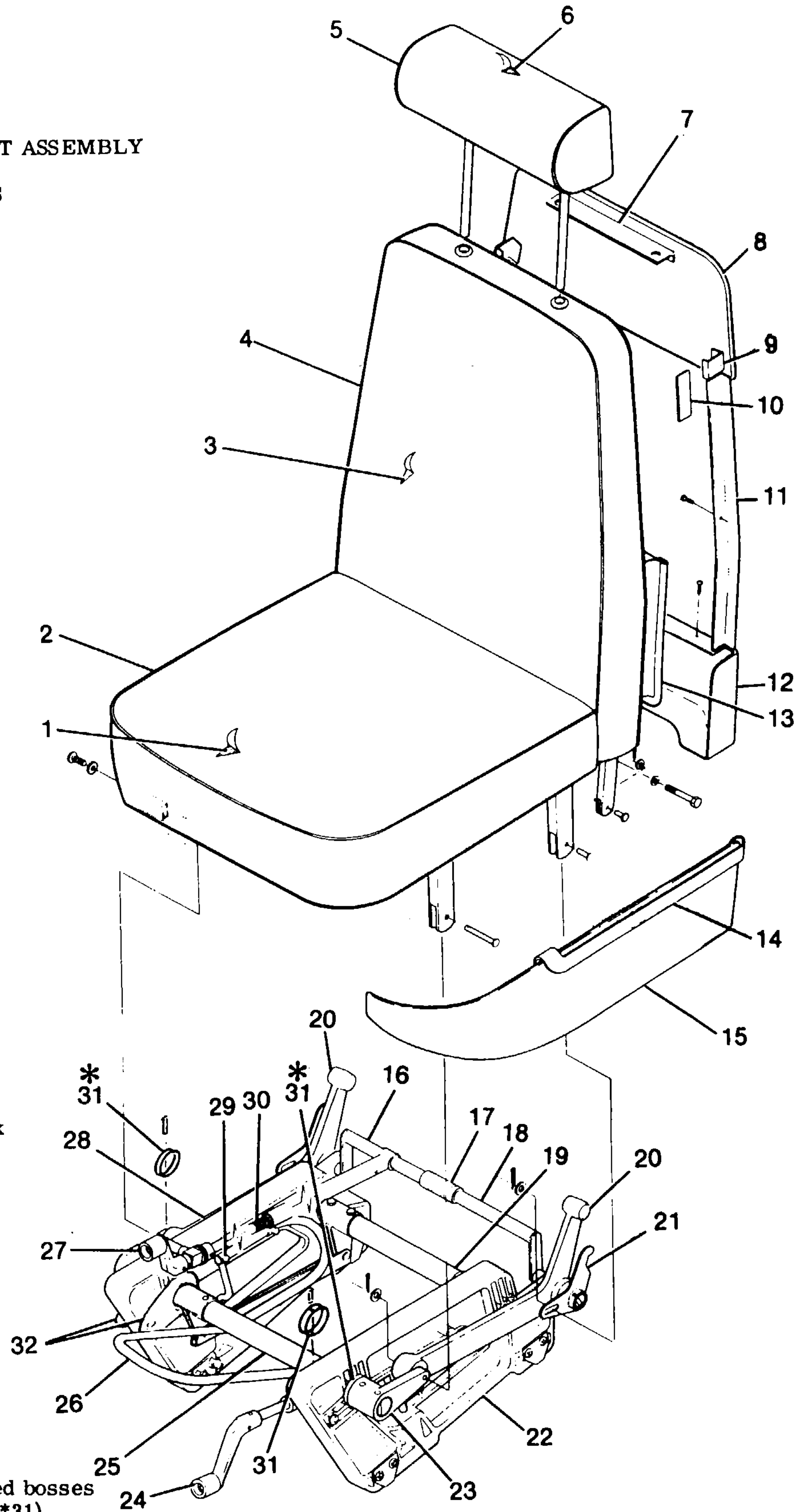


1. Seat Handle Pin
2. Spring
3. Seat Handle Adjust
4. Cushion
5. Cover
6. Grommet
7. Head Rest
8. Former Bracket
9. Former Assembly
10. Bracket
11. Clip
12. Pocket
13. Bolt and Spacer
14. Lock Cylinder
15. Frame
16. Bracket
17. Pin
18. Roller

Figure 3-6. Seat Installation (Sheet 7 of 9)

INFINITELY-ADJUSTABLE SEAT ASSEMBLY

BEGINNING WITH 1980 MODELS

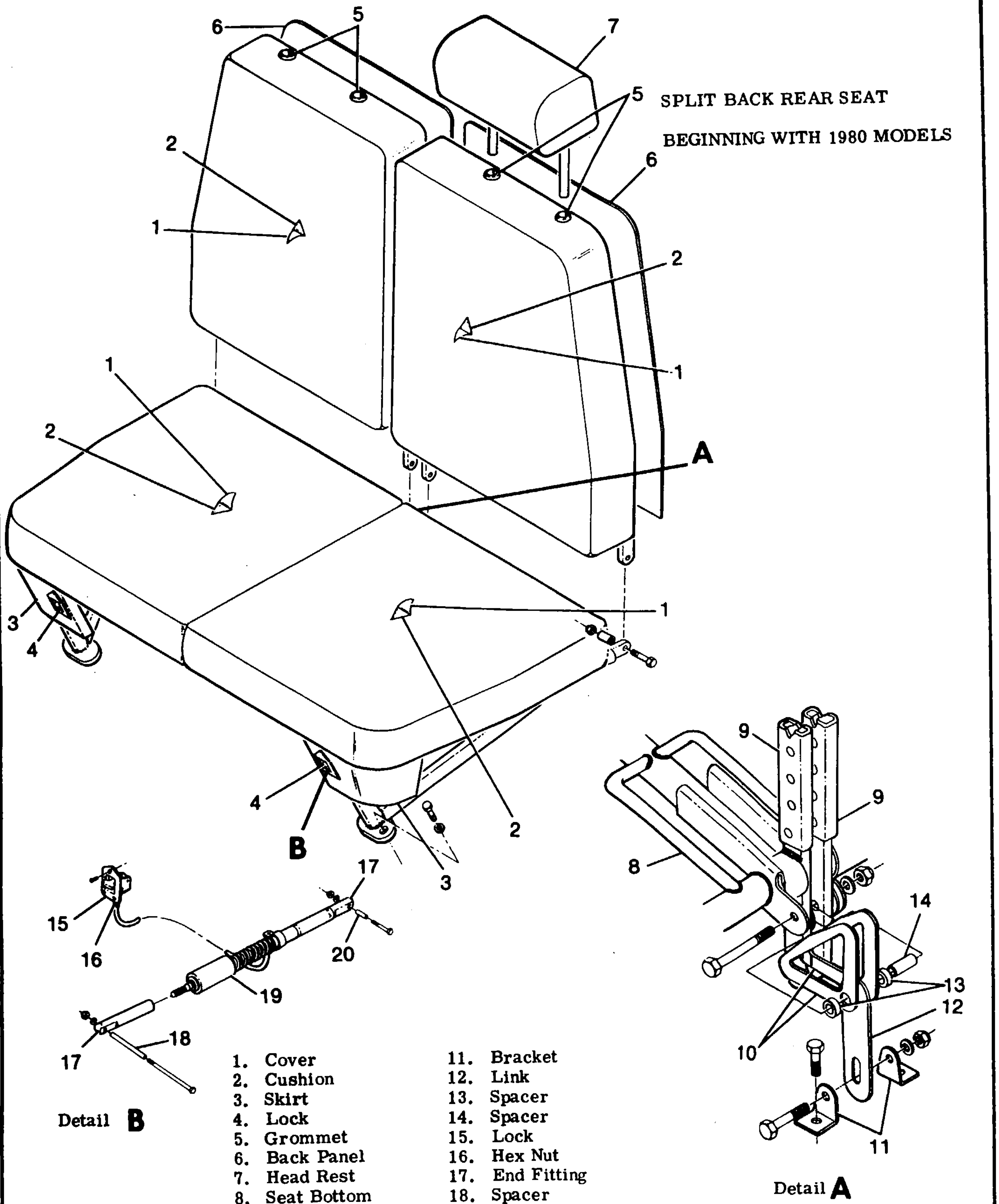


1. Cushion
2. Seat Bottom Cover
3. Cushion
4. Seat Back Cover
5. Head Rest
6. Head Rest Cover
7. Former Bracket
8. Former Assembly
9. Bracket
10. Clip
11. Seat Back Retainer
12. Seat Back Trim
13. Pocket Assembly
14. Seat Belt Retainer
15. Trim
16. RH Crank Assembly
17. Splice
18. LH Crank Assembly
19. Aft Torque Tube
20. Pivot Bracket
21. Seat Back Adjust Bellcrank
22. LH Pedestal
23. Bellcrank
24. Vertical Adjust Handle
25. Forward Torque Tube
26. Seat Handle Adjust
27. Seat Back Adjust Handle
28. RH Pedestal
29. Seat Adjust Pin
30. Jack Screw
31. Collar
32. Link

NOTE

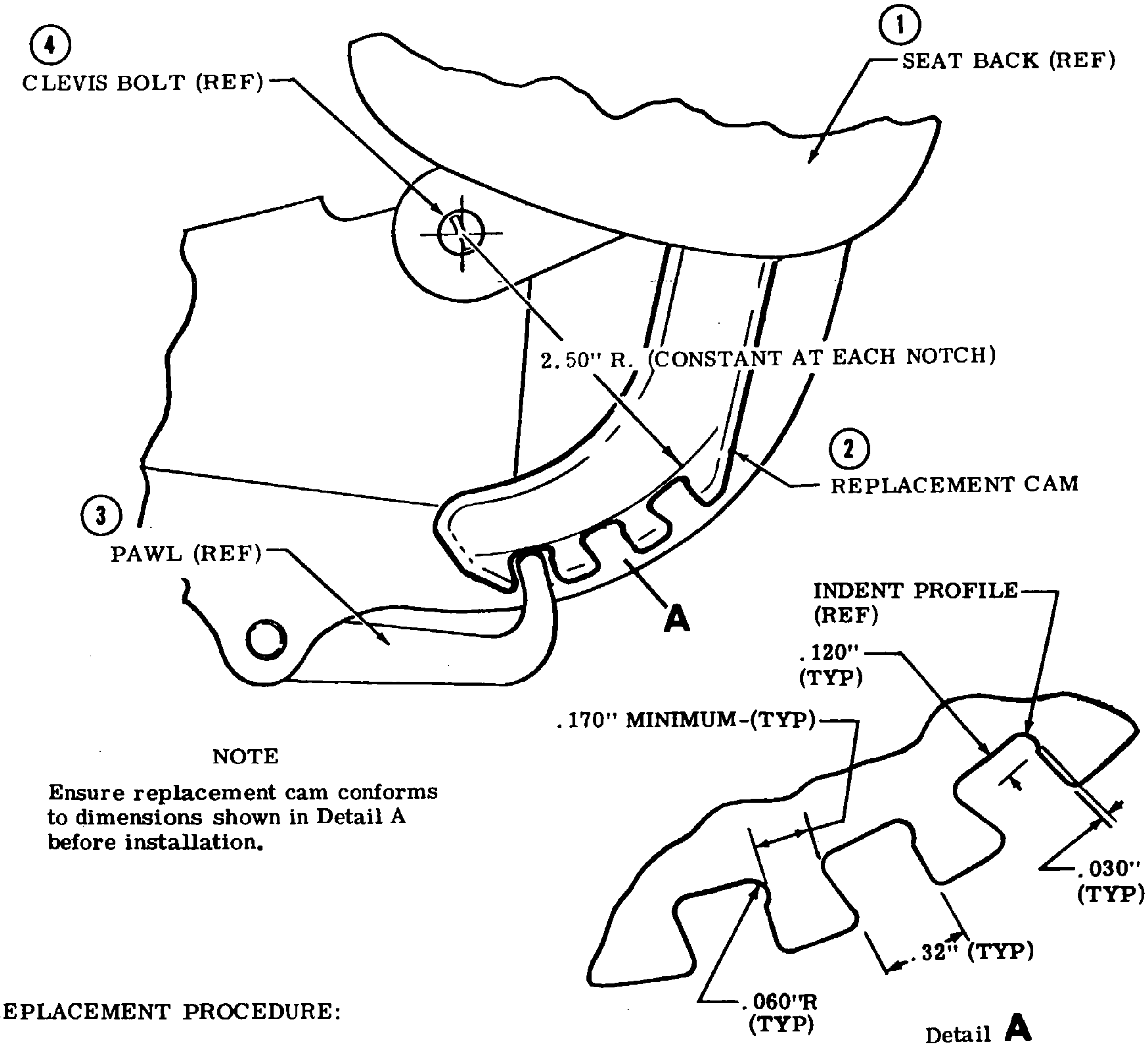
Beginning with R1723098, extended bosses of bellcranks (23) delete collars (*31).

Figure 3-6. Seat Installation (Sheet 8 of 9)



1. Cover
2. Cushion
3. Skirt
4. Lock
5. Grommet
6. Back Panel
7. Head Rest
8. Seat Bottom
9. Seat Back Legs
10. Seat Belt Stirrup
11. Bracket
12. Link
13. Spacer
14. Spacer
15. Lock
16. Hex Nut
17. End Fitting
18. Spacer
19. Lock Cylinder
20. Spacer

Figure 3-6. Seat Installation (Sheet 9 of 9)



NOTE

Ensure replacement cam conforms to dimensions shown in Detail A before installation.

REPLACEMENT PROCEDURE:

a. Remove seat from aircraft.

b. Remove plastic upholstery panels from aft side of seat back, then loosen upholstery retaining rings and upholstery material as required to expose rivets retaining old cam assembly.

c. Drill out existing rivets and insert new cam assembly (2). Position seat back so pawl (3) engages first cam slot as illustrated.

d. Position cam so each slot bottom aligns with the 2.50" radius as illustrated.

e. 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.

f. Reinstall upholstery, upholstery panels and seat.

Figure 3-7. Seat Back Cam Replacement

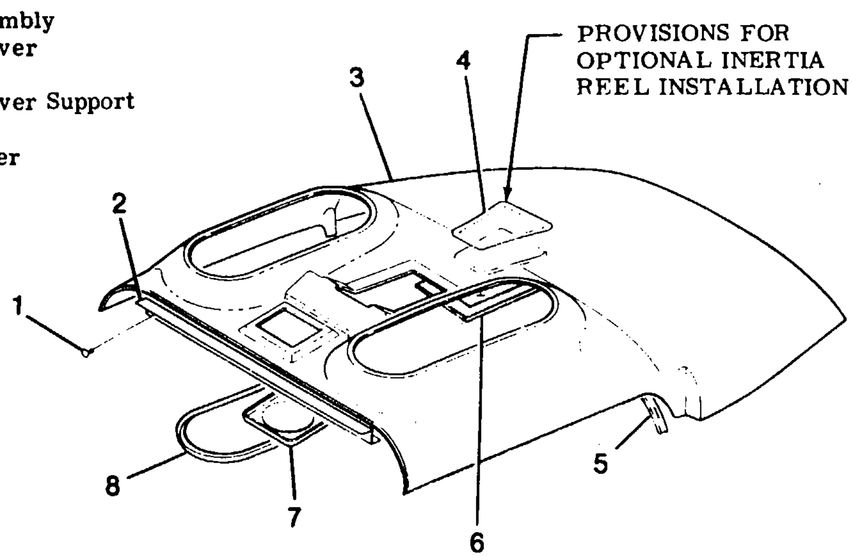


Figure 3-8. Cabin Headliner Installation

3-49. UPHOLSTERY SIDE PANELS. Removal of upholstery side panels is accomplished by removing seats for access, then removing parts attaching panels. 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.

3-50. CARPETING. Cabin area and baggage compartment carpeting is held in place by rubber cement, small sheet metal screws and retaining strips. When fitting a new carpet, use old one as a pattern for trimming and marking screw holes.

3-51. SAFETY PROVISIONS.

3-52. CARGO TIE-DOWNS. Cargo tie-downs are used to ensure baggage cannot enter seating area during flight. Methods of attaching tie-downs are illustrated in figure 3-9. The eyebolt and nutplate can be located at various points. The sliding tie-down lug also utilizes eyebolt and attaches to a seat rail.

3-53. SAFETY BELTS. (See figure 3-11.) Safety belts should be replaced if frayed or cut, latches are defective or stitching is broken. Attaching parts should be replaced if excessively worn or defective.

3-54. SHOULDER HARNESS. (See figure 3-11.) Individual shoulder harnesses may be installed for each seat except auxiliary. Each harness is connected to the upper fuselage structure and to the seat safety belt buckle. Component parts should be replaced as outlined in the preceding paragraph.

3-55. GLIDER TOW-HOOK. A glider tow-hook, which is mounted in place of the tail tie-down ring, is available for all models.

3-56. REAR VIEW MIRROR. A rear view mirror may be installed on the cowl deck above the instrument panel. Figure 3-10 illustrates details for rear view mirror installation. Optional thru R1722930.

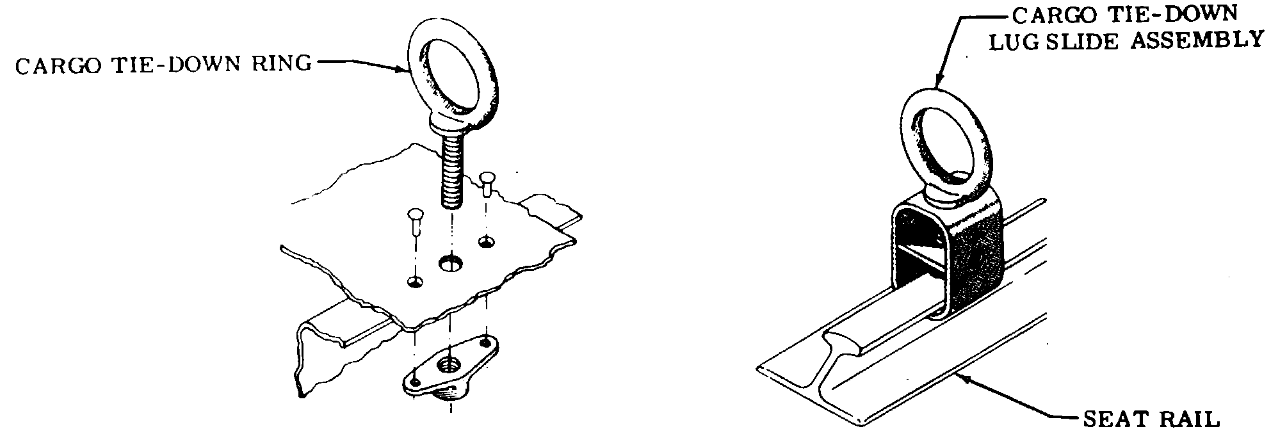
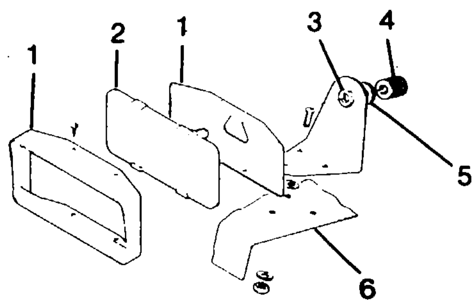


Figure 3-9. Cargo Tie-Down Rings



1. Cover
2. Mirror
3. Grommet
4. Nut
5. Washer
6. Deck Skin

Optional thru R1722930

Figure 3-10. Rear View Mirror Installation

SHOP NOTES:

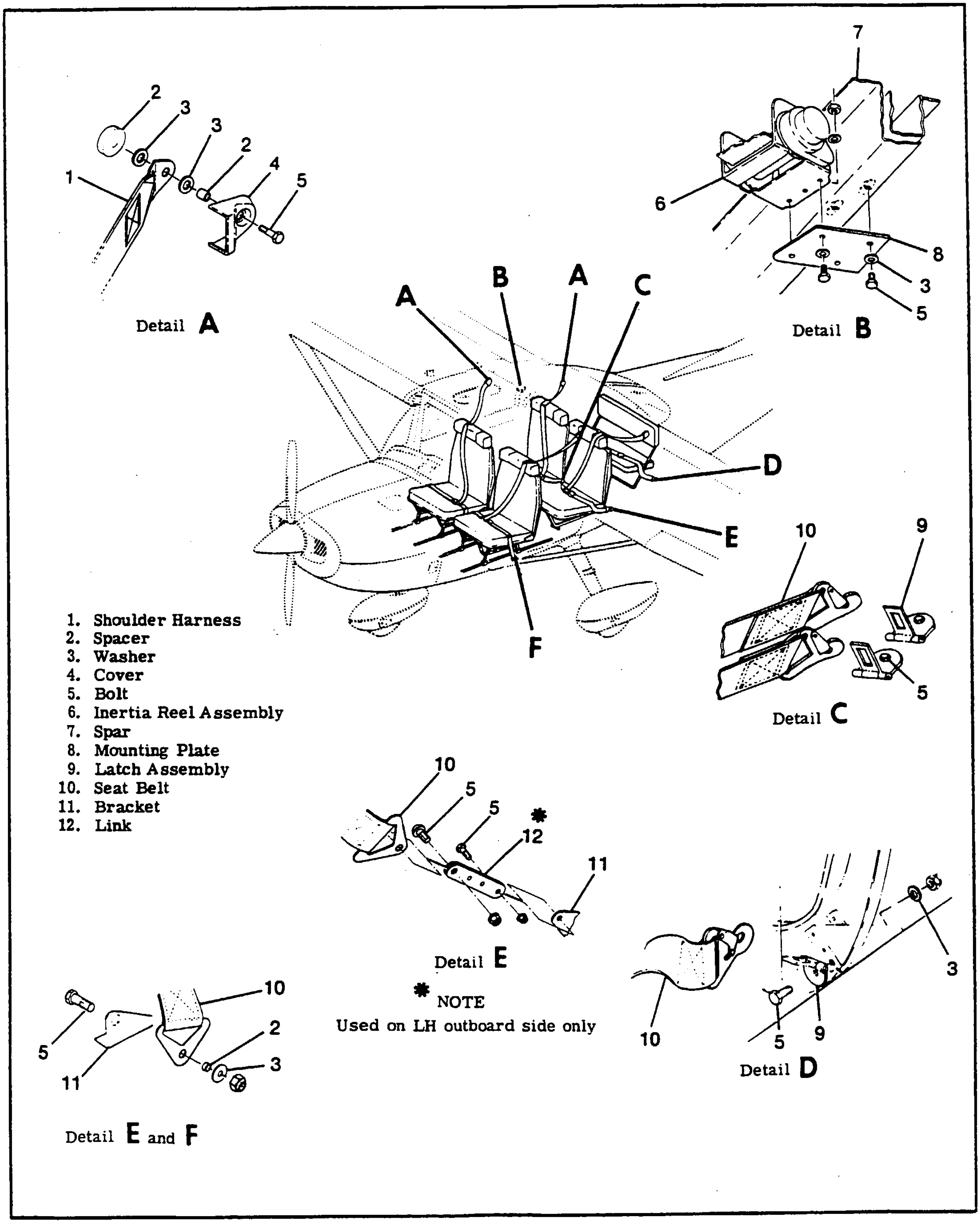
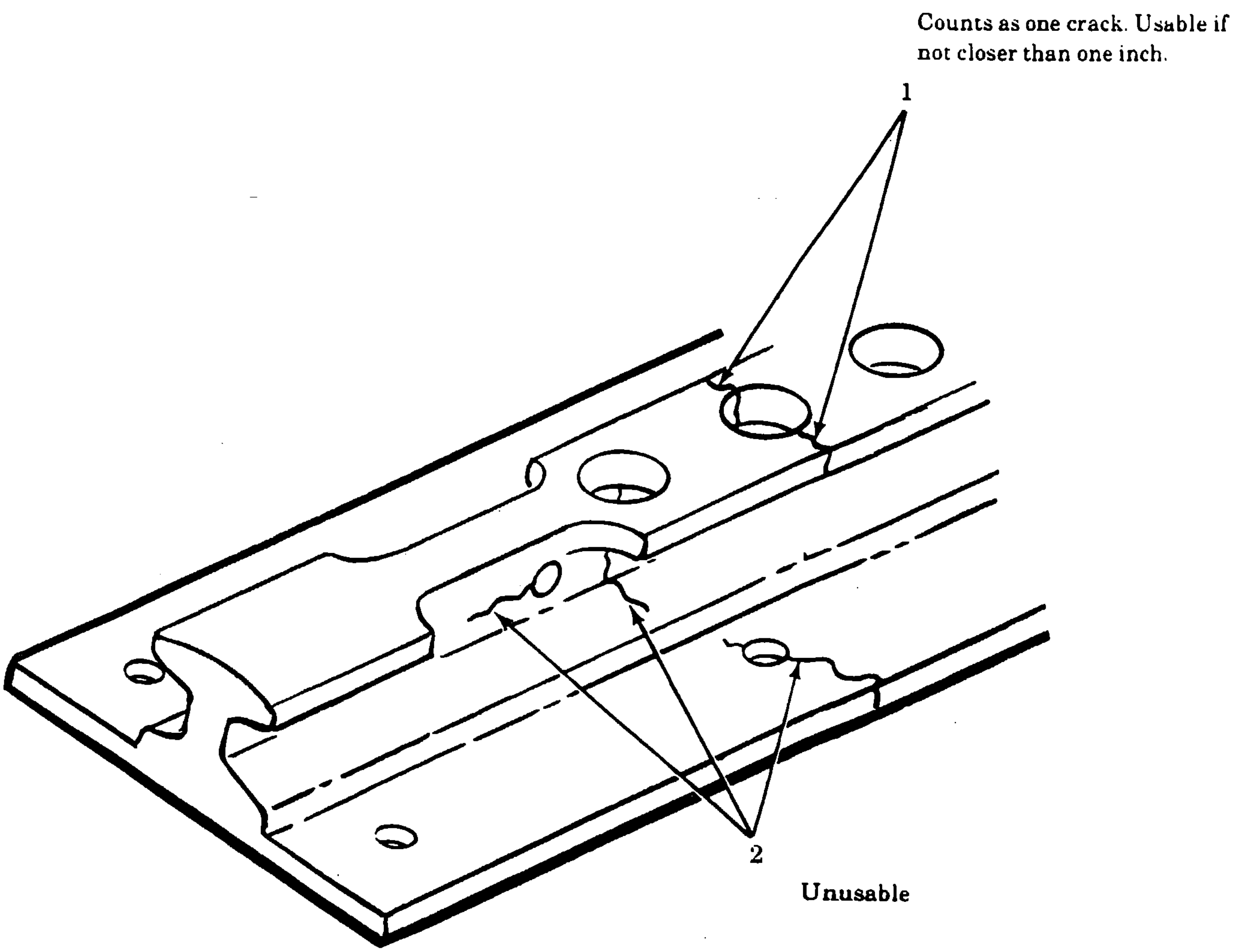


Figure 3-11. Seat Belt and Shoulder Harness Installation



REPLACE SEAT RAIL WHEN:

a. Any portion of web or flange is cracked (index 2).
b. Any crack in crown of rail is in any direction other than right angle to length of rail.
c. Number of cracks on 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 not permissable on seat rails with cracks.

Figure 3-12. Seat Rail Inspection

SECTION 4

WINGS AND EMPENNAGE

TABLE OF CONTENTS — Page No. Aerofiche/Manual

4-1. WINGS AND EMPENNAGE.

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

4-3. DESCRIPTION. Each all-metal wing 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. Colored navigation 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 tank of wing being removed.
d. Disconnect.
   1. Electrical wires at wing root disconnects.
   2. Fuel lines at wing root. (Refer to precautions outlined in Section 12.
   3. Pitot line (left wing only) at wing root.
   4. Cabin ventilator hose at wing root.
e. Reduce aileron cable tension by loosening turnbuckles, then disconnect cables at aileron bellcranks. Disconnect flap cables at turnbuckles above headliner, and pull cables into wing root area.

NOTE

To ease rerouting of the cables, a guide wire may be attached to each cable before it is pulled free from the wing. The cable may then be disconnected from the wire. Leave the guide wire routed through the wing; it may be attached again to the dable during installation, and used to pull the cable into place.

f. Remove screws from strut fairings and slide fairings toward center of strut.
g. Support wing at outboard end and remove strut-to-wing attach bolt.
h. Lower strut carefully to avoid damage to lower strut-to-fuselage fitting.

NOTE

Tape flaps in the streamlined position during wing removal. This will prevent flap damage due to the unsecured free-swinging action when handling the wing.

i. Mark position of wing-attachment eccentric bushings (See figure 4-1). These bushings are used to rig out "Wing-Heaviness."
j. Remove nuts, washers, bushings and bolts attaching wing spars to fuselage.

NOTE

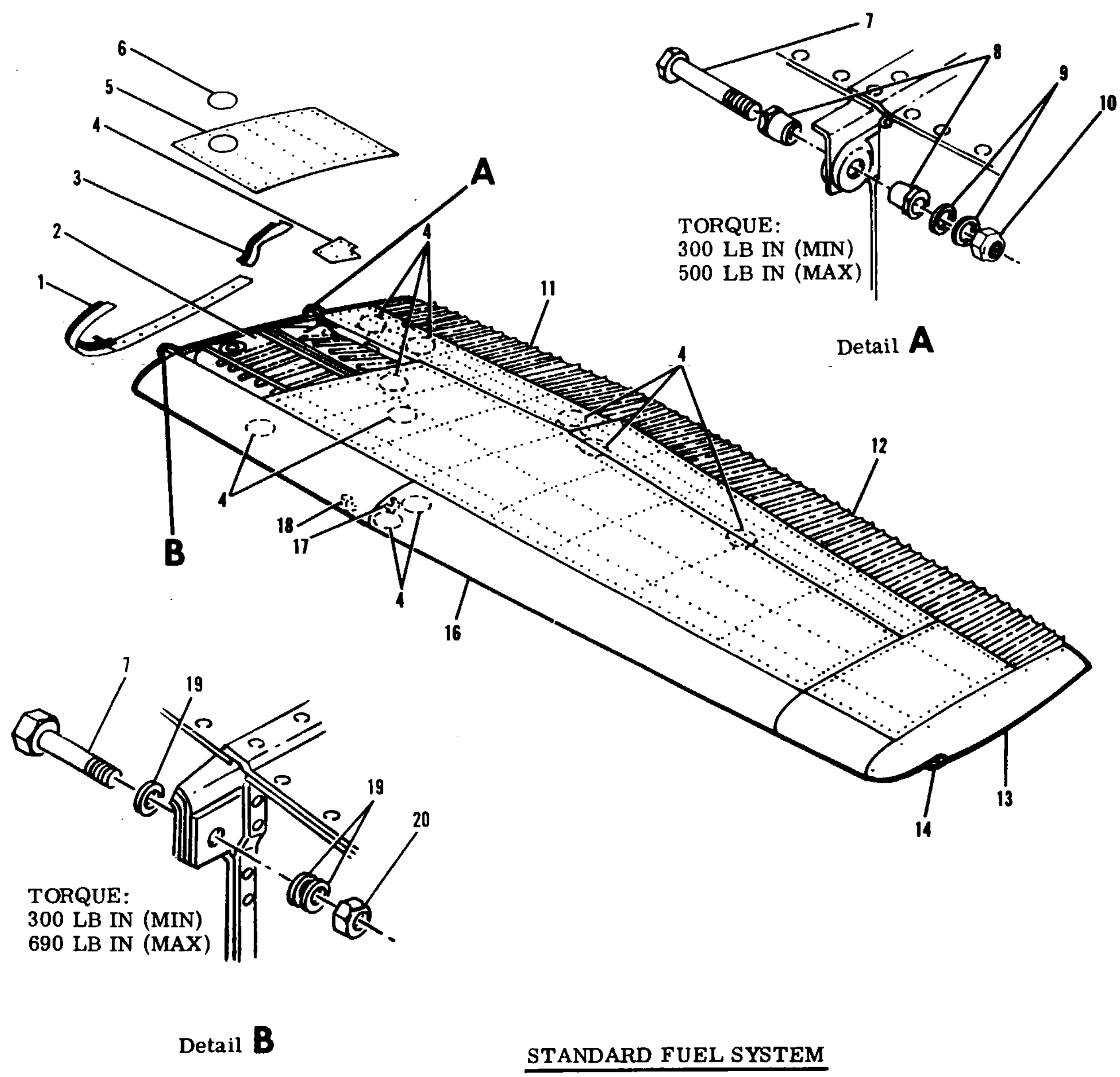
It may be necessary to rock the wings slightly and/or to use a long drift punch to remove attaching bolts.

k. Remove wing and lay on padded stand.

NOTE

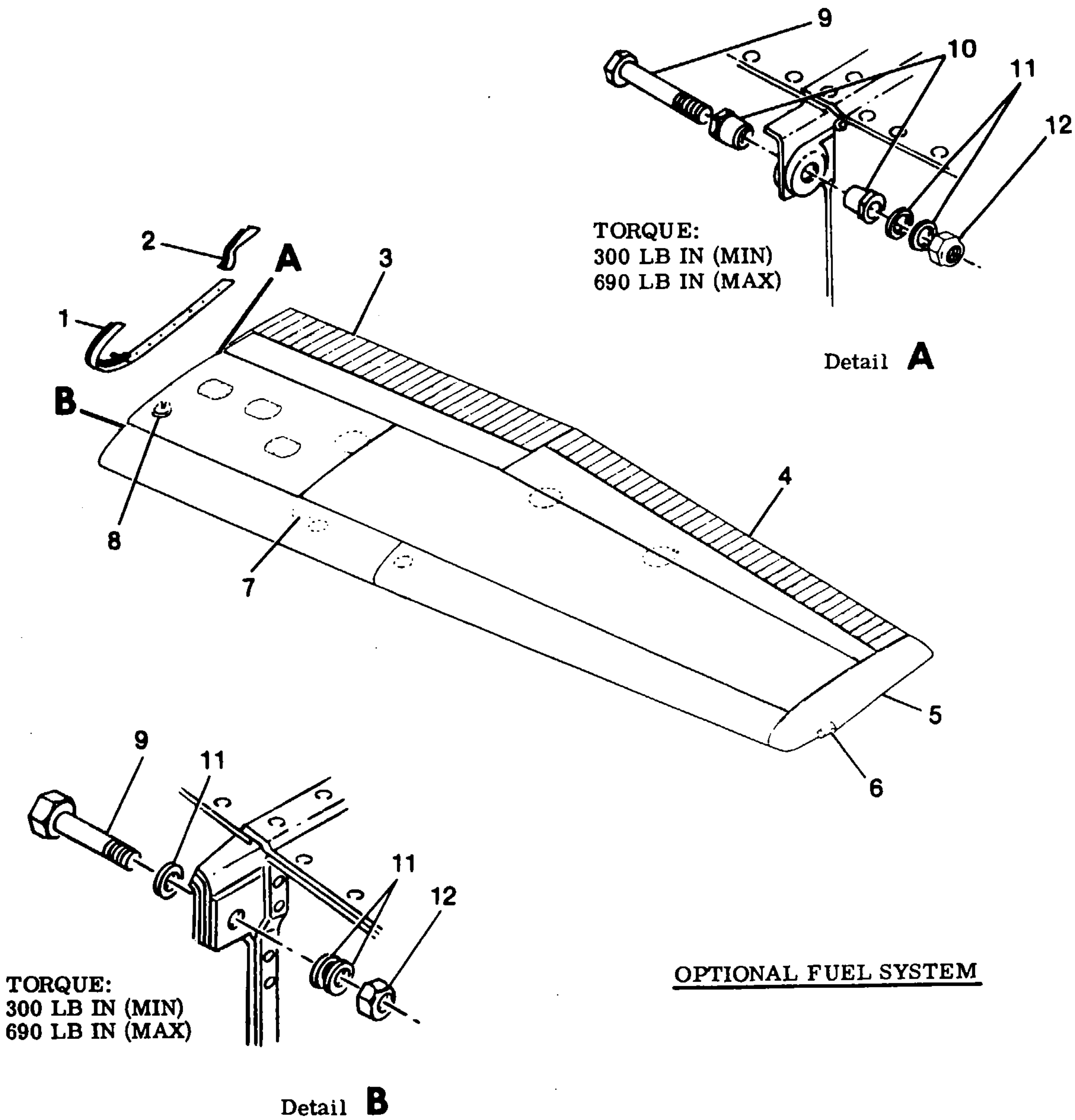
Plans for fabrication of padded wing support stands are illustrated in Section 18 of this manual.

4-5. REPAIR. A damaged wing may be repaired in accordance with instructions outlined in Section 18, which supplements Federal Aviation Regulation, Part 43. Extensive repairs of wing skin and structure are best accomplished by using the wing alignment 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 absolute alignment of the repaired wing.



1. Fairing
2. Fuel Tank
3. Lower Rear Fairing
4. Inspection Plate
5. Fuel Tank Cover
6. Fuel Gage Access Cover
7. Bolt
8. Eccentric Bushings
9. Washer
10. Nut
11. Wing Flap
12. Aileron
13. Wing Tip
14. Navigation and Strobe Lights
15. Deleted
16. Wing Assembly
17. Cover Plate
18. Stall Warning Unit
19. Washers
20. Nut

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



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

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

4-6. INSTALLATION. (See figure 4-1.)

NOTE

The forward wing spar fittings are attached to the fuselage fittings with AN8-23 bolts, and the aft wing spar fittings are attached to the fuselage fittings with AN7-24 bolts. Minimum torque on the AN8-23 bolts is 300 lb-in and the maximum torque is 690 lb-in. Minimum torque on the AN7-24 bolts is 300 lb-in, and the maximum torque is 500 lb-in.

NOTE

Upon installation of bolts, coat holes and bolts lightly with Electro-Moly No. 11 (MIL-G-121164) grease.

a. Hold wing in position and install bolts, bushings, washers and nuts attaching wing spars to fuselage fittings. Ensure eccentric bushings are positioned as marked. Torque nuts to values stipulated in note preceding this step.
b. Install bolts, spacers, and nuts to secure upper and lower ends of wing strut to wing and fuselage fittings.

NOTE

Upon installation of bolts, coat holes and bolts lightly with Electro-Moly No. 11 (MIL-G-121164) grease.

NOTE

Seal opening in fuselage skin around lower wing strut fitting with 579.6 Sealer (Inmont Corp., St. Louis, Missouri) or equivalent.

a. Route flap and aileron cables, using guide wires. (See note in paragraph 4-4.)
d. Connect:
  1. Electrical wires at wing root disconnects.
  2. Fuel lines at wing root. (Refer to precautions outlined in Section 12).
  3. Pitot line (if left wing is being installed).
e. Rig aileron system. (Section 6.)
f. Rig flap system (Section 7.)
g. Refuel wing tank and check for leaks. (Refer to precautions outlined in Section 12.)
h. Check operation of wing tip lights.
i. Check operation of fuel gage.
j. Install wing root fairings.

NOTE

Be sure to insert soundproofing panel in wing gap, if such a panel was installed originally, before replacing wing root fairings.

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

4-7. ADJUSTMENT (CORRECTING "WING-HEAVY" CONDITION.) (See 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 (10) and rotate bushings (8) simultaneously until the bushings are positioned with the thick side of the eccentrics up. This will lower the trailing edge of the wing, and decrease wing-heaviness by increasing 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.

c. Torque nut (10) 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. Torque nut (10), install fairing strip, and repeat flight test.

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 riveted to two end fittings for attachment at 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

Seal opening in fuselage skin around lower wing strut fitting with 579.6 Sealant (Inmont Corp., St. Louis, Missouri) or equivalent.

4-11. REPAIR. Wing strut repair is limited to replacement of tie-downs and attaching parts. A badly dented, cracked, or deformed wing strut should be replaced.

4-12. FIN. (See figure 4-3.)

4-13. DESCRIPTION. The fin is primarily of metal construction, consisting of ribs and spars covered with skin. Fin tips are of ABS construction. Hinge brackets at the fin rear spar attach the rudder.

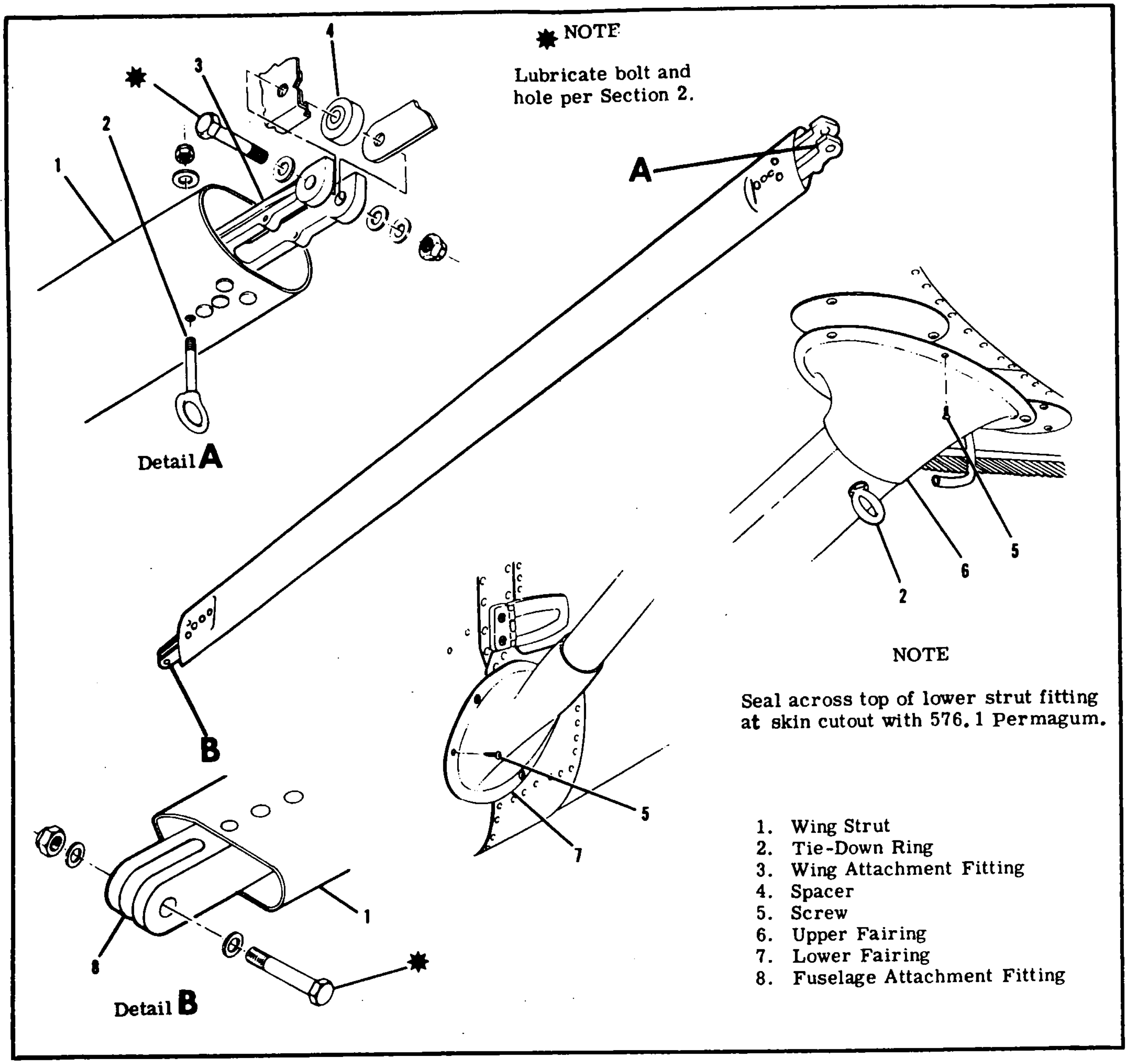


Figure 4-2. Wing Strut

4-14. REMOVAL. The fin may be removed without first removing the rudder. However, for access and ease of handling. the rudder may be removed in accordance with procedures outlined in Section 10 of this manual. Remove fin as follows:

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 electric lead that routes into the fuselage may be cut, then spliced (or quick-disconnects used) at installation.

c. Remove screws attaching dorsal to fin.

d. Disconnect elevator cable from elevator bellcrank.

e. Remove bolts attaching fin rear spar to fuselage fitting. Remove upper elevator stop bolts.

f. Remove bolts attaching fin front spar to fuselage bulkhead, and remove fin.

g. Retain any shims installed between the rear spar of the fin and the fuselage fitting.

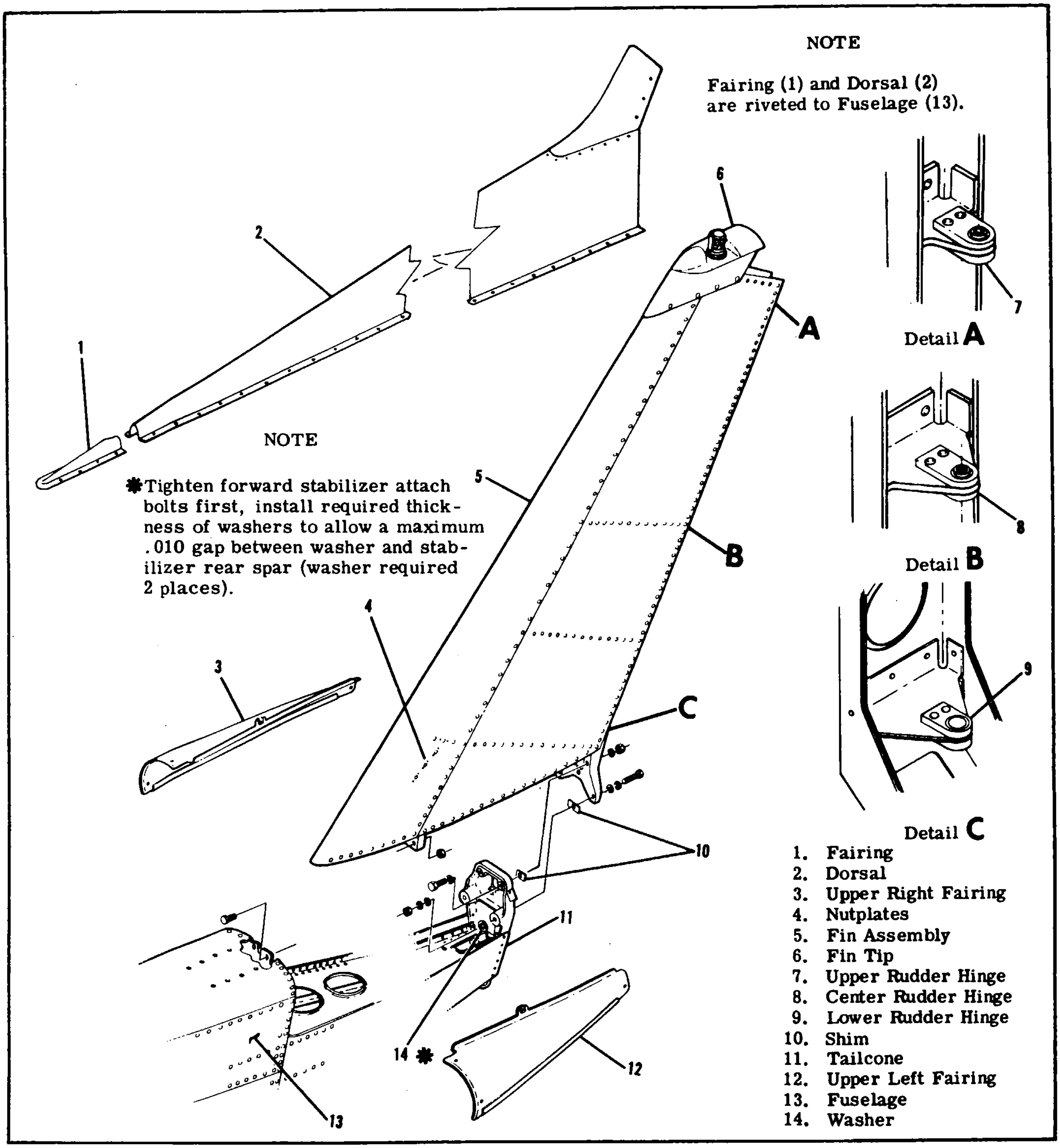


Figure 4-3. Vertical Fin

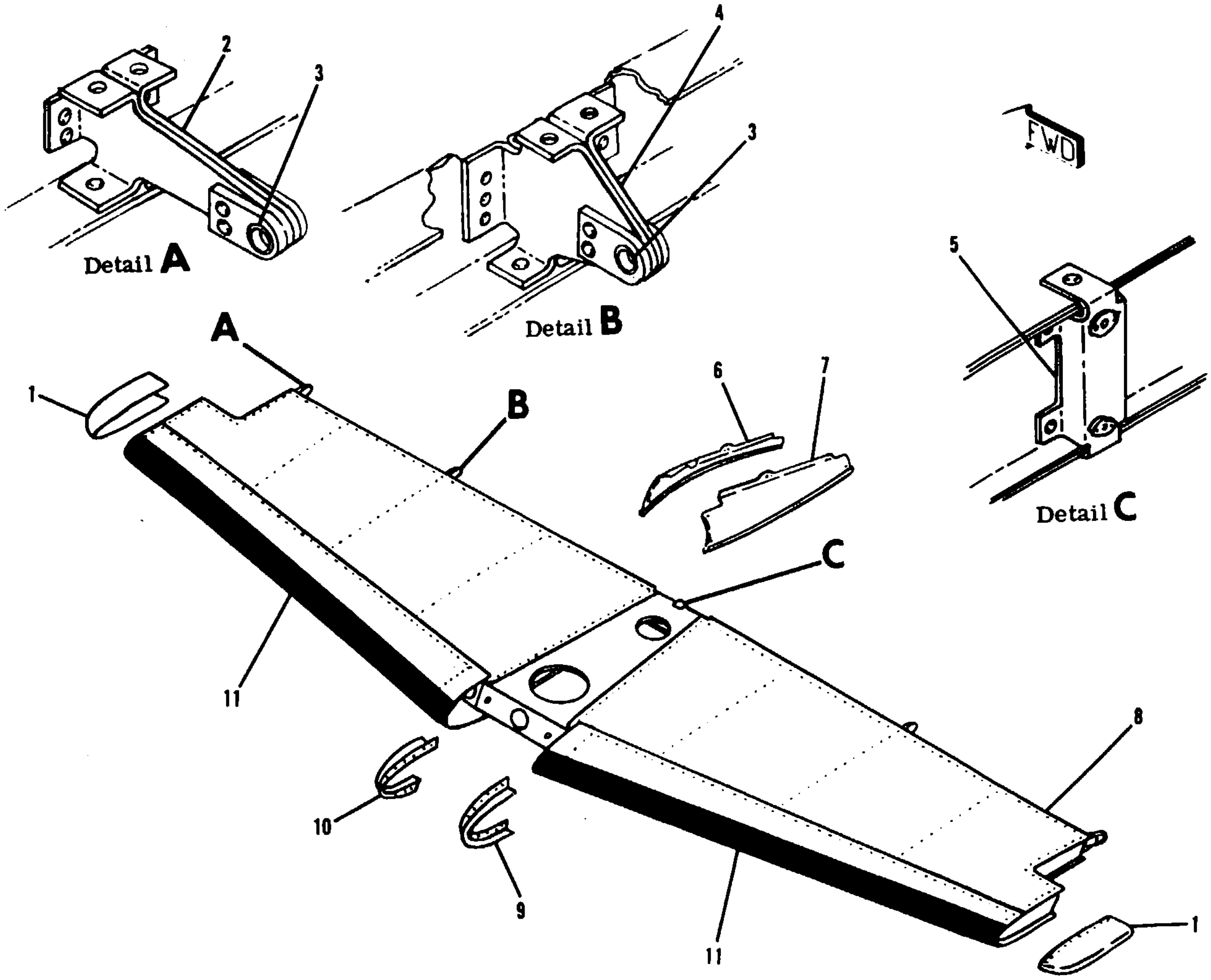
4-15. REPAIR. Fin repair should be accomplished in accordance with appiicable instructions outlined in Section 18.

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.

a. Reinstall any shims removed from between the fin rear spar and the fuselage fitting. If a new fin is being installed, measure any gap existing between the fin rear spar and the fuselage fitting and use shims as follows:

.000" to .030" gap . . . . .No Shim
.030" to .050" gap . . . . .0531115-1 Shim (.020")
.050" to .070" gap . . . . .0531115-2 Shim (.040")

A maximum of one shim per bolt is permissible.



NOTE

See figure 4-3 for stabilizer rear attach bolt installation.

NOTE

A kit is available from Cessna Service Parts Center for installation of abrasion boots on aircraft not so equipped.

1. Stabilizer Tip
2. Outboard Elevator Hinge
3. Bushing
4. Inboard Elevator Hinge
5. Bracket
6. Upper Right Fairing
7. Upper Left Fairing
8. Horizontal Stabilizer
9. Forward Left Fairing
10. Forward Right Fairing
11. Abrasion Boot

Figure 4-4. Horizontal Stabilizer

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 AND INSTALLATION.

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 clevis and turnbuckle inside tailcone, remove pulleys which route the aft cables into horizontal stabilizer, and pull cables out of tailcone.
d. Remove bolts securing horizontal stabilizer to fuselage.
e. Remove horizontal stabilizer.
f. Reverse preceding steps to install horizontal stabilizer.

NOTE

Tighten forward stabilizer-attach bolts first. Install required thickness of washers to allow a maximum .010-inch gap between washer and stabilizer rear spar. Washers are required in 2 places. The following washers are available from the Cessna Service Parts Center.

S1450-5A20-100
S1450-5A20-080
S1450-5A20-063

g. Check operation of tail navigation light and flashing beacon.
h. Rig control systems as necessary.

4-20. REPAIR. Horizontal stabilizer repair should be accomplished in accordance with applicable instructions in Section 18.

4-21. 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.

4-22. 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.

4-23. 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.

4-24. 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 metal surfaces of stabilizer, where boot is to be installed with Methyl-Ethyl-Ketone.
d. 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.

SECTION 5

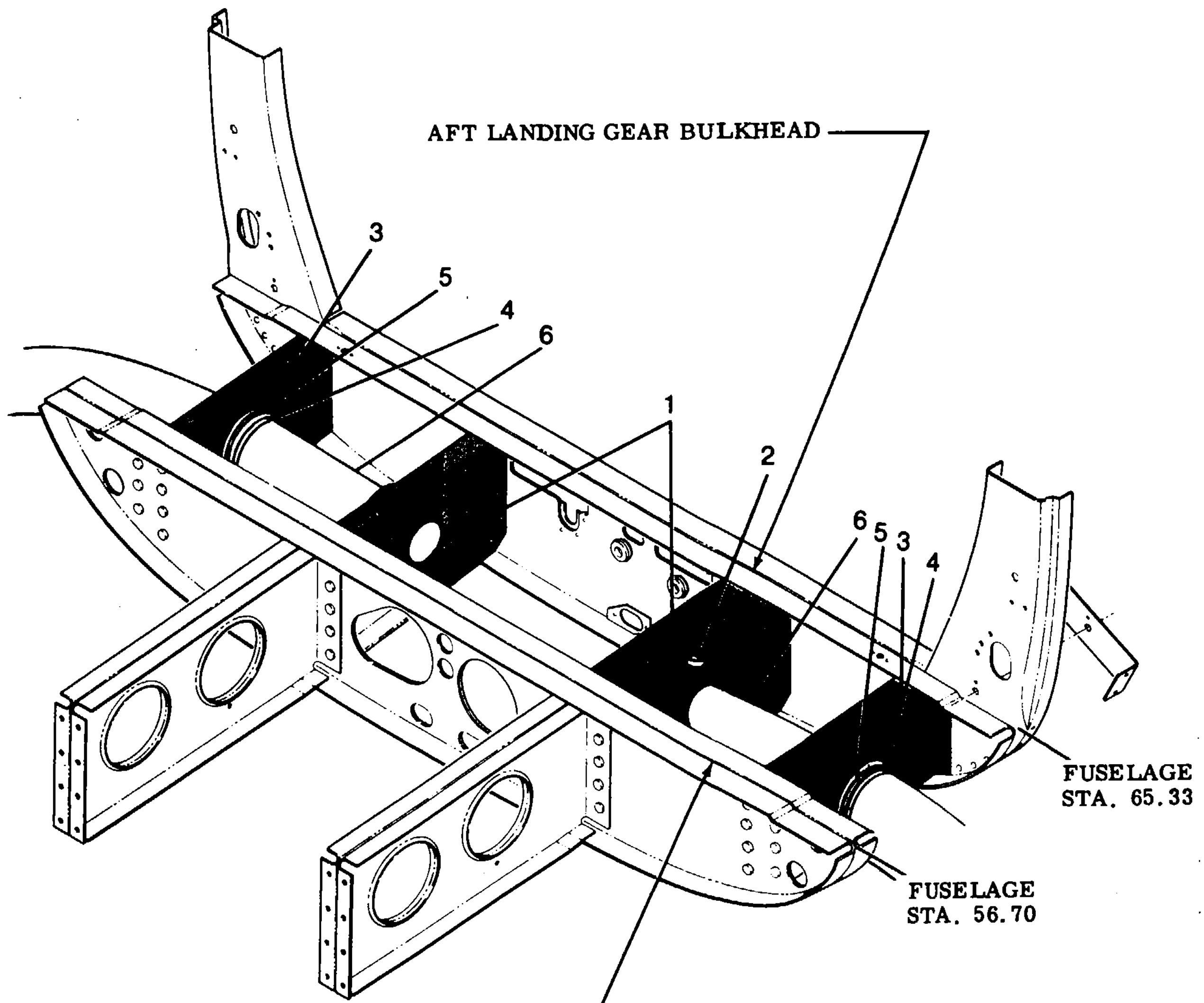
LANDING GEAR, WHEELS AND BRAKES

5-1. LANDING GEAR.

5-2. DESCRIPTION. The aircraft is equipped with a non-retractable tricycle landing gear, consisting of Cessna tubular spring-steel main gear struts and an air/oil steerable nose gear shock strut. A bracket to attach a step to each strut is bonded to the main gear strut with a thermo-setting, high-strength cement. Wheels with disc-type brakes and tube-type tires are installed. The brake disc is attached with the wheel thru-bolts or capscrews and becomes an integral part of the wheel. The nose gear is a combination of a conventional air/oil (oleo) strut and fork, incorporating a shimmy dampener. The nose wheel is steerable with the rudder pedals up to a maximum pedal deflection, after which it becomes free-swiveling up to a maximum travel of 30 degrees right or left of center.

5-3. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
AIRCRAFT LEANS TO ONE SIDE.	Incorrect tire inflation.	Inflate to pressure specified in figure 1-1.
	Landing gear attaching parts not tight.	Tighten loose parts; replace defective parts with new parts.
	Landing gear spring excessively sprung.	Remove and install new part(s).
	Bent axles.	Install new part(s).
TIRES WEAR EXCESSIVELY.	Incorrect tire inflation.	Inflate to pressure specified in figure 1-1.
	Main wheels out of alignment.	Remove and install new part(s).
	Landing gear spring excessively sprung.	Remove and install new part(s).
	Bent axles.	Install new part(s).
	Dragging brakes.	Refer to paragraph 5-70.
	Wheel bearings excessively tight.	Adjust properly.
	Wheels out of balance.	Correct in accordance with paragraph 5-30.
	Loose torque links.	Add shims or install new parts as required.
WHEEL BOUNCE EVIDENT ON SMOOTH SURFACE.	Out of balance condition.	Refer to paragraph 5-30.

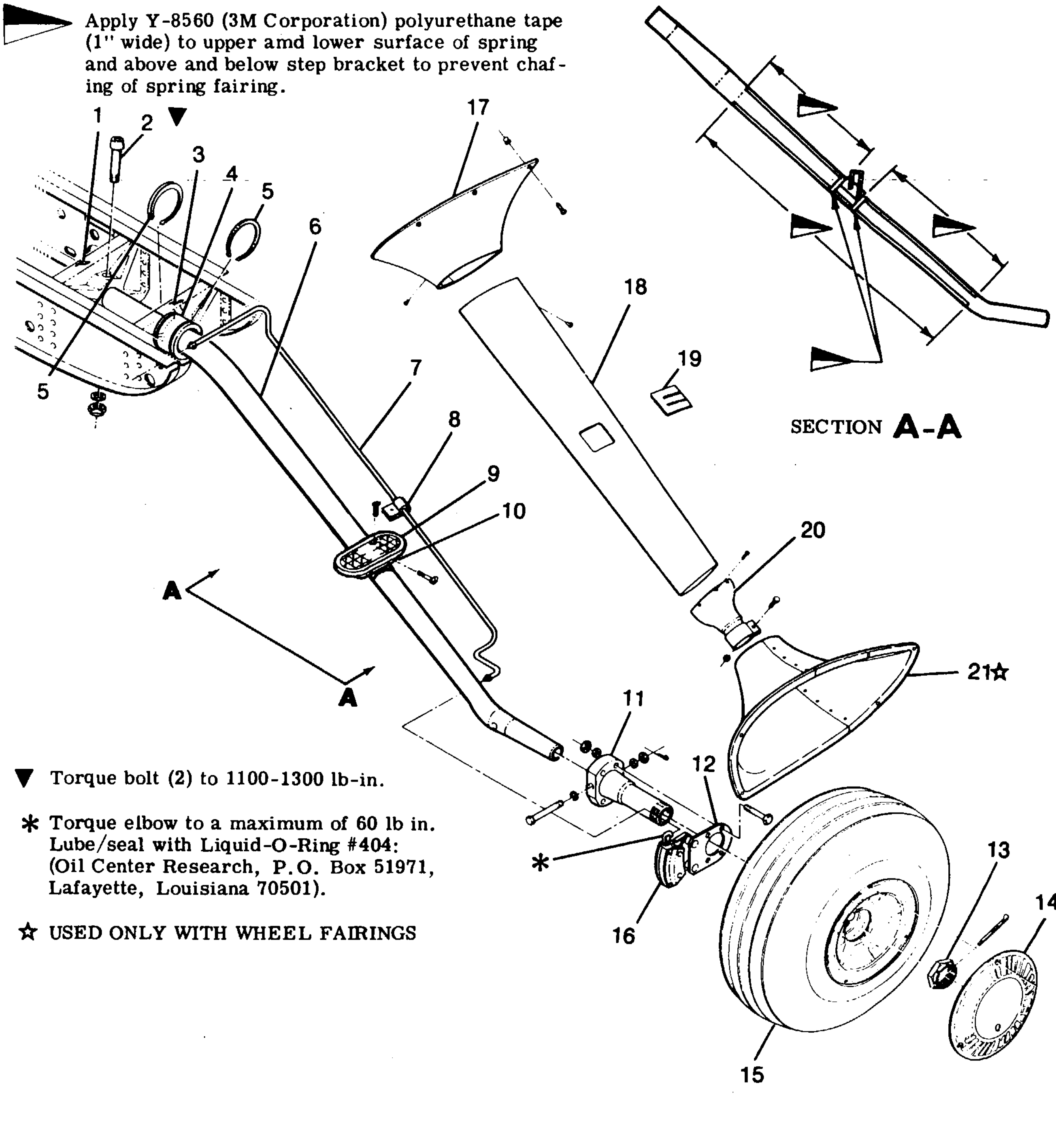


1. Inboard Forging
2. Bolt
3. Outboard Forging
4. Bushing
5. Bushing Retainer Ring
6. Tubular Strut
7. Brake Line
8. Clamp
9. Step
10. Step Bracket
11. Axle
12. Brake Torque Plate
13. Nut
14. Hub Cap
15. Wheel Assembly
16. Wheel Brake Assembly
17. Fuselage Fairing
18. Tubular Strut Fairing
19. Step Bracket Cover
20. Cap Fairing
21. Brake Fairing

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

Fuselage fairings (17) are split thru production model Serial R1722284. Beginning with production Serial R1722885, one-piece fairings are installed. However, service replacement fairings, ordered through the Cessna Service Parts Center, will be split, and can be installed without disassembling the main landing gear.

Apply Y-8560 (3M Corporation) polyurethane tape (1" wide) to upper amd lower surface of spring and above and below step bracket to prevent chafing of spring fairing.



▼ Torque bolt (2) to 1100-1300 lb-in.

✱ Torque elbow to a maximum of 60 lb in. Lube/seal with Liquid-O-Ring #404: (Oil Center Research, P.O. Box 51971, Lafayette, Louisiana 70501).

☆ USED ONLY WITH WHEEL FAIRINGS

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

5-4. MAIN LANDING GEAR.

5-5. DESCRIPTION. The tubular, spring-steel main landing gear struts are attached to the aircraft at inboard and outboard forgings, located in the belly of the aircraft. A bracket is bonded to each strut for attachment of a step. Hydraulic brake lines are routed down and clamped to each main gear strut. The axles, main wheels and brake assemblies are installed at the lower end of each strut.

5-6. MAIN LANDING GEAR REMOVAL. (See figure 5-1.)

NOTE

The following procedure removes the landing gear as a complete assembly. Refer to applicable paragraph for removal of individual components.

a. Remove seats as necessary, and remove access cover over strut being removed.
b. Hoist or jack aircraft in accordance with procedures outlined in Section 2 of this manual.
c. Remove screws attaching fairing (17) to fuselage. Remove screws at splice in fairing and work fairing off strut fairing.
d. Drain hydraulic brake fluid from brake line (7) on gear strut being removed.

NOTE

Fluid can be drained at the top of the strut next to the fuselage or brake fairing (21) and cap fairing (20) can be removed to drain fluid at brake assembly.

e. Disconnect brake line (7) in fuselage so that brake line is removed with gear strut. Cap or plug disconnected fittings to prevent entry of foreign material.
f. Remove nut, washer and bolt (2) attaching inboard end of gear strut to inboard landing gear bulkhead forging (1).
g. Remove retaining ring (5) and pull landing gear strut from forgings (1) and (3) and bushing (4), using care to prevent damage to hydraulic brake line.

NOTE

The tubular landing gear strut (6) is a compression fit in bushing (4) in outboard forging (3).

5-7. MAIN LANDING GEAR INSTALLATION. (See figure 5-1.)

NOTE

The following procedure installs the landing gear as a complete assembly. Refer to applicable paragraph for installation of individual components.

a. Install all parts removed from strut.
b. Apply Dow Corning Compound DC7 to approximately 11 inches of upper end of landing gear tubular strut.

CAUTION

Avoid use of Dow Corning DC7 on surfaces to be painted. DC7 contains silicone which is harmful to painted areas.

c. Work strut into place through bushing (4) in outboard forging (3).
d. Align strut (6) in inboard forging (1) and install bolt (2) through fitting and tubular strut. Install washer and nut on bolt and tighten to torque value of 1100-1300 lb-in.
e. Fill and bleed brake system in accordance with procedures outlined in applicable paragraph in this Section.
f. Install all fairings removed during gear removal.
g. Lower aircraft and install all access covers, carpets and seats removed for access.

5-8. STEP BRACKET INSTALLATION.

NOTE

The step bracket is secured to the tubular gear strut with EA9309, EC2216, EC2214, EC3445, or similar epoxy base adhesive.

a. Remove landing gear fairing, if installed.
b. Mark position of removed step bracket so that the new step bracket will be installed in approximately the same position on the strut.
c. Remove all traces of the original bracket and adhesive, as well as any rust, paint or scale with a wire brush and coarse sandpaper. Brush or scraping motion should be longitudinally with the strut.
d. Leave surfaces of strut slightly roughened or abraded, but deep scratches or nicks should be avoided. Also, roughen bonding surface of new bracket.
e. Clean surfaces to be bonded together thoroughly. If a solvent is used, remove all traces of the solvent with a clean, dry cloth. It is important that the bonding surfaces be clean and thoroughly dry.
f. Check fit of the step bracket on the landing gear strut. A small gap is permissible between the bracket and the strut.
g. Mix adhesive (any of those listed in note preceding step "a") in accordance with manufacturer's directions.
h. Spread a coat of mixed adhesive on bonding surfaces of strut and bracket, and place step in position on tubular gear strut. Clamp bracket to strut to ensure a good, tight fit.
i. Form a small fillet of the adhesive at all edges of the bonded surfaces. Remove excess adhesive with lacquer thinner.
j. Allow adhesive to thoroughly cure according to manufacturer's recommendations before flexing landing gear spring-strut or applying loads to the step.
k. Paint landing gear strut and step bracket after curing is completed.
l. If aircraft is equipped with landing gear strut fairings, install them at this time, then install step to bracket.

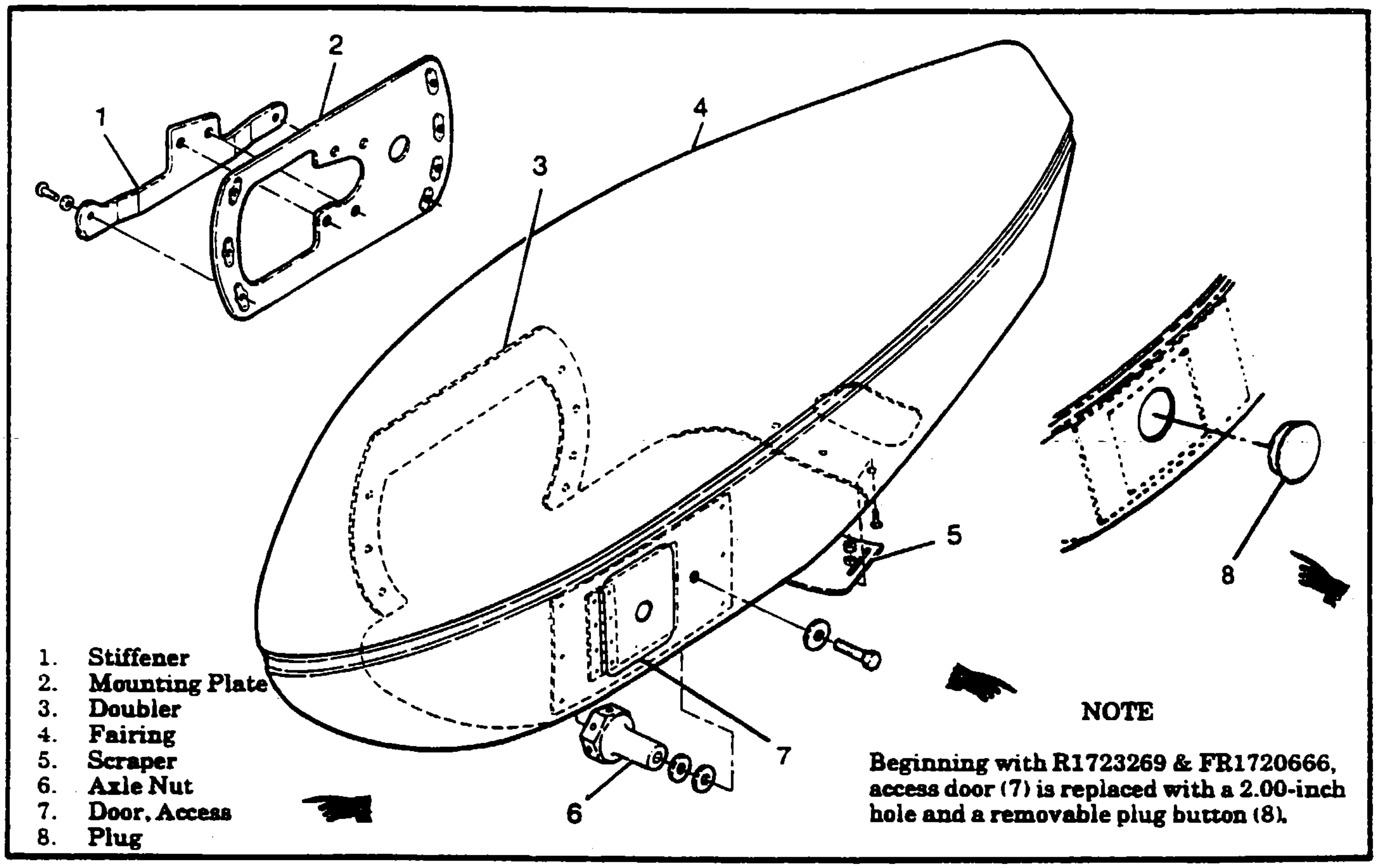


Figure 5-2. Main Wheel Speed Fairing

5-9. MAIN LANDING GEAR FAIRINGS. (See figures 5-1 and 5-2.)

5-10. DESCRIPTION. Some aircraft are equipped with fuselage fairings, attached to the fuselage and the tubular strut fairings with screws. The tubular strut fairings cover the tubular landing gear struts, and attach to the fuselage fairings at the upper end and to cap fairings at the lower end. The cap fairings attach to the tubular strut fairings at the upper end and are clamped to the tubular struts at the lower end. Brake fairings are installed at the lower end of the tubular strut fairings and cap fairings, and are attached to the wheel speed fairings by screws around their outer perimeters. The speed fairings are installed over the wheels and are attached to mounting plates, attached to the axles. The wheel fairings are equipped with adjustable scrapers, installed in the lower aft part of the fairings, directly behind the wheels.

5-11. REMOVAL AND INSTALLATION. (See figure 5-1.)

a. To remove brake fairings, proceed as follows:
   1. Remove screws from perimeter of fairing.
   2. Remove screws from nutplates holding two halves of fairing together; remove fairing halves.
   3. Reverse preceding steps for installation.
b. To remove cap fairings, proceed as follows:
   1. Remove screws attaching fairing to tubular spring strut.
   2. Disconnect clamp from tubular strut and spring clamp over strut; remove cap fairing.
   3. Reverse preceding steps for installation.
c. To remove fuselage fairings, proceed as follows:
   1. Remove screws attaching fairings to fuselage.
   2. Slide fairings down tubular strut fairings and, thru 1978 Models, remove screws from nutplates holding fairings together; spring fairings over strut fairings. Beginning with 1979 Models, fairings are one-piece and cannot be sprung apart.
   3. Reverse preceding steps for installation.
d. To remove tubular strut fairing, proceed as follows:
   1. Remove brake fairing per step "a".
   2. Remove cap fairing per step "b".
   3. Remove fuselage fairing per step "c".
   4. Remove screws from nutplates on strut fairing.
   5. Spring fairing over tubular gear strut.
   6. Reverse preceding steps for installation.
e. To remove step bracket cover, proceed as follows:
   1. Remove tubular strut fairing per step "d".
   2. Slide step bracket cover from step bracket on tubular gear strut.
   3. Reverse preceding steps for installation.

5-12. MAIN WHEEL SPEED FAIRING REMOVAL. (See figure 5-2.)

a. Remove wheel brake fairing (item 21, figure 5-1) by removing screws around perimeter of fairing, then removing screws from nutplates holding two halves of brake fairing together.

b. Remove screws attaching stiffener (1) and inboard side of wheel speed fairing (4) to mounting plate (2), which is bolted to the axle.

c. Remove bolt securing outboard side of fairing to axle nut.

d. Loosen scraper, if necessary, and work speed fairing from the wheel.

5-13. MAIN WHEEL SPEED FAIRING INSTALLATION. (See figure 5-2.)

a. Work speed fairing down over wheel.

b. Install bolt securing outboard side of fairing to axle nut.

c. Install screws attaching stiffener (1) and inboard side of wheel speed fairing (4) to mounting plate (2), which is bolted to the axle.

d. Install wheel brake fairing (item 21, figure 5-1) by installing screws in nutplates holding two halves of brake fairing together, then install screws around perimeter of fairing.

e. After installation, check scraper-to-tire clearance for a minimum of 0.25-inch to a maximum of 0.38-inch. Elongated holes are provided in the scraper for clearance adjustment.

CAUTION

Always check scraper-to-tire clearance after installing speed fairings, whenever a tire has been changed, and whenever scraper adjustment has been disturbed. If the aircraft is flown from surfaces with mud, snow, or ice, the speed fairings should be checked to make sure there is no accumulation which could prevent normal wheel rotation. Wipe fuel and oil from speed fairings to prevent stains and deterioration.

5-14. MAIN WHEEL REMOVAL. (See figure 5-1.)

NOTE

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

a. Hoist or jack aircraft in accordance with procedures outlined in Section 2.

b. Remove speed fairing, if installed, as outlined in paragraph 5-12.

c. Remove hub caps, if installed, cotter pin and axle nut.

d. Remove bolts and washers attaching brake back plate to brake cylinder, and remove back plate.

e. Pull wheel from axle.

5-15. MAIN WHEEL DISASSEMBLY. (McCauley Two-Piece Wheel.) (See figure 5-3, Sheet 1 of 3.)

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 (6).

WARNING

Serious injury can result from attempting to separate wheel halves with tire and tube inflated.

b. Remove nuts (10) and washers (9).

c. Remove thru-bolts (24) and washers (25).

d. Separate and remove wheel halves (6) from tire and tube.

e. Remove retaining rings (1), grease seal retainers (2) grease seal felts (3), grease seal retainers (4) and bearing cones (5) from both wheel halves (6).

NOTE

Bearing cups (races) (27) are a press fit in wheel halves (6), 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 a new bearing cup while wheel half is still hot.

5-16. MAIN WHEEL INSPECTION AND REPAIR. (McCauley Two-Piece Wheel.) (See figure 5-3, Sheet 1 of 3.)

a. Clean all metal parts and grease seal felts 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 (6) for cracks or damage.

c. Inspect bearing cones (5), cups (27), retaining rings (1), grease seal retainers (2), grease seal felts (3) and grease seal retainers (4) for wear or damage.

d. Inspect thru-bolts (24) and nuts (10) for cracks in threads or cracks in radius under bolt head.

e. Replace cracked or damaged wheel half (6).

f. Replace damaged retainer rings (1) and seals (2), (3) and (4).

g. Replace worn or damaged bearing cups (27) and cones (5).

h. Replace worn or chracked thru-bolts (24) or nuts (10). Inspect brakes per paragraph 5-87.

i. Remove any corrosion or small nicks.

j. Repair reworked areas of wheel by cleaning thoroughly, then applying one coat of clear lacquer paint.

k. Pack bearings with grease specified in Section 2 of this manual.

5-17. MAIN WHEEL REASSEMBLY. (McCauley Two-Piece Wheel.) (See figure 5-3, Sheet 1 of 3.)

a. Assemble bearing cone (5), grease seal retainer (4), grease seal felt (3), grease seal retainer (2) and retaining ring (1) into each wheel half (6).

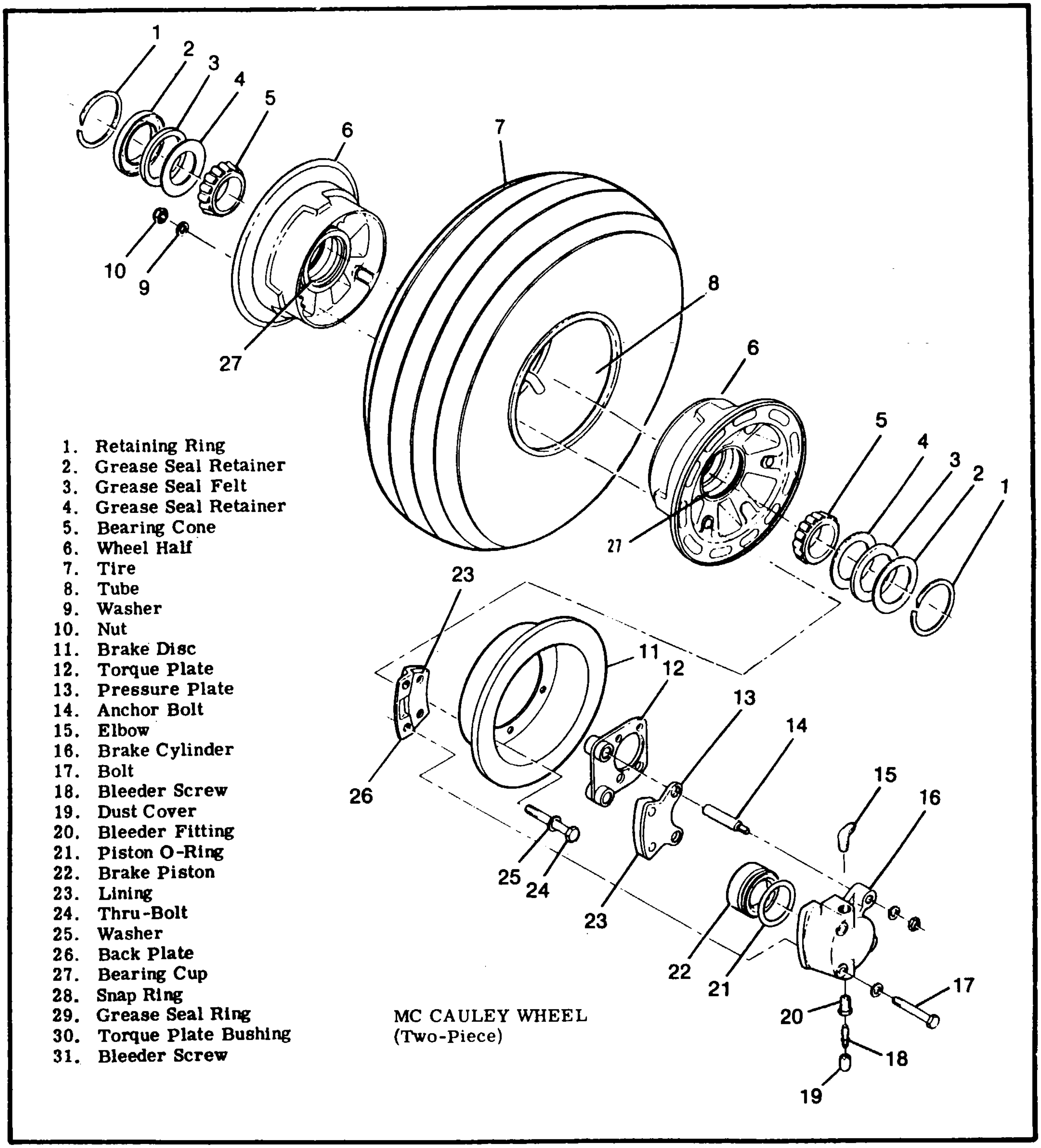


Figure 5-3. Main Wheel and Brake (Sheet 1 of 3)

b. Insert tube in tire, aligning index marks on tire and tube.

c. Place wheel half (6) into tire and tube (side opposite valve stem). With washer (25) under head of thru-bolt (24), insert bolt through wheel half (6).

d. Place wheel half (6) into other side of tire and tube, aligning valve stem in valve slot.

e. Insert washers (9) and nuts (10) on thru-bolts (24), and pre-torque to 10-15 lb. in.

CAUTION

Uneven or improper torque of the nuts can cause failure of the bolts with resultant wheel failure.

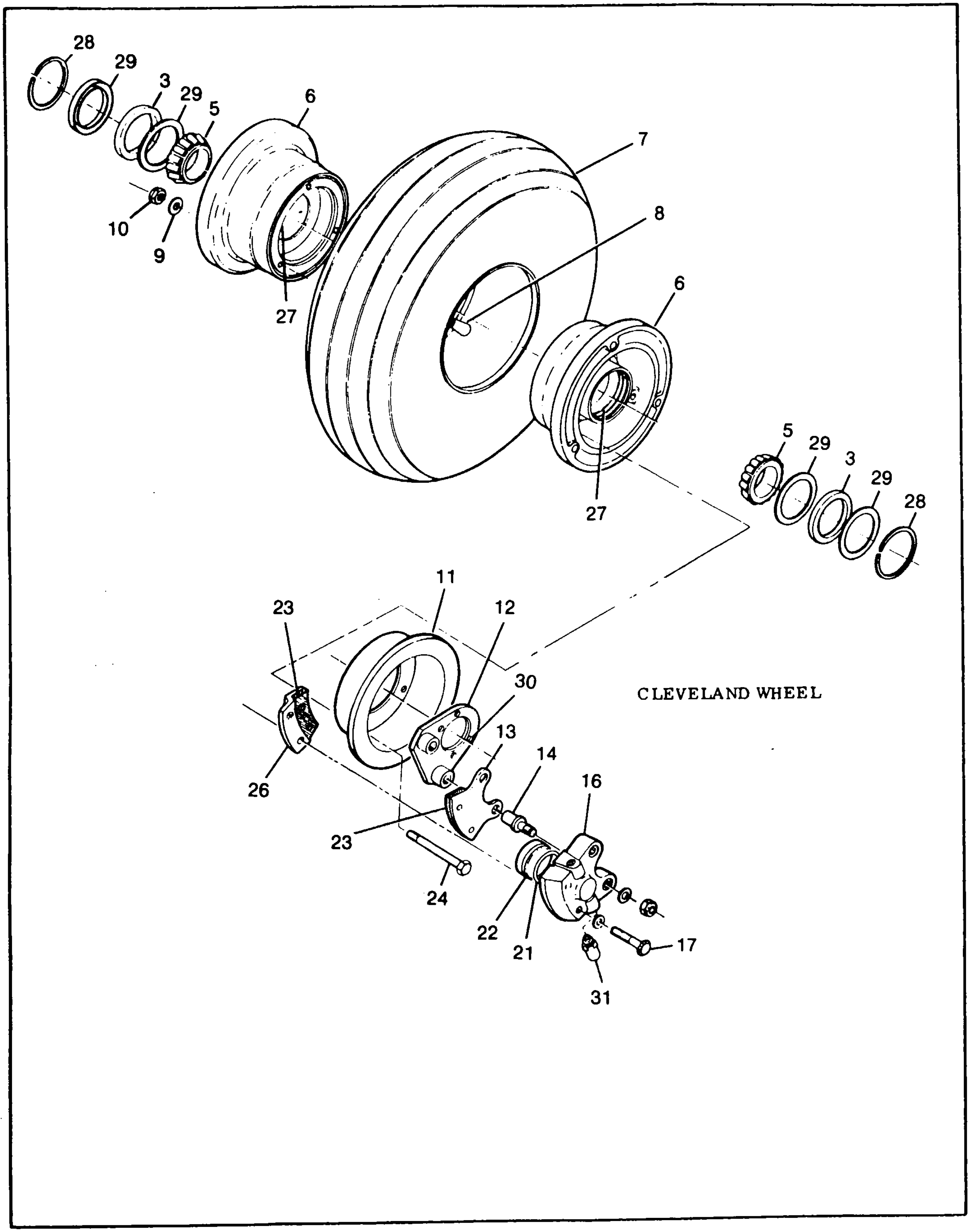
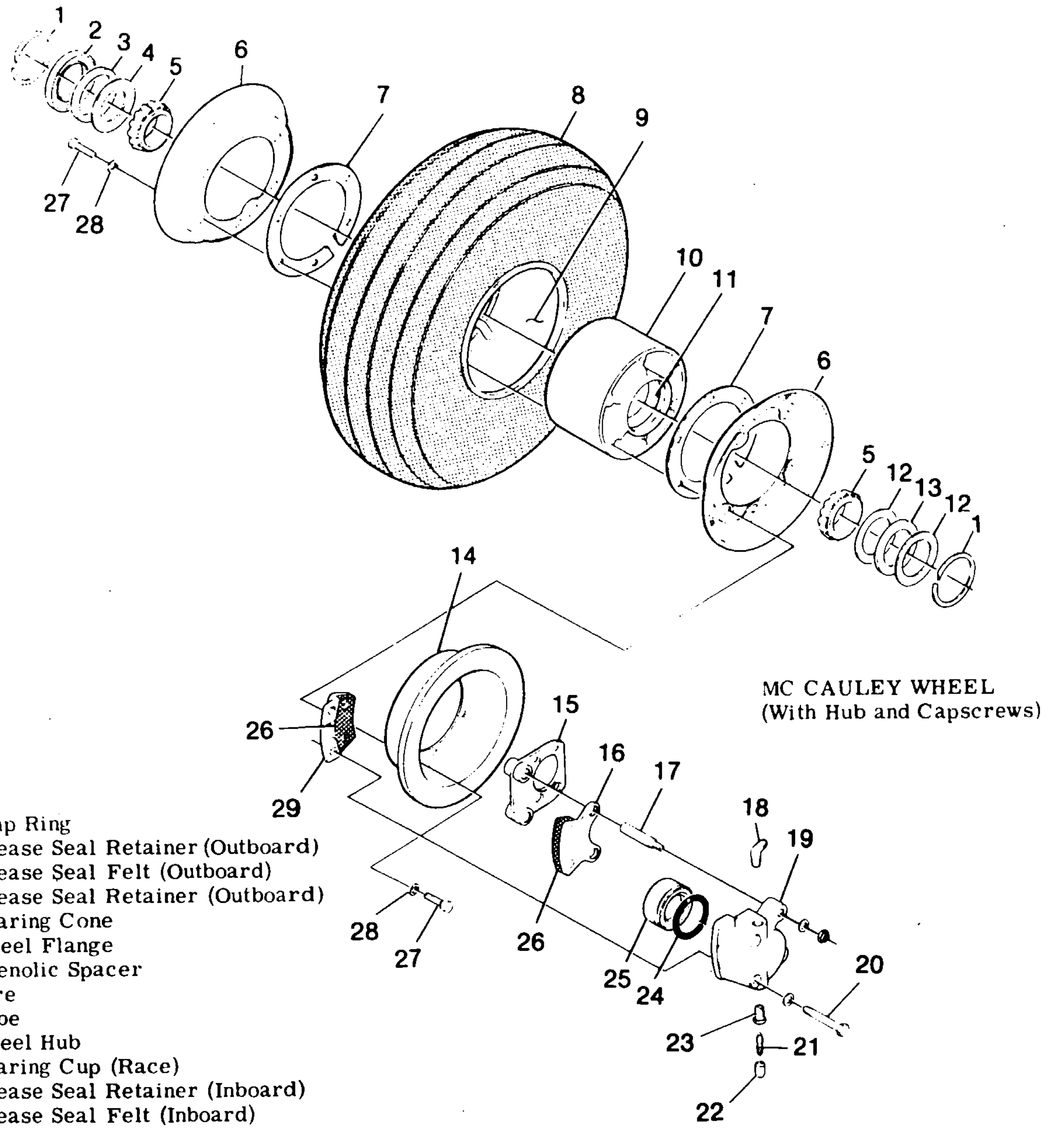


Figure 5-3. Main Wheel and Brake (Sheet 2 of 3)



1. Snap Ring
2. Grease Seal Retainer (Outboard)
3. Grease Seal Felt (Outboard)
4. Grease Seal Retainer (Outboard)
5. Bearing Cone
6. Wheel Flange
7. Phenolic Spacer
8. Tire
9. Tube
10. Wheel Hub
11. Bearing Cup (Race)
12. Grease Seal Retainer (Inboard)
13. Grease Seal Felt (Inboard)
14. Brake Disc
15. Torque Plate
16. Pressure Plate
17. Anchor Bolt
18. Elbow
19. Brake Cylinder
20. Bolt
21. Bleeder Screw
22. Dust Cup
23. Bleeder Fitting
24. Piston O-Ring
25. Brake Piston
26. Brake Lining
27. Capscrew
28. Washer
29. Back Plate

NOTE

Torque elbow (18) to a maximum of 60 lb-in. Lube/seal with Liquid O-Ring #404: (Oil Research, P.O. Box 51971, Lafayette, Louisiana 7050.)

Torque bolt (20) to 120-130 lb-in.

Torque bleeder screw (21) to 30-40 lb-in.

Figure 5-3. Main Wheel and Brake (Sheet 3 of 3)

f. Prior to torquing nuts (10), inflate tube with approximately 10-15 psi air pressure to seat tire.

CAUTION

Do not use impact wrenches on thru-bolts or nuts.

g. Dry torque all nuts (10) evenly to a torque value of 140-150 lb in.
h. Inflate tire to correct pressure specified in figure 1-1 of this manual.

5-18. MAIN WHEEL DISASSEMBLY. (Cleveland Wheel.) (See figure 5-3, sheet 2 of 3.)
a. Remove valve core and deflate tire and tube. Break tire beads loose from wheel rims.

WARNING

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

b. Remove thru-bolts and separate wheel halves, removing tire, tube and brake disc.
c. Remove grease seal rings, felts and bearing cones from wheel halves.

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 halves in boiling water for 30 minutes or in an oven not to exceed 149°C (300°F.) Using an arbor press, if available, press out bearing cup and press in new bearing cup while wheel half is still hot.

5-19. MAIN WHEEL INSPECTION AND REPAIR. (Cleveland Wheel.) (See figure 5-3, sheet 2 of 3.)
a. Clean all metal parts and grease seal felts in solvent and dry thoroughly.
b. Inspect wheel halves for cracks. Cracked wheel halves should be discarded and new parts used. Sand out nicks, gouges and corroded areas. When protective coating has been removed, the area should be cleaned thoroughly, primed with zinc chromate and painted with aluminum lacquer.
c. Inspect brakes per paragraph 5-87.
d. Carefully inspect bearing cones and cups for damage and discoloration. After cleaning, pack bearing cones with clean aircraft wheel bearing grease, as outlined in Section 2 of this manual, before installing in wheel half.

5-20. MAIN WHEEL REASSEMBLY. (Cleveland Wheel.) (See figure 5-3, sheet 2 of 3.)
a. Insert thru-bolts through brake disc and position disc in the inner wheel half, using thru-bolts to guide the disc. Ascertain that the disc is bottomed in the wheel half.
b. Position tire and tube on outboard wheel half with tube inflation valve through hole in wheel half.
c. Place inner wheel half in position on outboard wheel half. Apply a light force to bring wheel halves together. While maintaining the light force, assemble a washer and nut on thru-bolt and tighten to maintain force. Assemble remaining washers and nuts to thru-bolts. Tighten nuts evenly to the torque value of 90 lbin.

CAUTION

Uneven or improper torque of thru-bolt nuts can cause failure of bolts, resulting in wheel failure.

d. Clean and pack bearing cones with clean aircraft wheel bearing grease, as outlined in Section 2 of this manual.
e. Assemble bearing cones, grease seal felts and rings into wheel halves.
f. Inflate tire to seat tire beads, then adjust to correct tire pressure. Refer to chart in Section 1 of this manual for correct tire pressure.

5-21. MAIN WHEEL DISASSEMBLY. (McCauley Wheel with Hub and Capscrews.) (See figure 5-3, sheet 3 of 3.)

WARNING

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

a. Remove valve core and deflate tire and tube. Break tire beads loose from wheel flanges.
b. Remove capscrews and washers from outboard wheel flange.
c. Remove capscrews and washers from inboard wheel flange.
d. Remove brake disc.
e. Separate wheel flanges from wheel hub. Retain spacers on each side of wheel hub.
f. Remove wheel hub from tire.
g. Remove retainer rings, grease seal retainers, grease seal felts and bearing cones.

NOTE

Bearing cups (races) 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 the bearing cup and press in the new bearing cup while the wheel hub is still hot.

5-22. MAIN WHEEL INSPECTION AND REPAIR. (McCauley Wheel with Hub and Capscrews.) (See figure 5-3, Sheet 3 of 3.)
a. Clean all metal parts, grease seal felts and

phenolic spacers in cleaning solvent and dry thorough
b. Inspect wheel flanges and wheel hub for cracks. Cracked wheel flanges or hub shall be discarded and new parts installed. Sand out smooth 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. 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 of this manual for grease type.

5-23. MAIN WHEEL REASSEMBLY. (McCauley Wheel with Hub anc Capscrews.) (See figure 5-3, Sheet 3 of 3.)
a. Place wheel hub in tire and tube with tube inflation stem in hole of wheel hub.
b. Place spacer and wheel flange on inboard side of wheel hub (opposite of tube inflation stem).
c. Place washer under head of each capscrew, insert capscrew through brake disc, wheel flange and spacer, and start capscrews into wheel hub threads.

CAUTION

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

d. Tighten capscrews evenly and torque to the value specified.
e. Place spacer and wheel flange on outboard side of wheel hub and align valve stem hole in wheel flange.
f. Place washer under head of each capscrew, insert capscrew through wheel flange and spacer. Start capscrews into wheel hub threads.
g. Tighten capscrews (27) evenly and torque to 190 to 200 lb-in.
h. Clean and pack bearing cones with clean aircraft wheel bearing grease. Refer to Section 2 of this manual for grease type.
i. Assemble bearing cones, grease seal felts and retainer into wheel hub.
j. Inflate tire to seat tire beads, then adjust to correct pressure. Refer to chart in Section 1 of this manual for correct tire pressure.

5-24. MAIN WHEEL INSTALLATION.
a. Place wheel assembly on axle.
b. Install axle nut and tighten axle nut until a slight bearing drag is obvious when the wheel is rotated. Back off axle nut to the nearest castellation and install cotter pin.
c. Place brake back plate in position and secure with bolts and washers.
d. Install valve extension and hub cap. Install speed fairing (if used) as outlined in paragraph 5-13.

CAUTION

Always check scraper-to-tire clearance after installing speed fairings, whenever a tire has been changed, and whenever scraper adjustment has been disturbed. If the aircraft is flown from surfaces with mud, snow, or ice, the fairing should be checked to make sure there is no accumulation which could prevent normal wheel rotation. Refer to paragraph 5-12A for correct scraper-to-tire clearance.

5-25. MAIN WHEEL AXLE REMOVAL.

NOTE

This procedure should be used if the axle is not bonded to the tubular strut. If the axle is bonded to the strut, refer to paragraph 5-27.

a. Remove speed fairing, if installed, in accordance with paragraph 5-12.
b. Remove wheel in accordance with paragraph 5-14.
c. Disconnect, drain and cap or plug hydraulic brake line at the wheel brake cylinder.
d. Remove bolts attaching brake torque plate and speed fairing mounting plate to axle.
e. Remove cotter pin, nut, washer and bolt attaching axle to tubular strut.
f. Remove axle from spring-strut.

5-26. MAIN WHEEL AXLE INSTALLATION.

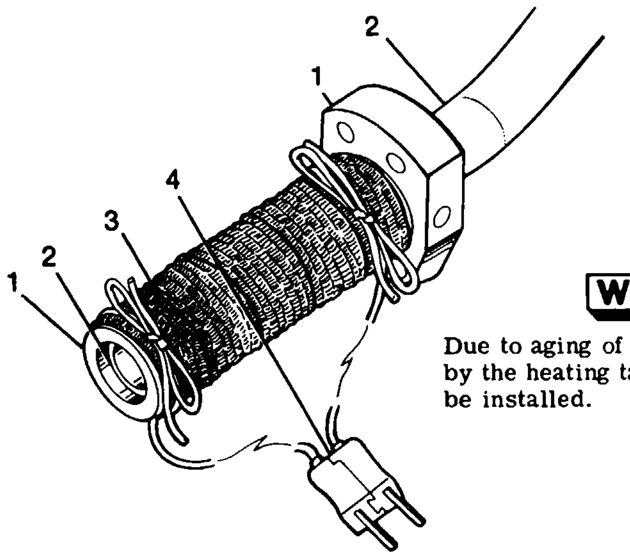
NOTE

This procedure should be used if the axle is not to be bonded to the tubular strut. If the axle is to be bonded to the strut, refer to paragraph 5-27.

a. Install axle on spring-strut, using wet primer on faying surfaces of axle and spring-strut. Axle is installed with tapered edges to bottom.
b. Install bolt, washer and nut attaching axle to spring-strut. After tightening nut, install cotter pin.
c. Install brake components and speed fairing mounting plate to axle.
d. Install wheel on axle in accordance with paragraph 5-24.
e. Connect hydraulic brake line to wheel brake cylinder.
f. Fill and bleed hydraulic brake system in accordance with applicable paragraph in this section.
g. Install speed fairing, if used, in accordance with paragraph 5-13.

CAUTION

Do not place tape in direct contact with tubular gear spring.



WARNING

Due to aging of the aluminum axle, caused by the heating tape, a new axle will have to be installed.

1. Axle
2. Tubular Gear Strut
3. Electrical Heating Tape
4. Plug

Figure 5-4. Main Wheel Axle Removal

5-27. BONDED MAIN WHEEL AXLE REMOVAL. (See figure 5-4.)

NOTE

On some aircraft, due to axle looseness, axles have been bonded to the tubular landing gear strut. The following procedure should be used to remove a bonded strut.

a. Remove speed fairings, if installed, according to procedures outlined in applicable paragraph of this section.
b. Remove wheels in accordance with procedures outlined in applicable paragraph of this section.
c. Disconnect, drain and cap or plug hydraulic brake line at the wheel brake cylinder.
d. Remove cotter pin, nut and bolt attaching axle to spring strut.
e. Remove brake components and speed fairing plate from axle.

NOTE

Axles are bonded to the struts of some tubular gear aircraft with EA9309-25GR adhesive, which is available from the Cessna Service Parts Center. The bond is too strong to allow the axle to be removed without first weakening the bond strength. The only methods of weakening the bond are with heat or cryogenic cold; heat being the most practical. A temperature of approximately 500°F is sufficient to weaken the bond so the axle can be removed. This is still a low enough temperature to prevent damage to the tubular strut.

f. Remove axles as follows:

NOTE

Axles should be removed from strut, using electric heating tape. Heating tape, P/N 135-459, can be obtained from the Cessna Service Parts Center.

g. Wrap heating tape around axle from base head to outer end of axle and tie it on with string provided with the tape, as shown in the figure.

SHOP NOTES:

CAUTION

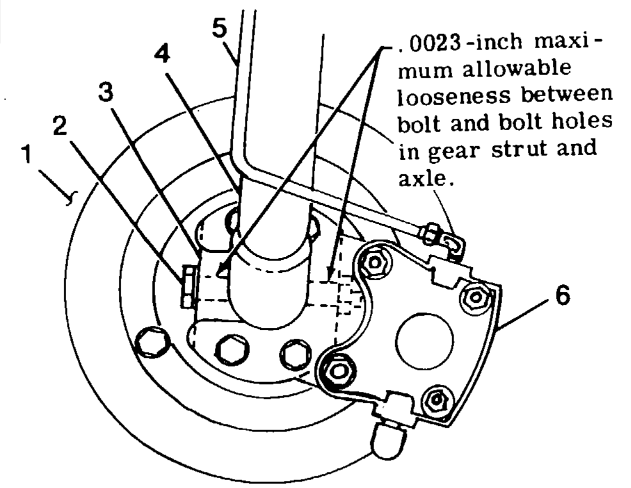
Do not place tape in direct contact with tubular gear spring.

h. Plug electric tape into 110 volt wall socket and heat for 20 to 30 minutes.
i. Unplug tape and remove from axle. Remove axle by striking axle base head with a few sharp blows.
j. Clean any old adhesive off landing gear spring with a wire brush. Brush strokes should run lengthwise along the spring. After old adhesive has been removed, wipe with clean rag saturated with acetone or alcohol. Immediately wipe dry with a clean, lint free cloth.

WARNING

Due to aging of the aluminum axle, caused by the heating tape, a new axle will have to be installed.

5-28. BONDED MAIN WHEEL AXLE INSTALLATION.



1. Tire
2. Attaching Bolt
3. Axle
4. Tubular Gear Strut
5. Brake Line
6. Brake

Figure 5-5. Checking Axle Looseness

NOTE

See figure 5-5 for checking looseness of axle on tubular gear strut. If a maximum looseness of .0023-inch between mounting bolt and holes in tubular gear strut and axle is encountered, it is permissible to bond the axle to the strut. Do not allow the adhesive to enter the holes in gear strut or axle, or to contact bolt threads. The following procedure outlines the method for bonding axle to strut.

a. Prior to installing new axle, wipe outer surface of tubular gear and inside of axle with solvent, drying immediately with a clean, lint free cloth.
b. Mix EA9309-25GR adhesive, available from the Cessna Service Parts Center, in accordance with instructions in the package. Spread adhesive thinly and evenly on outer surface of landing gear spring in area that will be covered by axle.
c. Place axle on gear spring and rotate axle to assure even coverage between inner surface of axle and outer surface of spring.
d. Install retaining bolt, washers, nut and cotter pin. Tighten nut securely.
e. Allow 24 hours at 75°F for adhesive to cure, or 30 minutes at 250°F, if heating equipment is available.
f. Install brake components and speed fairing mounting plate to axle.
g. Install wheel on axle in accordance with procedures outlined in applicable paragraph of this section.
h. Connect hydraulic brake line to wheel brake cylinder.
i. Fill and bleed hydraulic brake system in accordance with applicable paragraph in this section.
j. Install speed fairings, if used, in accordance with applicable paragraph in this section.

5-29. MAIN WHEEL ALIGNMENT CHECK. (See figure 1-1.) No provisions are made for aligning main wheels. Figure 5-6 contains procedures for checking toe-in and camber. If wheel alignment is out of these limitations, a new tubular spring strut will have to be installed.

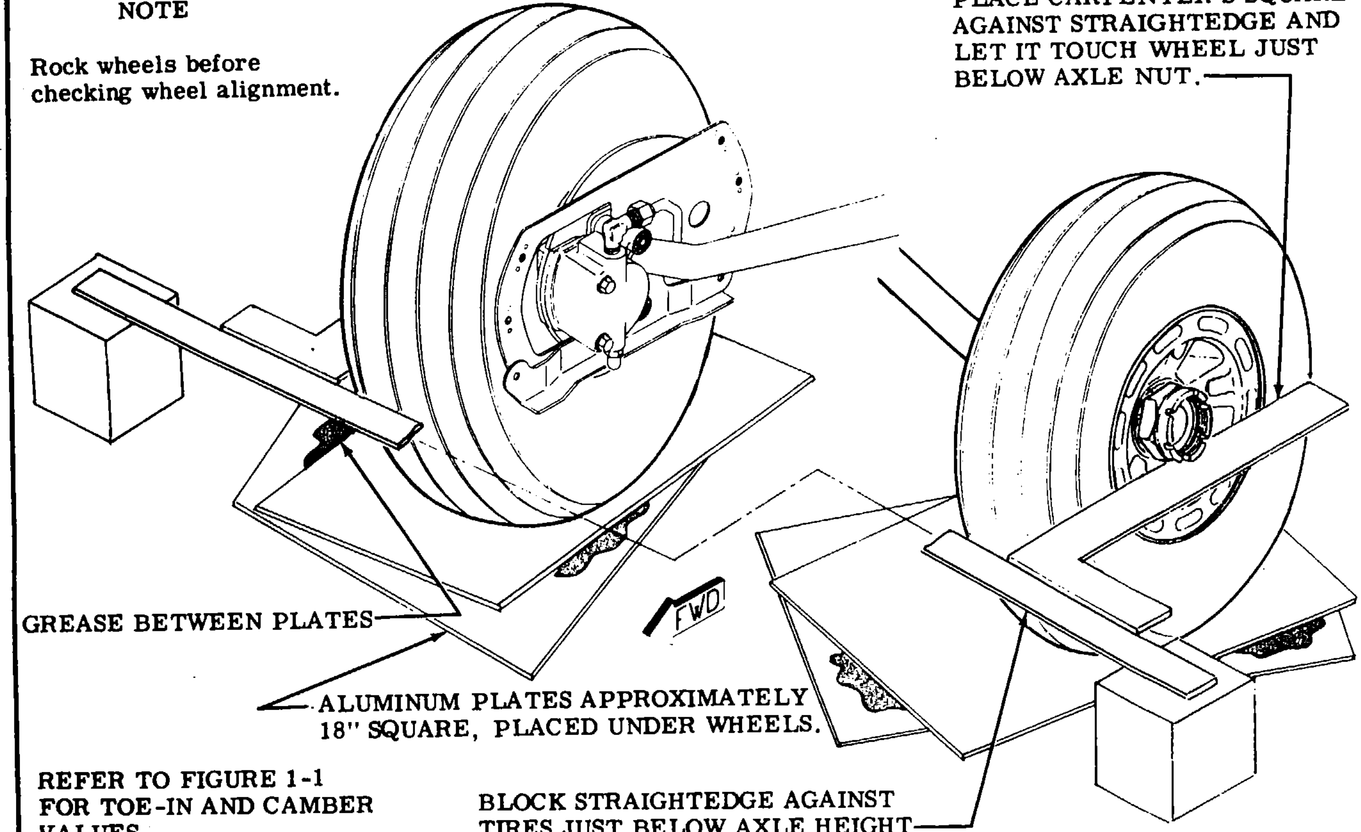
5-30. WHEEL BALANCING. Since uneven tire wear is usually the cause of wheel unbalance, replacing the tire will probably correct this condition. Tire and tube manufacturing tolerances permit a specified amount of static unbalance. The light-weight point of this tire is marked with a red dot on the tire 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 shows evidence of unbalance during service, it may be statically balanced. Wheel balancing equipment is available from the Cessna Service Parts Center.

5-31. NOSE GEAR. (See figure 5-7.)

5-32. DESCRIPTION. A steerable nose wheel, mounted in a fork, attached to an air/oil (oleo) shock strut, make up the nose gear. The shock strut is attached to the firewall with upper and lower strut fittings. Nose wheel steering is accomplished by two steering tubes linking the nose gear steering collar to the rudder pedal bars. A hydraulic fluid-filled shimmy dampener is provided to minimize nose wheel shimmy. A nose wheel speed fairing may be installed on some aircraft.

NOTE

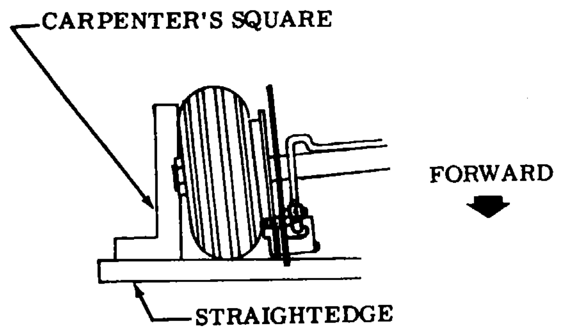
Rock wheels before checking wheel alignment.



REFER TO FIGURE 1-1 FOR TOE-IN AND CAMBER VALUES.

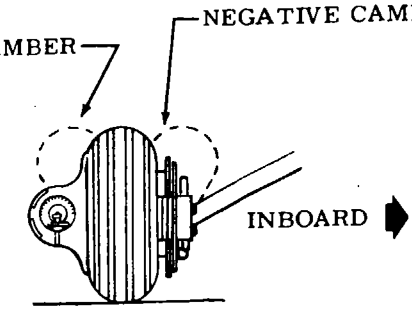
TOP VIEW OF TOE-IN CHECK

Measure toe-in at edges of wheel flange. Difference in measurements is toe-in for one wheel. (half of total toe-in.)



FRONT VIEW OF CAMBER CHECK

Measure camber by reading protractor level held vertically against outboard flanges of wheel.



NOTE

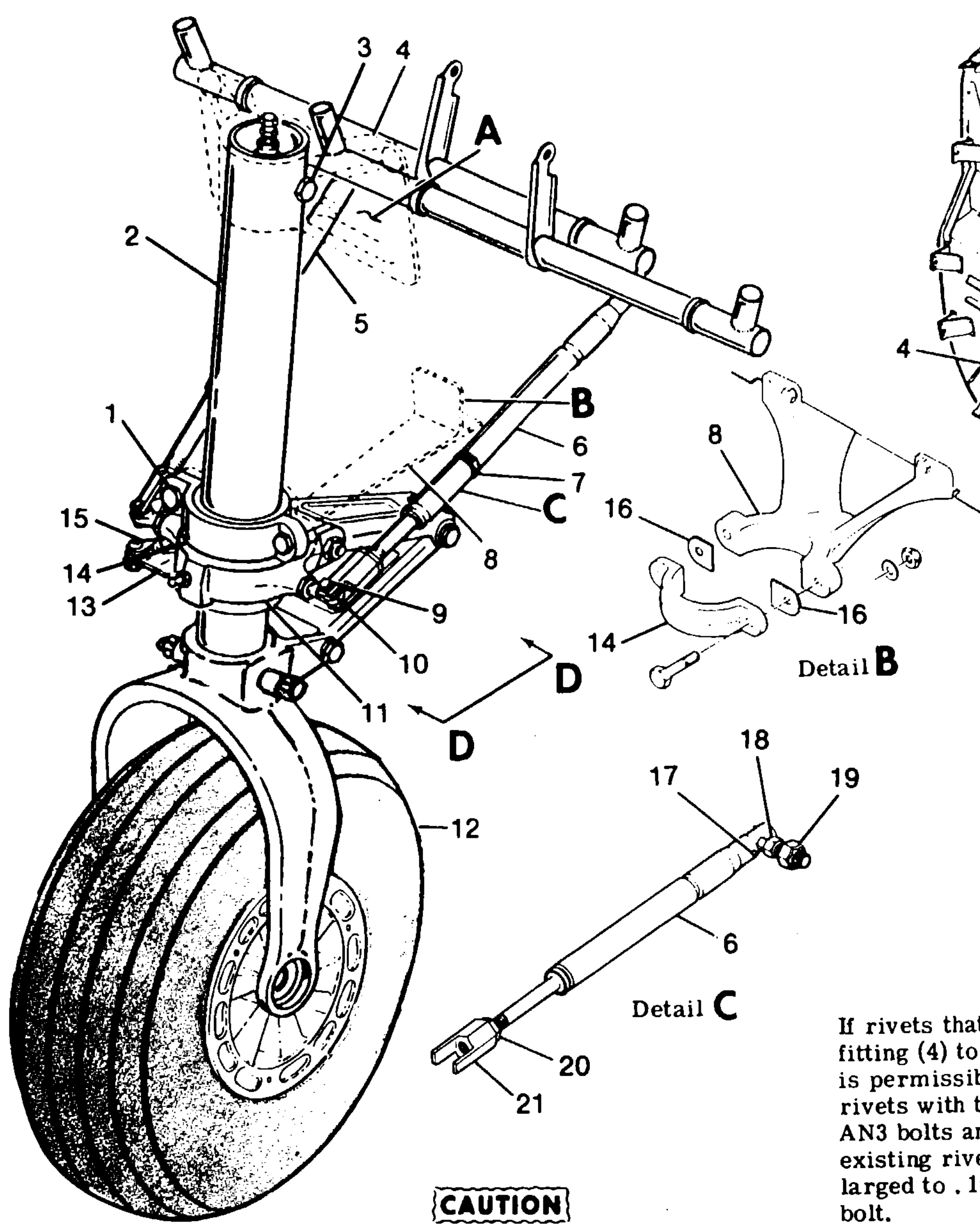
These procedures are specifically for checking wheel alignment. No provisions are made for aligning the main wheels. Refer to the chart in figure 1-1 of this manual for camber and toe-in limitations.

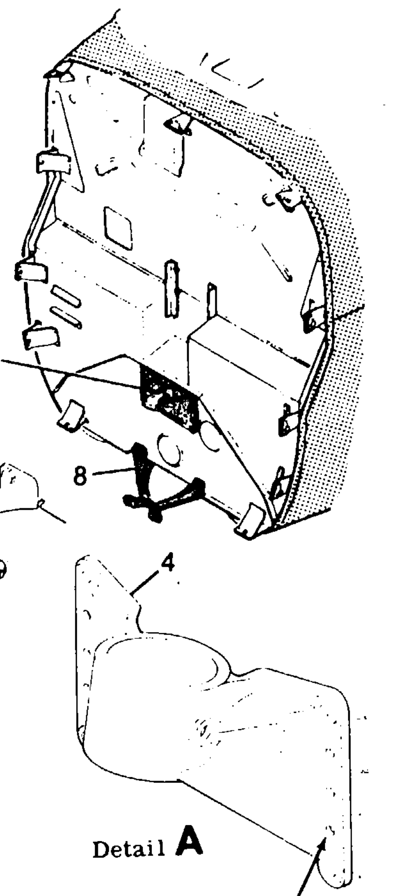
Figure 5-6. Main Wheel Alignment

5-33. TROUBLE SHOOTING THE NOSE GEAR.

TROUBLE	PROBABLE CAUSE	REMEDY
NOSE WHEEL SHIMMY.	Nose strut attaching bolts loose.	Tighten nose strut attaching bolts.
	Loose or worn nose wheel steering linkage.	Tighten. Replace defective parts with new parts.
	Nose wheel out of balance.	Refer to paragraph 5-49.
	Wheel bearings too loose.	Adjust properly.
	Defective shimmy dampener.	Repair, or install new dampener.
	Shimmy dampener fluid low.	Service in accordance with Section 2.
	Loose torque links.	Add shims, or install new parts as required.
NOSE STRUT DOES NOT HOLD AIR PRESSURE.	Defective or loose air filler valve.	Check gasket and tighten loose valve. Install new valve if defective.
	Defective strut seals.	Install new seals.
HYDRAULIC FLUID LEAKAGE FROM NOSE STRUT.	Defective strut seals.	Install new seals.

SHOP NOTES:



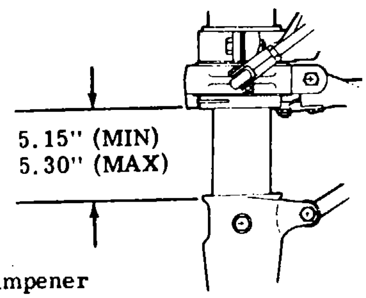


NOTE

If rivets that attach upper nose gear fitting (4) to firewall work loose, it is permissible to replace the Ad5 rivets with the appropriate length AN3 bolts and MS20365-1032 nut. The existing rivet holes should be enlarged to .193 inch to accomodate the bolt.

CAUTION

When installing cap (14), check gap between cap and strut fitting before attaching bolts are tightened. Gap tolerance is .010" minimum and .016" maximum. If gap exceeds maximum tolerance, install shims (16), Part No. 0543042-1 (.016") and Part No. 0543042-2 (.032"), as required, to obtain gap tolerance. Replace cap if gap is less than minimum, using shims to obtain proper gap. Install shims as equally as possible between sides.



Section **D-D**

1. Bolt
2. Strut Assembly
3. Bolt
4. Upper Nose Gear Fitting
5. RH Steering Tube
6. LH Steering Tube
7. Clamp
8. Lower Strut Fitting
9. Bolt
10. Rod End
11. Steering Arm Assembly
12. Wheel Assembly
13. Shimmy Dampener Arm
14. Strut Clamp Cap
15. Shimmy Dampener
16. Shim
17. Rivet
18. Ball Joint
19. Nut
20. Check Nut
21. Clevis

Figure 5-7. Nose Gear Installation

5-34. NOSE GEAR REMOVAL. (See figure 5-7.)

. Remove cowling for access.

Weight or tie down tail of aircraft to raise nose wheel off the floor.

c. Disconnect nose wheel steering tubes from nose gear steering collar.

d. Remove strut clamp cap and shims at lower strut fitting.

WARNING

Be sure strut is deflated completely before removing bolt at top of strut or before disconnecting torque links.

e. Deflate strut completely and telescope strut to its shortest length.

f. Remove bolt at top of strut.

g. Pull strut assembly down and out of upper attach forging.

5-35. NOSE GEAR INSTALLATION. (See figure 5-7.)

a. Before inflating nose gear strut, insert top of strut in upper attach forging on firewall and attach with bolt.

b. Telescope strut to mate strut clamp cap with lower strut fitting on firewall.

c. Install shims and strut clamp cap attaching strut to lower strut fitting, observing CAUTION in figure 5-7.

Inflate and service shock strut in accordance procedures outlined in Section 2 of this manual.

. Rig nose wheel steering tubes as outlined in applicable paragraph in Section 10 of this manual.

5-36. NOSE WHEEL SPEED FAIRING REMOVAL.

a. Weight or tie down tail of aircraft to raise nose wheel off the floor.

b. Remove nose wheel axle stud.

WARNING

Nose wheel fairing cover plate is secured by the lower torque link attaching bolt. Deflate strut before removing this bolt. (Refer to Section 2 of this manual.)

c. Deflate strut and remove bolt securing cover plate to strut; remove cover plate.

d. Remove bolt securing speed fairing and tow bar spacers to strut.

NOTE

Bolt attaching tow bar spacers also holds base plug in place. Cut head off an AN5 bolt and cut bolt approximately 3-inches in length. When driving attaching bolt out, drive 3-inch headless bolt in to hold base plug and bushing in place.

Slide speed fairing up and remove nose wheel. sen scraper as necessary.

f. Rotate speed fairing 90 degrees and work fairing down over nose gear fork to remove.

5-37. NOSE WHEEL SPEED FAIRING INSTALLATION.

WARNING

Do not inflate or service shock strut until after speed fairing is installed.

a. Rotate speed fairing 90 degrees and work fairing up over nose gear fork to install.

b. Slide fairing up and install nose wheel; install axle stud.

c. Tighten axle stud nut until a slight bearing drag is obvious when the wheel is rotated. Back off nut to the nearest castellation and install cotter pins.

d. Install bolt, tow bar spacers, washers and nut attaching fairing to strut, driving out 3-inch headless bolt.

e. Install cover plate and bolt attaching cover plate to strut.

f. Inflate and service shock strut in accordance with applicable paragraph in Section 2 of this manual.

g. Adjust wheel scraper clearance in accordance with the following CAUTION.

CAUTION

Always check scraper clearance after installing speed fairings, whenever a tire has been changed, and whenever scraper adjustment has been disturbed. Set clearance between tire and scraper for a minimum of 0.25-inch to a maximum of 0.38-inch. Elongated holes are provided in the scraper for clearance adjustments. If the aircraft is flown from surfaces with mud, snow, or ice, the speed fairing should be checked to make sure there is no accumulation which could prevent normal wheel rotation. Wipe fuel and oil from speed fairing to prevent stains and deterioration.

5-38. NOSE WHEEL REMOVAL.

a. Weight or tie down tail of aircraft to raise the nose wheel off the floor.

b. Remove nose wheel axle stud.

c. Pull nose wheel assembly from fork and remove axle tube from nose wheel. Loosen wheel scraper if necessary, if wheel is equipped with wheel fairings.

5-39. NOSE WHEEL DISASSEMBLY. (Thru FR1720610.) (See figure 5-9.)

a. Remove hub caps, completely deflate tire and break tire beads loose at wheel flanges.

WARNING

Injury can result from attempting to remove wheel flanges with tire and tube inflated. Avoid damaging wheel flanges when breaking tire beads loose.

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 and remove grease seal

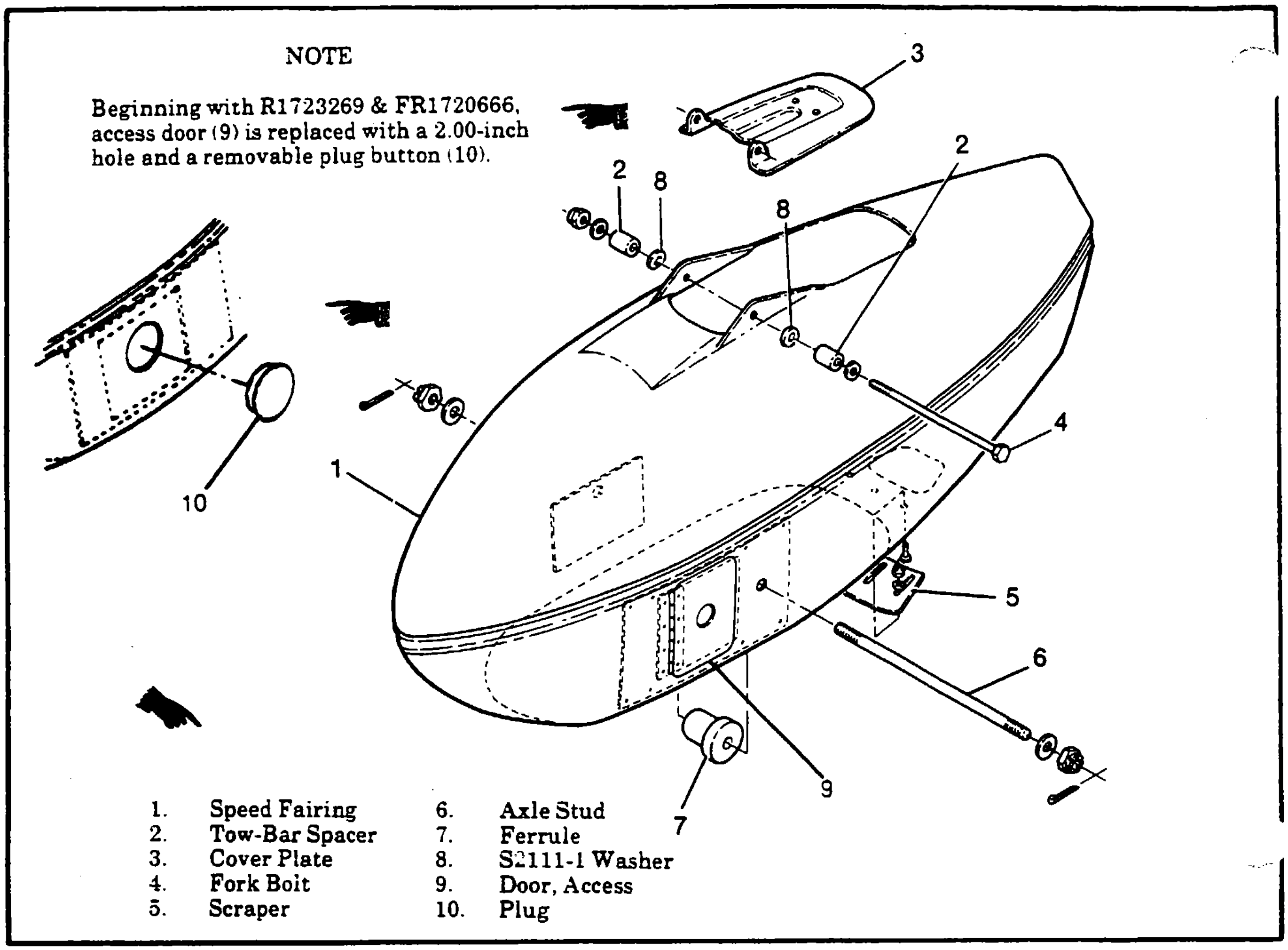


Figure 5-8. Nose Wheel Speed Fairings

retainers grease seal felts and bearing cones from wheel hub.

NOTE

The bearing cups (races) 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 the bearing cup and press in the new bearing cup while the wheel hub is still hot.

5-40. NOSE WHEEL INSPECTION AND REPAIR. (Thru FR1720610.) (See figure 5-9.)

a. Clean all metal parts, grease seal felts and phenolic 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 non zinc chromate primer, and paint with aluminum laquer.

c. Carefully inspect bearing cones and cups for damage and discoloration. After cleaning, pack bearing cones with clean aircraft wheel bearing grease (Section 2) before installing in the wheel hub.

5-41. NOSE WHEEL REASSEMBLY. (Thru FR1720610.) (See figure 5-9.)

a. Insert tube in tire, aligning index marks on tire and tube.

b. Place wheel in tire with valve stem in cutout of wheel hub.

c. Place spacer and wheel flange on one side of wheel hub and place washer under head of each capscrew and start capscrews into wheel hub threads.

d. Place spacer and wheel flange on other side and align valve stem in cutout in wheel flange.

e. Place washer under head of each capscrew and start capscrews into wheel hub threads.

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 the capscrews with resultant wheel failure.

f. Tighten capscrews (15) evenly and torque to 190 to 200 lb-in.
g. Clean and pack bearing cones with clean aircraft wheel bearing grease. (Refer to Section 2 for grease type.)
h. Assemble bearing cones, grease seal felts and retainers into wheel hub.
i. Inflate tire to seat tire beads, then adjust to correct tire pressure. (Refer to Section 1.)

5-42. NOSE WHEEL DISASSEMBLY. (Beginning with FR1720611 and R17202000.) (See figure 5-9.)

WARNING

Serious injury 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 (6).
b. Remove nuts (4) and washers (5).
c. Remove thru-bolts (8) and washers (5).
d. Separate and remove wheel halves (6) from tire and tube.
e. Remove retaining ring (1), grease seal retainer (2), felt grease seal (3), grease retainer (2) and bearing cone (9) from each wheel half (6).

NOTE

Bearing cups (races) (7) are a press fit in wheel half (6) 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 a new bearing cup while wheel half is still hot.

5-43. NOSE WHEEL INSPECTION AND REPAIR. (Beginning with FR1720611 and R17202001.) (See figure 5-9.)
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 (6) for cracks or damage.
c. Inspect bearing cones (9), cups (7), retaining rings (1) and seals (2) and (3), for wear or damage.
d. Inspect thru-bolts (8) and nuts (4) for cracks in threads or cracks in radius of bolt heads.
e. Replace cracked or damaged wheel half (6).
f. Replace damaged retaining rings (1) and seals (2) and (3).
g. Replace any worn or cracked thru-bolts (8) or nuts (4).
h. Replace worn or damaged bearing cups (7) or cones (9).
i. Remove any corrosion or small nicks.
j. Repair reworked areas of wheel by cleaning thoroughly, then applying one coat of clear lacquer paint.
k. Pack bearings with grease specified in Section 2 of this manual.

5-44. NOSE WHEEL REASSEMBLY. (Beginning with FR1720611 and R17202001.) (See figure 5-9.)
a. Assemble bearing cone (9), grease seal retainer (2), felt grease seal (3), grease seal retainer (2) and retaining ring (1) into both wheel halves (6).
b. Insert tube in tire, aligning index marks on tire and tube.
c. Place wheel half (6) into tire and tube (side opposite valve stem). With washer (5) under head of thru-bolt (8), insert bolt through wheel half (6).
d. Place wheel half (6) into other side of tire and tube, aligning valve stem in valve slot.
e. Install washers (5) and nuts (4) on thru-bolts (8) 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.

f. Prior to torquing nuts (4), inflate tube with approximately 10-15 psi air pressure to seat tire.

CAUTION

Do not use impact wrenches on thru-bolts or nuts.

g. Dry torque all nuts (4) evenly to a torque value of of 140 to 150 lb-in.
h. Inflate tire to correct pressure specified in figure 1-1 of this manual.

5-45. DISASSEMBLY. (Cleveland) (See figure 5-9, Sheet 2 of 2.)

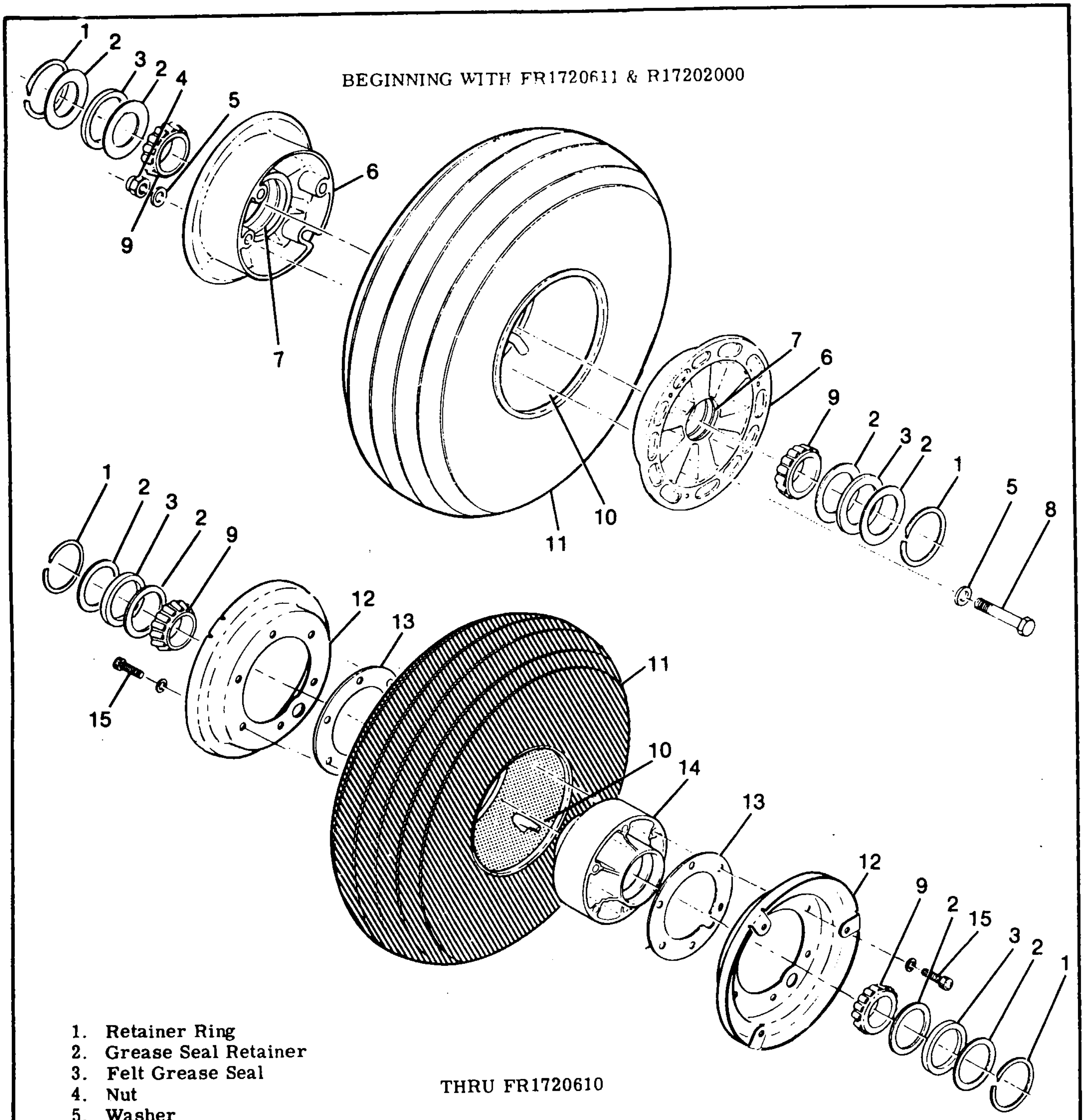
WARNING

Injury can result from attempting to separate wheel halves with tire inflated. Avoid damaging wheel flanges when breaking tire beads loose.

a. Deflate tire and break tire beads loose.
b. Remove thru-bolts and separate wheel halves.
c. Remove tire and tube.
d. Remove snap ring, grease seal felt, grease seal rings and bearing cones from both wheel halves.

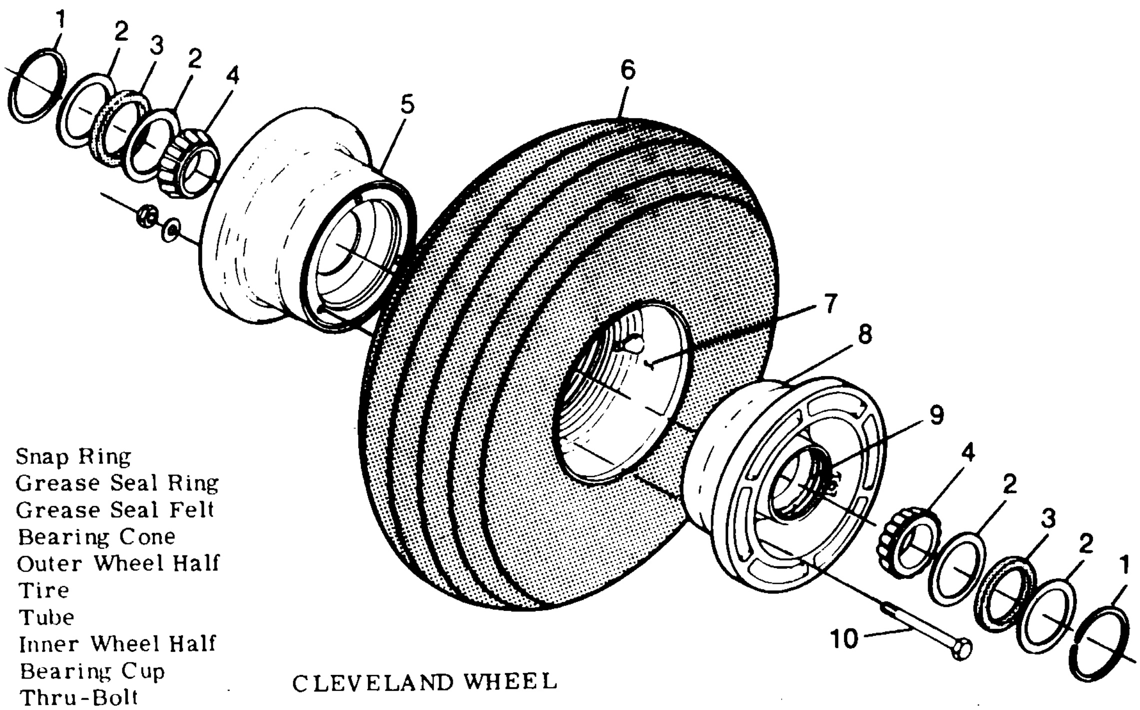
NOTE

Bearing cups are a press-fit in the wheel halves and should not be removed unless replacement is necessary. To remove bearing cups, heat wheel half in boiling water for 15 minutes. Using an arbor press, if available, press out bearing cup and press in new cup while wheel is still hot.



1. Retainer Ring
2. Grease Seal Retainer
3. Felt Grease Seal
4. Nut
5. Washer
6. Wheel Half
7. Bearing Cup
8. Bolt
9. Bearing Cone
10. Tube
11. Tire
12. Wheel Flange
13. Phenolic Spacer
14. Hub Assembly
15. Capscrew

Figure 5-9. Nose Wheel and Tire (Sheet 1 of 2)



1. Snap Ring
2. Grease Seal Ring
3. Grease Seal Felt
4. Bearing Cone
5. Outer Wheel Half
6. Tire
7. Tube
8. Inner Wheel Half
9. Bearing Cup
10. Thru-Bolt

CLEVELAND WHEEL

Figure 5-9. Nose Wheel and Tire (Sheet 2 of 2)

5-46. INSPECTION AND REPAIR. (Cleveland) (See figure 5-9, Sheet 2 of 2.)

a. Clean all metal parts and grease seal felts in solvent and dry thoroughly.

b. Inspect wheel halves for cracks. Cracked wheel halves must be replaced. Sand out nicks, gouges and corroded areas. Where protective coating has been removed, area should be cleaned thoroughly, primed with zinc chromate primer 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 (Section 2) before installation in the wheel. To replace bearing cups, refer to note in paragraph 5-33A.

5-47. REASSEMBLY. (Cleveland) (See figure 5-9, Sheet 2 of 2.)

a. Insert tire in tube, 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 nuts and washers. Take care to avoid pinching tube between wheel halves. Torque bolts to 90 lb-in.

CAUTION

Uneven or improper torque on thru-bolt nuts may cause bolt failure with resultant wheel failure.

d. Clean and repack bearing cones with clean aircraft wheel bearing grease (Section 2.)

e. Assemble bearing cones, seals and retainers into wheel halves.

f. Inflate tire to seat tire beads, then adjust to correct pressure.

g. Install wheel in accordance with paragraph 5-34.

5-48. NOSE WHEEL INSTALLATION.

a. Install axle tube in nose wheel.

b. Install nose wheel assembly in fork and install nose wheel axle stud.

c. Tighten axle stud nut until a slight bearing drag is obvious when wheel is rotated. Back nut off to the nearest castellation and insert cotter pins.

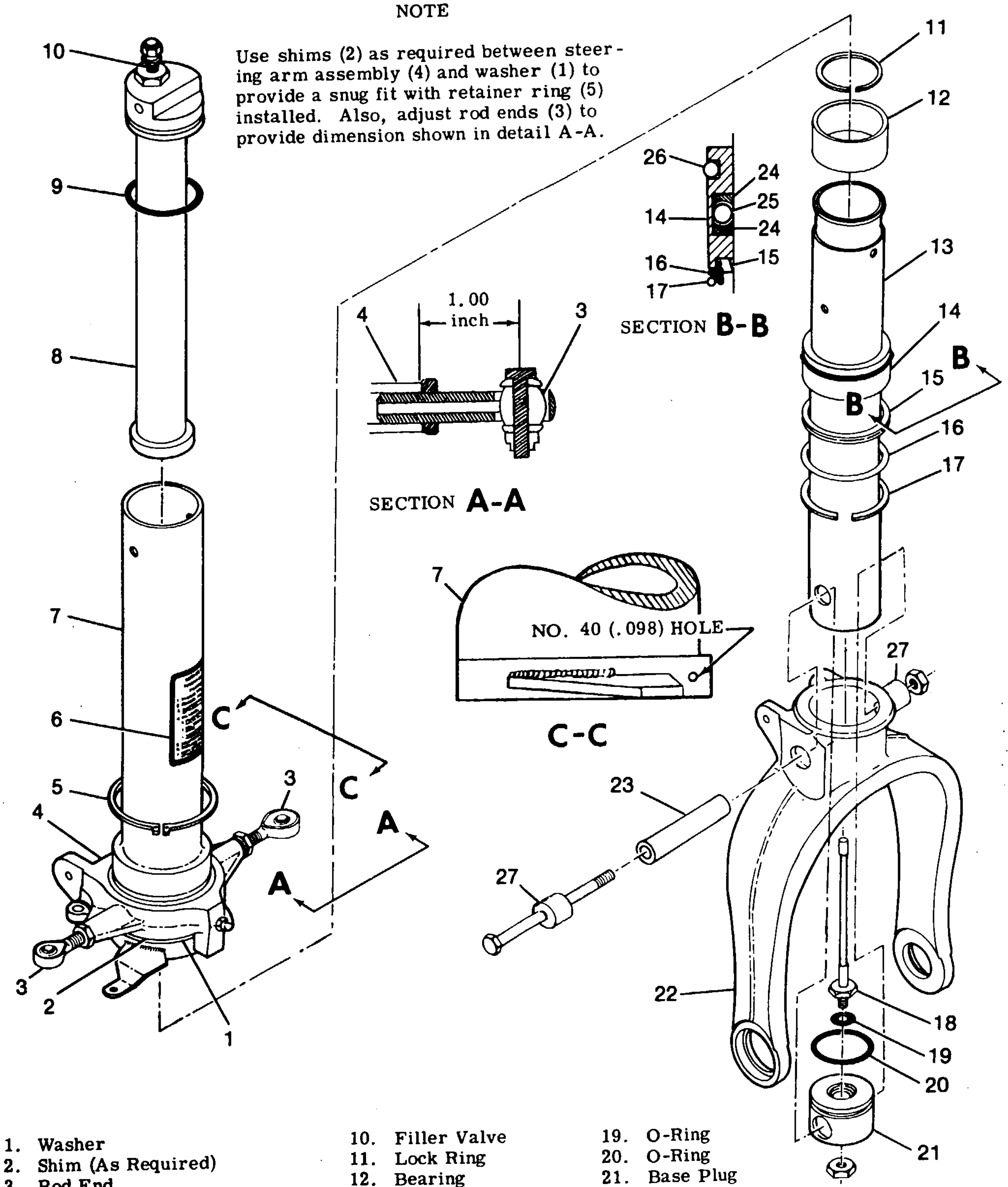
CAUTION

On aircraft equipped with speed fairings, always check scraper-to-tire clearance after installing speed fairing, whenever a tire has been changed or whenever scraper clearance adjustment has been disturbed. Set scraper clearance in accordance with instructions outlined in paragraph 5-37.

5-49. WHEEL BALANCING. Since uneven tire wear is usually the cause of 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

NOTE

Use shims (2) as required between steering arm assembly (4) and washer (1) to provide a snug fit with retainer ring (5) installed. Also, adjust rod ends (3) to provide dimension shown in detail A-A.



1. Washer
2. Shim (As Required)
3. Rod End
4. Steering Arm Assembly (Collar)
5. Retaining Ring
6. Decal
7. Upper Strut
8. Orifice Piston Support
9. O-Ring
10. Filler Valve
11. Lock Ring
12. Bearing
13. Lower Strut
14. Packing Support Ring
15. Scraper Ring
16. Retaining Ring
17. Lock Ring
18. Metering Pin
19. O-Ring
20. O-Ring
21. Base Plug
22. Fork
23. Bushing
24. Back-Up Ring
25. O-Ring
26. O-Ring
27. Tow Bar Spacer

Figure 5-10. Nose Gear Strut

marks adjacent to each other. If a wheel shows evidence of unbalance during service, it may be statically balanced. Wheel balancing equipment is available from the Cessna Service Parts Center.

5-50. NOSE GEAR SHOCK STRUT DISASSEMBLY. (See figure 5-10.)

NOTE

The following procedures apply to the nose gear shock strut after it has been removed from the aircraft and the speed fairing and the nose wheel have been removed. In many cases, separation of the upper and lower strut will permit inspection and parts installation without removal or complete disassembly of the strut.

WARNING

Be sure shock strut is completely deflated before removing lock ring in lower end of upper strut, or disconnecting torque links.

a. Remove shimmy dampener.
b. Remove torque links. Note position of washers, shims and spacers.
c. Remove lock ring from groove inside lower end of upper strut. A small hole is provided at the lock ring groove to facilitate removal of the lock ring.

NOTE

Hydraulic fluid will drain from strut halves as lower strut is pulled from upper strut.

d. Using a straight, sharp pull, separate upper and lower struts. Invert lower strut and drain hydraulic fluid.
e. Remove lock ring and bearing at upper end of lower strut assembly. Note top side of bearing.
f. Slide packing support ring, scraper ring, retaining ring and lock ring from lower strut, noting relative position and top side of each ring; wire or tape together, if desired.
g. Remove O-rings and back-up rings from packing support ring.
h. Remove bolt securing tow bar spacers.

NOTE

Bolt attaching tow bar spacers also holds bushing and base plug in place.

i. Remove bolt attaching fork to strut barrel and remove bushing, base plug and metering pin from lower strut. Remove O-rings and metering pin from base plug.

NOTE

Lower strut barrel and nose gear fork are a press fit, drilled on assembly. Separation of these parts is not recommended except for installation of a new part.

j. Remove retaining ring securing steering arm assembly on upper strut, and remove steering arm assembly, shims (if installed) and washer. If shims are installed, note number and position of each shim.
k. Push orifice support from upper strut and remove O-ring.
l. Remove filler valve from orifice support.

5-51. NOSE GEAR SHOCK STRUT INSPECTION AND REPAIR. (See figure 5-10.)
a. Thoroughly clean all parts in cleaning solvent and inspect them carefully.
b. All worn or defective parts and all O-rings and back-up rings must be replaced with new parts.
c. Sharp metal edges should be smoothed with No. 400 emery paper, then cleaned with solvent.

5-52. NOSE GEAR SHOCK STRUT REASSEMBLY. (See figure 5-10.)

NOTE

Used sparingly, Dow Corning Compound DC4 is recommended for O-ring lubrication. All other internal parts should be liberally coated with hydraulic fluid during reassembly.

a. Install washer (1) and shim(s) (2), if installed.
b. Lubricate needle bearings in steering collar (4), as shown in Section 2 of this manual, and install steering collar and retaining ring (5).
c. Check steering collar for snug fit against washer. Shims of variable thicknesses and available from the Cessna Service Parts Center to provide a snug fit for collar against washer.

NOTE

If shims are required, remove retaining ring and steering collar and add shims as necessary to provide a snug fit with steering collar retaining ring in place.

Part numbers of available shims and their thicknesses are listed as follows:

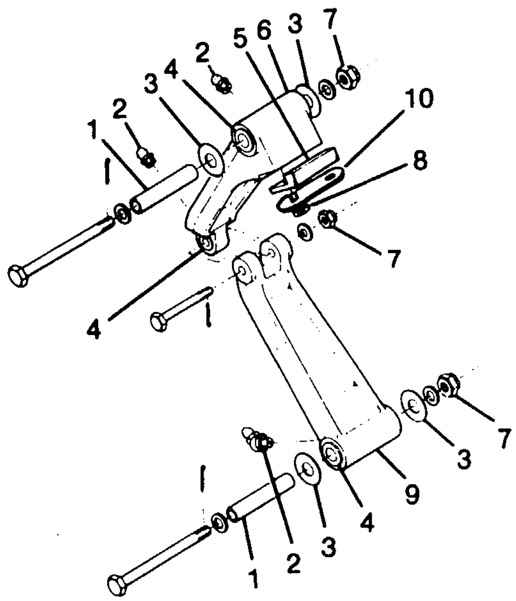
1243030-5	0.006
1243030-6	0.012
1243030-7	0.020

d. Install rod ends (3) in steering collar (4) and adjust rod ends to dimension specified in Section view A-A in figure 5-10.
e. Install O-ring (9) and filler valve (10) in orifice piston support (8) and install orifice piston support in upper strut (7).
f. Install O-ring (20) and metering pin (18) with O-ring (19) in base plug (21); secure with nut.

NOTE

If base plug (21) is to be replaced, new part will need to be line-drilled to accept NAS75-5 bushing.

g. Install bushing (23), if removed, in base plug



NOTE

Tighten bolts (8) to 20-25 pound-inches, then safety the bolts by bending tips of safety lug (10).

Tighten nuts (7) snugly, then tighten to align next castellation with cotter pin hole.

Shims (3) are available to use as required to remove any looseness.

1. Spacer
2. Grease Fitting
3. Shim
4. Bushing
5. Stop Lug
6. Upper Torque Link
7. Nut
8. Bolt
9. Lower Torque Link
10. Safety Lug

Figure 5-11. Torque Links

(21), and install base plug assembly in lower strut (13).

h. Align holes of bushing, hole in lower strut and hole in fork. Install tow bar spacer under head of bolt, and install bolt through fork, lower strut and bushing which is installed in base plug. Install tow bar spacer on threaded end of bolt, install and tighten nut.

i. Install lock ring (17), retaining ring (16) and scraper ring (15) on lower strut, making sure they are installed in the same positions as they were removed.

j. Install O-rings (25) and (26) and back-up rings in packing support ring (14); slide packing support ring over lower strut (13).

k. Install bearing (12) and lock ring (11) at upper end of lower strut assembly. Note top side of bearing.

l. Install upper strut assembly over lower strut assembly.

m. Install lock ring (17) in groove in lower end of upper strut. Position lock ring so that one of its ends covers the small access hole in the lock ring groove (Section view C-C.)

n. Install torque links, positioning washers, shims and spacers exactly in positions as removed.

o. Install shimmy dampener.

p. After shock strut assembly is complete, install strut on aircraft as outlined in paragraph 5-32.

q. After strut is installed on aircraft, fill and inflate shock strut in accordance with procedures outlined in Section 2 of this manual.

5-53. TORQUE LINKS. (See figure 5-11.)

5-54. DESCRIPTION. Torque links keep the lower strut aligned with the nose gear steering system, but permit shock strut action.

5-55. TORQUE LINK REMOVAL.

WARNING

Completely deflate strut before removing torque links.

a. Completely deflate shock strut.

b. Disconnect upper and lower attaching bolts, spacers, shims and nuts; remove torque links.

5-56. TORQUE LINK INSPECTION AND REPAIR. (See figure 5-11.) Torque links bushings should not be removed except for replacement of parts; replace if excessively worn.

5-57. TORQUE LINK INSTALLATION. (See figure 5-11.)

NOTE

If bolts (8), safety lug (10) and stop lug (5) were removed upon installation, tighten bolts (8) to 20-25 pound-inches, then safety the bolts by bending tips of safety lug (10).

a. With shock strut completely deflated, install upper and lower torque link assemblies.

b. Install bolt attaching upper and lower assemblies.

c. Tighten nuts (7) snugly, then tighten to align next castellation with cotter pin hole in bolt.

d. Check upper torque link (6) and lower torque link (9) for looseness. If looseness is apparent, remove nuts (7) and bolts, and install shims (3) as necessary to take up any looseness. This will assist in preventing nose wheel shimmy.

e. Retighten nuts (7) snugly, then tighten to align next castellation with cotter pin hole in bolt; install cotter pin.

f. Fill and inflate shock strut in accordance with procedures outlined in Section 2 of this manual.

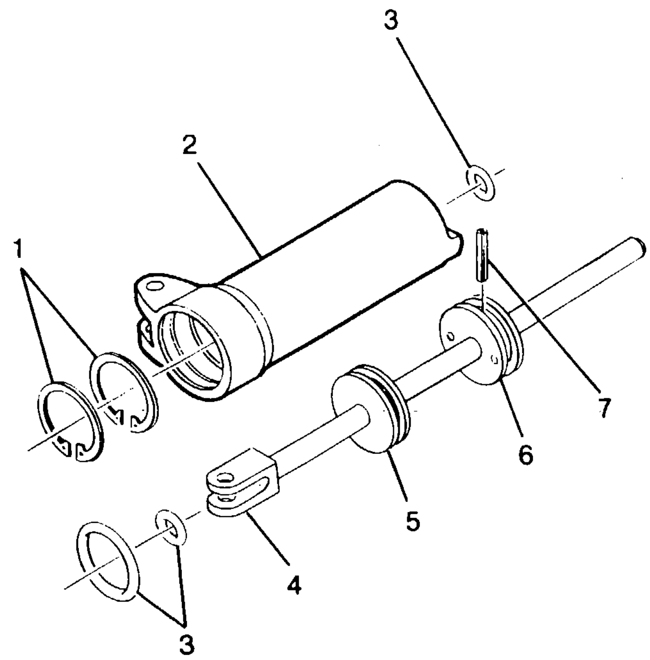


Figure 5-12. Shimmy Dampener

5-58. SHIMMY DAMPENER. (See figure 5-12.)

5-59. DESCRIPTION. The shimmy dampener, provided for the nose gear, offers resistance to shimmy by forcing hydraulic fluid through small orifices in a piston. The dampener piston shaft is secured to a bracket, welded on the bottom of the upper strut tube. The shimmy dampener housing is secured to the steering arm assembly, which moves as the nose wheel is turned, causing relative motion between the dampener shaft and housing.

5-60. SHIMMY DAMPENER REMOVAL.
a. Remove cotter pin, nut, washer and bolt attaching shaft clevis to bracket welded on bottom of upper strut tube.
b. Remove cotter pin, nut, spacer and bolt attaching dampener housing to steering arm assembly.
c. Remove shimmy dampener.

5-61. SHIMMY DAMPENER DISASSEMBLY AND REASSEMBLY. (See figure 5-12.) Refer to the figure during disassembly and assembly of the shimmy dampener. When reassembling the dampener, install all new O-rings. Lubricate all parts with clean hydraulic fluid. When dampener is completely assembled, service in accordance with procedures outlined in Section 2 of this manual.

5-62. SHIMMY DAMPENER INSTALLATION.
a. Attach shimmy dampener housing to steering arm assembly with bolt, spacer, nut and cotter pin.
b. Attach dampener piston rod clevis to bracket welded on bottom of upper strut tube with bolt, washers (as required) and nut.

5-63. NOSE WHEEL STEERING SYSTEM.

5-64. DESCRIPTION. Nose wheel steering is accomplished through the use of the rudder pedals. Spring-loaded steering rod assemblies connect the nose gear steering arm assembly to arms on the rudder bars. Steering is afforded up to approximately 10 degrees each side of neutral, after which, the brakes may be used to gain a maximum deflection of 30 degrees right or left of center. A flexible boot seals the fuselage entrance of the steering rod assemblies.

5-65. NOSE WHEEL STEERING ROD ASSEMBLIES.

5-66. DESCRIPTION. The steering rods are connected by a clevis to the rod ends extending from the nose gear steering arm, and to an arm on the rudder pedal crossbars.

5-67. NOSE WHEEL STEERING ADJUSTMENT. Before attaching nose wheel steering rods to the rod ends extending from the steering arm assembly, adjust rod ends to the dimension specified in Section view A-A in figure 5-10. Since the nose gear steering system and the rudder system are interconnected, adjustment to one system might affect the other system. Refer to Section 10 of this manual for instructions for rigging the nose wheel steering system and the rudder system.

5-68. BRAKE SYSTEMS. (See figure 5-14.)

5-69. DESCRIPTION. The hydraulic brake system is comprised of two master cylinders, located immediately forward of the pilot's rudder pedals, brake lines and hoses connecting each master cylinder to its wheel brake cylinder, and the single-disc, floating cylinder-type brake assembly, located at each main gear wheel.

5-70. TROUBLE SHOOTING THE BRAKE SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
DRAGGING BRAKES.	Brake pedal binding.	Check and adjust properly.
	Parking brake linkage holding brake pedal down.	Check and adjust properly.
	Worn or broken piston return spring (in master cylinder.)	Repair, or install new cylinder.
	Insufficient Clearance at Lock-O-Seal or correct adjustment of cylinder overall length.	Adjust as outlined in paragraph 5-76.
	Restriction in hydraulic lines or restrictions in compensating port in brake master cylinder.	Drain brake line and clear the inside of the brake line with filtered compressed air. If cleaning the lines fails to give satisfactory results, the master cylinder may be faulty and should be repaired.
	Worn, scored or warped brake disc.	Install new disc and brake linings.
	Damaged or accumulated dirt restricting free movement of wheel brake parts.	Clean and repair or install new parts as necessary.
BRAKES FAIL TO OPERATE.	Leak in system.	If brake master cylinders or wheel cylinder assemblies are leaking, repair, or install new parts.
	Air in system.	Bleed system.
	Lack of fluid in master cylinders.	Fill and bleed system.
	Defective master cylinder.	Repair, or install new parts.

5-71. BRAKE MASTER CYLINDER. (See figure 5-13.)

5-72. 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.

5-73. BRAKE MASTER CYLINDER REMOVAL.

a. Remove bleeder screw at wheel brake assembly and drain hydraulic fluid from brake cylinders.
b. Remove front seats and rudder bar shield for access to the brake master cylinders.
c. Disconnect parking brake linkage and disconnect brake master cylinders from rudder pedals.
d. Disconnect hydraulic hose from brake master cylinders and remove cylinders.
e. Plug or cap hydraulic fittings, hoses and lines. to prevent entry of foreign material.

5-74. DISASSEMBLY, (Thru 1978 Models.) (See figure 5-13, Sheet 1 of 2.)

a. Unscrew clevis (1) and jam nut (2).
b. Remove screw (18) and washer (19).
c. Remove filler plug (17) and setscrew (5).
d. Unscrew cover (4) and remove up over piston rod (3).
e. Remove piston rod (3) and compensating sleeve (16).
f. Slide sleeve (16) up over rod (3).
g. Unscrew nut (12) from threads of piston rod (3).

h. Remove spring (13) and O-ring (9) from piston (14).
i. Remove Lock-O-Seal (15).

5-75. INSPECTION AND REPAIR. (Thru 1978 Models.) (See figure 5-13, Sheet 1 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 (17) 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.

5-76. REASSEMBLY. (Thru 1978 Models.) (See figure 5-13, Sheet 1 of 2.)
a. Install Lock-O-Seal (15) at bottom of piston rod (3)
b. 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).
c. Run nut (12) up threads to spring (13). Tighten nut (12) enough to obtain 0.040±0.005-inch clearance between top of piston and bottom of Lock-O-Seal, as shown in the figure.
d. Install piston return spring (11) into cylinder (10) portion of body (7).
e. Install piston rod (3) through spring (11).
f. Slide compensating sleeve (16) over rod (3).
g. Install cover (4), washer (19) and screw (18).

5-77. DISASSEMBLY. (Beginning with 1979 Models.) (See figure 5-13, Sheet 2 of 2.)
a. Unscrew clevis (1) and jam nut (2).
b. Remove filler plug (3).
c. Unscrew cover (4) and remove up over piston (5).
d. Remove piston (5) and spring (8).
e. Remove packing (7) and back-up ring (6) from piston (5).

5-78. INSPECTION AND REPAIR. (Beginning with 1979 Models.) (See figure 5-13, 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 (3) 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 vent hole.

5-79. REASSEMBLY. (Beginning with 1979 Models.) (See figure 5-13, Sheet 2 of 2.)
a. Install spring (8) into cylinder body (9).
b. Install back-up ring (6) and packing (7) in groove of piston (5).
c. Install piston (5) in cylinder body (9).
d. Install cover (4) over piston (5) and screw cover into cylinder body (9).
e. Install nut (2) and clevis (1).
f. Install filler plug (3), making sure vent hole is open.

5-80. BRAKE MASTER CYLINDER 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.

5-81. HYDRAULIC BRAKE LINES.

5-82. DESCRIPTION. The brake lines are 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.

5-83. WHEEL BRAKE ASSEMBLIES. (See figure 5-3.)

5-84. DESCRIPTION. The wheel brake assemblies emply a floating brake assembly and a disc which is attached to the main wheel.

5-85. WHEEL BRAKE REMOVAL. (See figure 5-3.) Wheel brake assemblies can be removed by disconnecting the brake line(drain hydraulic fluid when disconnecting line)and removing the brake back plate. The brake disc is removed after the wheel is removed and disassembled. To remove the torque plate, remove wheel and axle.

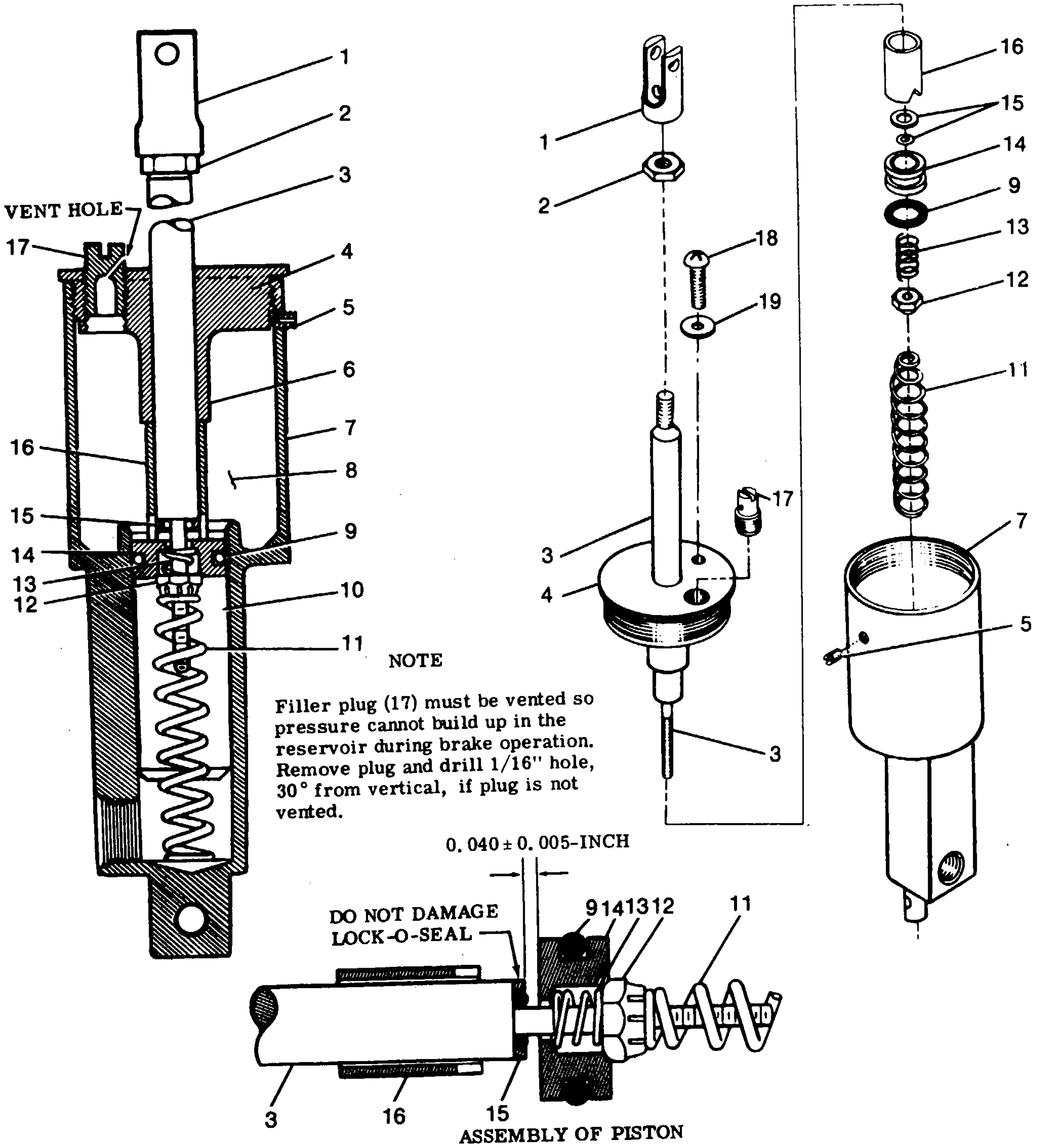
5-86. WHEEL BRAKE DISASSEMBLY. See figure 5-3 for a breakdown of wheel brake parts. This figure may be used as a guide for disassembling the wheel brakes.

5-87. WHEEL BRAKE INSPECTION AND REPAIR.
a. Clean all parts except brake linings and O-rings in dry cleaning solvent and dry thoroughly.
b. Install all new O-rings. If O-ring reuse is necessary, wipe with a clean cloth saturated in hydraulic fluid and inspect for damage.

NOTE

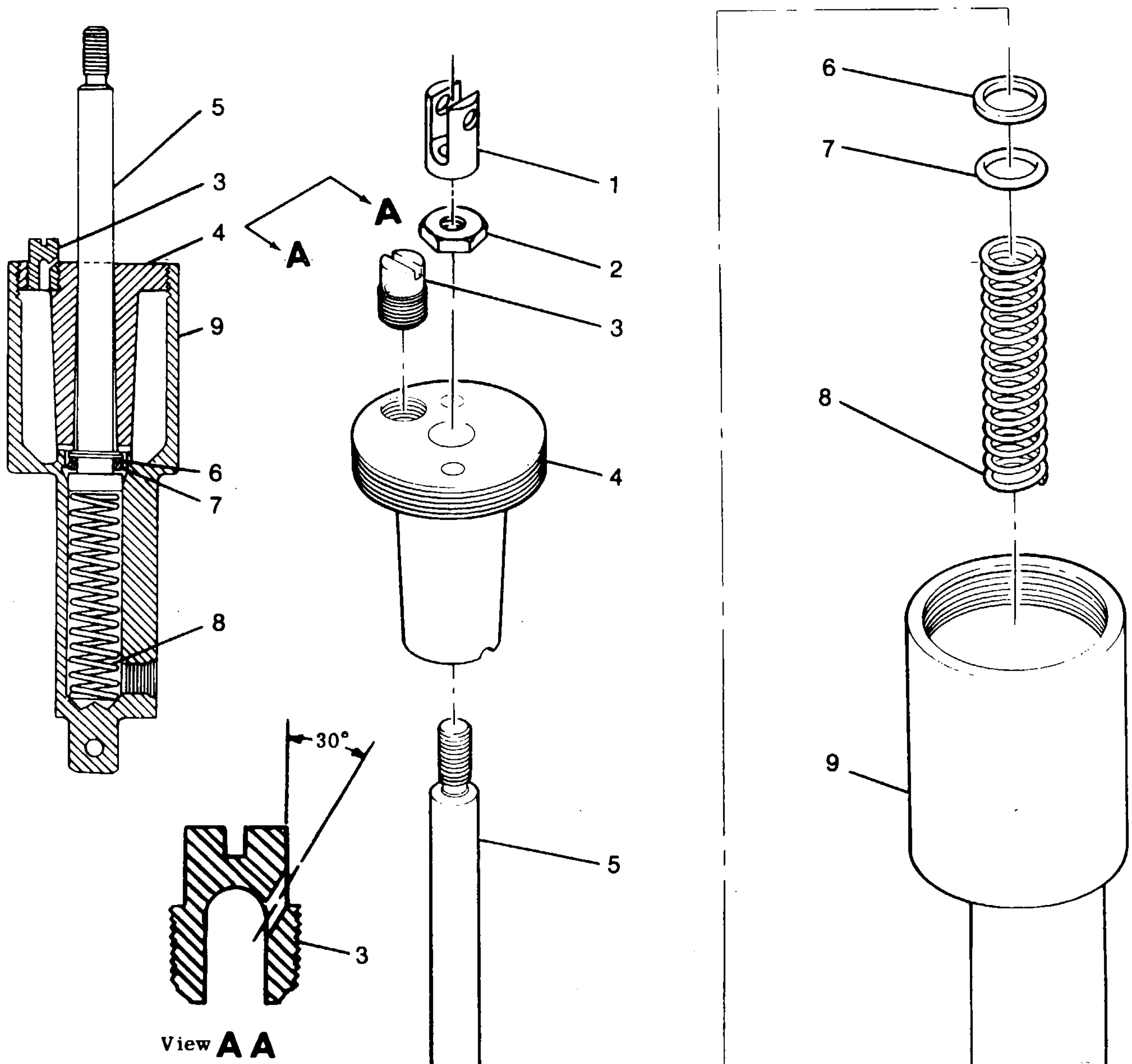
Thorough cleaning is important. Dirt and chips are the greatest single cause of malfunctions in the hydraulic brake system.

c. Check brake lining for deterioration and maximum permissible wear. (Refer to applicable paragraph for maximum wear limit.)
d. Inspect brake cylinder bore for scoring. A scored cylinder will leak or cause rapid O-ring 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 shall be sanded smooth to prevent binding with the pressure plate or torque plate. When new anchor bolts are to be installed,



1. Clevis
2. Jam Nut
3. Piston Rod
4. Cover
5. Setscrew
6. Cover Boss
7. Body
8. Reservoir
9. O-Ring
10. Cylinder
11. Piston Return Spring
12. Nut
13. Piston Spring
14. Piston
15. Lock-O-Seal
16. Compensating Sleeve
17. Filler Plug
18. Screw
19. Washer

Figure 5-13. Brake Master Cylinder (Sheet 1 of 2)



NOTE

Filler plug (3) must be vented so pressure cannot build up in the reservoir during brake operation. Remove plug and drill 1/16" hole, 30° from vertical (as shown in view A-A), if plug is not vented.

1. Clevis
2. Nut
3. Filler Plug
4. Cover
5. Piston
6. Back-up Ring
7. Packing
8. Spring
9. Cylinder Body

BEGINNING WITH
1979 MODELS

Figure 5-13. Brake Master Cylinder (Sheet 2 of 2) press out old bolts and install new bolts with a soft mallet.

f. Inspect wheel brake discs for a minimum thickness of 0.190-inch (McCauley) or 0.190-inch (Cleveland). If disc is below minimum, replace disc.

5-88. WHEEL BRAKE REASSEMBLY. (See figure 5-3.)

NOTE

Lubricate parts with clean hydraulic fluid during brake reassembly.

a. Refer to figure 5-3 as a guide while reassembling wheel brakes.

5-89. WHEEL BRAKE INSTALLATION.

a. Place brake assembly in position with pressure plate in place.

b. Install back plate.

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.

5-90. CHECKING BRAKE LINING WEAR. New brake lining should be installed when the existing lining has worn to a minimum 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.

5-91. BRAKE LINING INSTALLATION. (See figure 5-3.)

a. Remove bolts securing back plate, and remove back plate.

b. Pull brake cylinder out of torque plate and slide pressure plate off anchor bolts.

c. 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 pressure plate in the same manner.

NOTE

A rivet setting kit, Part No. R561, is available from the Cessna Service Parts Center. This kit consists of an anvil and punch.

d. Clamp the flat side of the anvil in a vise.

e. Align new lining on back plate and place brake rivet in hole with rivet head in the lining. Place the head against the anvil.

f. 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.

g. Realign the lining on the back plate and install and set rivets in the remaining holes.

h. Install a new lining on pressure plate in the same manner.

i. Position pressure plate on anchor bolts and place cylinder in position so that anchor bolts slide into the torque plate.

j. Install back plate with bolts and washers.

5-92. BRAKE SYSTEM BLEEDING.

NOTE

Bleeding with a clean hydraulic pressure source connected to the wheel cylinder bleeder is recommended.

a. Remove brake master cylinder filler plug and screw flexible hose with appropriate fitting into the filler hole at top of the master cylinder.

b. Immerse opposite end of flexible hose into a container with enough hydraulic fluid to cover end of the hose.

c. Connect a clean hydraulic pressure source, such as a hydraulic hand pump or Hydro-Fill unit to the bleeder valve in the wheel cylinder.

d. 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.

5-93. BRAKE LINING BURN-IN. 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.

a. Non-asbestos organic lining.

1. 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.

2. Allow brakes to cool for 10 to 15 minutes.

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 completed.

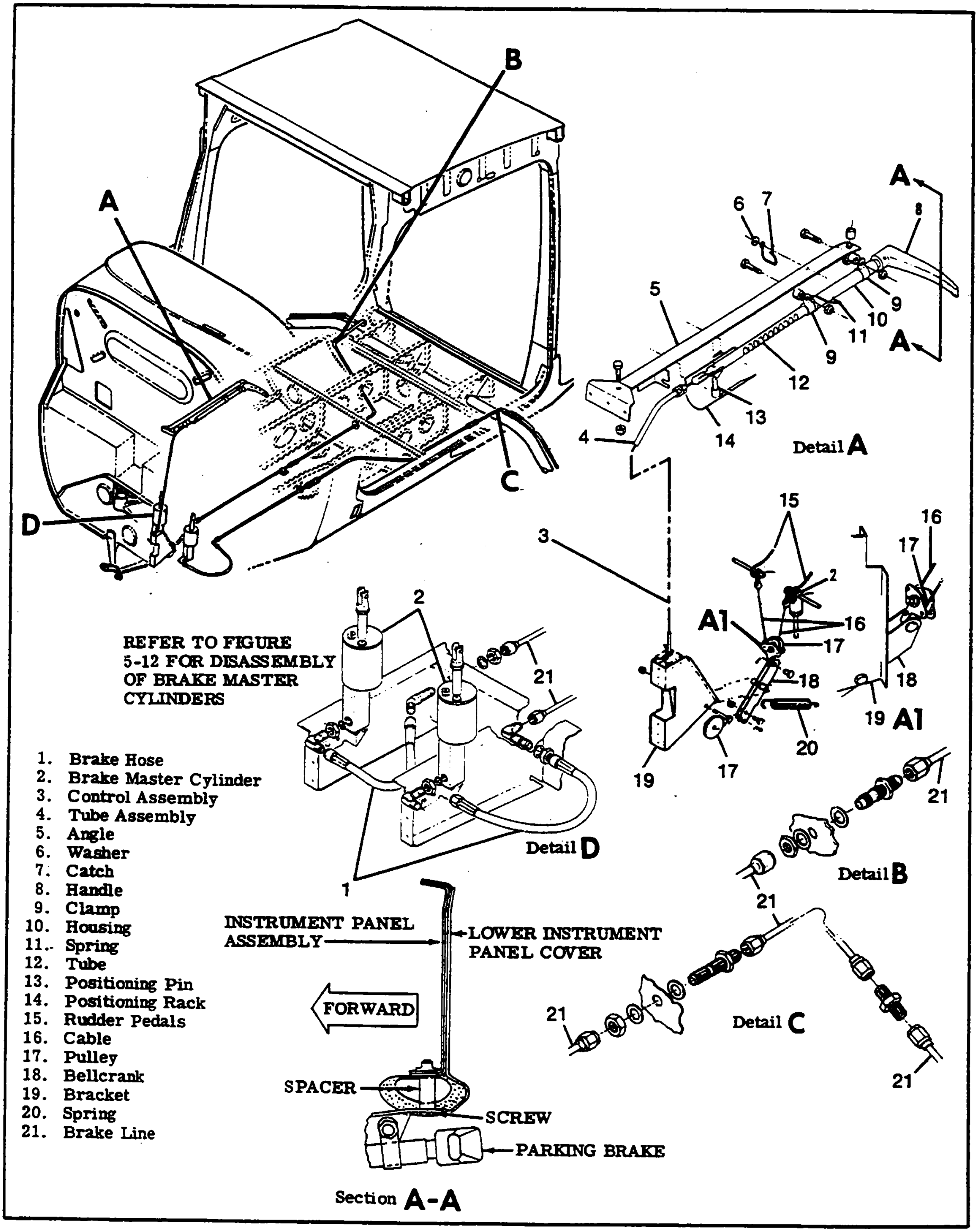
4. If static run up cannot be held, repeat steps 1. thru 3. as needed to successfully hold.

b. Iron based metallic lining.

Perform two consecutive full stop braking applications from 30 to 35 knots. Do not allow the brake discs to cool substantially between stops.

NOTE

Light brake usage can cause the 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.



1. Brake Hose
2. Brake Master Cylinder
3. Control Assembly
4. Tube Assembly
5. Angle
6. Washer
7. Catch
8. Handle
9. Clamp
10. Housing
11. Spring
12. Tube
13. Positioning Pin
14. Positioning Rack
15. Rudder Pedals
16. Cable
17. Pulley
18. Bellcrank
19. Bracket
20. Spring
21. Brake Line

Figure 5-14. Brake Systems

5-94. PARKING BRAKE SYSTEM. (See figure 5-14.)

5-95. 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.

5-96. REMOVAL AND INSTALLATION. See figure 5-14 for relative location of system components. The illustration may be used as a guide during removal and installation of components.

5-97. INSPECTION AND REPAIR OF SYSTEM COMPONENTS. Inspect lines for leaks, cracks, dents, chafing, proper 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.

SHOP NOTES:

SECTION 6

AILERON CONTROL SYSTEM

TABLE OF CONTENTS

6-1. AILERON CONTROL SYSTEM. (See figure 6-1.)

6-2. DESCRIPTION. The aileron control system consists of two control wheels, one for the pilot and one for the copilot, attached to columns and linked by universal joints to the control "U" located behind the instrument panel. Lateral rotation of either control wheel is transmitted to the ailerons, one per wing, via a series of sprockets, chains, pulleys, cables, bellcranks and push pull tubes.

6-3. TROUBLE SHOOTING.

NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to rerig system, refer to paragraph 6-18.

TROUBLE	PROBABLE CAUSE	REMEDY
LOST MOTION IN CONTROL WHEEL.	Loose control cables.	Adjust cables to proper tension.
	Broken pulley or bracket, cable off pulley or worn rod end bearings.	Replace worn or broken parts, install cables correctly.
	Sprung bellcranks.	Replace bellcranks.
	Loose chains.	Adjust to proper tension.

6-3. TROUBLE SHOOTING (Cont)

TROUBLE	PROBABLE CAUSE	REMEDY
RESISTANCE TO CONTROL WHEEL MOVEMENT.	Cables too tight.	Adjust cables to proper tension.
	Pulleys binding or cable off.	Replace defective pulleys. Install cables correctly.
	Bellcrank distorted or damaged.	Replace bellcrank.
	Clevis bolts in system too tight.	Loosen, then tighten properly and safety.
	Rusty chain.	Replace chain.
	Chain binding with sprockets.	Replace defective parts.
	Defective U-joints.	Replace defective U-joints.
CONTROL WHEELS NOT LEVEL WITH AILERONS NEUTRAL.	Improper adjustment of chains or cables. With control wheel centered, aileron bellcrank stop bushing should be centered in slot (both left and right bellcranks).	Adjust in accordance with paragraph 6-18.
	Improper adjustment of aileron push-pull rods. If chains and cables are properly rigged and bellcrank stop bushings are not centered in slots, push-pull rods are adjusted incorrectly.	Adjust push-pull rods to obtain proper alignment.
DUAL CONTROL WHEELS NOT COORDINATED.	Chains improperly adjusted.	Adjust in accordance with paragraph 6-18.
INCORRECT AILERON TRAVEL.	Push-pull rods not adjusted properly.	Adjust in accordance with paragraph 6-18.
	Worn bellcrank stop bushings or bellcrank slots.	Replace worn parts.

6-4. CONTROL "U". (See figure 6-2.)

6-5. DESCRIPTION. The control "U" transforms rotation of the control wheels into pulling motion on the aileron cables by means of sprockets and chains. The "U" is pivoted at the lower end to operate the elevator control system.

6-6. REMOVAL AND INSTALLATION.

a. Disconnect battery cables and insulate terminals as a safety precaution.

b. Remove pedestal cover as outlined in paragraph 9-13.

c. Remove rudder bar shields, carpeting and plates as necessary for access to lower end of control "U".

d. Remove radios, radio cooling plans, dust covers and associated hardware as necessary.

e. Remove glove box.

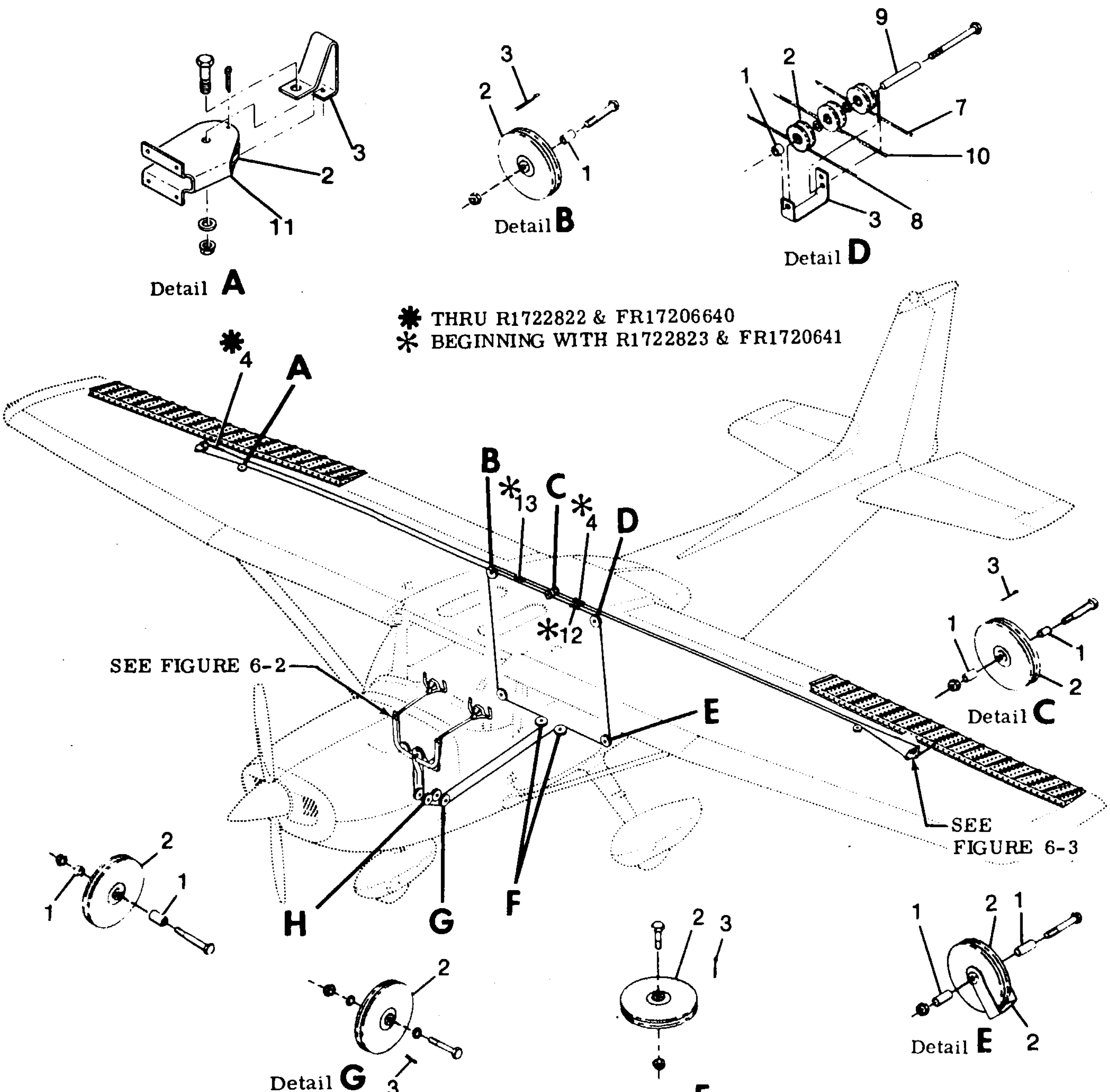
f. Remove cabin air cooling hose directly below right hand side of instrument panel.

g. Remove engine controls and cabin air controls as necessary.

h. Remove right hand forward side upholstery panel.

i. Remove bolt from each end of parking brake assembly and swing assembly away from working area.

j. Remove bolt attaching bearing (11) to RH side of control "U" and remove bolt attaching roller (beginning R17203200 and FR1720655) to LH side of control "U". Remove bearing, roller and attaching hardware.



1. Spacer
2. Pulley
3. Cable Guard
4. Carry-Thru Cable Turnbuckle
5. Bellcrank
6. Aileron
7. Carry-Thru Cable
8. RH Direct Cable
9. Bushing
10. LH Direct Cable
11. Pulley Bracket
12. RH Direct Cable Turnbuckle
13. LH Direct Cable Turnbuckle

CAUTION

MAINTAIN SPECIFIED 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

k. Drill out rivets attaching instrument panel support (after completion of step "j") and remove support.
l. Drill out rivets attaching right hand side panel to pedestal structure and remove panel.
m. Remove safety wire and disconnect turnbuckles (17).
n. Remove bolts (12) attaching control wheel tubes to universal joints (13).
o. Remove bolt (19) attaching push-pull tube (18) to control "U."
p. Remove pivot bolt (20) and carefully work control "U" out from under right hand side of instrument panel.
q. Reverse preceding steps for reinstallation.

NOTE

To prevent loss of strength and to ease reinstallation of right hand pedestal structure side panel, machine screws and nuts may be installed in the two upper rivet holes, provided at least No. 6 screws are installed.

r. Rig aileron control system in accordance with paragraph 6-18 and safety turnbuckles (17).
s. Check and/or rig elevator control system in accordance with paragraph 8-14.
t. Check and/or rig all engine and cabin air controls.
u. Check all radios and electrical components which may have been disconnected or become inoperative while performing the preceding steps.
v. Reinstall all items removed for access.

6-7. REPAIR. Repair consists of replacing worn, damaged or defective shafts, bearings, bushings, sprockets, roller chains, universal joints or other components. Refer to Section 2 for lubrication requirements.

6-8. AILERON BELLCRANK. (See figure 6-3.)

6-9. REMOVAL.
a. Remove access plate inboard of each bellcrank on underside of wing.
b. Relieve control cable tension by loosening turnbuckle barrel (17).
c. Disconnect control cables from bellcrank. Retain all spacers (12).
d. Disconnect aileron push-pull rod (8) at bellcrank.
e. Remove nuts, washers and bolts securing bellcrank stop bushing (15) and bellcrank (7) to wing structure.
f. Remove bellcrank through access opening, using care that bushing (5) is not dropped from bellcrank.

NOTE

Brass washers (11) may be used as shims between lower end of bellcrank and wing channel (9). Retain these shims. Tape open ends of bellcrank to prevent dust and dirt from entering bellcrank needle bearings (6).

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.
a. Place bushing (5) and stop-bushing (15) in bellcrank (7) and position bellcrank in wing.
b. Install brass washers (11) between lower end of bellcrank and wing channel (9) to shim out excess clearance.
c. Install bellcrank pivot bolt (4), washers and nut.
d. Position bellcrank stop-bushing and install attaching bolt (16), washers and nut.
e. Connect aileron cables and push-pull rod to bellcrank.
f. Rig aileron system in accordance with applicable paragraph in this section, safety turnbuckle (17) 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. Disconnect cables from aileron bellcranks and 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.

c. After cable is routed, install pulleys and cable guards. Ensure cable is positioned in pulley groove before installing guard.
d. Rig aileron system in accordance with applicable paragraph in this section, safety turnbuckles and install access plates, fairings and upholstery removed in step "a."

6-14. AILERONS. (See figure 6-3.)

6-15. REMOVAL.
a. Disconnect push-pull rod (8) at aileron.
b. Remove screws and nuts attaching aileron hinges (2) 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 (8) to aileron.

NOTE

If rigging was correct and push pull rod adjustment was not disturbed, it should not be necessary to rig system.

NOTE

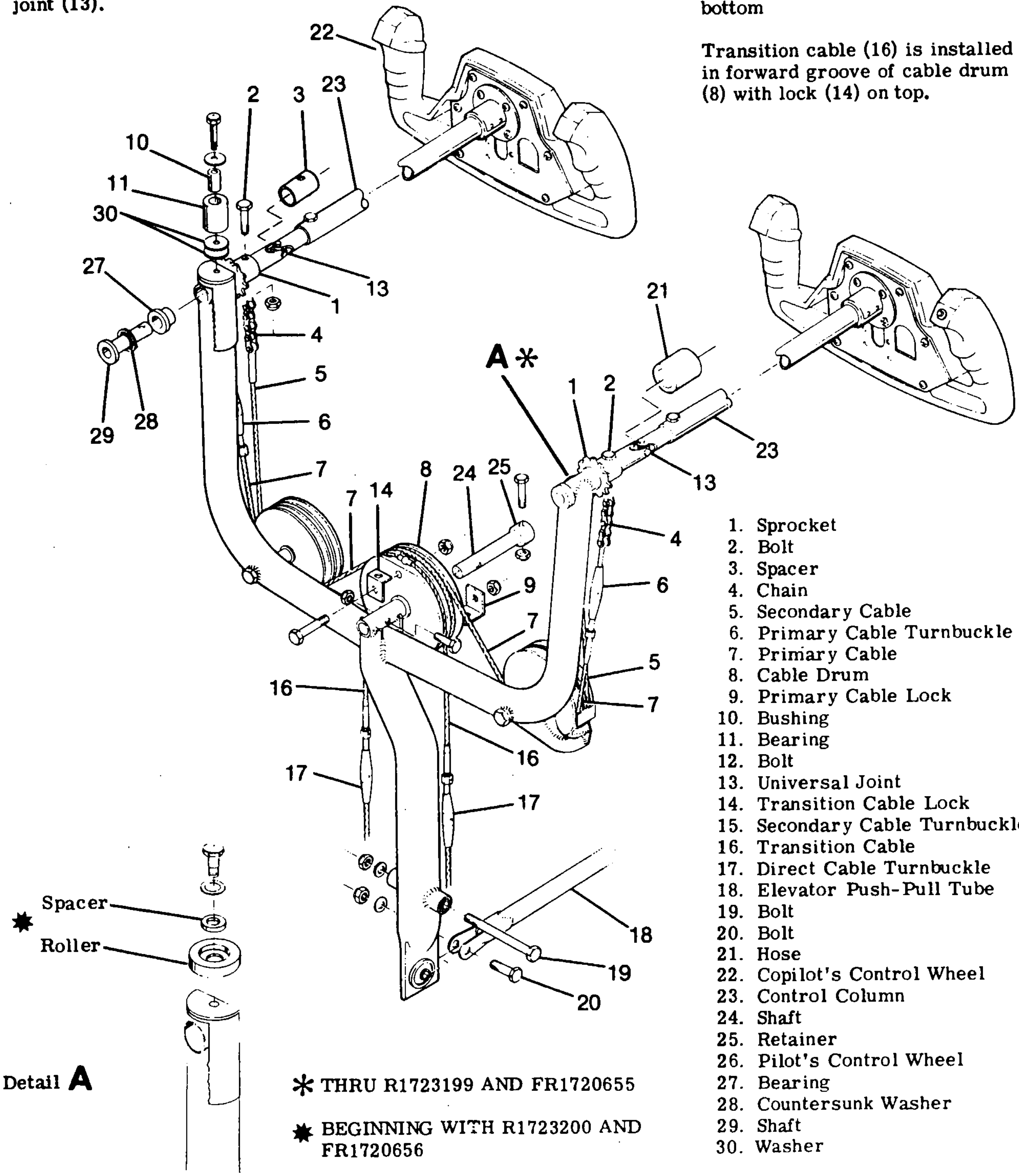
When dual controls are NOT installed, spacer (3) replaces copilot's control wheel (22), control column (23) and universal joint (13).

NOTES

Install cable drum (8) with wide groove aft.

Primary cable (7) is wrapped once around aft groove in cable drum (8) with cable lock (9) on bottom

Transition cable (16) is installed in forward groove of cable drum (8) with lock (14) on top.



1. Sprocket
2. Bolt
3. Spacer
4. Chain
5. Secondary Cable
6. Primary Cable Turnbuckle
7. Primary Cable
8. Cable Drum
9. Primary Cable Lock
10. Bushing
11. Bearing
12. Bolt
13. Universal Joint
14. Transition Cable Lock
15. Secondary Cable Turnbuckle
16. Transition Cable
17. Direct Cable Turnbuckle
18. Elevator Push-Pull Tube
19. Bolt
20. Bolt
21. Hose
22. Copilot's Control Wheel
23. Control Column
24. Shaft
25. Retainer
26. Pilot's Control Wheel
27. Bearing
28. Countersunk Washer
29. Shaft
30. Washer

* THRU R1723199 AND FR1720655

✱ BEGINNING WITH R1723200 AND FR1720656

Figure 6-2. Control "U" Installation

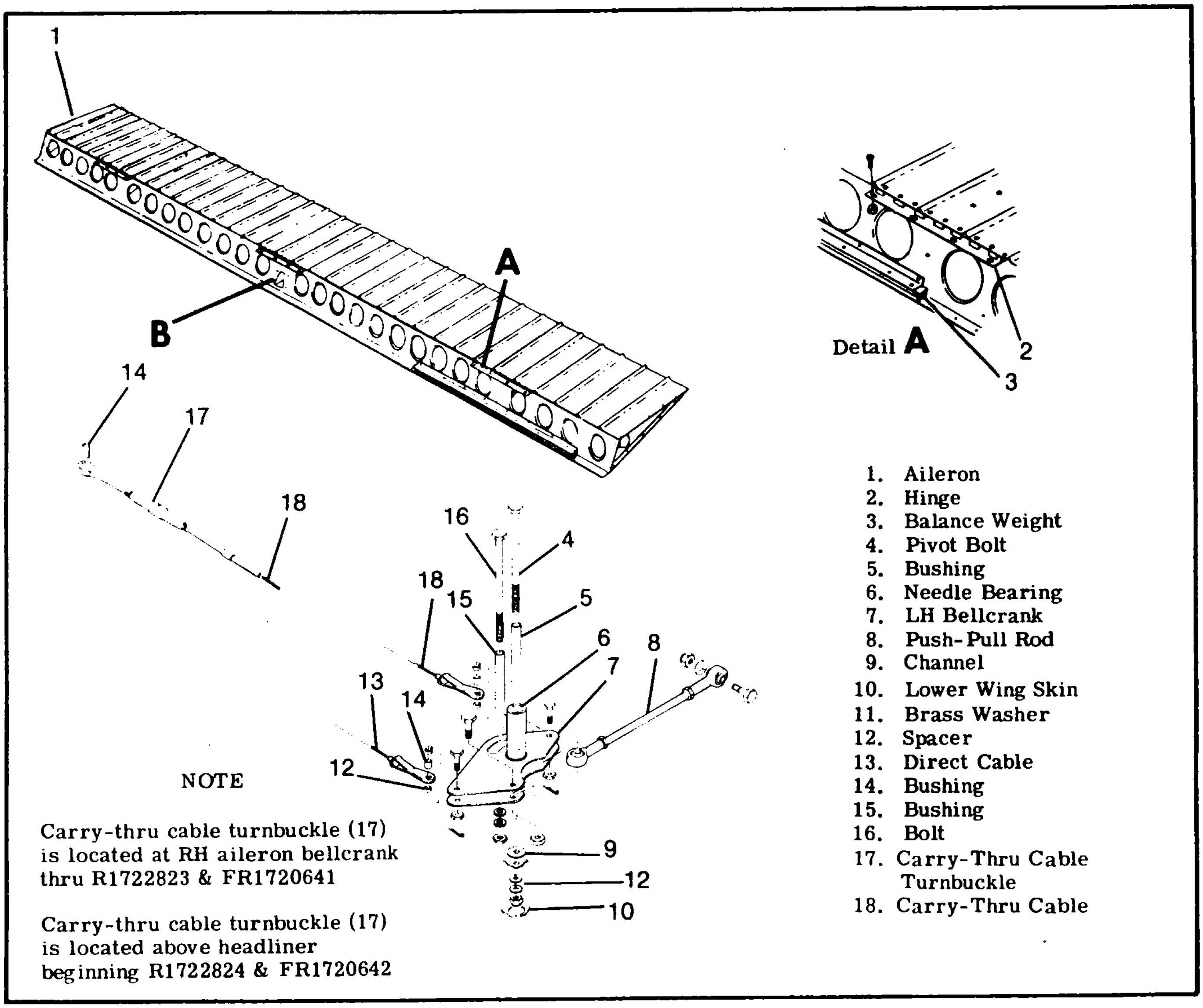
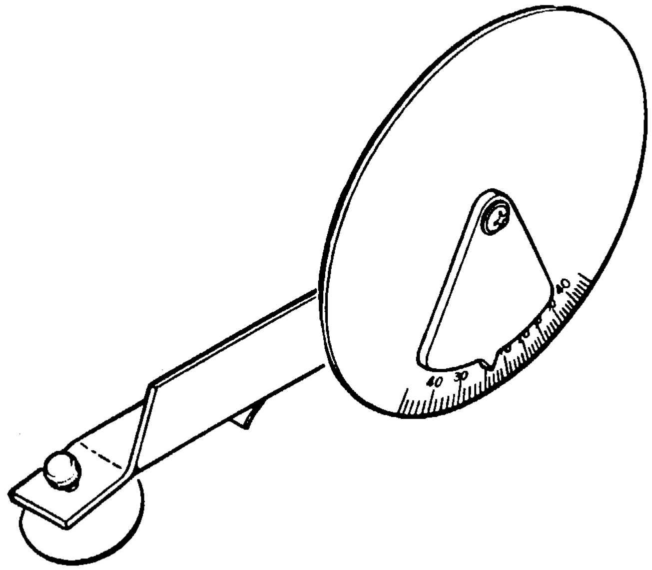


Figure 6-3. Aileron Installation

c. Check aileron travel and alignment, rig if necessary, in accordance with applicable paragraph in this section.

6-17. REPAIR. Aileron repair may be accomplished in accordance with instructions outlined in Section 17. Before installation, ensure balance weights and hinges are securely attached.

6-18. RIGGING. (See figure 6-2.)
a. Check primary control cable (7) is in aft groove of cable drum (8) and wrapped once around drum. The primary cable lock (9) is installed at bottom of drum and transition cable lock (14) is installed at top.
b. With control wheels neutral, check chain ends (4) are approximately same distance from sprockets (1).
c. Keeping control wheels neutral, tighten turnbuckles (6) so control wheels are level in neutral position (synchronized), with enough tension on cables to remove slack from chains (4), without binding. Results of adjusting turnbuckles are as follows:
1. Loosening primary cable turnbuckles (6) and tightening secondary cable turnbuckle (15) at center of control "U" will move inboard sides of both control wheels down.
2. Tightening either primary control cable turnbuckle and loosening secondary cable turnbuckle at center of control "U" will move outboard side of applicable control wheel down.
d. Tape a bar across both control wheels to hold them in neutral position.
e. Adjust direct cable turnbuckles (17) below control "U" and single carry-thru turnbuckle (index 17, figure 6-3) at aileron bellcrank (index 7, figure 6-3)



AVAILABLE FROM CESSNA SERVICE PARTS CENTER (TOOL NO. SE 716)

Figure 6-4. Inclinometer for Measuring Control Surface Travel

so bellcrank stop bushings (index 15, figure 6-3) are centered in both bellcrank slots with 40 ± 10 pounds tension on aileron carry-thru cable (index 18, figure 6-3). Disregard tension on direct cables, which will be different than tension on carry-thru cable.

f. Adjust push-pull rods (index 8, figure 6-3) at each aileron until ailerons are neutral with reference to trailing edge of wing flaps. Be sure wing flaps are fully up when making this adjustment.

g. Remove bar from control wheels.

h. Check ailerons for correct travel (figure 1-1) using an inclinometer (illustrated in figure 6-4). Make adjustments if necessary and check that the bushing travel stops are properly centered in the bellcranks.

i. Safety all turnbuckles by the single-wrap method using 0.040-inch monel safety wire.

j. Install all items removed for access.

WARNING

Be sure ailerons move in correct direction when operated by control wheel.

SHOP NOTES:

SECTION 7

WING FLAP CONTROL SYSTEM

TABLE OF CONTENTS

7-1. WING FLAP CONTROL SYSTEM. (See figure 7-1.)

7-2. DESCRIPTION. The wing flap control system is comprised of an electric motor and transmission assembly, drive pulleys, push-pull rods, cables and a follow-up control. Power from the motor and transmission assembly is transmitted to the flaps by a system of drive pulleys, cables and push-pull rods. Electrical power to the motor is controlled by two microswitches mounted on a floating arm assembly, by a camming lever and a follow-up control. As the flap control lever is moved to thedesired flap setting, the attached cam trips one of the microswitches, activating the flap motor. As the flaps move to the position selected, the floating arm is rotated by the follow-up control until the active microswitch clears the cam breaking the circuit and stopping the motor. To reverse flap direction, the control lever is moved in the opposite direction causing the cam to trip the second microswitch which reverses the flap motor. The follow-up control moves the cam until it is clear of the second switch, shutting off the flap motor. Limit switches on flap actuator assembly prevent over-travel of the flaps in the full UP or DOWN positions.

7-3. OPERATIONAL CHECK.

a. Operate flaps through their full range of travel observing for uneven travel or 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 the opposite flap.

NOTE

An inclinometer for measuring control surface travel is available from the Cessna Service Parts Center. See figure 6-4.

d. Remove access plates adjacent to flap drive pulleys and attempt to rock pulleys to check for bearing wear.

e. Inspect flap rollers and tracks for evidence of binding or defective parts.

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 7-16 and 7-20.

TROUBLE	PROBABLE CAUSE	REMEDY
BOTH FLAPS FAIL TO MOVE.	Popped 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.
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.
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.	Defective or disconnected flaps UP operating switch	Check continuity of switch. Connect or replace switch.
INCORRECT FLAP TRAVEL.	Incorrect rigging.	Refer to paragraph 7-16.
	Defective operating switch.	Check continuity of switches. Replace switches found defective.

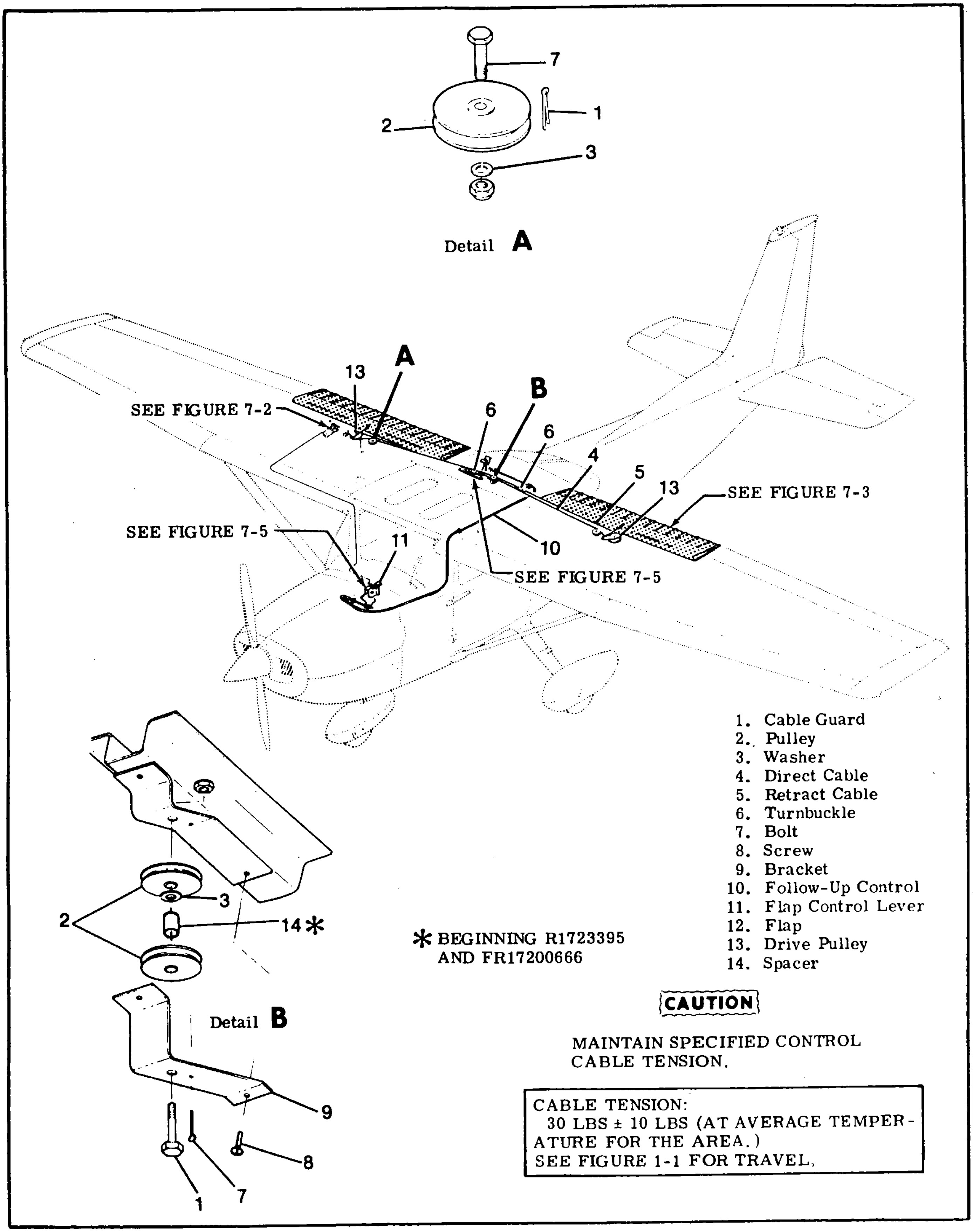


Figure 7-1. Wing Flap Control System

7-4. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
FLAPS FAIL TO EXTEND.	Defective or disconnected flaps DOWN operating switch.	Check continuity of switch. Connect or replace switch.

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; however, on some aircraft, it may be easier to detach motor and transmission assembly 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 (1) 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 60 inch-pounds.
l. Complete operational check as outlined in paragraph 7-3 and rerig system in accordance with paragraph 7-16.

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.

7-8. DRIVE PULLEYS. (See figure 7-2.)

7-9. REMOVAL AND INSTALLATION.

a. Remove access plate adjacent to drive pulley (13) in right wing.
b. Unzip or remove headliner as necessary for access to turnbuckles (index 4, figure 7-1), remove safety wire and loosen turnbuckles.
c. Remove bolt (19) securing flap push-pull rod (14) to drive pulley (13) and lower RIGHT flap gently.
d. Remove bolt (20) securing actuating tube (5) to drive pulley (13) and lower LEFT flap gently. Retain bushing.
e. Remove cable locks (12) securing control cables to drive pulley (13). Tag cables for reference on reinstallation.
f. Remove bolt (11) attaching drive pulley (13) to wing structure.
g. 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.
h. To remove left wing drive pulley, use this same procedure omitting step "d."
i. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 7-16, safety turnbuckles and reinstall all items removed for access.

7-10. REPAIR. Repair is limited to replacement of bearings. Cracked, bent or excessively worn drive pulleys must be replaced. Lubricate bearings as outlined in Section 2.

7-11. FLAPS. (See figure 7-3.)

7-12. REMOVAL AND INSTALLATION.

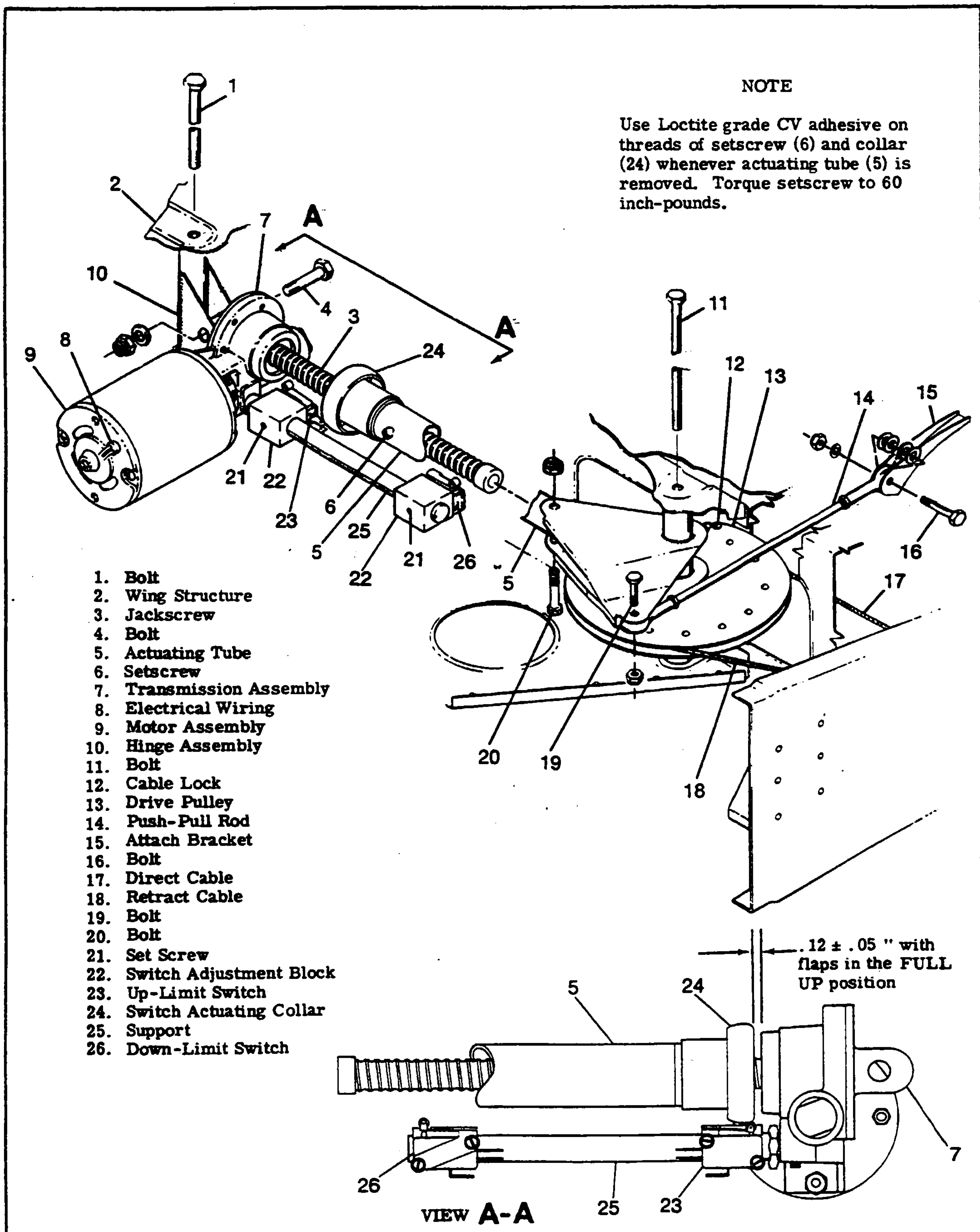
a. Run flaps to full DOWN position.
b. Remove access plates (1) from top leading edge on flap.
c. Disconnect push-pull rod (6) at flap bracket (7).
d. Remove bolts (5) at each flap track. As flap is removed from wing, all washers, rollers and bushings will fall free. Retain these for reinstallation.
e. Reverse the preceding steps for reinstallation. If push-pull rod (6) adjustment is not disturbed, rerigging of system should not be necessary. Check flap travel and rig in accordance with paragraph 7-16, if necessary.

7-13. REPAIR. Flap repair may be accomplished in accordance with instructions outlined in Section 18.

7-14. CABLES AND PULLEYS. (See figure 7-1.)

7-15. REMOVAL AND INSTALLATION.

a. Remove access plates, fairings, headliner and upholstery as necessary for access.
b. If direct cable (4) is to be removed, disconnect clamp (index 7, figure 7-5) from bellcrank (index 2, figure 7-5).
c. Remove safety wire, relieve cable tension, disconnect turnbuckles (6) and carefully lower LEFT flap.
d. Disconnect cables at drive pulleys, remove



NOTE

Use Loctite grade CV adhesive on threads of setscrew (6) and collar (24) whenever actuating tube (5) is removed. Torque setscrew to 60 inch-pounds.

1. Bolt
2. Wing Structure
3. Jackscrew
4. Bolt
5. Actuating Tube
6. Setscrew
7. Transmission Assembly
8. Electrical Wiring
9. Motor Assembly
10. Hinge Assembly
11. Bolt
12. Cable Lock
13. Drive Pulley
14. Push-Pull Rod
15. Attach Bracket
16. Bolt
17. Direct Cable
18. Retract Cable
19. Bolt
20. Bolt
21. Set Screw
22. Switch Adjustment Block
23. Up-Limit Switch
24. Switch Actuating Collar
25. Support
26. Down-Limit Switch

Figure 7-2. Flap Motor and Transmission Installation

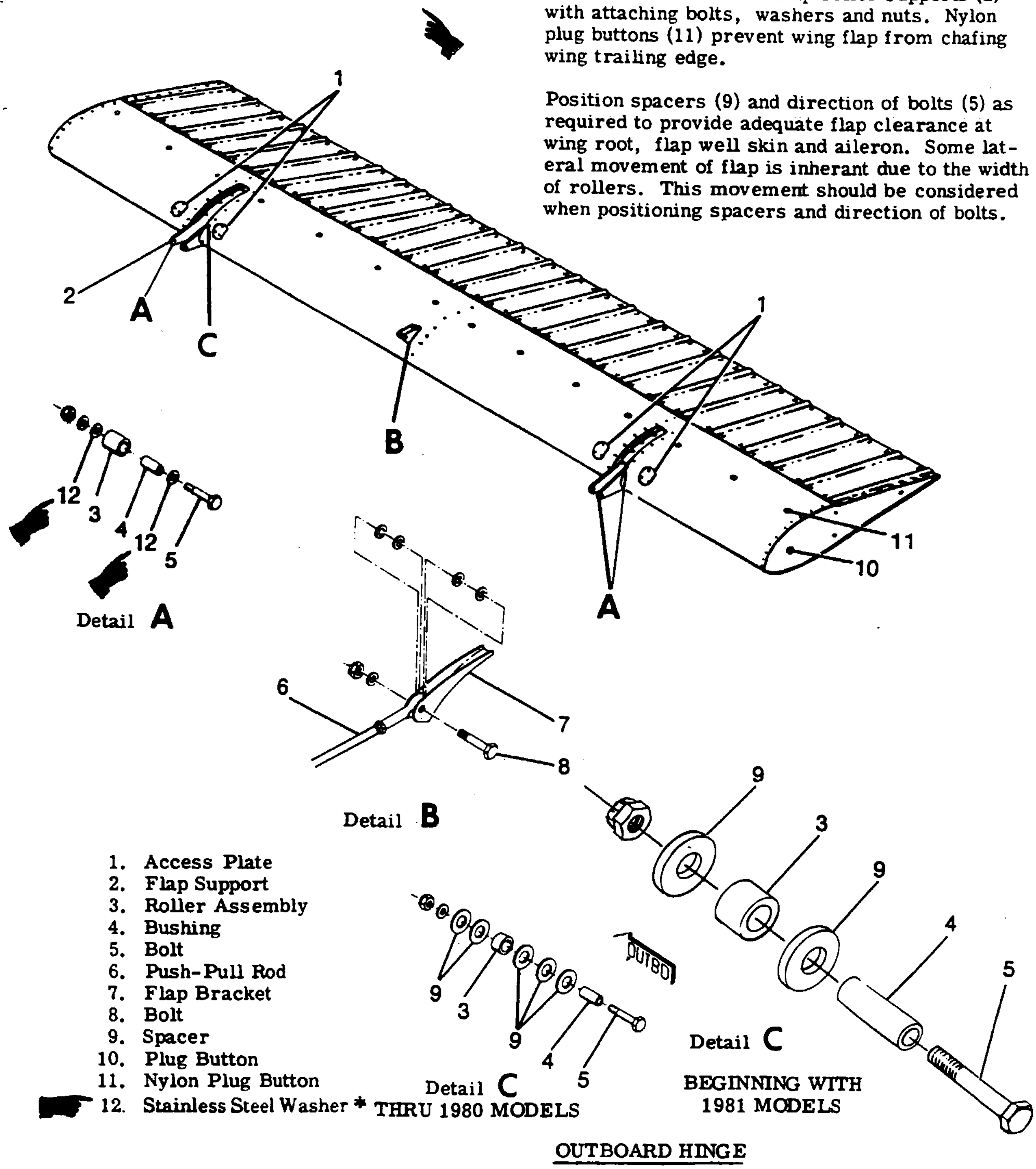
NOTE

*Airplanes R1722000 thru R1723454 and FR17200001 thru FR17200675 incorporating SK180-44. When incorporating SK180-44 only stainless steel washers (12) are used.

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 wing 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 inherant due to the width of rollers. This movement should be considered when positioning spacers and direction of bolts.



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 *

Figure 7-3. Flap Installation

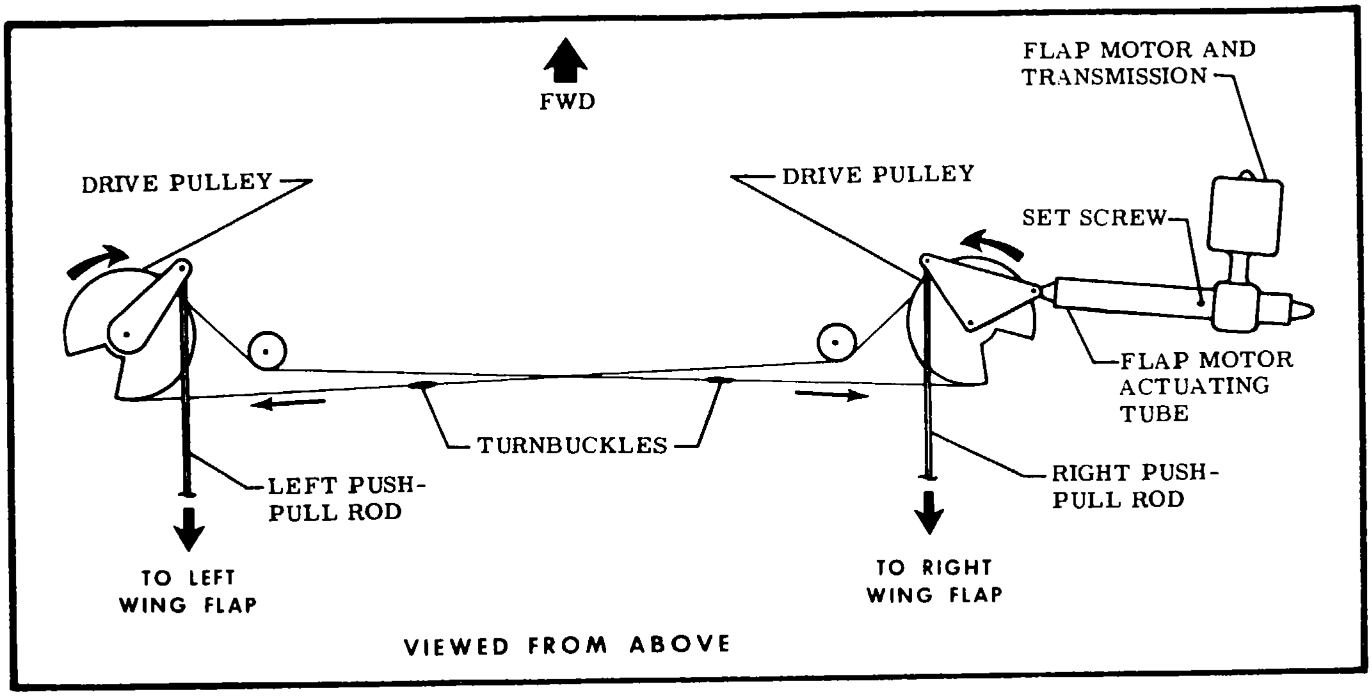


Figure 7-4. Flap System Schematic

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 the 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 7-16 and safety turnbuckles.
h. Re-rig follow-up system in accordance with paragraph 7-20 and reinstall all items removed in step "a."

7-16. RIGGING.
a. (See figure 7-1.) Unzip or remove headliner as necessary for access to turnbuckles (6).
b. With flaps in the full UP position, disconnect follow-up cable (index 4, figure 7-5) by removing clevis attaching follow-up cable to bellcrank (index 2, figure 7-5).
c. (See figure 7-1.) Remove safety wire, relieve cable tension, disconnect turnbuckles (6) and carefully lower left flap.
d. (See figure 7-2.) Disconnect push-pull rods (14) at drive pulleys (13) in both wings and lower RIGHT flap gently.
e. 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 7-4.

f. Adjust both push-pull rods (14) to 8.83±.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 6, 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. (See figure 7-2.) Screw actuating tube (5) IN toward transmission (7) by hand to .12±.05 inches between switch actuating collar (24) and transmission as illustrated in View A-A.

h. Loosen setscrew (6) securing actuating tube (5) to switch actuating collar (24) and hold collar to maintain .12 ±.05 inch while holding RIGHT flap in the full UP position and adjust actuating tube (5) IN or OUT, as necessary to align with attachment hole in drive pully (13).

i. Apply Loctite grade CV sealant (or equivalent) to threads of setscrew (6) and torque to 60 inch-pounds.

NOTE

If actuating tube (5) is too long to allow attachment to drive pully after completion of step "h", proceed to step "j".

j. Disconnect push-pull rod (14) at drive pully (13) to allow connecting actuating tube (5) to drive pully.

k. Manually hold RIGHT flap in full UP postion and readjust push-pull rod (14) to align with attachment hole in drive pully. 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.

l. With flaps in full UP position, loosen setscrew (21) and slide up limit switch adjustment block (22) on support (25) to just activate switch and shut off electrical power to motor at this position. Tighten setscrew.

m. Manually hold LEFT flap, full UP and connect control cables at turnbuckles (index 4, figure 7-1). Remove reference tags previously installed.

n. With flaps full UP, adjust turnbuckles to obtain 30±10 pounds tension on cables. Adjust retract cable (18) first.

NOTE

Ensure cables are positioned in pully grooves and cable ends are postioned correctly at drive pullys before tightening turnbuckles.

o. Disconnect push-pull rod at left drive pully. Run motor to extend flaps approximately 20° and check tension on each flap cable. If necessary, readjust turnbuckles to maintain 30±10 pounds tension on each cable and safety turnbuckles.

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.

NOTE

An inclinometer for measuring control surface travel is available from the Cessna Service Parts Center. See figure 6-4.

q. Mount an inclinometer on RIGHT flap and adjust to 0°.

r. Run flaps to full DOWN postion and adjust DOWN limit switch (26) to stop motor and flap at the degree of travel specified in figure 1-1. Repeat check on LEFT flap. Recheck limit switch through several flap cycles.

NOTE

All flap rollers may not bottom in the flap tracks at the travel extremes.

s. Reconnect and rerig the flap follow-up system in accordance with paragraph 7-20. Perform an operational check in accordance with paragraph 7-3, recheck all items for proper safetying and replace items removed for access.

7-17. FLAP FOLLOW-UP AND INDICATING SYSTEM. (See figure 7-5.)

7-18. DESCRIPTION. The flap follow-up and indicating system consists of a sheathed cable assembly one end of which is attached to the flap operating switch mounting arm and the other end is clamped to the flap direct cable above the headliner in the rear cabin area. Motion of the flap cable is transmitted through the follow-up control to the pointer attached to the switch mounting arm, moving the pointer along a scale as the flaps are extended or retracted. When this motion of the switch mounting arm, to which the flap operating switches are attached, positions the "active" operating switch to clear a cam on the flap lever, the circuit to the flap motor is broken and the flaps stop at the selected position.

7-19. REMOVAL AND INSTALLATION. Figure 7-5 can be used as a guide to removal and installation of the flap follow-up and indicating system.

7-20. RIGGING. (See figure 7-5.)

a. Flap control system must be rigged in accordance with paragraph 7-16 before flap follow-up system can be rigged.

b. Disconnect spring (21) from switch mounting arm (16).

c. With flaps and flap lever (13) in full UP position and holding flap position indicator (14) to a clearance of .03 inch maximum with top of instrument panel opening, pull center cable of flap follow-up (index 4, detail b) to remove slack. Connect cable through clamp bolt (17) observing note of figure 7-5.

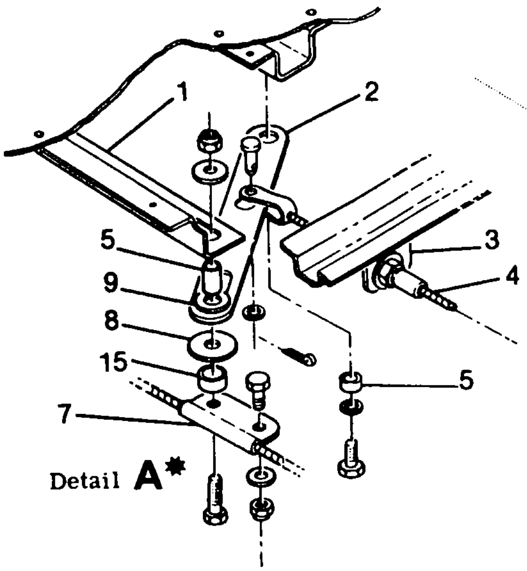
d. Connect spring (21) to switch mounting arm (16).

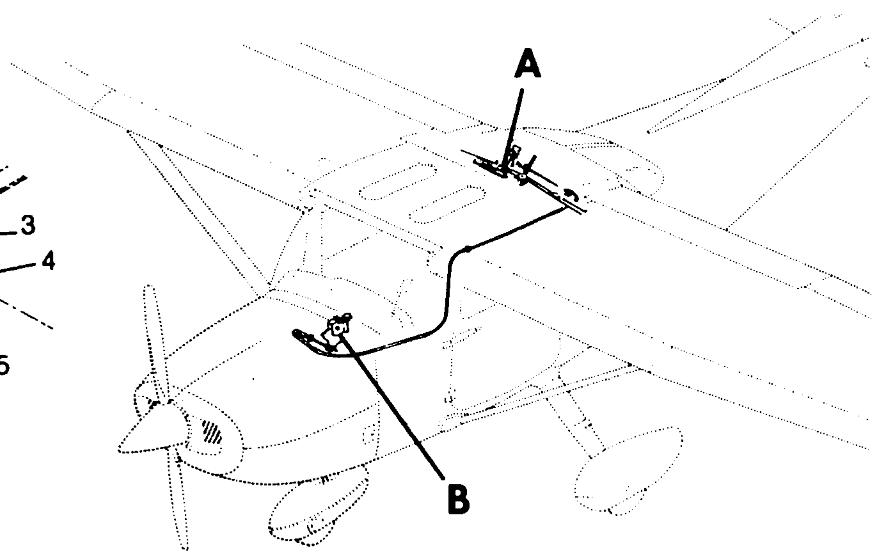
e. Adjust switches (18) and (20) in slotted holes in mounting arm (16) until cam (19) is centered between switch rollers.

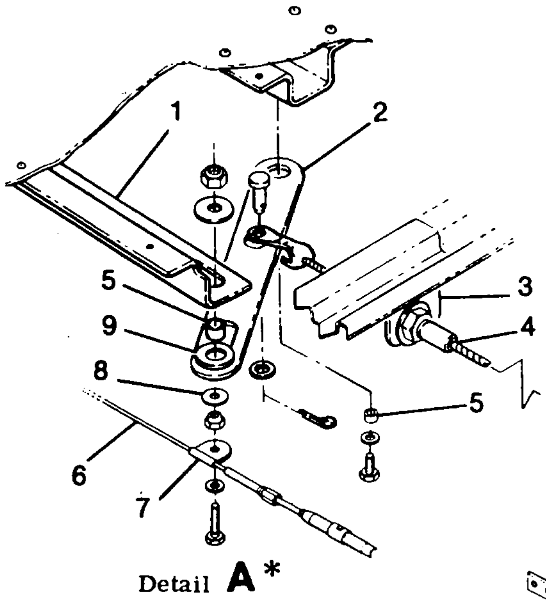
f. Mount an inclinometer on one flap and set to 0° (flaps full UP). Turn master switch ON and move flap lever (13) to 10° position.

NOTE

An inclinometer for measuring control surface travel is available from the Cessna Service Parts Center. See figure 6-4.

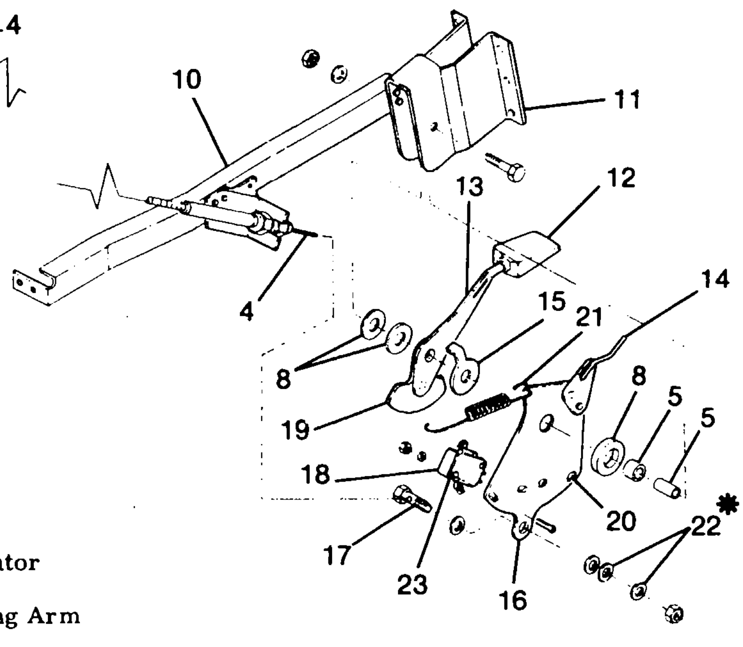






NOTE
Lubricate slots of guide (1) and bellcrank (2) with molybdenum or graphite

* THRU R1723090 AND FR1720656
✱ BEGINNING R1723091 AND FR1720657



1. Guide
2. Bellcrank
3. Mounting Bracket
4. Follow-Up Cable
5. Bushing
6. Flap Direct Cable
7. Clamp
8. Washer
9. Teflon Washer
10. Support
11. Bracket
12. Knob
13. Flap Lever
14. Position Indicator
15. Spacer
16. Switch Mounting Arm
17. Clamp Bolt
18. Flaps DOWN Operating Switch
19. Cam
20. Flaps UP Operating Switch
21. Spring

Detail B

NOTE
Position center cable of flap follow-up (4) between washers (22)

Figure 7-5. Flap Follow-Up Control and Position Indicator

g. Observe inclinometer reading when flaps stop. Adjust flaps DOWN operating switch (18) in slotted holes on mounting arm (16) as required to obtain flap travel of 10° +0° -2°.

h. Adjust flaps UP operating switch (20) to obtain positive clearance with cam (19) when flaps DOWN operating switch has just opened in the 10° position.

i. Repeat steps g. and h. for 20° flap position (travel 20° +0° -2°).

j. Run flaps to full DOWN position at the degree of travel specified in figure 1-1. Check that flaps DOWN operating switch (18) remains closed as flap motor limit switch (index 26, figure 7-2) stops flaps at full DOWN position.

k. Check flaps through several cycles. recheck all components for security and replace items removed for access.

SHOP NOTES:

SECTION 8

ELEVATOR CONTROL SYSTEM

TABLE OF CONTENTS — Page No. Aerofiche/Manual

8-1. ELEVATOR CONTROL SYSTEM.

8-2. DESCRIPTION. The elevators are operated by power transmitted through forward and aft movement of the control "U". This power reaches the elevators through a system consisting of a push-pull tube, cables and bellcranks. The elevator control cables, at their aft ends, are attached directly to a bellcrank, installed between the elevators. This bellcrank serves as an interconnect between the elevators and as a bearing point for the travel stop bolts. A trim tab is installed on 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.	Check visually and attach push-pull tube correctly.
	Cables disconnected.	Check visually, attach cables and rig system in accordance with paragraph 8-14.

8-3. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
BINDING OR JUMPY MOTION FELT IN MOVEMENT OF ELEVATOR SYSTEM.	Defective forward or rear bellcrank or bellcrank pivot bearing.	Move to check for play or binding. Replace bellcranks found defective.
	Cables slack.	Check tension and adjust to tension specified in figure 8-1.
	Cables not riding correctly on pulleys.	Open access plates and observe pulleys. Route cables correctly over pulleys.
	Nylon bearing on instrument panel binding.	Disconnect universal joint and check for binding. Replace bearing if binding is felt.
	Defective control "U" pivot bearing.	Disconnect elevator push-pull tube at lower end of "U" and check that control moves freely. Replace bearing if defective.
	Defective elevator hinges.	Move elevators by hand, checking hinges. Replace hinges found defective.
	Lubrication needed.	Lubricate in accordance with Section 2.
	Clevis bolts too tight.	Check and readjust bolts to eliminate binding.
	Defective pulleys or cable guards.	Open access plates and check visually. Replace defective parts and install guards properly.
ELEVATORS FAIL TO ATTAIN PRESCRIBED TRAVEL.	Stops incorrectly set.	Check elevator travel with inclinometer. Rig in accordance with paragraph 8-14.
	Cables tightened unevenly.	Rig in accordance with paragraph 8-14.
	Interference at instrument panel.	Rig in accordance with paragraph 8-14.

8-4. ELEVATORS. (See figure 8-2.)

8-5. REMOVAL AND INSTALLATION.

NOTE

This procedure is written primarily for the right elevator since the trim tab is attached to this elevator.

a. Disconnect trim tab push-pull channel (3) at tab actuator.

b. Remove bolts (6) securing elevators to bellcrank (9).

NOTE

If trim system is not moved and actuator screw is not turned, rigging of trim system should not be necessary after installation of elevator.

c. Remove bolts (16) from elevator hinges.
d. Using care, remove elevator.

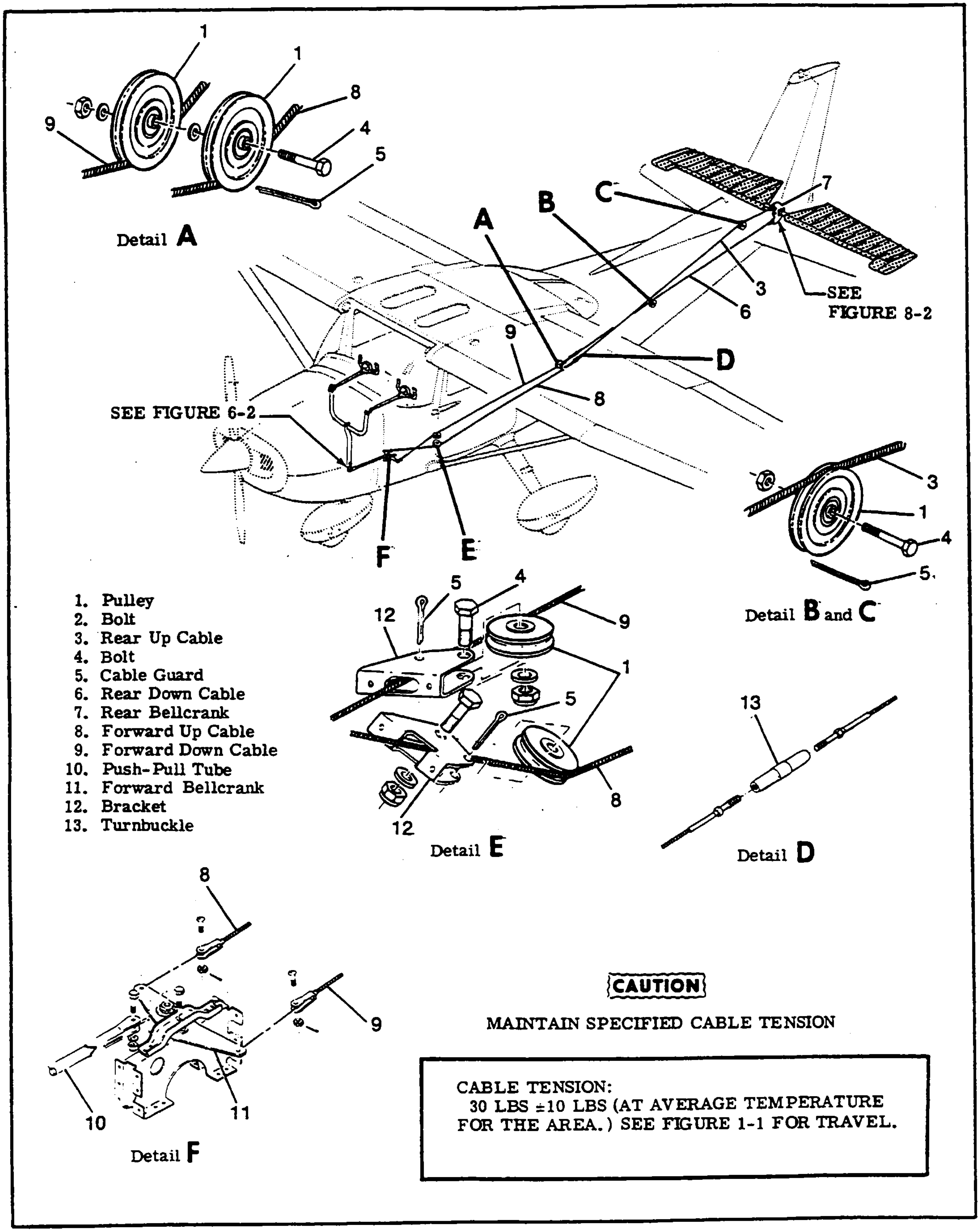
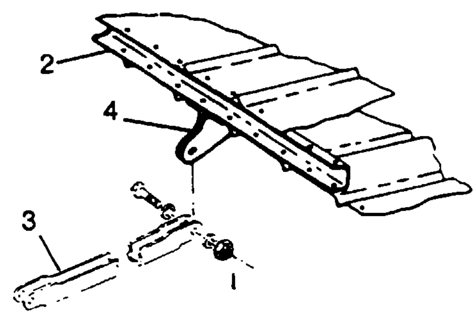


Figure 8-1. Elevator Control System

● Do not paint cable terminals, bolts, or ends of elevator bellcrank.

NOTE

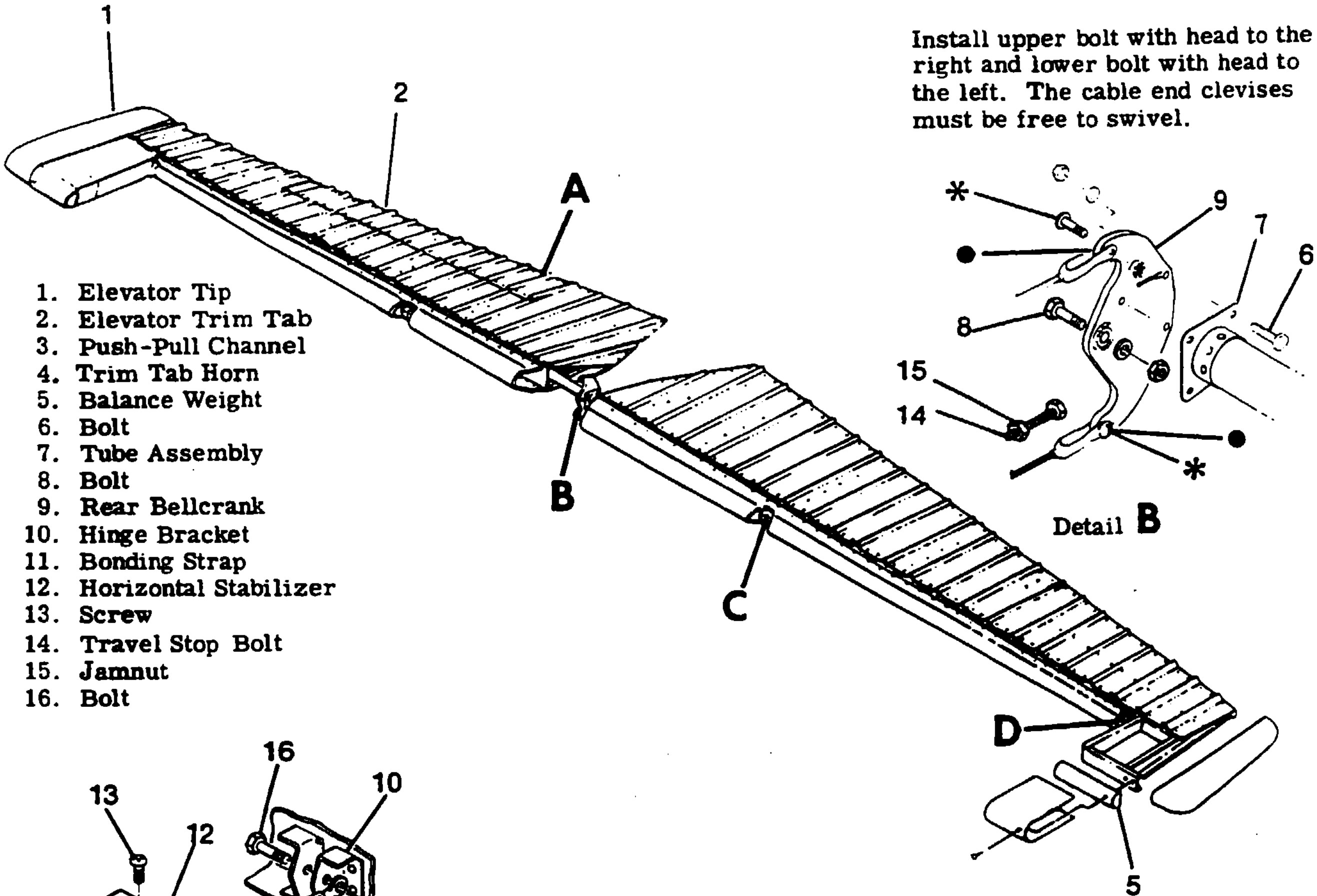
Install push-pull channel (3) with channel opening up on all floatplanes and landplanes through Serials R1723399 and FR17200665. Beginning with landplanes Serials R1723400 and FR17200666, install push-pull channel (3) with channel opening down.



Detail A

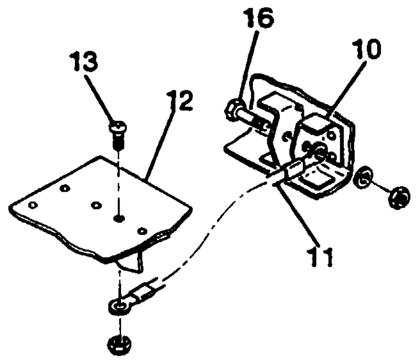
✻ NOTE

Install upper bolt with head to the right and lower bolt with head to the left. The cable end clevises must be free to swivel.

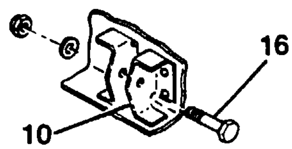


1. Elevator Tip
2. Elevator Trim Tab
3. Push-Pull Channel
4. Trim Tab Horn
5. Balance Weight
6. Bolt
7. Tube Assembly
8. Bolt
9. Rear Bellcrank
10. Hinge Bracket
11. Bonding Strap
12. Horizontal Stabilizer
13. Screw
14. Travel Stop Bolt
15. Jamnut
16. Bolt

Detail B



Detail D



Detail C

Figure 8-2. Elevator Installation

e. To remove left elevator use same procedure, omitting step "a".
f. Reverse preceding steps for installation. Rig system in accordance with applicable paragraph in this section if necessary.

8-6. REPAIR. Repair may be accomplished as outlined in Section 18. If repair has affected static balance, check and rebalance as required.

8-7. BELLCRANKS.

8-8. FORWARD. (See figure 8-1.)

8-9. REMOVAL AND INSTALLATION.
a. Remove seats, upholstery and access plates as necessary.
b. Relieve cable tension at turnbuckles (13) and disconnect cables from bellcrank (11).
c. Disconnect push-pull tube (10) from bellcrank (11).
d. Remove pivot bolt and remove bellcrank.
e. Reverse preceding steps for installation. Rig system in accordance with applicable paragraph in this section, safety turnbuckles and reinstall all items removed in step "a".

8-10. REAR. (See figure 8-2.)

8-11. REMOVAL AND INSTALLATION.
a. Remove rudder. (Refer to Section 10.)
b. Relieve cable tension at turnbuckles (index 13, figure 8-1) and disconnect cables from rear bellcrank (9).
c. Remove bolts (6) securing elevators to bellcrank.
d. Remove bellcrank pivot bolt (8) and slide bellcrank from between tube assemblies (7).

NOTE

It may be necessary to remove one of the stabilizer attaching bolts for clearance when removing the bellcrank pivot bolt.

e. Reverse preceding steps for installation. Rig system in accordance with applicable paragraph in this section, safety turnbuckles and reinstall all items removed for access.

8-12. CABLES AND PULLEYS. (See figure 8-1.)

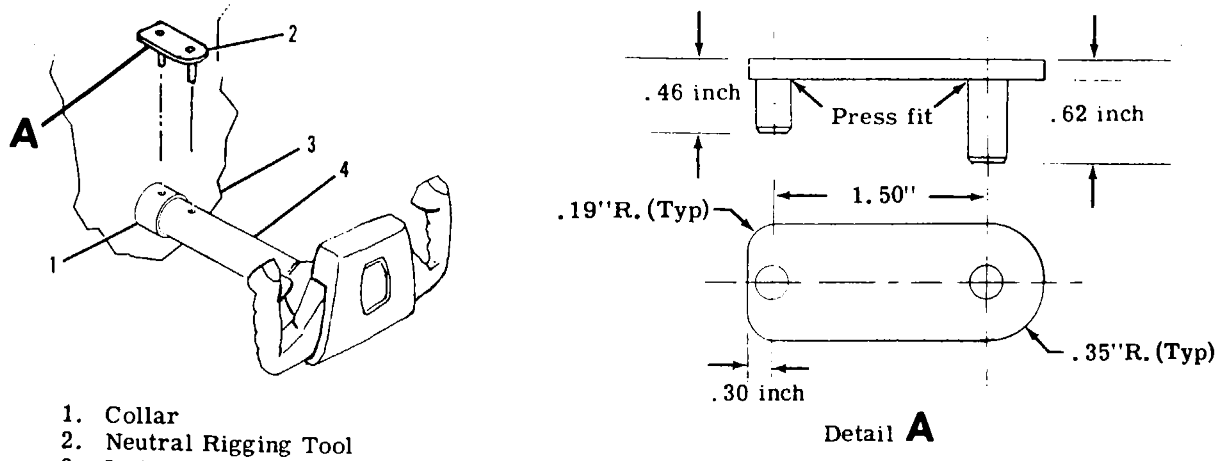
8-13. REMOVAL AND INSTALLATION.
a. Remove seats, upholstery and access plates as necessary.
b. Relieve cable tension at turnbuckles (13).
c. Disconnect cables at forward bellcrank (11).
d. Disconnect cables at rear bellcrank (7).
e. Remove cable guards and pulleys as necessary to work cables free of aircraft.

NOTE

To ease routing of cables, a length of wire may be attached to end of cable before being withdrawn from aircraft. Leave wire in place, routed through structure, attach 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. Rig system in accordance with applicable paragraph in this section, safety turnbuckles and reinstall all items removed in step "a".

SHOP NOTES:



1. Collar
2. Neutral Rigging Tool
3. Instrument Panel
4. Pilot's Control Column

Fabricate from .125 inch steel plate and .209 inch dia. drill rod according to dimensions shown.

Figure 8-3. Control Column Neutral Position Rigging Tool

8-14. RIGGING. (See figure 8-1.)

a. Lock control column in neutral position by installing neutral rigging tool (index 2, figure 8-3).

b. Streamline elevators to neutral with horizontal stabilizer.

NOTE

Disregard counterweight areas of elevators when streamlining since these areas are contoured to streamline elevator tips in cruise flight.

c. Holding elevators in neutral position, adjust turnbuckles (13) equally to obtain 30±10 lbs. cable tension.

d. Mount an inclinometer on elevator and keeping elevator streamlined with stabilizer, set inclinometer to 0°.

NOTE

An inclinometer for measuring control surface travel is available from Cessna Service Parts Center. Refer to figure 6-4.

e. Remove control column neutral rigging tool and adjust travel stop bolts (index 14, figure 8-2) to range of travel specified in figure 1-1.

f. Check that control "U" does NOT contact instrument panel in full UP position or firewall in the full DOWN position.

g. Safety turnbuckles (13) and travel stop bolts; check remainder of elevator control system for security and reinstall all items removed for access.

WARNING

Be sure elevators move in the correct direction when operated by controls.

SECTION 9

ELEVATOR TRIM CONTROL SYSTEM

TABLE OF CONTENTS

9-1. ELEVATOR TRIM CONTROL SYSTEM. (See figure 9-1.)

9-2. DESCRIPTION. The elevator trim tab, located on 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 chains, cables and an actuator. A mechanical pointer, adjacent to the trim wheel indicates tab position. A "nose-up" setting results in a tab-down position.

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.

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. Repair or replace as necessary.
	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.

9-3. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
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 9-2.

9-4. TRIM TAB. (See figure 8-2.)

9-5. REMOVAL AND INSTALLATION.

a. Disconnect push-pull channel (3) from horn assembly (4).

b. Drill out rivets attaching hinge to elevator.

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 preceding steps for installation.

9-6. TRIM TAB ACTUATOR.

9-7. REMOVAL AND INSTALLATION. (See figure 9-1.)

CAUTION

Position a support stand under tail tie-down ring to prevent tailcone from dropping while working inside.

a. Remove baggage compartment aft wall for access.

b. Remove safety wire and relieve cable tension at turnbuckle (8).

c. Disconnect push-pull tube from actuator (3).

d. Remove access plate from underside of right hand stabilizer beneath actuator.

e. Remove chain guard (2) and disengage chain (4) from actuator sprocket.

f. Remove screws attaching actuator clamps to bracket and carefully work actuator out through access opening.

g. Reverse the preceding steps for reinstallation. Rig trim system in accordance with paragraph 9-18, safety turnbuckle (8) and reinstall all items removed for access.

9-8. DISASSEMBLY. (See 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 groov-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 groov-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).

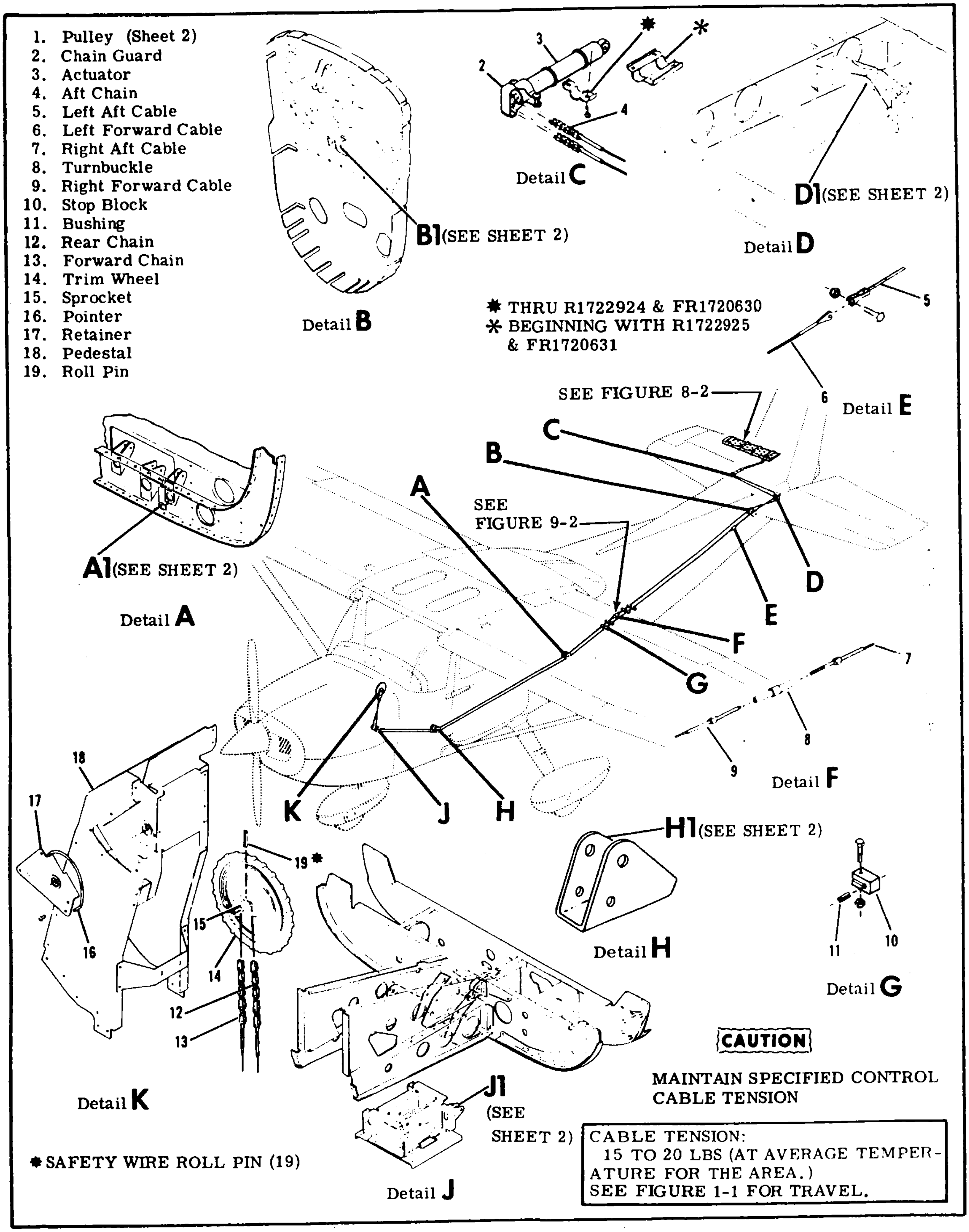


Figure 9-1. Elevator Trim Tab Control System (Sheet 1 of 2)

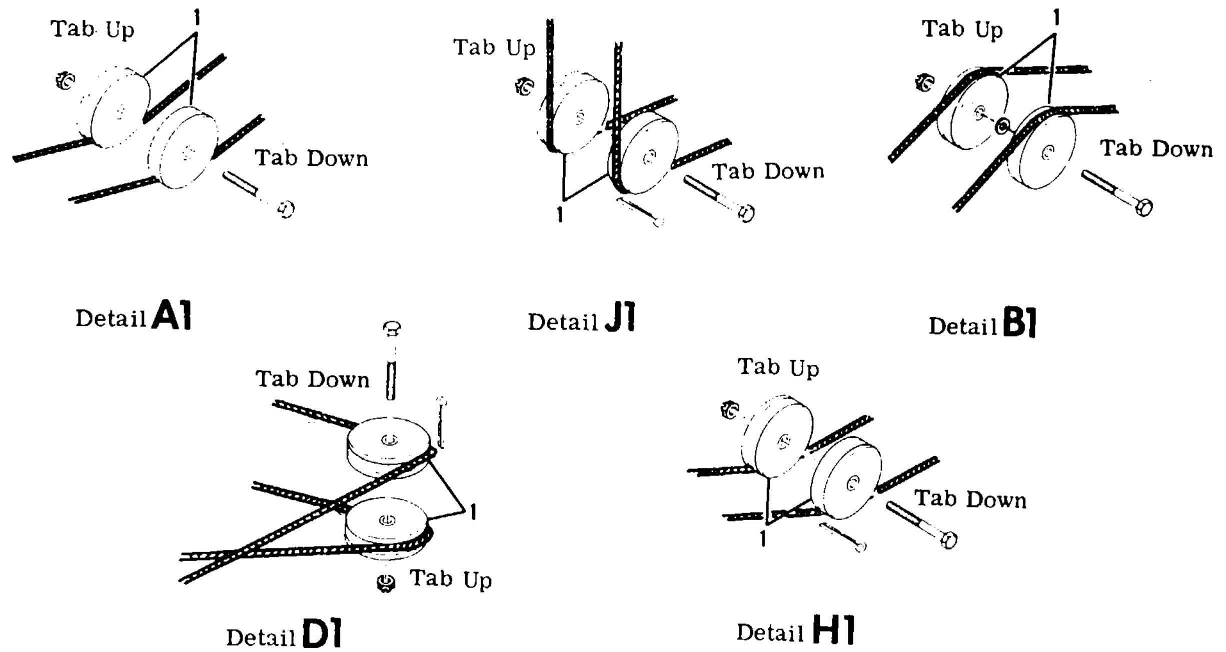
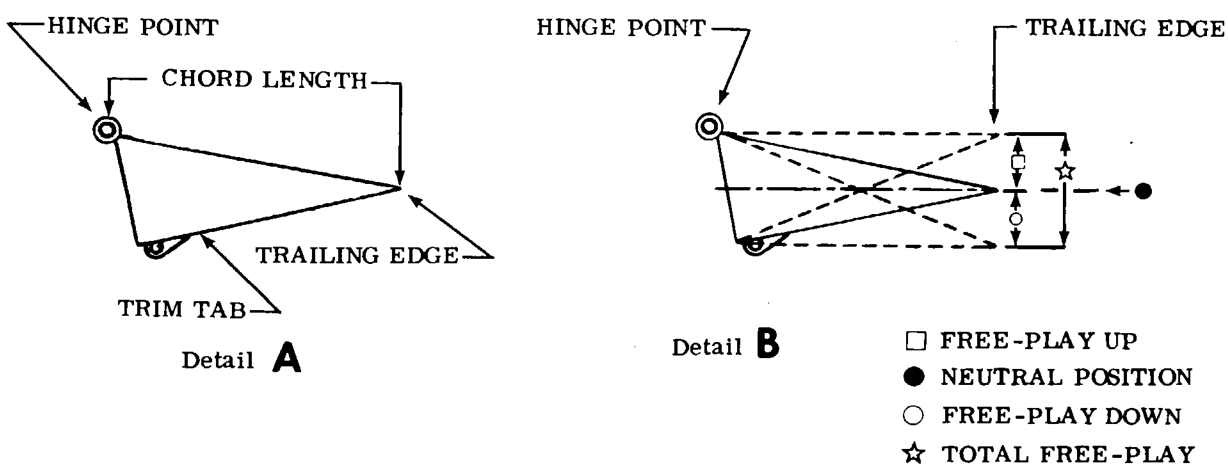


Figure 9-1. Elevator Trim Tab Control System (Sheet 2 of 2)



1. Measure chord length at extreme inboard end of trim tab as shown in detail A.
2. Mulitiply chord length by 0.025 to obtain maximum allowable free-play.
3. Measure free-play at same point on trim tab that chord length was measured.
4. Total free-play must not exceed maximum allowable. Refer to detail B.

Figure 9-2. Trim Tab Free-Play Inspection.

9-9. CLEANING, INSPECTION AND REPAIR. (See 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.

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. (See figure 9-4.)

a. Always discard the following items and install new parts during reassembly:

1. Groov-Pins (8 and 10).
2. O-Ring (13).
3. Nuts (2).

b. During reassembly, lubricate collars (7), screw (9) and threaded rod end (15) in accordance with procedures outlined in Section 2.

c. Install collar (7) and bearing (6) on screw (9).

d. Press sprocket (5) into the end of screw (9), align groov-pin holes and install new groov-pins (8).

e. Insert screw (9), with assembled parts, into housing (12) until bearing (6) is flush with end of housing.

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 groov-pins (10) are 1/16 inch in diameter, therefore, requiring a 1/16 (0.0625) 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 groov-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.

a. Place elevator and trim tab in neutral position and secure elevator from movement.

b. Determine maximum amount of allowable free play using formula shown in 9-2.

c. Using moderate hand pressure (up and down), measure free-play at trailing edge of trim tab.

d. If trim tab free-play is less than maximum allowable, the system is within prescribed limits.

e. If trim tab free-play is more than maximum allowable, check the following items for looseness while moving trim tab up and down.

1. Check push-pull channel to trim tab horn assembly attachment for looseness.
2. Check push-pull channel to actuator assembly threaded rod end attachment for looseness.
3. Check actuator assembly threaded rod end for looseness in the actuator assembly.

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.

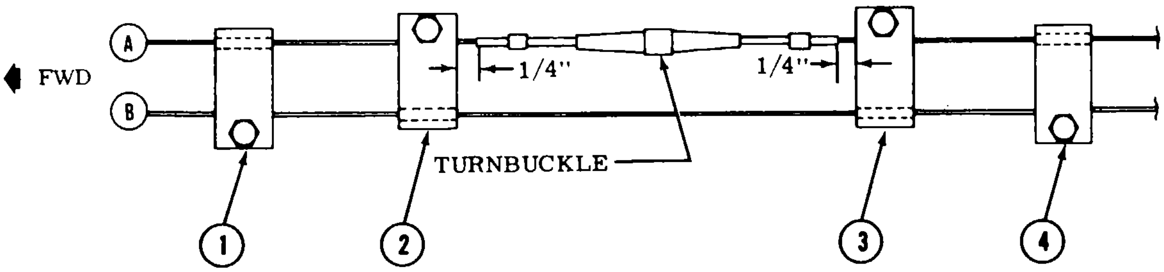
9-12. TRIM TAB CONTROL WHEEL. (See figure 9-1.)

9-13. REMOVAL AND INSTALLATION.

a. Relieve cable tension at turnbuckle (8).

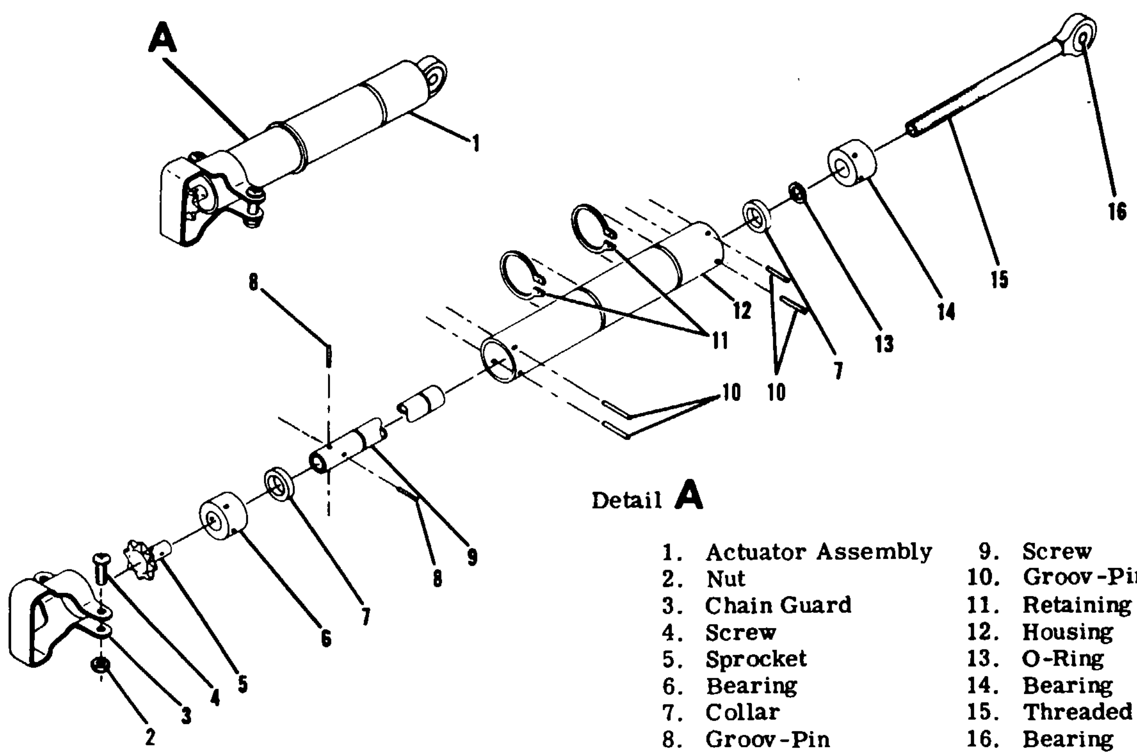
CAUTION

Position a support stand under tail tie-down ring to prevent tailcone from dropping while working inside.



1. With elevators in neutral, set trim tab to neutral (streamlined).
2. Position stop blocks (2) and (3) approximately 1/4" fore-and-aft of turnbuckle respectively, and secure to cable A.
3. Place inclinometer on trim tab and run tab to DOWN TRAVEL limit listed in Section 1.
4. Position stop block (4) against stop block (3) and secure to cable B.
5. Run trim tab to UP TRAVEL limit listed in Section 1, place stop block (1) against stop block (2) and secure to cable B.

Figure 9-3. Elevator Trim Tab Travel Adjustment



1.	Actuator Assembly	9.	Screw
2.	Nut	10.	Groov-Pin
3.	Chain Guard	11.	Retaining Ring
4.	Screw	12.	Housing
5.	Sprocket	13.	O-Ring
6.	Bearing	14.	Bearing
7.	Collar	15.	Threaded Rod End
8.	Groov-Pin	16.	Bearing

Figure 9-4. Elevator Trim Tab Actuator Assembly

b. Remove pedestal cover (12). (Refer to applicable paragraph in this section.)
c. Remove screws attaching control wheel retainer (17).
d. Remove retainer and pointer (16), using care not to drop control wheel (14).
e. Disengage roller chain (13) from sprocket (15) and remove control wheel.
f. Reverse preceding steps for installation. Rig system in accordance with applicable paragraph in this section, safety turnbuckle and reinstall all items removed for access.

9-14. CABLES AND PULLEYS. (See figure 9-1.)

9-15. REMOVAL AND INSTALLATION.
a. Remove seats, upholstery and access plates as necessary.
b. Disconnect cables at turnbuckle (8) and cable ends (5 and 6).
c. 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, attach cable being installed and pull cable into position.

d. After cable is routed in position, install pulleys and cable guards. Ensure cable is positioned in pulley groove before installing guards.
e. Rig system in accordance with applicable paragraph in this section, safety turnbuckle and re install all items removed in step "a."

9-16. PEDESTAL COVER. (See figure 9-1.)

9-17. REMOVAL AND INSTALLATION.
a. Remove fuel selector valve handle and placard.
b. Remove mike and remove mike jack mounting nut.
c. Remove screws attaching pedestal cover to structure and remove cover.

9-18. RIGGING. (See figure 9-1.)

CAUTION

Position a support stand under tail tie-down ring to prevent tailcone from dropping while working inside.

a. Remove rear baggage compartment panel and access plates as necessary.
b. Loosen travel stop blocks (10) on cables.
c. Disconnect actuator (3) from trim tab push-pull channel.
d. Check cable tension and readjust turnbuckle (8) if necessary.

NOTE

If chains and/or cables are being installed, permit actuator screw to rotate freely as chains and cables are connected. Set cable tension.

e. Rotate trim wheel (14) full forward (nose down). Ensure pointer (16) does not restrict wheel movement. If necessary, reposition pointer using a thin screwdriver to pry trailing leg of pointer out of groove.

NOTE

Full forward (nose down) position of trim wheel is where further movement is prevented by chain or cable ends contacting sprockets or pulleys.

f. With elevator and trim tab both in neutral (streamlined), place inclinometer on tab and set to zero.

NOTE

An inclinometer for measuring control surface travel is available from Cessna Service Parts Center. Refer to figure 6-4.

g. Rotate actuator screw in or out as required to place tab up with a maximum of 2° overtravel, with actuator screw connected to push-pull channel.
h. Rotate trim wheel to position tab up and down, readjusting actuator screw as required to obtain overtravel in both directions.
i. Position stop blocks (10) and adjust as illustrated in figure 9-3 to limit travel as outlined in Section 1.
j. Check trim wheel pointer travels the same distance from ends of slot in cover. Reposition trailing leg of pointer if necessary (refer to step "d").
k. Safety turnbuckle and reinstall all items removed in step "a".

WARNING

Be sure trim tab moves in correct direction when operated by trim wheel. Nose down trim corresponds to tab up position.

SECTION 10

RUDDER AND RUDDER TRIM CONTROL SYSTEM

TABLE OF CONTENTS

10-1. RUDDER CONTROL SYSTEM. (See figure 10-1.)

10-2. DESCRIPTION. Rudder control is maintained through use of conventional rudder pedals which also control nose wheel steering. The system is comprised of rudder pedals, cables and pulleys, all of which link the pedals to the rudder and nose wheel steering. Cable tension is automatically determined when the rudder pedals are rigged against return springs 6.50 inches from firewall.

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.

10-3. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
BINDING OR JUMPY MOVEMENT OF RUDDER PEDALS.	Cables too tight.	Refer to figure 10-2 for distance between firewall and pedals. 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.
	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 10-2 for distance between firewall and pedals. 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. (See figure 10-2.)

10-5. REMOVAL AND INSTALLATION.

a. Remove carpeting, shields and soundproofing from pedal and tunnel areas as necessary.

b. Disconnect master cylinders (12) at pilot rudder pedals.

c. Disconnect parking brake cables at master cylinders.

d. Remove rudder pedals (2) and brake links (5).

e. Releive cable tension at clevises (index 11, figure 10-1).

f. Disconnect cables, return springs, trim bungee, and steering tubes from rudder bars.

g. Remove bolts securing bearing blocks (8) and work rudder bars out of tunnel area.

NOTE

Rudder bar assemblies should be checked for excessive wear before installation. The bearing blocks are nylon and require no lubrication unless binding occurs. A few drops of general purpose oil should eliminate such binding.

h. Reverse preceding steps for installation. Rig system in accordance with applicable paragraph in this section. Safety turnbuckles or clevises, as applicable, and reinstall all items removed in step "a".

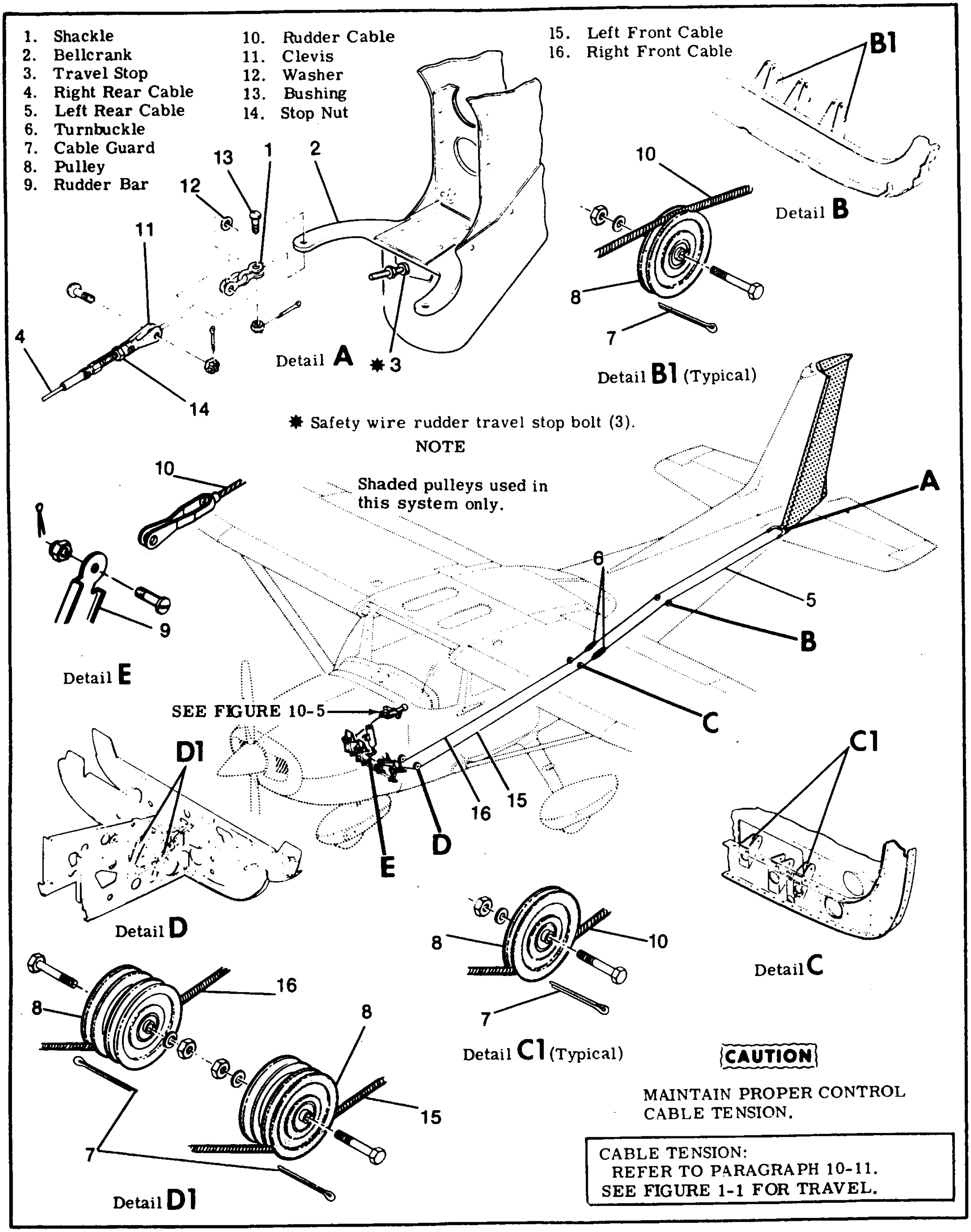
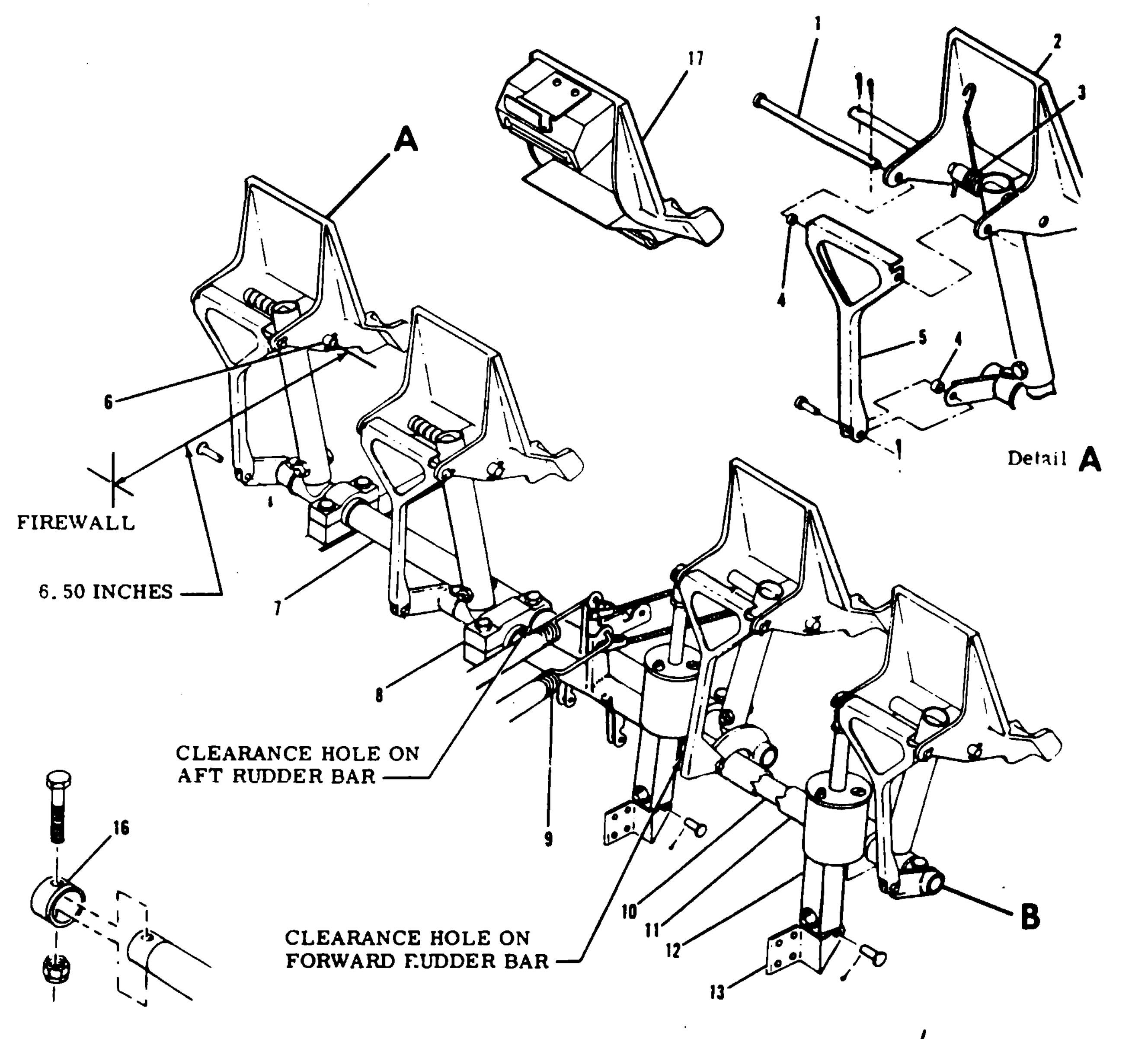
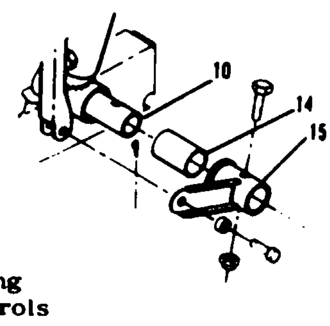


Figure 10-1. Rudder Control System





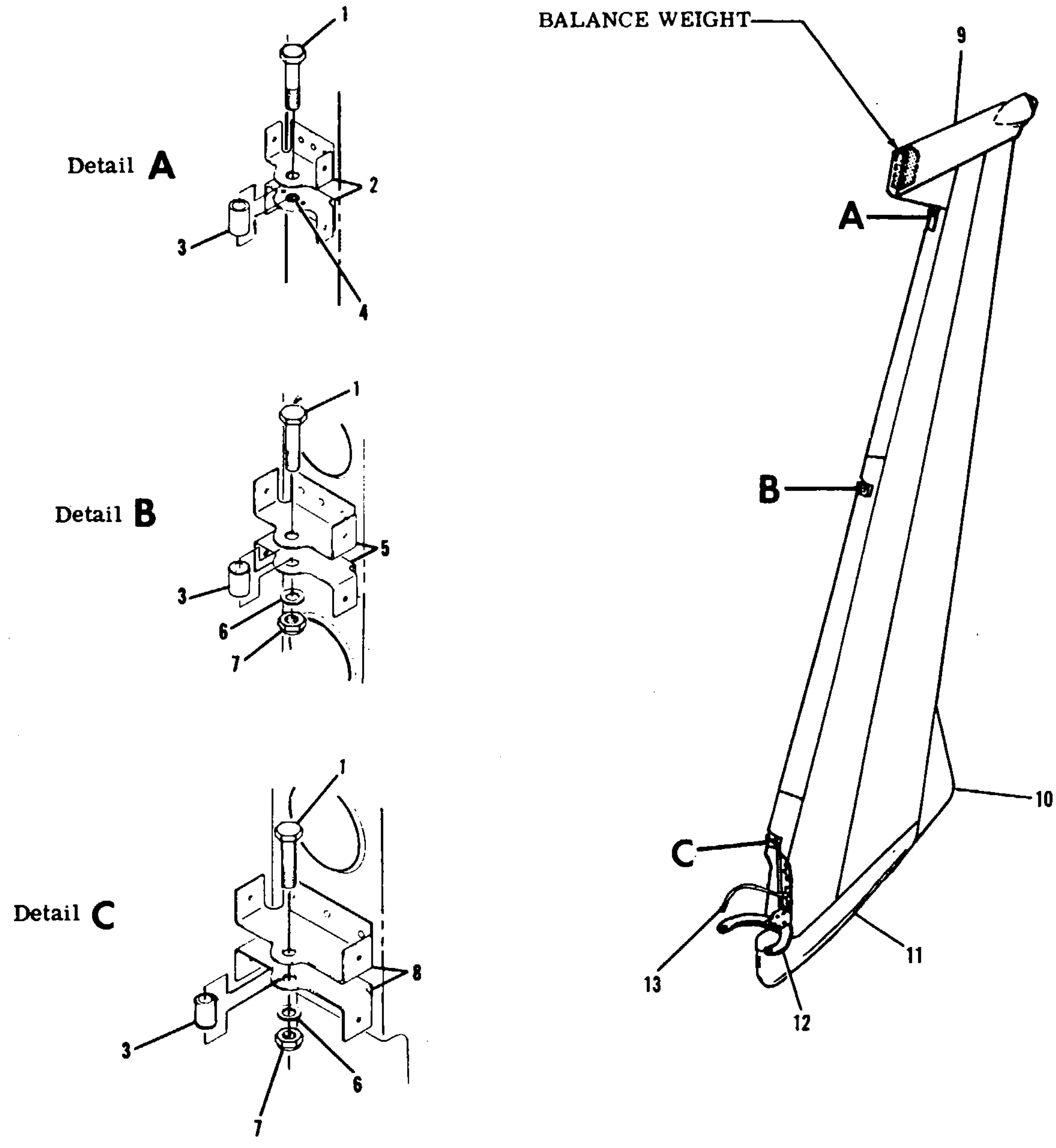
1. Shaft
2. Rudder Pedal
3. Anti-Rattle Spring
4. Spacer
5. Brake Link
6. Pivot Shaft
7. Aft Rudder Bar
8. Bearing Block
9. Return Spring
10. Brake Torque Tube
11. Forward Rudder Bar
12. Master Cylinder
13. Bracket
14. Bearing
15. Bellcrank
16. Single Controls Hub
17. Rudder Pedal Extension

NOTE

Brake links (5), bellcranks (15) and attaching parts are replaced with hubs when dual controls are NOT installed.

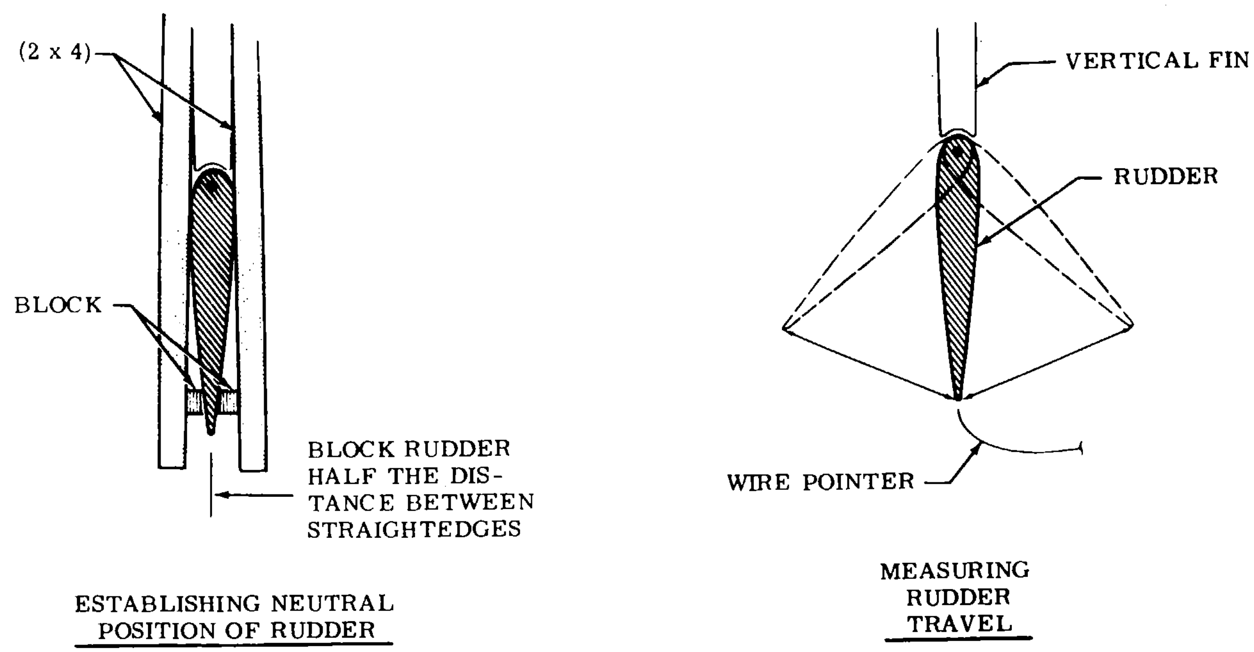
Nylon washers may be installed between shaft (1) and brake link (5) as required to eliminate excessive clearance when dual controls ARE installed.

Figure 10-2. Rudder Pedals Installation



1. Bolt
2. Upper Hinge
3. Bushing
4. Nutplate
5. Center Hinge
6. Washer
7. Nut
8. Lower Hinge
9. Upper Tip
10. Trim Tab
11. Lower Tip
12. Bellcrank
13. Quick-Disconnect

Figure 10-3. Rudder Assembly



1. 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 straightedges as shown.
2. Tape a length of soft wire to one elevator in such a manner that it can be bent to index with a point on rudder trailing edge just above the lower rudder tip (disregard fixed trim tab).
3. Using soft lead pencil, mark rudder at point corresponding to soft wire indexing point (neutral).
4. Remove straightedges.
5. Hold rudder against right, then left, rudder stop. Measure the distance from pointer to pencil mark on rudder in each direction of travel. Distance should be between 5.29" and 5.91".

Figure 10-4. Checking Rudder Travel

10-6. RUDDER. (See figure 10-3.)

10-7. REMOVAL AND INSTALLATION.
a. Disconnect tail navigation light quick-disconnect (13).
b. Relieve cable tension at clevises (index 11, figure 10-1) and disconnect clevises from rudder bellcrank (12).
c. With rudder supported, remove hinge bolts (1) and lift rudder free of vertical fin.
d. Reverse preceding steps for installation. Rig system in accordance with appropriate paragraph in this section and safety turnbuckles or clevises, as applicable.

10-8. REPAIR. Repair may be accomplished as outlined in Section 18. Hinge bushings may be replaced as necessary.

10-9. CABLES AND PULLEYS. (See figure 10-1.)

10-10. REMOVAL AND INSTALLATION.
a. Remove seats, upholstery and access plates as necessary.
b. Disconnect cable at rudder bar (9) and bellcrank (2).
c. 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, attach cable being installed and pull cable into position.

d. After cable is routed in position, install pulleys and cable guards. Ensure cable is positioned in pulley groove before installing guard.
e. Rig system in accordance with appropriate paragraph in this section. Safety turnbuckles or clevises, as applicable, and reinstall all items removed in step "a".

10-11. RIGGING. (See figure 10-1.)
a. Adjust travel stops (3) to attain travel specified in Section 1. Figure 10-4 illustrates correct travel and one method of checking.
b. Disconnect nose wheel steering tubes (refer to section 5) from nose strut.
c. Adjust cables at clevises (11) to align rudder and pedals in neutral position, 6.50 inches from firewall to pedal pivot shafts (index 6, figure 10-2). This step automatically determines cable tension because of the return springs (index 9, figure 10-2) attached to the rudder bar.

NOTE

Due to thickness of insulation on firewall, it is recommended that a piece of 1/16 inch welding rod be ground to a sharp point and notched at the 6.50 inch dimension. Pierce insulation on firewall and use notch to measure proper dimension.

d. Tie down or weight tail to raise nose wheel free of ground.
e. Center nose gear against external stop.
f Extend steering tubes until free play is removed. DO NOT COMPRESS SPRINGS.
g. Adjust steering tube rod ends to 1.00 inch dimension between steering arm assembly and bolt hole as illustrated in section 5 and tighten jam nuts.
h. Adjust steering tube clevises to align with rod end bearings.

NOTE

Extend steering tubes to seat rods against internal springs but do not attempt to preload these springs by shortening rod end clevises after alignment. Preload is built into steering tubes.

i. Install clevises on rod ends.

NOTE

DO NOT adjust rudder trim with steering tubes. Degree of steering travel cannot be adjusted.

j. Rig rudder trim control system in accordance with paragraph 10-14.
k. Safety clevises (11) and install all items removed for access.

NOTE

Flight test aircraft to determine if ground adjustment of fixed trim tab is necessary. DO NOT rig rudder "off-center" unless trim tab does not provide adequate correction.

WARNING

Be sure rudder moves in correct direction when operated by pedals.

10-12. RUDDER TRIM CONTROL SYSTEM. (See figure 10-5.)

10-13. DESCRIPTION. A lever assembly, actuated by the pilot, is linked via a bellcrank to a rudder trim bungee which is, in turn connected directly to the rudder bar assembly and hence to the rudder itself. The lever assembly is mounted on the center console structure and utilizes a pin to positively lock the trim system in any of 3 positions left or right of the center or "neutral" trim position. The lever also serves as the trim position indicator.

10-14. RIGGING. (See figure 10-5.)

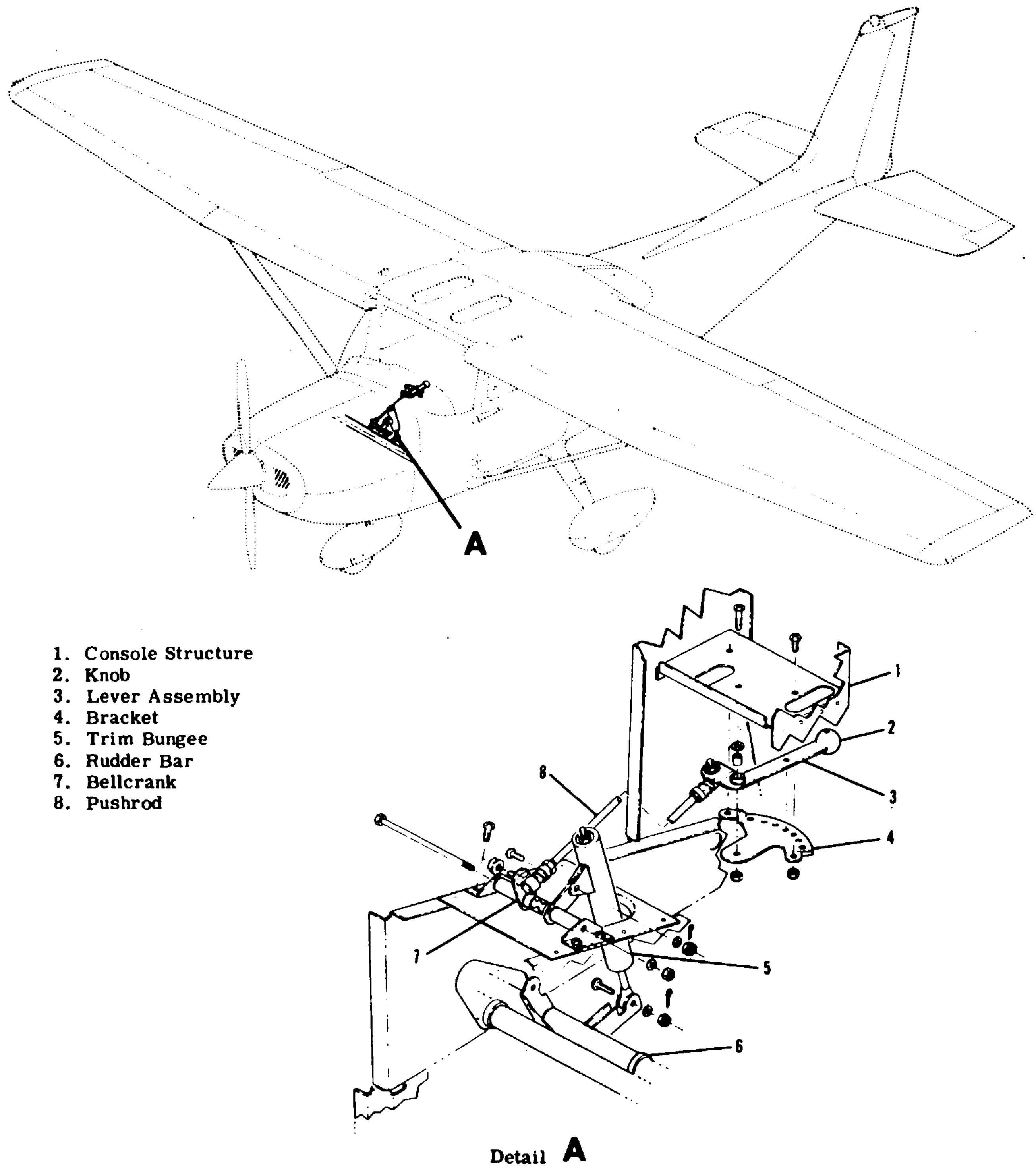
NOTE

The rudder control system MUST be rigged according to paragraph 10-11 prior to rigging the rudder trim control system.

a. Tie down or weight tail of the aircraft to raise nose wheel clear of ground.
b. Ensure nose wheel rudder and rudder pedals are all in "neutral" position.
c. Ensure top nut on bungee assembly is adjusted to eliminate end play between shaft and housing.
d. Install bungee (5) between rudder bar (6) and bellcrank (7) as shown in fig 10-5, detail A.
e. Make sure lever assembly (3) is in neutral position or center hole of bracket (4).
f. Adjust ball ends of push rod (8) so that ball end studs align with holes in bellcrank (7) and lever assembly (3) and install push rod.
g. Check for security and safetying of all components and reinstall all items removed for access.

WARNING

Be sure rudder trim lever moves rudder in correct direction.



1. Console Structure
2. Knob
3. Lever Assembly
4. Bracket
5. Trim Bungee
6. Rudder Bar
7. Bellcrank
8. Pushrod

Figure 10-5. Rudder Trim Control System

SECTION 11

ENGINE

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.

TABLE OF CONTENTS — Page No. Aerofiche/Manual

TABLE OF CONTENTS (Cont.)

SHOP NOTES:

11-1. ENGINE COWLING.

11-2. DESCRIPTION. The upper and lower engine cowling is shock-mounted. Instead of attaching directly to the fuselage, the cowling attaches to shock mounts which, in turn, are fastened to the fuselage. Screws are used to attach the right and left nosecaps together which, in turn, is fastened to the cowlings with quick release fasteners. A door in the top cowl provides access to the engine oil dipstick, and oil filler neck. Landing and taxi lights are installed in the lower cowl assembly and a single, retractable cowl flap is installed in the aft end of the lower cowl to air in controlling engine temperature.

11-3. REMOVAL AND INSTALLATION.

a. Release the quick-release fasteners (2, figure 1-1), attaching the cowling at the shock mounts and at the parting surfaces of the upper and lower cowl.

b. Disconnect the landing and taxi light wires at the quick-disconnects.

c. Disconnect cowl flap control clevis at cowl flap shock mount.

d. Reverse the preceding steps for reinstallation. Be sure the baffle seals are turned in the correct direction to confine and direct air flow around the engine. The vertical seals must fold forward and the side seals must fold upwards.

NOTE

When the new shock mounts or brackets are being installed, careful measurements should be made to position these parts correctly on the firewall. These service parts are not pre-drilled. Install shock mounts on brackets so that cowling stud and shock mount are correctly aligned. Sheet aluminum may be used as shims between bracket halves to provide proper cowling contour.

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.

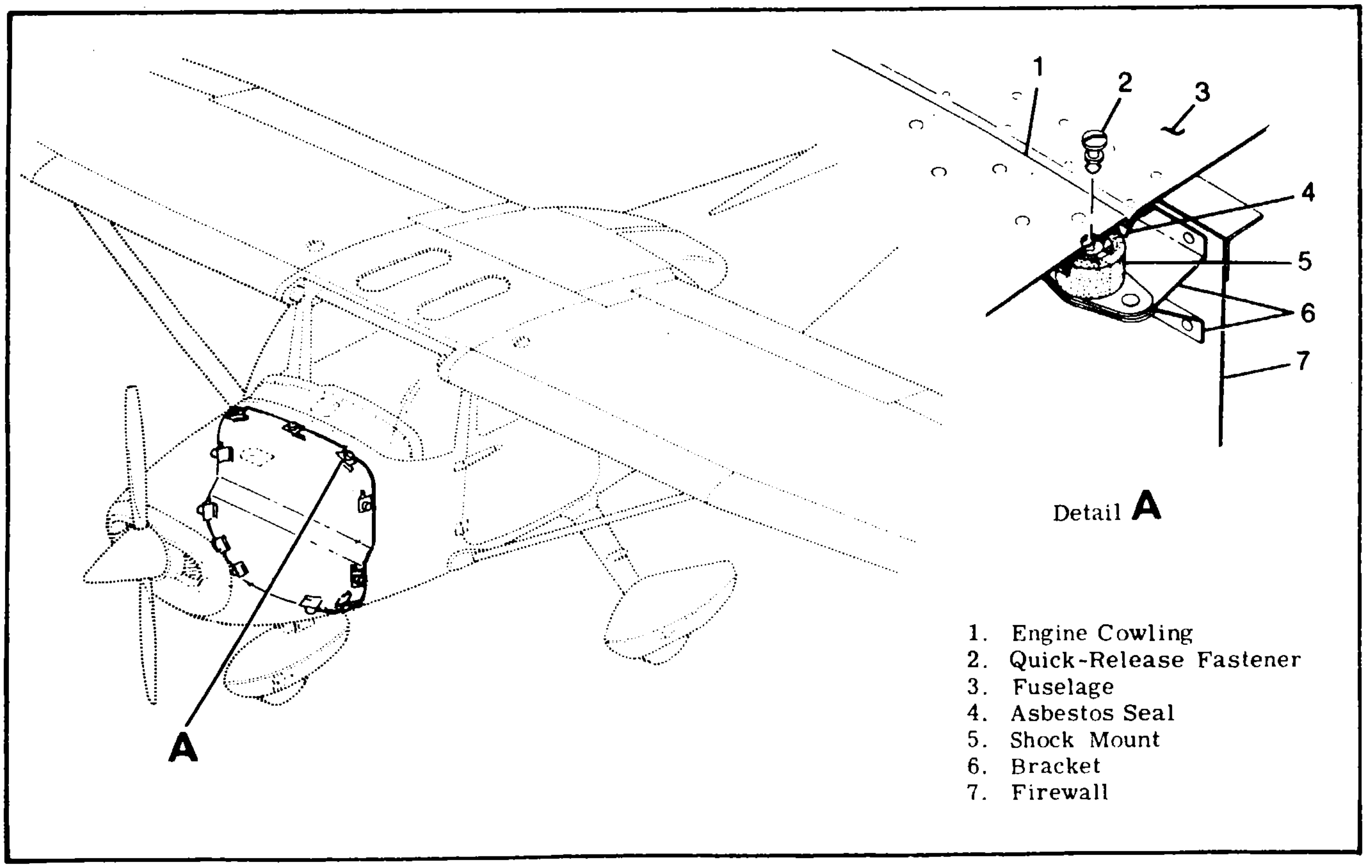


Figure 11-1. Engine Cowling Shock Mounts

11-5. REPAIR. If cowling skins are extensively damaged, new complete sections of the cowling should be installed. Standard insert-type patches may be used for repair if repair parts are formed to fit contour of cowling. Small cracks may be stop-drilled and small dents straightened if they are reinforced on the inner surface with a doubler of the same material as the cowling skin. Damaged reinforcement angles should be replaced with new parts. Due to their small size, new reinforcement angles are easier to install than to repair the damaged part.

11-6. COWL FLAP. (See figure 11-2.)

11-7. DESCRIPTION. A single, retractable cowl flap is installed in the aft end of the lower cowl to aid in controlling engine temperature.

11-8. REMOVAL AND INSTALLATION. (See figure 11-2.)

a. Place cowl flap lever (3) in the open position.
b. Disconnect cowl flap control clevis (1) from cowl flap shock mount (8).
c. Remove safety wire securing hinge pin (11) to cowl flap, pull pin from hinge and remove flap.
d. Reverse the preceding steps for reinstallation. Rig cowl flap, if necessary, in accordance with paragraph 11-9.

11-9. RIGGING. (See figure 11-2.)

a. Disconnect cowl flap control clevis (1) from cowl flap shock-mount (8).
b. Check to make sure that the flexible control reaches its internal stops in each direction. Mark control so that full travel can be readily checked and maintained during the remaining rigging procedures.
c. Place cowl flap lever (3) in the closed position. If the control lever cannot be placed in the closed position, adjust control at upper clevis (1) to position control lever in bottom hole of position bracket (2).
d. With the control lever in closed position, hold cowl flap closed, streamlined with trailing edge of lower cowl. Loosen jam nut and adjust clevis (1) on the control to hold cowl flap in this position and install bolt. Tighten jam nut.

11-10. ENGINE.

11-11. DESCRIPTION. An air-cooled, wet-sump, six-cylinder, horizontally-opposed, Continental IO-360-K engine, equipped with fuel injection, is used to power the aircraft. The engine features inclined valves, with individual rocker box covers for each valve. The intake ports are located on the opposite side of the cylinders from the exhaust ports. An oil cooler is located at the rear (accessory case) end of the engine on the 2-4-6 side. Refer to paragraph 11-12 for engine data. For repairs and overhaul of the engine, accessories and propeller, refer to the applicable publications issued by their manufacturers.

SHOP NOTES:

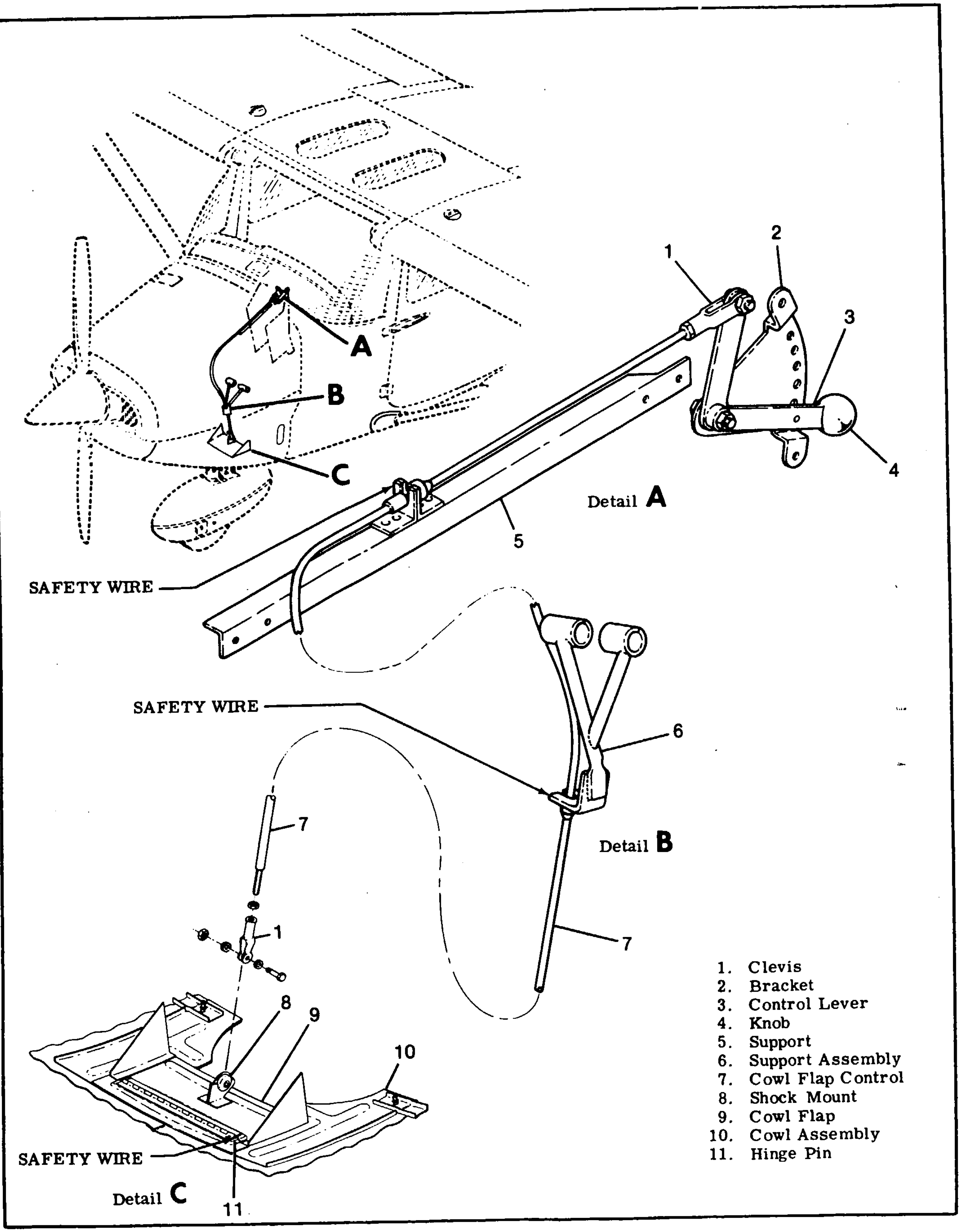


Figure 11-2. Cowl Flap Installation

11-12. ENGINE DATA.

Model (Continental)	IO-360-K
BHP at RPM	195 at 2600 RPM
Number of Cylinders	6-Horizontally Opposed
Displacement	360 Cubic Inches
Bore	4,438 Inches
Stroke	3,875 Inches
Compression Ratio	8. 5:1
Magnetos THRU R1723199 & FR1720655	Bendix - Scintilla S6LN - 25 *
Right Magneto	Fires 20° BTC 1-3-5 Upper and 2-4-6 Lower Spark Plugs
Left Magneto	Fires 20° BTC 2-4-6 Upper and 1-3-5 Lower Spark Plugs
BEGINNING WITH R1723200 & FR1720656	Slick 6214 *
Right Magneto	Fires 20° BTC 1-3-5 Upper and 2-4-6 Lower Spark Plugs
Left Magneto	Fires 20° BTC 2-4-6 Upper and 1-3-5 Lower Spark Plugs
Firing Order	1-6-3-2-5-4
Spark Plugs	18mm (Refer to Continental Service Bulletin M68-4)
Torque Value	330 # 30 lb-in
Fuel Metering System	Continental Fuel Injection
Unmetered Fuel Pressure	6 to 8 PSI at 600 RPM 23 to 26 PSI at 2600 RPM
Nozzle Pressure	2. 5 to 4. 0 PSI at 600 RPM 14. 0 to 16. 0 PSI at 2600 RPM
Oil Sump Capacity	8 U. S. Quarts
With Filter Change	9 U. S. Quarts
Tachometer	Mechanical
Oil Pressure	
Minimum Idling	10 PSI
Normal	30 to 60 PSI
Maximum	100 PSI
Oil Temperature	
Normal Operation	Within Green Arc (100°F to 240°F)
Maximum Permissible	Red Line (240°F)
Cylinder Head Temperature	460°F Maximum Allowable
Dry Weight with Accessories	325 lb (Weight is approximate, excluding baffles, propeller vacuum pump and tachometer drive)
Direction of Crankshaft Rotation as Viewed from Propeller End of Engine	Counterclockwise.

* Magneto rotors rotate clockwise as viewed from the magneto drive end.

11-13. TIME BETWEEN OVERHAUL (TBO). Teledyne Continental Motors recommends engine overhaul at 2000 hours operating time for this IO-360 series engine. Refer to Continental Aircraft Engine Service Bulletin M79-14, and to any superseding bulletins, revisions or supplements thereto, for further recommendations. At the time of engine overhaul the accessories should be overhauled.

11-14. OVERSPEED LIMITATIONS The engine must not be operated above specified maximum continuous RPM. However, should inadvertent overspeed occur, refer to Continental Aircraft Engine Service Bulletin M75-16, and to any superseding bulletins, revisions or supplements thereto, for further recommendations.

11-15. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE WILL NOT START.	Improper use of starting procedure.	Review starting procedure. Refer to Pilot's Operating Handbook.
	Defective aircraft fuel system.	Refer to Section 12.
	Spark plugs fouled or defective.	Remove and clean. Check gaps and insulators. Use new gaskets. Check cables to persistently fouled plugs. Replace if defective.
	Defective magneto switch or grounded magneto leads.	Check continuity, repair or replace switch or leads.
	Defective ignition system.	Refer to paragraph 11-75.
	Excessive induction air leaks.	Check visually. Correct cause of air leaks.
	Dirty screen in fuel control unit or defective fuel control unit.	Check screen visually. Check fuel flow through control unit. Replace defective fuel control unit.
	Defective electric fuel pump.	Refer to Section 12.
	Defective fuel manifold valve or dirty screen.	Check fuel flow through valve. Remove and clean. Replace if defective.
	Clogged fuel injection lines or discharge nozzles.	Check fuel through lines and nozzles. Clean lines and nozzles. Replace if defective.
	Fuel pump not permitting fuel from auxiliary pump to bypass.	Check fuel flow through engine-driven fuel pump. Replace engine-driven pump.
	Vaporized fuel in system.	Refer to Pilot's Operating Handbook.
	Fuel tanks or bays empty.	Visually inspect tanks or bays Fill with proper grade and quantity of gasoline.
	Fuel contamination or water in fuel system.	Open fuel strainer drain and check for water. Drain all fuel and flush out fuel system. Clean all screens, fuel lines, strainer, etc.
	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 tanks known to contain gasoline.
	Magneto impulse coupling failure.	Repair or install new coupling.

11-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE STARTS BUT DIES, OR WILL NOT IDLE.	Idle stop screw or idle mixture incorrectly adjusted.	Refer to paragraph 11-55.
	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 tank or bay sumps, lines and strainer.
	Defective ignition system.	Refer to paragraph 11-75.
	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.
	Dirty screen in fuel control unit or defective fuel control unit.	Check screen visually. Check Fuel flow through control unit. Clean screen. Replace fuel control unit if defective.
	Defective manifold valve or clogged screen.	Check fuel flow through valve. Replace if defective. Clean screen.
	Defective engine-driven fuel pump.	If engine continues to run with electric pump turned on, but stops when it is turned off, the engine-driven pump is defective. Replace pump.
	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 aircraft fuel system.	Refer to Section 12.
	Restricted fuel injection lines or discharge nozzles.	Check fuel flow through lines and nozzles. Clean lines and nozzles. Replace if defective.
	Obstructed air intake.	Check visually. Remove obstruction; service air filter, if necessary.
	Improper positioning of discharge nozzle shield.	Position lower edge of nozzle shield approximately 1/16" above wrench pads on nozzle.

11-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE RUNS ROUGHLY, WILL NOT ACCELERATE PROPERLY.	Propeller control in high pitch (low RPM) position.	Use low pitch (high RPM) for all ground operations.
	Restriction in aircraft fuel system.	Refer to Section 12.
	Restriction in fuel injection system.	Clean system. Replace any defective units.
	Engine-driven fuel pump pressure improperly adjusted.	Refer to paragraph 11-68.
	Worn or improperly rigged throttle or mixture control.	Check visually. Rig properly. Replace worn linkage.
	Spark plugs fouled or improperly gapped.	Clean and regap. Replace if defective.
	Defective ignition system.	Refer to paragraph 11-75.
	Defective engine.	Check compression. Listen for unusual engine noises. Engine repair is required.
	Propeller out of balance.	Check and balance propeller.
	Interference between engine mount and cowling.	Edges of cowling stiffeners and doublers may be ground for clearance.
	Defective engine shock mount.	Replace defective parts.
	Engine or engine mount attaching bolts loose or broken.	Torque properly. Replace if defective.
POOR IDLE CUT-OFF.	Worn or improperly rigged mixture control.	Rig properly. Replace worn linkage.
	Defective or dirty manifold valve.	Operate electric fuel pump and check that no fuel flows through manifold valve with mixture control in IDLE CUT-OFF. Remove and clean. Replace if defective.
	Auxiliary fuel pump ON.	Turn to OFF position.
	Defective fuel control unit.	If none of the preceding causes corrects the problem, the control unit is probably at fault. Replace control unit.
	Fuel contamination.	Drain fuel, flush out fuel system. Clean all screens, strainer, manifold valve, nozzles, and fuel lines.
	Defective mixture control valve in pump.	Replace fuel pump

11-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
HIGH CYLINDER HEAD TEMPERATURE.	Defective cylinder head temperature indicating system.	Refer to Section 15.
	Improper use of cowl flap.	Refer to Pilot's Operating Handbook.
	Defective cowl flap operating system.	Refer to paragraph 11-6.
	Engine baffles loose, bent or missing.	Check visually. Install baffles properly. Repair or replace if defective.
	Dirt accumulated on cylinder cooling fins.	Check visually. Clean thoroughly.
	Incorrect grade of fuel.	Drain and refill with proper fuel.
	Incorrect ignition timing.	Refer to paragraph 11-80 or 11-87.
	Defective fuel injection system.	Refer to paragraph 11-51.
	Improper use of mixture control.	Refer to Pilot's Operating Handbook.
	Defective engine.	Repair as required.
HIGH OR LOW OIL TEMPERATURE OR PRESSURE.		Refer to paragraph 11-42.

11-16. STATIC RUN-UP PROCEDURES. In a case of suspected low engine power, a static RPM run-up should be conducted as follows:

a. Run-up engine, using take-off power and mixture settings, with the aircraft facing 90° right and then left to the wind direction.

b. 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.

c. Average the results of the RPM obtained. It should be within 50 RPM of 2565 RPM.

d. If the average results of the RPM obtained are lower than stated above, the following recommended checks may be performed to determined a possible deficiency.

1. 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 the governor was adjusted properly.

2. Check operation of alternate air door spring or magnetic lock to make sure door will remain closed in normal operation.

3. Check magneto timing, spark plugs, and ignition harness for setting and condition.

4. Check fuel injection nozzles for restriction and check for correct unmetered fuel flow.

5. Check condition of induction air filter. Clean if required.

6. Perform an engine compression check. Refer to engine Manufacturer's Manual for procedures.

11-17. ENGINE REMOVAL. If the engine is to be placed in storage or returned to the manufacturer, proper preparatory steps should be taken prior to beginning the removal procedure. Refer to Section 2 for engine storage.

NOTE

Tag each item disconnected to aid in identifying wires, hoses, and control linkage when engine is installed. Protect openings, exposed as a result of removing or disconnecting units, against entry of foreign material by installing covers or sealing with tape.

a. Place all cabin switches and fuel shut-off valve in the OFF position.
b. Remove the engine cowling. (Refer to paragraph 11-3.)
c. Open battery circuit by disconnecting battery.
d. Disconnect ignition switch leads at the magnetos.

WARNING

These magnetos DO NOT have internal grounding springs. Ground the magneto points to prevent accidental firing when propeller is rotated.

e. Drain the engine oil.
f. Remove the propeller. Refer to Section 13 for propeller removal.

NOTE

During the following procedures, remove any clamps which secure controls, wires, hoses, or lines to the engine, engine mount, or attached brackets, so they will not interfere with removal of the engine and mount.

g. Disconnect the throttle control, propeller control, and mixture control at their respective units. Pull these controls free of engine, using care not to damage them by bending too sharply.
h. Remove oil temperature bulb located directly above oil cooler. Work bulb aft through baffles carefully to prevent damage to capillary tube.
i. Disconnect wires and cables as follows:
1. Tachometer drive at adapter.
2. Cylinder head temperature wire at temperature bulb on lower side of cylinder.
3. Electrical wires and wire shielding ground at alternator.

CAUTION

When disconnecting the starter cable, do not permit starter terminal bolt to rotate. Rotation of the terminal bolt could break the conductor between terminal and field coils causing the starter to be inoperative.

4. Starter electrical cable at starter and insulate cable as a safety precaution.
5. Remove all clamps attaching wires or cables to the engine. Pull all wires and cables aft to clear the engine.

j. Disconnect lines and hoses as follows:
1. Vacuum pump hoses at vacuum pump.
2. Manifold pressure line at firewall.
3. Fuel supply hose at fuel strainer and vapor return hose at firewall.

WARNING

Residual fuel draining from lines and hoses is a fire hazard. Use care to prevent the accumulation of such fuel when lines and/or hoses are disconnected.

4. Fuel flow gage line at firewall.
5. Oil pressure hose at firewall.
6. Engine primer line at firewall.

k. Disconnect flexible ducting.
l. Attach a hoist to the hoisting lug on top of the engine and take up engine weight on hoist.

CAUTION

Place a stand under the tail tie-down ring before removing the engine. The loss of engine weight will allow the tail to drop.

m. Remove bolts attaching engine mount to upper part of firewall, then remove bolts attaching engine mount to lower part of firewall. Balance the engine by hand as the last of these bolts is removed.

CAUTION

Hoist engine slowly and make sure all wires, lines, and hoses have been disconnected.

n. Carefully guide disconnected components out of engine assembly.

11-18. CLEANING. The engine and engine compartment should be cleaned thoroughly with a solvent-dampened cloth. Solvent may be applied with a spray gun or brush and allowed to soften and dissolve inaccessible grease deposits before compressed air is used to remove them.

CAUTION

Particular care should be given to electrical components before cleaning. Solvent should not be allowed to enter magnetos, starters, alternators, voltage regulators, and the like. Hence, these should be protected before saturating the engine with solvent. Any oil, fuel, and air openings on the engine and accessories should be covered before washing down the engine with solvent. Caustic cleaning solutions should not be used.

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 disassembly process, removed items should be examined carefully, and defective parts should be tagged for repair or replacement.

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 hole. This will prevent entry of foreign particles. If suitable covers are not available, tape may be used to cover the openings.

11-20. INSPECTION. For specific items to be inspected refer to engine manufacturer's manual.

a. Visually inspect the engine for loose nuts, bolts, cracks and fin damage.
b. Inspect baffles, baffle seals and brackets for cracks, deterioration and breakage.
c. 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.
d. 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.

e. Refer to Section 2 for replacement intervals for flexible fluid carrying hoses in the engine compartment.
f. For major engine repairs, refer to the manufacturer's overhaul and repair manual.

11-21. BUILD-UP. Engine build-up consists of the installation of parts, accessories and components to the basic engine to build up a powerplant unit ready for installation in the aircraft. All safety wire, lockwashers, Palnuts, elastic stop nuts, gaskets and rubber connections should be new parts.

11-22. INSTALLATION. Before installing the engine, reinstall any items which were removed from the engine after it was removed from the aircraft.

NOTE

Remove all protective covers, plugs, caps, and identification tags as each item is connected or installed.

a. Hoist engine and mount assembly to a point near the firewall.
b. Route controls, lines, and hoses in place as the engine is positioned near the firewall.
c. Install engine mount bolts. Install the upper engine mount bolts at firewall, then install lower bolts. When tightening, torque to 160 to 190 lb-in.
d. Remove hoist and stand placed under tail.
e. Route throttle, mixture, and propeller controls to their respective units and connect. Secure controls in position with clamps.
f. Connect lines and hoses as follows:
 1. Engine primer line at firewall.
 2. Oil pressure hose at firewall.
 3. Fuel flow gage line at firewall.
 4. Fuel supply hose at fuel strainer and vapor return hose at firewall

NOTE

Throughout the aircraft fuel system, from the fuel tanks to the engine-driven fuel pump, 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 lubricant or to seal a leaking connection. Apply sparingly to male threads only, omitting the first two 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. Throughout the fuel injection system, from the engine-driven fuel pump through the discharge nozzles, use only a fuel-soluble lubricant, such as engine oil, on fitting threads. Do not use any other form of thread compound on the injection system.

 5. Manifold pressure line at firewall.
 6. Vacuum pump hoses at firewall and separator.

g. Connect wires and cables as follows:
 1. Tachometer drive shaft at adapter on engine. Tighten drive shaft attaching nut to 100 lb-in.
 2. Cylinder head temperature wire at temperature bulb. Do not exceed 4 lb-in torque.
 3. Electrical wire and wire shielding ground at alternator.

CAUTION

When connecting the starter cable, do not permit starter terminal bolt to rotate. Rotation of the terminal bolt could break the conductor between terminal and field coils causing the starter to be inoperative.

 4. Starter electrical cable at starter.
 5. Install all clamps attaching wires or cables to the engine.

h. Install oil temperature bulb.
i. Install propeller. (See Section 13.)
j. Make a magneto switch ground-out and continuity check. Connect magneto primary wires to the magnetos. Remove temporary ground.

WARNING

Be sure magneto switch is in OFF position when connecting primary leads to magnetos.

k. Clean induction air filter and install.
l. Service engine with proper grade and quantity of engine oil. Refer to Section 2 if engine has been in storage.
m. Make sure all switches are in the OFF position, and connect battery ground cable.

n. Rig engine controls in accordance with paragraphs 11-93 and 11-97.
o. Check engine installation for security, correct routing of controls, lines, hoses and electrical wiring, proper safetying, and tightness of all components.
p. Install engine cowling.
q. Perform engine run-up and make final adjustments on engine controls.

11-23. FLEXIBLE FLUID HOSES.

11-24. PRESSURE TEST.
a. After each 50 hours of engine operation, all flexible fluid hoses in the engine compartment should be pressure tested as follows:
1. Place mixture control in the idle cut-off position.
2. Operate the auxiliary fuel pump in the high position.
3. Examine the exterior of hoses for evidence of leakage or wetness.
4. Hoses found leaking should be replaced.
5. After pressure testing fuel hoses, allow sufficient time for excess fuel to drain overboard from the engine manifold before attempting an engine start.
6. 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 same or tied with sta-straps to prevent chafing.
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, Chapter 10, for additional installation procedures for flexible fluid hose assemblies.

11-26. TACHOMETER DRIVE ADAPTER SEAL.

11-27. REMOVAL AND INSTALLATION. To install a new tachometer drive seal, special tools are required. (See figures 11-3 and 11-4.)

NOTE

Tool Kit MK6-1 and tool SE909 are available from the Cessna Service Parts Center. Tools in the MK6-1 kit are used for installing the seal in the adapter and installation of the adapter on the engine. The SE909 tool is used to apply the correct torque value on the tachometer drive connector.

a. Remove engine cowling as required for access.
b. Drain oil until a maximum of eight quarts are left in the engine.
c. Remove alternator. (Refer to Section 16.)
d. Disconnect tachometer drive shaft from tachometer drive reduction adapter.
e. Remove drive reduction adapter from tachometer drive housing.
f. Remove three sets of nuts and washers and remove tachometer drive housing.
g. Engage lock tool (10) and driver tool (9) through the housing (4) as shown in figure 11-4. Tap the driver tool (9) with a hammer until the seal (4) is removed from the drive housing.
h. Engage bolt (5) through sleeve (6), washer (7), drive housing (4), seal (3), and into driver tool (8) as shown in figure 11-4. Tighten bolt (5) until driver tool (8) comes in contact with the face of drive housing (4).

SHOP NOTES:

NOTE

Seal is to be installed with lip of seal as shown in figure 11-4.

i. Remove the tools and inspect seal (3) for proper seating.
j. Using the SE909 tool, remove tachometer shaft connector from engine.
k. Inspect connector for rough or sharp edges along groove for the tachometer cable drive.
l. If sharp or rough edges are found, use a fine stone and smooth the edges of the connector. Rough or sharp edges could damage the seal.
m. Install connector and using tool SE909, torque connector to 280 to 300 lb-in.
n. Insert bullet tool (2) into end of the tachometer drive connector as shown in figure 11-4.

NOTE

The end of connector (1) has a sharp edge. The bullet tool will protect the seal (3) during engagement of the connector with the housing (4).

o. Using a new gasket, install housing and remove bullet tool.
p. Install reduction adapter and connect tachometer drive shaft. Tighten reduction adapter and drive shaft nuts to 100 lb-in.
q. Install alternator. (Refer to Section 16.)
r. Service engine with oil and install cowling removed for access.

11-28. ENGINE BAFFLES.

11-29. 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 of the engine. These baffles incorporate rubber-asbestos composition seals at points of contact with the engine cowling to help confine and direct the airflow to the desired area. It is very important to engine cooling that the baffles and seals are installed correctly and maintained in good condition.

11-30. 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. Replace or repair defective parts.

11-31. REMOVAL AND INSTALLATION. Removal and installation of the various baffle segments is 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.

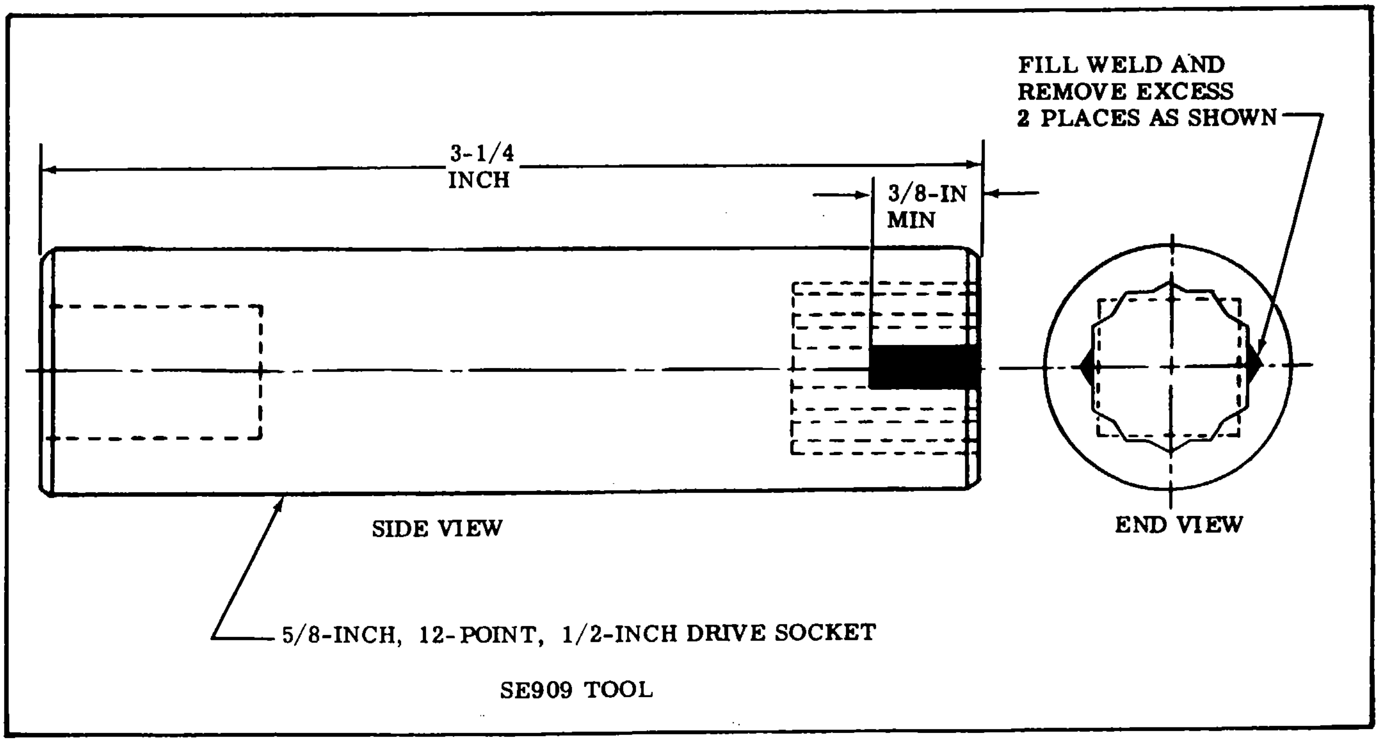
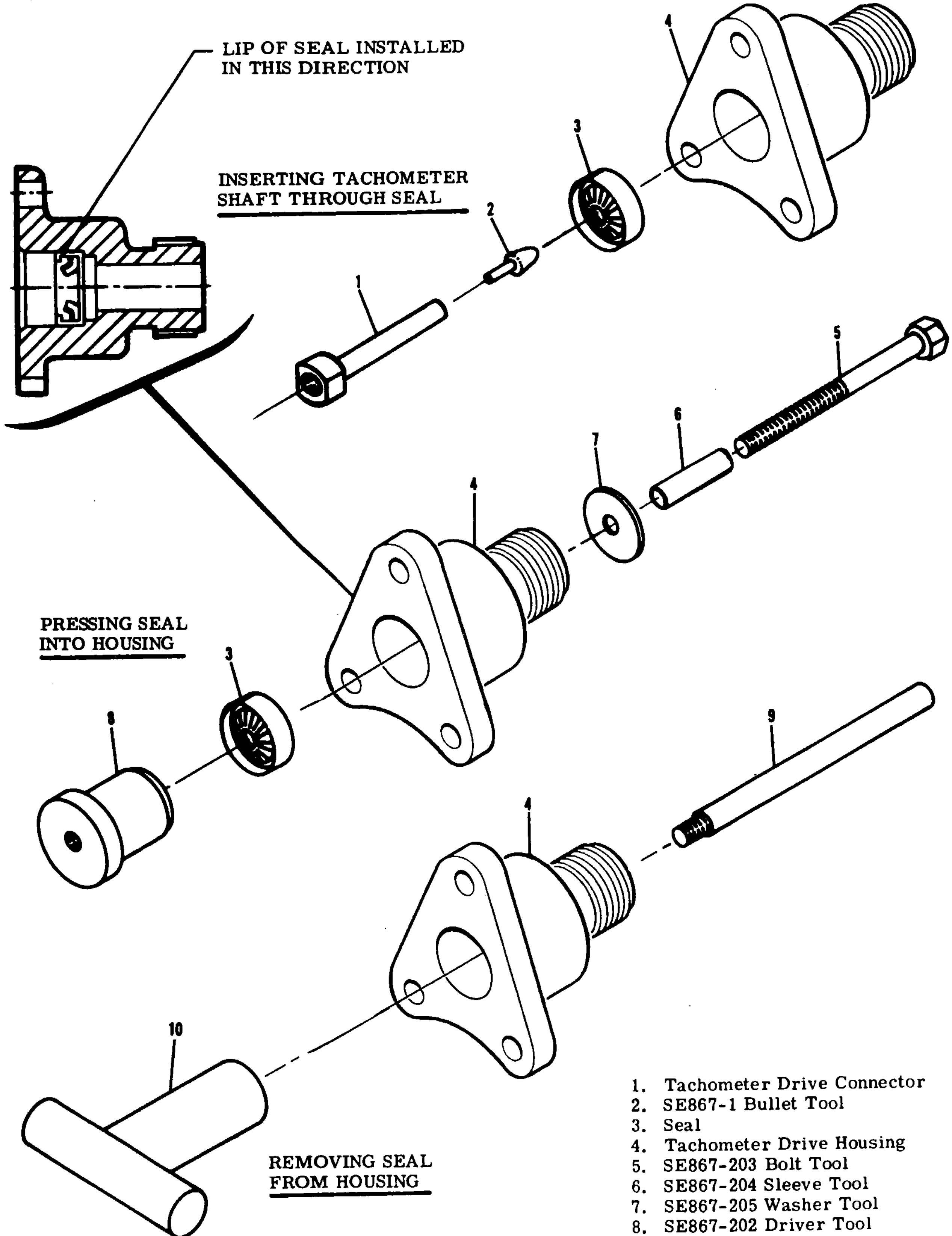


Figure 11-3. Torque Wrench Adapter



1. Tachometer Drive Connector
2. SE867-1 Bullet Tool
3. Seal
4. Tachometer Drive Housing
5. SE867-203 Bolt Tool
6. SE867-204 Sleeve Tool
7. SE867-205 Washer Tool
8. SE867-202 Driver Tool
9. SE867-4 Driver Tool
10. SE867-3 Lock Tool

Figure 11-4. Tachometer Drive Seal Installation

11-32. REPAIR. Baffles ordinarily should be replaced 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.

11-33. ENGINE MOUNT.

11-34. DESCRIPTION. The engine mount is composed of sections of tubing welded together and reinforced with welded gussets. The purpose of the mount is to support the engine and attach it to the air-

11-35. REMOVAL AND INSTALLATION. Removal and installation of the engine mount may be accomplished without completely removing the engine from the aircraft.

a. Remove cowling for acess.
b. Remove engine exhaust system as outlined in paragraph 11-101.
c. Remove clamps attaching lines, hoses, and wiring to engine mount.
d. Remove heat shields from right hand rear and left hand forward engine shock mounts (if installed).
e. Attach a suitable hoist to the hoisting lug on top of the engine and take up engine weight with the hoist.

CAUTION

Place a stand under the tail tie-down ring before lifting the engine. The loss of engine weight will allow the tail to drop.

f. Remove nuts, washers, and bolts attaching engine to mount.
g. Raise hoist slightly so that no engine weight is on the mount and remove engine shock mount pads and spacers.

CAUTION

Use care when lifting engine to prevent damage to lines, hoses, wiring, and controls.

h. Remove bolts attaching engine mount to fuselage and work mount from aircraft.
i. To install the engine mount, reverse the preceding steps. Be sure that spacer washers are installed between engine mount and firewall.

NOTE

When tightening mount-to-firewall bolts, tighten to a torque value of 160 to 190 lb-in. When tightening engine-to-mount bolts, tighten to a torque value of 450 to 500 lb-in.

11-36. REPAIR. Refer to section 18 of this manual for repair procedures.

11-37. PAINTING. Refer to section 19 of this manual for painting procedures.

11-38. SHOCK MOUNT PADS. 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 dry cloth.

NOTE

Do not clean the rubber parts with any type of cleaning solvent.

Inspect metal parts for cracks and excessive wear due to aging and deterioration. Inspect the rubber parts for swelling, cracking, or a pronounced set of the part. Replace with new parts all of the parts that show evidence of wear or damage.

11-39. ENGINE OIL SYSTEM.

11-40. DESCRIPTION. A wet-sump, pressure-lubricating oil system is used in the engine. Refer to applicable engine manual for specific details.

SHOP NOTES:

11-41. OIL SYSTEM CAPACITY. (Refer also to Section 2.) The oil system has an 8-quart capacity. Engine should not be operated on less than six quarts. To minimize loss of oil through breather, fill to seven quart level for normal flights of less than three hours. For extended flights, fill to eight quarts. These quantities refer to dipstick readings only. For engines that have the optional full-flow oil filter installed, one additional quart is required when the filter is changed.

11-42. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
NO OIL PRESSURE.	No oil in sump.	Check oil with dipstick. Fill sump with proper grade and quantity of oil. Refer to Section 2.
	Oil pressure line broken, disconnected or pinched.	Check visually. Replace or connect.
	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. Replace gage if defective.
	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 defective parts.
LOW OIL PRESSURE.	Low oil supply.	Check with dipstick. Replenish with proper grade and quantity.
	Low viscosity oil.	Check visually. Drain sump and refill with proper grade and quantity of oil.
	Oil pressure relief valve spring weak or broken.	Remove and inspect. Replace weak or broken spring.
	Defective oil pump.	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. Replace gage if defective.
	Secondary result of high oil temperature.	Observe oil temperature gage for high indication. Determine and correct reason for high oil temperature.

11-42. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
HIGH OIL PRESSURE.	High viscosity oil.	Check visually. 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 defective parts.
	Defective oil pressure gage.	Check with a known good gage. Replace oil pressure gage.
LOW OIL TEMPERATURE.	Defective oil temperature gage or temperature bulb.	Check with another gage. If reading is normal, aircraft gage is defective. If reading is similar temperature bulb is defective. Replace defective part/or parts.
	Oil cooler thermo-bypass valve defective or stuck closed.	Remove valve and check for proper operation. Replace valve if defective.
	Defective wiring.	Check continuity. Repair wiring.
HIGH OIL TEMPERATURE.	Oil cooler air passages clogged.	Check visually. Clean air passages
	Oil cooler oil passages clogged.	Attempt to drain cooler. Inspect for sludge. Remove cooler and flush thoroughly.
	Low oil supply.	Replenish.
	Oil viscosity too high.	Drain and fill sump with proper grade and quantity.
	Prolonged high speed operation on ground.	Hold ground running above 1500 RPM to a minimum.
	Defective oil temperature indicating system.	Refer to Section 15.
	Oil congealed in cooler.	If congealing is suspected, use external heater or a heated hangar to thaw the congealed oil.
	Secondary result of low oil pressure.	Check for low oil pressure reading. Determine cause and correct.
	Secondary result of high cylinder head temperature.	Check for high cylinder head temperature. Determine cause and correct.

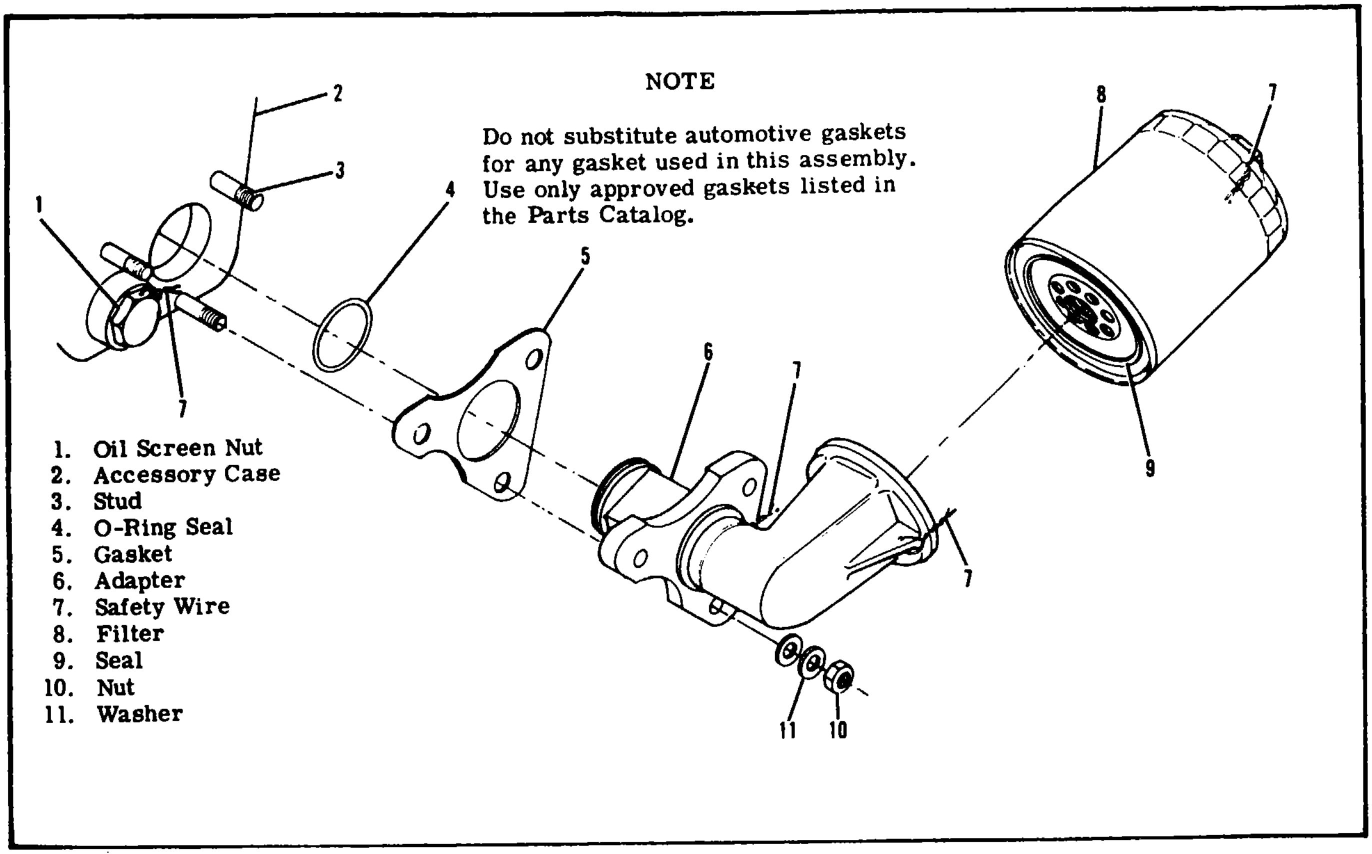


Figure 11-6. Full-Flow Oil Filter

11-43. OIL COOLER.

11-44. DESCRIPTION. The fin and plate oil cooler is attached to a plate on the aft left side of the engine crankcase. Oil is allowed to circulate through the adapter plate until the oil reaches a predetermined temperature, the Vernatherm then closes causing the oil to be routed through the oil cooler to be cooled. Cooling air is routed through the cooler from the top side and is exhausted into the lower cowling.

11-45. FULL-FLOW OIL FILTER. (See figure 11-6.)

11-46. DESCRIPTION. Beginning with Serials R172-3200 & on, and FR1720656 & on, the Full-Flow oil filter is included as standard equipment. The filter and filter adapter replace the regular oil filter screen. The filter adapter is a bolt on type held by three studs installed on the engine accessory case. The filter is a throw-away type spin-on filter which has an internal bypass valve.

11-47. REMOVAL AND INSTALLATION (FILTER). (See figure 11-6.)

a. Remove engine cowl as necessary to gain access to the filter.
b. Remove safety wire (7) from filter, (8).
c. Unscrew filter from adapter, (6).

NOTE

Teledyne Continental Motors recommends that the spin-on filter be inspected. Refer to Continental Aircraft Engine Service Bulletin M74-2, dated 16 January 1974.

d. Lightly lubricate gasket (9) with engine oil only prior to installation.
e. Install spin-on filter, (8), on the stud and torque to 18-20 lb-ft or 3/4 to 1 full turn after gasket makes contact.
f. Safety wire filter to adapter.
g. After first engine run check for oil leaks.

11-48. REMOVAL AND INSTALLATION (ADAPTER). (See figure 11-6.)

a. Remove spin-on filter per paragraph 11-45.
b. Remove safety wire between adapter (6) and oil screen nut.
c. Remove nuts (10) and washers (11) and pull adapter from accessory case (2) taking care not to damage O-ring seal (4).
d. Check O-ring seal for damage.
e. Place new adapter gasket (5) over studs.
f. Lubricate O-ring seal with engine oil and slide adapter into place taking care not to damage O-ring seal.

g. Install washers and nuts
h. Safety wire oil screen nut to adapter.
i. Install oil filter per paragraph 11-47.

11-49. ENGINE FUEL SYSTEM. (See figure 11-7.)

11-50. DESCRIPTION. The fuel injection system is a simple, low-pressure system of injecting metered fuel into the intake valve ports in the cylinders. It is a multi-nozzle, continuous-flow system which controls fuel flow to match engine airflow. Any change in throttle position, engine speed, or a combination of both, changes fuel flow in the correct relation to engine airflow. A manual mixture control and a fuel flow indicator are provided for leaning at any combination of altitude and power setting. The continuous-flow system uses a typical rotary-vane fuel pump, which is the only running part in the system. Since the fuel injection nozzles and the intake manifolds are installed on the top side of the cylinders, drain lines are installed in the bottom side of the intake ports to drain any fuel which might accumulate in the intake ports during engine shut-down.

SHOP NOTES:

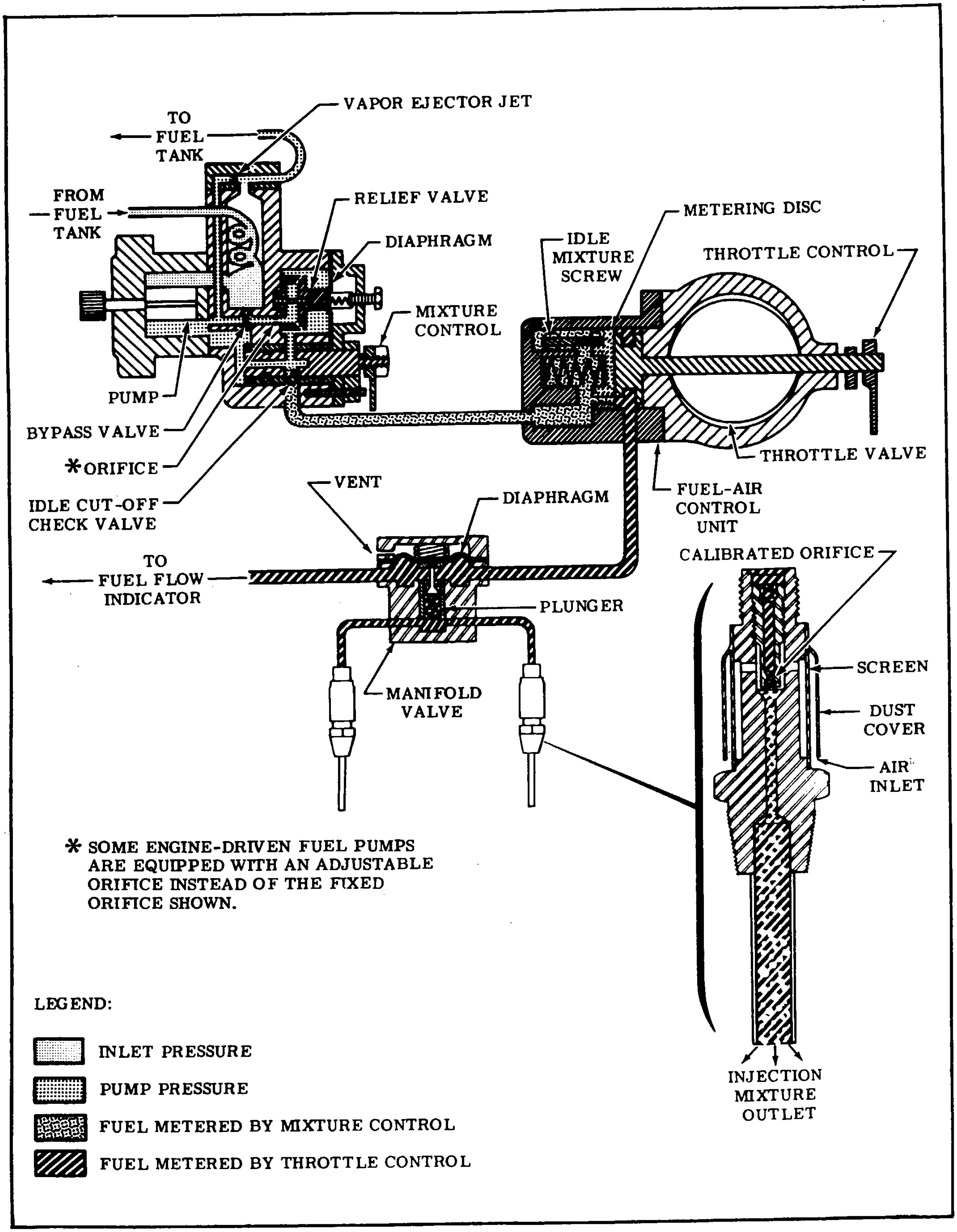


Figure 11-7. Fuel Injection Schematic

11-51. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
NO FUEL DELIVERED TO ENGINE.	Fuel tanks or bays empty.	Check visually. Service with desired quantity of fuel.
	Defective aircraft fuel system.	Refer to Section 12.
	Vaporized fuel. (Most likely to occur in hot weather with a hot engine.)	Refer to Pilot's Operating Handbook.
	Fuel pump not permitting fuel from electric pump to bypass.	Check fuel-flow through pump. Replace engine-driven fuel pump if defective.
	Defective fuel control unit.	Check fuel flow through unit. Replace fuel-air control unit if necessary.
	Defective fuel manifold valve, or clogged screen inside valve.	Check fuel flow through valve. Remove and clean in accordance with paragraph 11-59. Replace if defective.
	Clogged fuel injection lines or discharge nozzles.	Check fuel flow through lines and nozzles. Clean and replace if defective.
HIGH FUEL PRESSURE.	Restricted discharge nozzles.	Clean or replace plugged nozzle or nozzles.
	Restriction in vapor vent return line or check valve.	Clean vapor return line. Clean or replace check valve.
ENGINE RUNS ROUGH AT IDLE.	Improper idle mixture adjustment.	Refer to paragraph 11-55.
	Restriction in aircraft fuel system.	Refer to Section 12.
	Low unmetered fuel pressure.	Refer to paragraph 11-68.
	High unmetered fuel pressure.	Refer to paragraph 11-68.
	Worn throttle plate shaft or shaft O-rings.	Replace shaft and/or O-rings.
	Intake manifold leaks.	Repair leaks or replace defective parts.
	Leaking intake valves.	Engine repair required.
	Discharge nozzle air vent manifolding restricted or defective.	Check for bent or loose connections, restrictions or defective components. Tighten loose connections; replace defective components.

11-51. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE RUNS ROUGH AT IDLE. (Cont.)	Improper positioning of discharge nozzle dust caps.	Position dust caps to have opening of approximately 1/16-inch between bottom of dust cap and wrench pads on nozzle.
POOR IDLE CUT-OFF.	Dirt in fuel pump or defective pump.	Remove pump and flush out thoroughly. Check that mixture arm contacts cut-off stop.
	Dirty or defective fuel manifold valve.	Remove and clean in accordance with paragraphs 11-58 and 11-59. Replace if defective.

11-52. FUEL-AIR CONTROL UNIT.

11-53. DESCRIPTION. The fuel-air control unit, located at the inlet to the intake manifold, contains the air throttle and a fuel metering unit. The function of the fuel-air control unit is to meter fuel and air in the proper ratio. The throttle control operates the air throttle valve. The valve shaft extends into the fuel metering valve. Idle speed and idle mixture adjustments are provided in the fuel-air control unit. The main mixture control is incorporated in the fuel pump.

NOTE

Throughout the aircraft fuel system, from the fuel tanks or bays to the engine-driven fuel pump, 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 lubricant or to seal a leaking connection. Apply sparingly to male threads only, omitting the first two 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. Throughout the fuel injection system, from the engine-driven fuel pump through the discharge nozzles, use only a fuel-soluble lubricant, such as engine oil, on fitting threads. Do not use any other form of thread compound on the injection system.

11-54. REMOVAL AND INSTALLATION.

a. Place fuel shut-off valve in OFF position.

b. Tag and disconnect fuel hoses at the fuel metering unit.

c. Disconnect manifold pressure line.

d. Loosen clamps securing the two hoses which connect fuel-air control unit to intake manifolds, and slide hoses away from connection.

e. Disconnect throttle control rod end.

f. Disconnect induction air valve return spring from tab on mounting bolt.

g. Remove bolts attaching fuel-air control unit to airbox. Lay microswitch and bracket to one side. Note any other parts secured by these bolts.

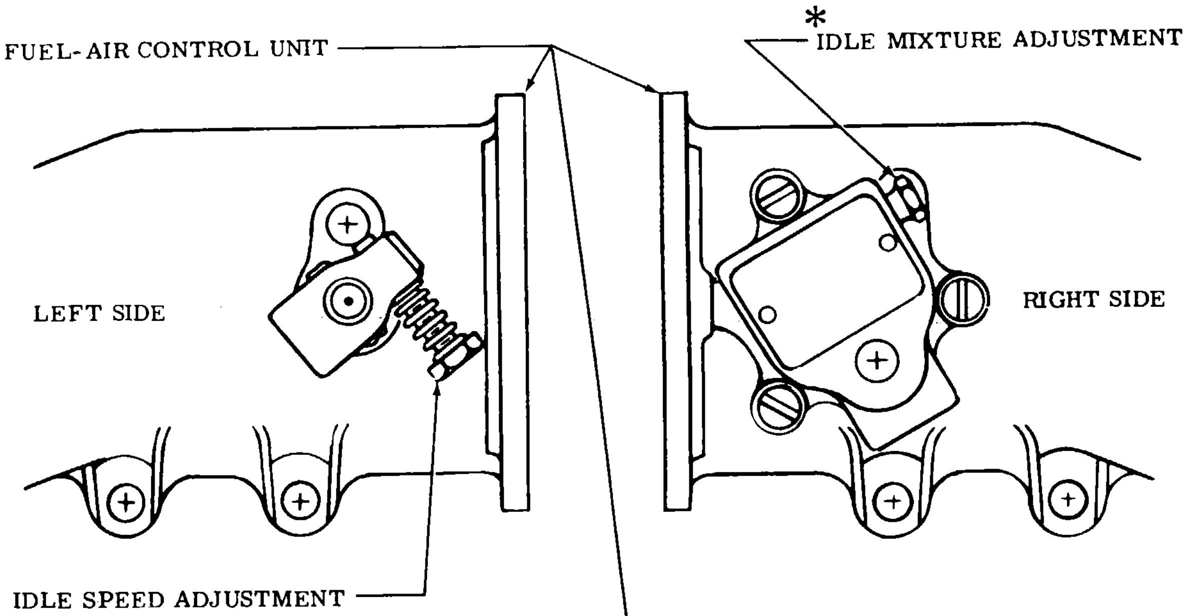
h. Remove bolts attaching fuel-air control unit to bracket on engine, and remove the unit. Cover open ends of intake manifolds and airbox.

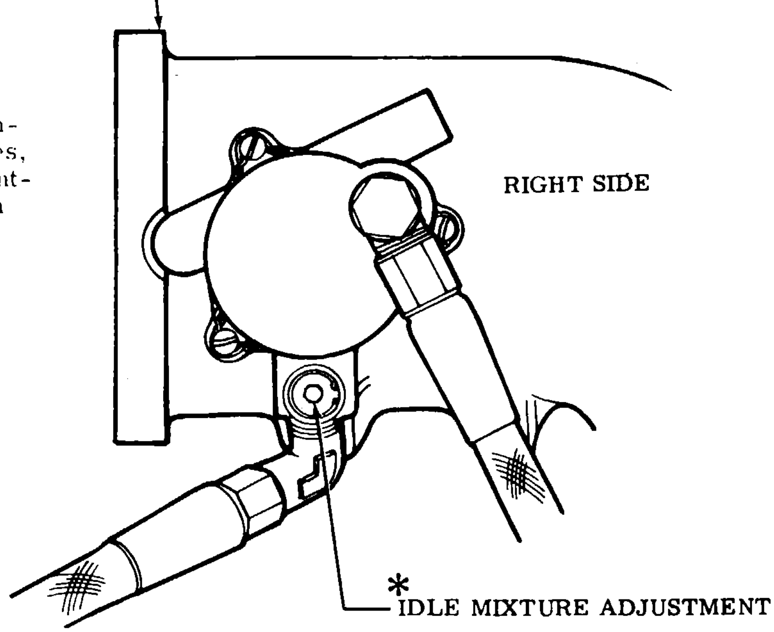
i. Reverse this procedure to install the fuel-air control unit. Check rigging of throttle and throttle-operated microswitch.

11-55. ADJUSTMENT (IDLE SPEED AND IDLE MIXTURE). (See figure 11-8.) The idle speed may be regulated by adjusting a spring-loaded screw located on the air throttle lever. The idling screw should be set to provide between 575 and 625 RPM. The idle mixture adjustment is a screw/allen screw located on the fuel metering unit. Turning clockwise leans the mixture and counterclockwise richens the mixture. Adjust mixture control to obtain a slight & momentary gain of 25 RPM maximum at 1000 RPM engine speed as mixture control is moved slowly from full RICH toward idle cutoff. If mixture is set too LEAN, engine speed will drop immediately, thus requiring enrichment. If mixture is set too RICH, engine speed will increase above 25 RPM, thus requiring leaning. Return mixture control to full RICH position as soon as leaning effect is observed, to keep engine running.

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. When checking or setting





*NOTE

When problems exist with respect to non-repeatability or drifting of fuel pressures, fuel flow, or idle mixtures, refer to Continental Aircraft Engine Service Bulletin #76-11 and all revisions thereto. Fuel pump pressure must be checked and adjusted (if necessary) before idle mixture can be set. Refer to paragraph 11-68.

Figure 11-8. Idle Speed and Idle Mixture Adjustment idle speed or idle mixture, "clear" the engine between checks to prevent false indications.

11-56. FUEL MANIFOLD VALVE.

11-57. DESCRIPTION. Metered fuel flows to the fuel manifold valve, which provides a central point for distributing fuel to individual cylinders. An internal diaphragm, operated by fuel pressure, raises or lowers a plunger to open and close the individual cylinder supply ports simultaneously. A needle valve in the plunger ensures that the plunger fully opens the outlet ports before fuel flow starts, and closes the ports simultaneously for positive engine shut-down. A fine-mesh screen is included in the fuel manifold valve.

11-58. REMOVAL AND INSTALLATION.
a. Disconnect all lines and hoses from the fuel manifold valve.
b. Remove the two crankcase bolts which secure mounting bracket. After removal, bracket may be disassembled from manifold valve if desired.
c. Reverse this procedure to install the fuel manifold valve.

11-59. CLEANING.
a. Remove fuel manifold valve from engine and remove safety wire from cover attaching screws.
b. Hold the top cover down against internal spring until all four cover attaching screws have been removed, then gently lift off the cover. Use care not to damage the spring-loaded diaphragm below cover.
c. Remove the upper spring and lift the diaphragm assembly straight up.

NOTE

If the valve attached to the diaphragm is stuck in the bore of the body, grasp the center nut and rotate and lift at the same time to work gently out of the body.

CAUTION

Do not attempt to remove needle or spring from inside plunger valve. Removal of these items from the valve will disturb the calibration of the valve.

d. Using clean gasoline, flush out the chamber below the screen.
e. Flush above the screen and inside the center bore making sure that outlet passages are open. Use only a gentle stream of compressed air to remove dust and dirt and to dry.

CAUTION

The filter screen is a tight fit in the body and may be damaged if removal is attempted. It should be removed only if a new screen is to be installed.

f. Clean diaphragm and valve and top cover in the same manner. Be sure the vent hole in the top cover is open and clean.
g. Carefully replace diaphragm and valve. Check that valve works freely in body bore.
h. Position diaphragm so that horizontal hole in plunger valve is 90 degrees from the fuel inlet port in the valve body.
i. Place upper spring in position on diaphragm.
j. Place cover in position so that vent hole in cover is 90 degrees from inlet port in valve body. Install cover attaching screws and tighten to 20±1 lb-in. Install safety wire on cover screws.
k. Install fuel manifold valve assembly on engine and reconnect all lines and hoses to valve.
l. Inspect installation and install cowling.

11-60. FUEL DISCHARGE NOZZLES.

11-61. DESCRIPTION. From the fuel manifold valve, individual, identical size and length fuel lines carry metered fuel to the fuel discharge nozzles located in the cylinder heads. The outlet of each nozzle is directed into the intake port of each cylinder. An air bleed, incorporated into each nozzle, aids in vaporizing the fuel by breaking the high vacuum in the intake manifold at idle RPM and keeps the fuel lines filled. The nozzles are calibrated in several ranges All nozzles furnished for one engine are the same range and are identified by a number and a suffix letter stamped on the flat portion of the nozzle body. When replacing a fuel discharge nozzle be sure that it is of the same calibrated range as the rest of the nozzles in the engine. When a complete set of nozzles is being replaced, the number must be the same as the one removed, but the suffix letters may be different, as long as they are the same for all nozzles being installed on a particular engine.

11-62. REMOVAL.

NOTE

Plug or cap all disconnected lines and fittings.

a. Disconnect the fuel injection lines at the fuel discharge nozzles. Remove the nozzles with a 1/2-inch deep socket.

11-63. CLEANING AND INSPECTION. To clean nozzles, immerse in clean solvent and use compressed air to dry them. When cleaning the nozzle with compressed air, direct air through the nozzle in the direction opposite of normal fuel flow. Do not remove the nozzle shield or distort it in any way. Do not use a wire or other metal object to clean the orifice or metering jet. After cleaning, check the shield height from the hex portion of the nozzle. The bottom of the shield should be approximately 1/16 inch above the hex portion of the nozzle.

11-64. INSTALLATION.
a. Install the fuel discharge nozzles in the cylinders using a 1/2-inch deep socket, and tighten nozzle to a torque value of 60 to 80 lb-in.
b. Connect the fuel injection lines at the fuel discharge nozzles.
c. Check installation for crimped lines, loose fittings, etc.

11-65. FUEL INJECTION PUMP.

11-66. DESCRIPTION. The fuel pump is a positive-displacement, rotating vane type, located just forward of number five cylinder at the propeller end of the engine. Fuel enters the pump at the swirl well of the pump vapor separator. Here, vapor is separated by a swirling motion so that only liquid fuel is fed to the pump. The vapor is drawn from the top center of the swirl well by small pressure jet of fuel and is fed into the vapor return line, where it is returned to the aircraft fuel tank or bay. Since the pump is engine-driven, changes in engine speed affect total pump flow proportionally. The pump supplies more fuel than is required by the engine; therefore, a spring-loaded, diaphragm type relief valve is provided, with an adjustable orifice installed in the fuel passage to this relief valve to maintain the desired pressure at the full throttle position. The fuel pump is equipped with a manual mixture control to provide positive mixture control throughout the range required by the injection system. This control limits output of the pump from full rich to idle cutoff. Non-adjustable mechanical stops are located at these positions. A check valve allows the auxiliary fuel pump pressure to bypass the engine-driven fuel pump for starting, or in the event of an engine-driven fuel pump failure.

11-67. REMOVAL AND INSTALLATION.

a. Place fuel shut-off valve in OFF position and remove cowling, baffles, and covers as necessary for access.
b. Disconnect mixture control from lever on pump.
c. Tag and disconnect fuel hoses attached to pump.
d. Remove mounting nuts, and pull pump and gasket from mounting pad.
e. The drive shaft coupling may come off with the fuel pump, or if may remain in the engine. If it comes off with the pump, reinstall it in the engine to prevent dropping or losing it.
f. If a pump is not to be installed for some time, install a cover on the engine pad.
g. Using a new gasket, reverse this procedure to install the fuel pump. Do not force engagement of drive. Rotate engine crankshaft and drive will engage smoothly when aligned properly. Check mixture control rigging.

11-68. ADJUSTMENT.

NOTE

On fuel pumps requiring full throttle fuel pressure calibration and the adjustable orifice is sealed, Continental Aircraft Engine Service Bulletin No. M70-10 must be complied with before calibration can be performed.

a. Remove engine cowling as required for access.
b. Disconnect engine-driven fuel pump hose at the fuel metering unit. Using test hose and fittings, connect test gage pressure port into fuel injection system in accordance with figure 11-9.

NOTE

Cessna Service Kit No. SK320-2J provides a special indicator, lines, and instructions for connecting the indicator into the system to perform accurate calibration of the engine-driven fuel pump.

c. Allow engine to warm-up. Set mixture control full rich and propeller control full forward (low pitch high RPM).
d. Idle engine at 600 RPM and check fuel pressure on special indicator per paragraph 11-12.

WARNING

DO NOT make fuel pump pressure adjustments while engine is operating.

e. If pressure is not within prescribed tolerances, stop engine and adjust pressure by turning the screw on the fuel pump relief valve (turn IN to increase pressure and OUT to decrease pressure) to attain correct pressure and repeat steps "c" and "d".

NOTE

After adjusting fuel pressure, idle speed and idle mixture must be readjusted (refer to paragraph 11-55).

f. Advance throttle to obtain maximum RPM and check fuel pressure on special indicator per paragraph 11-12.

WARNING

DO NOT make fuel pump pressure adjustments while engine is operating.

g. If pressure is not within prescribed tolerances, (paragraph 11-12) on the adjustable orifice pump; stop engine and adjust pressure by loosening locknut and turning the slotheaded needle valve located just below the fuel pump inlet fitting (turn clockwise to increase pressure and counterclockwise to decrease pressure) to attain the correct pressure and repeat steps "c and d".
h. After correct pressure is obtained, safety adjustable orifice locknut and remove test equipment.
i. Install cowling.

NOTE

When a problem exists with respect to non-repeatability or drifting of fuel pressures, fuel flows, or idle mixtures, refer to Continental Aircraft Engine Service Bulletin #76-11 and all revisions thereto.

11-69. AUXILIARY ELECTRIC FUEL PUMP FLOW RATE ADJUSTMENT. (Refer to Section 12.)

11-70. INDUCTION AIR SYSTEM.

11-71. DESCRIPTION. Induction air enters the cylindrical air filter and flows through the airbox, through the air throttle body, into the intake manifolds. The complete air induction system, including the intake manifolds, is located on the top side of the engine. The alternate air source is automatic. If the air filter should become clogged, suction from the engine intake will open a spring-loaded door. This permits the induction air to be drawn from within the engine compartment.

11-72. REMOVAL AND INSTALLATION.

a. Remove and install the air filter as follows:

1. Cut safety wire and loosen wing nut at outer end of filter.
2. Remove element for cleaning or replacement. Refer to Section 2 for servicing.
3. Do not over-tighten wing nut when installing but be sure to resafety.

b. Remove and install the induction airbox as follows:

1. Disconnect alternate air duct.
2. Disconnect lever return spring.
3. Remove four bolts and nuts securing airbox to air throttle body, and remove airbox. Lay parts of the throttle-operated microswitch to one side. Note any other parts secured by these bolts.
4. Reverse this procedure to install airbox, using new gasket. Check rigging of throttle-operated microswitch.

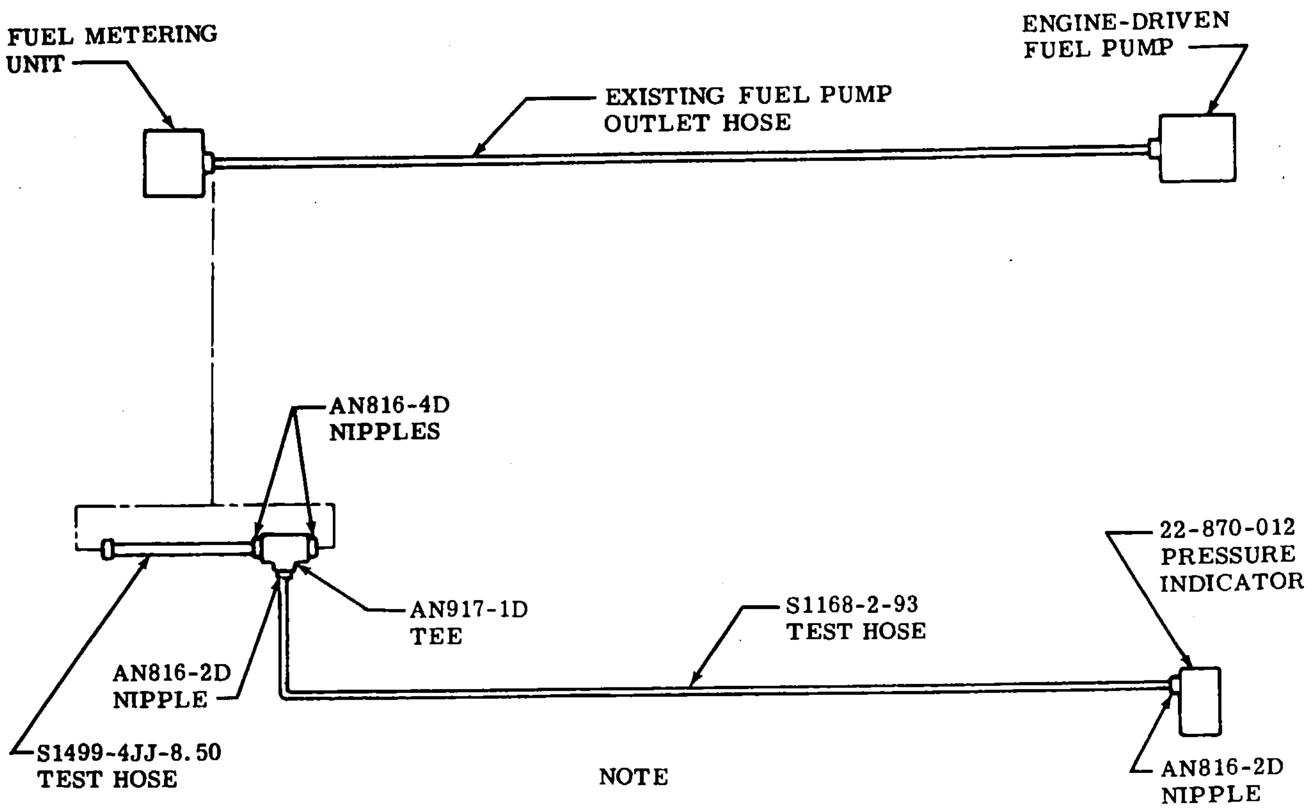
NOTE

The air throttle body is a part of the fuel-air control unit, which is included in the fuel injection system discussed later.

c. Removal of various intake manifold sections is accomplished by loosening hose clamps, sliding hoses back, and removing nuts attaching those segments which are secured to engine cylinders. Disconnect any lines or hoses interfering with removal. Reverse this procedure to install the intake manifold.

11-73. IGNITION SYSTEM.

11-74. DESCRIPTION. The ignition system is comprised of two magnetos, 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.



NOTE

WHEN ADJUSTING THE UNMETERED FUEL PRESSURE, THE TEST EQUIPMENT MAY BE "TEED" INTO THE ENGINE-DRIVEN FUEL PUMP OUTLET PRESSURE HOSE AT THE FUEL PUMP OR AT THE FUEL METERING UNIT.

Figure 11-9. Test Harness Fuel Injection Pump Adjustment

11-75. 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 couplings.	Impulse coupling pawls should engage at cranking speeds. Listen for loud clicks as impulse couplings operate. Remove magnetos and determine cause. Replace defective parts.
	Defective magneto.	Refer to paragraph 11-81 or 11-88.
	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.
ENGINE WILL NOT IDLE OR RUN PROPERLY.	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.
	Defective magneto.	Refer to paragraph 11-81 or 11-88.
	Impulse coupling pawls remain engaged.	Pawls should never engage above 450 RPM. Listen for loud clicks as impulse coupling operates. Remove magneto and determine cause. Replace defective parts.
	Spark plugs loose.	Check and install properly.

11-76. MAGNETO'S (THRU R1723199 & FR1720655)

11-77. DESCRIPTION. Two Bendix Scintilla, S6LN-25 magnitos, equiped with impulse couplings are used on this engine. The magnitos contain a conventional two-pole rotating magnet (rotor) mounted in ball bearings. Engine-driven at one end, the rotor shaft operates breaker contact points at the other end. A gear on the rotor shaft drives a distributor gear which transfers high-tension current from the coil to the proper outlet in the distributor block. A breaker compartment is located at the opposite end of the drive end, and a capacitor is provided in this breaker compartment, next to the breaker contact points.

11-78. REMOVAL. Access to the breaker compartment is gained by removing the breaker compartment cover at the back end of the magneto. To remove the magneto from the engine, proceed as follows:

a. Remove cowling as necessary for access.
b. Remove high-tension outlet plate, and disconnect magneto "P" lead.
c. Disconnect any noise filters used with radio installations.
d. Note the approximate angular position at which the magneto is installed, then remove magneto mounting clamps.

NOTE

Never remove the screws fastening the two halves of the magneto together. Separating the halves would disengage distributor gears, causing loss of internal timing and necessitating complete removal and internal retiming.

11-79. INTERNAL TIMING. (Bendix Scintilla Magnetos.) The following information gives instructions for adjusting breaker contacts to open at the proper position. It is assumed that the magneto has not been disassembled, and that the distributor gear, rotor gear and cam have been assembled for correct meshing of gears and direction of rotation. Magneto overhaul, including separating the two major sections of the magneto, is not covered in this manual. Refer to applicable Bendix publications for disassembly and overhaul.

a. Fabricate a timing template as follows:
   1. Cut a paper template from figure 11-12.
   2. Cement paper template to a thin piece of metal for use as a support plate, then trim the plate to the shape of the paper template.
   3. Drill the two mounting holes with a No. 18 drill.
b. Fabricate a timing pointer as shown in figure 11-10.
c. Remove magneto from engine per paragraph 11-78, remove breaker compartment cover, and remove timing inspection plug from top of magneto.
d. Attach timing template to breaker compartment as shown in figure 11-11, using 8-32 screws 1/4 inch long.
e. Turn rotating magnet in its direction of rotation until the painted chamfered tooth on distributor gear is approximately in the center of inspection window, then turn rotating magnet back until it locates in its magnetic neutral position.

NOTE

Impulse coupling pawls must be depressed to turn rotating magnet in its normal direction of rotation.

f. Remove cam screw, lockwasher, and washer, and use cam screw to install timing pointer so it indexes with 0° mark on template, while rotating magnet is still in its magnetic neutral position.
g. Turn rotating magnet in proper direction of rotation until pointer indexes with 10° mark ("E" gap). Using a 11-9110 timing light or equivalent, adjust breaker contacts to open at this point.
h. Turn rotating magnet until cam follower is on high part of cam lobe, and measure clearance between breaker contacts. Clearance must be .018± .006 inch. If clearance is not within these limits, readjust breaker contacts until they are within tolerance, then recheck the 10° ("E" gap) position. Tolerance on the "E" gap position is ± 4°. Replace breaker assembly if "E" gap and contact clearance will not both fall within the specified tolerances.
i. Remove timing pointer and timing template, and install cam screw, lockwasher, and washer.
j. Install magneto and time to engine in accordance with paragraph 11-80.

11-80. INSTALLATION AND TIMING TO ENGINE.

a. Turn propeller in normal direction of rotation until No. 1 cylinder is 20° BTC on compression stroke, the correct firing position.

NOTE

A plugged hole, through which timing marks on a crankshaft counterweight hanger are visible, is provided to facilitate timing. This hole is located under a brass, hex-head plug on the upper left side of the engine, above No. 2 cylinder. Marks are scribed from 24° BTC to 16° BTC, plus a mark for top center (TC). Reference for the marks is the centerline of the hole. Determine compression stroke by placing thumb over spark plug hole.

b. Turn magneto backwards (so impulse coupling pawls will not engage) until painted chamfered tooth is approximately in center of timing window. Be sure magneto gasket is in place, then install magneto approximately at the angle noted during removal. Tighten mounting clamps enough to hold magneto in place, but loose enough to permit magneto to be rotated in its clamps.

c. Using a timing light connected across the breaker contacts, rotate magneto case in normal direction of cam rotation until contacts have just closed, then rotate in the opposite direction until timing light indicates position at which contacts break. Secure magneto.

d. Turn propeller back a few degrees (approximately 5°) to close contacts.

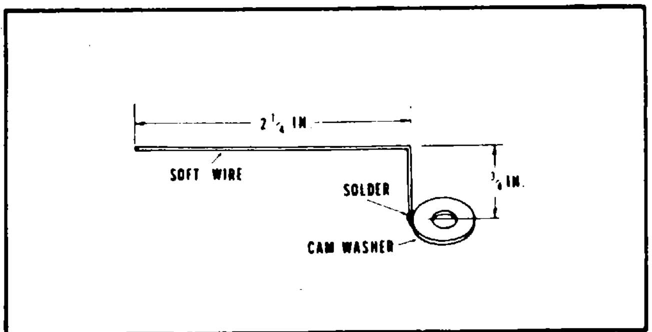


Figure 11-10. Timing Pointer

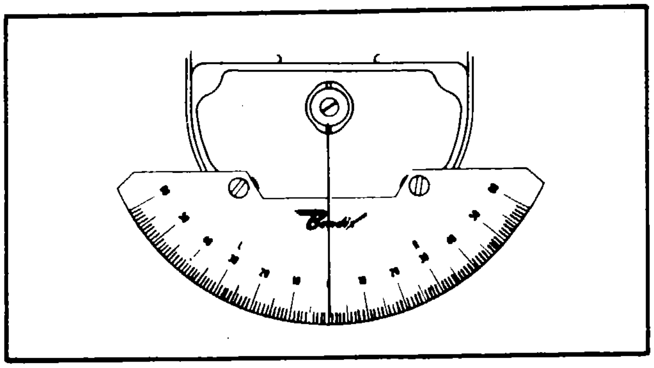


Figure 11-11. Template and Pointer Attached

NOTE

Do not turn propeller back far enough to engage impulse coupling, or propeller will have to be turned in normal direction of rotation until impulse coupling releases, then again backed up to a few degrees before the firing position.

e. Slowly advance propeller (tap forward with minute movements as firing position is approached) in normal direction of rotation until timing light indicates position at which contacts break. The contacts should break at the advance firing position of No. 1 cylinder listed in step "a." Rotate magneto case to make contacts break at correct position.

CAUTION

Do not adjust contacts to compensate for incorrect magneto-to-engine timing. Breaker contact adjustment is for internal timing only, and any readjustment after internal timing has been accomplished will result in a weaker spark, with reduced engine performance.

f. After tightening magneto mounting clamps and rechecking magneto-to-engine timing, remove timing equipment. Install and connect any spark plugs that were removed.

g. Install timing inspection plug, breaker compartment cover, any noise filters that were removed, and magneto "P" lead.

h. Install high-tension outlet plate.

NOTE

The No. 1 magneto outlet is identified with the number "1." The magneto fires at each successive outlet in direction of rotation. No. 1 magneto outlet routes to No. 1 cylinder, No. 2 magneto outlet to the next cylinder to fire, etc. Cylinder firing order is 1-6-3-2-5-4.

i. Reinstall cowling removed for access.

11-81. MAINTENANCE. (Bendix Scintilla Magnetos.) At the first 25-hour inspection and at each 100-hour inspection thereafter, the breaker compartment should be inspected. Magneto-to-engine timing should be checked at each 100-hour inspection. If timing is 20° (plus zero, minus 2°), internal timing need not be checked. If timing is out of tolerance, remove magneto and set internal timing, then reinstall and time to the engine.

NOTE

If ignition trouble should develop, spark plugs and ignition wiring should be checked first. If the trouble appears definitely to be associated with a magneto, the following may be used to help disclose the source of trouble without overhauling the magneto.

a. Moisture Check.

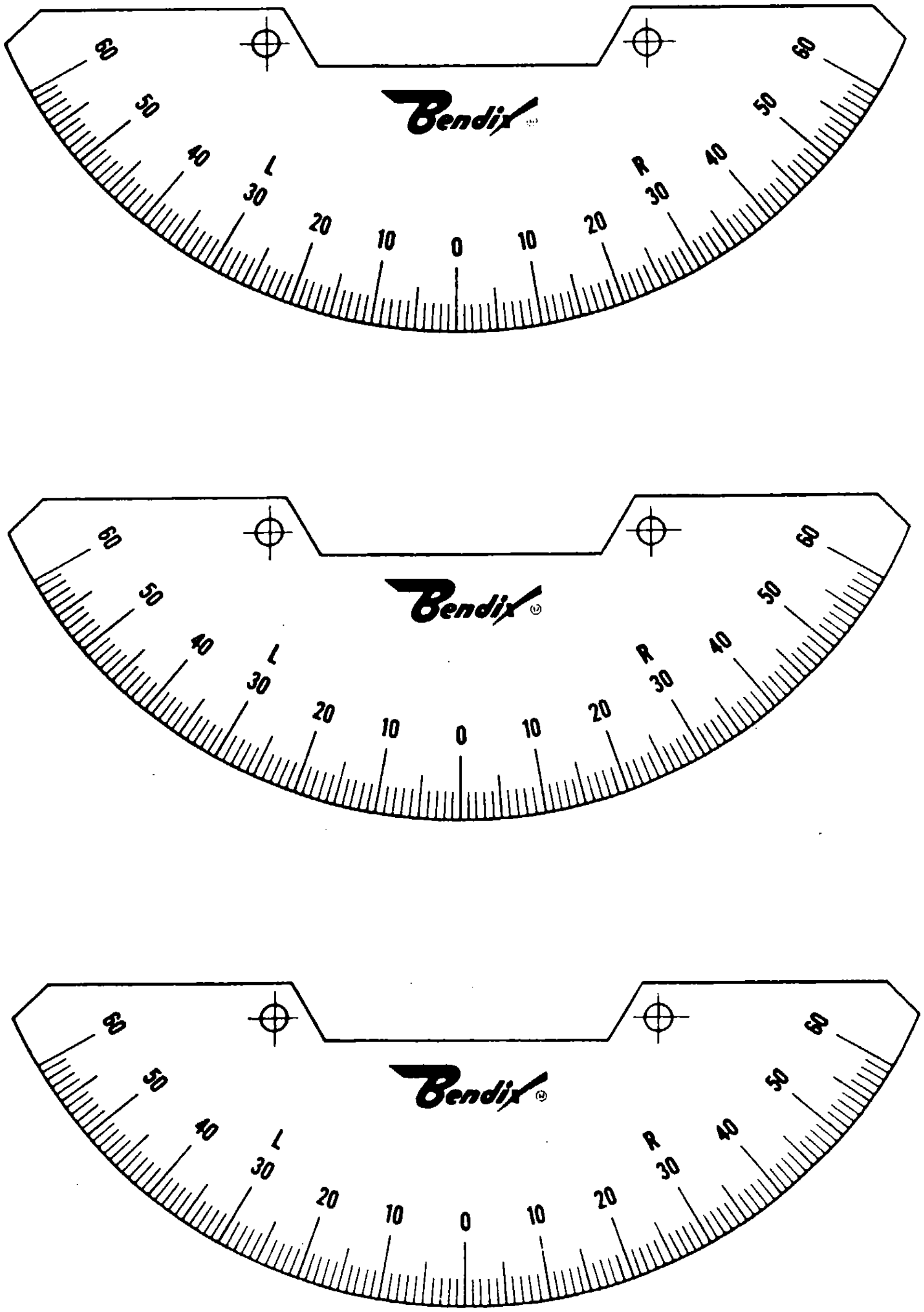
1. Remove the high-tension outlet plate, cables, and grommet, and inspect for moisture.
2. Inspect distributor block high-tension outlet side for moisture.
3. If any moisture is evident, lightly wipe with a soft, dry, clean, lint-free cloth.

CAUTION

Do not use gasoline or other solvents, as these will remove the wax coating on some parts and could cause electrical leakage.

b. Breaker Compartment Check.

1. Remove breaker cover.
2. Check all parts of the breaker assembly for security.



CAUTION

TO REPRODUCE THIS TEMPLATE FROM AEROFICHE TO CORRECT SCALE ON PAPER, READER/PRINTER LENS MUST BE 42X MAGNIFICATION.

Figure 11-12. Templates For Timing Bendix Magnetos

3. Check breaker contacts for excessive wear, burning, deep pits, and carbon deposits. Contacts may be cleaned with a hard-finish paper. Replace defective breaker assemblies. Make no attempt to stone or dress contacts. Clean new contacts with clear, unleaded gasoline and hard-finish paper before installing.

4. Check cam follower oiling felt. If it appears dry, re-oil with 2 or 3 drops of lubricant (Scintilla 10-86527, or equivalent). Allow about 30 minutes for the felt to absorb the oil, then blot off excess with a clean cloth. Too much oil may result in fouling and excessive burning of contacts.

5. Check that the condenser mounting bracket is not cracked or loose. If equipment is available, check condenser for a minimum capacitance of .30 microfarads. If equipment for testing is not available and a defective condenser is suspected, replace with a new one.

c. If the trouble has not been corrected after accomplishing steps "a" and "b," check magneto-to-engine timing. If timing is not within prescribed tolerance, remove magneto and set internal timing, then reinstall and time to the engine.

d. If the trouble has still not been corrected, magneto overhaul or replacement is indicated.

11-82. MAGNETO CHECK. Advanced timing settings in some cases, is the result of the erroneous practice of bumping magnetos up in timing in order to reduce RPM drop on single ignition. NEVER ADVANCE TIMING BEYOND SPECIFICATIONS IN ORDER TO REDUCE RPM DROP. Too much importance is being attached to RPM drop on single ignition. RPM drop on single ignition is a natural characteristic of dual ignition design. The purpose of the following magneto check is to determine that all cylinders are firing. If all cylinders are not firing, the engine will run extremely rough and cause for investigation will be quite apparent. The amount of RPM drop is not necessarily significant and will be influenced by ambient air temperature, humidity, airport altitude, etc. In fact, absence of RPM drop should be cause for suspicion that the magneto timing has been bumped up and is set in advance of the setting specified. Magneto checks should be performed on a comparative basis between individual right and left magneto performance.

a. Start and run engine until the oil and cylinder head temperature is in the normal operating range.

b. Place the propeller control in the full low pitch (high RPM) position.

c. Advance engine speed to 1800 RPM.

d. 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.

e. Turn the switch to the "L" position and note the RPM drop, then return the switch to the "BOTH" position.

f. The RPM drop should not exceed 150 RPM on either magneto or show greater than 50 RPM differential between magnetos. 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 a 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.

11-83. MAGNETO'S (BEGINNING WITH R1723200 & FR1720656)

11-84. DESCRIPTION. Two Slick 6214 Magnitos, equiped with impulse couplings are used on this engine. The magnitos incorporate an integral feed-thru capacitor and require no external noise filter in the ground lead. The direction of rotation of the magnito shafts, viewed from the anti-propeller end of engine, is clockwise. Refer to Slick 4200/6200 Series Aircraft Magnetos Maintenance and Overhaul Instructions Bulletin, and all revisions and supplements thereto, for a detailed description, disassembly and reassembly of the magneto.

11-85. REMOVAL.

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 the magneto or the spark plugs.

a. Remove engine cowling in accordance with paragraph 11-3.

b. Remove 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 advance firing position before removing the magneto.

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.

11-86. INTERNAL TIMING. (MAGNETO REMOVED FROM ENGINE.) Refer to Slick 4200/6200 Series Aircraft Magnetos Maintenance and Overhaul Instructions Bulletin, and all revisions and supplements thereto, for internal timing instructions.

11-87. INSTALLATION AND TIMING TO ENGINE. After 100 hours of operation and every 100 hours thereafter. or at annual inspection, whichever comes first, the magneto-to-engine timing should be checked. This is accomplished in the following manner:

a. Reverse the removal steps for reinstallation.

NOTE

Magneto (primary) lead nut torque range is 13-15 inch-pounds. Exceeding this torque range could result in possible condenser damage.

WARNING

Be sure switch is in "OFF" position and the "P" lead is grounded.

b. Turn the engine crankshaft in the normal direction of rotation until the No. 1 cylinder is in the full-advance firing position, following the engine manufacturer's procedure for timing of magnetos.

c. Loosen the magneto mounting bolts, and connect a standard timing light between engine ground and the magneto condenser terminal.

NOTE

Switch must be "ON".

c. Rotate the complete magneto opposite normal rotation of the magneto on the engine mounting, until the timing light indicates the contact breaker points are just opening. Secure the magneto in this position.

WARNING

During all magneto maintenance, always take proper precautions to make sure the engine can not fire or start when the propeller is moved. TURN SWITCH "OFF".

11-88. DISASSEMBLY, INSPECTION, AND REASSEMBLY. Refer to Slick 4200/6200 Series Aircraft Magnitos Maintenance and Overhaul Instructions.

11-89. MAGNETO CHECK. Refer to paragraph 11-82.

11-90. SPARK PLUGS. Two 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 service 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. At each inspection, remove, clean, inspect and regap all plugs. 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.

11-91. ENGINE CONTROLS.

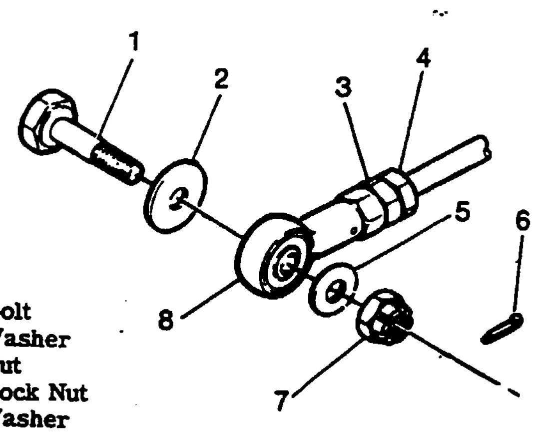
11-92. DESCRIPTION. The throttle, mixture and propeller controls are of the push-pull type. The propeller and mixture controls are equipped to lock in any position desired. To move the control, the spring-loaded button, located in the end of the control knob, must be depressed. When the button is released, the control is locked. The propeller and mixture controls also have a vernier adjustment. Turning the control 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. An additional "Palnut" type lockout is installed in back of the locknut at the engine end of the throttle, mixture and

SHOP NOTES:

propeller controls. Beginning with Serials R1722930 & on and FR17200631 & on, the throttle, mixture, and propeller control cable ends that utilize a ball bearing -type rod end, are secured to the engine with a pre-drilled AN bolt, washers, castellated nut, and a cotter pin. (See figure 11-13.)

NOTE

Steel AN bolts with an undrilled shank are identified with an "A" suffix (AN3-6A). A steel bolt of the same size, with the shank drilled for castellated nut and cotter pin, is identified as -- AN3-6. Aluminum AN bolts are not to be used in this application.



1. Bolt
2. Washer
3. Nut
4. Lock Nut
5. Washer
6. Cotter Pin
7. Castellated Nut
8. Rod End Bearing

Figure 11-13. Control Cable End (Typical).

11-93. RIGGING. When adjusting any engine control, it is important to check that the control slides smoothly throughout its full travel, that it locks securely and the arm or lever which it operates moves through its full arc of travel. Throttle and mixture control arms at their corresponding engine components may be re-positioned on ther shafts if necessary. Make sure the countersunk side of the arm faces the serrated portion of its shaft. If throttle arm is repositioned, check rigging of throttle-operated cam and microswitch.

CAUTION

Whenever a fuel pump arm or fuel-air control unit arm is removed or installed, always use a wrench at the wrench pads on the arm when removing or installing attaching nut. This will prevent twisting the shaft or other damage which might be caused.

11-94. THROTTLE CONTROL. (See figure 11-14.)

NOTE

Before rigging throttle control, check that clamping sleeve (13) is secure. If any indication of looseness or breakage is apparent, replace throttle control.

a. Screw friction lock nut (2) into threads of barrel (7).
b. Ensure washer (5) is installed, and nut (8) on forward side of panel is secured against washer.
c. Disconnect the throttle control at the engine.
d. Push knob assembly (1) full in against friction lock nut (2), then pull knob assembly out approximately 1/8-inch to obtain "cushion."
e. Tighten friction lock nut (2) against barrel (7), being careful not to change the position of the throttle.
f. Move the throttle arm on the fuel-air control unit to full open.

NOTE

Ensure palnut (17) and locknut (4) are on threads of plunger (18) before installing rod end (16).

g. Adjust end of control to fit, and connect to throttle arm on fuel-air control unit.

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.

h. Check clamping sleeve (13) in bracket (12) and clamp (15).
i. Loosen friction lock nut (2).
j. Pull knob assembly full out and check that idle stop on carburetor is contacted.
k. Push knob assembly full in and check that full power stop on carburetor is contacted.
l. Check that throttle has maintained the approximate 1/8-inch "cushion" set in step "c".
m. Work throttle control in and out several times to check for binding.

NOTE

Refer to the inspection chart in Section 2 for inspection, lubrication, and/or replacement interval for the throttle control.

11-95. MIXTURE CONTROL.

NOTE

When checking mixture control rigging see that the arm on the fuel injection pump contacts the mechanical stops in both directions, that the mixture control has approximately 1/8 inch cushion at the instrument

1. Knob Assembly
2. Friction Lock Nut
3. Locking Collet
4. Instrument Panel
5. Washer
6. Nut
7. Barrel
8. Core
9. Casing
10. Clamping Sleeve
11. Firewall
12. Bracket
13. Clamping Sleeve
14. Packing
15. Clamp
16. Rod End
17. Palnut
18. Plunger
19. Plunger Seal
20. Plunger Guide

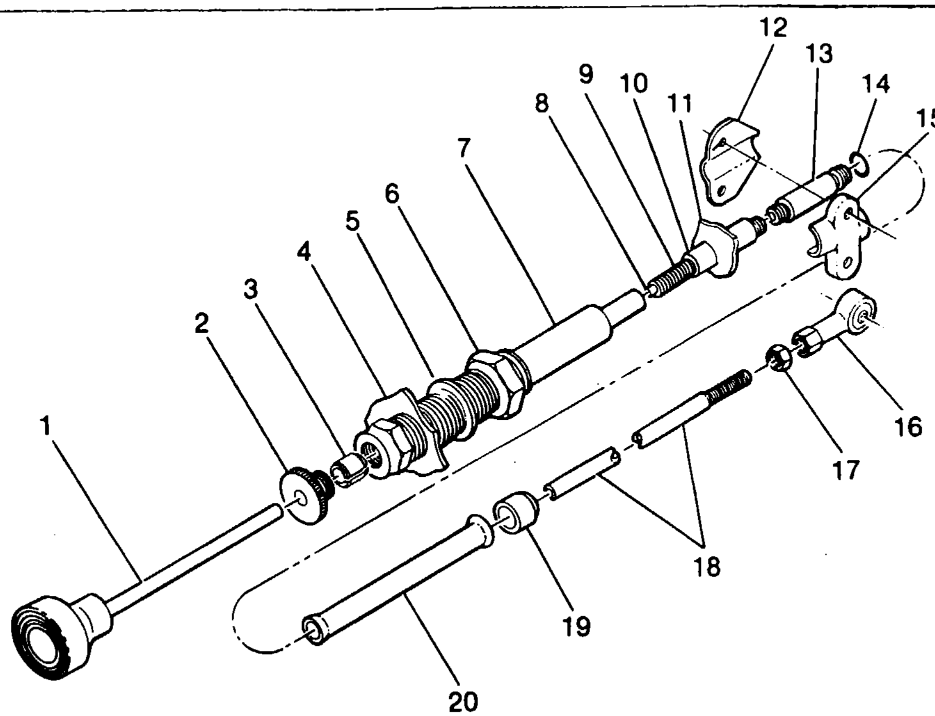


Figure 11-14. Throttle Control.

panel, and that the small retaining ring contacts the end of the control housing at the same time that the idle cut-off stop is reached.

a. Disconnect mixture control rod end from arm on fuel injection pump.

CAUTION

The mixture control has a small retaining ring brazed (or attached with epoxy resin) near the threaded end (engine end of control) of the control. The purpose of this retaining ring is to prevent inadvertent withdrawal and possible damage to the knob end of the control while jam nuts and rod end are removed.

b. Pull mixture control full out until retaining ring contacts control housing.
c. Move mixture control arm to idle cut-off. With arm against stop, adjust rod end to align with arm, and connect in this position.
d. Push mixture control full forward and check that when the full rich stop is reached, there is approximately 1/8 inch cushion at the instrument panel.

After rigging is completed, be sure that the idle cut-off stop is reached at the same time that the retaining ring contacts the mixture control housing and that the full rich stop is reached with the proper amount of cushion. Tighten jam nuts to secure the rod end. Be sure the threaded end of the rod extends into the rod end far enough. An inspection hole is provided in the rod end for checking purposes.

NOTE

Refer to the inspection chart in Section 2 for inspection and/or replacement interval for the mixture control.

11-96. PROPELLER GOVERNOR CONTROL. (Refer to Section 13.)

11-97. RIGGING THROTTLE-OPERATED MICRO-SWITCH. (Refer to Section 12.)

11-98. EXHAUST SYSTEM.

11-99. DESCRIPTION. The exhaust system consists of two exhaust stack assemblies, one for the left and one for the 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 pipe forming an exhaust stack assembly. Each exhaust stack assembly connects to the muffler assembly beneath the engine. The muffler assembly is enclosed in a shroud which captures exhaust heat that is used to heat the airplane cabin. The tailpipe is welded to the muffler.

11-100. ECONOMY MIXTURE INDICATOR (EGT). (Refer to Section 15.)

11-101. REMOVAL.

a. Remove engine cowling for access.
b. If installed, remove exhaust gas temperature probes or disconnect leads. (See figure 11-15.)
c. Disconnect ducts from heater shroud on muffler 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.

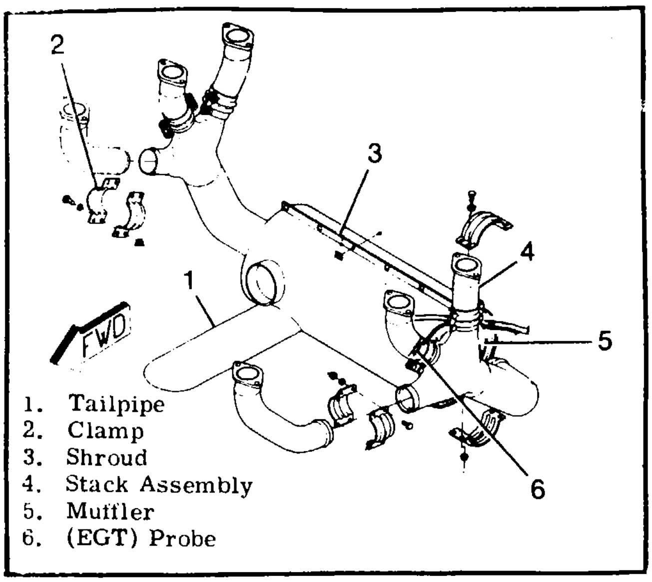


Figure 11-15. Exhaust System.

11-102. INSPECTION.

NOTE

Refer to the inspection chart in Section 2 for exhaust system inspection interval.

The exhaust system must be thoroughly inspected, especially the heat exchange section of the muffler. Any time exhaust fumes are detected in the cabin, an immediate inspection must be performed. All components that show cracks and general deterioration must be replaced with new parts. The 100 hour inspection is as follows:

a. Remove engine cowling in accordance with paragraph 11-3.
b. Loosen or remove shrouds so that ALL surfaces of the exhaust system are visible.
c. Check for holes, cracks and burned spots. Especially check the areas adjacent to welds. Look for exhaust gas deposits in surrounding areas which indicate an exhaust leak.
d. Where a surface is not accessible for visual inspection or for a positive test, proceed as follows:
   1. Remove exhaust pipes and muffler.
   2. Remove shrouds.
   3. Seal openings with expansion rubber plugs.
   4. Using a manometer or gage, apply approximately 3 ± 1/2 psi (6 inches of mercury) air pressure while the unit is submerged in water. Any leaks will appear as bubbles and can be readily detected.
   5. It is recommended that any components found defective be replaced with new parts before the next flight.
   6. If no defects are found, remove plugs and dry components with compressed air.
e. Install the exhaust system and engine cowling.

11-103. INSTALLATION.

NOTE

Use new gaskets between riser and mounting pad on cylinder, regardless of apparent condition of those removed. Install the exhaust flange gasket with raised bead toward exhaust port on engine.

a. Place all sections of the assembly in position and join together loosely with attaching clamps.
b. Tighten nuts securing risers to cylinders first; then tighten all clamps joining sections together.
c. Torque exhaust stack nuts at cylinders to 100-110 pound-inches.
d. Install engine cowling.
e. Check for adequate clearance where tailpipe emerges through the cowling.

11-104. STARTING SYSTEM.

11-105. DESCRIPTION. An electric starter motor, mounted on a 90 degree starter adapter, is provided as an integral part of the engine. A starter solenoid is activated by the ignition switch on the instrument panel. When the starter solenoid is actuated, its contacts close and electrical current energizes the starter motor. Initial rotation of the starter motor engages the starter through an overrunning clutch in the starter adapter, which incorporates worm reduction gears. The starter motor is located just aft of the right rear cylinder.

11-106. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
STARTER WILL NOT OPERATE.	Defective master switch or circuit.	Check continuity. Install new switch or wires.
	Defective starter switch or switch circuit.	Check continuity. Install new switch or wires.
	Defective starter motor.	Check voltage to starter. Repair or replace starter motor.
STARTER MOTOR RUNS, BUT DOES NOT TURN CRANK-SHAFT.	Defective overrunning clutch or drive.	Remove starter and inspect. Install new starter adapter.
	Starter motor shaft broken.	Install new starter motor.
STARTER MOTOR DRAGS.	Low battery.	Charge or install new battery.
	Starter switch or relay contacts burned or dirty.	Check continuity. Install serviceable unit.
	Defective starter motor power cable.	Check visually. Install new cable.
	Loose or dirty connections.	Check visually. 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.
	Dirty or worn commutator.	Check visually. Clean and turn commutator.
STARTER EXCESSIVELY NOISY.	Worn starter pinion.	Remove starter and inspect. Replace starter drive.
	Worn or broken teeth on crankshaft gears.	Check visually. Replace crankshaft gear.

11-107. PRIMARY MAINTENANCE. The starter circuit should be inspected at regular intervals, the frequency of which should be determined by the amount of 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 or No. 000 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 slowly in direction of normal rotation. Clean sanding dust from motor after seating brushes.

11-108. STARTER MOTOR

11-109. REMOVAL AND INSTALLATION.

CAUTION

When disconnecting on connecting the starter cable do not permit starter terminal bolt to rotate. Rotation of the terminal bolt could break the conductor between terminal bolt and field coils causing the starter to be inoperative.

a. Disconnect electrical cable from starter motor. Insulate cable terminal as a safety precaution.
b. Remove two sets of nuts and washers securing motor to the starter adapter and pull motor from mounting pad.
c. To install the starter motor, reverse the preceding steps. Install a new O-ring on the starter, then install to starter motor, be sure that starter motor drive engages drive in the starter adapter.

11-110. EXTREME WEATHER MAINTENANCE.

NOTE

Refer to the appropriate Pilot's Operating Handbook for approved starting procedures.

11-111. COLD WEATHER. Cold weather starting is made easier by the installation of the manually-operated engine primer system. Fuel is supplied by a line from the fuel strainer to the plunger type primer. Operating the primer forces fuel to the forward end of each engine intake manifold. This primes the entire length of each intake manifold for each bank of cylinders. Primer lines should be replaced when crushed or broken, and should be properly clamped to prevent vibration and chafing. 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 pre-heated. Cover the engine to prevent ice or snow from collecting inside the cowling. When preparing the aircraft for flight or engine run-up after these conditions have been followed, preheat the drained oil. After pre-heating the oil, gasoline may be mixed with the oil in a ratio of 1 part gasoline to 12 parts oil before pouring into the engine oil sump. If the free air temperature is below -29°C (-20°F), the engine compartment should be preheated by a ground heater. After the engine compartment has been preheated, inspect all engine compartment drain and vent lines for presence of ice. After this procedure has been followed, pull the propeller through several revolutions by hand before starting the engine.

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.

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 pump. Small deposits may actually enter the oil pump 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 oil change. This will prevent the accumulation of the sludge and carbon deposits.

11-112. DUSTY CONDITIONS. Dust inducted into the intake system of the engine is probably the greatest single cause of early engine wear. When operating under high dust conditions, service the induction air filter daily as outlined in Section 2. Also, change engine oil and lubricate the airframe more often than specified.

11-113. SEACOAST AND HUMID AREAS. In salt water areas, special care should be taken to keep the engine and accessories clean to prevent oxidation. In humid areas, fuel and oil should be checked frequently and drained of condensed moisture.

SECTION 12

FUEL SYSTEM

TABLE OF CONTENTS — Page No. Aerofiche/Manual

12-1. FUEL SYSTEM. The fuel system as covered in this manual includes all components up to and including the line (inlet) to the engine driven fuel pump. The fuel pump and the fuel injection system are not covered, because they are considered engine accessories, therefore, are covered in the Engine Section.

12-2. DESCRIPTION. These aircraft are equipped with either a standard fuel system, an optional long-range fuel system, or beginning with Serials R1722930 and FR1720631, an optional extended range "Wet Wing" system. The standard and long range systems are essentially the same, differing mainly in fuel tank capacity. The extended range system consists of an integral fuel bay in the inboard end of each wing. Fuel flows by gravity from two aluminum tanks (one per wing) in the standard and long-range systems, and from an integral fuel bay area in each wing in the extended range system, through a three-position fuel selector valve, fuel reservoir tank, fuel shutoff valve, auxiliary fuel pump, fuel strainer, engine-driven fuel pump and mixture unit, to a fuel/air control unit, which directs the flow to the engine fuel manifold and fuel flow indicator. Depending upon selector valve handle position, fuel is directed from either or both tanks or bays to the engine through other components of the system. Positive ventilation for all three systems is provided by a vent line and check valve assembly located in the left wing tank/bay, a cross-over vent line connecting the two tanks/bays together, and a vented cap on the right hand tank/bay. The vent line from the check valve assembly extends overboard thru the lower wing skin adjacent to the left wing strut. The reservoir tank has a vapor return line from the engine and a vent line connected to the tank crossover line.

12-3. PRECAUTIONS. Common sense and certain general precautions should be observed when performing maintenance on the fuel and associated systems. Some of these are as follows:

a. Always GROUND aircraft to a suitable ground stake to prevent electrostatic build-up.

b. Eliminate accumulation of residual fuel spills and drainage by using proper drip pans and good housekeeping practices.

c. Prevent damage to fittings and entry of foreign materials by covering or capping all open or disconnected lines, fittings, and connectors.

NOTE

Throughout the aircraft fuel system from the fuel tanks to the engine-driven fuel pump, 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 lubricant or to seal a leaking connection. Apply sparingly to male threads only, omitting the first two threads, exercising extreme care 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. Throughout the fuel injection system, from the engine-driven fuel pump through the discharge nozzles, use only a fuel-soluble lubricant, such as engine oil, on fitting threads. Do not use any other form of thread compound on the injection system.

12-4. TROUBLE SHOOTING.

NOTE

Use this trouble shooting chart in conjunction with the engine and fuel-injection trouble shooting charts in Section 11.

TROUBLE	PROBABLE CAUSE	REMEDY
NO FUEL FLOW TO ENGINE-DRIVEN FUEL PUMP.	Fuel shut-off valve control not pushed in.	Push shut-off valve in.
	Fuel tanks or bays empty.	Service with proper grade and amount of fuel.
	Fuel line disconnected or broken.	Connect or repair fuel lines.
	Fuel tank or bay outlet screen plugged.	Remove and clean screen and flush out fuel tank or bay.
	Defective fuel shut-off valve or selector valve.	Remove and repair or replace valves.
	Plugged fuel strainer.	Clean strainer and screen.
	Defective electric fuel pump.	Repair or replace fuel pump.
	Fuel line plugged.	Clean out or replace fuel line.
FUEL STARVATION AFTER STARTING.	Partial fuel flow from the preceding causes.	Use the preceding remedies.
	Malfunction of engine-driven fuel pump or fuel injection system.	Refer to Section 11.
	Fuel vent plugged.	Refer to paragraph 12-11.
	Water in fuel.	Drain fuel tank or bay sumps, fuel lines and fuel strainer.
NO FUEL FLOW WHEN ELECTRIC PUMP IS OPERATED.	Defective fuel pump switch.	Replace defective switch.
	Defective throttle switch.	Replace defective switch.
	Open or defective circuit breaker.	Reset. Replace if defective.

12-4. TROUBLE SHOOTING. (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
NO FUEL FLOW WHEN ELECTRIC PUMP IS OPERATED. (CONT.)	Loose connections or open circuit.	Tighten connections; repair or replace wiring.
	Defective electric fuel pump.	Replace defective pump.
	Defective engine-driven fuel pump by-pass or defective fuel injection system.	Refer to Section 11.
PRESSURIZED FUEL TANKS OR BAYS.	Plugged bleed hole in vent valve.	Refer to paragraph 12-11.
NO FUEL QUANTITY INDICATION.	Fuel tanks or bays empty.	Service with proper grade and amount of fuel.
	Circuit breaker open or defective.	Reset. Replace if defective.
	Loose connections or open circuit.	Tighten connections; repair or replace wiring.
	Defective fuel quantity indicator.	Refer to Section 15.

SHOP NOTES:

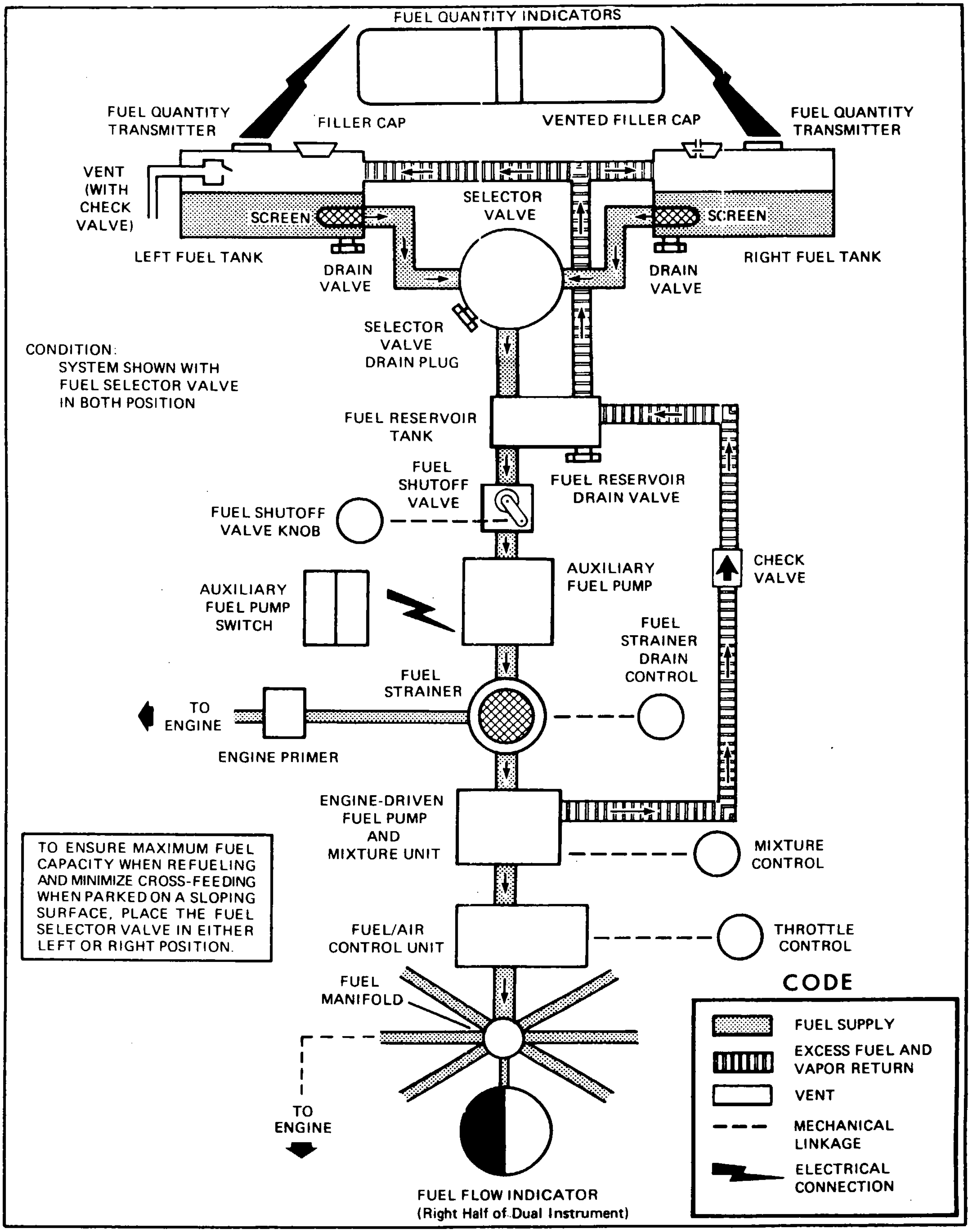
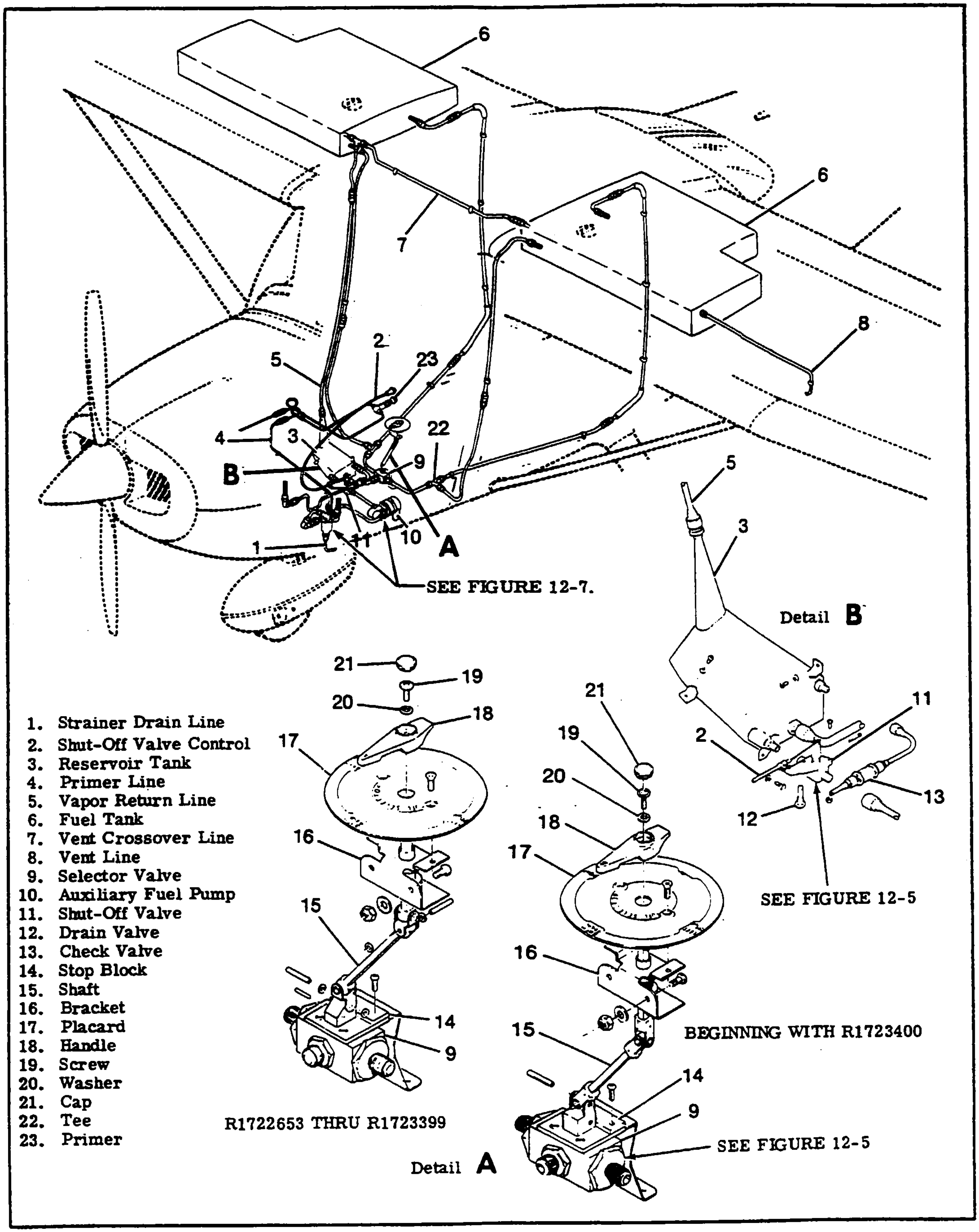
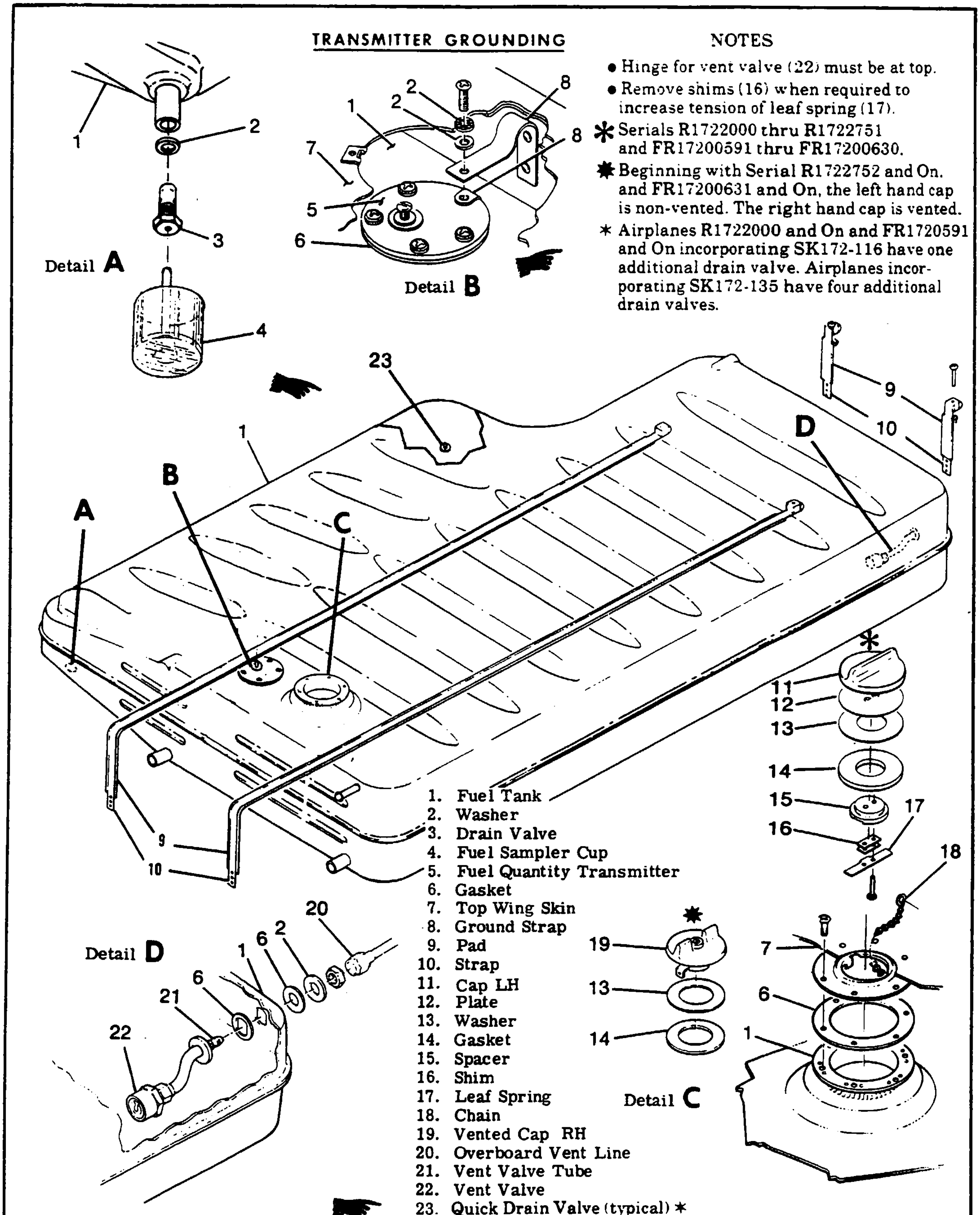


Figure 12-1. Fuel System Schematic



1. Strainer Drain Line
2. Shut-Off Valve Control
3. Reservoir Tank
4. Primer Line
5. Vapor Return Line
6. Fuel Tank
7. Vent Crossover Line
8. Vent Line
9. Selector Valve
10. Auxiliary Fuel Pump
11. Shut-Off Valve
12. Drain Valve
13. Check Valve
14. Stop Block
15. Shaft
16. Bracket
17. Placard
18. Handle
19. Screw
20. Washer
21. Cap
22. Tee
23. Primer

Figure 12-2. Fuel System Installation



NOTES

- Hinge for vent valve (22) must be at top.
- Remove shims (16) when required to increase tension of leaf spring (17).

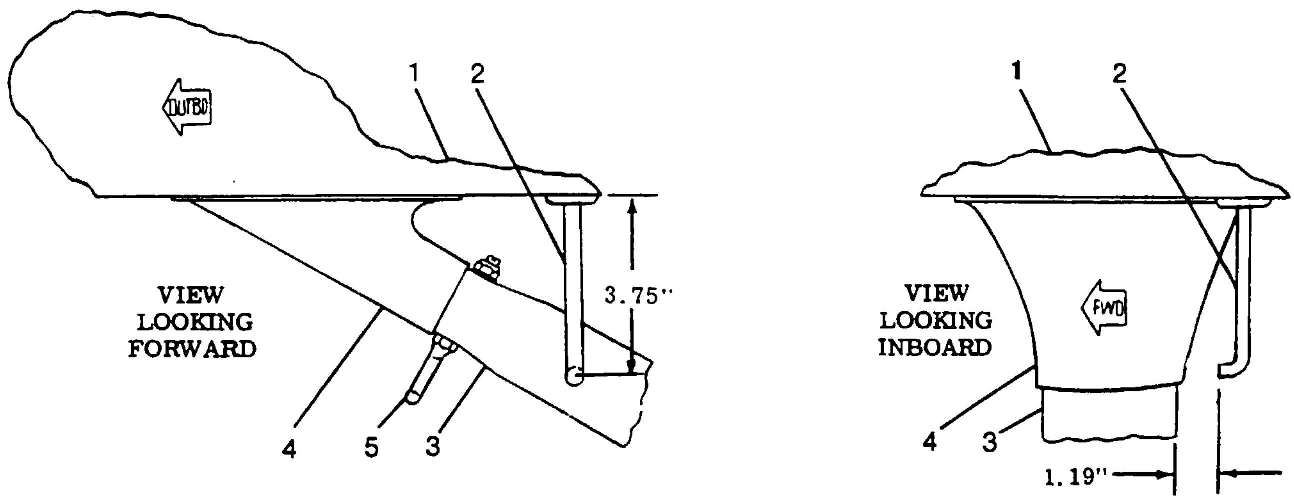
✱ Serials R1722000 thru R1722751 and FR17200591 thru FR17200630.

✸ Beginning with Serial R1722752 and On. and FR17200631 and On, the left hand cap is non-vented. The right hand cap is vented.

∗ Airplanes R1722000 and On and FR1720591 and On incorporating SK172-116 have one additional drain valve. Airplanes incorporating SK172-135 have four additional drain valves.

1. Fuel Tank
2. Washer
3. Drain Valve
4. Fuel Sampler Cup
5. Fuel Quantity Transmitter
6. Gasket
7. Top Wing Skin
8. Ground Strap
9. Pad
10. Strap
11. Cap LH
12. Plate
13. Washer
14. Gasket
15. Spacer
16. Shim
17. Leaf Spring
18. Chain
19. Vented Cap RH
20. Overboard Vent Line
21. Vent Valve Tube
22. Vent Valve
23. Quick Drain Valve (typical) ∗

Figure 12-3. Fuel Tank



1. Wing
2. Vent
3. Strut
4. Fairing
5. Tie-Down Ring

Figure 12-4. Fuel Vent Location

12-5. FUEL TANKS.

12-6. DESCRIPTION. A rigid metal tank is installed in the inboard panel of each wing. Sump drain valves, one in each tank, are provided for draining trapped water and sediment. Airplanes R1722000 and On and FR1720591 and On incorporating SK172-116 have an additional quick drain valve installed in the lower, outboard corner of the tank for draining trapped water and sediment. Airplanes R1722000 and On and FR1720591 and On incorporating SK172-135 have four additional quick drain valves in each tank for draining trapped water and sediment.

12-7. REMOVAL AND INSTALLATION. (See figure 12-3.)

a. Remove sump drain valves and drain fuel from applicable tank. (Observe precautions in paragraph 12-3.)
b. Remove fuel tank cover by removing attaching screws.
c. Remove wing root fairings.
d. Disconnect and plug or cap all fuel and vent lines from tank. Remove fittings as necessary for clearance when removing tank.
e. Disconnect electrical lead and ground strap from fuel quantity transmitter.
f. Disconnect straps securing fuel tank and remove tank. Use care to avoid damage to protruding fittings and hose connections.
g. Reverse the preceding steps for installation. Ensure transmitter is grounded in accordance with figure 12-3.

12-8. FUEL QUANTITY TRANSMITTERS. Fuel quantity transmitters are installed in the top of fuel tanks. A complete description, along with procedures for removal, installation and adjustment is contained in Section 15.

NOTE

Ensure transmitter is properly grounded in accordance with figure 12-3.

12-9. FUEL VENTS.

12-10. DESCRIPTION. A vent line is installed in the outboard end of the left fuel tank and extends overboard down through the lower wing skin. The inboard end of the vent line extends into the fuel tank, then forward and slightly downward. A vent valve is installed on the inboard end of the vent line inside the fuel tank, and a crossover vent line connects the two tanks for positive ventilation. In addition, the right hand fuel tank cap incorporates a small vent safety valve to ensure positive fuel tank ventilation.

12-11. CHECKING. Field experience has demonstrated that the fuel vent can become plugged, with possible fuel flow interruption. Also, the bleed hole in the vent valve assembly could possibly become plugged, allowing pressure from expanding fuel to pressurize the tanks/bays. 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. Blow into tube to slightly pressurize tank. If air can be blown into tank, vent line is open.
c. After tank 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.
d. After completion of step "c", blow into tube again to slightly pressurize the tank, and loosen, but do not remove filler cap on opposite wing to check tank crossover line. If pressure escapes from filler cap, crossover line is open.

NOTE

Remember that a plugged vent line or bleed hole can cause either fuel flow interruption or the pressurizing of the tanks/bays by fuel expansion.

e. Any fuel vent found plugged or restricted must be corrected prior to returning aircraft to service.

NOTE

The fuel vent line protruding beneath the wing near the wing strut must be correctly aligned to avoid possible icing of the vent tube. Dimensions are shown in figure 12-4.

12-12. FUEL RESERVOIR TANK.

12-13. DESCRIPTION. A reservoir tank is installed in the lower fuselage area beneath the floor immediately forward of the copilot position. The tank has four fuel line connections; a fuel supply line from the selector valve, a supply line to the shut-off valve, a vapor return line from the engine and a vent line teed into the tank crossover vent line. A drain plug or valve is installed in the bottom of the tank for draining trapped water and sediment from the fuel system.

12-14. REMOVAL AND INSTALLATION. (See figure 12-2.)

a. Completely drain all fuel from wing tanks, fuel strainer, lines, reservoir tanks and selector valve.
b. Remove copilot's seat and carpeting as necessary to gain access to tank cover plate.
c. Remove access plate from floorboard.
d. Disconnect and cap or plug all fuel lines at tank.
e. Remove tank mounting bolt and screws and lift out tank.
f. Reverse the preceding steps for installation. Prior to reinstalling access plate, service fuel tanks and check for leaks.

12-15. FUEL SELECTOR VALVE.

12-16. DESCRIPTION. A three position fuel selector valve is located between the pilot and copilot positions on the pedestal. The positions on the valve are labeled "LEFT, BOTH ON and RIGHT." Valve repair consists of replacement of seals, springs, balls and other detail parts. Figure 12-5 illustrates the proper relationship of parts and may be used as a guide during disassembly and assembly.

12-17. REMOVAL AND INSTALLATION. (See figure 12-2.)

a. Completely drain all fuel from wing tanks, fuel strainer, lines, reservoir tank and selector valve. (Observe precautions in paragraph 12-3.)
b. Remove fuel selector valve handle.
c. Remove pedestal cover.
d. Remove carpeting as necessary to gain access to plates aft of pedestal and inboard of right front doorpost.
e. Disconnect handle drive shaft from valve.
f. Disconnect and cap or plug all fuel lines at valve.
g. Remove screws attaching valve to bracket and remove valve.
h. Reverse the preceding steps for installation. Prior to installing access plates, service fuel tanks and check for leaks.

12-18. DISASSEMBLY. (See figure 12-5.)

a. Remove fuel selector valve in accordance with paragraph 12-17.
b. Remove nipples (10) from the two fuel inlet ports.

NOTE

Removal of inlet nipples will allow spring (9), ball (4), O-ring (8), retainer (7) and ball (4) to pop free of valve body. Use care to avoid loss of these parts during disassembly.

c. Remove nipple (10) from fuel outlet port.
d. Remove roll pin (3) and lift housing (1) from cam. Retain ball (4) and detent spring (18) for reinstallation.
e. Remove two screws holding stop (2) to cover. Remove four screws attaching cover (15) to valve body (6) and carefully remove cover.
f. Remove gasket (12) and withdraw cam (13) with washer (14) and O-ring (8).
g. Remove bushing (5).

12-19. CLEANING, INSPECTION AND REPAIR.

NOTE

Repair of damaged or worn parts of the selector valve is NOT authorized, and therefore is limited to replacement of component parts only.

a. Clean disassembled parts by washing in Stoddard solvent or equivalent. Blow parts dry using clean compressed air.
b. Inspect all parts for obvious wear or damage as follows:
1. Check detent holes in cover (15) for excessive wear.
2. Inspect shaft and bearing surfaces of cam (13) for removal of black anodized surface indicating wear.
3. Examine valve body (6) for wear, cracks, distortion and internal corrosion. Any damage to thread surfaces at inlet and outlet ports or cover attach holes is cause for rejection.

12-20. REASSEMBLY. (See figure 12-5.)
a. Ensure that all component parts are clean, then coat sparingly with lightweight engine oil.
b. Insert bushing (5) into place in valve body.
c. Fit washer and a new O-ring in place on cam (13) and insert cam into valve body.
d. Install new gasket (12) and cover (15).
e. Install ball (4), retainer (7), O-ring (8), ball (4), spring (9), O-ring (8) and nipple (10) in each inlet port.
f. Install nipple (10) and O-ring (8) in outlet port.
g. Lubricate detent spring (16) and ball (4) with lubricant conforming to Military Specification VV-P-236 (USP Petrolatum or equivalent).
h. Insert spring (16) in hole in housing (1).
i. Rotate cam as necessary so that ball (4) will align with one of the detent holes on cover when in position on cam.
j. With ball (4) on spring (16), slide housing (1) onto cam and install roll pin.
k. Install stop (2) and check rotation of cam for ease of operation and positive detent engagement.
l. Reinstall selector valve in accordance with paragraph 12-17

12-21. FUEL SHUTOFF VALVE.

12-22. DESCRIPTION. The fuel shutoff valve is a two position ON-OFF valve mounted directly on the reservoir tank using an adapter. The valve control knob is located on the left lower instrument panel. Valve repair consists of replacement of seals, springs, balls and other detail parts. Figure 12-6 illustrates the proper relationship of parts and may be used as a guide during disassembly and reassembly.

12-23. REMOVAL AND INSTALLATION. (See figure 12-2.)
a. Completely drain all fuel from wing tanks, fuel strainer, lines, reservoir tank and selector valve.
b. Remove copilot's seat and carpeting as necessary to gain access to reservoir tank access plate.
c. Remove access plate from floorboard.
d. Disconnect shutoff valve control.
e. Disconnect and cap or plug all fuel lines at valve.
f. Remove valve mounting bolts.
g. Reverse the preceding steps for installation. Prior to reinstalling access plate, rig valve control, service fuel tanks and check for leaks.

12-24. DISASSEMBLY. (See figure 12-6.)
a. Remove fuel shutoff valve in accordance with paragraph 12-23.
b. Remove two screws securing cover (2) to valve body (1) and carefully remove cover. Discard O-ring (8) but retain ball (5) and detent spring (4) for reinstallation.
c. Slowly withdraw rotor (3) from valve body.

NOTE

Removal of rotor (3) will allow seal (9), O-ring (10), washer (11) and spring (12) to pop free.

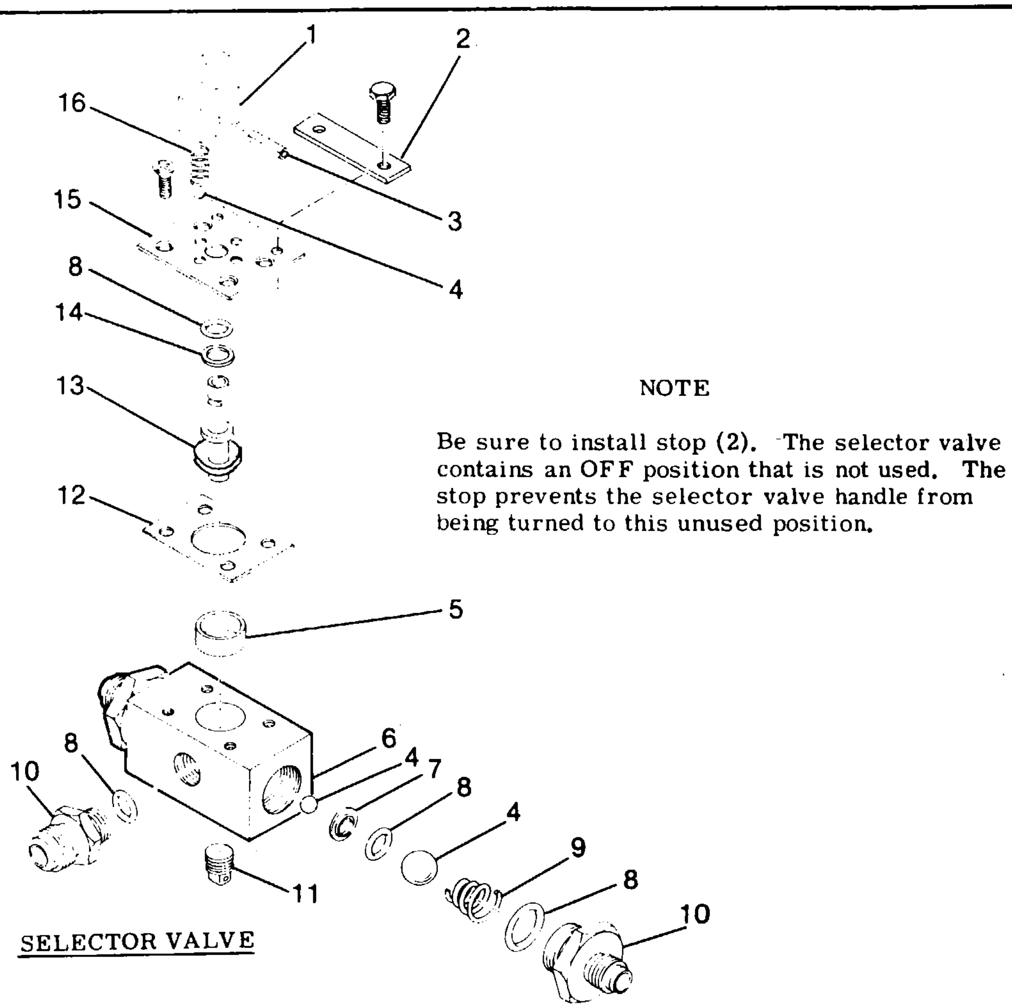
12-25. CLEANING, INSPECTION AND REPAIR.

NOTE

Repair of damaged or worn parts of the fuel shutoff valve is NOT authorized, and therefore is limited to the replacement of component parts only.

a. Clean disassembled parts by washing in Stoddard solvent or equivalent. Blow parts dry 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 on rotor (3).
2. Inspect shaft and bearing surfaces of rotor (3) for removal of black anodized finish indicating wear. Check for internal corrosion of drilled passages.
3. Examine valve body (1) 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.

12-26. REASSEMBLY. (See figure 12-6.)



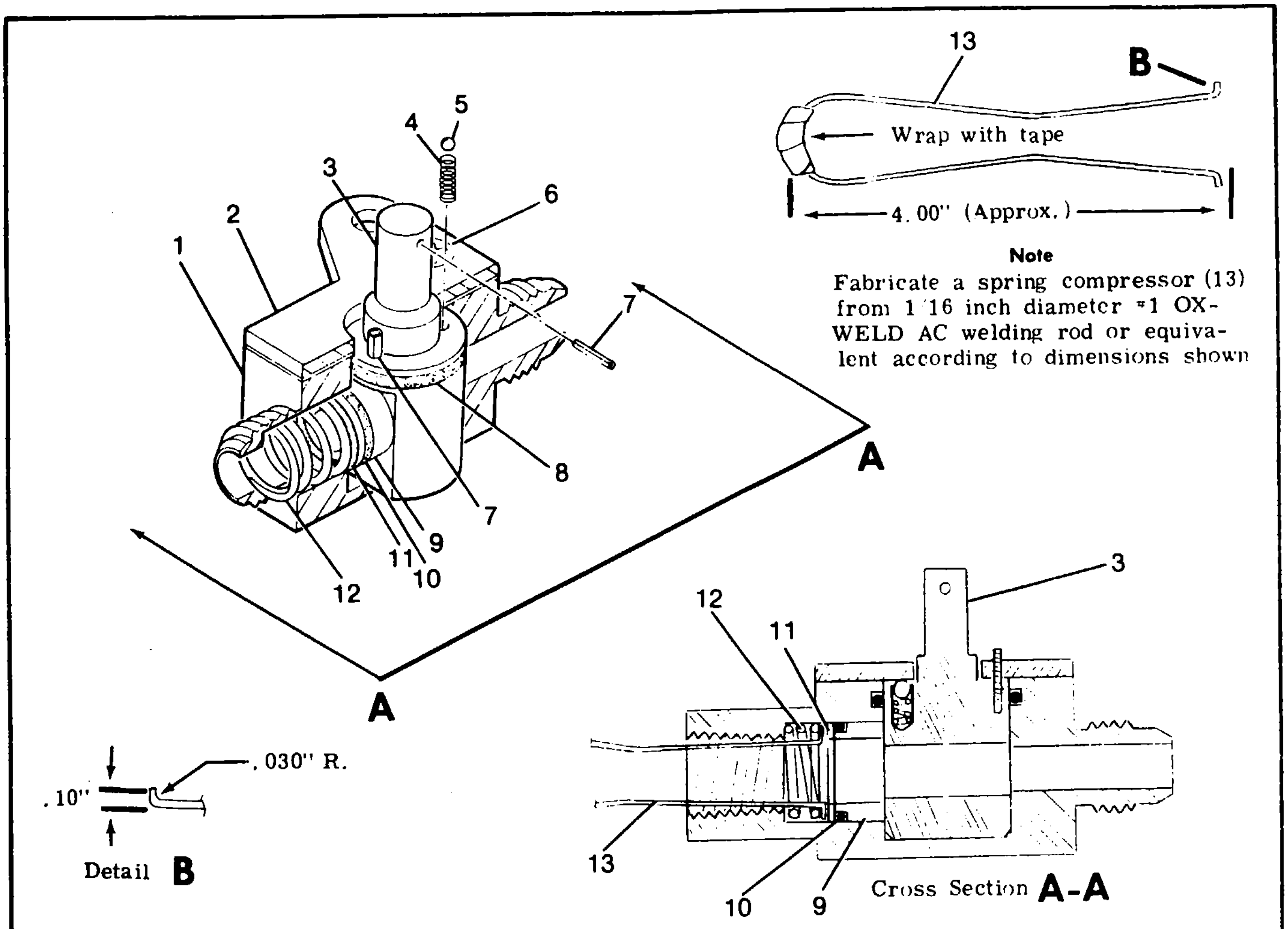
1. Housing
2. Stop
3. Roll Pin
4. Ball
5. Bushing
6. Body
7. Retainer
8. O-Ring
9. Spring
10. Nipple
11. Plug
12. Gasket
13. Cam
14. Washer
15. Cover
16. Detent Spring

Figure 12-5. Fuel Selector Valve

NOTE

Reassembly of fuel shutoff valve is facilitated by mounting in a bench vise or equivalent bench support, making sure valve body (1) is protected from damage. Fabrication of a spring compressor (13) is recommended before reassembly.

a. Ensure all components are clean, then coat sparingly with lightweight engine oil.
b. Insert new O-ring (8) into recess in valve body (1).
c. Insert spring (12) into body (1).
d. With spring compressor in place as shown in Section A-A on figure 12-6, compress spring (12) and install washer (11), new O-ring (10) and seal (6) into inlet port.
e. Holding spring compressed, carefully insert rotor (3) into valve body (1). Release spring compressor and check for proper seating of seal to rotor.
f. Lubricate detent spring (4) and ball (5) with lubricant conforming to Military Specification VV-P-236 (USP Petrolatum or equivalent), inserting spring into hole in rotor.
g. Place ball (5) on spring and turn rotor as required to index one of the detent holes in cover (2).
h. Attach cover (2) and test rotation of rotor shaft for ease of operation and positive detent engagement.
i. Reinstall shutoff valve in accordance with paragraph 12-23.



1. Valve Body
2. Cover
3. Rotor
4. Detent Spring
5. Steel Ball
6. Screw
7. Roll Pin
8. O-Ring
9. Seal
10. O-Ring
11. Washer
12. Spring
13. Spring Compressor

Figure 12-6. Fuel Shutoff Valve

12-27. AUXILIARY FUEL PUMP.

12-28. DESCRIPTION. The auxiliary fuel pump is located beneath the floorboard just to the left of the selector valve handle. An integral bypass and check valve permits fuel flow through the pump even when inoperative but prevents reverse flow. A separate overboard drain line from the pump prevents entry of fuel into the electric motor, in the event of an internal leak. The auxiliary pump is used in starting and in the event of engine-driven pump malfunction.

12-29. REMOVAL AND INSTALLATION. (See figure 12-7.)

a. Remove pilot and copilot seats in accordance with Section 3.

b. Peel back carpet as required to expose pump access cover.

c. Place fuel shut-off valve in "OFF" position and drain as much fuel as possible from strainer bowl and associated lines using strainer drain control. (Observe precautions in paragraph 12-3.)

d. Disconnect and cap fuel lines to pump and remove electrical leads.

e. Loosen clamps securing pump and remove.

f. Reverse preceding steps for installation. With fuel shut-off valve in "ON" position check for leaks and proper auxiliary pump operation.

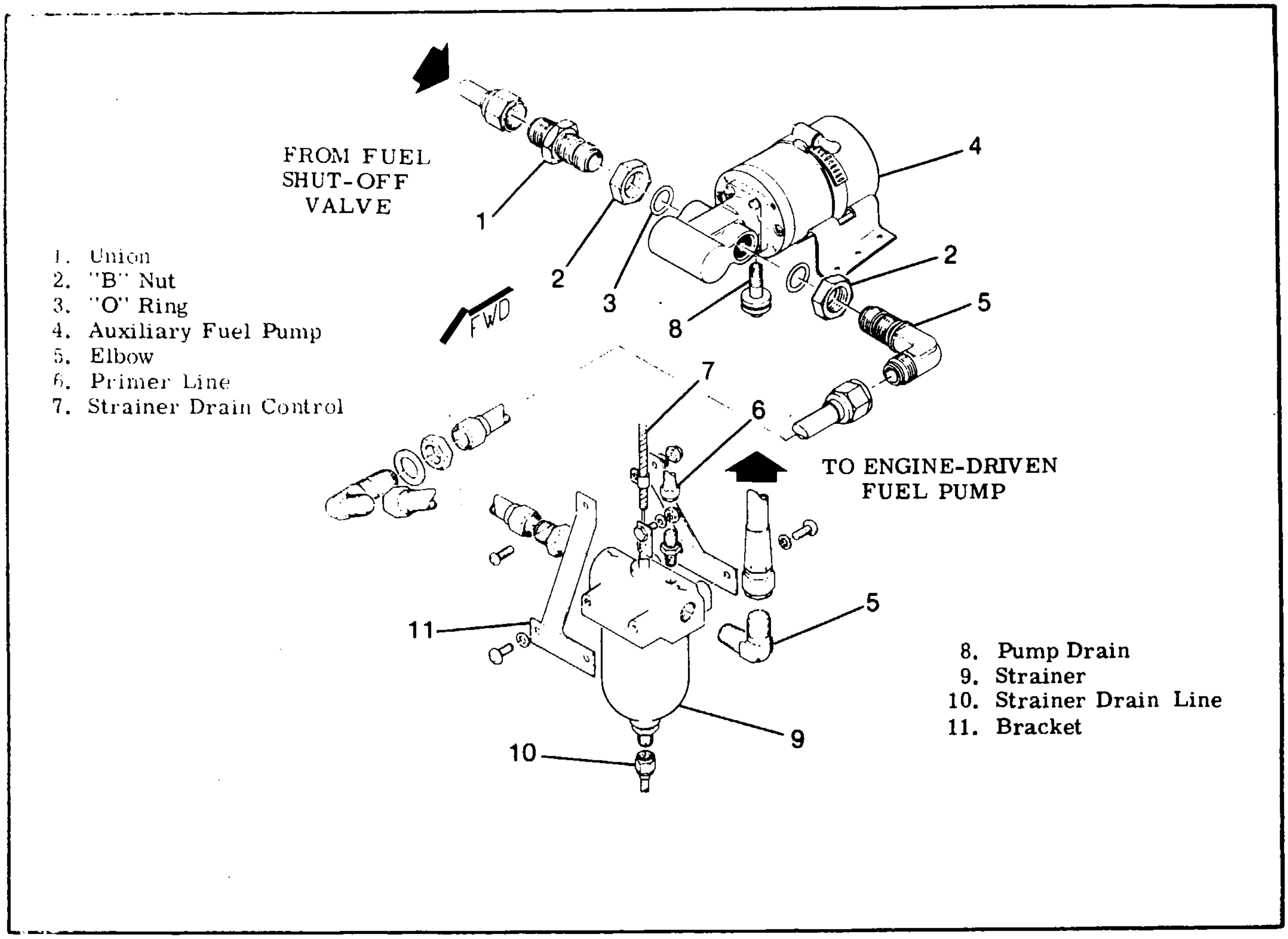


Figure 12-7. Auxiliary Fuel Pump and Strainer Drain Installation

12-30. ELECTRIC AUXILIARY FUEL PUMP CIRCUIT. The electric auxiliary fuel pump circuit used on these aircraft supplies fuel flow for start priming and engine operation if the engine driven pump should fail. The auxiliary pump on aircraft serial R1722724 and earlier is controlled by a three position toggle switch, located on the lower left switch/circuit breaker panel. Aircraft beginning serial R1722725 and subsequent have a dual/split rocker type switch installed.

a. Aircraft employing the toggle type switch operate as follows: With the switch in the up position, labeled "HI", the auxiliary fuel pump operates at maximum output.

NOTE

The switch is spring loaded to OFF from the HI position, and must, therefore, be held in "HI" to obtain maximum output.

The HI position is used for engine starting, for vapor purging in very hot weather, and for engine operation with a failed engine-driven pump during takeoff, or other very high power operations. The down position of the auxiliary fuel pump switch, labeled LOW, operates the pump at one of two speeds, depending on the throttle position. With the throttle at cruise setting, and the auxiliary fuel pump switch is the "LOW" position, sufficient fuel is provided for cruise flight operation, with a failed engine-driven fuel pump. When the throttle is moved toward the closed position, the auxiliary fuel pump flow rate is automatically reduced, preventing an excessively rich mixture during periods of low engine power operation. With the switch in the "LOW" position, the pump will supply sufficient flow for vapor suppression during taxi and flight operations in hot climates.

CAUTION

If the auxiliary fuel pump switch is turned on when the master switch is on, but the engine is stopped, the intake manifolds will be flooded unless the mixture control is in "IDLE CUT-OFF."

b. Beginning with 1978 model aircraft, the red and yellow split-rocker auxiliary fuel pump switch oper-

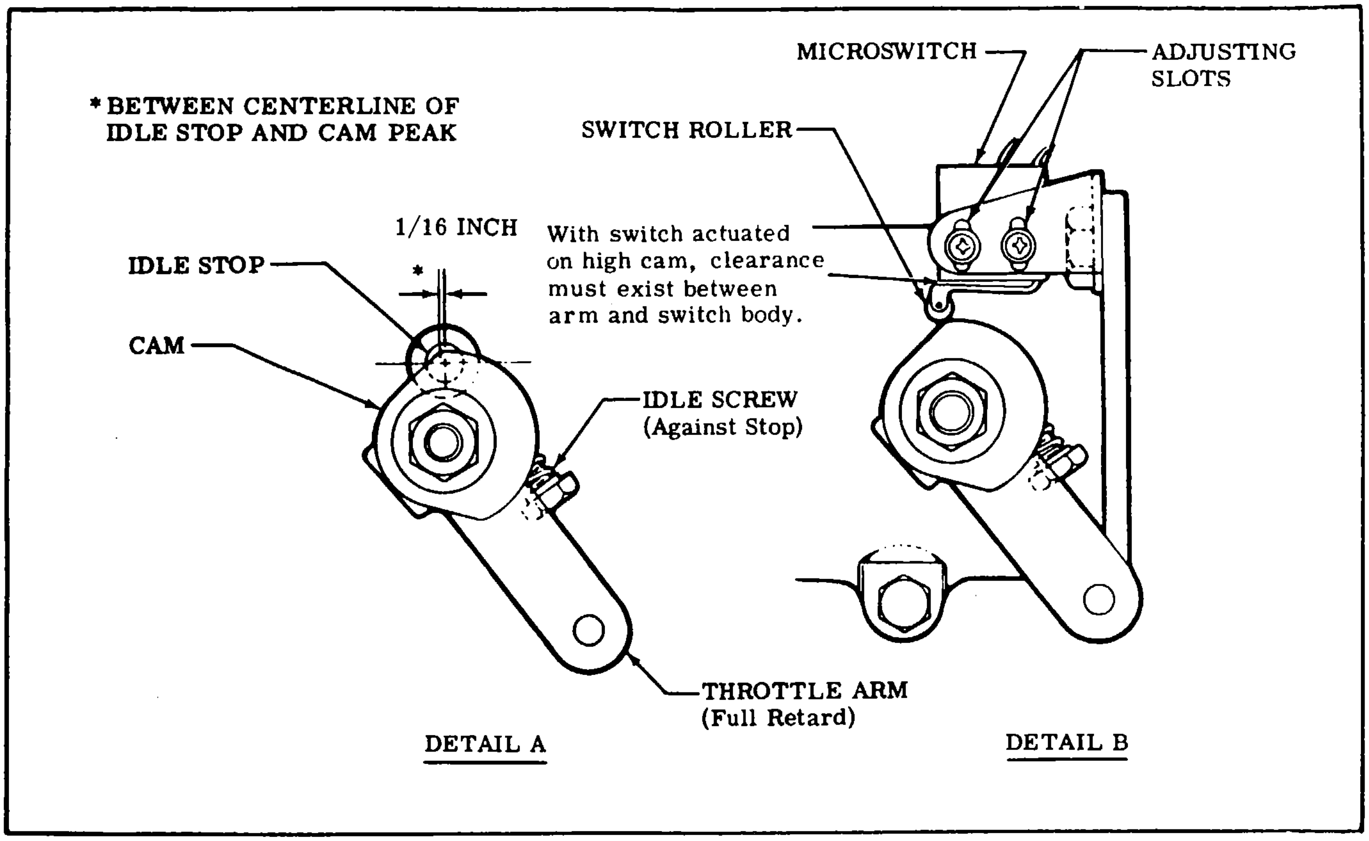


Figure 12-8. Rigging Throttle Operated Microswitch

ates as follows: The YELLOW right half of the switch is labeled LOW, and is used to prime the engine for normal starting and minor vapor purging during taxi. The RED left half of the switch is labeled HIGH, and is used in the event an engine-driven pump failure during takeoff or high power operation. The HIGH position may also be used for extreme vapor purging. With the YELLOW half of the switch in the LOW position, the pump operates at one of two speeds, that are dependent upon the throttle setting. If the throttle is open to cruise settings the pump operates at high flow capacity, to supply sufficient fuel flow to maintain flight. When the throttle is moved toward the closed position, as during letdown, landing or taxiing, the fuel pump flow is automatically reduced to prevent an excessively rich mixture during these low engine speed conditions. Maximum fuel flow is produced when the RED portion of the split rocker is held in the spring loaded HIGH position. In the HIGH position, an interlock in the switch also moves the YELLOW portion of the switch to the LOW position. When the spring-loaded HIGH portion is released, the LOW will remain ON until manually turned OFF. When the engine driven fuel pump is operating, a fuel air ratio considerably richer than best-power is produced unless the mixture is leaned. A throttle operated microswitch adds resistance to the circuit to lower pump output as the throttle is retarded.

CAUTION

If the LOW position of the switch is accidentally selected with the master switch ON and the engine stopped, the intake manifolds will be flooded unless the mixture control is in IDLE CUT-OFF.

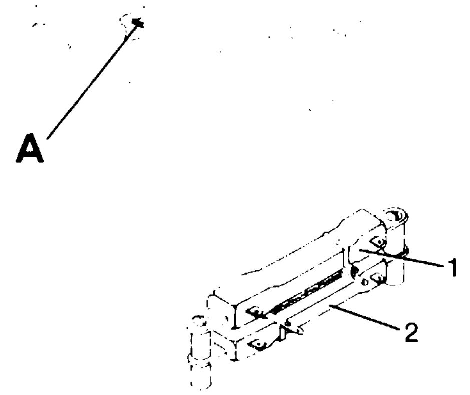
12-31. RIGGING THROTTLE OPERATED MICROSWITCH. (See figure 12-8.) The aircraft electric auxiliary fuel pump circuit is equipped with a microswitch which operates on a cam attached to the throttle arm of the fuel-air control unit. The cam on the throttle arm actuates the microswitch as the throttle is retarded to a manifold pressure of approximately 16" Hg, thus reduces the speed of the auxiliary fuel pump by introducing a resistance into the circuit. Rig the microswitch as follows:

a. Perform an initial adjustment of cam and microswitch as follows:

1. Close throttle and adjust cam as shown in detail "A" of figure 12-8.

2. Refer to detail "B" of figure 12-8 to set microswitch to actuate on the peak of the cam, and to de-actuate on the flat portion of the cam. Be sure that roller arm of switch actuator clears switch body in actuated position.

b. Start engine, and set throttle to obtain approximately 15 - 17" Hg manifold pressure. Mark this position on throttle control rod, and stop engine.



1. No 1 Resistor (Hi Boost)
2. No 2 Resistor (Low Boost)

Figure 12-9. Auxiliary Fuel Pump Resistors.

c. Set controls as follows:
   1. Mixture Control - IDLE CUT-OFF.
   2. Auxiliary Fuel Pump Switch:
      (a) Toggle - LOW.
      (b) Split-Rocker - ON.
   3. Throttle - FULL OPEN.

WARNING

Be sure the propeller area is clear, because certain malfunctions can cause the engine to turn when external power is applied, or the master switch is turned on.

   4. Master Switch - ON.

d. Close throttle until mark made in step "b" appears. At this position the microswitch should actuate, and the auxiliary fuel pump should slow down enough to be audibly detectable.

e. Adjust microswitch as required to cause auxiliary fuel pump to slow down as throttle is closed to marked position.

f. Return all controls to "OFF" position.

12-32. AUXILIARY FUEL PUMP FLOW RATE ADJUSTMENT. (See figure 12-9.) Conduct these tests with engine stopped and external power on bus.

WARNING

During this test raw fuel may drain from the engine compartment, therefore, proper safety precautions should be taken. Conduct test in a well ventilated area, use drip pans, insure aircraft is properly grounded, and keep ignition source, (cigarettes, lighters, matches, etc.) away from area.

a. Serials THRU R1722929 and FR1720630 apply an external source of 27.75 ± .25 VDC to airplane bus. BEGINNING WITH serials R1722930 and FR1720631 apply an external source of 28.8 VDC to airplane bus.

b. Set mixture control at FULL RICH

c. Turn Master Switch - ON, and Aux Fuel to either:
   1. Toggle - LOW.
   2. Split-Rocker - LOW.

d. Advance throttle to FULL OPEN.

e. Check metered fuel pressure/flow on airplane gage for a flow of 6 to 6.5 gal/hr fuel flow.

f. Adjust number one(1) if required. (See figure 12-9.)

g. Retard throttle slowly, as previously marked position is passed, speed of auxiliary pump should slow enough to be audible.

h. Wait momentarily for pressure/flow meter to

stabilize. The pressure/flow gage should read 2 gal/hr.
i. Adjust number (2) two resistor if required.

12-33. MAXIMUM HIGH BOOST CHECK. To verify high position function momentarily depress spring-loaded rocker, with master switch "ON," and verify noticeable increase in fuel flow on the fuel flow gage.

12-34. FUEL STRAINER.

12-35. DESCRIPTION. The fuel stainer is mounted on the firewall in the engine compartment. The strainer 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. Access to the drain control is made through the oil dipstick cowling door.

NOTE

The fuel strainer can be disassembled, cleaned and reassembled without removing the assembly from the aircraft. (Refer to paragraph 12-37.)

12-36. REMOVAL AND INSTALLATION. (See figure 12-7.)
a. Remove cowling as necessary to gain access to strainer.
b. With shut-off 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 controls 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 shut-off valve in "ON" position check for leaks and proper operation of quick-drain valve.

12-37. DISASSEMBLY AND ASSEMBLY.
a. With shut-off 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 shut-off 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.

12-38. PRIMING SYSTEM.

12-39. 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 the front end of each intake manifold. Injecting the fuel into each manifold primes both banks of cylinders.

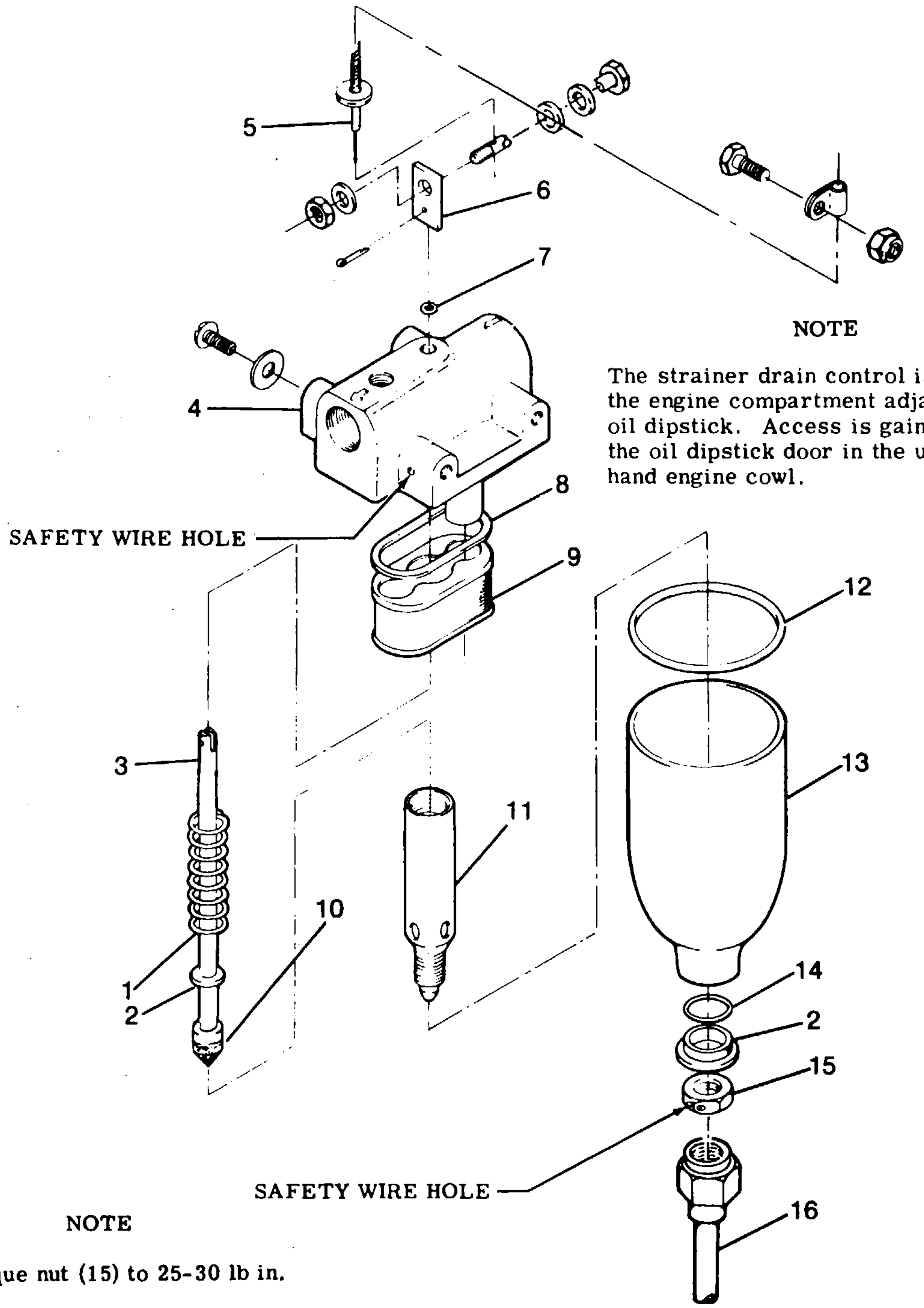
12-40. REMOVAL AND INSTALLATION.
a. With shut-off valve in "OFF" position, drain fuel from strainer and lines with quick-drain control.
b. Disconnect and cap or plug all fuel lines at primer. (Observe precautions in paragraph 12-3.)
c. Unscrew knurled nut and remove plunger from pump body.
d. Remove pump body from instrument panel.

NOTE

Visually inspect primer lines for crushed, kinked, or broken condition. Ensure proper clamping to prevent fatigue due to vibration and chafing.

e. Prior to installing a primer, check for proper pumping action and positive fuel shut-off in the locked position.
f. Reverse the preceding steps for installation. With shut-off valve in"ON" position, check for leaks and proper pumping action.

SHOP NOTES:



NOTE

The strainer drain control is located in the engine compartment adjacent to the oil dipstick. Access is gained through the oil dipstick door in the upper left hand engine cowl.

NOTE

Torque nut (15) to 25-30 lb in.

1. Spring
2. Washer
3. Plunger
4. Top
5. Drain Control
6. Plate
7. O-Ring
8. Gasket
9. Filter
10. Collar
11. Standpipe
12. O-Ring
13. Bowl
14. O-Ring
15. Nut
16. Drain Line

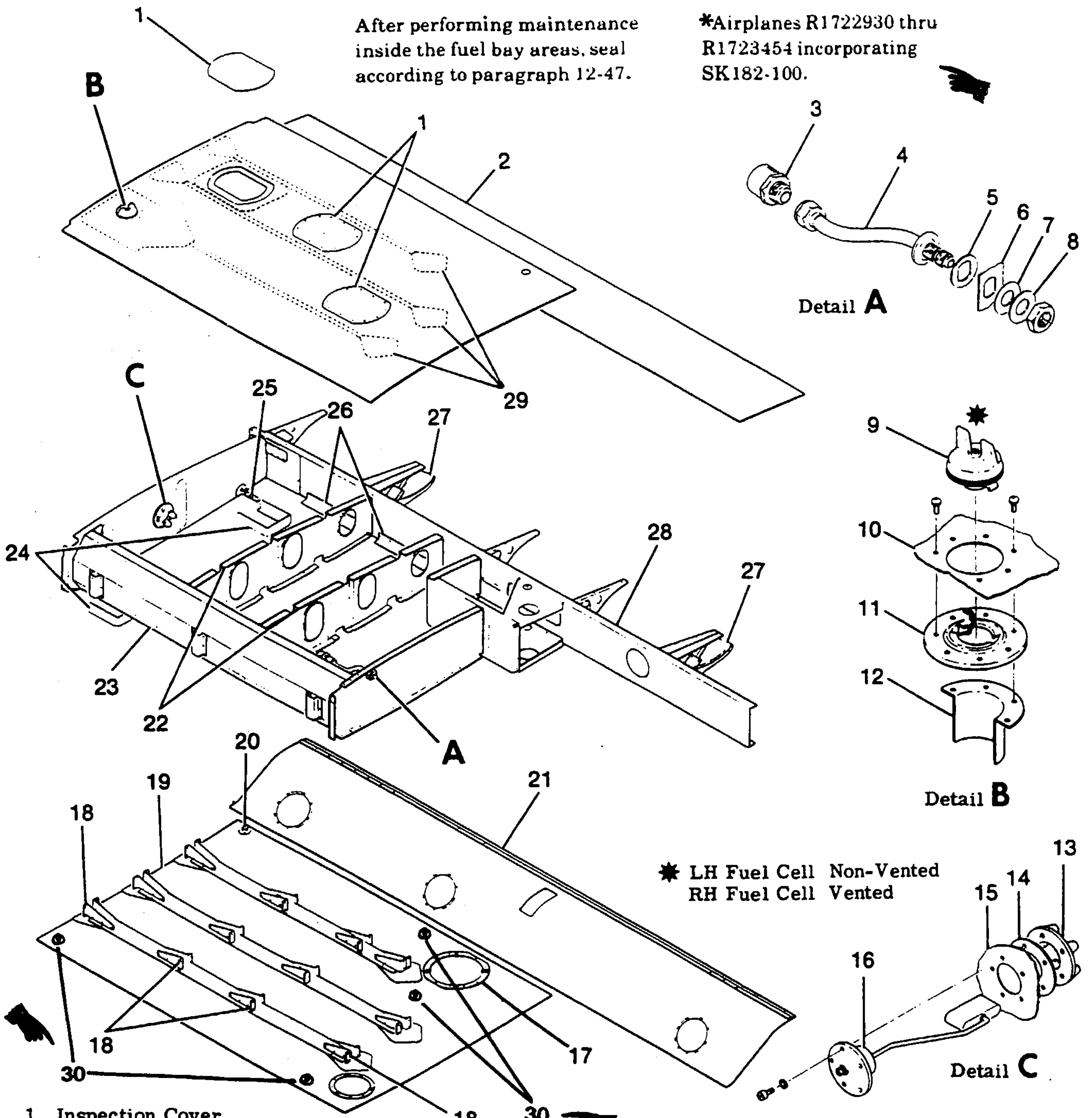
Figure 12-10. Fuel Strainer

NOTE

After performing maintenance inside the fuel bay areas, seal according to paragraph 12-47.

NOTE

*Airplanes R1722930 thru R1723454 incorporating SK182-100.



1. Inspection Cover
2. Upper Trailing Edge Skin
3. Fuel Vent Valve Assembly
4. Tube Weld Assembly
5. Gasket
6. LH Rib
7. Gasket
8. Washer
9. Fuel Cap Assembly
10. Upper Forward LH Skin
11. Fuel Filler Neck Assembly
12. Fuel Indicator Assembly
13. Fuel Transmitter Nut Ring
14. Gasket
15. Wing Root (LH) Rib Assembly
16. Fuel Transmitter (LH Cell)
17. Inspection Doubler Assembly
18. Gusset
19. Lower Forward (LH) Skin
20. Fuel Drain Valve
21. Trailing Edge Skin Stiffener
22. Rib
23. Fuel (LH) Spar Assembly
24. Baffle
25. Screen
26. Stiffener
27. Flap Track Rib Assembly
28. LH Channel
29. Gusset
30. Quick Drain Valve*

Figure 12-11. Intergral Fuel Cell Structure Assembly.

12-41. EXTENDED RANGE FUEL SYSTEM (OPTIONAL).

12-42. DESCRIPTION. Beginning with Serials R1722930 and FR17200631, an extended range fuel system is available. The extended range system is a wet wing configuration that consists of integral fuel bays in the inboard end of each wing, vented fuel cap for right wing fuel bay, non-vented fuel cap for left wing fuel bay, fuel quantity transmitters mounted on the side of the left and right wing root rib assemblies, fuel vent valve assembly mounted on the inboard side of the left outboard fuel bay rib, fuel sump drain valves in the bottom inboard end of each fuel bay, fuel screens over the end of each fuel supply line, and baffles mounted on the bottom inboard surface of each fuel bay. In addition, airplanes incorporating SK182-100 have four quick drain fuel sump valves installed in each fuel bay.

12-43. CLASSIFICATION OF FUEL LEAKS. Fuel leaks which do not constitute a flight hazard are stains, seeps and heavy seeps NOT in an enclosed area. However, they should be repaired when the aircraft is grounded for other maintenance. Fuel leaks which 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, the sections of wing inboard and outboard of the fuel bay and the area between the rear fuel spar and the main spar. These leaks must be repaired before that bay is used for another flight. The wet or stained spot on the wing in the area of the bay is an indication of the intensity of the leak. Fuel leak classifications are shown in figure 12-12.

NOTE

Stains and seeps that are not considered a flight hazard must be inspected after each flight to ensure that they have not grown in intensity to the point of causing a flight hazard.

If a leak causing a flight hazard should occur at a place where there are no facilities available to make an acceptable repair, it is recommended that the leaking bay be drained and some suitable material placed over the leak, if it is within an enclosed area of the wing, to eliminate escaping fumes. By switching the fuel selector valve to the other bay, the aircraft can then be flown to a base where the fuel leak can be repaired.

12-44. 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 the aircraft to a suitable ground stake.
b. Remove safety wire from shut-off valve control knob and pull control to "OFF" position. (Resafety control knob after completion of repair.)
c. Drain all fuel from bay being repaired. (Observe the precautions in paragraph 12-3.)
d. Remove access door and insert hose into bay.
e. Allow inert gas to flow into bay for several minutes (time dependent upon hose size, rate of flow, etc.) to remove all fuel vapors.

Since argon and carbon dioxide are heavier than air, these gases will remain in the bay during the repair. The repair shall be made using non-sparking tools (air motors, plastic scrapers, etc.)

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.

12-45. INTEGRAL FUEL BAY SEALANT. Two kinds of sealant are used, one to seal the fuel 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 as firmly as the bay sealant does. This permits the access doors and fuel quantity transmitter adapter to be removed without damage to them. 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

The accelerator, EC-1608B, contains cumene hydroperoxide. 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 with water and get prompt medical attention.

12-46. MIXING SEALANT. Use all the accelerator and sealant in the container when mixing, to insure 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 allow air bubbles to mix in. If this occurs, work air bubbles out.

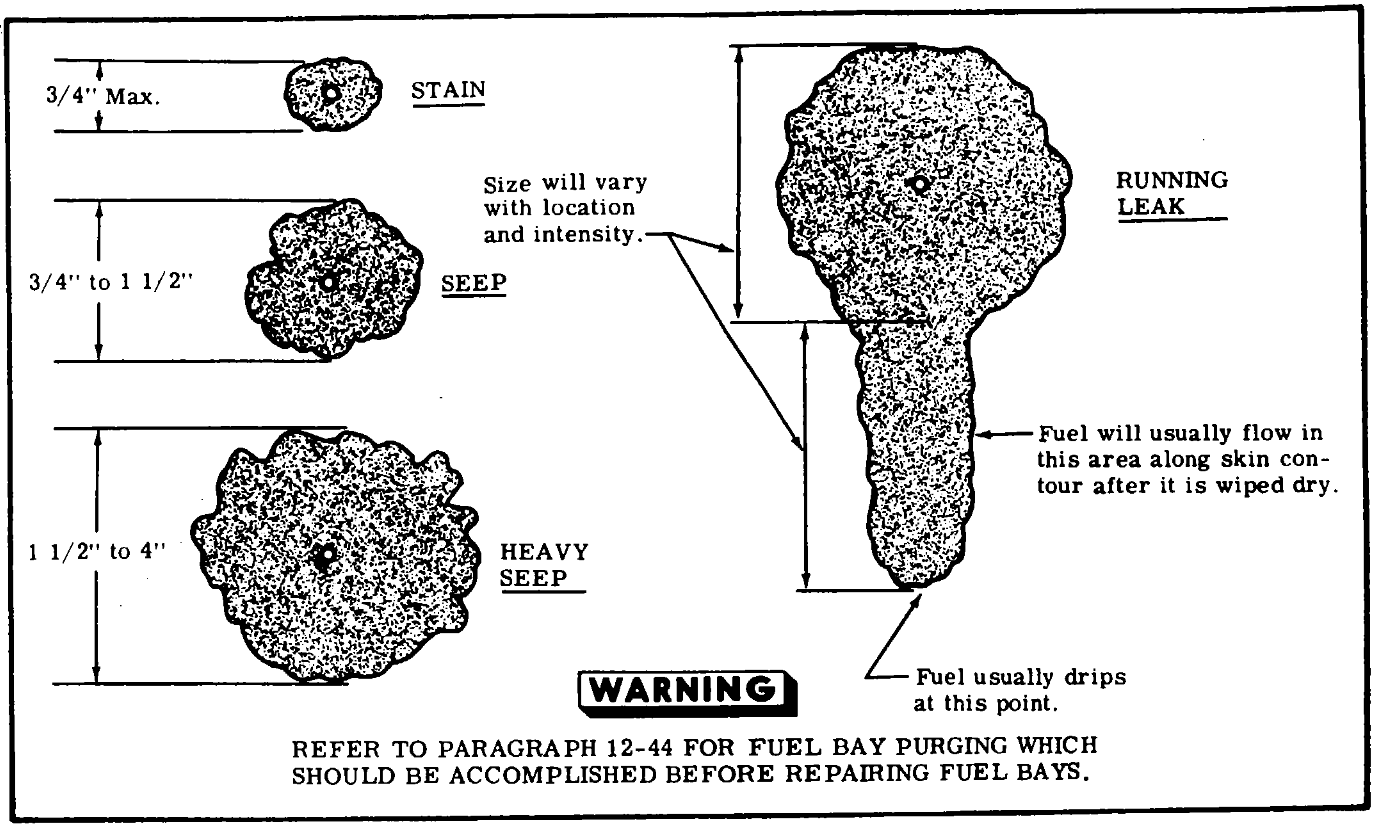


Figure 12-12. Classification of Fuel Leaks

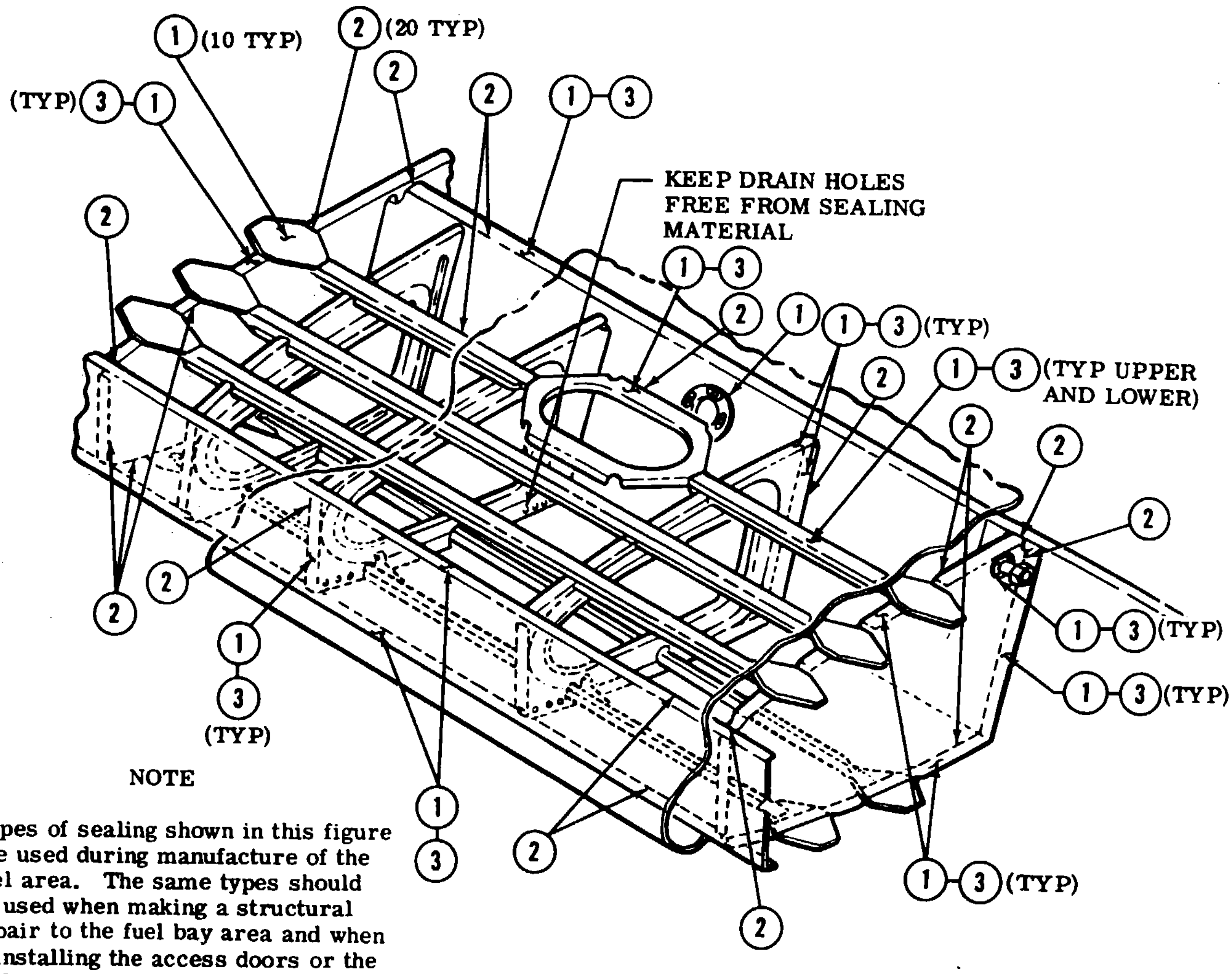
12-47. SEALING DURING AND AFTER STRUCTURAL REPAIR.

CAUTION

Protect drain holes and fuel outlet screens when applying sealants.

Any repair that breaks the fuel bay seal will necessitate resealing of that area of the bay. Repair parts that need sealing must be installed and riveted during the sealing operation. All joints within the boundary of the bay, but which do not provide a direct fuel path out of the bay, such as stringers and rib flanges within the bay, must be fay surface sealed only. Joints which provide a direct fuel path out of the bay area, such as fuel spar flanges and inboard and outboard rib flanges, 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 the joint when the parts are riveted or fastened together. The fillet seal is applied

SHOP NOTES:



NOTE

Types of sealing shown in this figure are used during manufacture of the fuel area. The same types should be used when making a structural repair to the fuel bay area and when reinstalling the access doors or the fuel quantity transmitter nutring.

CODE

1. FAYING SURFACE SEAL
2. FILLET SEAL
3. RIVET AND FASTENER SEAL

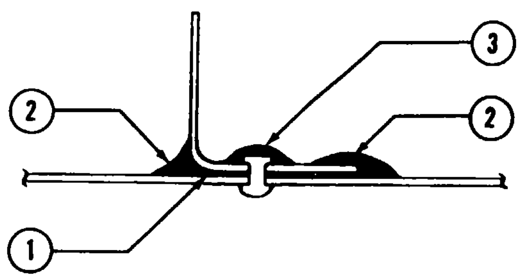


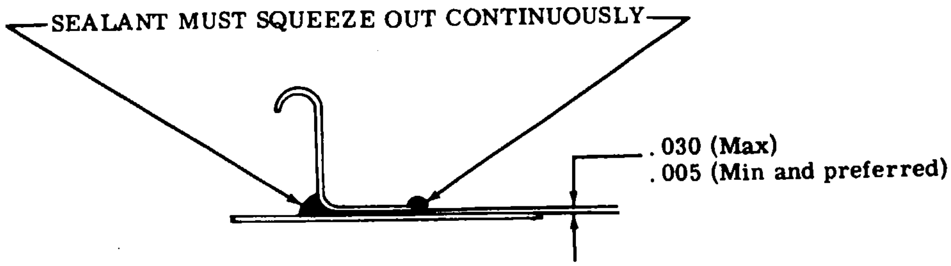
Figure 12-13. Typical Fuel Bay Sealing (Sheet 1 of 2).

after the joint is fay surface sealed and riveted or fastened together. Fillet sealing is applying sealant to the edge of all riveted joints, joggles, bend reliefs, voids, rivets or fasteners through the boundary of the bay and any place that could produce a fuel leak. The fay sealant need not be cured before the fillet seal is applied, but the squeezed out sealant, to which the fillet sealant is applied, must be free of dirt and contamination. Fillets laid on intersecting joints shall be joined together to produce a continuous fillet. Filler sealant must be pressed into the joint, working out all entrapped air. The best method of applying sealant is with an extrusion gun. Then work the sealant into the joint with a small paddle, being careful to eliminate all air bubbles.

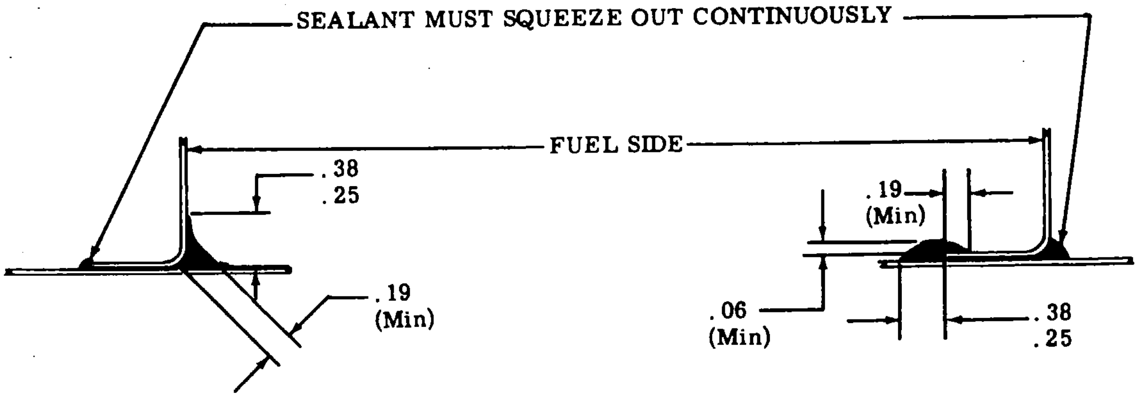
NOTE

During structural repair, parts must be predrilled, countersunk or dimpled and cleaned before being sealed and positioned for final installation.

a. Remove all existing sealant from area to be



FAY SURFACE SEALING



FILLET SEALING (With fay surfaces sealed)

FASTENER SEALING

Figure 12-13. Typical Fuel Bay Sealing (Sheet 2 of 2).

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 may then be removed with aluminum wool. Steel wool or sandpaper must not be used.

b. Vacuum thoroughly to remove all chips, filings, dirt, etc., from the bay area.
c. All surfaces and areas to be sealed shall 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 the solvent evaporates. Always pour the solvent on the cloth. Never use contaminated solvent. The cloth shall not be so saturated that dripping occurs.

NOTE

Allowable work life of EC-1675B/A sealant is four hours from the starting time of mixing. Allowable work life of EC-1608B/A sealant is one hour. These apply to standard conditions of 77° Fahrenheit 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 allowable work life.

NOTE

During the sealing operation, sealant must be checked at various times to determine that it has not exceeded its allowable work life. Use a small wood paddle, such as a tongue depressor, to gather some sealant. Touch the sealant to a piece of clean sheet metal. If the sealant adheres to the sheet metal, it is still within its allowable work life. If the sealant does not adhere to the sheet metal, it is beyond its 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 fay surface door sealant to access doors and fuel quantity transmitter adapter, if removed, and install the doors and adapter.
g. Allow the sealant to cure. Refer to paragraph 12-49 for curing time.
h. Clean stains from outside of bay area.
i. Test fuel bay for leaks as described in paragraph 12-50.

12-48. SEALING FUEL LEAKS. First determine the source of the fuel leaks. Fuel can flow along a seam or the 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 12-50. 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 a soap bubble solution is applied to the outside of the bay. After the leak source has been found, proceed as follows:
a. Remove existing sealant in the area of the leak as described in paragraph 12-47, step "a."
b. Clean the area and apply a fillet seal. Press sealant into leaking area with a small paddle, being sure to work out all entrapped air.
c. If a leak occurs around a rivet or bolt, restrike the rivet or torque the bolt to the maximum allowable torque, and repair any damaged sealant.
d. Apply fay surface door sealant to access doors or fuel quantity transmitter adapter, if removed, and install the doors and adapter.
e. Test fuel bay for leaks as described in paragraph 12-50.

12-49. CURING TIME. Service Kit SK210-56 contains SP654890B2 Fuel Tank Area Sealant Kit and SP654706B2 Access Door Sealant Kit. Normal curing time for SP654890B2 Sealant Kit is 72 hours. Normal curing time for SP654706B2 Sealant Kit is 24 hours. These values are based on a Standard condition of 77° Fahrenheit and 50% humidity. Curing time may be accelerated as shown in the following chart.

Temperature of Sealant °F.	Time in Hours
160	3
140	4
120	7

NOTE

Temperature shall not exceed 160°F. Bay must be vented to relieve pressure during accelerated curing.

WARNING

Access door sealant must not be heated above 90° until sealant is cured for 24 hours based on a standard condition of 77° Fahrenheit and 50% relative humidity. Harmful vapors are released if sealant is heated above 90°F.

12-50. TESTING INTEGRAL FUEL BAY.
a. Remove vent line from vent fitting and cap the fitting.
b. Remove forward and aft fuel lines from bay.
c. To one of the bay fittings, attach a water manometer capable of measuring 20 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 shut-off 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 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.

12-51. FUEL QUANTITY TRANSMITTERS. one float-actuated, variable-resistive transmitter is located in each fuel bay. They are connected electrically to separate galvanometric gages, one for each bay, thereby indicating fuel level in each bay. A complete description, operation, and maintenance is covered in Section 15.

12-52. VENTED FUEL FILLER CAP. (See figure 12-14.)

12-53. DESCRIPTION. The RIGHT-HAND fuel filler cap incorporates a vent and safety valve that provides both vacuum and positive pressure relief.

12-54. INSPECTION, CLEANING AND REPAIR.
a. Remove RIGHT-HAND fuel filler cap from the adapter assembly.
b. Disconnect the safety chain from the cap and cover or plug the tank opening to keep out foreign matter.
c. Check condition of gasket and frictionless washer, replace as required.
d. Using cottom swabs and Stoddard solvent or equivalent, gently lift edges of rubber umbrella and clean seat and umbrella removing all contaminates. Using a second swab wipe seat and umbrella thoroughly, removing all cottom fibers. Repeat until swabs show no discoloration.
e. 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.
f. Connect fuel cap to safety chain and reinstall cap in the adapter assembly.

1. Umbrella Rubber
2. Check Valve (Vent)
3. Gasket
4. Frictionless Washer
5. Fuel Cap Body

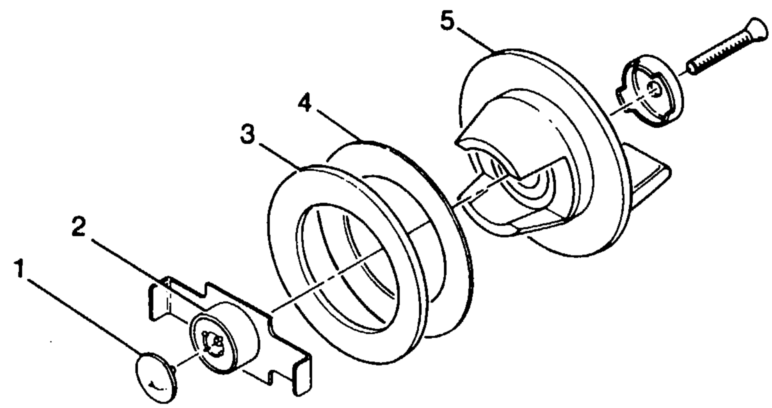


Figure 12-14. Vented Fuel Filler Cap

SECTION 13

PROPELLER AND GOVERNOR

WARNING

WHEN PERFORMING ANY INSPECTION OR MAINTENANCE THAT REQUIRE TURNING ON THE MASTER SWITCH, INSTALLING A BATTERY, OR TURNING 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.

TABLE OF CONTENTS

13-1. PROPELLER. (See figure 13-1.)

13-2. DESCRIPTION. The airplane is equipped with an all metal, constant-speed, governor-regulated propeller. The constant-speed propeller is single acting, in which engine oil pressure, boosted and regulated by the governor is used to obtain the correct blade pitch for the engine load. Engine lubrication oil is supplied to the power piston in the propeller hub through the crankshaft. The amount and pressure of the oil supplied is controlled by the engine driven governor. An increase or decrease in throttle setting or a change in aircraft attitude will affect the balance which maintains a given RPM. If the throttle is opened further or if the aircraft speed is increased, engine RPM will try to increase. The governor senses this and directs oil pressure to the forward side of the piston in the propeller hub. The blades will be moved to a higher pitch and engine speed will remain constant. Conversely, if the throttle opening or the aircraft speed is decreased, the engine RPM will try to decrease. The governor senses this and allows oil to drain from the forward side of the piston. Spring tension and centrifugal twisting moment will move the blades to a lower pitch to maintain the selected engine speed.

NOTE:

For information not covered in this section, refer to the applicable McCauley Service Manual and applicable supplements.

13-3. REPAIR. Metal propeller repair first involves evaluating the damage and determining whether the repair will be a major or minor one. Federal Aviation Regulations, Part 43 (FAR 43), and Federal Aviation Agency, Advisory Circular No. 43.13 (FAA AC No. 43.13), define major and minor repairs, alterations and who may accomplish them. When making repairs or alterations to a propeller FAR 43, FAA AC No. 43.13 and the propeller manufacturer's instructions must be observed.

13-4. TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
FAILURE TO CHANGE PITCH	Governor control disconnected or broken.	Check visual. Connect or replace control.
	Governor not correct for propeller (Sensing wrong).	Check that correct governor is installed. Replace governor.
	Inoperative governor.	Refer to paragraph 13-10.
	Inoperative 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.
	Inoperative 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 CAUTION See Overspeed Limitations Contained in Section 11.	Governor high RPM stop set too high.	Refer to paragraph 13-13.
	Inoperative governor.	Refer to paragraph 13-10.
	Incorrect propeller or incorrect low pitch blade angle.	Check aircraft specification and install correct propeller with correct blade angle.
STATIC RPM TOO LOW	Governor high RPM stop set too low.	Refer to paragraph 13-13.
	Inoperative governor.	Refer to paragraph 13-10.
	Incorrect propeller or incorrect low pitch blade angle.	Check aircraft specification and install correct propeller with correct blade angle.
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 of time.
	Excessive friction in pitch changing mechanism inside propeller or excessive blade friction.	Propeller repair or replacement is required.
	Inoperative governor.	Refer to paragraph 13-10.

TROUBLE	PROBABLE CAUSE	REMEDY
OIL LEAKAGE AT PROPELLER MOUNTING FLANGE.	Damaged O-ring and seal between engine crankshaft flange and propeller.	Check visual. Remove propeller and install O-ring seal.
	Foreign material between engine crankshaft flange and propeller mating surface or mounting nuts are 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	Failed seals, gaskets, threads etc., or incorrect assembly.	Propeller repair or replacement is required.

WARNING

EXERCISE CARE WHEN WORKING WITH THE PROPELLER. ALWAYS 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. ENSURE MAGNETO SWITCH IS IN THE OFF POSITION BEFORE TURNING THE PROPELLER.

WARNING

ENSURE MAGNETOS ARE GROUNDED BEFORE TURNING PROPELLER.

13-5. REMOVAL. (Refer to figure 13-1.)

a. Remove all power from the airplane.

b. Remove spinner attaching screws (2) and remove spinner (1), spinner support (3) and spacers (4). Retain spacers (4) if so equipped.

c. Remove cowling as required for access to mounting nuts (9).

d. Loosen all mounting nuts (9) approximately 1/4 inch and pull propeller (15) forward until stopped by nuts.

NOTE:

As the propeller (15) is separated from the engine crankshaft flange, oil will drain from the propeller and engine cavities.

e. Remove all propeller mounting nuts (9) and pull propeller forward to remove from engine crankshaft (12).

f. If desired, the spinner bulkhead (11) can be removed by removing screws (10), which attach the spinner bulkhead to the propeller.

13-6. INSTALLATION. (Refer to figure 13-1.)

a. If the spinner bulkhead was removed, position bulkhead so the propeller blades will protrude through the spinner with ample clearance. Install spinner bulkhead attaching screws (10), which attach the spinner to bulkhead.

CAUTION

AVOID SCRAPING METAL FROM BORE OF SPINNER BULKHEAD AND WEDGING SCRAPINGS BETWEEN ENGINE FLANGE AND PROPELLER. TRIM THE INSIDE DIAMETER OF THE BULKHEAD AS NECESSARY WHEN INSTALLING A NEW SPINNER BULKHEAD.

b. Clean propeller hub cavity and mating surfaces of propeller and crankshaft.

c. Lightly lubricate new O-ring and the crankshaft pilot with clean engine oil and install the O-ring in the propeller hub.

WARNING

ENSURE MAGNETOS ARE GROUNDED BEFORE TURNING PROPELLER.

d. Lubricate the hub mounting studs with A-1637-16 (MIL-T-83483) grease.

CAUTION

ALL PROPELLER STUDS AND NUTS ARE REQUIRED TO BE INSTALLED WITH LUBRICATION ON THE HUB MOUNTING STUDS.

e. Align propeller mounting studs and dowel pins with proper holes in engine crankshaft flange and slide propeller carefully over crankshaft pilot until mating surfaces of propeller and crankshaft flange are approximately 1/4 inch apart.

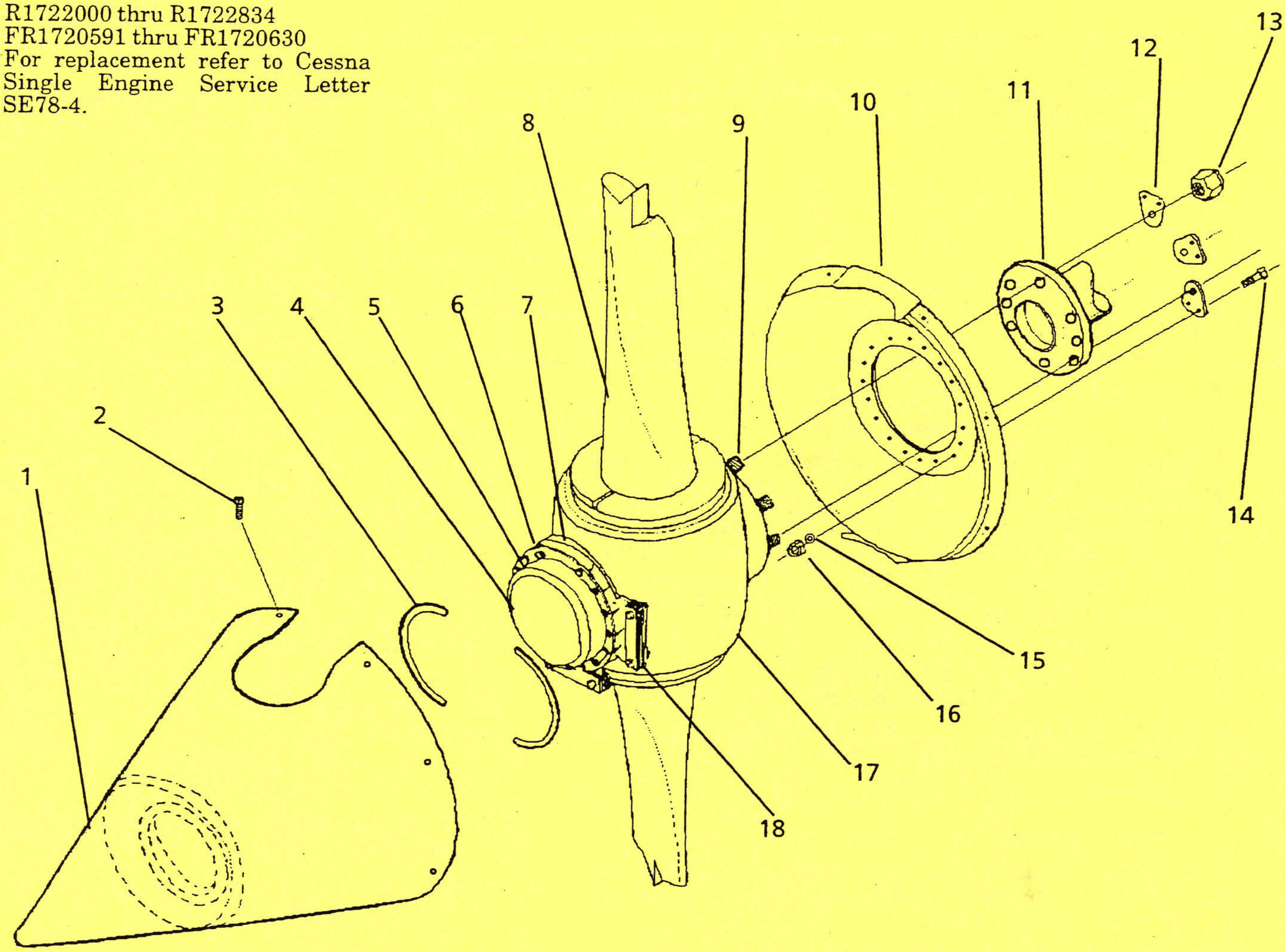
f. Install propeller attaching washers and new nuts (9) and work propeller aft as far as possible, then tighten nuts evenly.

WARNING

DO NOT USE ALL STEEL LOCKNUTS. USE ONLY NEW ELASTIC ELEMENT LOCKNUTS WHEN INSTALLING PROPELLER.

g. Torque nuts 45 to 50 lb-ft. LUBRICATED TORQUE ONLY. Refer to McCauley Service Bulletin 227, or latest revision, as applicable for propeller stud and nut torque and lubrication requirements.

R1722000 thru R1722834
FR1720591 thru FR1720630
For replacement refer to Cessna Single Engine Service Letter SE78-4.



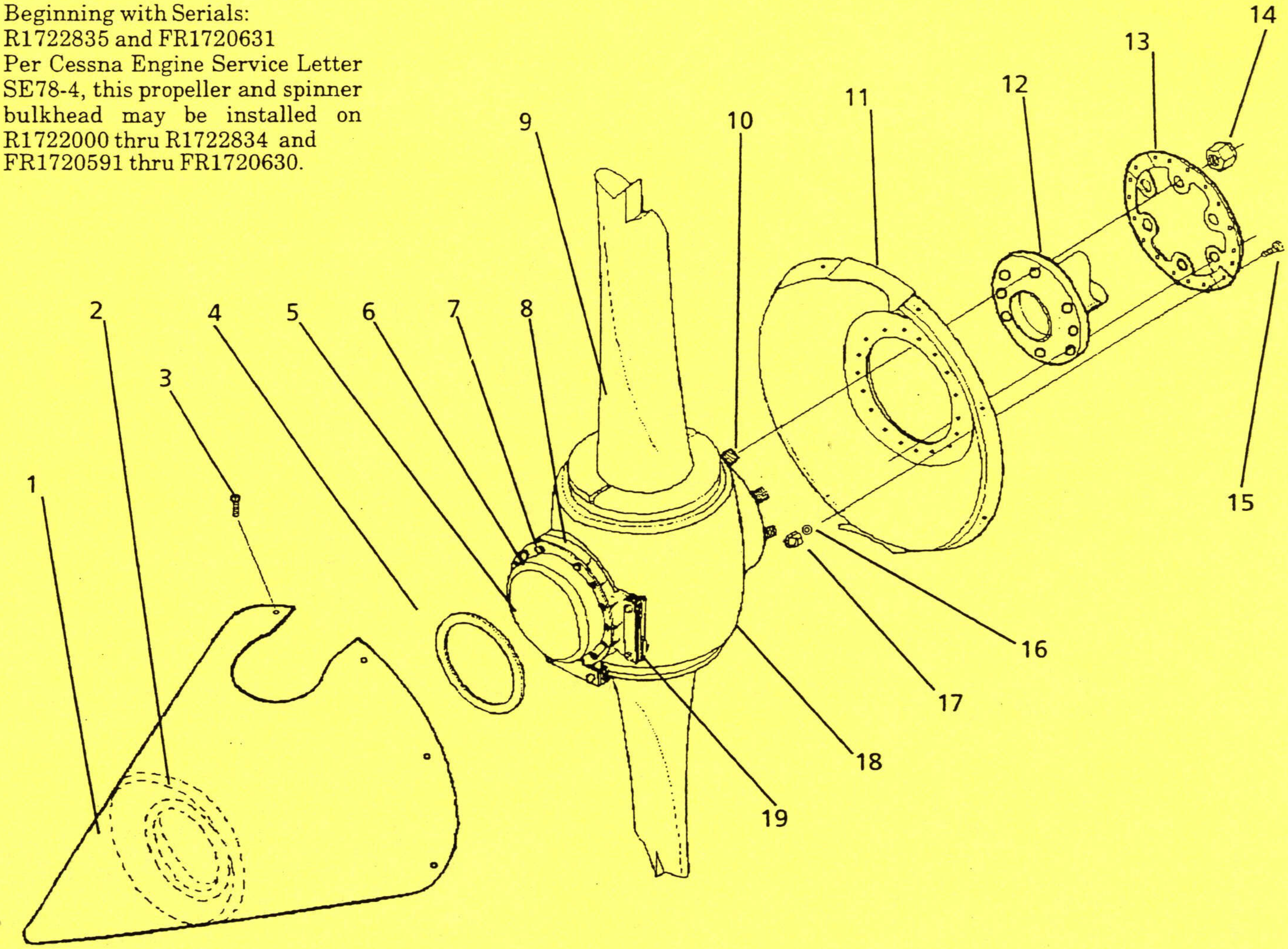
1. Spinner
2. Screw
3. Grommet
4. Cylinder
5. Cylinder Mounting Screw
6. Cylinder Ring
7. Cylinder Mounting Tube
8. propeller Blade
9. Stud
10. Spinner Bulkhead
11. Crankshaft Flange
12. Lug
13. Hub Mounting Nut
14. Bolt
15. Washer
16. Nut
17. Hub Assembly
18. Balance Weight

NOTE

Torque nuts 45 to 50 lb-ft. LUBRICATED TORQUE ONLY. Refer to McCauley Service Bulletin 227, or latest revision, as applicable for propeller stud and nut torque and lubrication requirements.

Figure 13-1. Propeller Installation (Sheet 1 of 2)

Beginning with Serials:
R1722835 and FR1720631
Per Cessna Engine Service Letter SE78-4, this propeller and spinner bulkhead may be installed on R1722000 thru R1722834 and FR1720591 thru FR1720630.

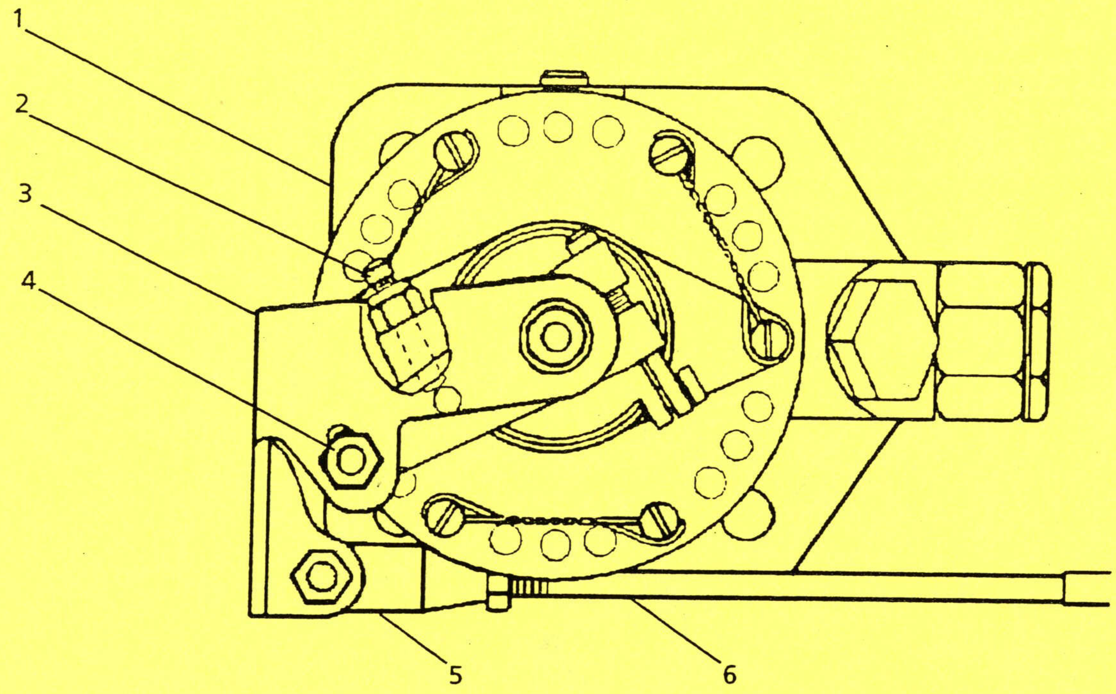


NOTE

Torque nuts 45 to 50 lb-ft. LUBRICATED TORQUE ONLY. Refer to McCauley Service Bulletin 227, or latest revision, as applicable for propeller stud and nut torque and lubrication requirements.

1. Spinner
2. Stabilizer
3. Screw
4. Grommet
5. Cylinder
6. Cylinder Mounting Screw
7. Cylinder Ring
8. Cylinder Mounting Tube
9. propeller Blade
10. Stud
11. Spinner Bulkhead
12. Crankshaft Flange
13. Lug
14. Hub Mounting Nut
15. Bolt
16. Washer
17. Nut
18. Hub Assembly
19. Balance Weight

Figure 13-1. Propeller Installation (Sheet 2 of 2)



1. Propeller Governor
2. High Speed Stop Screw
3. Governor Arm Extension
4. Nut
5. Control Rod End
6. Governor Control

Figure 13-2. Governor and Controls Adjustments

CAUTION

USE OF CROW FOOT OPEN-ENDED TORQUE WRENCHES CAN CAUSE SLIPPAGE AND LEAVE MARKS ON THE ENGINE OUTPUT FLANGE IF CARE IS NOT USED DURING THE TORQUE PROCESS.

USE PROPER CALCULATIONS WHEN USING TORQUE ADAPTERS TO ENSURE CORRECT INSTALLATION TORQUE.

TO PRODUCE CONSISTENT AND ACCURATE INSTALLATION TORQUE, MCCAULEY RECOMMENDS AN ADJUSTABLE "CLICK" TYPE WRENCH WITH NON RATCHETING, INTERCHANGEABLE, 12 POINT BOX-END WRENCH HEADS.

IT MAY BE NECESSARY TO USE VARIOUS ADAPTERS IN CERTAIN APPLICATIONS. HOWEVER, IT IS STRONGLY RECOMMENDED THAT EXTREME CAUTION BE EXERCISED TO ENSURE THAT ACCURATE TORQUE IS BEING APPLIED FOR MAXIMUM RETENTION.

ON MOST AIRPLANES, A TORQUE WRENCH CANNOT BE FITTED DIRECTLY ON THE PROPELLER MOUNTING NUT BECAUSE OF THE LACK OF CLEARANCE BETWEEN THE FLANGE AND ENGINE CASE. AN ADAPTER MUST BE USED ON THE TORQUE WRENCH.

THE USE OF A TORQUE WRENCH WITH ANY FORM OF EXTENSION REQUIRES THE TORQUE READING ON THE WRENCH TO BE CHANGED TO OBTAIN THE CORRECT TORQUE APPLIED AT THE NUT. TO OBTAIN CORRECT RESULTS REFER TO THE FORMULA IN SECTION 1.

h. Install Spinner.

1. For R1722000 thru R1722834 and FR1720591 thru FR1720630 that have not complied with Cessna Single Engine Service Letter SE78-4:
   (a.) Install spinner stabilizer, and grommet on propeller cylinder.
   (b.) Hold spinner snug against spinner support and align holes in spinner with holes in spinner bulkhead.
   (c.) Install screws and washers (if required).
   (d.) Tighten all screws uniformly around the spinner.
2. For R1722835 and On and FR1720631 and On, and earlier serial number airplanes that have complied with Cessna Single Engine Service Letter SE78-4:
   (a.) Install spacers and spinner support on propeller cylinder. If spacers are not centered mechanically (piloted), visually center and hold them until spinner support is forced firmly in place.

(b.) Hold spinner snug against spinner support and check alignment of holes in spinner with holes in spinner bulkhead. Add or remove spacers from propeller cylinder until holes are within .050 inch forward of the true center of holes in spinner bulkhead assembly.

(c.) Push on spinner to align holes and install screws and washers (if required) in three (3) or more equal spacers around the spinner bulkhead (11). Relax pressure on spinner and install remaining screws and washers (if required) in spinner.

(d.) Tighten all screws uniformly around the spinner.

13-7. TIME BETWEEN OVERHAUL (TBO). Propeller overhaul shall coincide with engine overhaul, but shall not exceed limits specified in McCauley Service Bulletin 137 and all revisions and supplements thereto.

13-8. GOVERNOR. (See Figurer 13-2.)

WARNING

EXERCISE CARE WHEN WORKING WITH THE PROPELLER. ALWAYS 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. ENSURE MAGNETO SWITCH IS IN THE OFF POSITION BEFORE TURNING THE PROPELLER.

WARNING

ENSURE MAGNETOS ARE GROUNDED BEFORE TURNING THE PROPELLER.

13-9. DESCRIPTION. The propeller governor is a single-acting, centrifugal type, which boosts oil pressure from the engine and directs it to the propeller where the oil is used to increase blade pitch. A single-acting governor uses oil pressure to effect a pitch change in one direction only; a pitch change in the opposite direction results from a combination of centrifugal twisting moment of rotating blades and compressed springs. Oil pressure is boosted in the governor by a gear type oil pump. A pilot valve, flyweight and speeder spring act together to open and close governor oil passages as required to maintain a constant engine speed.

NOTE:

Outward physical appearance of specific governors is the same, but internal parts determine whether it uses oil pressure to increase or decrease blade pitch. The propellers used on these aircraft require governors which "sense" in a certain manner. "Sensing" is determined by the type pilot valve installed inside the governor. Since the basic governor may be sent to"sense" oppositely, it is important to ascertain that the governor is correct for the propeller being used.

13-10. TROUBLESHOOTING. When troubleshooting the propeller/governor combination, it is recommended that a governor known to be in good condition be installed to check whether the propeller or the governor has failed. Removal and replacement, rigging high-speed stop adjustment, de-sludging and replacement of the governor mounting gasket are not major repairs and may be accomplished in the field. Repairs to propeller governors are classed as propeller major repairs in the Federal Aviation Regulations, which also define who may accomplish such repairs.

13-11. REMOVAL. (See Figure 13-2.)

a. Remove all electrical power from the airplane.

b. Remove cowling and engine baffles as required for access to the governor.

c. Disconnect governor control from governor extension arm.

NOTE:

Note the position of all washers so that washers may be installed in the same position on reinstallation.

d. Remove four nuts and washers securing governor from mounting studs.

e. Remove gasket from between governor and engine mounting pad.

13-12. INSTALLATION. (See Figurer 13-2.)

a. Clean mating surfaces of propeller governor and engine mounting surface.

b. Install new gasket on the mounting studs. Install gasket with the raised surface of the gasket screen toward the governor.

CAUTION

DO NOT FORCE GOVERNOR SPLINE ENGAGEMENT. ROTATE THE ENGINE CRANKSHAFT SLIGHTLY AND SPLINES WILL MESH SMOOTHLY WHEN PROPERLY ALIGNED.

c. Position governor on the mounting studs, aligning governor drive splines in the engine and install mounting nuts and washers. Do not force spline engagement. Rotate engine crankshaft as required to properly align the propeller drive splines.

d. Connect governor control to governor arm extension and rig control as outlined in paragraph 13-14.

e. Reinstall all items removed for access.

13-13. HIGH RPM STOP ADJUSTMENT.

WARNING

EXERCISE CARE WHEN WORKING WITH THE PROPELLER. ALWAYS 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. ENSURE MAGNETO SWITCH IS IN THE OFF POSITION BEFORE TURNING THE PROPELLER.

WARNING

ENSURE MAGNETOS ARE GROUNDED BEFORE TURNING THE PROPELLER.

a. Remove engine cowling and baffles as required for access.

b. Remove safety wire and loosen the high speed screw locknut.

c. Turn the stop screw IN (clockwise) to decrease maximum RPM and OUT (counterclockwise) to increase maximum RPM. One full turn of the stop screw causes a change of approximately 25 RPM.

d. Tighten stop screw locknut, safety wire stop screw and make propeller control linkage adjustment as necessary to maintain full travel.

e. Install baffles and cowling.

f. Functionally test the propeller and governor.

NOTE:

It is possible for either the propeller low pitch (high RPM) stop or the governor high RPM stop to be the high RPM limiting factor. It is desirable for the governor stop to limit the high RPM at the maximum rated RPM for a particular aircraft. Due to climatic conditions, field elevation, low pitch blade angle and other considerations, an engine may not reach rated RPM on the ground. It may be necessary to adjust the governor stop after test flying to obtain maximum rated RPM when airborne.

13-14. RIGGING PROPELLER CONTROL.

WARNING

EXERCISE CARE WHEN WORKING WITH THE PROPELLER. ALWAYS 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. ENSURE MAGNETO SWITCH IS IN THE OFF POSITION BEFORE TURNING THE PROPELLER.

CAUTION

THE PROPELLER CONTROL HAS A SMALL RETAINING RING BRAZED (OR ATTACHED WITH EPOXY RESIGN) NEAR THE THREADED END (ENGINE END) OF THE CONTROL. THE PURPOSE OF THIS RETAINING RING IS TO PREVENT INADVERTENT WITHDRAWAL AND POSSIBLE DAMAGE TO THE KNOB END OF THE CONTROL WHILE JAM NUTS AND ROD END IS REMOVED.

a. Disconnect governor control from governor extension arm.

b. Place propeller governor control, in cabin, full forward, then pull back approximately 1/8 inch. This will allow "cushion" to assure full contact of the governor arm with the governor high RPM stop screw.

c. Place governor arm against the high RPM stop screw.

d. Loosen jam nut and adjust control rod end until attaching holes align while governor arm is against the high RPM stop screw. Be sure to maintain sufficient thread engagement of the control and rod end. If necessary, shift control in the clamps to achieve this.

e. Attach rod end to the governor arm extension. Be sure all washers are installed correctly.

f. Operate the control to see that the governor arm bottoms out against the high pitch stop on the governor before reaching the end of control cable travel.

NOTE:

The governor is equipped with an offset extension to the governor arm. The offset extension has an elongated slot to permit further adjustment. The proceeding steps may still be used as an outline in the rigging procedure. The result of rigging, in all cases , is full travel of the governor arm (bottom out against both high and low pitch stops) with some "cushion " at both ends of control travel.

13-15. TIME BETWEEN OVERHAUL (TBO).

Propeller governing overhaul should, as much as practicable, coincide with engine overhaul, but shall not exceed 1800 hours of service. Refer to Section 11 for engine time between overhaul (TBO) periods. The governor overhaul manual is available from Cessna Parts Distribution.

SECTION 14

UTILITY SYSTEMS

TABLE OF CONTENTS

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.

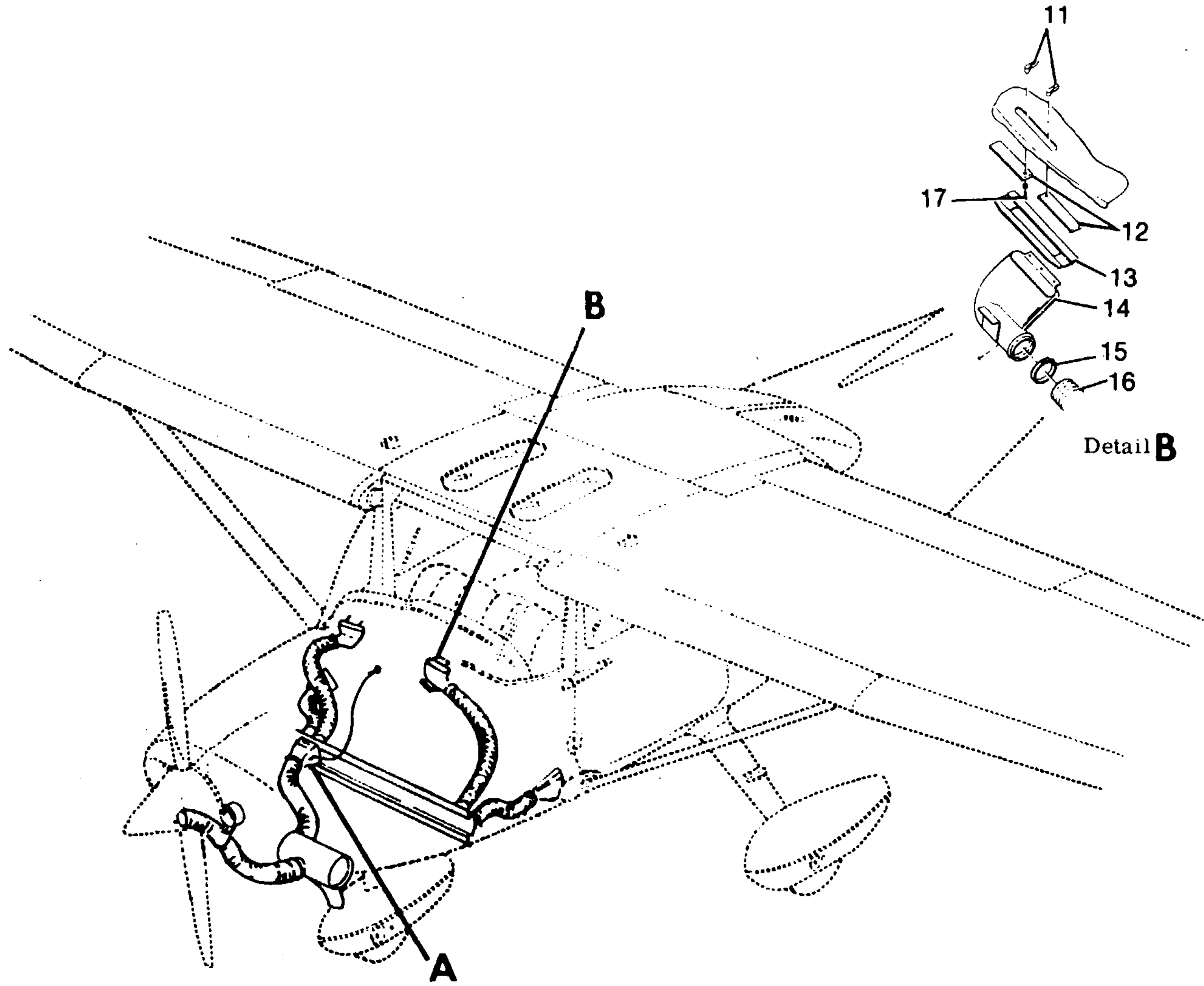
14-4. SYSTEM OPERATION. Ram air is ducted through an engine baffle inlet and heat exchange section of the exhaust muffler, to the shut-off valve at the firewall. The heated air flows from the shut-off valve into a duct across the aft side of the firewall, where it is distributed into the cabin. The shut-off valve, operated by a push-pull control marked "CABIN HT," 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, defrosting and ventilating systems are caused by sticking or binding air valves and/or 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 that valves respond freely to control movement, that they move in the correct direction, and that they move through their complete 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 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 shut-off valves or openings at the firewall with Pro-Seal #700 (Coast Pro-Seal Co., Los Angeles, California) compound, or equivalent.

14-6. REMOVAL, REPAIR AND INSTALLATION. The heating and defrosting systems are illustrated in figure 14-1. The figure may be used as a guide for removal, repair or installation of system components. Burned, frayed or crushed hose must be replaced with new hose, cut to correct length and installed in the original routing. Trim hose windings shorter than complete hose length to allow clamps to be installed. Defective air valves should be repaired or replaced. Check for correct operation of valves and their controls after repair and/or installation.

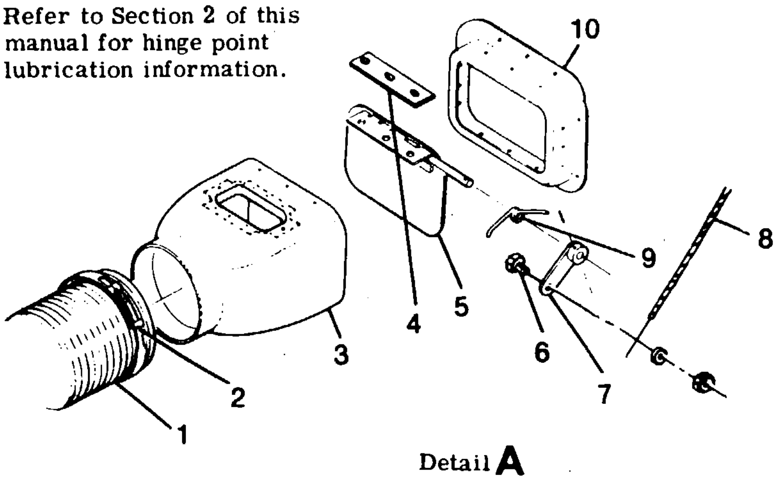
14-7. DEFROSTER SYSTEM.

14-8. DESCRIPTION. The defrosting system is comprised of a duct across the aft side of the firewall, defroster outlets, mounted on the cowl deck, immediately aft of the windshield, and flexible ducting connecting the system.



NOTE

Refer to Section 2 of this manual for hinge point lubrication information.



1. Heater Hose
2. Clamp
3. Valve Body
4. Shim
5. Valve Plate
6. Clamp Bolt
7. Control Arm
8. Cabin Heat Control
9. Valve Spring
10. Valve Seat
11. Knob
12. Valve
13. Valve Guide
14. Nozzle
15. Clamp
16. Defroster Hose
17. Screw

Figure 14-1. Heating and Defrosting Systems

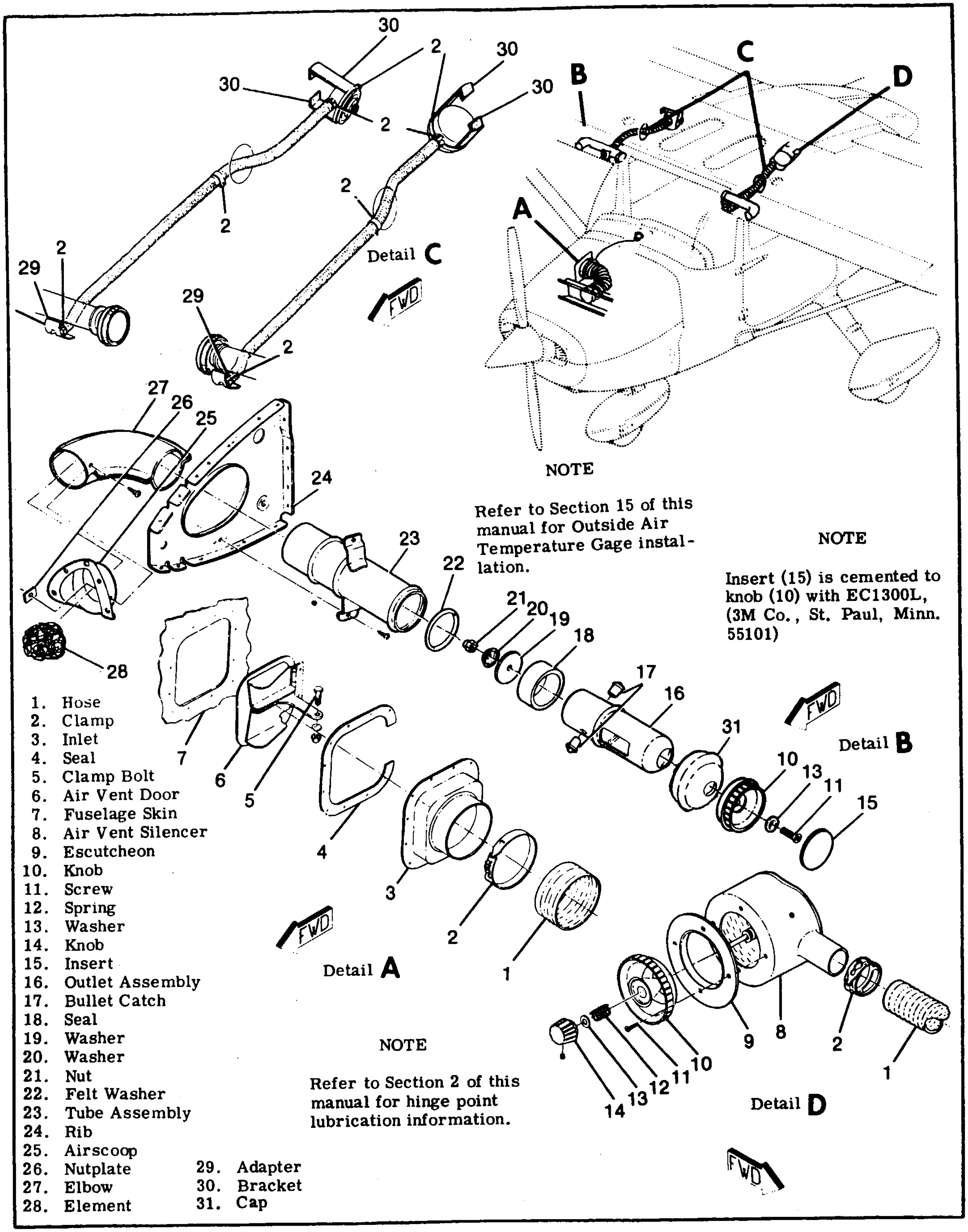


Figure 14-2. Ventilating Systems

14-9. SYSTEM OPERATION. Air from the duct across the aft side of the firewall flows through the flexible ducting to the defroster outlet. Temperature and volume of this air is controlled by settings of the heater system control.

14-10. TROUBLE SHOOTING. Since the defrosting system depends on proper operation of the heating system, trouble shooting procedures outlined in paragraph 14-5 should be followed for checking the defroster system.

14-11. REMOVAL, REPAIR AND INSTALLATION. The defroster system is illustrated in figure 14-1 in conjunction with the heating system. The figure may be used as a guide for removal, repair or installation of system components. Burned, frayed or crushed hose must be replaced with new hose, cut to correct length and installed in the original routing. Trim hose windings shorter than complete hose length to allow clamps to be installed. A defective defroster outlet should be repaired or replaced. Check for correct operation of control after repair and/or installation.

4-12. VENTILATING SYSTEMS.

14-13. DESCRIPTION. Three separate systems are installed for cabin ventilation. One system is comprised of an airscoop, located in each wing root fillet, with flexible ducting connecting each airscoop to an adjustable air vent silencer unit, located on each side of the rear cabin area. Another system is comprised of an airscoop, located in the leading edge of each wing, just outboard of the airscoop in the wing root fillets. These airscoops are connected to cabin outlets, installed on each side of the cabin, near the upper corners of the windshield. These outlets are manually-adjustable with knobs on the outlet assemblies. A third system is comprised of a fresh airscoop door on the right side of the fuselage, just forward of the copilot seat. Flexible ducting connects this airscoop to the duct across the aft side of the firewall. This system is controlled by a push-pull control on the instrument panel.

14-14. SYSTEMS OPERATION. Heating, defrosting and ventilating systems work together to provide the conditions desired by the pilot. The heating system, defrosting system and one ventilating system receive air from the duct across the aft side of the firewall. As long as the "CABIN HT" control is pushed in, no heated air can enter the firewall duct; therefore, if the "CABIN AIR" control (to the scoop door on the right forward fuselage) is pulled out, only fresh air from the scoop will flow through the duct into the cabin. As the "CABIN HT" 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. Rear seat ventilation is provided by air vent silencer assemblies, mounted in the left and right rear cabin wing root areas. These units receive ram air from the airscoops in the wing root fillets. Each silencer assembly is equipped with a valve which meters incoming cabin ventilating air, which greatly reduces inlet air noise. The outlet assemblies, installed near the upper corners of the windshield are manually-operated, increasing or decreasing flow of ram air into the cabin.

14-15. TROUBLE SHOOTING. Most of the operational troubles in the ventilating systems are caused by sticking or binding of the inlet scoop door or its control. Check 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 could 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, REPAIR AND INSTALLATION. The ventilating system is illustrated in figure 14-2. The figure may be used as a guide for removal, repair or installation of system components. A defective ventilator or scoop must be repaired or replaced. Check for proper operation of controls after repair and/or installation.

14-17. AIR CIRCULATING FAN SYSTEM. (See figure 14-3.)

14-18. DESCRIPTION. An optional cabin ventilating fan may be located above the extended baggage compartment. This system consists of a high-speed blower and overhead ductwork, similar to that offered with the air conditioning option. This fan only circulates air and no cooling components are attached. The blower is controlled by a four-position switch, located on the pilot's console. The four switch positions are labeled HI, MED, LOW and OFF.

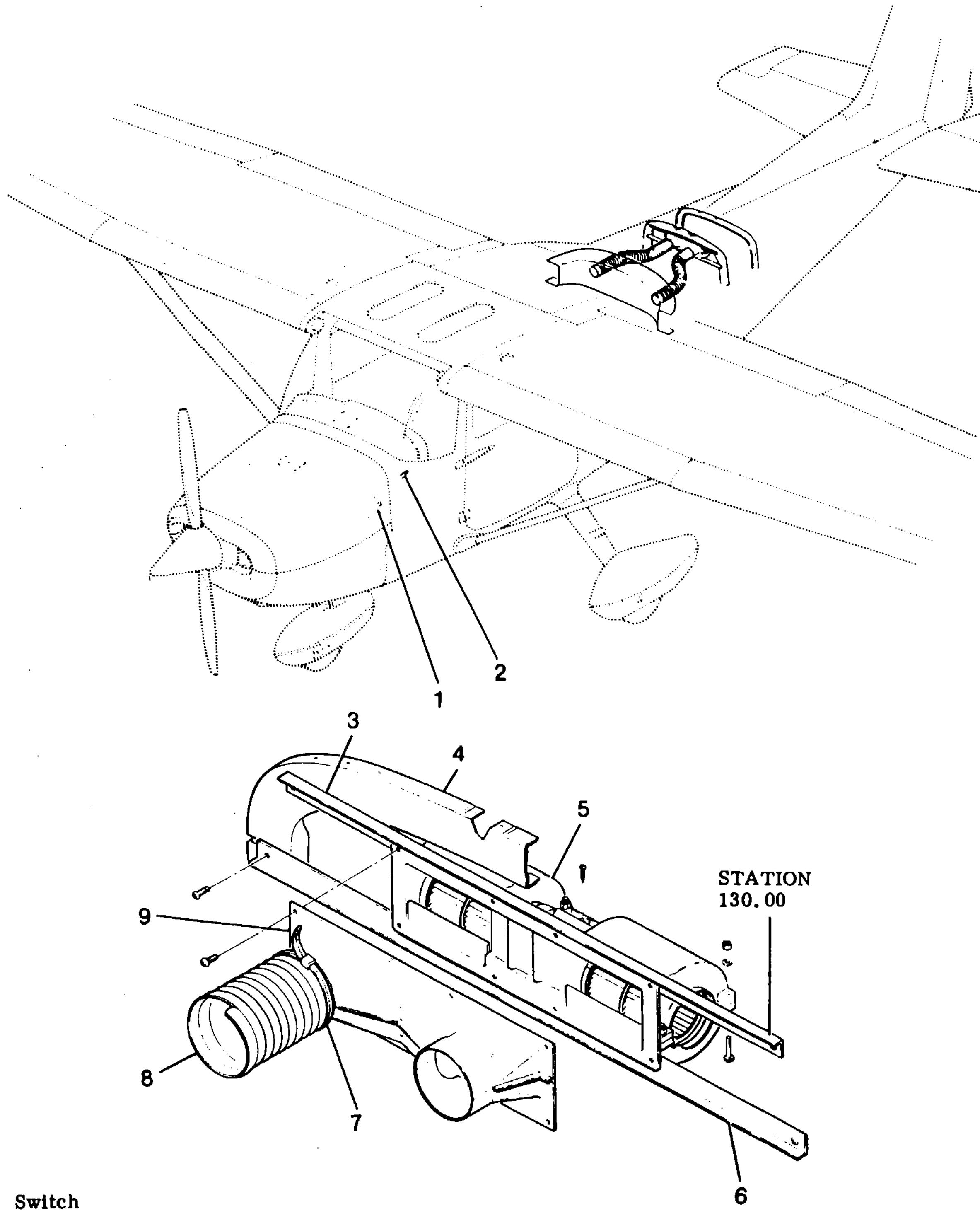
14-19. REMOVAL. (See figure 14-3.) Access to the blower assembly and ducting is gained through the baggage door.

a. Remove baggage compartment panel.
b. Disconnect forward and aft ends of hoses (8) by removing hose clamps.
c. Remove 8 screws attaching blower assembly (5) and duct assembly (9) to supports (3) and (6).
d. Remove lower support (6).
e. Disconnect electrical connections.
f. Remove blower assembly.

14-20. INSPECTION AND REPAIR. Hoses should be checked for security, and replaced if frayed or crushed. Check that hose clamps are properly tightened. Check electrical connections, and check that blower fans rotate freely.

14-21. INSTALLATION. (See figure 14-3.)

a. Install blower unit (5) and duct assembly (9) to upper support (3).
b. Connect electrical connections.
c. Install lower support (6), and attach blower assembly and duct (9).
d. Install hoses and hose clamps.
e. Install baggage compartment panel.



1. Switch
2. Circuit Breaker
3. Support
4. Bulkhead
5. Blower Assembly
6. Support
7. Clamp
8. Duct
9. Duct Assembly

Figure 14-3. Circulating Fan Installation

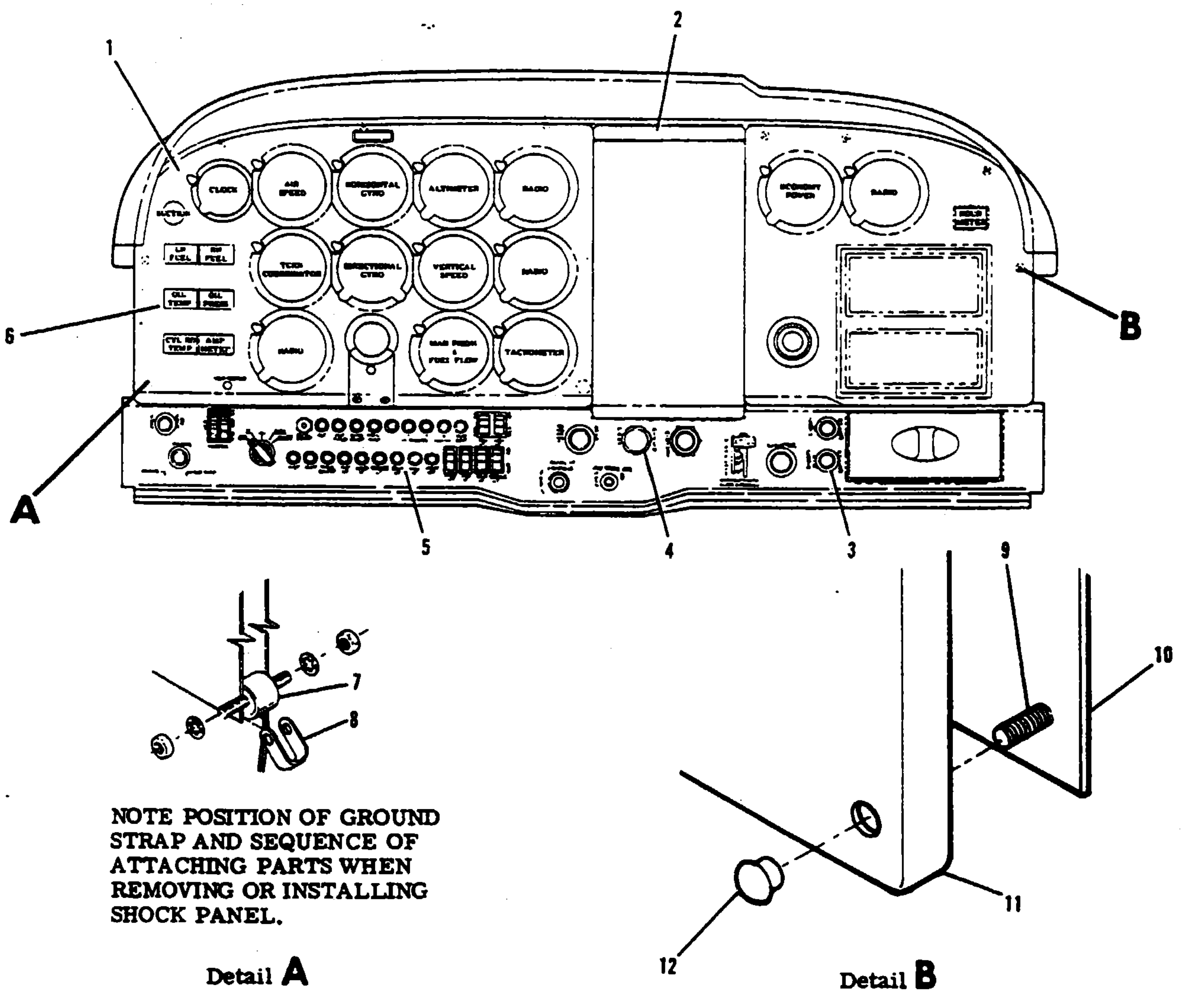
SECTION 15

INSTRUMENTS AND INSTRUMENT SYSTEMS

TABLE OF CONTENTS

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.



1. Shock-Mounted Panel
2. Radio Panel
3. Heating and Ventilating Controls
4. Engine Controls
5. Switch and Circuit Breaker Panel
6. Engine Instruments
7. Shock-Mount
8. Ground Strap
9. Stud
10. Instrument Panel
11. Decorative Cover
12. Threaded Button

Figure 15-1. Typical Instrument Panel

15-3. INSTRUMENT PANEL.

15-4. DESCRIPTION. The instrument panel assembly consist of a stationary and shock-mounted panel. The stationary panel contains instruments which are NOT sensitive to vibration. The shock-mounted panel contains major flight instruments such as horizontal and directional gyros which are affected by vibration. Most of the instruments are screw-mounted on the panel backs.

15-5. REMOVAL AND INSTALLATION. (Refer to figure 15-1.) The stationary panel is secured to engine mount stringers and a forward fuselage bulkhead and ordinarily is not considered removable. The shock-mounted panel is secured to the stationary panel with rubber shock-mounted assemblies. To remove shock-mounted panel proceed as follows:

a. Unscrew threaded buttons securing decorative cover and remove cover.
b. Remove nuts and washers from shock-mounts.
c. Tag and disconnect instrument wiring.
d. Disconnect plumbing and cap all open fittings and lines.
e. Pull panel straight back to remove.
f. For installation reverse the preceding procedure. Ensure ground strap is properly installed.

15-6. SHOCK MOUNTS. Service life of instruments is directly related to adequate shock-mounting of panel. If removal of panel is necessary, check mounts for deterioration.

15-7. INSTRUMENTS.

15-8. REMOVAL. (Refer to figure 15-1.) Most instruments are secured to panel with screws inserted through panel face. 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, disconnect 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 Cessna Service Parts Center.

When replacing an electrical gage in an instrument cluster assembly, avoid bending pointer or dial plate. Distortion of dial or back plate could change calibration of gages.

15-10. PITOT AND STATIC SYSTEMS. (Refer to figure 15-2.)

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 source buttons to collect condensation in static system. A pitot tube heater may be installed. The heating element is controlled by a switch at instrument panel and powered by the electrical system. An alternate static source valve may be installed in the static system for use when the external static source is malfunctioning. Refer to the Owner's Manual for flight operation using the alternate static source.

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 prinicpal 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 alternations 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. Close static pressure alternate source control, if installed.
d. Attach a source of suction to static pressure

source opening, place a piece of tape over other opening. Figure 15-3 shows method of obtaining suction.
e. 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 airpseed indicator.

f. 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.
g. If leakage rate is within tolerance, slowly release suction source.

NOTE

If leakage rate exceeds maximum allowable, first tighten all connections, then repeat leakage test. If leakage rate still exceeds maximum allowable, use following procedure.

h. 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.
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.
j. Attach a source of positive pressure to static source opening. Figure 15-3 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.

k. 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 solution of mild soap and water, watching for bubbles to locate leaks.
l. Tighten leaking connections. Repair or replace parts found defective.
m. Reconnect airspeed and vertical speed indicators into static pressure system and repeat leakage test per steps "c" thru "g".

15-14. PITOT SYSTEM INSPECTION AND LEAKAGE TEST. To check pitot system for leaks, place a piece of taps 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 leak in system, check all connections for tightness.

15-15. BLOWING OUT LINES. Although 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 line, disconnect at airspeed indicator. Using low pressure air, blow from indicator end of line toward pitot tube.

CAUTION

Never blow through pitot or static lines toward instruments.

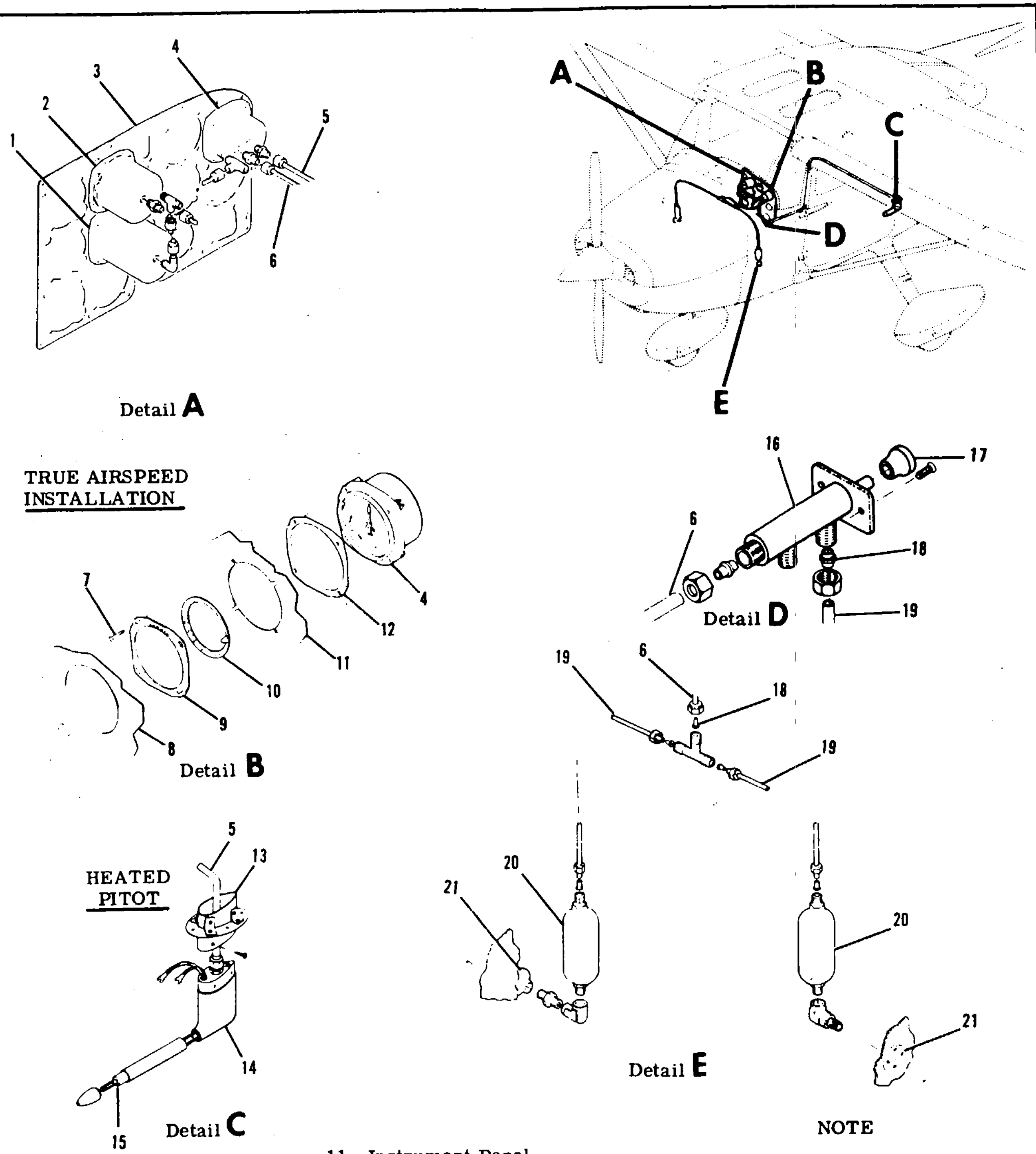
Like pitot lines, static pressure lines must be kept clear and connections tight. All models have a static source sump which collects moisture and keeps system clear. However, when necessary, disconnect static line at first instrument to which it is connected, then blow line clear with low-pressure air. 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. (Refer to figure 15-2.) To remove pitot mast remove four mounting screws on side of connector (13) and pull mast out of connector far enough to disconnect pitot line (5). 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 from wing. The tubing may be removed intact by drawing it out through cabin and right door. 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. ENCODING ALTIMETER.

15-18. DESCRIPTION. An encoding altimeter may be installed which is also connected to static system pressure. The encoding altimeter supplies coded altitude signals to the aircraft's transponder for transmission to ground based interrogating radar. The encoding altimeter installation requires the use of a fully operational secondary altimeter as backup.

15-19. REMOVAL AND INSTALLATION. Figure 15-2, sheet 2 may be used as a guide for removal and installation of the encoding altimeter.



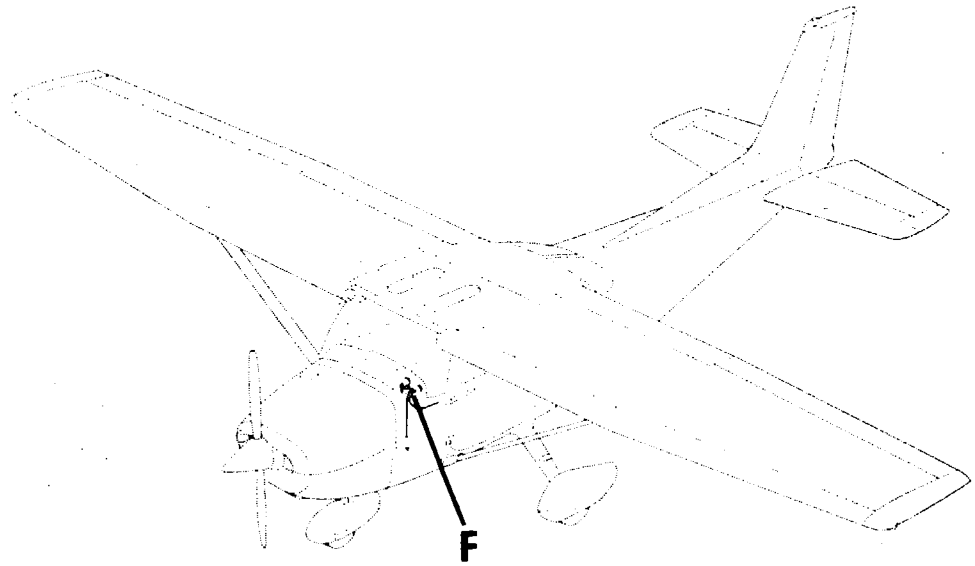
1. Vertical Speed Indicator
2. Altimeter
3. Shock-Mounted Panel
4. Airspeed Indicator
5. Pitot Line
6. Static Line
7. Mounting Screw
8. Cover
9. Retainer
10. True Airspeed Ring
11. Instrument Panel
12. Spacer
13. Connector
14. Mast Body
15. Heater Element
16. Valve
17. Knob
18. Insert
19. Line (to Sump)
20. Static Sump
21. Flange

NOTE

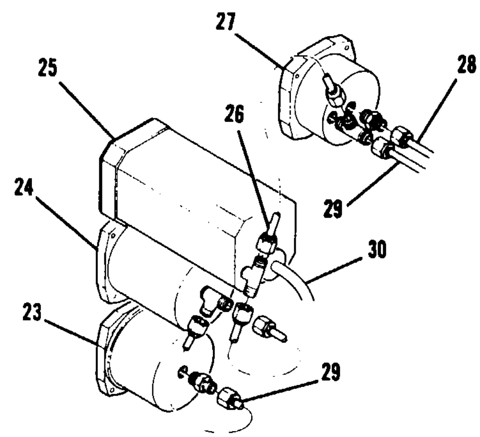
Do not overtighten screws (7) and do not lubricate any parts.

Use spacers (12) as required for adequate friction on ring assembly (10).

Figure 15-2. Pitot Static Systems (Sheet 1 of 2)



ENCODING ALTIMETER INSTALLATION



Detail F

23. Backup Altimeter
24. Vertical Speed Indicator
25. Encoding Altimeter
26. Static Line
27. Airspeed Indicator
28. Pitot Line
29. Static Line
30. Cable (to Transponder)

Figure 15-2. Pitot Static Systems (Sheet 2 of 2)

15-20. TROUBLE SHOOTING--PITOT STATIC SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
LOW OR SLUGGISH AIRSPEED INDICATION. (Normal altimeter and vertical speed.)	Pitot tube obstructed, leak or obstruction in pitot line.	Test pitot tube and line for leaks or obstructions. Blow out tube and line, repair or replace damaged line.
INCORRECT OR SLUGGISH RESPONSE. (all three instruments.)	Leaks or obstruction in static line.	Test line for leaks and obstructions. Repair or replace line, blow out obstructed line.

15-21. TRUE AIRSPEED INDICATOR.

15-22. DESCRIPTION. The true airspeed indicator is equipped with a conversion ring, which may be 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.

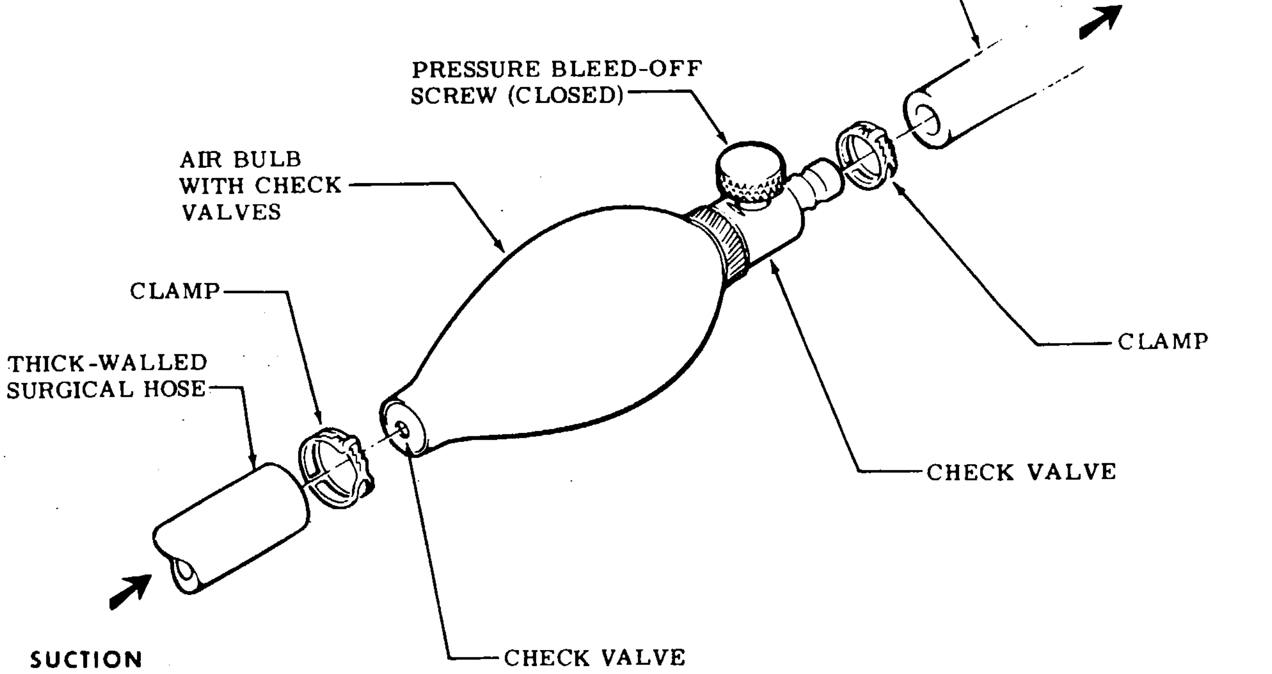
15-23. REMOVAL AND INSTALLATION. (Refer to figure 15-2.) Upon installation, before tightening mounting screws (7), calibrate instrument as follows: Rotate ring (10) until 105 knots on the adjustment ring aligns with 105 knots on the indicator. Holding this setting, move retainer (9) until 60°F aligns with zero pressure altitude, then tighten mounting screws (7) and replace decorative cover (8).

15-24. TROUBLE SHOOTING--AIRSPEED INDICATOR.

TROUBLE	PROBABLE CAUSE	REMEDY
HAND FAILS TO RESPOND.	Pitot pressure connection not properly connected to pressure line from pitot tube.	Test line and connection for leaks. Repair or replace damaged line, tighten connections.
	Pitot or static lines clogged.	Check line for obstructions. Blow out lines.
INCORRECT INDICATION OR HAND OSCILLATES.	Leak in pitot or static lines.	Test lines and connections for leaks. Repair or replace damaged lines, tighten connections.
	Defective mechanism or leaking diaphragm.	Substitute known-good indicator and check reading. Replace instrument.
HAND VIBRATES.	Excessive vibration.	Check panel shock mounts. Replace defective shock mounts.
	Excessive tubing vibration.	Check clamps and line connections for security. Tighten clamps and connections, replace tubing with flexible hose.

NOTE

Air bulb with check valves may be obtained locally from a surgical supply company. This is the type used in measuring blood pressure.



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 15-3. Static Test Equipment

15-25. TROUBLE SHOOTING--ALTIMETER

TROUBLE	PROBABLE CAUSE	REMEDY
INSTRUMENT FAILS TO OPERATE.	Static line plugged.	Check line for obstructions. Blow out lines.
	Defective mechanism.	Substitute known-good altimeter and check reading. Replace instrument.
INCORRECT INDICATION.	Hands not carefully set.	Reset hands with knob.
	Leaking diaphragm.	Substitute known-good altimeter and check reading. Replace instrument.
	Pointers out of calibration.	Compare reading with known-good altimeter. Replace instrument.
HAND OSCILLATES.	Static pressure irregular.	Check lines for obstruction or leaks. Blow out lines, tighten connections.
	Leak in airspeed or vertical speed indicator installations.	Check other instruments and system plumbing for leaks. Blow out lines, tighten connections.

15-26. TROUBLE SHOOTING--VERTICAL SPEED INDICATOR.

TROUBLE	PROBABLE CAUSE	REMEDY
INSTRUMENT FAILS TO OPERATE.	Static line plugged.	Check line for obstructions. Blow out lines.
	Static line broken.	Check line for damage, connections for security. Repair or replace damaged line, tighten connections.
INCORRECT INDICATION.	Partially plugged static line.	Check line for obstructions. Blow out lines.
	Ruptured diaphragm.	Substitute known-good indicator and check reading. Replace instrument.
	Pointer off zero.	Reset pointer to zero. Reset pointer to zero.
POINTER OSCILLATES.	Partially plugged static line.	Check line for obstructions. Blow out lines.

15-26. TROUBLE SHOOTING--VERTICAL SPEED INDICATOR. (Cont)

TROUBLE	PROBABLE CAUSE	REMEDY
POINTER OSCILLATES. (cont).	Leak in static line.	Test lines and connections for leaks. Repair or replace damaged lines, tighten connections.
	Leak in instrument case.	Substitute known-good indicator and check reading. Replace instrument.
HAND VIBRATES.	Excessive vibration.	Check shock mounts. Replace defective shock mounts.
	Defective diaphragm.	Substitute known-good indicator and check for vibration. Replace instrument.

15-27. TROUBLE SHOOTING--PITOT TUBE HEATER.

TROUBLE	PROBABLE CAUSE	REMEDY
TUBE DOES NOT HEAT OR CLEAR ICE.	Switch turned "OFF."	Turn switch "ON."
	Open circuit breaker.	Reset circuit breaker.
	Break in wiring.	Test for open circuit. Repair wiring.
	Heating element burned out.	Check resistance of heating element. Replace element.

15-28. VACUUM SYSTEM.

15-29. DESCRIPTION. Suction to operate the gyros is provided by a dry-type engine-driven vacuum pump, gear-driven through a spline-type coupling. A suction relief valve, to control system pressure, is connected between the pump inlet and the instruments. In the cabin, the vacuum line is routed from gyro instruments to the relief valve at the firewall. A throw away type central air filtering unit is installed. 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. In addition, airplanes R1722000 and On and FR1720591 and On incorporating SK172-87 have a red low-vacuum light installed on the instrument panel. The light is controlled by a vacuum switch mounted on the back of the gyro horizon. The switch contacts are normally closed. The light may be checked by turning ON the master switch. The light illuminates when suction drops below approximately 3.0 inches of mercury.

15-30. TROUBLE SHOOTING--VACUUM SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
HIGH SUCTION GAGE READINGS.	Gyros function normally-relief valve screen clogged, relief valve malfunction.	Check screen, then valve. Compare gage readings with new gage. Clean screen, reset valve. Replace gage.
NORMAL SUCTION GAGE READING, SLUGGISH OR ERRATIC GYRO RESPONSE.	Instrument air filters clogged.	Check Filter. Replace if Required.
LOW SUCTION GAGE READINGS.	Leaks or restriction between instruments and relief valve, relief valve out of adjustment, defective pump.	Check lines for leaks, disconnect and test pump. Repair or replace lines, adjust or replace relief valve, repair or replace pump.
	Central air filter dirty.	Check Filter. Replace if required.
SUCTION GAGE FLUCTUATES.	Defective gage or sticking relief valve.	Check suction with test gage. Replace gage. Clean sticking valve with Stoddard solvent. Blow dry and test. If valve sticks after cleaning, replace valve.

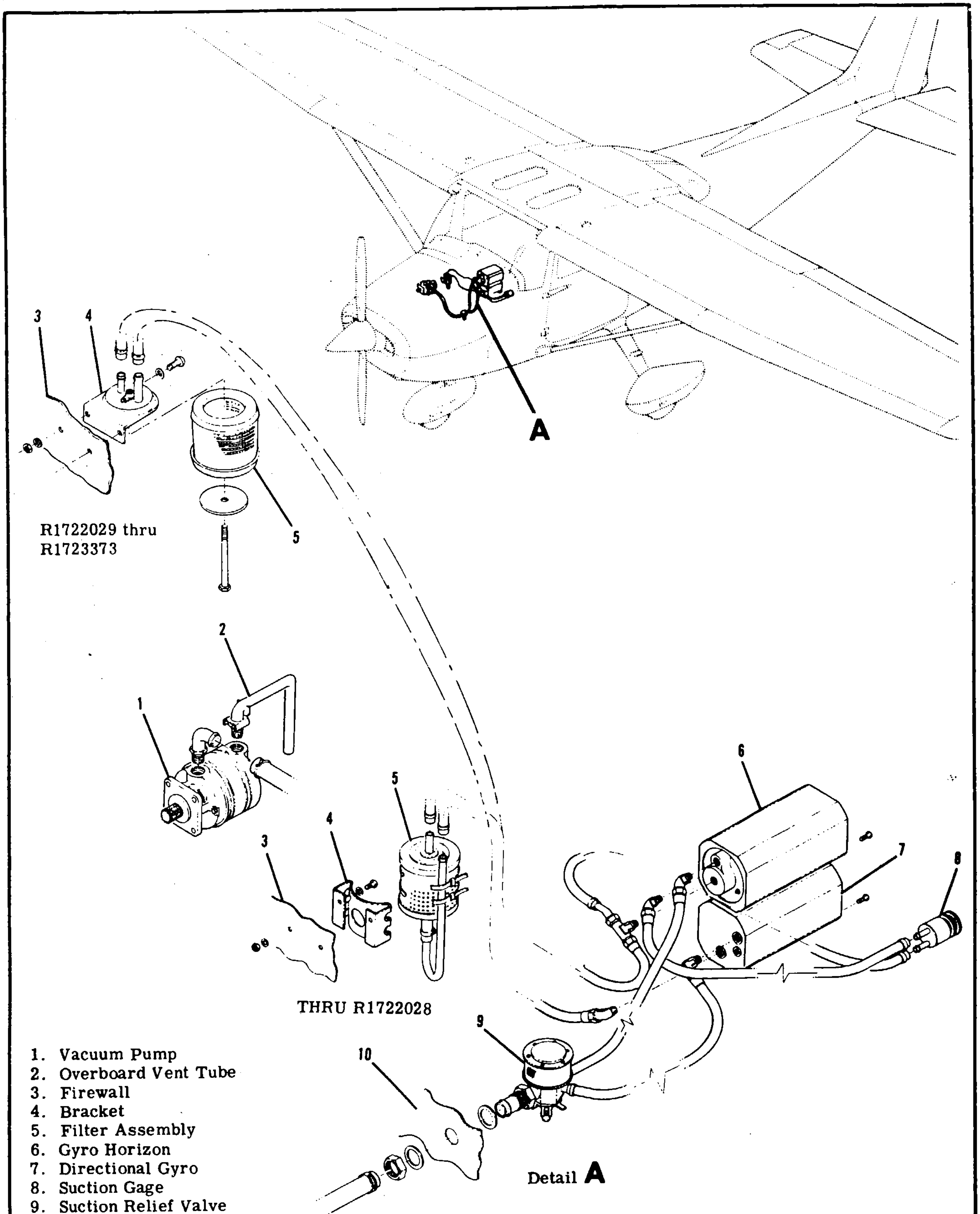
15-31. TROUBLE SHOOTING--GYROS.

TROUBLE	PROBABLE CAUSE	REMEDY
HORIZON BAR FAILS TO RESPOND.	Central filter dirty.	Check Filter. Replace if Required.
	Suction relief valve improperly adjusted.	Adjust or replace relief valve.
	Faulty suction gage.	Substitute known-good suction gage and check gyro response. Replace suction gage.
	Vacuum pump failure.	Check pump. Replace pump.
	Vacuum line kinked or leaking.	Check lines for damage and leaks. Repair or replace damaged lines, tighten connections.
HORIZON BAR DOES NOT SETTLE.	Defective mechanism.	Substitute known-good gyro and check indication. Replace instrument.
	Insufficient vacuum.	Adjust or replace relief valve.
	Excessive vibration.	Check panel shock-mounts. Replace defective shock-mounts.

15-31. TROUBLE SHOOTING--GYROS. (Cont).

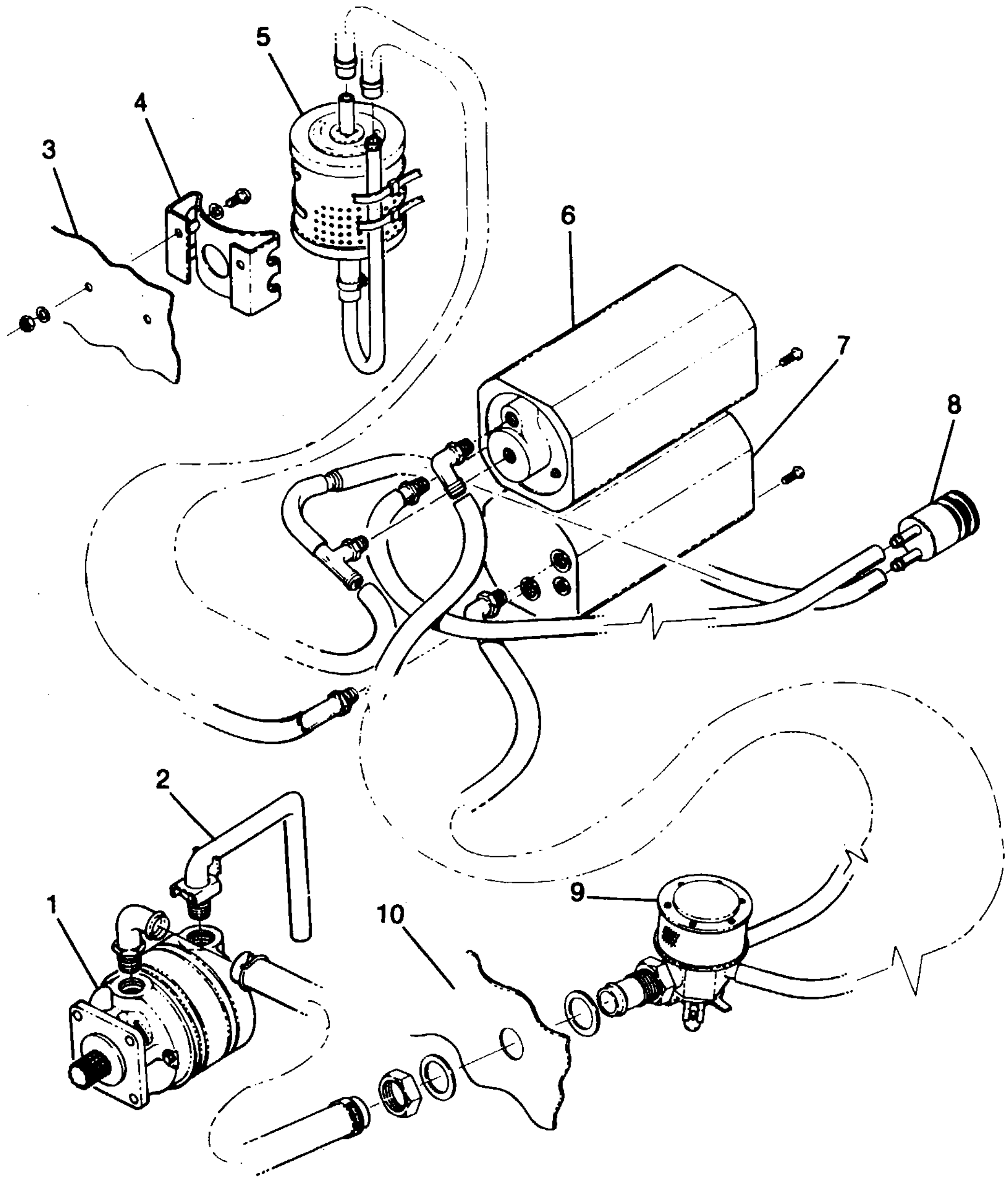
TROUBLE	PROBABLE CAUSE	REMEDY
HORIZON BAR OSCILLATES OR VIBRATES EXCESSIVELY.	Central filter dirty.	Check Filter. Replace if Required.
	Suction relief valve improperly adjusted.	Adjust or replace relief valve.
	Faulty suction gage.	Substitute known-good suction gage and check gyro indication. Replace suction gage.
	Defective mechanism.	Substitute known-good gyro and check indication. Replace instrument.
	Excessive vibration.	Check panel shock-mounts. Replace defective shock-mounts.
EXCESSIVE DRIFT IN EITHER DIRECTION.	Central air filter dirty.	Check Filter. Replace if Required.
	Low vacuum, relief valve improperly adjusted.	Adjust or replace relief valve.
	Faulty suction gage.	Substitute known-good suction gage and check gyro indication. Replace suction gage.
	Vacuum pump failure.	Check pump. Replace pump.
	Vacuum line kinked or leaking.	Check lines for damage and leaks. Repair or replace damaged lines, tighten connections.
DIAL SPINS IN ONE DIRECTION CONTINUOUSLY.	Operating limits have been exceeded.	Replace instrument.
	Defective mechanism.	Substitute known-good gyro and check indication. Replace instrument.

SHOP NOTES:



1. Vacuum Pump
2. Overboard Vent Tube
3. Firewall
4. Bracket
5. Filter Assembly
6. Gyro Horizon
7. Directional Gyro
8. Suction Gage
9. Suction Relief Valve
10. Firewall

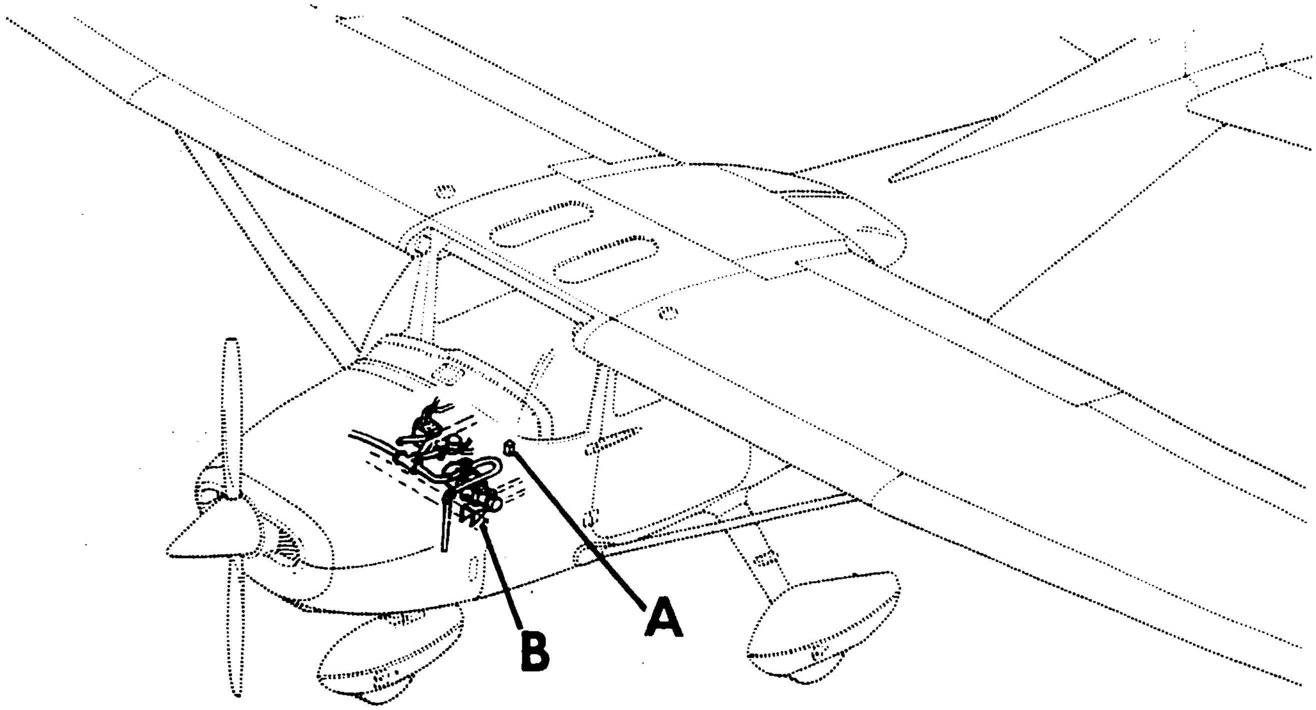
Figure 15-4. Vacuum System (Sheet 1 of 2)



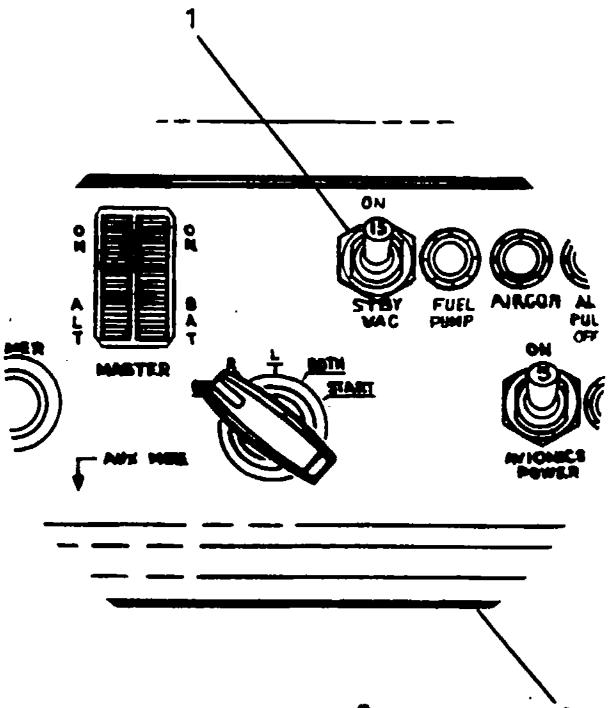
Detail **A**

BEGINNING WITH R1723374

Figure 15-4. Vacuum System (Sheet 2 of 2)

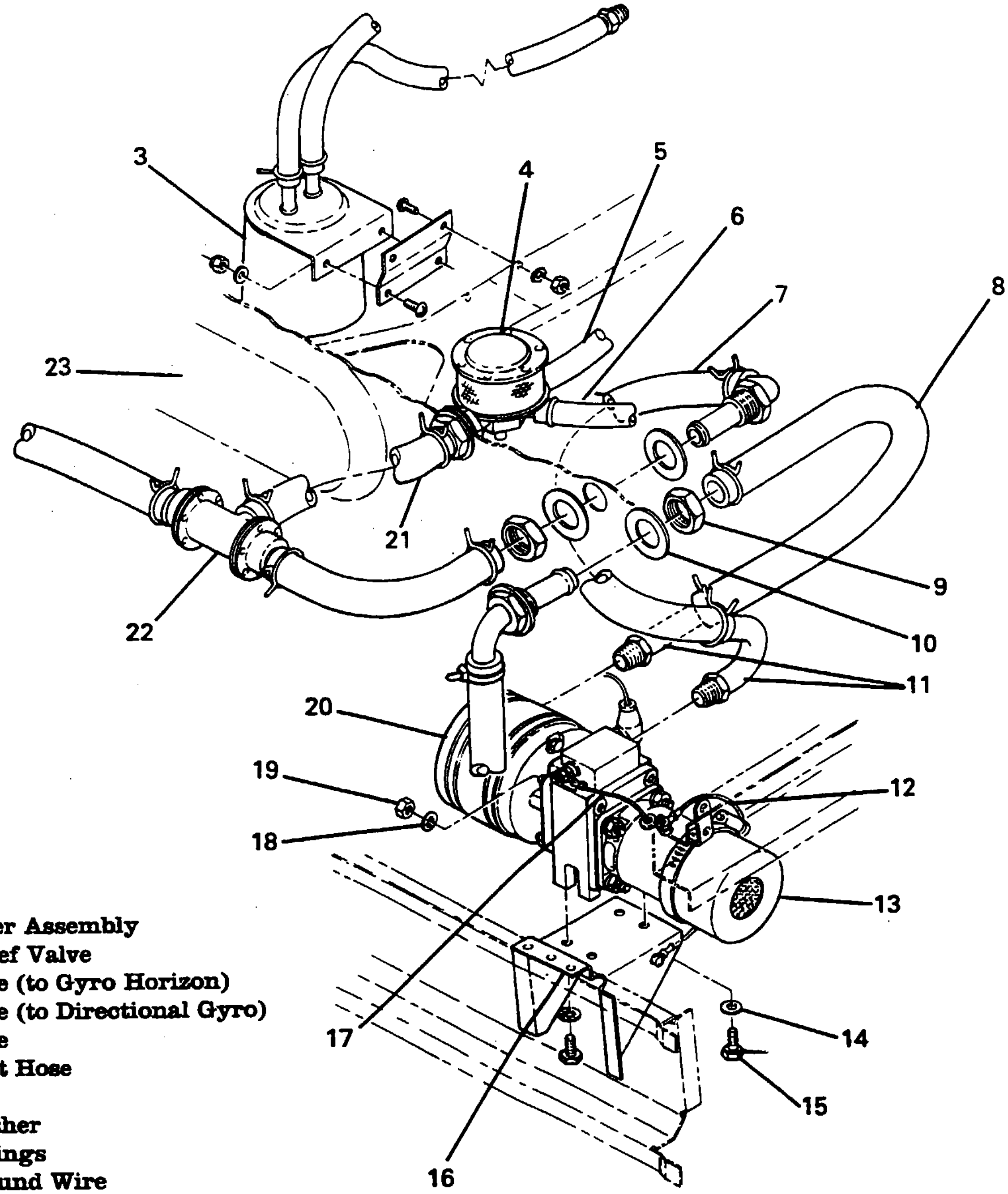


1. Circuit Breaker Switch
2. Instrument Panel



Detail A

Figure 15-4A. Standby Vacuum System (Sheet 1 of 2)



Detail **B**

3. Filter Assembly
4. Relief Valve
5. Hose (to Gyro Horizon)
6. Hose (to Directional Gyro)
7. Hose
8. Vent Hose
9. Nut
10. Washer
11. Fittings
12. Ground Wire
13. Motor
14. Washer
15. Bolt
16. Bracket
17. Voltage Input Wire
18. Washer
19. Nut
20. Vacuum Pump
21. Hose
22. Manifold
23. Firewall

Figure 15-4A. Standby Vacuum System (Sheet 2 of 2)

15-32. TROUBLE SHOOTING--VACUUM PUMP.

TROUBLE	PROBABLE CAUSE	REMEDY
OIL IN DISCHARGE.	Damaged engine drive seal.	Replace gasket.
HIGH SUCTION.	Suction relief valve filter clogged.	Check Filter. Replace if Required.
LOW SUCTION.	Relief valve leaking.	Replace relief valve.
	Vacuum pump failure.	Substitute known-good pump and check pump suction. Replace vacuum pump.
LOW PRESSURE.	Safety valve leaking.	Replace safety valve.
	Vacuum pump failure.	Substitute known-good pump and check pump pressure. Replace vacuum pump.

15-33. REMOVAL AND INSTALLATION. For removal and installation of vacuum system components refer to figure 15-4. The various components of vacuum system are secured by conventional clamps, mounting screws and nuts. To remove a component, remove mounting screws and disconnect inlet and discharge lines. When replacing a vacuum system component, ensure connections are made correctly. Use no thread-lube on any connections. Teflon tape may be used on male threads. Avoid over-tightening connections. Before re-installing a vacuum pump, place mounting pad gasket over studs. After installing pump, before connecting plumbing, start engine and check for evidence of oil in the discharge which would indicate a leaking engine drive seal.

15-34. CLEANING. In general, low-pressure, dry compressed air should be used in cleaning vacuum system components. Suction relief valve, exposed to engine oil and dirt, should be washed with Stoddatd solvent, then dried with a low-pressure air blast. 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.

15-35. 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 the relief valve, remove control air filter, run engine to 2200 rpm on the ground and adjust relief valve to 5.3 ±.1 inches of mercury.

CAUTION

Do not exceed maximum engine temperature.

Be sure element is clean before installing. If reading drops noticeably, install new filter element.

15-35A. STANDBY VACUUM SYSTEM.

15-35B. DESCRIPTION. Airplanes R1722725 and ON and FR17200621 and On incorporating SK172-88 have an electric standby vacuum system installed. The system consists of a vacuum pump, driven by an electric motor, mounted on the aft side of the firewall and associated hoses. One hose is the vacuum pump vent hose and the other connects to a manifold with the engine-driven vacuum pump, just prior to the system relief valve. A two position circuit breaker switch, mounted adjacent to the cabin air control on the instrument panel, controls and protects the system.

15-35C. REMOVAL AND INSTALLATION. Refer to figure 15-4A for removal and installation of standby vacuum pump system.

15-36. ENGINE INDICATORS.

15-37. TACHOMETER.

15-38. DESCRIPTION. The tachometer used on Cessna single-engine aircraft is a mechanical indicator driven at half crankshaft speed by a flexible shaft. Most tachometer difficulties will be found in the driveshaft. To function properly, 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 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 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). Refer to Section 11.

15-39. MANIFOLD PRESSURE/FUEL FLOW INDICATOR.

15-40. DESCRIPTION. The manifold pressure and fuel flow indicators 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 flow indicator is a pressure instrument calibrated in gallons per hour, indicating approximate gallons of fuel metered per hour to the engine. Pressure for operating the indicator is obtained through a hose from the fuel manifold valve.

15-41. 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.

15-41. TROUBLE SHOOTING--MANIFOLD PRESSURE GAGE (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
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.

15-42. TROUBLE SHOOTING -- FUEL FLOW INDICATOR.

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.

15-43. CYLINDER HEAD TEMPERATURE GAGE

15-44. 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. Torque on lead nut at sending unit is not to exceed 4 inch-pounds. 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 1, page 15-22A, when trouble shooting the cylinder head temperature gage.

15.45 TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE INOPERATIVE.	No current to circuit.	Check circuit breaker and electrical circuit to gage. Repair electrical circuit.
	Defective gage, bulb or circuit.	Isolate with ohmmeter check of circuits. Repair or replace defective items.
GAGE FLUCTUATES RAPIDLY.	Loose or broken wire permitting alternate make and break of gage circuit.	Inspect circuit wiring. Repair or replace defective items.
GAGE READS TOO HIGH ON SCALE.	High voltage.	Check voltage supply.
	Gage off calibration.	Replace gage.
GAGE READS TOO LOW ON SCALE.	Low voltage.	Check voltage supply.
	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 bulb.	Replace bulb.
OBVIOUSLY INCORRECT READING.	Defective gage mechanism	Replace gage.
	Incorrect calibration.	Replace gage.

15-46. OIL PRESSURE GAGE.

15-47. 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.

15-48. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE DOES NOT REGISTER.	Pressure line clogged.	Check line for obstructions. Clean line.
	Pressure line broken.	Check line for leaks and damage. Repair or replace damaged line.
	Fractured Bourdon tube.	Replace instrument.
	Gage pointer loose on shaft.	Replace instrument.
	Damaged gage movement.	Replace instrument.
GAGE POINTER FAILS TO RETURN TO ZERO.	Foreign matter in line.	Check line for obstructions. 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.	Check line for leaks and damage. Repair or replace damaged line.

15-49. OIL TEMPERATURE GAGE.

15-50. DESCRIPTION. The oil temperature gage is an electrically operated indicator, located in the instrument cluster. The gage is connected by a single wire to a sending unit located in the engine oil passage above the oil cooler. The gage and sending unit requires little or no maintenace other than cleaning, making sure the lead is properly supported and all connections are clean, tight and properly insulated. Refer to Table 2, page 15-22B, when trouble shooting the oil temperature gage.

15-51. ECONOMY MIXTURE INDICATOR (EGT)

15-52. 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 intering the engine cylinders. Refer to the Pilots Operating Handbook for operating procedures.

15-53. CALIBRATION. A potentiometer adjustment screw is provided behind the plastic cap at the back of the instrument for calibration. This adjustment screw is used to position the pointer over the reference increment line (4/5 of scale) at peak EGT. Establish 75% power in level flight, then carefully lean the mixture to peak EGT. After the pointer has peaked using the adjustment screw, position pointer over reference increment line (4/5 scale).

NOTE

This setting will provide selective temperature indications for normal cruise power settings within range of the instrument.

Turning the screw clockwise increases the meter reading and counterclockwise decreases the meter reading. There is a stop in each direction and damage can occur if to much torque is applied against stops. Approximately 600°F total adjustment is provided. The adjustable yellow pointer on the face of the instrument is a reference pointer only.

15-54. REMOVAL AND INSTALLATION. (Refer to figure 15-5.)

a. Indicator.
   1. Remove instrument panel decorative cover.
   2. Disconnect EGT indicator leads.
   3. Remove screws, nuts and washers securing indicator and remove indicator.
   4. To install reverse the preceding steps.
b. Probe.
   1. Disconnect probe leads.
   2. Remove clamp and probe assembly.
   3. When installing probe, tighten clamp to 30-35 lb-in.
   4. Coil or fold excess lead and tie in a convenient out of the way location.

15-55. TROUBLE SHOOTING.

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 15-53.
FLUCTUTATING READING	Loose, frayed or broken lead, permitting alternate make and break of circuit.	Tighten connections and repair or replace defective leads.

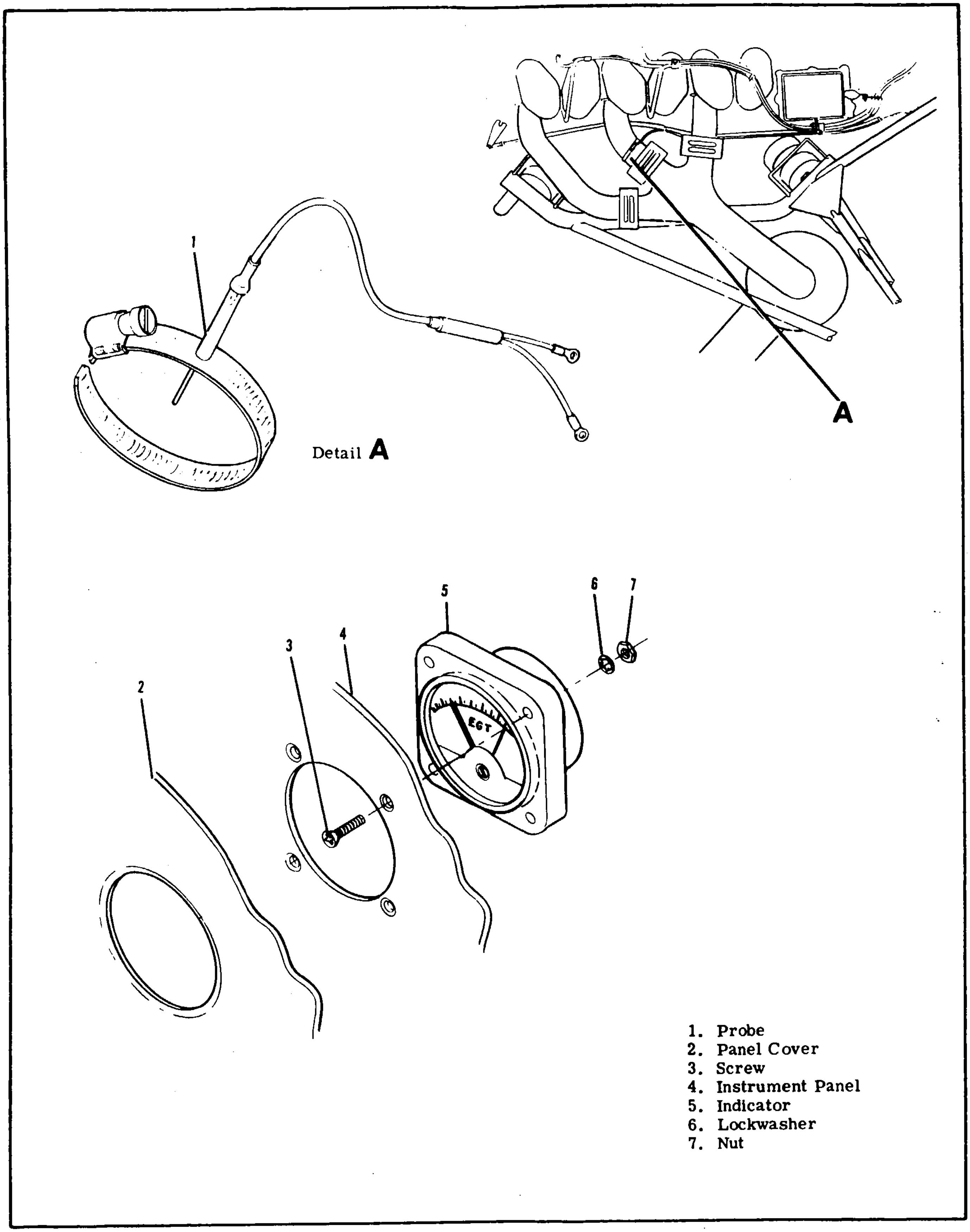


Figure 15-5. Economy Mixture Indicating System E.G.T.

15-56. FUEL QUANTITY INDICATING SYSTEM.

15-57. DESCRIPTION. The magnetic type fuel quantity indicators are used in conjunction with a float-operated variable-resistance transmitter in each fuel tank. The full position of float produces a minimum resistance through transmitter, permitting maximum current flow through the fuel quantity indicator and maximum pointer deflection. As fuel level is lowered, resistance in transmitter is increased, producing a decreased current flow through fuel quantity indicator and a smaller pointer deflection.

15-58. REMOVAL AND INSTALLATION OF FUEL QUANTITY TRANSMITTERS.

a. Drain fuel from tank. (Observe precautions in Section 12.
b. Remove access plate above fuel tank for access to transmitter.
c. Disconnect electrical lead and ground strap/wire from transmitter.
d. Remove screws attaching transmitter and carefully work transmitter from tank. DO NOT BEND FLOAT ARM.
e. Install transmitter by reversing preceding steps, using new gaskets around opening in fuel tank and under screw heads. Be sure to tighten screws evenly.
f. When re-installing the transmitter access plate on the extended range fuel system the sealing procedures outlined in Section 12 should be followed.
g. Service fuel tanks. Check for leaks and correct quantity indication.

NOTE

Ensure transmitter is properly grounded in accordance with Section 12.

15-59. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
FAILURE TO INDICATE.	No power to indicator or transmitter. (Pointer stays below E.)	Check fuse and inspect for open circuit. Replace fuse, repair or replace defective wire.
	Grounded wire. (Pointer stays above F.)	Check for partial ground between transmitter and gage. Repair or replace defective wire.
	Low voltage.	Check voltage at indicator. Correct voltage.
	Defective indicator.	Substitute known-good indicator. Replace indicator.
OFF CALIBRATION.	Defective indicator.	Substitute known-good indicator. Replace indicator.
	Defective transmitter.	Substitute known-good transmitter. Recalibrate or replace.
	Low or high voltage.	Check voltage at indicator. Correct voltage.
STICKY OR SLUGGISH INDICATOR OPERATION.	Defective indicator.	Substitute known-good indicator. Replace indicator.
	Low voltage.	Check voltage at indicator. Correct voltage
ERRATIC READINGS.	Loose or broken wiring on indicator or transmitter.	Inspect circuit wiring. Repair or replace defective wire.
	Defective indicator or transmitter.	Substitute known-good component. Replace indicator or transmitter.
	Defective master switch.	Replace switch.

15-60. TRANSMITTER CALIBRATION.

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.

15-60A. 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 15-49.

15-60B. ROCHESTER GAGE TRANSMITTER. Do not attempt to adjust float arm or stop. No adjustment is allowed.

Table 1

NOTE

Select the cylinder head temperature sending unit part number that is used in your aircraft 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

Table 2

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	
S1630-3	Oil Temp		620.0			52.4
S1630-4	Oil Temp		620.0			52.4
S1630-5	Oil Temp			192.0		
S2335-1	Oil Temp	990.0				34.0

15-60 TRANSMITTER ADJUSTMENT.
(Refer to page 15-24A.)

15-61. HOURMETER. (Refer to figure 15-6.)

15-62. DESCRIPTION. The hourmeter is electrically operated and is actuated by a pressure switch in the oil system. Electrical power is supplied through a one-amp fuse from the electrical clock circuit and therefore, will not operate independent of the master switch. If no clock is installed, a line direct from the battery contactor provides power independent of the master switch through a one-amp fuse located adjacent to the battery box. An indicator on the dial face rotates when the meter is actuated. If the meter is inoperative and clock is operating, the meter or its wiring is faulty and must be replaced.

NOTE

Hourmeters installed in some later aircraft and later spares incorporate adiode. These are identified only by awhite "+" above the positive terminal. When installing this type hourmeter, the positive wire (red on factory equipped aircraft) must be connected to the white "+" terminal. Connecting wires incorrectly will damage the meter.

15-63. MAGNETIC COMPASS.

15-64. DESCRIPTION. The magnetic compass is liquid-filled, with expansion provisions to compensate for temperature changes. It is equipped with compensating magnets adjustable from front of case. The compass is internally lighted, controlled by the panel lights rheostat. No maintenance is required on compass except an occasional check on a compass rose for adjustment of compensation and replacement of lamp.

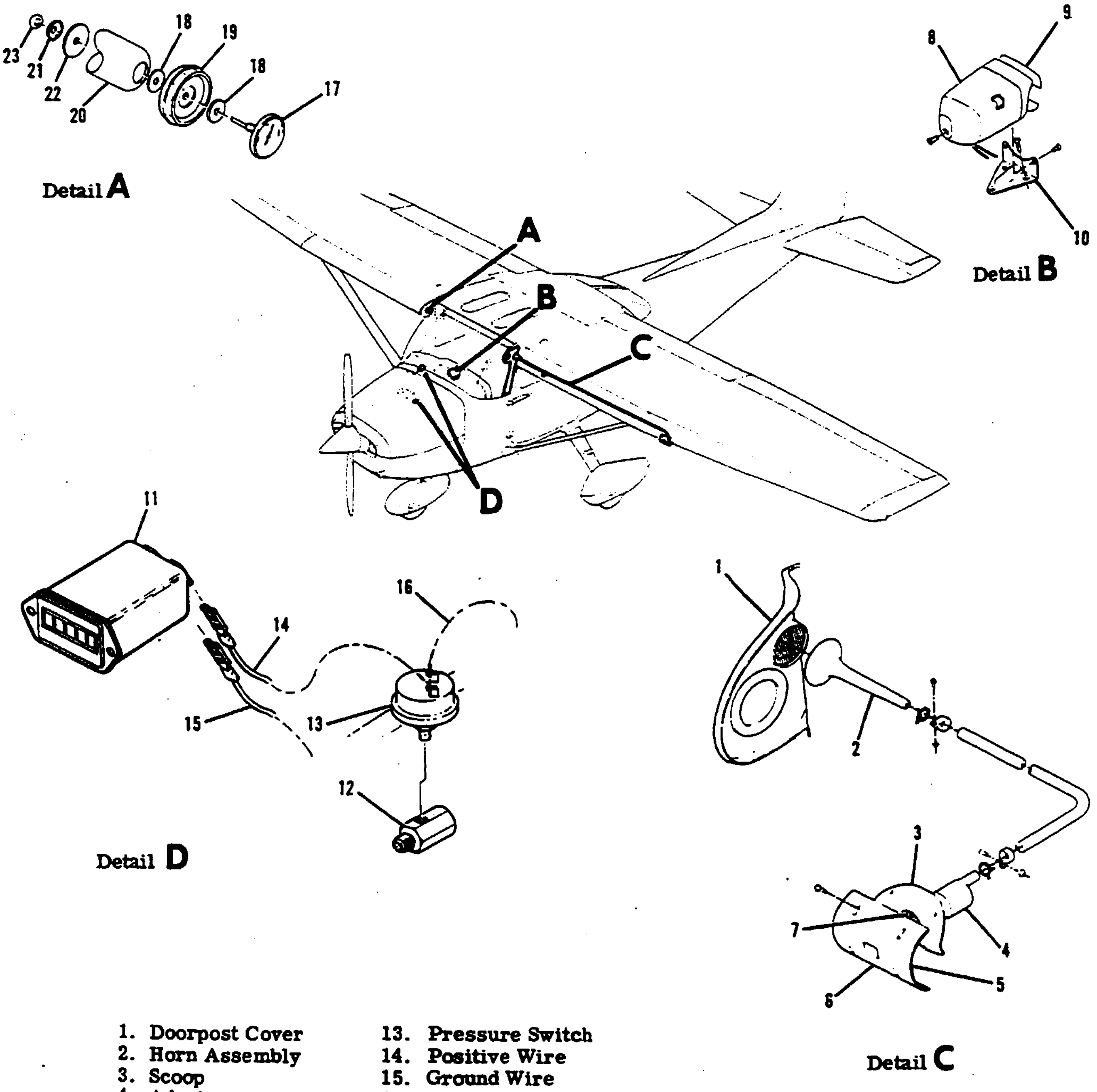
15-65. REMOVAL AND INSTALLATION. Refer to figure 15-6 for removal and installation.

15-66. STALL WARNING SYSTEM.

15-67. DESCRIPTION. The system is composed of an adjustable plate on left wing leading edge, connected to a reed type horn by means of plastic tubing. The horn is actuated approximately 5 to 10 knots above stalling speed as a negative air pressure area at wing leading edge causes a reverse flow of air through the horn. By moving adjustable plate (6) up, actuation of horn will occur at a higher speed and moving plate down causes actuation to occur at a slower speed. Center adjustable plate opening in wing leading edge upon installation, then flight test aircraft, observing horn actuation during stall. Readjust plate to obtain desired results if necessary. Approximately 3/32 inch adjustment of plate will change speed at which horn actuation occurs by 5 miles per hour. To test horn operation, cover opening in plate (6) with a clean cloth, such as a handkerchief and apply a slight suction by mouth to draw air through horn.

15-68. REMOVAL AND INSTALLATION. Refer to figure 15-6 for removal and installation.

SHOP NOTES:



1. Doorpost Cover
2. Horn Assembly
3. Scoop
4. Adapter
5. Felt Seal
6. Adjustable Plate
7. Screen
8. Compass
9. Compass Card
10. Bracket
11. Hourmeter
12. Adapter
13. Pressure Switch
14. Positive Wire
15. Ground Wire
16. Wire from Clock Circuit
17. O.A.T. Gage
18. Rubber Washer
19. Knob
20. Air Vent
21. Washer
22. Plastic Washer
23. Nut

NOTE

Bug screen (7) should be inspected and cleaned periodically.

Figure 15-6. Miscellaneous Instruments and Stall Warning System

15-60. TRANSMITTER CALIBRATION

WARNING: USING THE FOLLOWING FUEL TRANSMITTER CALIBRATION PROCEDURES ON COMPONENTS OTHER THAN THE ORIGINALLY INSTALLED (STEWART WARNER) COMPONENTS WILL RESULT IN A FAULTY FUEL QUANTITY READING.

15-60A. STEWART WARNER GAGE TRANSMITTER CALIBRATION

Chances of transmitter calibration changing in normal service is remote; however it is possible that the float arm or the float arm stops may become bent if the transmitter is removed from the fuel cell/tank. Transmitter calibration is obtained by adjusting float travel. Float travel is limited by the 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 the master switch in the "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 the 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 15-49.

15-60B. ROCHESTER FUEL GAGE TRANSMITTER

Do not attempt to adjust float arm or stop. No adjustment is allowed.

15-60C. 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, ELECTRICALLY 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.
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 15-60A 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 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 15-60A 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.

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 15-60A 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 this procedure, remove maintenance warning tags and connect the airplane battery.

15-60D. CYLINDER HEAD TEMPERATURE INDICATING SYSTEM RESISTANCE TABLE 1

The following table is provided to assist in the troubleshooting the cylinder head temperature indicating system components.

Select the cylinder head temperature sending unit part number that is used in your airplane 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 Ω	34.8 Ω	
S1372-2	CHT		310.0 Ω	34.8 Ω	
S1372-3	CHT			113.0 Ω	
S1372-4	CHT			113.0 Ω	
S2334-3	CHT	745.0 Ω			38.0 Ω
S2334-4	CHT	745.0 Ω			38.0 Ω

15-60E. OIL TEMPERATURE INDICATING SYSTEM RESISTANCE TABLE 2

The following table is provided to assist in the troubleshooting the oil temperature indicating system components.

Select the oil temperature sending unit part number that is used in your airplane 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 Ω	
S1630-3	Oil Temp		620.0 Ω			52.4 Ω
S1630-4	Oil Temp		620.0 Ω			52.4 Ω
S1630-5	Oil Temp			192.0 Ω		
S2335-1	Oil Temp	990.0 Ω				34.0 Ω

15-69. TURN COORDINATOR.

15-70. DESCRIPTION. The turn coordinator is an electrically operated, gyroscopic, roll-rate turn indicator. Its gyro simultaneously senses rate of motion roll and yaw axes which is projected on a single indicator. The gyro is a non-tumbling type requiring no caging mechanism and incorporates an a. e. brushless spin motor with a solid state inverter.

15-71. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
INDICATOR DOES NOT RETURN TO CENTER.	Friction caused by contamination in the indicator damping.	Replace instrument.
	Friction in gimbal assembly.	Replace instrument.
DOES NOT INDICATE A STANDARD RATE TURN (TOO SLOW).	Low voltage.	Measure voltage at instrument. Correct voltage.
	Inverter frequency changed.	Replace instrument.
NOISY MOTOR	Faulty bearings.	Replace instrument.
ROTOR DOES NOT START.	Faulty electrical connection.	Check continuity and voltage. 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.	Check voltage at instrument. Correct voltage.
NOISY GYRO.	High voltage.	Check voltage to instrument. Correct voltage.
	Loose or defective rotor bearings.	Replace instrument.

15-72. TURN-AND-SLIP INDICATOR.

15-73. DESCRIPTION. The turn-and-slip indicator is an electrically operated instrument powered by the aircraft electrical system, therefore, operating only when the master switch is ON.

15-74. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
INDICATOR POINTER FAILS TO RESPOND.	Internal fuse blown.	Check wiring for continuity, check voltage at indicator. Replace fuse, if fuse still blows, replace instrument.
	Master switch "OFF" or switch defective.	Check switch "ON." Replace defective switch.
	Broken or grounded lead to indicator.	Check circuit wiring. Repair or replace defective wiring.
	Indicator not grounded.	Check ground wire. Repair or replace defective wire.
	Defective mechanism.	Replace instrument.
HAND SLUGGISH IN RETURNING TO ZERO.	Defective mechanism.	Replace instrument.
	Low voltage.	Check voltage at indicator. 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.
	Low voltage.	Check voltage at indicator. Correct voltage.
NOISY GYRO.	High voltage.	Check voltage at indicator. Correct voltage.
	Loose or defective rotor bearings.	Replace instrument.

15-75. OUTSIDE AIR TEMPERATURE GAGE (Refer to figure 15-6.)

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.

TABLE OF CONTENTS — Page No. Aerofiche/Manual

16-1. ELECTRICAL SYSTEMS.

16-2. GENERAL. This section contains service information necessary to maintain the Aircraft Electrical Power Supply System, Aircraft Lighting System, Pitot Heater, Cigar Lighter and Electrical Load Analysis Chart.

16-3. ELECTRICAL POWER SUPPLY SYSTEM.

16-4. DESCRIPTION. Electrical energy for the aircraft is supplied by a 14-volt, direct current, single-wire, negative ground electrical system. A single 12-volt battery supplies power for starting and furnishes a reserve source of power in the event of alternator failure thru 1977 models. Beginning with 1978 models the electrical system is 28-volt and a 24-volt battery is utilized. An engine-driven alternator is the normal source of power during flight and maintains a battery charge controlled by a voltage regulator. An external power receptacle is offered as optional equipment to supplement the battery system for starting and ground operation.

16-5. SPLIT BUS BAR.

16-6. DESCRIPTION. Electrical power is supplied through a split bus bar. One side of the bus bar supplies power to the electrical equipment while the other side supplies the electronic installations. When the master switch is closed, the battery contactor engages and the battery power is supplied to the electrical side of the split bus bar. The electrical bus feeds battery power thru a relay, thru 1977 models and an avionics master switch beginning with 1978 models, to the electronics bus.

16-7. MASTER SWITCH.

16-8. DESCRIPTION. The operation of the battery and alternator systems are controlled by a master switch. This switch is an interlocking split rocker with battery mode on the right hand side and 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.

16-9. AMMETER.

16-10. 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 the battery is fully charged and cruise is maintained with all electrical equipment off, the ammeter will show a minimum charging rate.

16-11. BATTERY POWER SYSTEM.

16-12. BATTERY.

16-13. DESCRIPTION. Thru 1977 models a 12-volt battery with an approximate 25 ampere-hour capacity is installed. Beginning with 1979 models the battery is 24-volt with an approximate 12.75 ampere-hour capacity as standard and a optional battery with an approximate 15.5 ampere hour rating. The battery is mounted in the tailcone on the left hand side, aft of the baggage compartment. The battery is equipped with non-spill filler caps.

16-14. REMOVAL AND INSTALLATION. (See figure 16-2.)

CAUTION

- When installing or removing battery always observe the proper polarity with the aircraft electrical system (negative to ground), reversing the polarity, even momentarily, may result in failure of semiconductor devices (alternator diodes, radio proteaction diodes and radio transistors).
- Always remove the battery ground cable first and replace it last to prevent accidental short circuits.

a. THRU 1979 MODELS.
1. Remove aft floor of baggage compartment for access to the battery.
2. Remove battery box cover.
3. Disconnect the ground cable from the negative

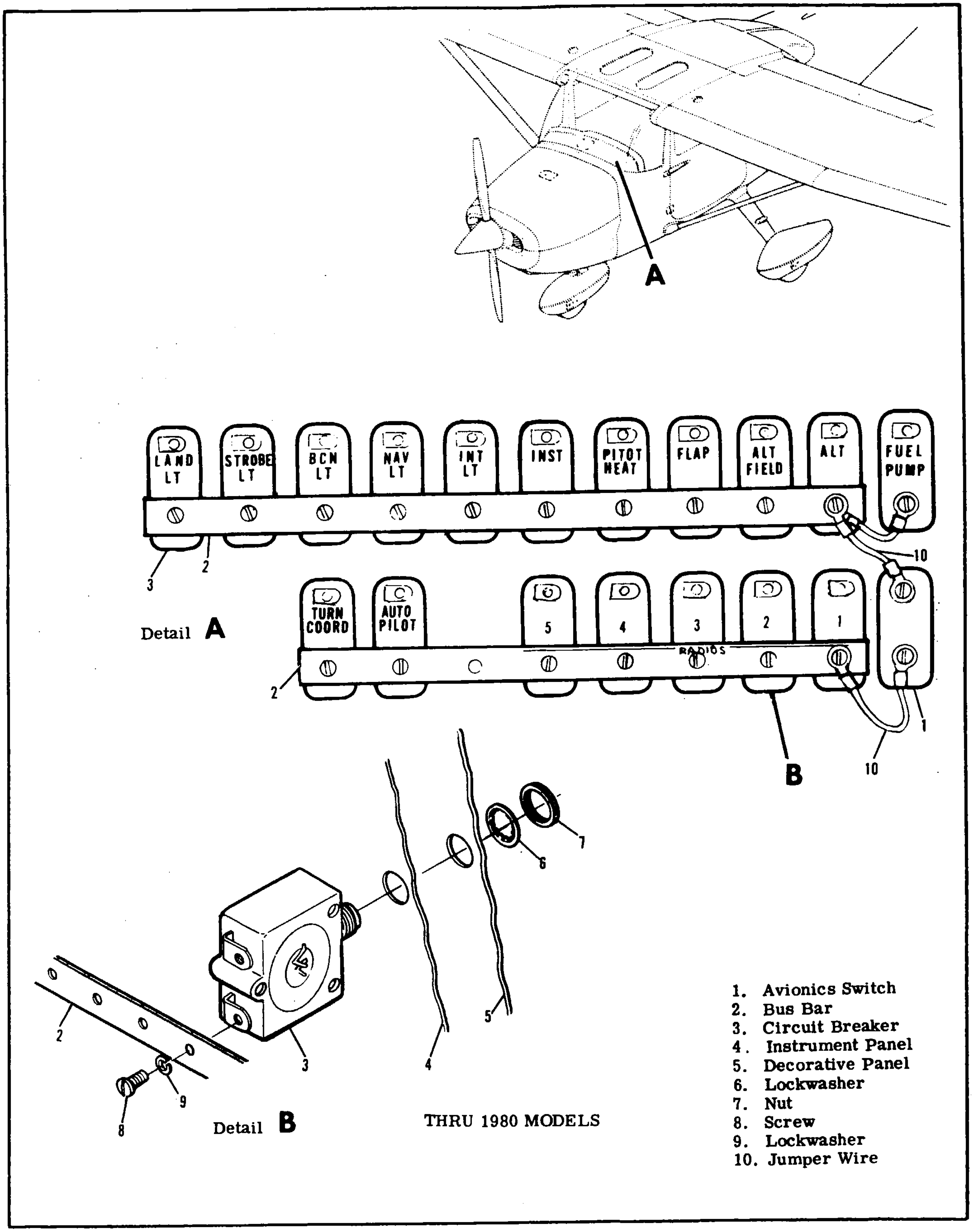
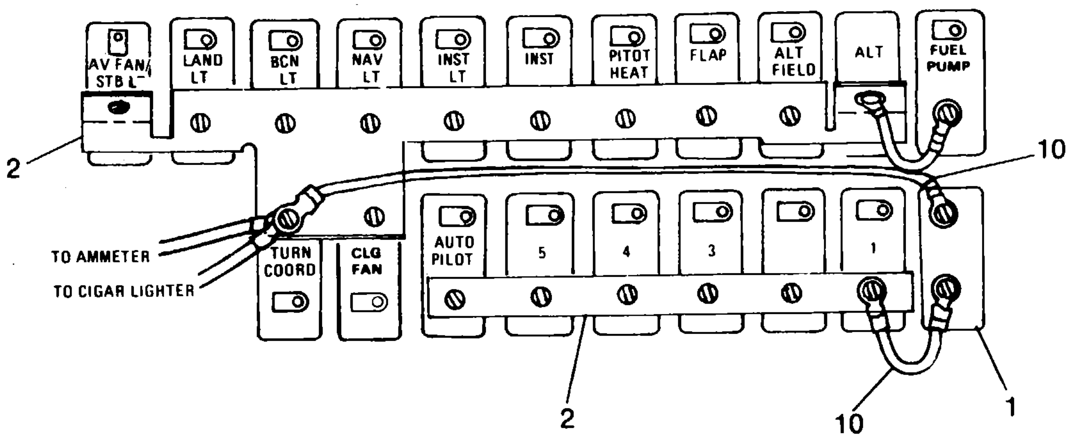
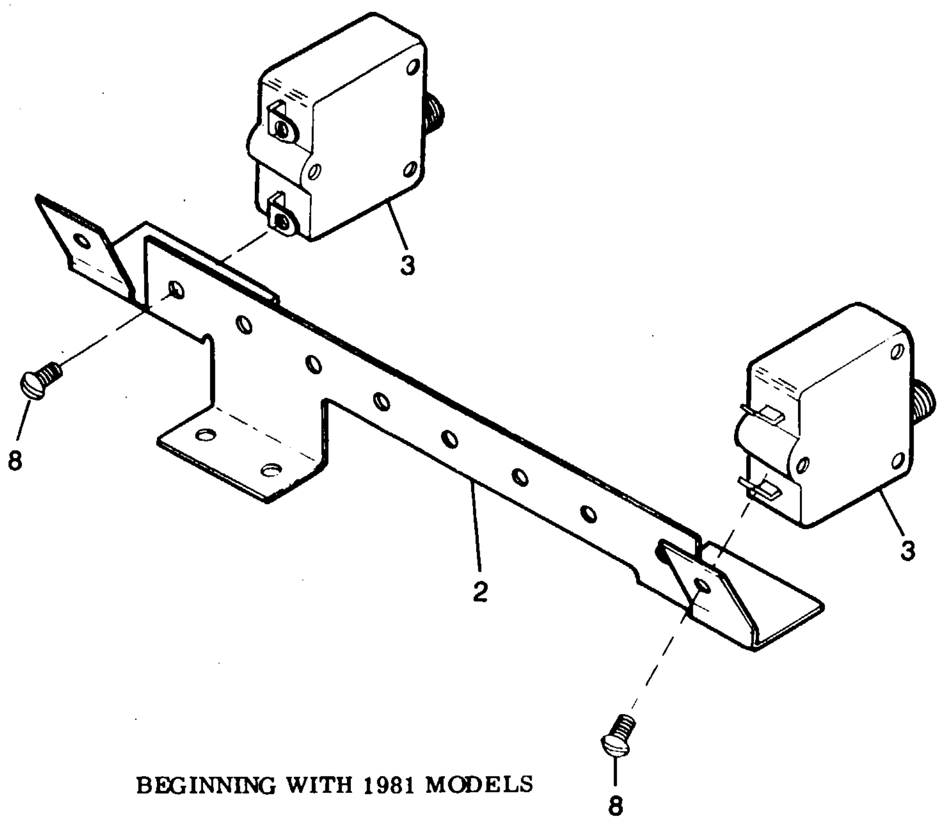


Figure 16-1. Circuit Breaker and Bus Bar Installation (Sheet 1 of 2)





BEGINNING WITH 1981 MODELS

Figure 16-1. Circuit Breaker and Bus Bar Installation (Sheet 2 of 2) battery terminal.

4. Disconnect the cable from the positive terinal of the battery.

5. Lift the battery out of the battery box.

6. To install battery, reverse this procedure.

b. BEGINNING WITH 1980 MODELS,

1. Remove aft floor of baggage compartment for access to the battery.

2. Disconnect the ground strap from the negative battery terminal.

3. Cut sta-strap and remove cover from the positive terminal, then remove positive cable.

4. Release clamp on battery drain tube and remove tube from battery.

5. Remove hold down bolts and cover from the battery.

6. Remove battery from aircraft.

7. To install the battery, reverse this procedure.

16-15. TROUBLE SHOOTING THE BATTERY POWER SYSTEM.

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 11.5 volts or more on a 14 volt system or 23 volts or more on a 28 volt system. If voltage is low proceed to step 2. If voltage is normal, proceed to step 3.
	Battery faulty.	2. Check fliud level in cells and charge 12-volt battery at 14 volts or 24-volt battery at 28 volts for approximately 30 minutes or until battery voltage rises to 14 volts on 12-volt battery or 28 volts on 24-volt battery. If tester indicates a good battery, the malfunction may be assumed to be a discharged battery. If the tester indicates a faulty battery, replace the battery.
	Faulty contactor or wiring between contactor or 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 on 14 volt aircraft is 16-24 ohms. Normal indication on 28 volt aircraft is 50-70 ohms. If ohmmeter indicates an open coil, replace contactor. If ohmmeter indicates a good coil, proceed to step 5.

16-15. TROUBLE SHOOTING THE BATTERY SYSTEM (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
BATTERY WILL NOT SUPPLY POWER TO BUS OR IS INCAPABLE OF CRANKING ENGINE. (Cont.)	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 intermittant, 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. CLEANING THE BATTERY. For maximum efficiency the battery and connections should be kept clean at all times.

a. Remove the battery and connections in accordance with the preceding paragraph.
b. Tighten battery cell filler caps to prevent the cleaning solution from entering the cells.
c. Wipe the battery cable ends, battery terminals and the 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 according to the preceding paragraph.
g. Coat the battery terminals with petroleum jelly or an ignition spray product to reduce corrosion.

16-17. 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, however will decompose into gases and should be replaced regularly. Add distilled water as necessary to maintain the electrolyte level with the horizontal baffle plate or the split ring on the filler neck inside the battery. When "dry charged" batteries are put into service fill as directed with electrolyte. When the electrolyte level falls below normal with use, add only distilled water to maintain the proper level. On Aircraft Serials R1722725 thru R1722776 and FR172-2725 thru FR1722776 refer to Cessna Single-engine Service Letter, SE78-6 Dated February 13, 1978 when filling the battery. 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.

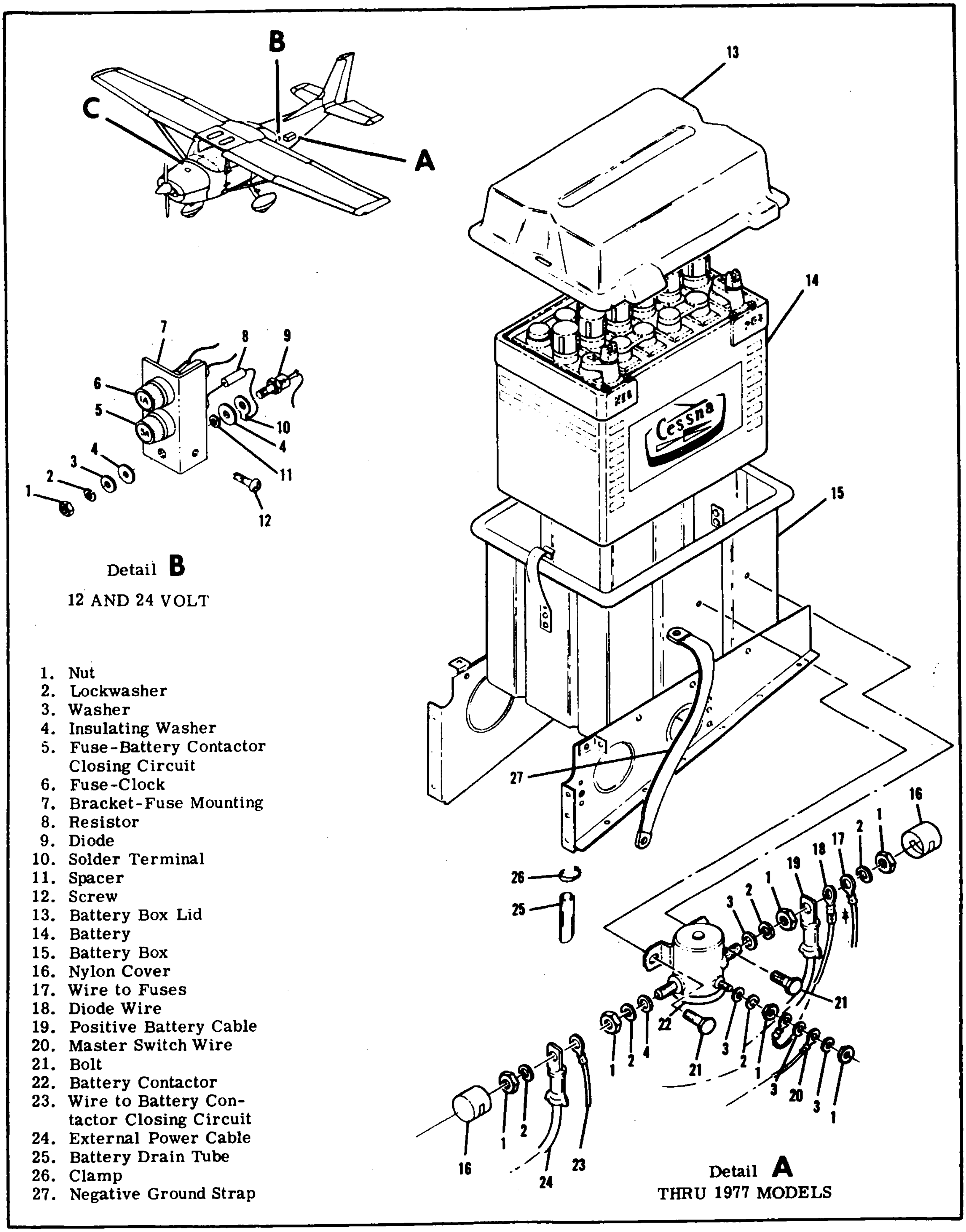
16-18. TESTING THE BATTERY. The specific gravity of the battery may be measured with a hydrometer to determine the state of battery charge. If the hydrometer reading is low, slow-charge the battery and retest. Hydrometer readings of the electrolyte must be compensated for the temperature of the electrolyte. Some hydrometers have a built-in thermometer and conversion chart. The following chart shows the battery condition for various hydrometer readings with an electrolyte temperature of 80° Fahrenheit.

BATTERY HYDROMETER READINGS

READINGS	BATTERY CONDITION
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

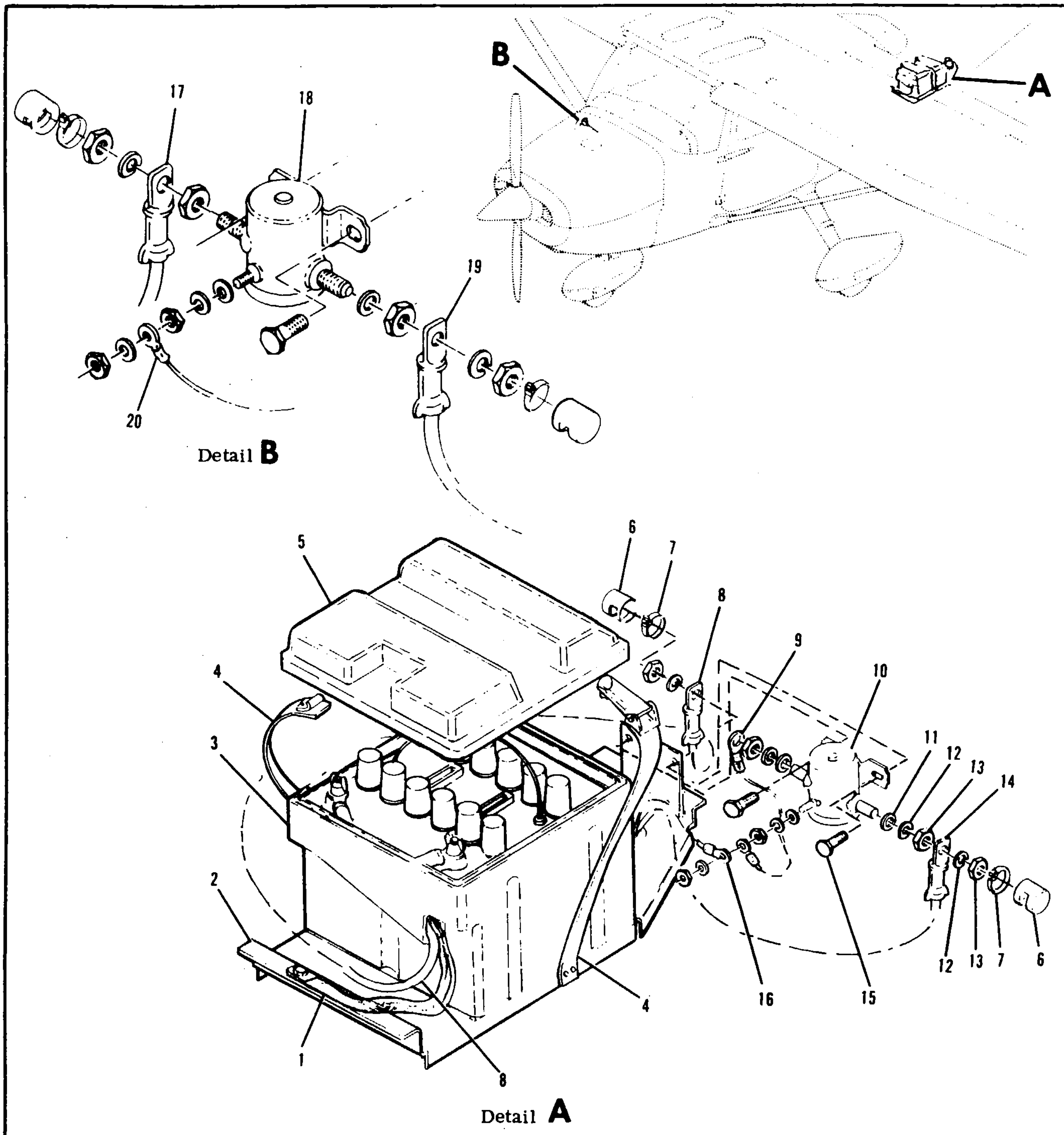
NOTE

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 will have a built-in temperature compensation chart and thermometer. If this type tester is used, disregard this chart.



1. Nut
2. Lockwasher
3. Washer
4. Insulating Washer
5. Fuse-Battery Contactor Closing Circuit
6. Fuse-Clock
7. Bracket-Fuse Mounting
8. Resistor
9. Diode
10. Solder Terminal
11. Spacer
12. Screw
13. Battery Box Lid
14. Battery
15. Battery Box
16. Nylon Cover
17. Wire to Fuses
18. Diode Wire
19. Positive Battery Cable
20. Master Switch Wire
21. Bolt
22. Battery Contactor
23. Wire to Battery Contactor Closing Circuit
24. External Power Cable
25. Battery Drain Tube
26. Clamp
27. Negative Ground Strap

Figure 16-2. Battery and Electrical Equipment Installation (Sheet 1 of 4)

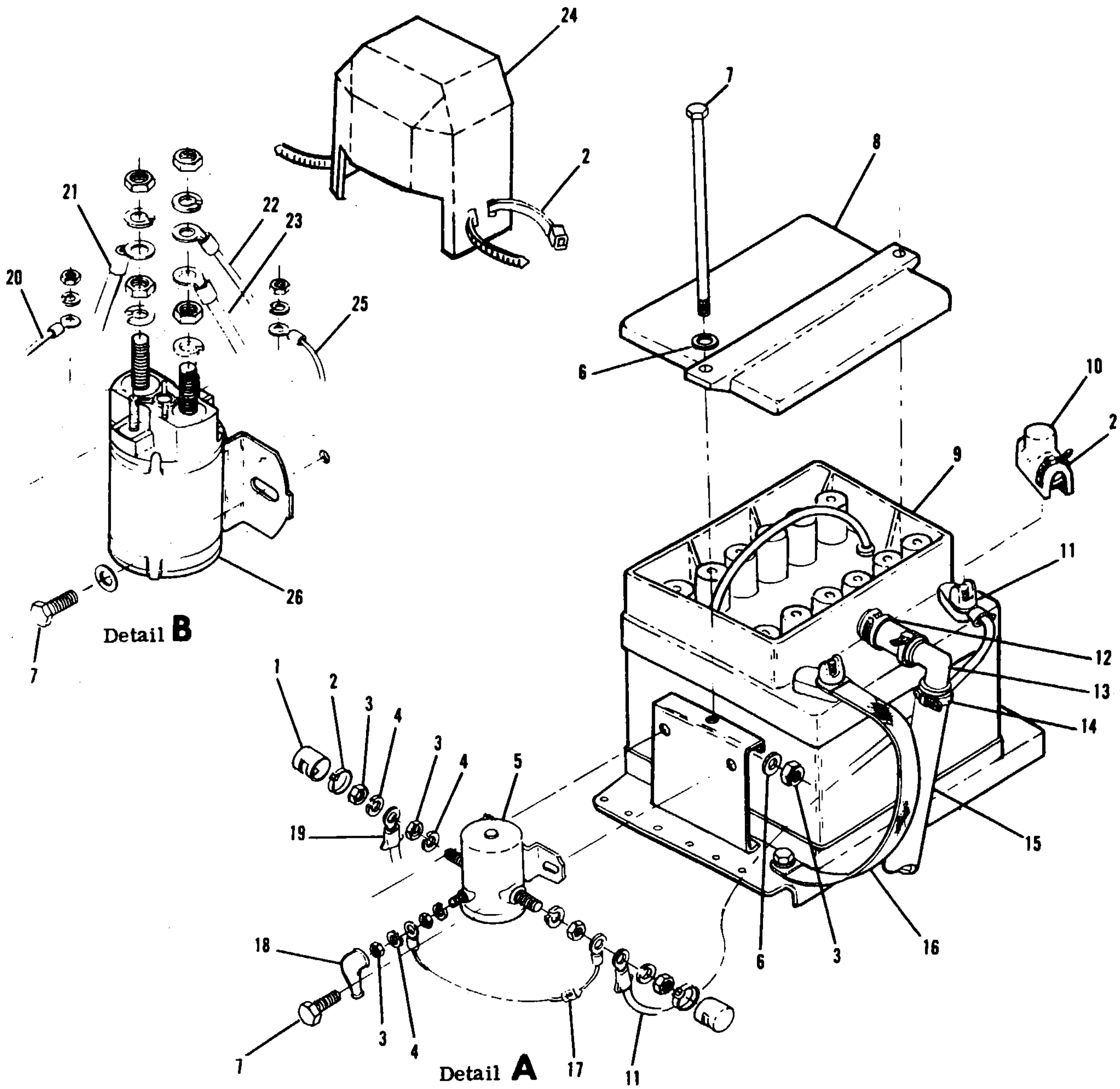


1978 MODELS THRU 1979 MODELS

1. Ground Strap
2. Mounting Bracket
3. Battery Box
4. Battery Box Strap
5. Battery Box Lid
6. Nylon Cover
7. Sta-strap
8. Positive Battery Cbale
9. Diode Assembly
10. Battery Contactor
11. Washer
12. Lockwasher
13. Nut
14. Cable (to Starter Contactor)
15. Bolt
16. Wire (to Master Switch)
17. Wire (to Starter)
18. Starter Contactor
19. Wire (to Battery Contactor)
20. Wire (to Ignition Switch)

Figure 16-2. Battery and Electrical Equipment Installation (Sheet 2 of 4)

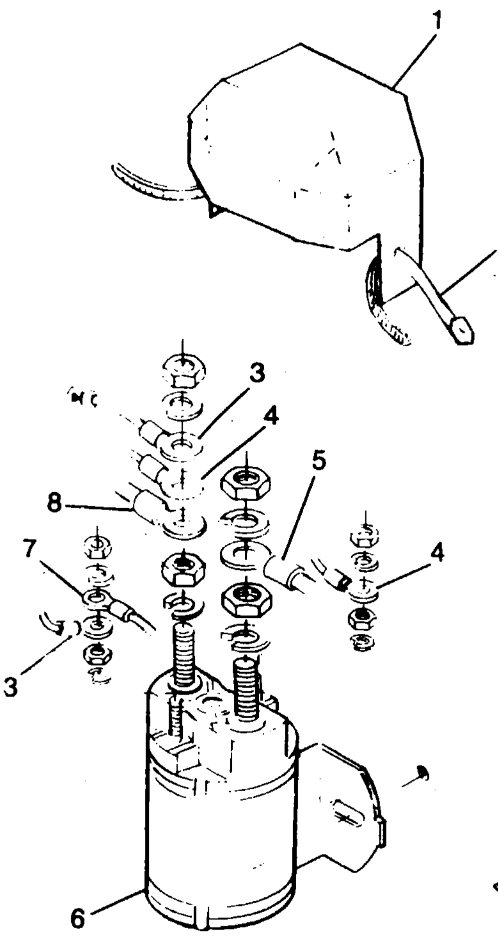
16-19. CHARGING THE BATTERY. When the battery is to be charged, the level of the electrolyte should be checked and adjusted by adding distilled water to cover the tops of the internal battery plates. Remove the battery from the aircraft and place in a well ventilated area for charging.

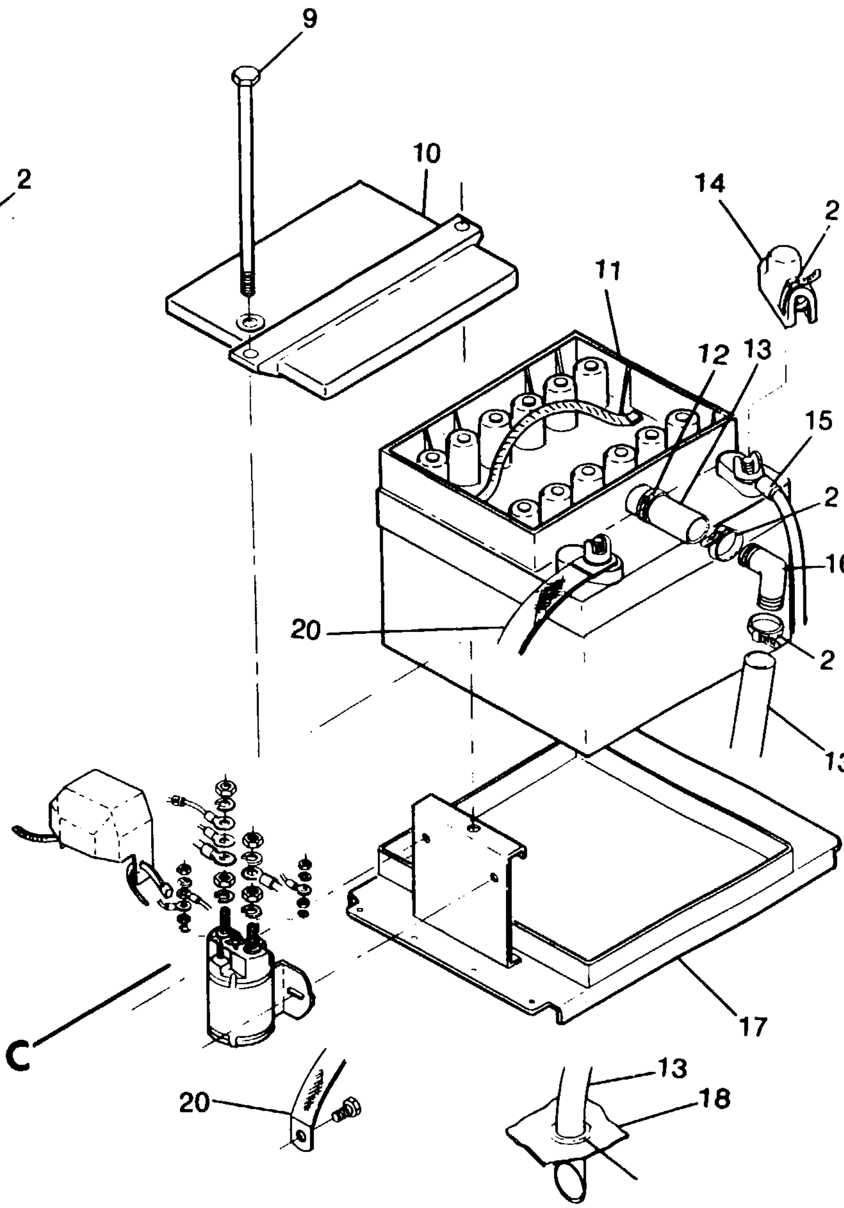


BEGINNING WITH 1980 MODELS

1. Nylon Cover
2. Sta-strap
3. Nut
4. Lockwasher
5. Battery Contactor
6. Washer
7. Bolt
8. Cover (Battery)
9. Battery
10. Terminal Cover
11. Positive Cable
12. Clamp
13. Elbow
14. Sta-strap
15. Drain Tube
16. Ground Strap
17. Diode
18. Rubber Boot
19. Cable (to Starter Contactor)
20. Wire (to Ignition Switch)
21. Wire (to Starter)
22. Wire (to Ammeter)
23. Wire (to Battery Contactor)
24. Cover
25. Ground Wire
26. Starter Contactor

Figure 16-2. Battery and Electrical Equipment Installation (Sheet 3 of 4)





1. Cover
2. Sta-strap
3. Diode Assembly
4. Jumper Wire
5. Positive Battery Cable
6. Battery Contactor
7. Wire (to Master Switch)
8. Wire (to Starter Contactor)
9. Bolt
10. Battery Cover
11. Battery
12. Clamp
13. Drain Tube
14. Cover Positive Terminal
15. Positive Cable
16. Elbow
17. Mounting Bracket
18. Aircraft Skin
19. Grommet
20. Ground Strap

Figure 16-2. Battery and Electrical Equipment Installation (Sheet 4 of 4)

WARNING

When a battery is being charged, 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. Test the battery with a hydrometer to determine the amount of charge. Decrease the charging rate or stop charging temporarily if the battery temperature exceeds 125°F.

16-20. BATTERY BOX.

16-21. DESCRIPTION. The battery is completely enclosed in a box which is painted with acid proof paint. The box has a vent tube which protrudes through the bottom of the aircraft allowing battery gasses and spilled electrolyte to escape. The battery box is riveted to mounting brackets in the tailcone thru 1977 models, beginning with 1978 models the battery box is held in place by a strap riveted to the mounting brackets.

16-22. REMOVAL AND INSTALLATION. (Refer to figure 16-2.) Thru 1977 models to remove the battery box, drill out rivets securing the box to the mounting brackets. When a battery box is installed , all rivets and scratches inside the box should be painted with acid proff lacquer Part No. CES1054-381, available from the Cessna Service Parts Center. Beginning with 1978 models the box is held in place by straps riveted to the mounting brackets.

16-23. MAINTENANCE OF BATTERY BOX. 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. Hard deposits may be removed with a wire brush. When all corrosive deposits have been removed from the box, flush it thoroughly with clean water.

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 ruined upon contact with battery acid.

Inspect the cleaned box and cover for physical damage and for areas lacking proper acid proofing. A badly damaged or corroded box should be replaced. If the box or lid require acid proofing, paint the area with acid proof lacquer Part No. CES1054-381, available from the Cessna Service Parts Center.

16-24. BATTERY CONTACTOR.

16-25. DESCRIPTION. The battery contactor is bolted to the side of the battery box thru 1977 models and on a bracket aft of the battery box beginning with 1978 models. The contactor is plunger type 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 transistorized radio equipment. The large terminal of the diode connects to the battery terminal of the battery contactor. The small terminal of the diode and the master switch wire connect to the minus terminal of the contactor coil. A nylon cover is installed on the contactor terminals to prevent accidental short circuits.

16-26. REMOVAL AND INSTALLATION. (See figure 16-2.)

a. Remove aft floor of baggage compartment
b. Remove battery box cover and disconnect ground cable from negative battery terminal.
c. Cut sta-straps and remove nylon cover/covers from contactor/terminals.
d. Remove nuts, washers securing battery cable and starter contactor cable.
e. Remove nut, washer securing ignition switch wire.
f. Remove bolt, washer and nut securing each side of the battery contactor and remove the contactor.
g. To install battery contactor, reverse the preceding steps, be sure to install diode assembly if removed.

16-27. BATTERY CONTACTOR CLOSING CIRCUIT.

16-28. DESCRIPTION. This circuit consists of a 5 amp fuse, a resistor and a diode located on a bracket adjacent to the battery. This 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 offered as optional equipment to permit 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 reverse polarity, the external power contactor will not close. This feature protects the diodes in the alternator, and other semiconductor devices used in the aircraft from possible reverse polarity damage.

NOTE

Thru 1977 models application of external power opened the relay supplying voltage to the electronics bus. Beginning with 1978 models this relay is replaced by an avionics master switch. The avionics master switch must be OFF when external power is applied.

NOTE

On Aircraft Serials R1722000 thru R1722835 refer to Cessna Single-engine Service Letter SE78-19, dated March 27, 1978.

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 used in the aircraft.

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

16-31. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
STARTER ENGAGES WHEN GROUND POWER IS CONNECTED. (THRU 1977 MODELS)	Shorted or reversed diode in split bus-bar system.	Check wiring to, and condition of diode mounted on the split bus relay bracket adjacent to the magneto switch. Correct wiring. Replace diode board assembly.
GROUND POWER WILL NOT CRANK ENGINE.	Ground service connector wired incorrectly.	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.
		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.
	Open or mis-wired diode on ground service diode board assembly.	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.
	Faulty external power contactor.	4. Check resistance from small (coil) terminal of external power contactor to ground (master switch off and ground power unplugged . Normal indication is 16-24 ohms on the 12 volt and 50-70 on the 24 volt. If resistance indicates an open coil, replace contactor. If resistance is normal, proceed to step 5.

16-31. TROUBLE SHOOTING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
GROUND POWER WILL NOT CRANK ENGINE (Cont.)	Faulty contacts in external power contactor.	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.

16-32. REMOVAL AND INSTALLATION. (See figure 16-3.)

a. Open battery box and disconnect the ground cable from the negative terminal of the battery and pull the cable from the battery box.

b. Remove the nuts, washers, ground strap and diode board from the studs of the receptacle and remove the battery cable.

c. Remove the screws and nuts holding the receptacle. The receptacle will then be free from the bracket.

d. To install a ground service receptacle, reverse this procedure. Be sure to place the ground strap on the negative stud of the receptacle.

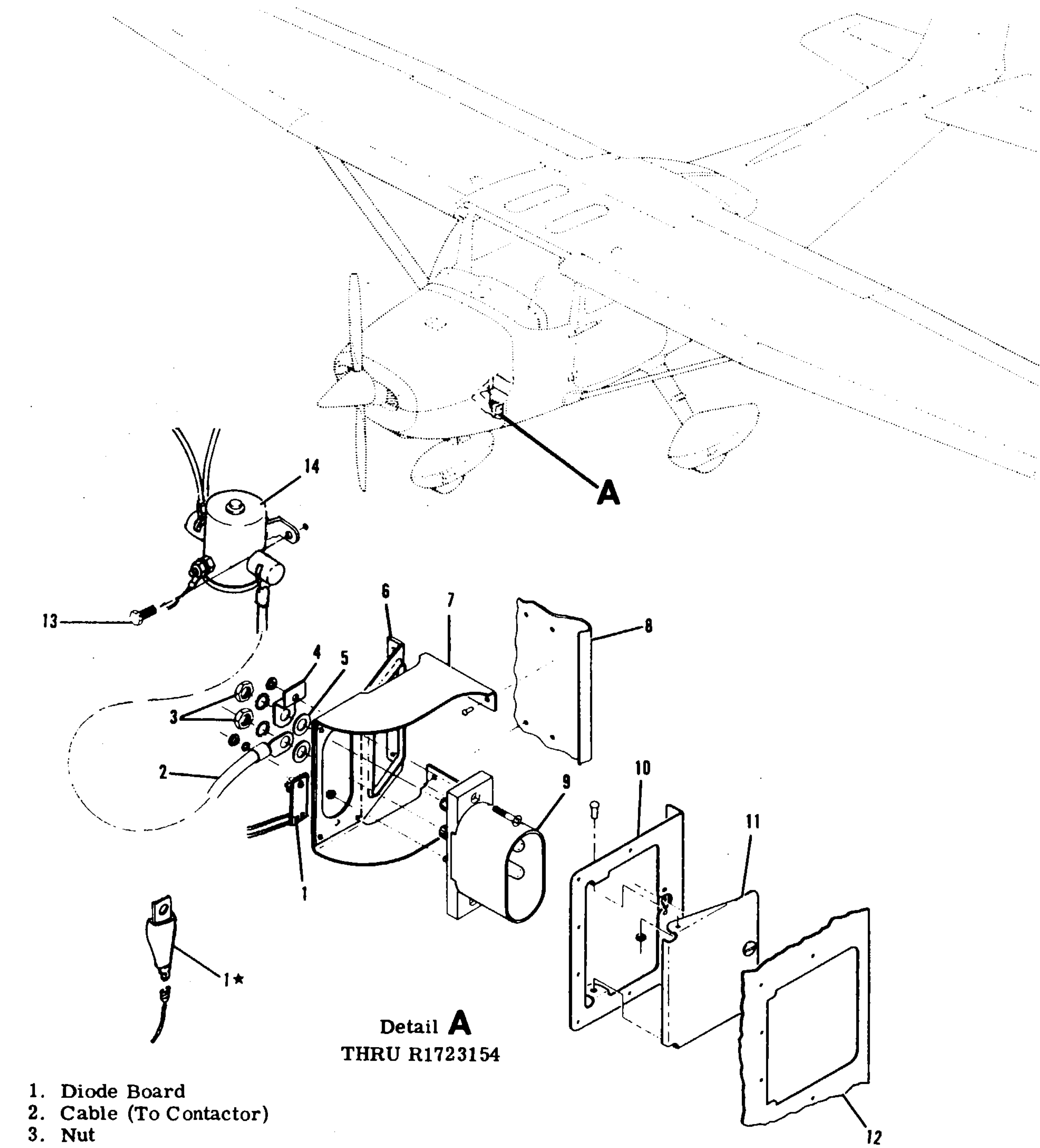
16-33. ALTERNATOR POWER SYSTEM.

16-34. DESCRIPTION. The alternator system consists of a engine driven alternator, a voltage regulator/alternator control unit, mounted on the left hand side of the firewall 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 and over-voltage sensor switch and red warning light labeled "HIGH VOLTAGE" are incorporated to protect the system. Beginning with 1979 models, over-voltage and under-voltage switches are contained within the alternator control unit and a red warning light labeled "LOW VOLTAGE" is installed on the instrument panel. The aircraft battery supplies the source of power for excitation of the alternator.

16-35. ALTERNATOR.

16-36. DESCRIPTION. The 60-ampere alternator is three phase, delta connected with integral silicon diode rectifiers. The alternator is belt driven and is rated at 14 volts at 60 amperes continous output thru 1977 models and 28 volts at 38 amperes beginning with 1978 models.

SHOP NOTES:

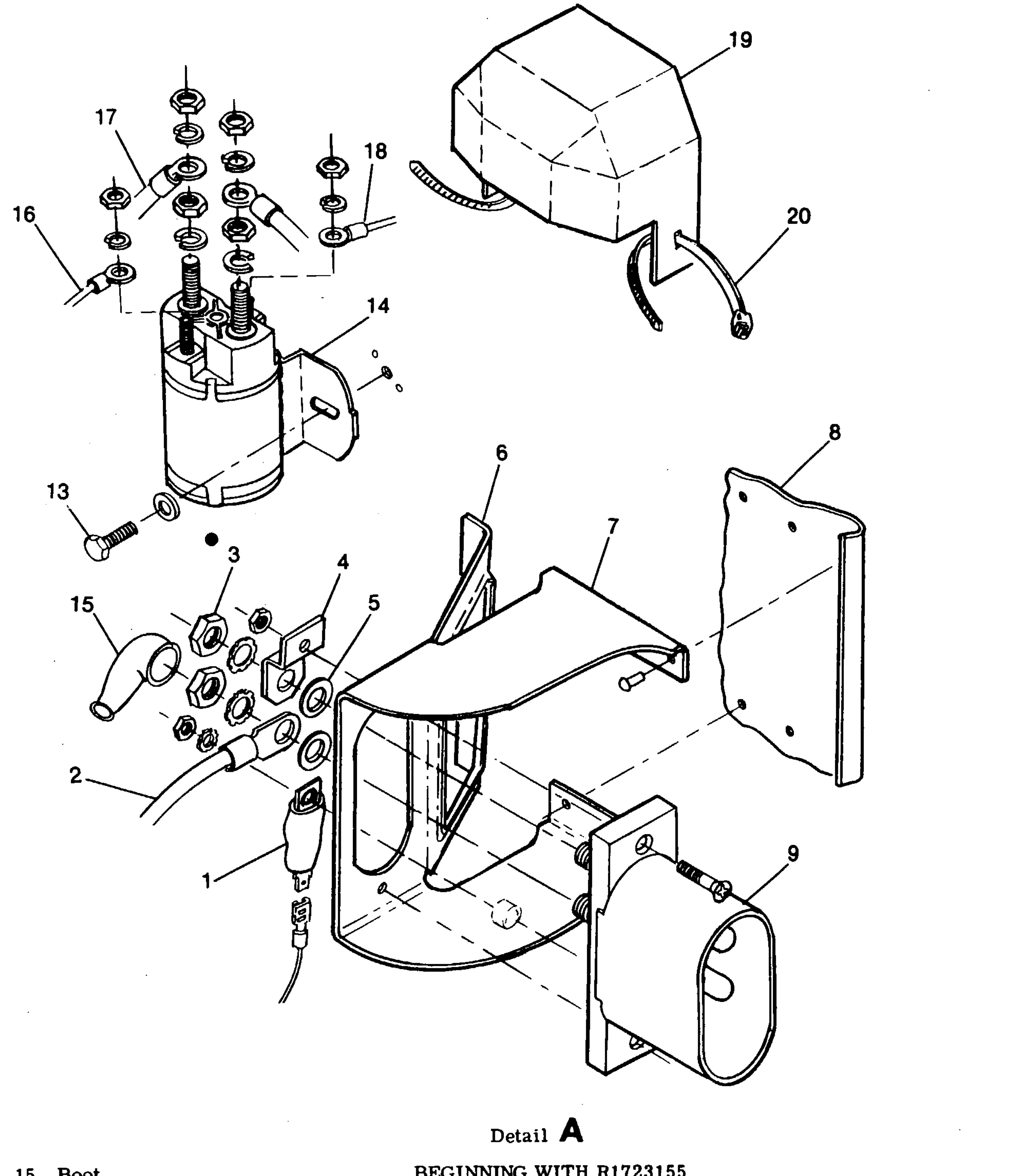


1. Diode Board
2. Cable (To Contactor)
3. Nut
4. Ground Strap
5. Washer
6. Brace
7. Bracket Assembly
8. Firewall
9. Receptacle
10. Doubler
11. Door
12. Cowl Skin
13. Bolt
14. Contactor

● THRU 1980 MODELS

★ BEGINNING WITH 1981 MODELS

Figure 16-3. Ground Service Receptacle Installation (Sheet 1 of 2)



15. Boot
16. Wire(to Diode)
17. Wire (to Terminal Block)
18. Ground Wire
19. Cover
20. Sta-strap

NOTE

Refer to sheet 1 for door installation.

Figure 16-3. Ground Service Receptacle Installation (Sheet 2 of 2)

16-37. TROUBLE SHOOTING THE ALTERNATOR SYSTEM (THRU 1977 MODELS)

TROUBLE	PROBABLE CAUSE	REMEDY
AMMETER INDICATES HEAVY DISCHARGE WITH ENGINE NOT RUNNING OR ALTERNATOR CIRCUIT BREAKER OPENS WHEN MASTER SWITCH IS TURNED ON.	Shorted radio noise filter or shorted wire.	1. Remove cable from output terminal of alternator. Check resistance from end of cable to ground (MASTER SWITCH MUST BE OFF). If resistance does not indicate a direct short, proceed to step 4. If resistance indicates a direct short, proceed to step 2.
		2. Remove cable connections from radio noise filter. Check resistance from the filter input terminal to ground. Normal indication is infinite resistance. If reading indicates a direct short, replace filter. If no short is evident, proceed to step 3.
		3. Check resistance from ground to the free ends of the wires which were connected to the radio noise filter (or alternator is no noise filter is installed). Normal indication does not show a direct short. If a short exists in wires, repair or replace wiring.
	Shorted diodes in alternator.	4. Check resistance from output 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 SYSTEM WILL NOT KEEP BATTERY CHARGED.	Regulator faulty or improperly adjusted.	1. Start engine and adjust for 1500 RPM. Ammeter should indicate a heavy charge rate with all electrical equipment turned off. Rate should taper off in 1-3 minutes. A voltage check at the bus should indicate a reading consistant with the voltage ex temperature chart in the Cessna Alternator Charging System Service/Parts Manual. 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 is low, proceed to step 2.

16-37. TROUBLE SHOOTING THE ALTERNATOR SYSTEM (THRU 1977 MODELS) (CONT.)

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED. (cont)	Regulator faulty or improperly adjusted. (cont)	2. Stop engine, remove cowl, and remove cover from voltage regulator. Turn master switch ON/OFF several times and observe field relay in regulator. Relay should open and close with master switch and small arc should be seen as contacts open. If relay is inoperative, proceed to step 3. If relay operates, proceed to step 4.
		3. Check voltage at "S" terminal of regulator with master switch closed. Meter should indicate bus voltage. If voltage is present, replace regulator. If voltage is not present, check wiring between regulator and bus.
		4. Remove plug from regulator and start engine. Momentarily jumper the "A+" and "F" terminals together on the plug. Ship's ammeter should show heavy rate of charge. If heavy charge rate is observed, replace regulator. If heavy charge rate is not observed, proceed to step 5.
		5. Check resistance from "F" terminal of regulator to "F" terminal of alternator. Normal indication is a very low resistance. If reading indicates no, or poor continuity, repair or replace wiring from regulator to alternator.
		6. Check resistance from "F" terminal of alternator to alternator case. Normal indication is 6-7 ohms. If resistance is high or low, repair or replace alternator.
		7. Check resistance from case of alternator to airframe ground. Normal indication is very low resistance. If reading indicates no, or poor continuity, repair or replace alternator ground wiring.
ALTERNATOR OVERCHARGES BATTERY - BATTERY USES EXCESSIVE WATER.	Regulator faulty or improperly adjusted.	Check bus voltage with engine running. Normal indication agrees with the Cessna Alternator Charging system Service/Parts Manual. Observe ship's ammeter, ammeter should indicate near zero after a few minutes of engine operation. Replace regulator.

16-37. TROUBLE SHOOTING THE ALTERNATOR SYSTEM (THRU 1977 MODELS) (CONT.)

TROUBLE	PROBABLE CAUSE	REMEDY
OVER-VOLTAGE WARNING LIGHT ON.	Regulator faulty or improperly adjusted. Faulty sensor switch.	1. With engine running turn off and on battery portion of the master switch. If the light stays on shut down engine then turn on the "BAT" and "ALT" portion the master switch. Check for voltage at the "S" terminal of the voltage regulator. If voltage is present adjust or replace regulator. If voltage is not present check master switch and wiring for short or open condition. If wiring and switch are normal replace sensor.

16-38. TROUBLE SHOOTING THE ALTERNATOR SYSTEM. (1978 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 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.

16-38. TROUBLE SHOOTING THE ALTERNATOR SYSTEM. (1978 MODELS) (CONT.)
b. ENGINE RUNNING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON, OVER-VOLTAGE LIGHT DOES NOT COME ON.	Defective circuit breaker.	Replace circuit breaker.
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.

CAUTION

This malfunction frequently causes a shorted regulator which will result in an over-voltage condition when system is again operated.

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR MAKES ABNORMAL WHINING NOISE	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check reisitance 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	Replace regulator
	Defective over-voltage sensor.	Replace sensor.
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 bue 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 20. 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.

16-38. TROUBLE SHOOTING THE ALTERNATOR SYSTEM. (1978 MODELS) (CONT.)
b. ENGINE RUNNING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED.	Alternator output voltage insufficient.	1. Connect coltmeter 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.
		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.
		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 20.
	Alternator field winding open.	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.

16-38. TROUBLE SHOOTING THE ALTERNATOR SYSTEM. (1978 MODELS) (CONT.)
b. ENGINE RUNNING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED. (Cont.)	Alternator field winding open (cont).	2. Check resistance from case of alternator to airframe ground. Normal indication is very low resistance. If reading indicates no, or poor continuity, repair or replace alternator ground wiring.

16-39. TROUBLE SHOOTING THE ALTERNATOR SYSTEM. (BEGINNING WITH 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" Termianl of 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 contol 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 CITCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON, LOW-VOLTAGE LIGHT DOES NOT COME ON.	Defective circuit breaker.	Replace circuit breaker.
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.

This malfunction may cause a shorted alternator control unit which will result in an over-voltage condition when system is again operated.

16-39. TROUBLE SHOOTING THE ALTERNATOR SYSTEM. (BEGINNING WITH 1979 MODELS) (CONT.)
b. ENGINE RUNNING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
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. 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.	Replace alternator control unit.
	Defective low-voltage sensor.	Replace alternator control unit.
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. 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.

16-39. TROUBLE SHOOTING THE ALTERNATOR SYSTEM. (BEGINNING WITH 1979 MODELS) (CONT.)
b. ENGINE RUNNING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED. (Cont.)	Alternator output voltage insufficient. (Cont).	3. Starting at "F" terminal of alternator, trace circuit to alternator conrol 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 20.
	Alternator field winding open.	1. If voltage is present turn off alternator and battery switches. Check resistance from "F" terminal of alternator to alternator case, turning 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.
		2. Check resistance from case of alternator to airframe ground. Normal indication is very low resistance. If reading indicates no, or poor continuity, repair or replace alternator ground wiring.

SHOP NOTES:

16-40. REMOVAL AND INSTALLATION. (See figure 16-4.)

a. Insure that the master switch is off and the negative lead is disconnected from the battery.
b. Remove wiring from the alternator and label.
c. Remove screw and nut holding blast tube to support strap clamp, blast tube will then be free for removal.
d. Remove nuts and washers from alternator mounting bolts.
e. Remove alternator.
f. To replace alternator, reverse this procedure.

16-41. OVER-VOLTAGE WARNING SYSTEM.

16-42. DESCRIPTION. The over-voltage system consists of an over-voltage sensor switch and a red warning light labeled "HIGH VOLTAGE". The over-voltage sensor is attached to the wire bundle behind the instrument panel thru 1977 models and on a mounting bracket just forward of the instrument panel on the left hand side beginning with 1978 models. 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 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.

NOTE

The over-voltage sensor switch contains solid state devices. Observe proper polarity before supplying power. Grounding the orange lead or interconnecting orange and black leads will destroy the device. When removal is required for replacement, identify (tag) wiring and follow the wiring diagram in Section 20 for rewiring.

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.

16-43. ALTERNATOR VOLTAGE REGULATOR.

16-44. DESCRIPTION. Thru 1977 Models the voltage regulator is semi-solid state. The mechanical relay in the regulator is actuated by the aircraft master switch and connects the regulator to the battery. The solid state portion is voltage sensitive and controls the current applied to the field windings of the alternator. The regulator is a remove and replace item and not repairable. 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. Thru 1978 Models the voltage regulator is solid-state. The regulator is a remove and replace item, and not repairable. 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 regulator and the 28-volt alternator. Refer to paragraph 16-43.

16-45. ALTERNATOR CONTROL UNIT.

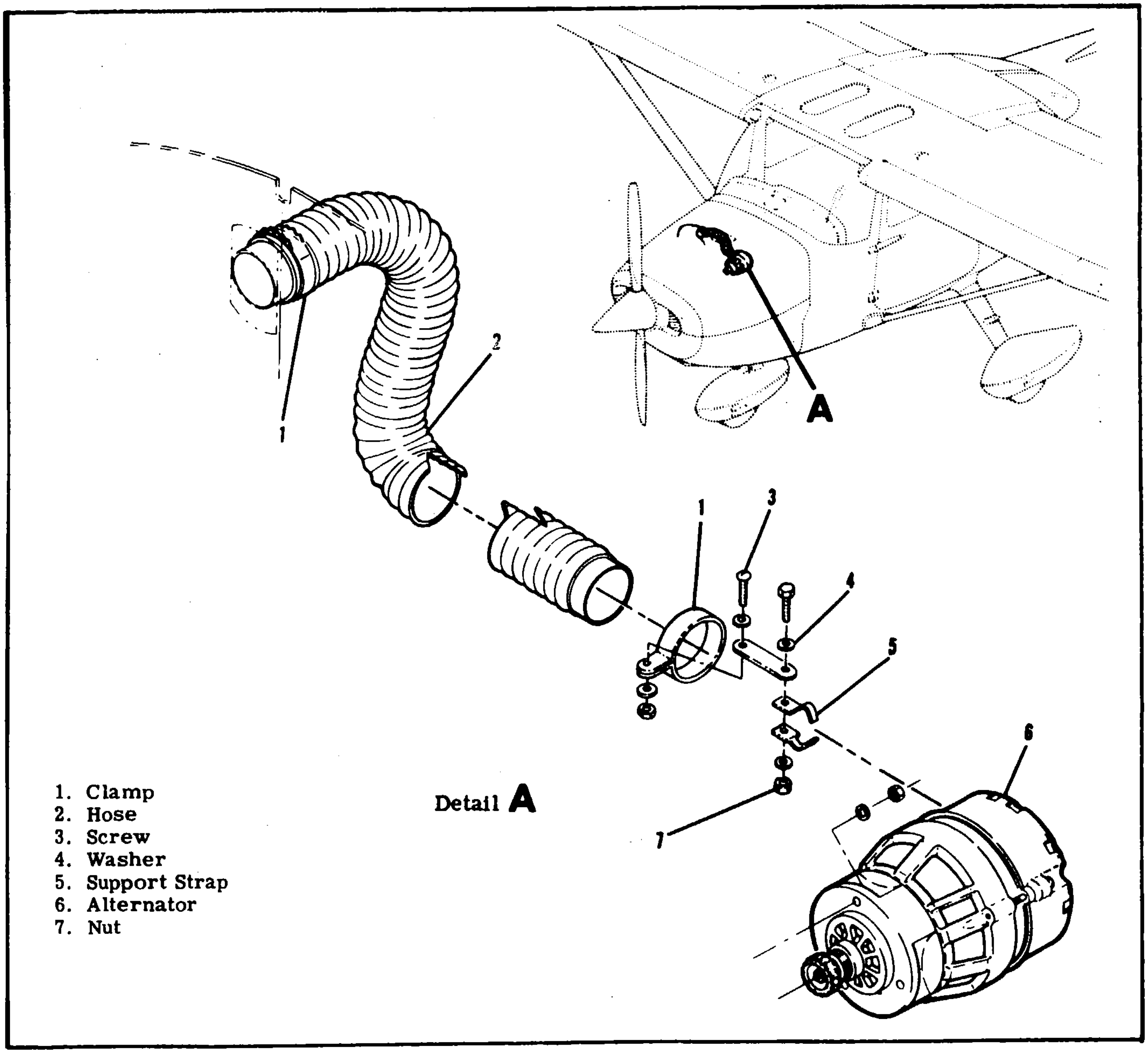
16-46. DESCRIPTION. The alternator control unit is a solid state voltage regulator with an over-voltage sensor and low-voltage sensor incorporated in the unit. The control unit is not adjustable and is a remove and replace item. A Cessna Alternator Charging System Test Box Assembly (PN 9870005(is Available 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.

16-47. 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.

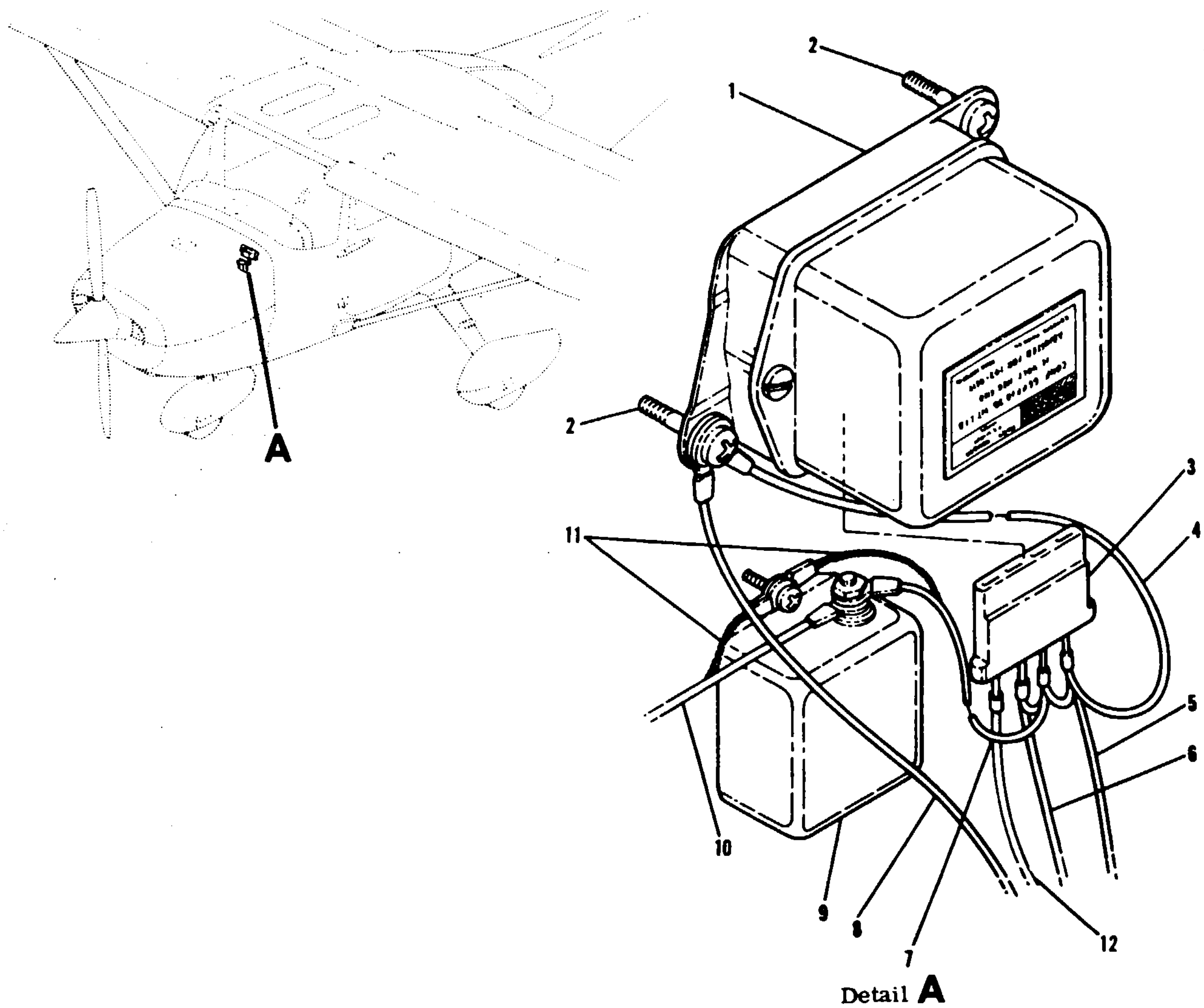
16-48. RIGGING THROTTLE-OPERATED MICRO SWITCHES. (Refer to Section 12.)

16-49. AUXILIARY ELECTRICAL FUEL PUMP FLOW RATE ADJUSTMENT. (Refer to Section 12.)



1. Clamp
2. Hose
3. Screw
4. Washer
5. Support Strap
6. Alternator
7. Nut

Figure 16-4. Alternator Installation.



THRU 1977 MODELS

1. Voltage Regulator
2. Screw
3. Housing
4. Wire Shields to Ground
5. Wire to Alternator "F"
6. Wire to Alternator "A+"
7. Wire to Filter
8. Wire to Alternator Ground
9. Filter - Radio Noise
10. Wire to Master Switch
11. Shield - Ground
12. Wire to Overvoltage Light

Figure 16-5. Voltage Regulator Installation (Sheet 1 of 3)

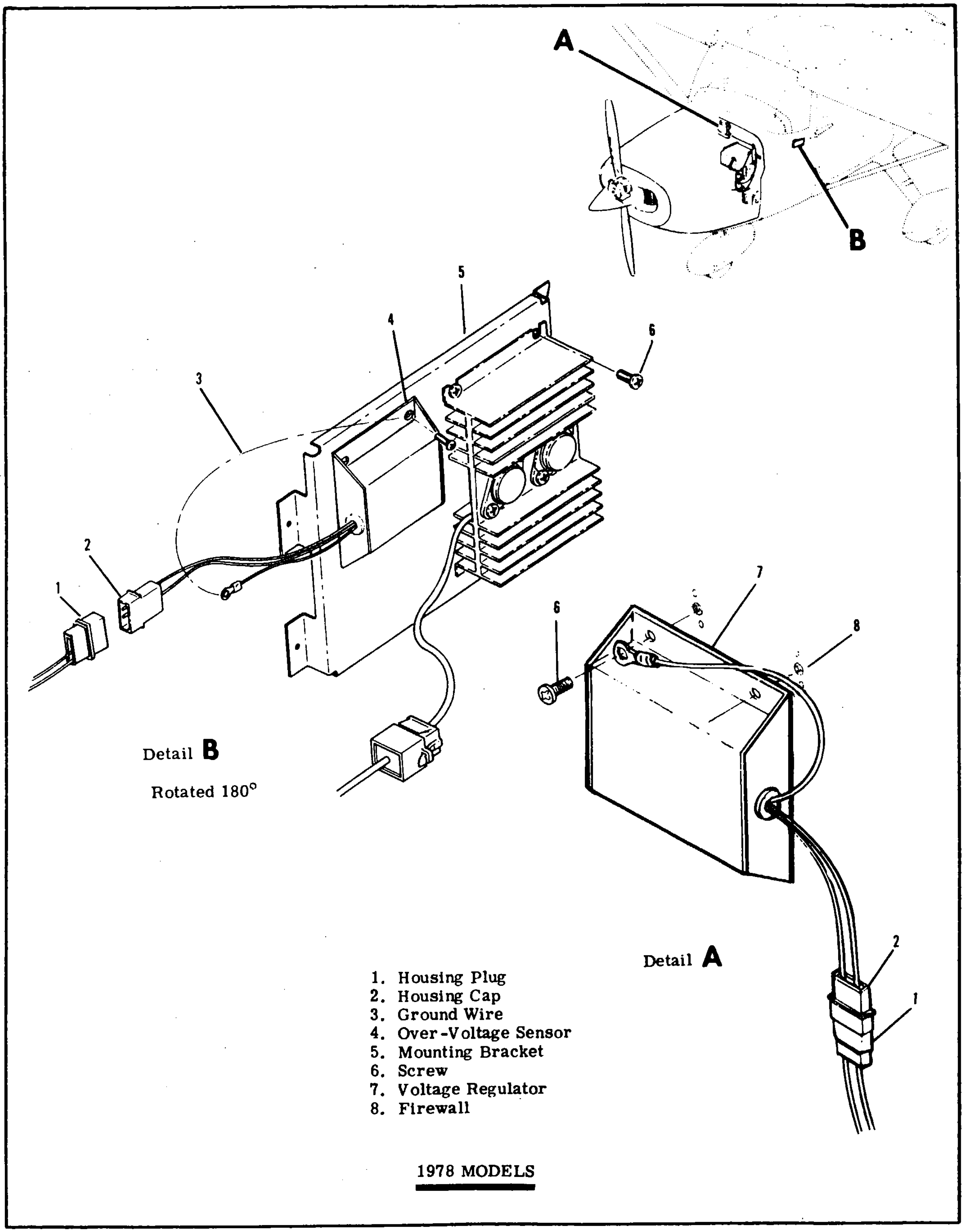
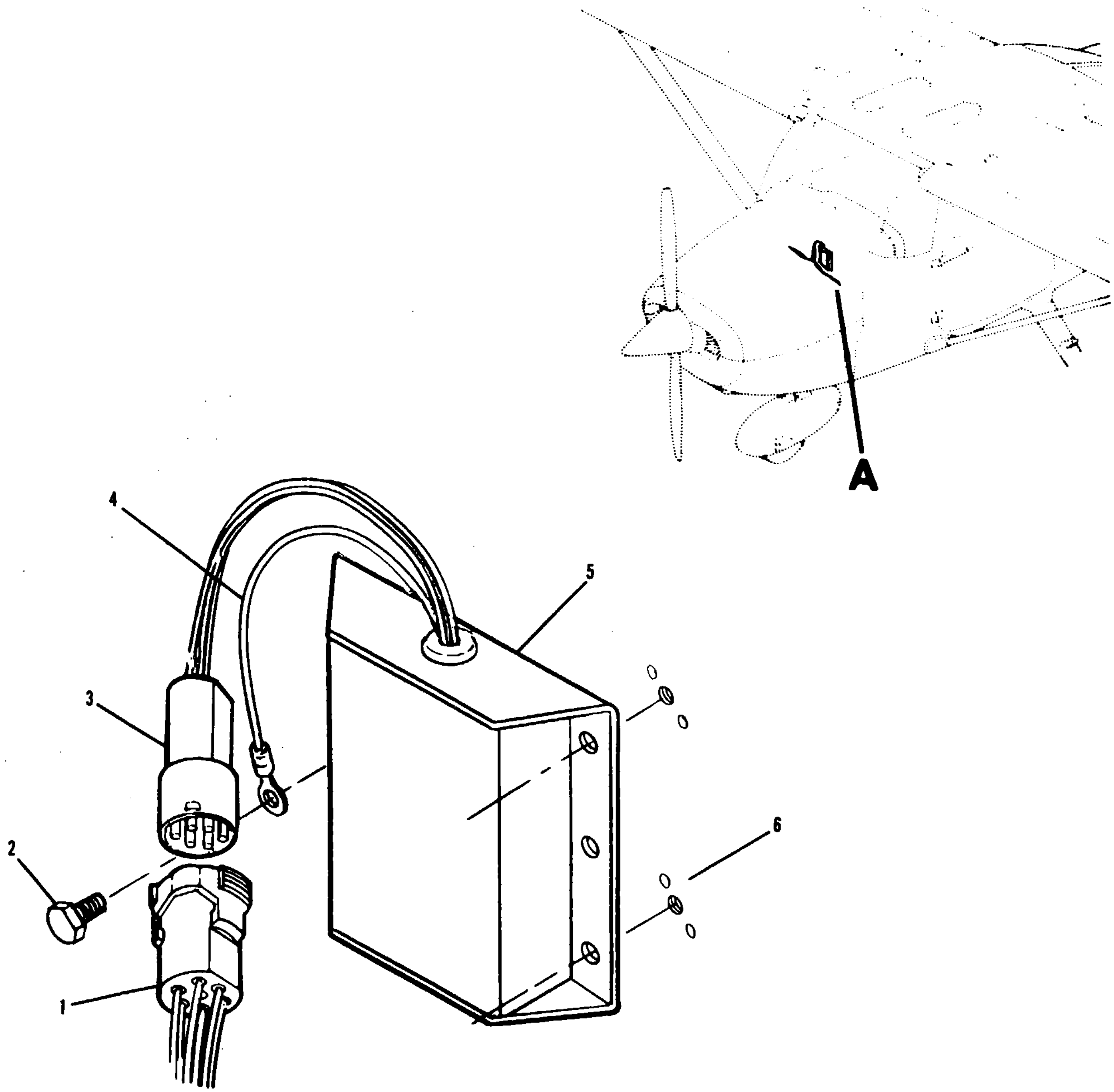


Figure 16-5. Voltage Regulator Installation (Sheet 2 of 3)



1. Housing Cap
2. Bolt
3. Housing Plug
4. Ground Wire
5. Alternator Control Unit
6. Firewall

BEGINNING WITH 1979 MODELS

Figure 16-5. Voltage Regulator Installation (Sheet 3 of 3)

16-50. AIRCRAFT LIGHTING SYSTEM.

16-51. DESCRIPTION. The aircraft lighting system consists of landing and taxi lights, navigation lights, anti-collision strobe lights, flashing beacon light, dome, instrument flood lights and courtesy light, map light, control wheel map light, compass and radio dial lights.

16-52. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
LANDING AND TAXI LIGHT(S) OUT.	Short circuit in wiring.	1. Inspect circuit breaker. If circuit breaker is open, proceed to step 2. If circuit breaker is O.K. 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 AND/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 O.K. 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 a 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.
	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 O.K. proceed to step 3.

16-52. TROUBLE SHOOTING (CONT.)

TROUBLE	PROBABLE CAUSE	REMEDY
ALL NAV LIGHTS OUT. (Cont).	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.

TROUBLE	PROBABLE CAUSE	REMEDY
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.
		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. If circuit breaker opens on both strobe power supplies proceed to step 3. If circuit breaker does not open proceed to step 4.
		3. Check aircraft wiring. Repair or replace as necessary.
		4. Inspect strobe power supply ground wire for contact with wing structure.

16-52. TROUBLE SHOOTING (CONT.)

TROUBLE	PROBABLE CAUSE	REMEDY
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 may be used. Be sure power leads are protected properly when unit is removed to prevent short circuit.		
ONE ANTI-COLLISION STROBE LIGHT WILL NOT LIGHT.	Defective Strobe Power Supply, or flash tube.	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 12 volts, thru 1977 models and 24 volts beginning with 1978 models. If OK proceed to step 2. If not, check aircraft power supply (battery/external power).
		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 ohmeter 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.

16-52. TROUBLE SHOOTING (CONT.)

TROUBLE	PROBABLE CAUSE	REMEDY
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 O.K., 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.
	Faulty section in dimming potentiometer.	4. Lights will work when control is placed in brighter 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 O.K., 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 switches on. If battery voltage is present, replace map light assembly.

16-53. LANDING AND TAXI LIGHTS.

16-54. DESCRIPTION. Cowl mounted landing and taxi lights are installed. The left hand light is used for taxi and the right hand light for landing. Two rocker type switches on the pilots switch panel control the lights. A 20 amp circuit breaker is installed to protect the system.

16-55. REMOVAL AND INSTALLATION. (See figure 16-6.

a. Remove screws (1) and pull bracket assembly (2) from nose cap to gain access to electrical leads.
b. Disconnect electrical leads from lamps making sure switches are off and leads do not short out.
c. Remove screws (9) from plate (7) and remove lamp assembly from bracket (2). If left hand (taxi) light is being removed, note position of spacers (3) and (11) for reinstallation.
d. Remove screws (10) from bracket (4) to disassemble lamp assembly.
e. Install new lamp and reassemble.

16-56. ADJUSTMENT. Park the aircraft 3 feet from a wall or any suitable light reflecting surface (distance is measured between landing light and wall). With the nose gear shock strut extended 2 inches, the center of the landing light beam (right hand) on the wall should be 35 3/4 inches above the floor. The center of the taxi light beam, (left hand) on the wall should be 32 1/8 inches above the floor.

16-57. NAVIGATION LIGHTS.

16-58. DESCRIPTION. The navigation lights are mounted on each wing tip and the aft end of the vertical fin tip. The lights are controlled by a rocker type switch located on the instrument panel. A circuit breaker is installed on the panel to protect the system.

16-59. REMOVAL AND INSTALLATION. For removal and installation of navigation lights see figure 16-7.

16-60. ANTI-COLLISION STROBE LIGHTS.

16-61. DESCRIPTION. A white strobe light may be installed on each wing tip with the navigation lights. Strobe 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 lights from individual power supplies mounted on each wing tip rib.

16-62. REMOVAL AND INSTALLATION. For removal and installation of strobe light and power supply see figure 16-7.

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.

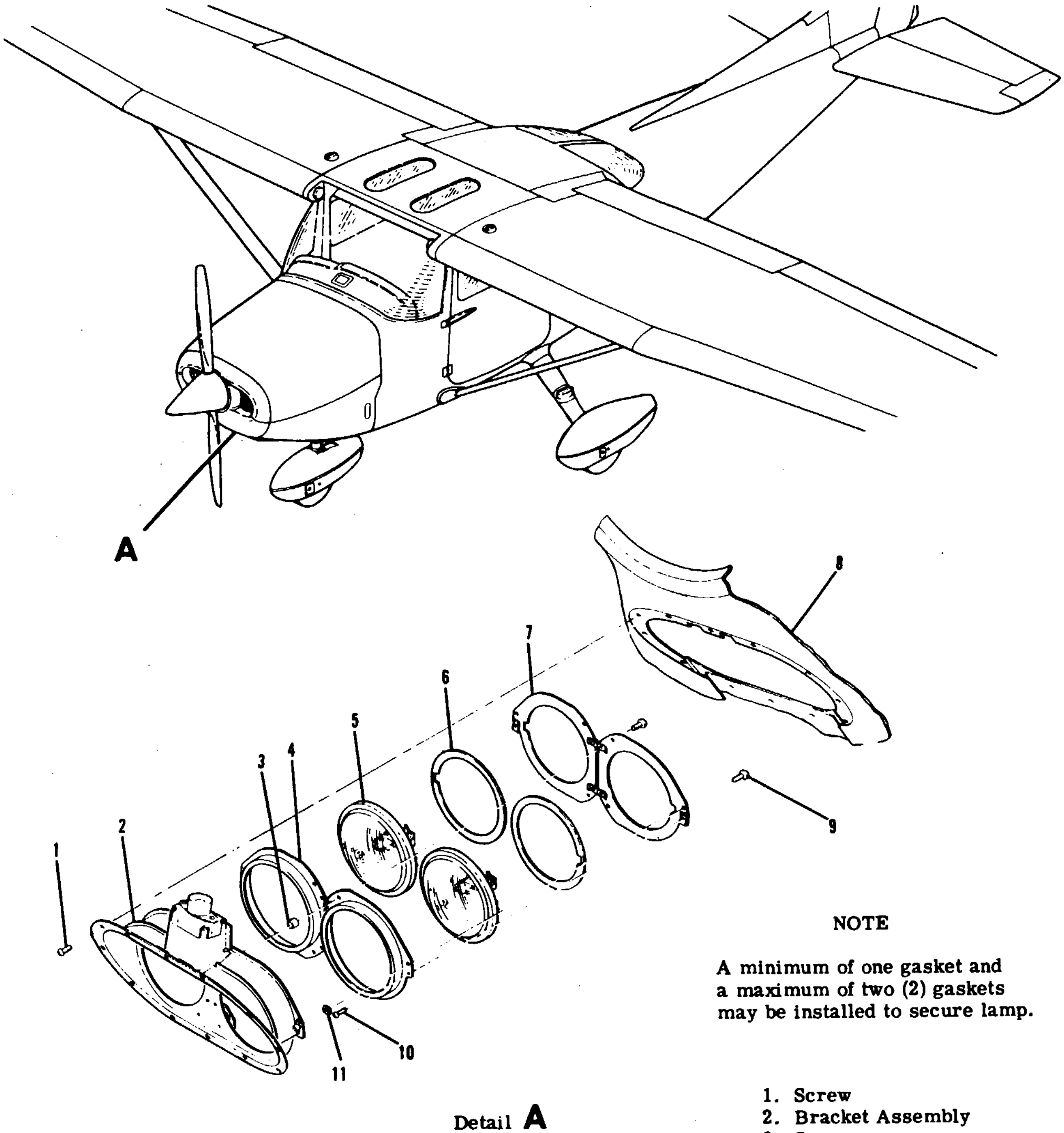
16-63. OPERATIONAL REQUIREMENTS (THRU 1977 MODELS).

CAUTION

The capacitors in the strobe light power supplies must be reformed if not used for a period of (6) months. The following procedure must be used.

Connect the power supply, red wire to plus, black to ground to 6 volt DC source. Do Not connect strobe tube. Turn on 6 volt supply. Note current draw after one minute. If less than 1 ampere, continue operation for 24 hours. Turn off DC power source. Then connect to the proper voltage, 12 volt. Connect tube to output of strobe power supply and allow to operate, flashing, for 15 minutes. Remove strobe tube. Operating power supply at 12 volts, note the current drain after one minute. If less than 0.5 amperes, operate for 6 hours. If current draw is greater than 0.5 amperes, reject the unit.

SHOP NOTES:



NOTE

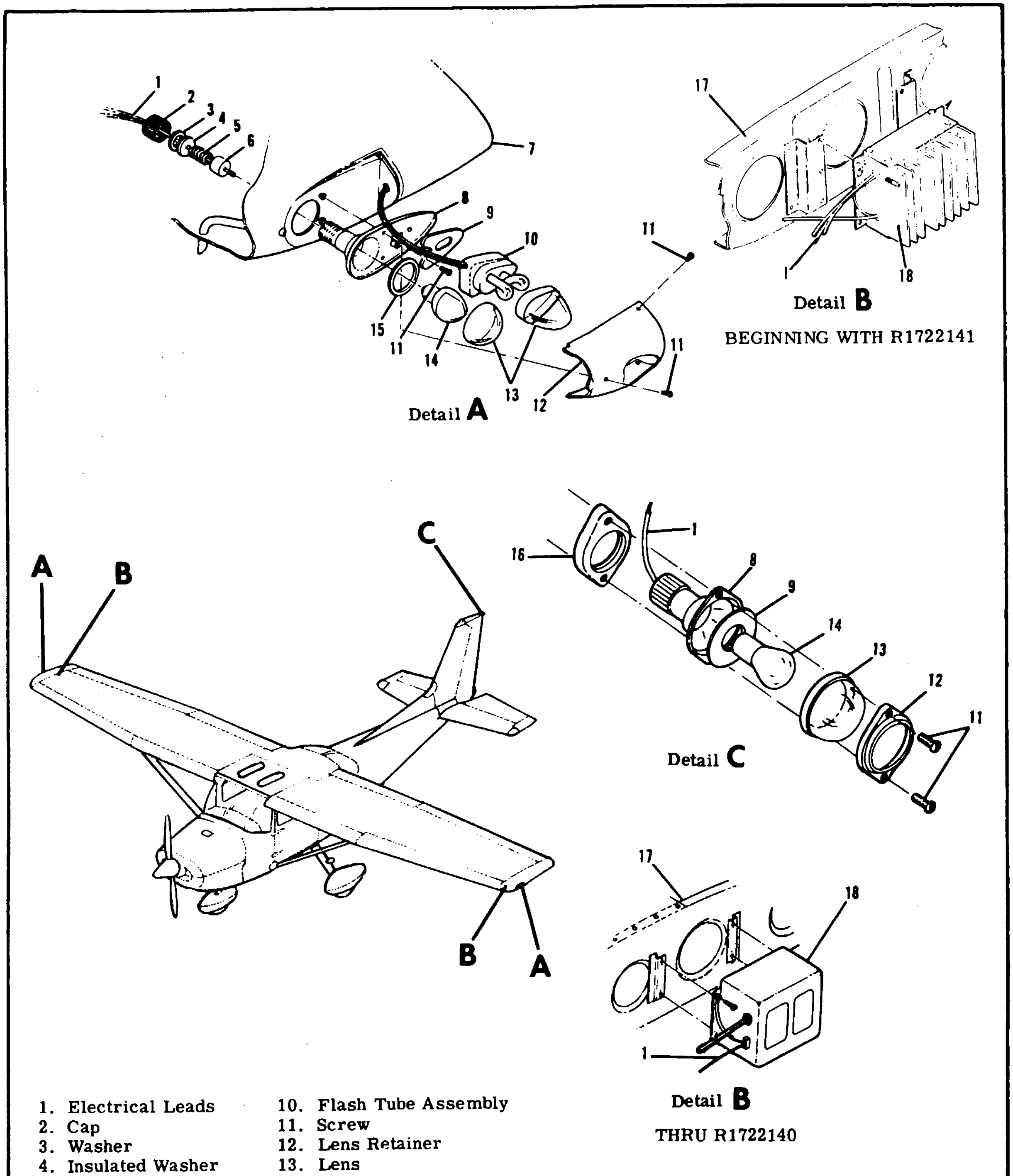
A minimum of one gasket and a maximum of two (2) gaskets may be installed to secure lamp.

1. Screw
2. Bracket Assembly
3. Spacer
4. Bracket
5. Lamp
6. Gasket
7. Plate
8. Nose Cap
9. Screw
10. Screw
11. Washer

NOTE

A maximum of two washers on each screw may be used for adjustment.

Figure 16-6. Landing and Taxi Light Installation.



1. Electrical Leads
2. Cap
3. Washer
4. Insulated Washer
5. Spring
6. Insulator
7. Wing Tip
8. Receptacle
9. Gasket
10. Flash Tube Assembly
11. Screw
12. Lens Retainer
13. Lens
14. Lamp
15. Seal
16. Mount
17. Wing Tip Rib
18. Power Supply

Figure 16-7. Navigation and Anti-Collision Strobe Light Installation.

16-64. FLASHING BEACON.

16-65. DESCRIPTION. The flashing beacon light is attached to the vertical fin tip. The lamp is iodine-vapor, electrically switched by a solid-state flasher assembly. The flasher assembly is mounted in the aft section of the tailcone. The switching frequency of the flasher assembly operates the beacon at approximately 45 flashes per minute. A 1.5 ohm resistor is installed thru 1977 models and a 6 ohm resistor is installed beginning with 1978 models to eliminate a pulsing effect on the cabin lighting and ammeter.

16-66. REMOVAL AND INSTALLATION. For removal and installation of flashing beacon see figure 16-8.

16-67. INSTRUMENT AND DOME LIGHTS.

16-68. DESCRIPTION. The instrument flood light and dome light are installed in the overhead console. The dome light consists of a frosted lens and a single bulb controlled by a switch mounted forward of the light. The instrument flood light consists of a red lens and a single bulb controlled by an off/on switch mounted aft of the light. Intensity of the lamp is controlled by a rheostat switch located on the instrument panel.

16-69. REMOVAL AND INSTALLATION. For removal and installation of instrument and dome light, see figure 16-9.

16-70. COURTESY LIGHTS.

16-71. DESCRIPTION. The courtesy lights are m mounted in the underside of each wing, inboard of the upper wing strut attach. The light consists of a lens socket and a single bulb. The lights are controlled by the dome light switch.

16-72. REMOVAL AND INSTALLATION. For removal and installation of the courtesy lights see figure 16-9.

16-73. COMPASS AND RADIO DIAL LIGHTING.

16-74. DESCRIPTION. The compass and radio dial lights are contained within the individual units. The lights are controlled by the instrument flood light switch on the overhead console. Intensity is controlled by a rheostat located on the instrument panel.

16-75. INSTRUMENT POST LIGHTING.

16-76. DESCRIPTION. Individual post lighting may be installed to provide nonglare instrument lighting. The post light consists of a cap and a clean lamp assembly with a tinted lens bonded to the decorative covers. The intensity of the post lights is controlled by the radio light dimming rheostat located on the instrument panel.

16-77. REMOVAL AND INSTALLATION. For removal and installation of post lamp, slide the cap and lens assembly from the base. Slide the lamp from the socket and replace.

16-78. TRANSISTORIZED LIGHT DIMMING.

16-79. DESCRIPTION. A remotely located, two-circuit transistorized dimming assembly is installed to control instrument lighting. One circuit controls the compass light, map light and instrument flood lights. The other circuit controls radio lighting. A concentric knob arrangement on a dual rheostat assembly mounted on the instrument panel.

16-80. REMOVAL AND INSTALLATION. For removal and installation of transistorized dimming assembly, see figure 16-10.

16-81. MAP LIGHTING.

16-82. DESCRIPTION. White map lighting and red-non-glare instrument lighting are provided by an adjustable light mounted on the upper forward part of the left door post. The switch is a three position type with red, white and off positions. The map light contains a white bulb for general purpose lighting and a red bulb for adjustable instrument lighting. The intensisty of the red bulb is controlled by the center portion of a concentric knob arrangement thru a dual rheostat assembly located on the pilot's switch panel.

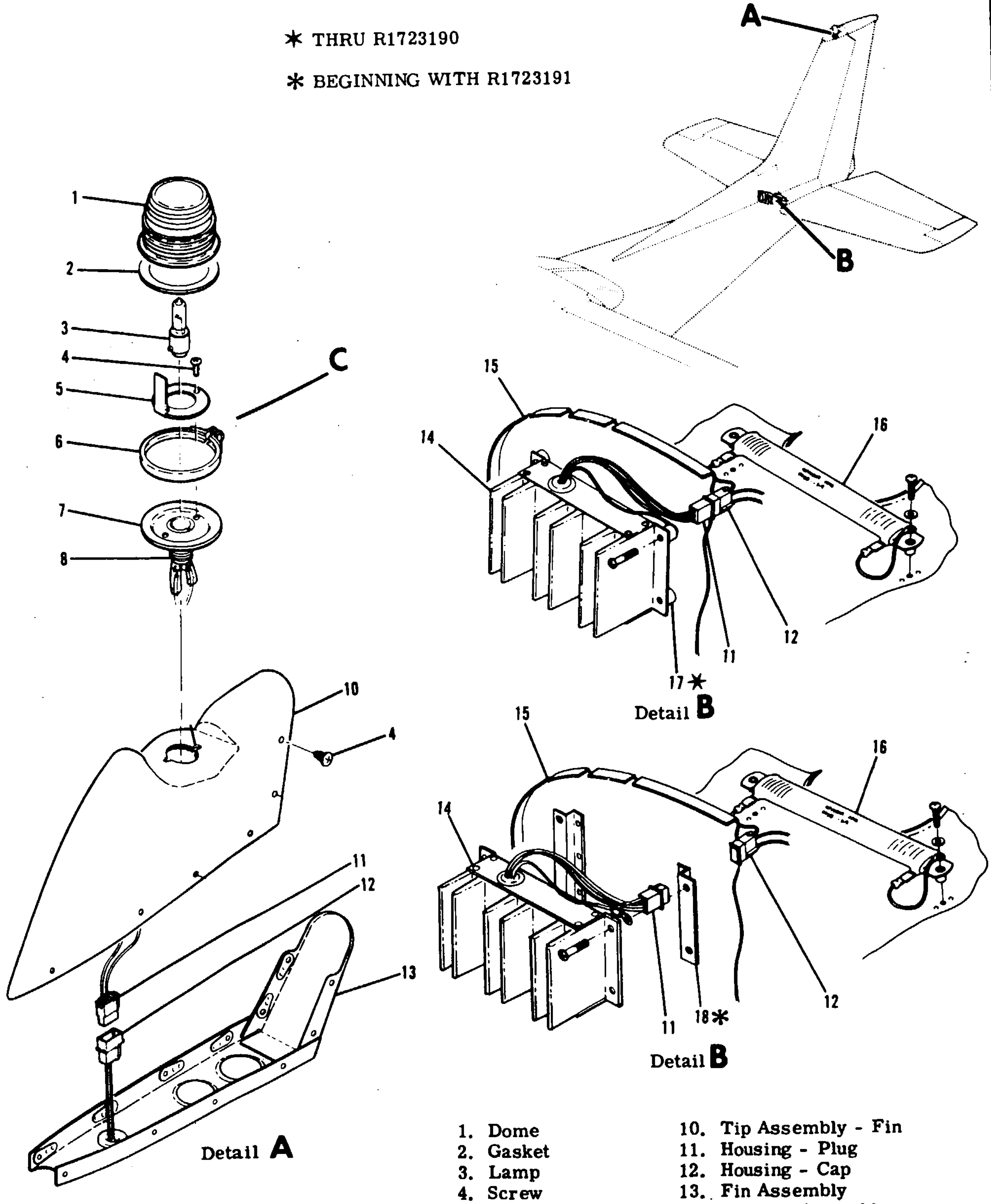
16-83. REMOVAL AND INSTALLATION. (See figure 16-11.)

a. For replacement of defective lamp slide the hood and lens from the map light assembly and remove the bayonet type bulb.

b. For removal of the map light assembly, remove the screws from the front door post shield. Remove the washer and nut attaching the map light. Remove the ground wire from the map light screw. Detach the wires at the quick disconnect fasteners and remove the map light assembly.

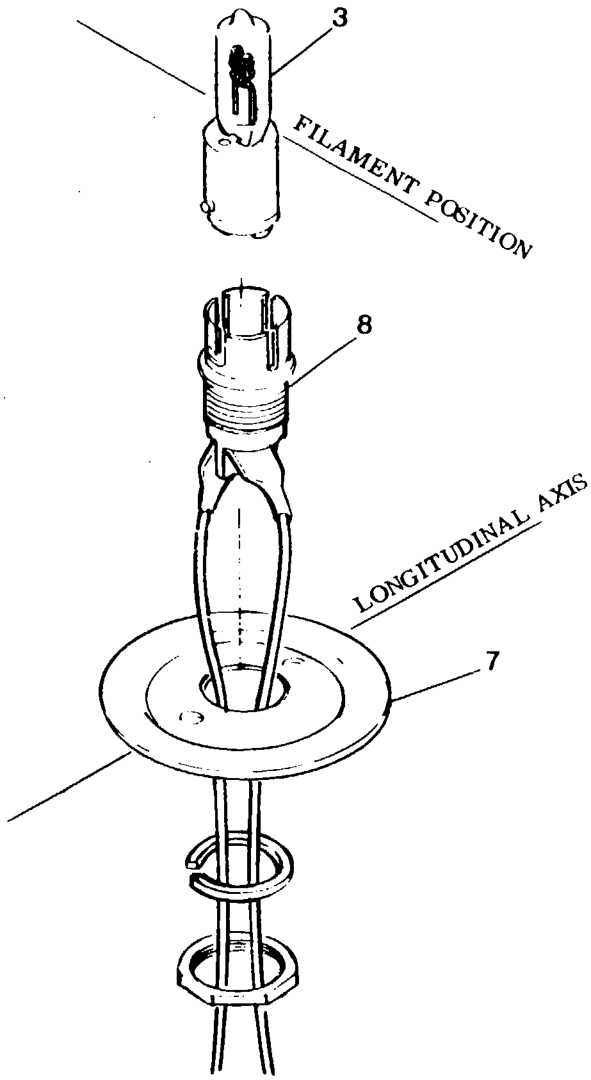
✱ THRU R1723190

✱ BEGINNING WITH R1723191



1. Dome
2. Gasket
3. Lamp
4. Screw
5. Baffle
6. Clamp Assembly
7. Plate - Mounting
8. Socket Assembly
9. Nut Plate
10. Tip Assembly - Fin
11. Housing - Plug
12. Housing - Cap
13. Fin Assembly
14. Flasher Assembly
15. Bulkhead
16. Resistor
17. Spacer
18. Z Bracket

Figure 16-8. Flashing Beacon Light Installation (Sheet 1 of 2)

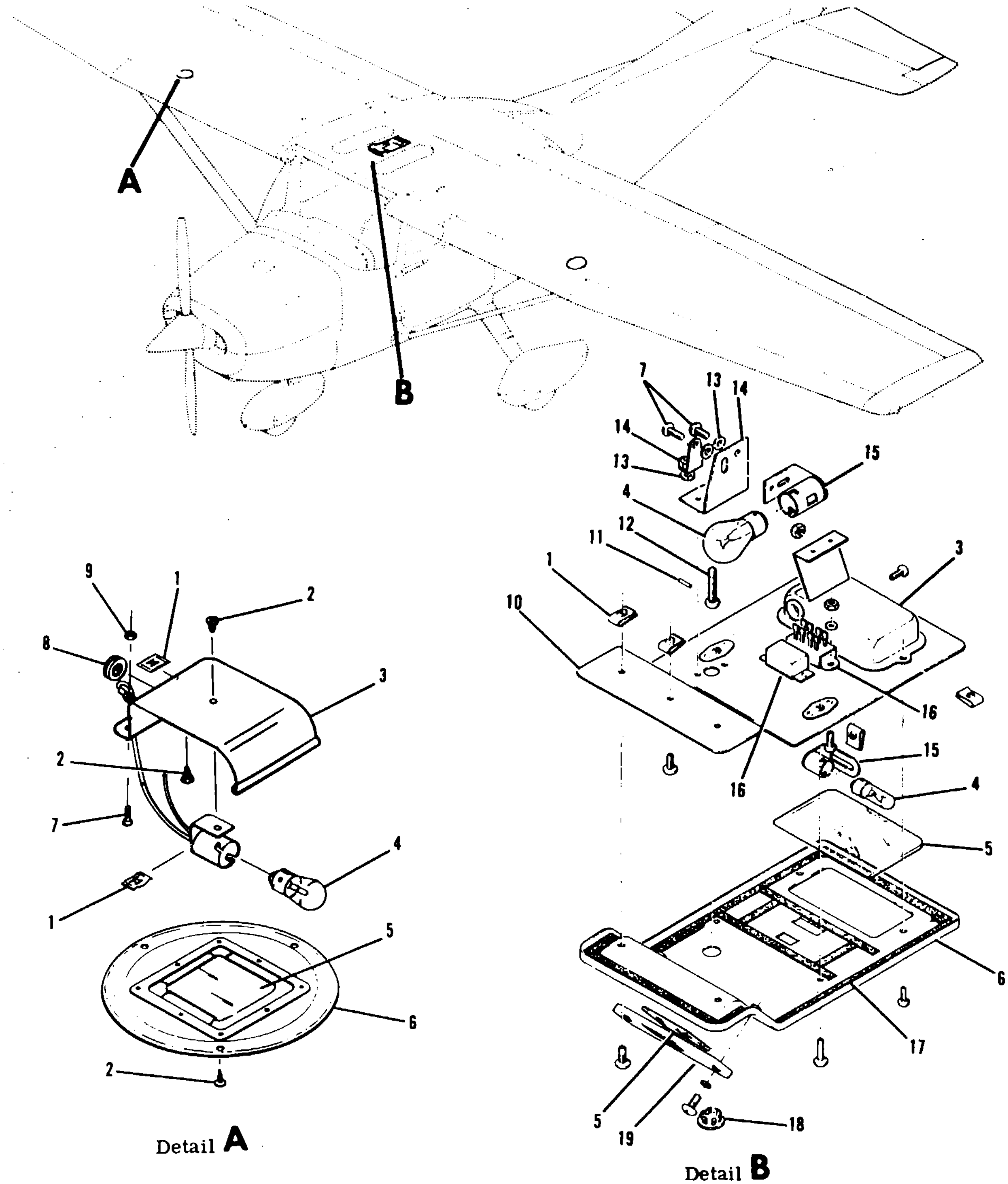


Detail C
BEGINNING WITH R1723333

NOTE

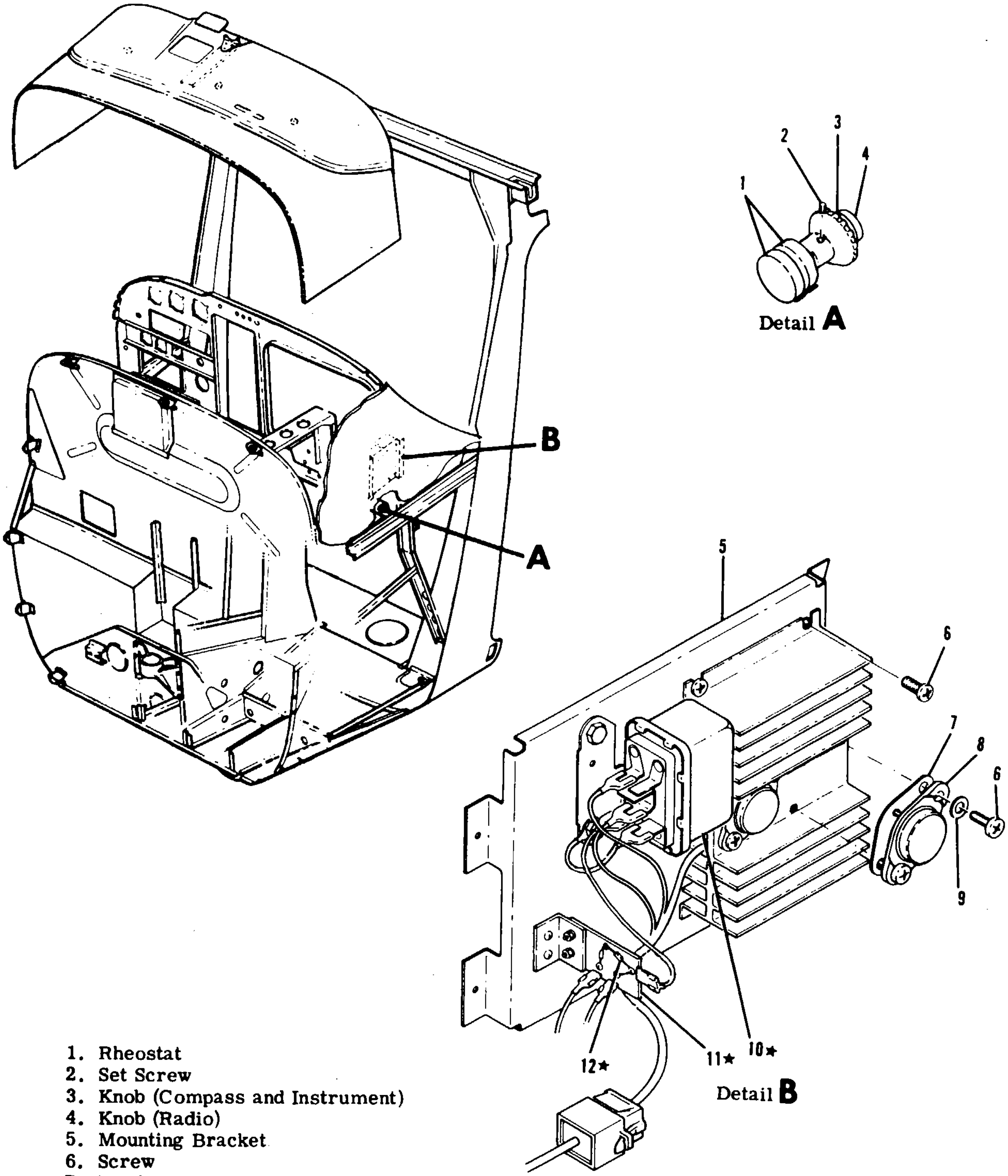
When installing lamp be sure socket assembly is installed in mounting plate so lamp may be installed with filament perpendicular to the longitudinal axis of the aircraft.

Figure 16-8. Flashing Beacon Light Installation (Sheet 2 of 2)



1. Tinnerman Nut
2. Tinnerman Screw
3. Reflector
4. Lamp
5. Lens
6. Cover
7. Machine Screw
8. Grommet
9. Nut
10. Support
11. Pin
12. Adjustment Screw
13. Washer
14. Nut Plate
15. Socket
16. Switch
17. Seal
18. Plug Button
19. Lens Retainer

Figure 16-9. Instrument, Dome and Courtesy Light Installation.



1. Rheostat
2. Set Screw
3. Knob (Compass and Instrument)
4. Knob (Radio)
5. Mounting Bracket
6. Screw
7. Insulator
8. Transistor
9. Washer
10. Relay
11. Diode Board
12. Diode

★ THRU R1722824
AND FR1720611

Figure 16-10. Transistorized Dimming.

16-84. CONTROL WHEEL MAP LIGHT.

16-85. DESCRIPTION. The control wheel map light is mounted on the lower side of the control wheel. Light intensity is controlled by a thumb operated rheostat. For dimming the rheostat should be turned clockwise.

16-86. REMOVAL AND INSTALLATION. (See to figure 16-12.)

a. For easy access to the map light assembly rotate the control wheel 90°.

b. Label the wires connecting to the map light assembly (terminal block) and remove the screws securing the wires to the terminal block.

c. The assembly should now be free for removal. Remove the two screws securing the map light to the control wheel and remove the map light assembly.

d. For reassembly reverse this procedure.

16-87. PITOT HEATER.

16-88. DESCRIPTION. An electrical heater unit is installed in some pitot tubes. The heater offsets the possibility of ice formations on the pitot tube. The heater is integrally mounted in the pitot tube and is operated by a switch on the instrument panel. (See figure 16-13.)

16-89. CIGAR LIGHTER.

16-90. 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 master switch is "OFF" before inserting probe into circuit breaker on cigar lighter to reset.

16-91. CLOCK. .

16-92. DESCRIPTION.. Thru 1978 Models an electric clock may be installed in the aircraft. During the 1979 Models a digital clock may be installed. The digital clock has the capability of date and second read out as well as time. Both clocks are installed in the instrument panel in the same manner, see figure 16-14. Also refer to Pilots Operating Hnadbook for operational procedures.

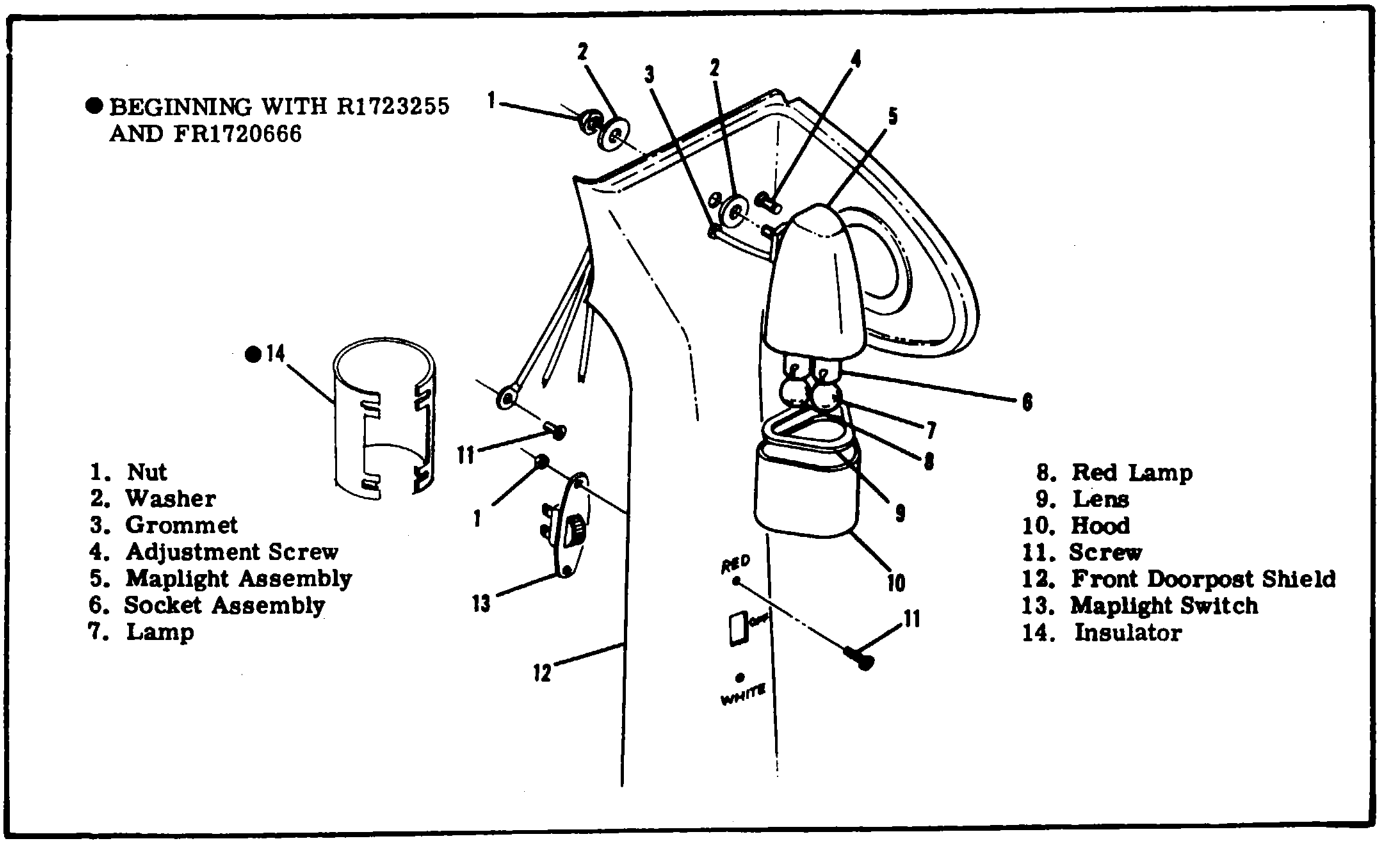
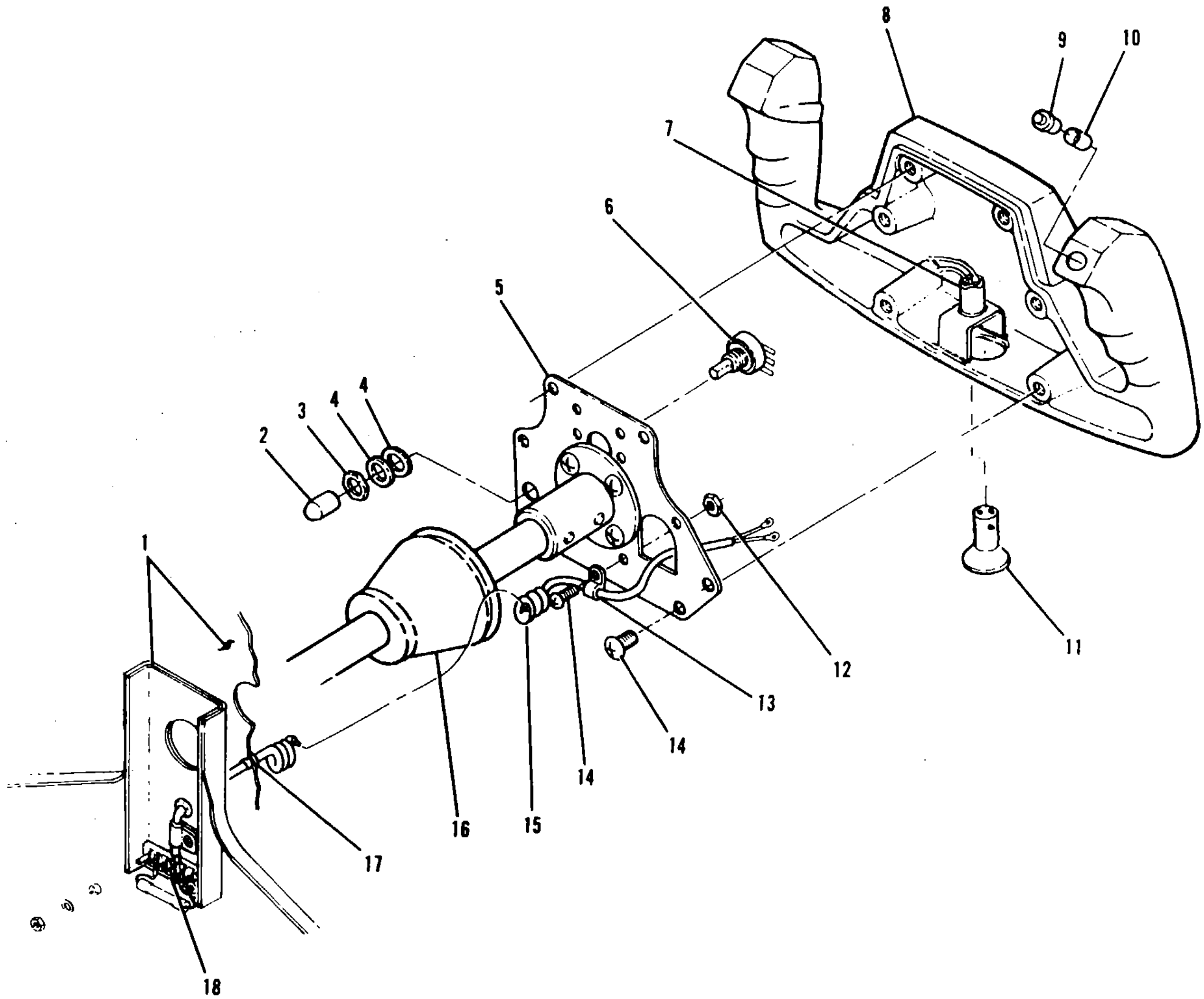


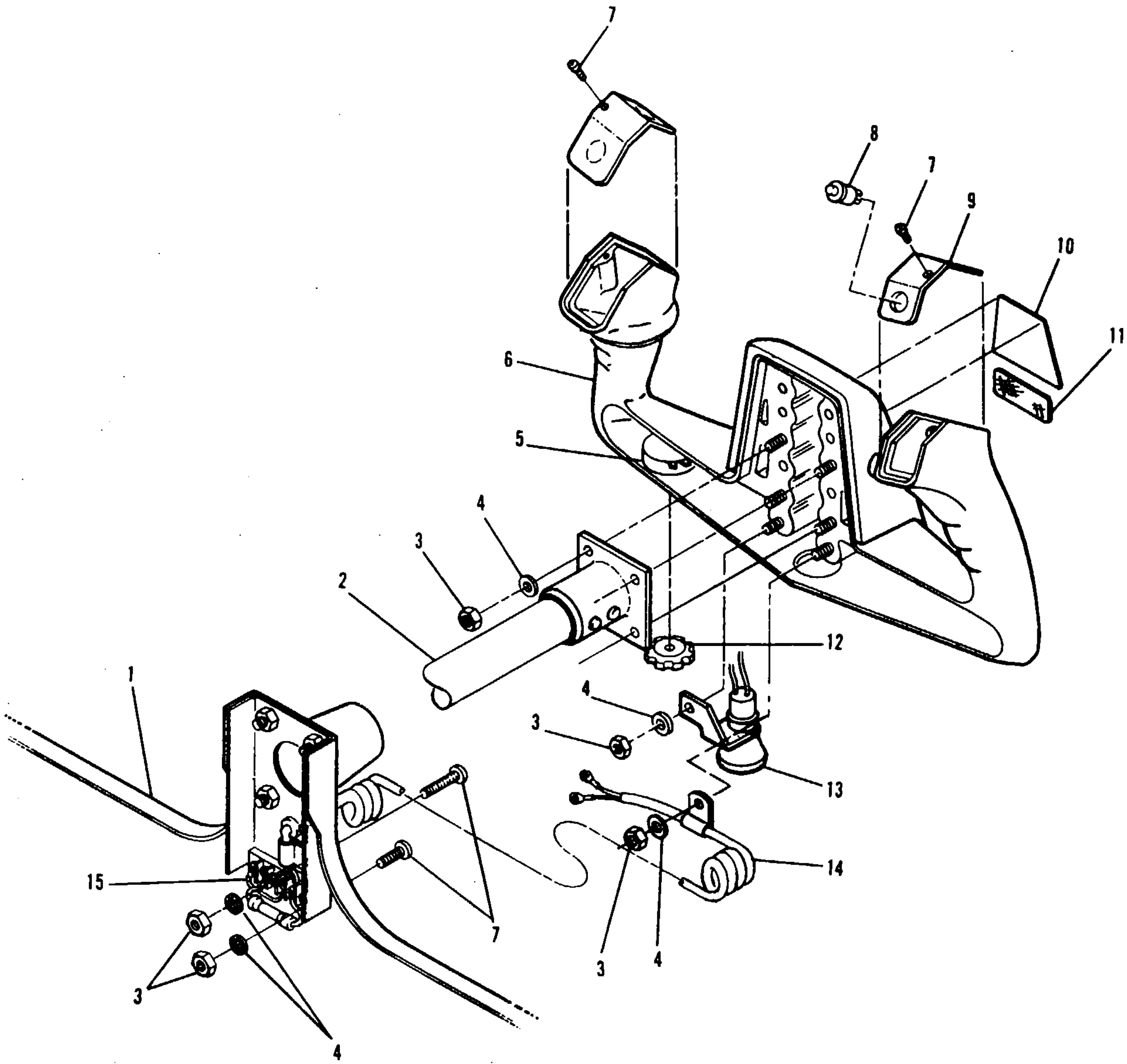
Figure 16-11. Map Light Installation.



1. Stationary Panel
2. Cover
3. Nut
4. Washer
5. Plate
6. Rheostat
7. Socket
8. Control Wheel Assembly
9. Switch
10. Insulator
11. Lamp
12. Nut
13. Clamp
14. Screw
15. Cable Assembly
16. Cover
17. Grommet
18. Terminal Block

THRU R1722848 AND FR17200645

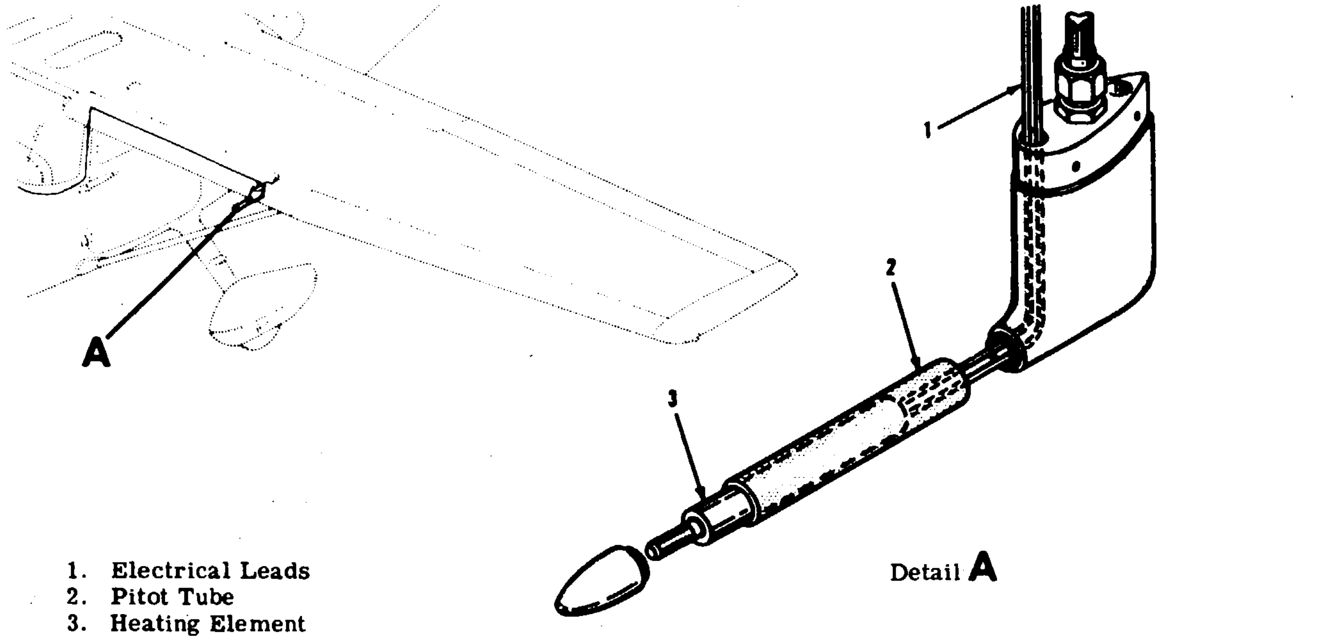
Figure 16-12. Control Wheel Map Light Installation (Sheet 1 of 2)



BEGINNING WITH R1722849 AND FR17200646

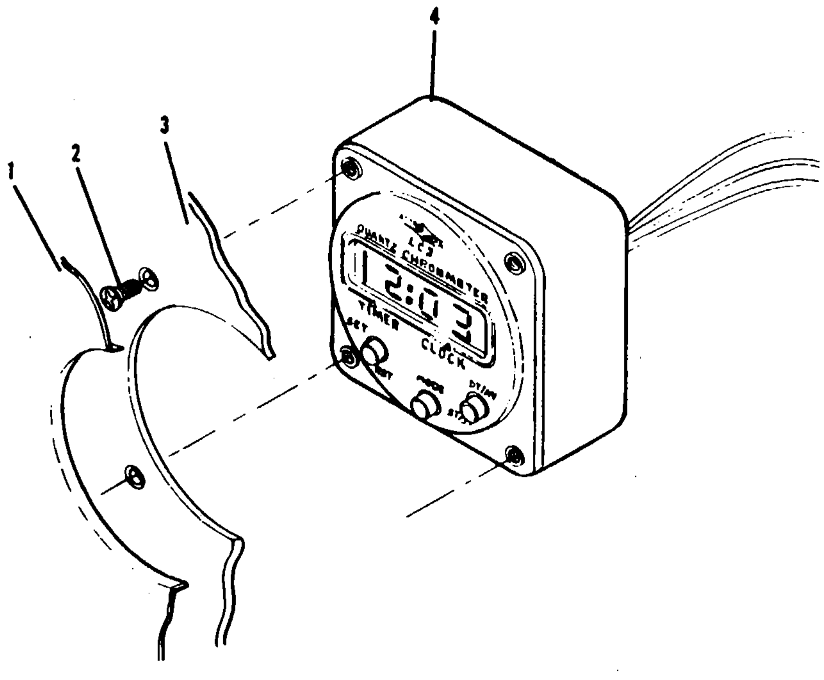
1. Instrument Panel
2. Control Tube
3. Nut
4. Washer
5. Rheostat
6. Control Wheel
7. Screw
8. Switch
9. Escutcheon
10. Placard
11. Fastener
12. Knob
13. Map Light Assembly
14. Cable
15. Terminal Block

Figure 16-12. Control Wheel Map Light Installation (Sheet 2 of 2)



1. Electrical Leads
2. Pitot Tube
3. Heating Element

Figure 16-13. Heated Pitot Installation.



1. Decorative Cover
2. Screw
3. Instrument Panel
4. Clock

Figure 16-14. Digital Clock Installation.

16-93, EMERGENCY LOCATOR TRANSMITTER. THRU R17222287.

16-94. DESCRIPTION. The ELT is a self-contained, solid state unit, having its own power supply, with an externally mounted antenna. The C589510-0209 transmitter is designed to transmit simultaneously on dual emergency frequencies of 121.5 and 243.0 Megahertz. The C589510-0211 transmitter used for Canadian registry, operates on 121.5 only. The unit is mounted in the tailcone, aft of the baggage curtain on the right 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. Power is supplied to the transmitter by a battery-pack which has the service life of the batteries placarded on the batteries and also on the outside end of the transmitter. ELT's are equipped with a battery-pack containing four lithium "D" size batteries which are stacked in two's (See figure 16-13). The ELT exhibits line of sight transmission characteristics which correspond approximately to 100 miles at a search altitude of 10,000 feet. When battery inspection and replacement schedules are adhered to, the transmitter will broadcast an emergency signal at rated power (75 MW-minimum), for a continuous period of time as listed in the following table.

TRANSMITTER LIFE
TO 75 MILLIWATTS OUTPUT

Temperature	4 Cell Lithium Battery Pack
+130°F	115 hrs
+ 70°F	115 hrs
- 4°F	95 hrs
- 40°F	23 hrs

Battery-packs have a normal shelf life of five to ten (5-10) years and must be replaced at 1/2 of normal shelf life in accordance with TSO-C91. Cessna specifies 5 years replacement of lithium (4-cell) battery packs.

16-95. 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 5 seconds or you may activate downed aircraft procedures by C.A.P., D.O.T. or F.A.A. personnel.

16-96. CHECKOUT INTERVAL:

100 HOURS.

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.
d. Place the ELT's function selector switch in the ON position for 5 seconds 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.

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.

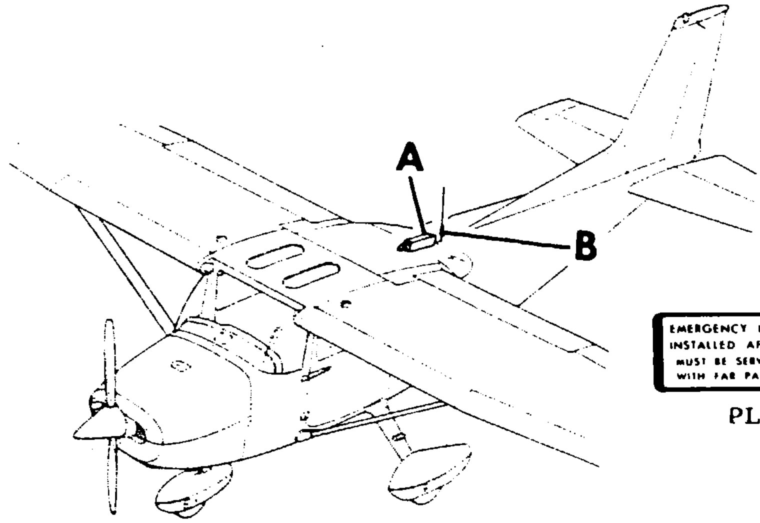
16-97. REMOVAL AND INSTALLATION OF TRANSMITTER. (See figure 16-15.)
a. Remove baggage curtain to gain access to the transmitter and antenna.
b. Disconnect co-axial cable from end of transmitter.
c. Cut sta-strap securing antenna cable and unlatch metal strap to remove transmitter.

NOTE

Transmitter is also attached to the mounting bracket by velcro strips; pull transmitter to free from mounting bracket and velcro.

NOTE

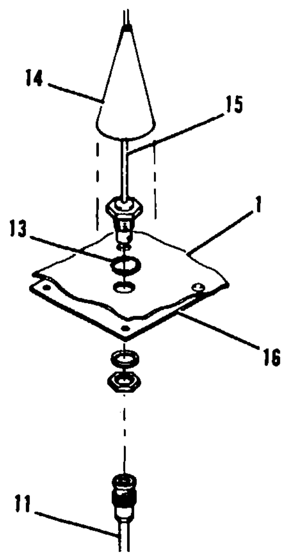
To replace velcro strips, clean surface thoroughly with clean cloth saturated in one of the following solvents: Trichloric thylene, Aliphatic Napthas, Methyl Ethyl Ketone or Enmar 6094 Lacquer Thinner. Cloth should be folded each time the surface is wiped to present a clean area and avoid redepositing of grease. Wipe surface immediately with clean dry cloth, do not allow solvent to dry on surface. Apply Velcro #40 adhesive to



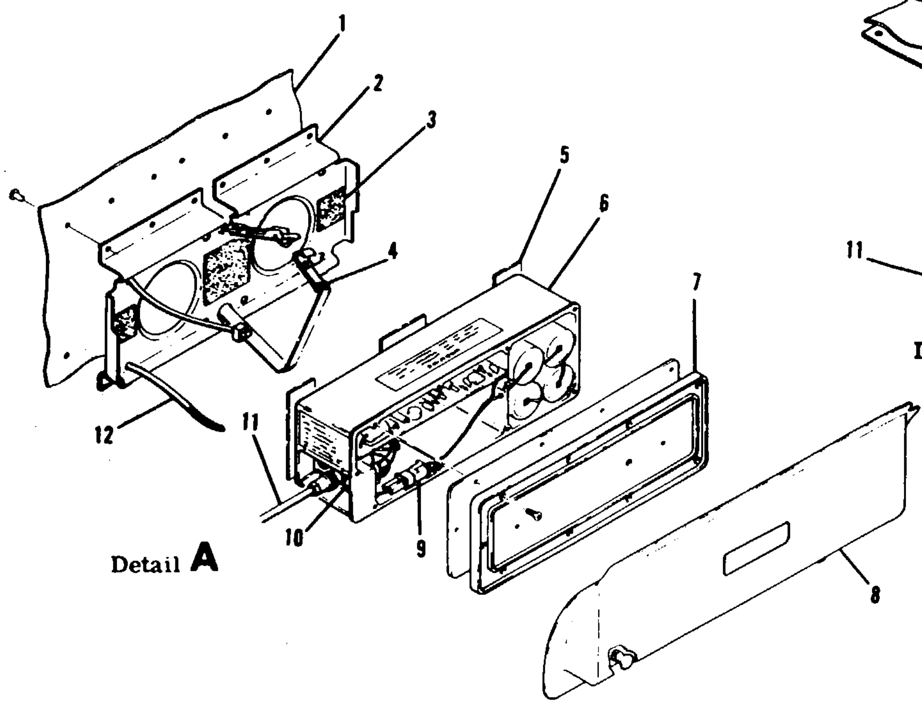
PLACARD

NOTE

Metal Strap (4) must be positioned so that latch is on top of transmitter as installed in the aircraft and not across transmitter cover.



Detail **B**



Detail **A**

1. Tailcone Skin
2. Bracket
3. Fabric Fastener - Hook
4. Metal Strap
5. Fabric Fastener - Pile
6. Transmitter
7. Cover
8. Access Cover
9. Connector
10. Arm Switch
11. Co-axial Cable
12. Sta-strap
13. Rubber Washer
14. Rubber Boot
15. Antenna
16. Doubler

Figure 16-15. Emergency Locator Transmitter Installation.

each surface in a thin even coat and allow to dry until quite tacky, but no longer transfers to the finger when touched (usually between 5 and 30 minutes). Porous surfaces may require two coats. Place the two surfaces in contact and press firmly together to ensure intimate contact. Allow 24 hours for complete cure.

d. To reinstall transmitter, reverse preceding steps.

NOTE

An installation tool is required to properly secure sta-strap. This tool may be purchased locally or ordered from the Panduit Corporation, Tinley Park, Ill., part number GS-2B (Conforms to MS90387-1).

CAUTION

Ensure that the direction of flight arrows (placarded on the transmitter) are pointing towards the nose of the aircraft.

16-98. REMOVAL AND INSTALLATION OF ANTENNA. (See figure 16-15.)

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.

16-99. REMOVAL AND INSTALLATION OF LITHIUM FOUR (4) CELL BATTERY-PACK. (See figure 16-16.)

NOTE

When existing battery fails or exceeds normal expiration date, convert ELT System to new D/M alkaline powered ELT per Avionics Service Letter AV78-31 Dated November 20, 1978.

NOTE

Transmitters equipped with the 4 cell battery-pack can only be replaced with another 4 cell battery-pack.

a. After the transmitter has been removed from aircraft in accordance with para, 16-97, place the transmitter switch in the OFF position.
b. Remove the nine screws attaching the cover to the case and then remove the cover to gain access to the battery pack.

NOTE

Retain the rubber gasket and screws for reinstallation.

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 16-16.
e. Connect the electrical connector as shown in figure 16-16.

NOTE

Before installing the new 4 cell battery-pack, check to ensure that its voltage is 11.2 volts or greater.

CAUTION

It is desirable to replace adhesive material on the 4 cell battery-pack, use only 3M Jet Melt Adhesive #3738. Do not use other adhesive materials since other materials may corrode the printed circuit board assembly.

f. Replace the transmitter cover and gasket.
g. Remove the old battery-pack placard from the end of transmitter and replace with new battery-pack placard supplied with the new battery-pack.

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.

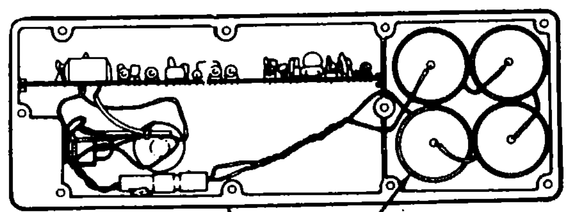


Figure 16-16. Lithium 4 Cell Battery Pack Installation.

16-100. 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.

16-100. TROUBLE SHOOTING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
*POWER LOW	Low battery voltage.	1. Set toggle switch to off. 2. Remove plastic plug from the remote jack and by means of a Switchcraft #750 jackplug, connect a Simpson 260 model voltmeter and measure voltage. If the battery pack transmitters is 11.2 volts or less, the battery pack is below specification.
	Faulty transmitter.	3. If the battery-pack voltage meets the specifications in step 2, the battery-pack is O.K. If the battery is O.K., check the transmitter as follows: a. Remove the voltmeter. b. By means of a switchcraft 750 jackplug and 3 inch maximum long leads, connect a Simpson Model 1223 ammeter to the jack. c. Set the toggle switch to ON and observe the ammeter current drain. If the current-drain is in the 85-100 ma range, the transmitter or the co-axial cable is faulty.
	Faulty co-axial antenna cable.	4. Check co-axial antenna cable for high resistance joints. If this is found to be the case, the cable should be replaced.

*This test should be carried out with the co-axial cable provided with your unit.

16-101. EMERGENCY LOCATOR TRANSMITTER. BEGINNING WITH R1722288

16-102. DESCRIPTION. The ELT is a self-contained, solid state unit, having its own power supply, with an externally mounted antenna. The C589511-0103 is used thru 1978 and the C589511-0117 beginning with 1979 models. The transmiiters are designed to transmit simultaneously on dual emergency frequencies of 121.5 and 243.0 Megahertz. Aircraft with Canadian registry utilize the C589511-0104 thru 1978 and the C589511-0113 transmitters beginning with 1979 models. These transmitters operate on 121.5 only. The unit is mounted in the tailcone, aft of the baggage curtain on the right 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. Power is supplied to the transmitter by a battery-pack which has the service life of the batteries placarded on the batteries and also on the outside end of the transmitter. 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, to incorporate the new alkaline batteries which are installed beginning with 1979 models (see figure 16-14). The ELT exhibits line of sight transmission characteristics which correspond approximately to 100 miles at a search altitude of 10,000 feet. When battery inspection and replacement schedules are adhered to, the ELT supplied domestic aircraft thru 1978 models transmit on both distress frequencies 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 ELT unit in export aircraft transmits on 121.5 MHz at 25 mw rated power output for 100 continuous hours in the temperature range of -40°F to +131°F (-40°C to +55°C). Battery-packs have a normal shelf life of five to ten (5-10) years and must be replaced at 1/2 of normal shelf life in accordance with TSO-C91. Cessna specified 5 years replacement of lithium (4-cell) battery-packs, C589511-0105. Beginning with 1979 models the ELT supplied domestic aircraft transmits on both distress frequencies simultaneously at 75 mw rated power output for continuous hours in the temperature range of -4°F to +131°F (-20°C to +55°C). The ELT unit in export aircraft 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). 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.

16-103. 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 5 seconds or you may activate downed aircraft procedures by C.A.P., D.O.T. or F.A.A. personnel.

16-104. CHECKOUT INTERVAL:

100 HOURS.

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.
d. Place the ELT's function selector switch in the ON position for 5 seconds 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.

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

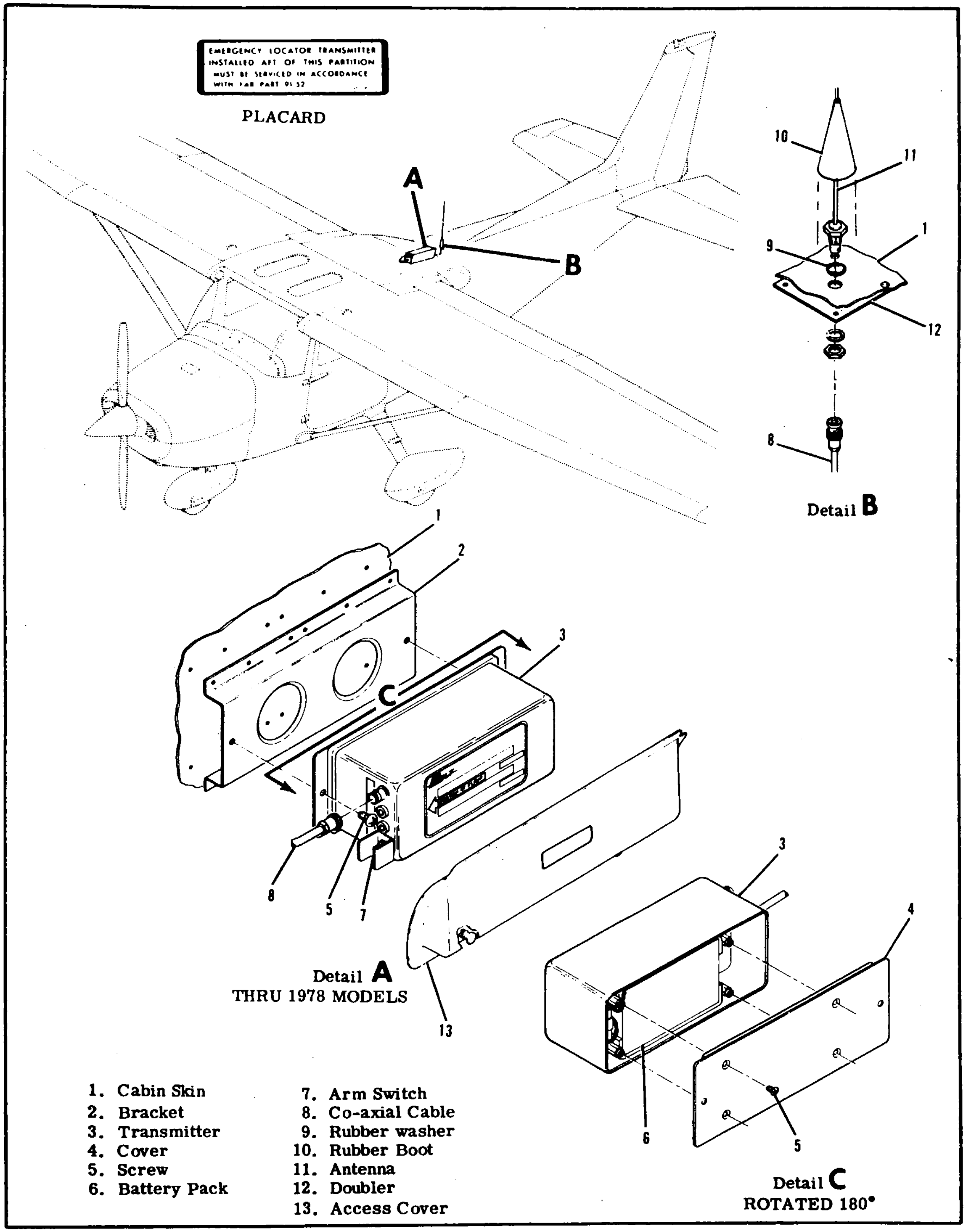
After accumulated test or operation time equals 1 hour, battery-pack replacement is required.

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.

16-105. REMOVAL AND INSTALLATION OF TRANSMITTER. (See figure 16-17.)
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.



1. Cabin Skin
2. Bracket
3. Transmitter
4. Cover
5. Screw
6. Battery Pack
7. Arm Switch
8. Co-axial Cable
9. Rubber washer
10. Rubber Boot
11. Antenna
12. Doubler
13. Access Cover

Figure 16-17. Emergency Locator Transmitter Installation (Sheet 1 of 2)

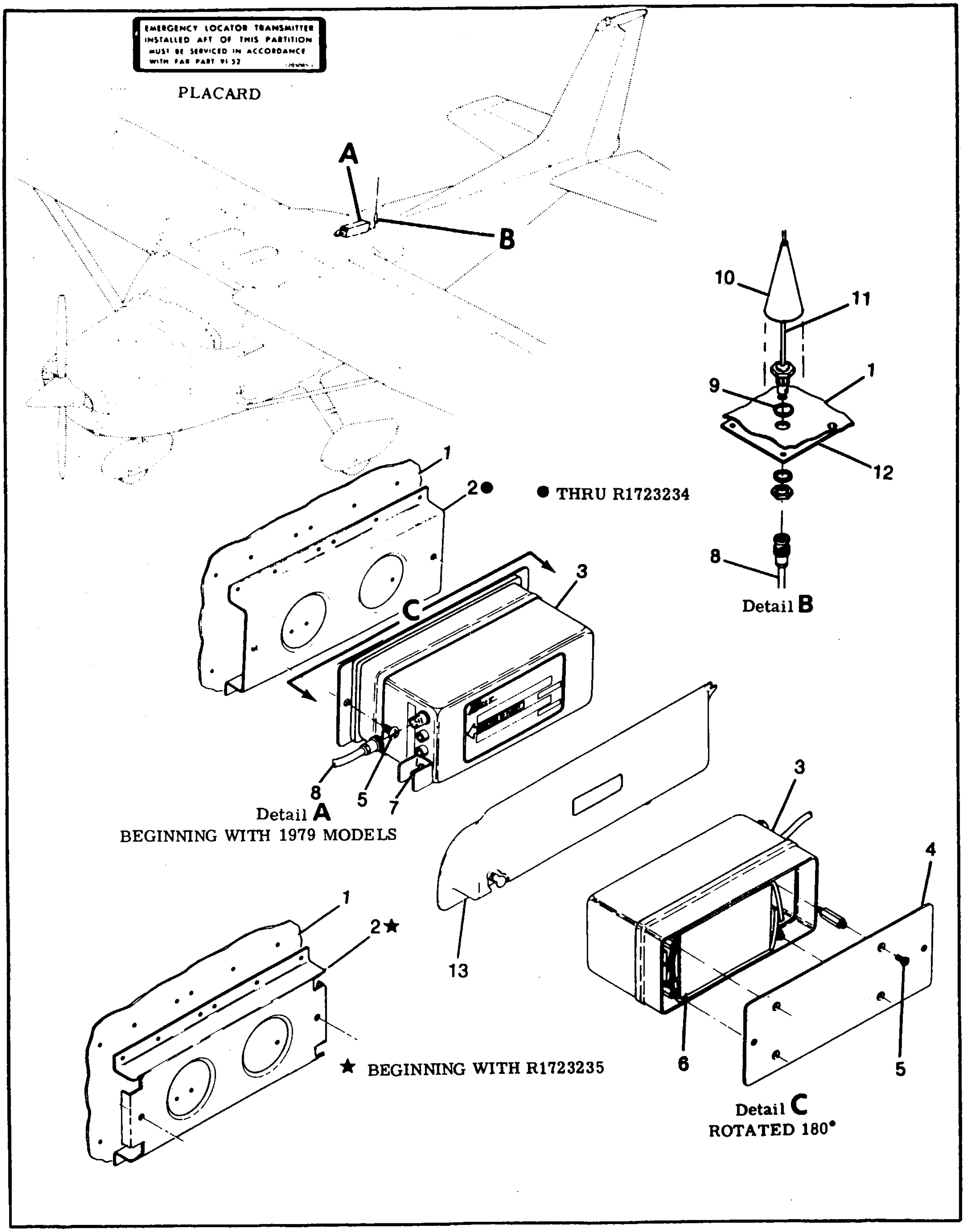


Figure 16-17. Emergency Locator Transmitter Installation (Sheet 2 of 2)

16-106. REMOVAL AND INSTALLATION OF ANTENNA. (See figure 16-17.)

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.

16-107. REMOVAL AND INSTALLATION OF BATTERY PACK. (See figure 16-18.)

NOTE

Transmitters equipped with the C589511-0105 or C589511-0106 battery-packs can only be replaced with a C589511-0114 after modification by SK185-20 has been completed.

CAUTION

Lithium battery-pack must be replaced with alkaline battery-packs per SK185-20.

a. After the transmitter has been removed from aircraft in accordance with para. 16-105, 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 16-18.

e. Connect the electrical connector as shown in figure 16-18.

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.

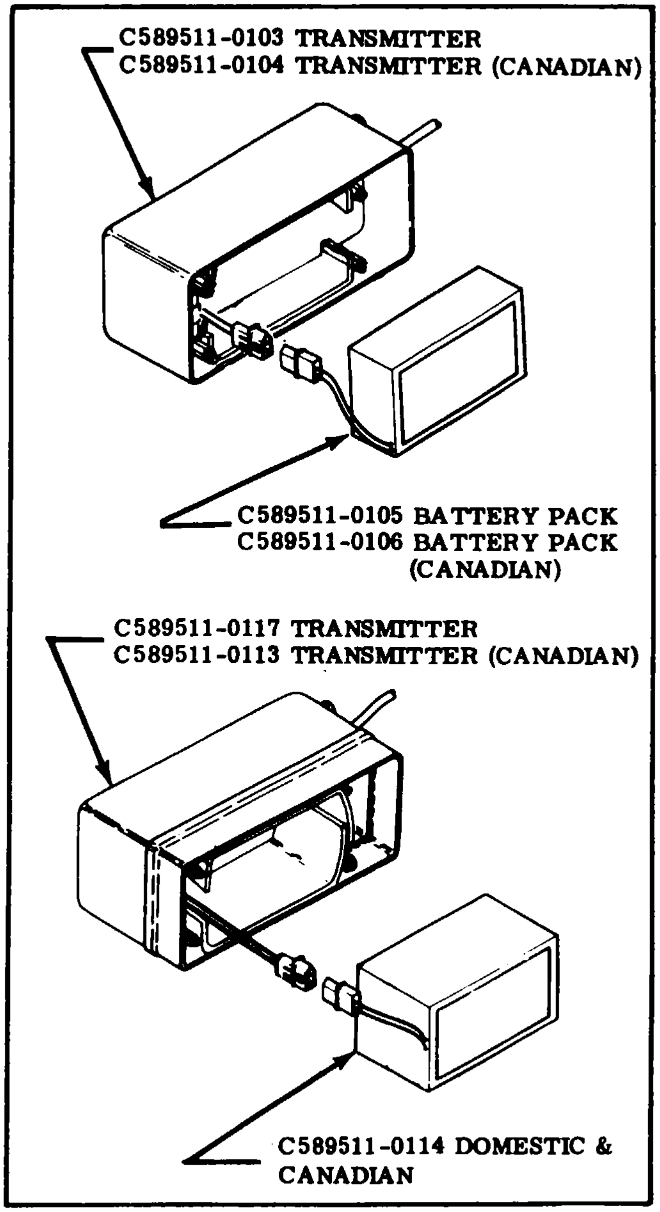


Figure 16-18. BATTERY PACK INSTALLATION.

16-108. 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.

16-108. TROUBLE SHOOTING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
*POWER LOW	Low battery voltage.	1. Set toggle switch to off. 2. Disconnect the battery-pack from the transmitter and connect a Simpson 260 model voltmeter and measure voltage. If the battery pack transmitters is 7.5 volts or less, the battery pack is below specification.
	Faulty transmitter.	3. If the battery-pack voltage meets the specifications in step 2, the battery-pack is O.K. If the battery is O.K., check the transmitter as follows: a. Reconnect battery pack to the transmitter. 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. 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 co-axial cable is faulty.
	Faulty co-axial antenna cable.	4. Check co-axial antenna cable for high resistance joints. If this is found to be the case, the cable should be replaced.

*This test should be carried out with the co-axial cable provided with your unit.

ELECTRICAL LOAD ANALYSIS CHART

	AMPS REQD				
STANDARD EQUIPMENT (RUNNING LOAD)	1977	1978	1979	1980	1981
Battery Contactor	0.6	0.45	0.5	0.5	0.5
Fuel Indicators	0.4	0.11	0.1	0.1	0.1
Flashing Beacon Light	7.0	6.00	6.00	6.00	6.00
Instrument Lights	1.3	0.67	0.7	0.7	0.7
Position Lights	5.6	2.50	2.5	2.5	2.5
Turn Coordinator	0.8	0.28	0.3	0.3	0.3
OPTIONAL EQUIPMENT (RUNNING LOAD)					
Altitude Blind Encoder		0.1	0.1	0.1	0.1
Strobe Lights		3.00	3.0	3.0	3.0
Cessna 300 ADF (Type R-546E)	1.0	1.00	1.0	1.0	1.0
Cessna 300 Nav/Com (100 Channel Type RT-308C)	1.5				
Cessna 300 Nav/Com (Type RT-385A)		1.00*	1.00*	1.00*	1.0*
Cessna 300 HF Transceiver (PT10-A)	1.5	1.00***	1.00***	1.00***	
Cessna 300 Transceiver (Type RT-524A)	3.2				
Cessna 300 Transponder (RT-359A)	1.0	2.00	2.00	2.00	2.00
Cessna 400 Glideslope (Type R-443B) (40 Channel)	.4	0.50	0.50	0.50	
Cessna 400 Marker Beacon (Type R-402A)	.3	0.10	0.10		0.10
Sunair SS Band HF Transceiver (Type ASB-125)	5.0	2.50**	2.50**	2.50**	2.50**
Cessna 300A Navomatic (Type AF-395A)	2.0	2.50	2.50	2.50	2.50
Cessna 200 Navomatic (Type AF-295B)	2.0	2.50	2.50	2.50	2.50
Cessna EA-401A Encoding Altimeter	.065	0.07	0.1	0.1	0.1
Cessna 300 Nav/Com (720 Channel RT-328T)	1.5	1.50●			
Narco 190 DME	3.0	2.90	2.90	2.90	2.90
Cessna 400 XPDR (ARC Type RT-459A)	1.0★	2.00	2.00	2.00	2.00
Bendix GM-247A Marker Beacon	.1★	1.00			
Pitot Heat		2.90	2.90	2.90	2.90
Post Lights		.64	0.6	0.6	2.5
RNAV 511			1.0	1.0	1.0
ITEMS NOT CONSIDERED AS PART OF RUNNING LOAD					
Cigarette Lighter	10.0	7.50	7.0	7.0	7.0
Clock	†	†	†	†	†
Control Wheel Map Light	.33	0.08	0.1	0.1	0.1
Courtesy & Dome Lights	2.5	0.68	1.2	1.2	1.2
Flap Motor	15.0	10.00	10.00	10.0	8.5
Landing and Taxi Light (Single)	20.0	8.93	8.9	8.9	8.9
Landing and Taxi Lights (Dual)	15.6	7.14	3.6 (Ea)	3.6 (Ea)	3.6 (Ea)
Map Light (Door Post)	.33	0.17	0.2	0.2	0.2
Air Conditioner (High Blower)			6.7	6.7	6.7
Ventilation System Blower (High Speed)			5.0	5.0	5.0
Auxiliary Fuel Pump			3.0	3.0	3.0
Avionics Cooling Fan					1.0

† Negligible
★ Export Only
* 2.25 Transmitting
** 7.50 Transmitting
*** 9.00 Transmitting
● 6.00 Transmitting

SECTION 17

STRUCTURAL REPAIR

TABLE OF CONTENTS — Page No. Aerofiche/Manual

17-1. STRUCTUREAL REPAIR.

17-2. REPAIR CRITERIAL. 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 attach 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.

17-8. Wing twist (washout) and horizontal stabilizer angle fo 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 18-2 for wing twist measurement.

WING
Twist (Washout) 3° 37'

STABILIZER
Angle of Incidence -3° 30'

17-9. 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 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.

17-10. WING

17-11. 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.

17-12. WING SKIN.

17-13. 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 damaged 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.

17-14. REPAIRABLE DAMAGE. Figure 17-5 outlines typical repair to be employed in patching skin. Before installing a patch, trim the damaged area to form a retangular 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.

17-15. 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.

17-16. WING STRINGERS.

17-17. NEGLIGIBLE DAMAGE. Refer to paragraph 17-13.

17-18. REPAIRABLE DAMAGE. Figure 17-6 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.

17-19. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If a stringer is so badly damaged that more than one section must be spliced, replacement is recommended.

17-20. WING AUXILIARY SPARS.

17-21. NEGLIGIBLE DAMAGE. Refer to paragraph 17-13.

17-22. REPAIRABLE DAMAGE. Figure 17-9 illustrates a typical auxiliary spar repair.

17-23. 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.

17-24. WING RIBS.

17-25. NEGLIGIBLE DAMAGE. Refer to paragraph 17-13.

17-26. REPAIRABLE DAMAGE. Figure 17-7 illustrates a typical wing rib repair.

17-27. 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.

17-28. WING SPARS.

17-29. 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.

17-30 REPAIRABLE DAMAGE. Figure 17-8 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.

17-31. DAMAGE NECESSITATING REPLACEMENT OF PARTS. Damage so extensive that a repair is not practicable requires replacement of a complete wing spar. Also refer to paragraph 17-2.

17-32. AILERONS

17-33. NEGLIGIBLE DAMAGE. Refer to paragraph 17-13.

17-34. REPAIRABLE DAMAGE. The repair shown in figure 17-10 may be used as a guide to repair damage to aileron leading edge skins. Figure 17-5 may be used to repair damage to flat surfaces between corrugations. When damaged airea includes corrugations, soo figure 17-4. It is recommended that material for repair be cut from spare parts of the same gage and corrugation spacing. The aileron must be balanced after repair. Refer to paragraph 17-36 and see figure 17-3 for aileron balancing. If damage would require a repair which could not be made between adjacent ribs, refer to following paragraph.

17-35. 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 occured, replacement of the aileron assembly is recommended. After repair and/or replacement, balance aileron in accordance with paragraph 17-36 and figure 17-3.

17-36. AILERON BALANCING. Following repair, replacement or painting, the aileron must be balanced. Complete instructions for fabricating balancing fixtures and mandrels and their use are given in figure 17-3..

17-37. WING FLAPS.

17-38. NEGLIGIBLE DAMAGE. Refer to paragraph 17-13.

17-39. REPAIRABLE DAMAGE. Flap repair should be similar to aileron repairs discussed in paragraph 17-34. A flap leading edge repair is shown in figure 17-11. If an overlapping patch is to be used, be sure it will not interfere with the wing during flap operation.

17-40. DAMAGE NECESSITATING REPLACEMENT OF PARTS. Flap repairs which require replacement of parts should be similar to aileron repairs discussed in paragraph 17-35. Since the flap is not considered a moveable control surface, no balnacing is required.

17-41. WING LEADING EDGE.

17-42. NEGLIGIBLE DAMAGE. Refer to paragraph 17-13.

17-43. REPAIRABLE DAMAGE. A typical leading edge skin repair is shown in figure 17-10. An epoxy-type filler may be used to fill gaps at butt-joints. To facilitate repair, extra access holes may be installed in the locations noted in figure 17-12. If the damage would require a repair which could not be made between adjacent ribs, refer to the following paragraph.

17-44. DAMAGE NECESSITATING REPLACEMENT OF PARTS. For extensive damage, complete leading edge skin panels must be replaced. To facilitate replacement, extra access holes may be installed in the locations noted in figure 17-12.

17-45. ELEVATORS AND RUDDER.

17-46. NEGLIGIBLE DAMAGE. Refer to paragraph 17-13. 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.

17-47. REPAIRABLE DAMAGE. Skin patches illustrated in figure 17-5 may be used to repair skin damage between corrugations. For skin damage which includes corrugations, see figure 17-4. Following the repair, the elevator/rudder must be balanced. See figure 17-3 for balancing. If damage would require a repair which could not be made between adjacent ribs, refer to the following paragraph.

17-48. 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 17-49 and figure 17-3.

17-49. ELEVATOR AND RUDDER BALANCING. Following repair, replacement or painting, the elevators and rudder must be balanced. Complete instructions for fabricating balancing fixtures and mandrels and their use are given in figure 17-3.

17-50. FIN AND STABILIZER.

17-51. NEGLIGIBLE DAMAGE. Refer to paragraph 17-13.

17-52. REPAIRABLE DAMAGE. Skin patches illustrated in figure 17-8 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.

17-53. 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.

17-54. FUSELAGE.

17-55. DESCRIPTION. The fuselage is of semi-monocoque construction, consisting of formed bulkheads, longitudinal stringers, reinforcing channels, and skin panels.

17-56. NEGLIGIBLE DAMAGE. Refer to paragraph 17-13. 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 a thorough examination of the lower portion of the landing gear bulkhead and its tie-in structure.

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 x 1/2 x .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 17-13.

17-33A. CRACKS IN CORRUGATED AILERON SKINS (Continued from page 17-3)

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 18-33, -34, and -35 as applicable for repair information.

5. Any control surface that has 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 17-33, -34, and -35 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.

17-38A. CRACKS IN CORRUGATED FLAP SKINS (Continued from page 17-3)

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 17-38, -39, and -40 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 17-38, -39, and -40 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.

17-46A. CRACKS IN CORRUGATED ELEVATOR SKINS (Continued from page 17-4)

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 17-46, -47, and -48 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 17-46, -47, and -48 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.

17-57. REPAIRABLE DAMAGE. Fuselage skin repairs may be accomplished in the same manner as wing skin repairs outlined in paragraph 17-14. Stringers, formed skin flanges, bulkhead channels and similar parts may be repaired as shown in figure 18-6.

18-58. DAMAGE NECESSITATING REPLACEMENT OF PARTS. Fuselage skin major repairs may be accomplished in the same manner as the wing repairs outlined in paragraph 17-15. Damaged fittings must be replaced. Seat rails serve as structural parts of the fuselage and must be replaced if damaged.

17-59. BONDED DOORS.

17-60. 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.

17-61. BULKHEADS.

17-62. 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.

17-63. 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.

17-64. REPLACEMENT OF HI-SHEAR RIVETS. Hi-shear rivet replacement with close-tolerance bolts or other commercial fasteners of equivalant 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.

a. NAS464P-* bolt. MS21042-* nut and AN960-* washer in place of Hi-shear rivets for forgings with machined flat surfaces around attachment holes.

b. NAS464P-* bolt. ESNA 2935-* 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 are to be determined according to the holes and the grip lengths required. Bolt grip length should be chosen so that no threads remain in the bearing area.

17-65. FIREWALL DAMAGE. Firewall sheet may be repaired by removing the damaged material (MIL-S-5059) corrosion-resistant (18-8) steel, and splicing in a new section. The new portion must be lapped over the old material, sealed with Pro Seal #700 (Coast Pro-Seal Co., Chemical Division, 2235 Beverly Blvd., Los Angeles, California), compound or equivalent, and secured with steel (MS20450) rivets. Patches, splices and joints should be repaired with steel rivets. Angles around the periphery of the firewall are secured with steel rivets, except where engine shock mount brackets are attached with aluminum (MS20470) rivets. The diagonal support angles on the upper firewall are secured with steel rivets. Nutplates are attached with aluminum rivets. The diagonal support angles on the lower firewall are secured with aluminum rivets.

17-66. ENGINE MOUNT.

17-67. DESCRIPTION. The mount for the aircraft engine is constructed of 4130 chrome-molybdenum steel tubing. A truss structure, fastened to the firewall at four points, supports a cradle arrangement. This cradle arrangement with its supporting lugs, forms the base for rubber shock mounted engine supports.

17-68. 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. Refer to Section 18 for engine mount painting.

17-69. ENGINE MOUNT SUPPORT CRADLE DAMAGE. Minor damage such as a crack adjacent to an engine attaching lug may be repaired by rewelding the cradle tube and extending a gusset past the damaged area. Extensively damaged parts must be replaced.

17-70. 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.

17-71. BAFFLES. Baffles ordinarily require replacement if damaged for cracked. However, small plate reinforcements riveted to the baffle will often prove satisfactory both to the strength and cooling requirements of the unit.

17-72. ENGINE COWLING.

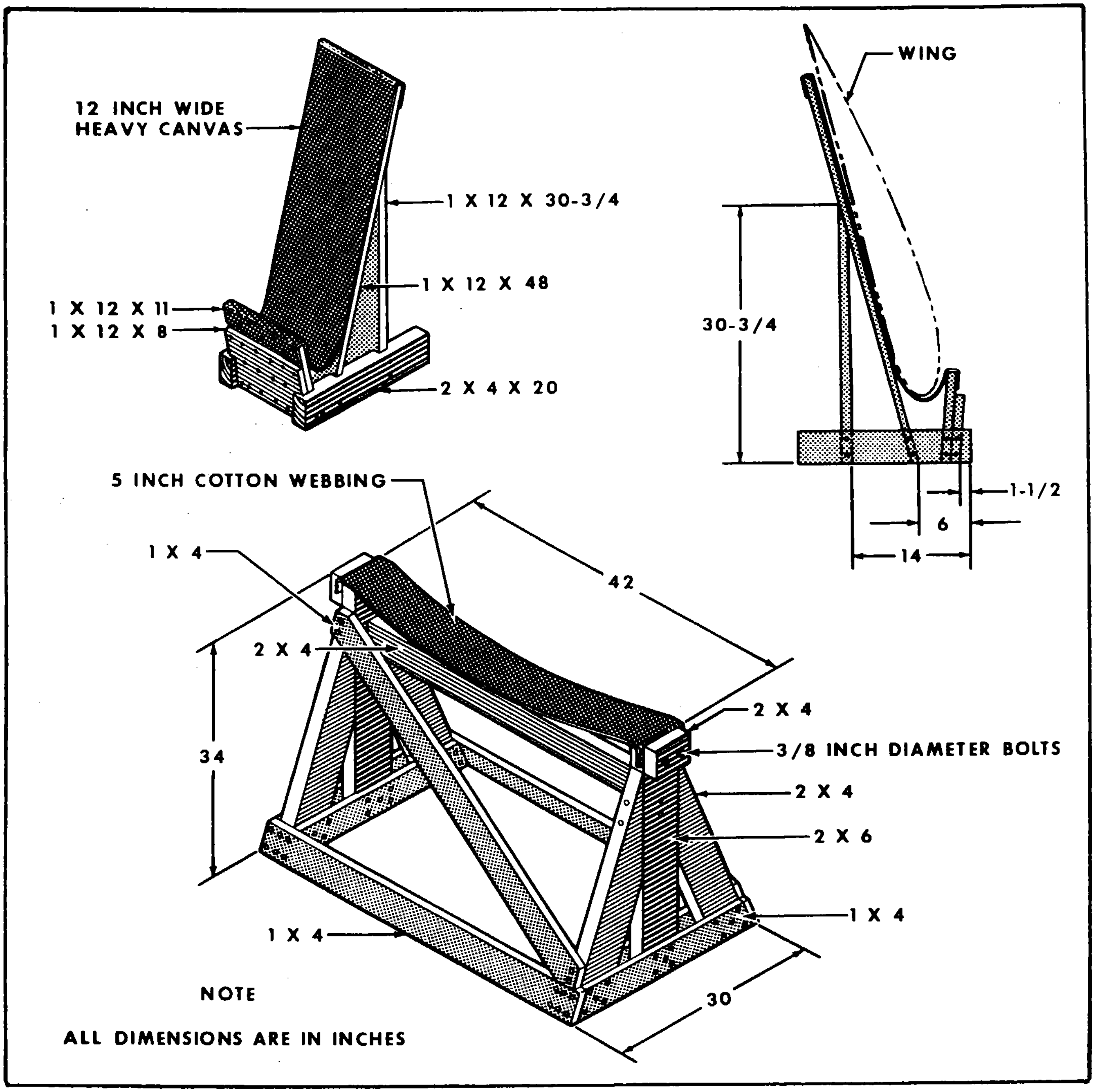
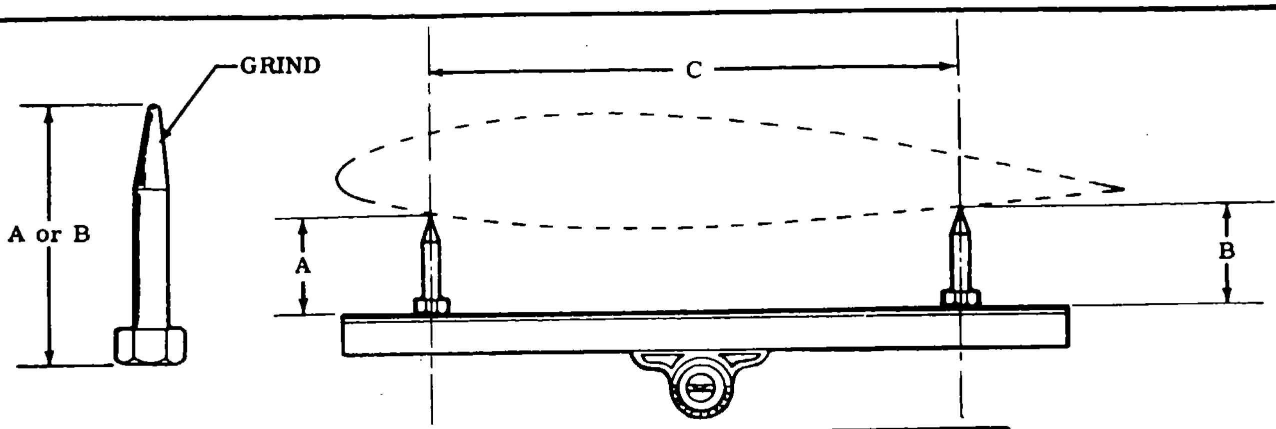


Figure 17-1. Wing and Fuselage Support Stands

17-73. 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. Bonded cowling 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 cowling 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 cowling.

17-74. 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.



A	B	C	WING STATION
2.00	1.00	29.50	39.00
2.00	1.00	29.50	100.50
.45	1.00	24.00	208.00

ALL WING TWIST OCCURS BETWEEN STA. 100.50 AND STA. 208.00.
(Refer to paragraph 17-7 for angle of incidence.)

MEASURING WING TWIST

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 shanks 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

17-75. 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.

BALANCING PROCEDURES

1. Balance control surfaces in an enclosed draft free area.

2. Control surface to be balanced must be in the final flight configuration, painted (if applicable) trim tabs installed, and all foreign matter removed from inside control surface.

3. Make sure all control surfaces are in their approved flight configuration: 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 (detail B) on a table or other suitable FLAT, LEVELED surface. Mandrels must be placed at 90° to the hinge line of the control surface.

5. On control surfaces with the piano type hinges, insert inboard and outboard hinges into slotted ends of the balancing mandrels, making sure that balancing mandrels are 90° to the hinge line. On control surfaces with the bearing type hinge point, bolts or pins are inserted through the attaching brackets, then placed on the knife edges of the mandrels as illustrated in (detail H).

6. AILERONS.
   a.
      (1) Block up the trailing edge of the aileron until a spirit-level protractor placed on the front face of the aileron spar at W.S. 154.00 (± 6.00), (detail E), indicates 57° 10', (detail D).

      (2) ALTERNATE METHOD:
      Measure the vertical distance from the aileron hinge point to the leveled surface. Subtract 1.80 inches, then block up trailing edge of the aileron to this measurement.

   b. With the aileron blocked in position place the balancing beam (detail A) at W.S. 154.00, (90° to the hinge line), and adjust the trailing edge support on the balancing beam (detail D) until the beam is level. If the aileron has not been disturbed during this operation, the beam is now parallel to the aileron chord line at W.S. 154.00 (detail D).

NOTE

The above procedure must be performed with care. Small angular discrepancies will produce large balancing errors.

   c. Remove balancing beam and balance the beam by itself at the knife edges by adding washers as shown, (detail C).

   d. Place the balancing beam on the aileron in its original position, then remove the blocks from beneath the trailing edge.

   e. Place the sliding weight (detail D) on the forward end of the balancing beam, moving it along the beam until the beam is again level. A small, lightweight, spirit-level may be used for this purpose provided it is symmetrical about its bubble reference and this reference is placed on the beam directly over the aileron hinge line (detail D).

   f. If aileron is correctly balanced, the position of the sliding weight with respect to the aileron hinge line, will produce a moment about the hinge line somewhere within the underbalance tolerance listed in the chart on (Sheet 5 of 5).

   g. If modification of the aileron balance weight is necessary to correct an out-of-tolerance condition, the balance weight can be lightened by drilling out part of the weight on the inboard end. The weight can be increased by a reasonable amount by ordering additional weight and gang channel listed in the applicable Parts Catalog, and installing next to the inboard weight the minimum amount necessary for correct balance. The minimum amount that must be installed, however, must contain at least two attaching rivets. If this minimum amount results in an over-balanced condition, the new weight and/or old weights can be lightened.

Figure 17-3. Control Surface Balancing (Sheet 1 of 5)

7. RUDDER AND ELEVATORS.
   a. With the rudder/elevator set upon a FLAT, LEVELED surface, block up the trailing edge until a center line through the attaching bolt and the trailing edge is equal distance from the leveling surface (detail H).

   b. Place the balancing beam (detail A) on the rudder/elevator near the center attaching bracket, (90° to the hinge line). Adjust the trailing edge support on the balancing beam (detail H) until the beam is level. If the rudder/elevator has not been disturbed during this operation, the beam is now parallel to the chord line of the rudder/elevator.

NOTE

The above procedure must be performed with care. Small angular discrepancies will produce large balancing errors.

   c. Mark position of the balancing beam, then remove and balance the beam by itself at the knife edges by adding washers as shown in (detail C).

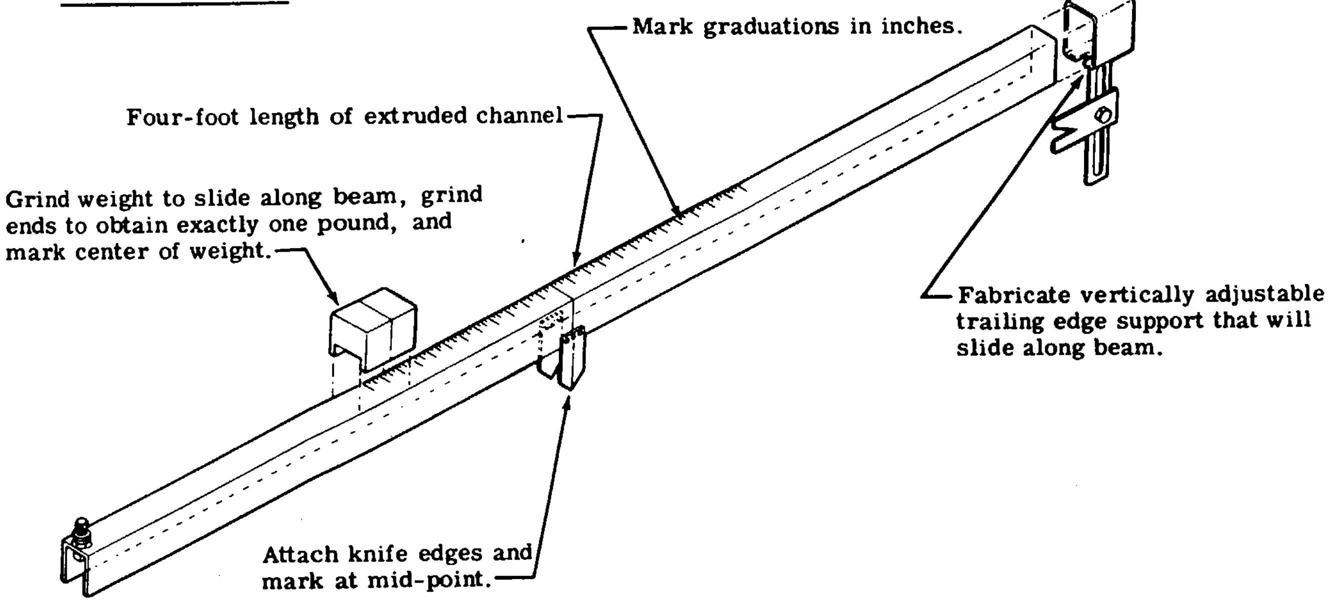
   d. Place the balancing beam on the rudder/elevator in its original position, then remove the block from beneath the trailing edge.

   e. Place the sliding weight (detail H) on the forward end of the balance beam, move it along the beam until the beam is again level. A small, lightweight, spirit-level may be used for this purpose provided it is symmetrical about its bubble reference and this reference is placed on the beam directly over the rudder/elevator hinge line (detail H).

   f. If the rudder/elevator is correctly balanced, the position of the sliding weight with respect to the rudder/elevator hinge line, will produce a moment about the hinge line somewhere within the underbalance tolerance listed in the chart on (Sheet 5 of 5).

   g. If modification of the rudder/elevator balance weight is necessary to correct an out-of-balance condition, the balance weight can be lightened by drilling out part of the weight. The weight can be increased by fusing bar stock solder to the weight after removal from rudder/elevator.

BALANCING BEAM



Detail **A**

Figure 17-3. Control Surface Balancing (Sheet 2 of 5)

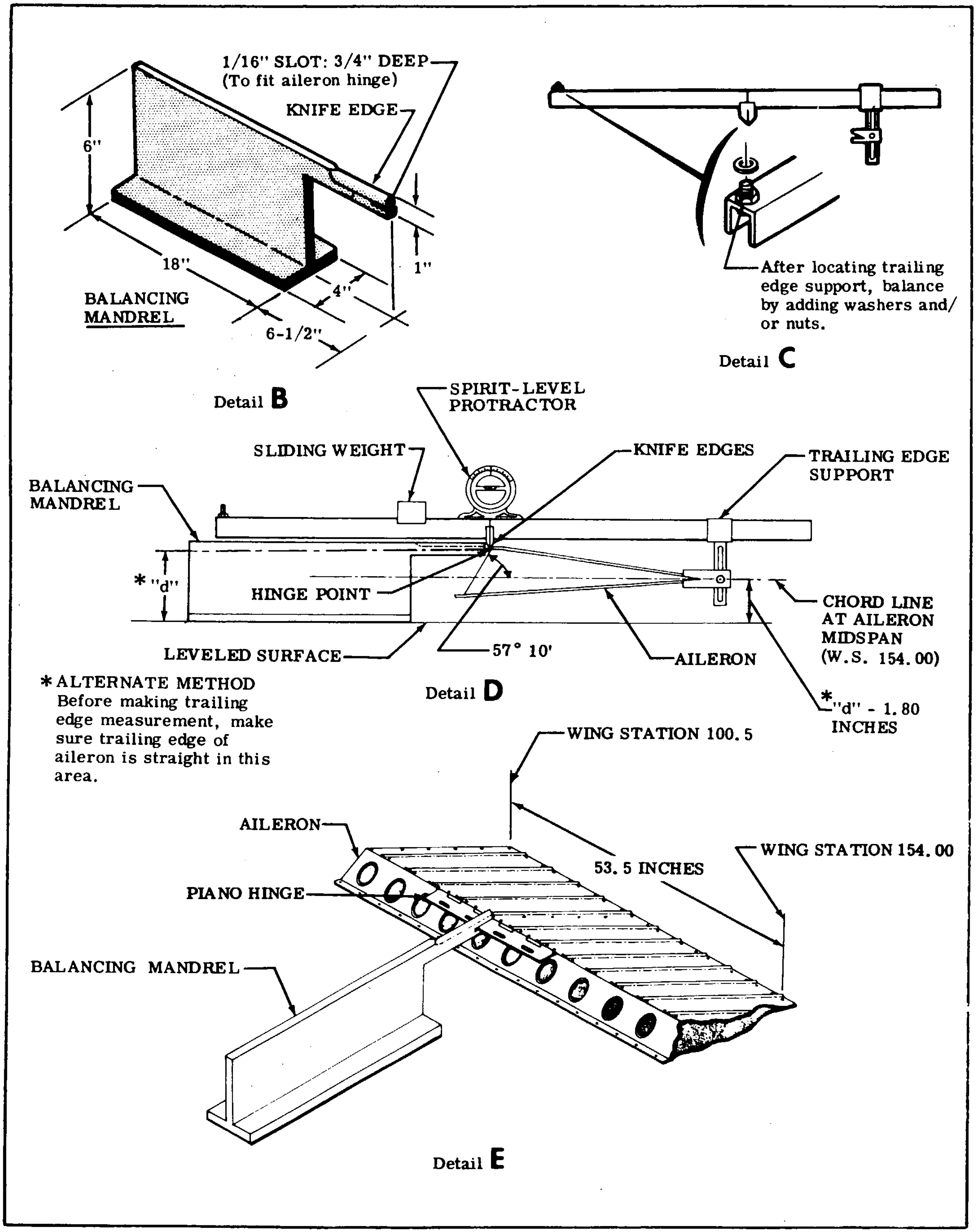


Figure 17-3. Control Surface Balancing (Sheet 3 of 5)

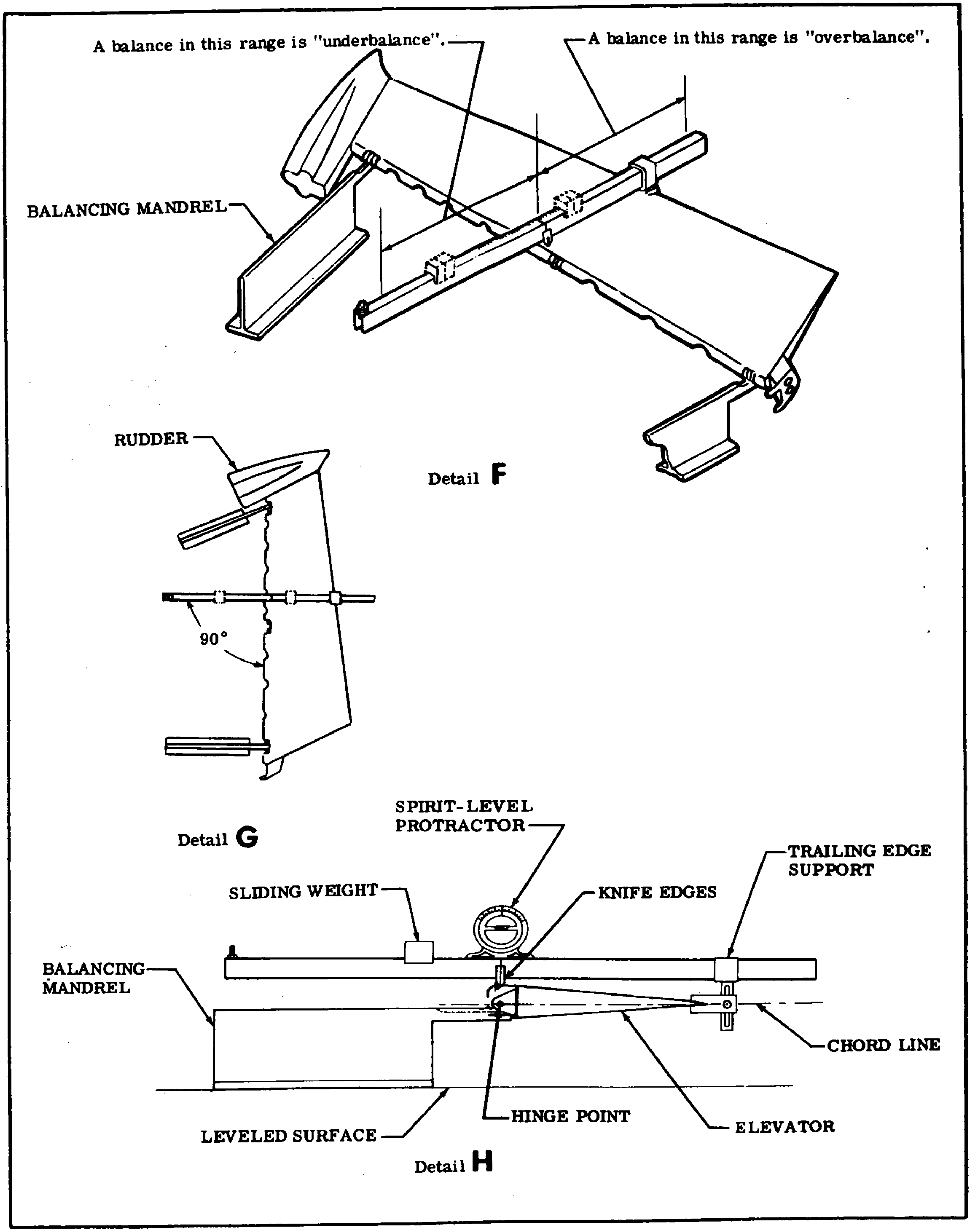


Figure 17-3. Control Surface Balancing (Sheet 4 of 5)

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 the control surface is trailing edge heavy, and is symbolized by a plus (+).

OVERBALANCE is defined as the condition that exists when the control surface is leading edge heavy, and is symbolized by a minus (-).

CONTROL SURFACE	APPROVED FLIGHT CONFIGURATION BALANCE LIMITS (Inch-Pounds)
AILERON	0.0 to + 11.31
RUDDER	0.0 to + 6.7
RIGHT ELEVATOR	0.0 to + 24.5
LEFT ELEVATOR	0.0 to + 18.5

Figure 17-3. Control Surface Balancing (Sheet 5 of 5)

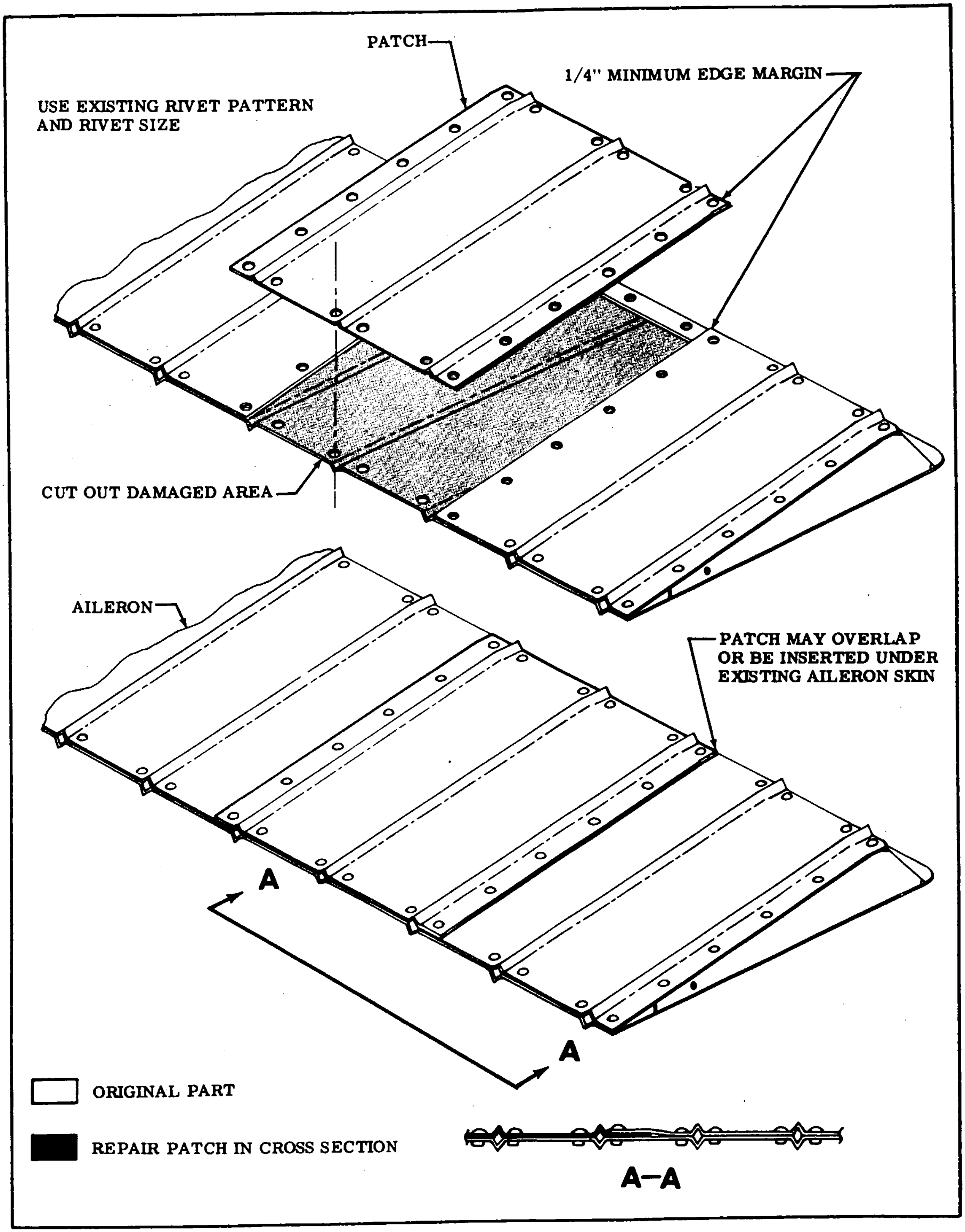


Figure 17-4. Corrugated Skin Repair

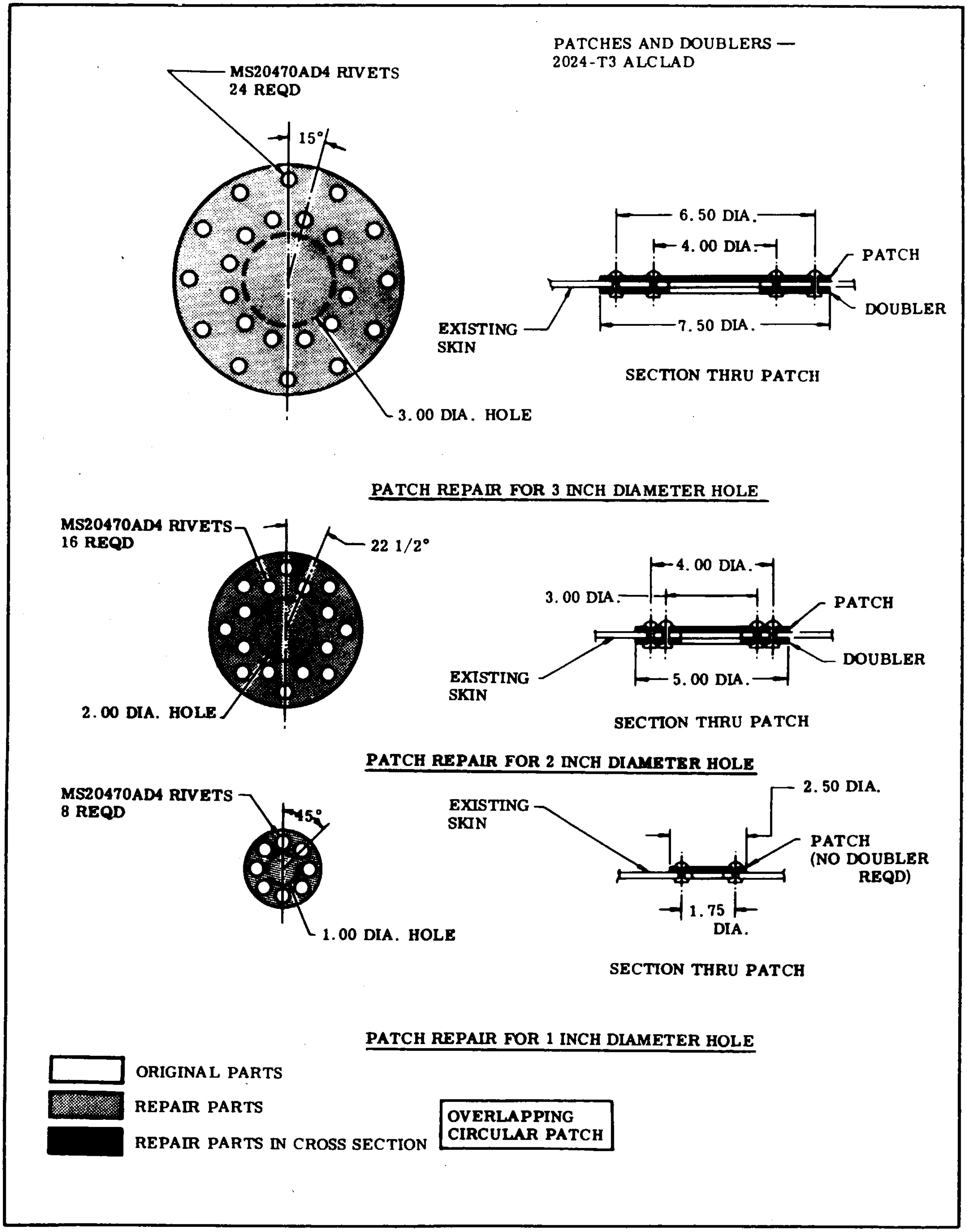
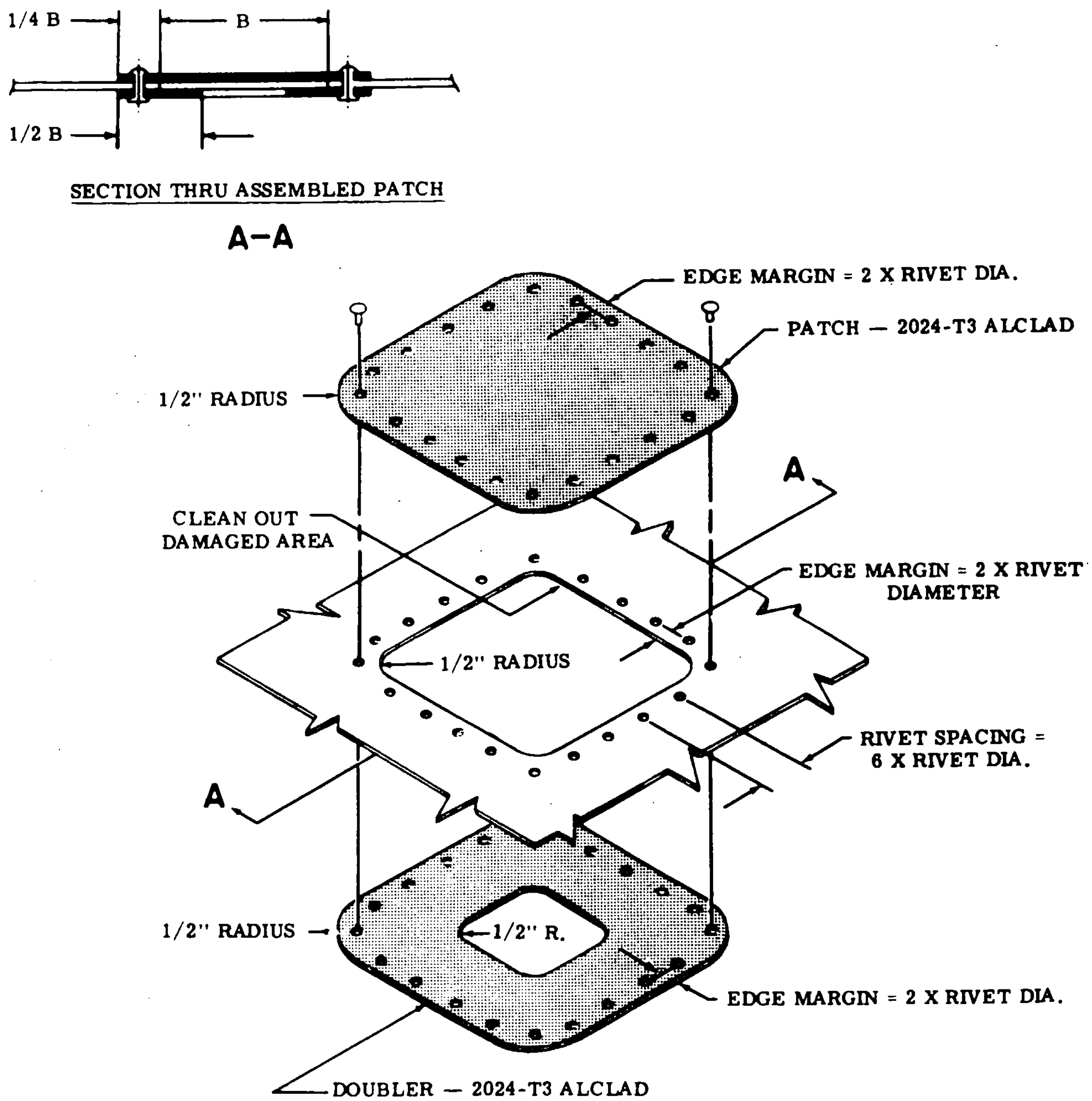


Figure 17-5. Skin Repair (Sheet 1 of 6)



OVERLAPPING RECTANGULAR PATCH

ORIGINAL PARTS

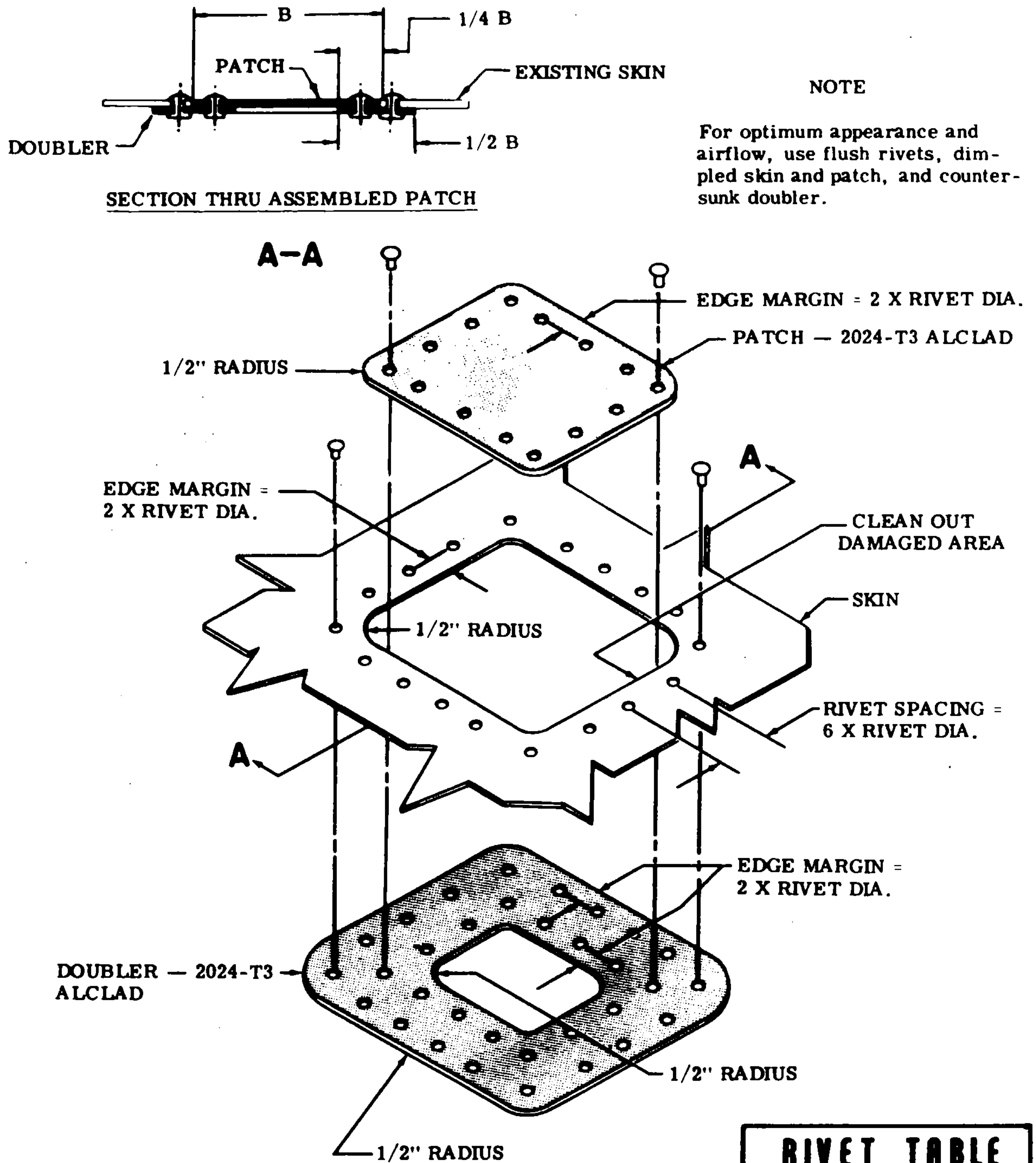
REPAIR PARTS

REPAIR PARTS IN CROSS SECTION

RIVET TABLE

SKIN GAGE	RIVET DIA.
.020	1/8
.025	1/8
.032	1/8
.040	1/8
.051	5/32

Figure 17-5. Skin Repair (Sheet 2 of 6)



NOTE

For optimum appearance and airflow, use flush rivets, dimpled skin and patch, and countersunk doubler.

RIVET TABLE

SKIN GAGE	RIVET DIA.
.020	1/8
.025	1/8
.032	1/8
.040	1/8
.051	5/32

FLUSH RECTANGULAR PATCH (CIRCULAR FLUSH PATCH IS SIMILAR)

ORIGINAL PARTS

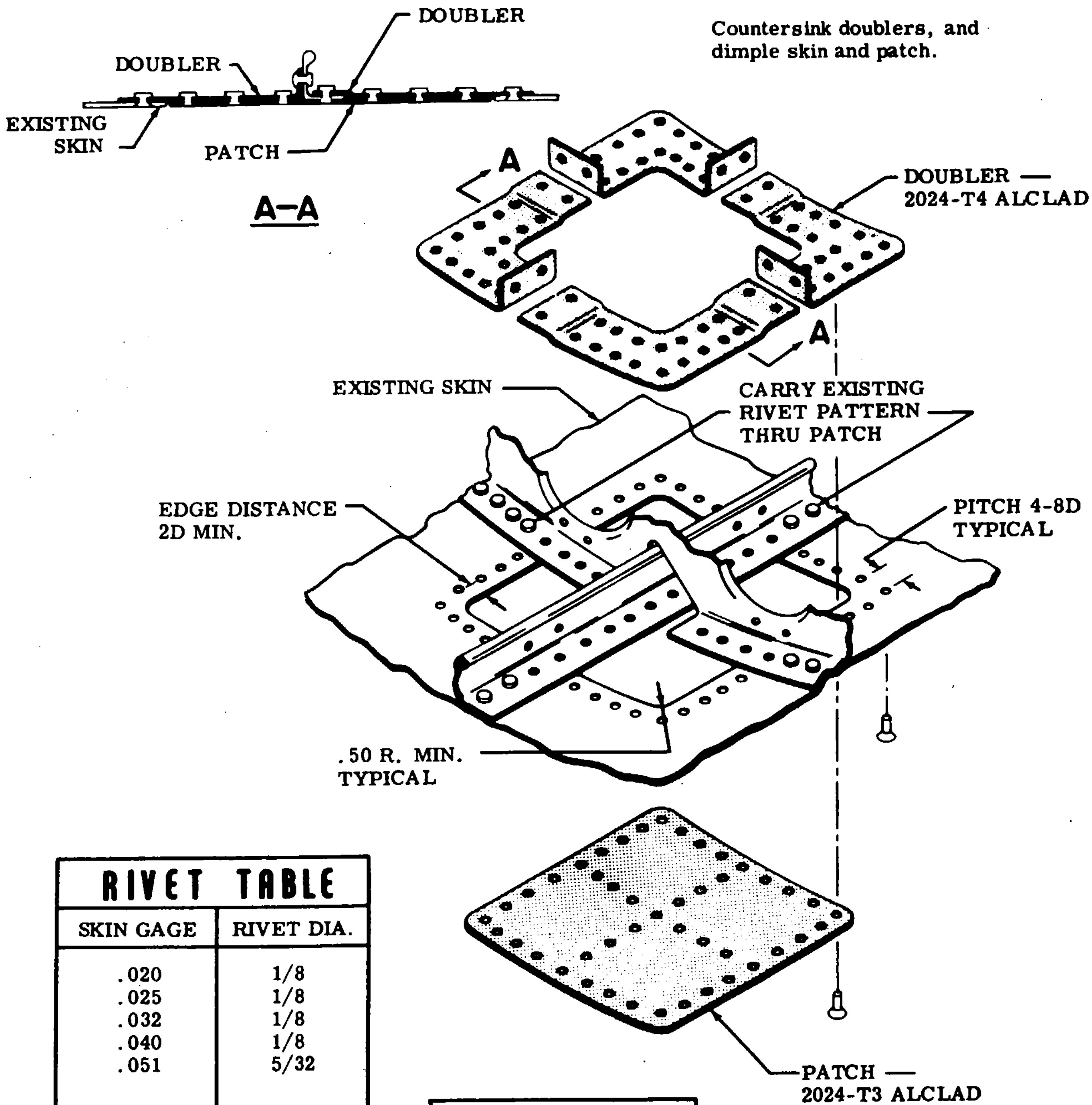
REPAIR PARTS

REPAIR PARTS IN CROSS SECTION

Figure 17-5. Skin Repair (Sheet 3 of 6)

NOTE

Countersink doublers, and dimple skin and patch.



RIVET TABLE	
SKIN GAGE	RIVET DIA.
.020	1/8
.025	1/8
.032	1/8
.040	1/8
.051	5/32

FLUSH PATCH AT STRINGER/BULKHEAD INTERSECTION

ORIGINAL PARTS

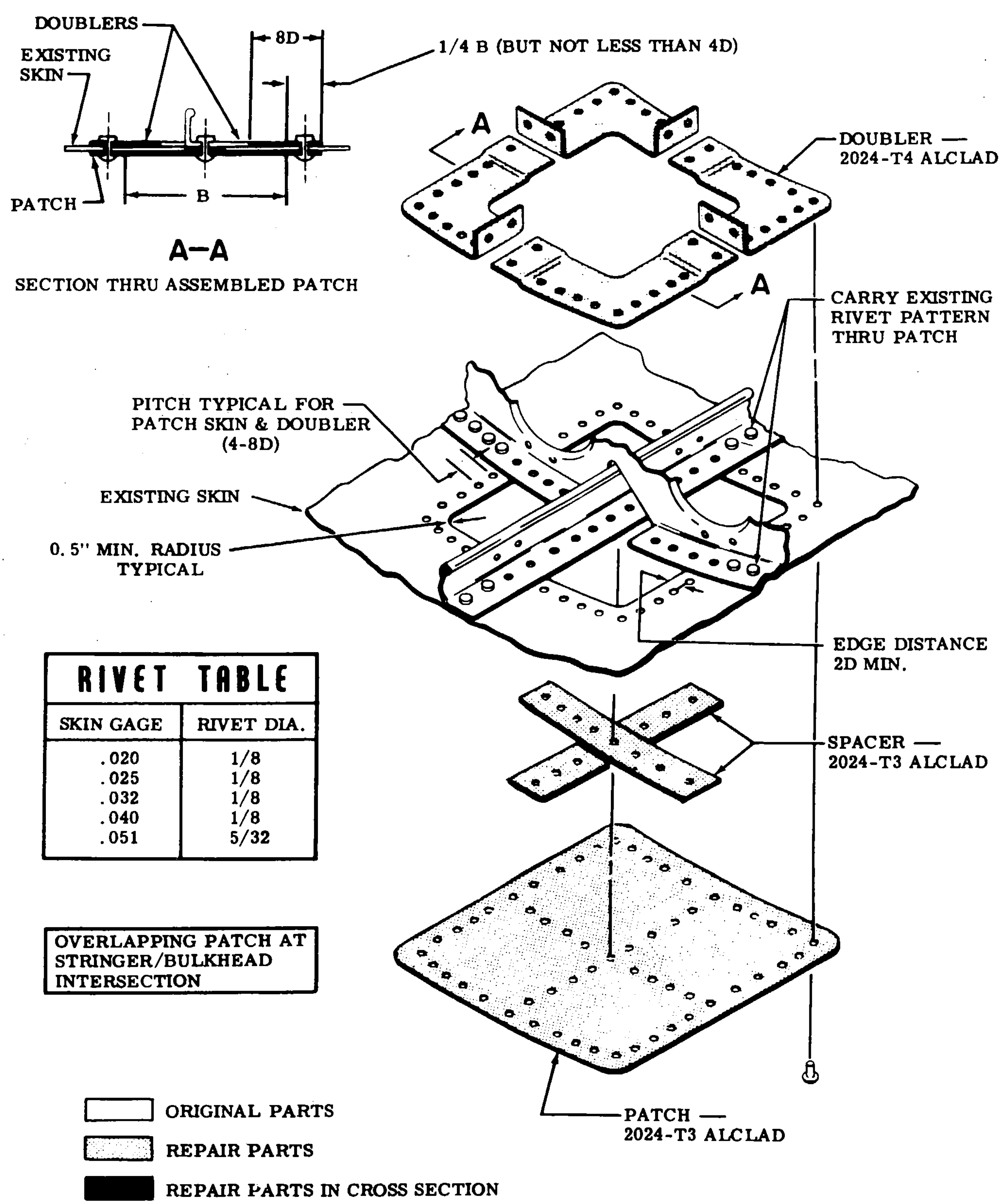
REPAIR PARTS

REPAIR PARTS IN CROSS SECTION

NOTE

This procedure is not recommended in areas where stringers are riveted to bulkheads.

Figure 17-5. Skin Repair (Sheet 4 of 6)



RIVET TABLE

SKIN GAGE	RIVET DIA.
.020	1/8
.025	1/8
.032	1/8
.040	1/8
.051	5/32

Figure 17-5. Skin Repair (Sheet 5 of 6)

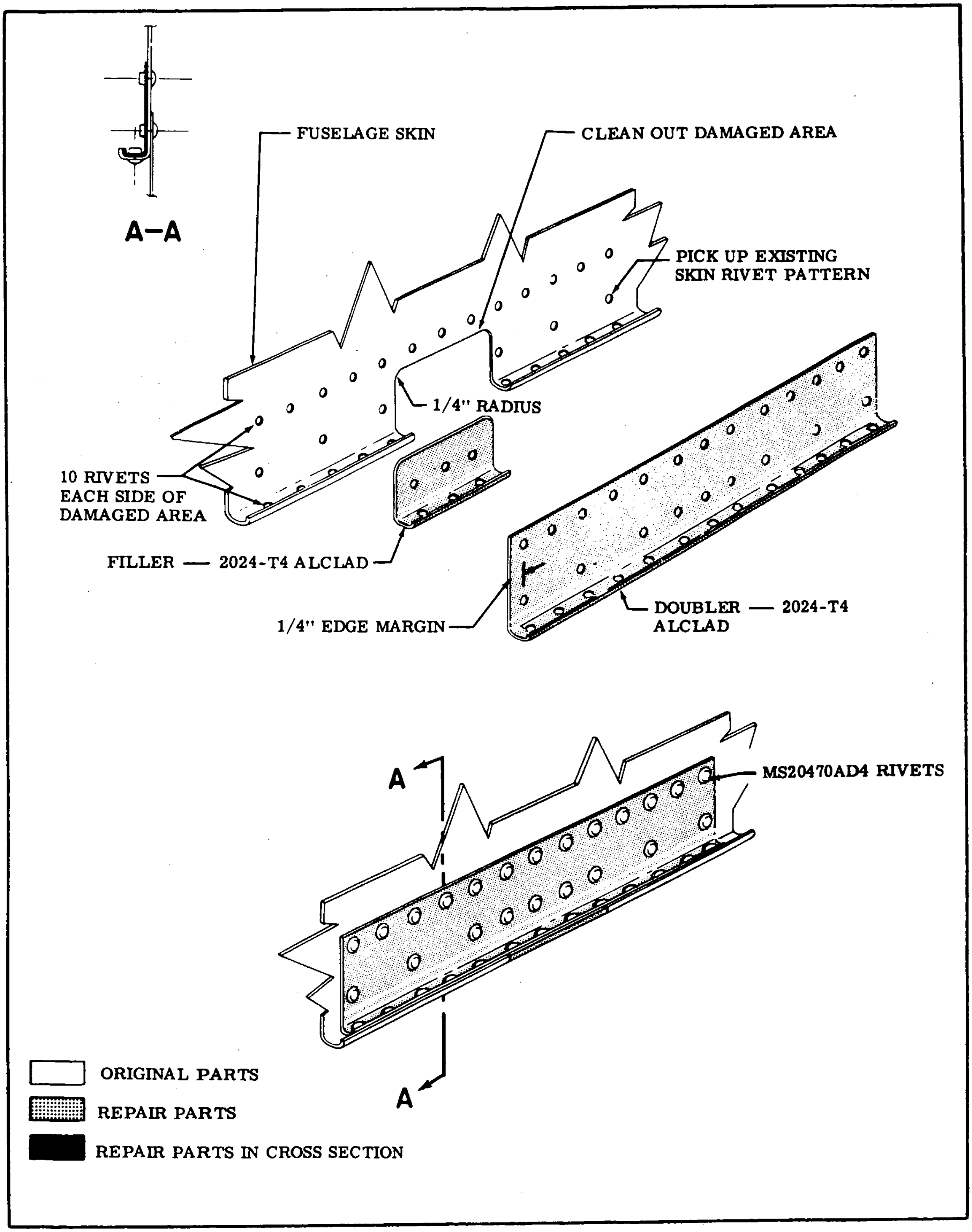


Figure 17-5. Skin Repair (Sheet 6 of 6)

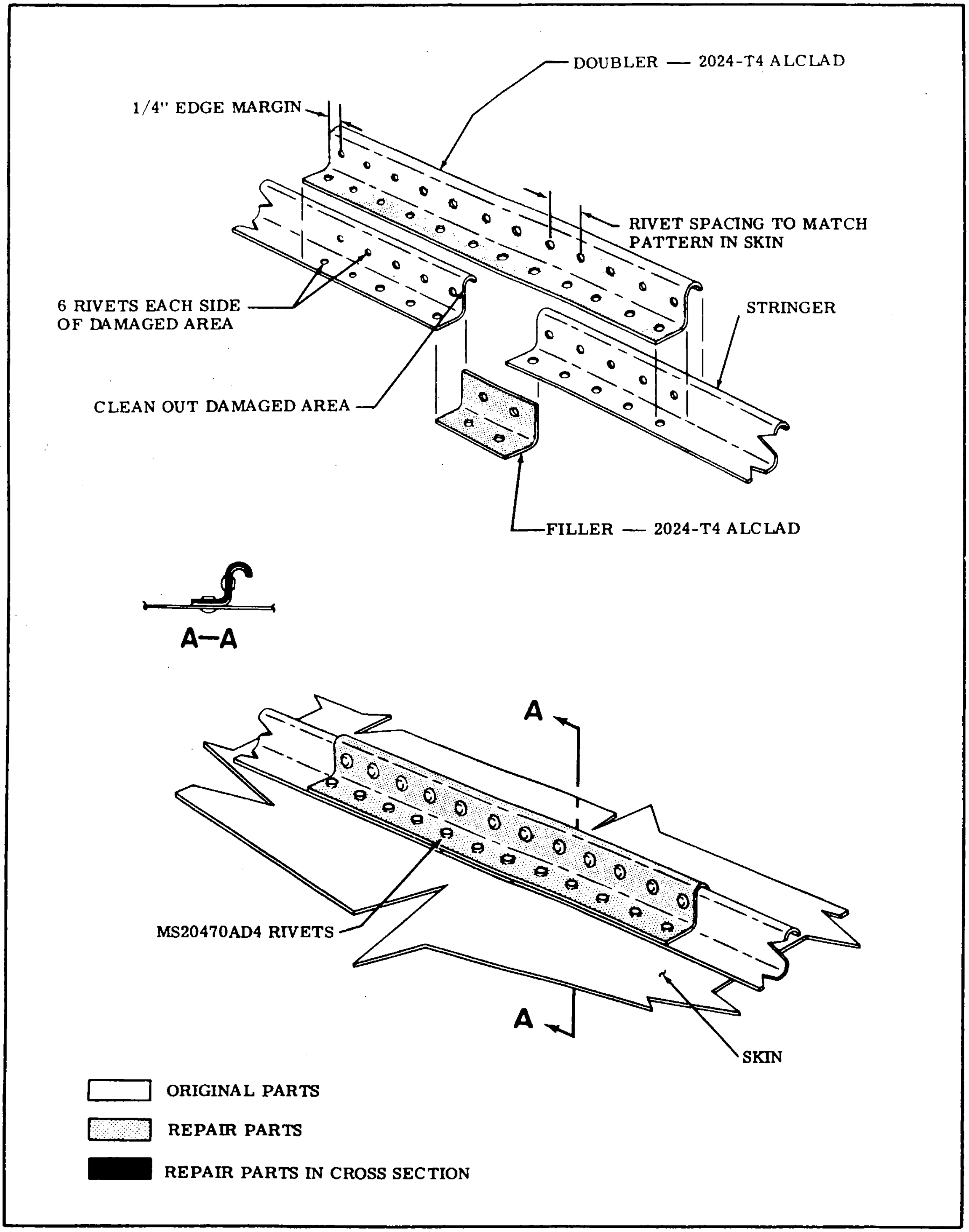


Figure 17-6. Stringer and Channel Repair (Sheet 1 of 4)

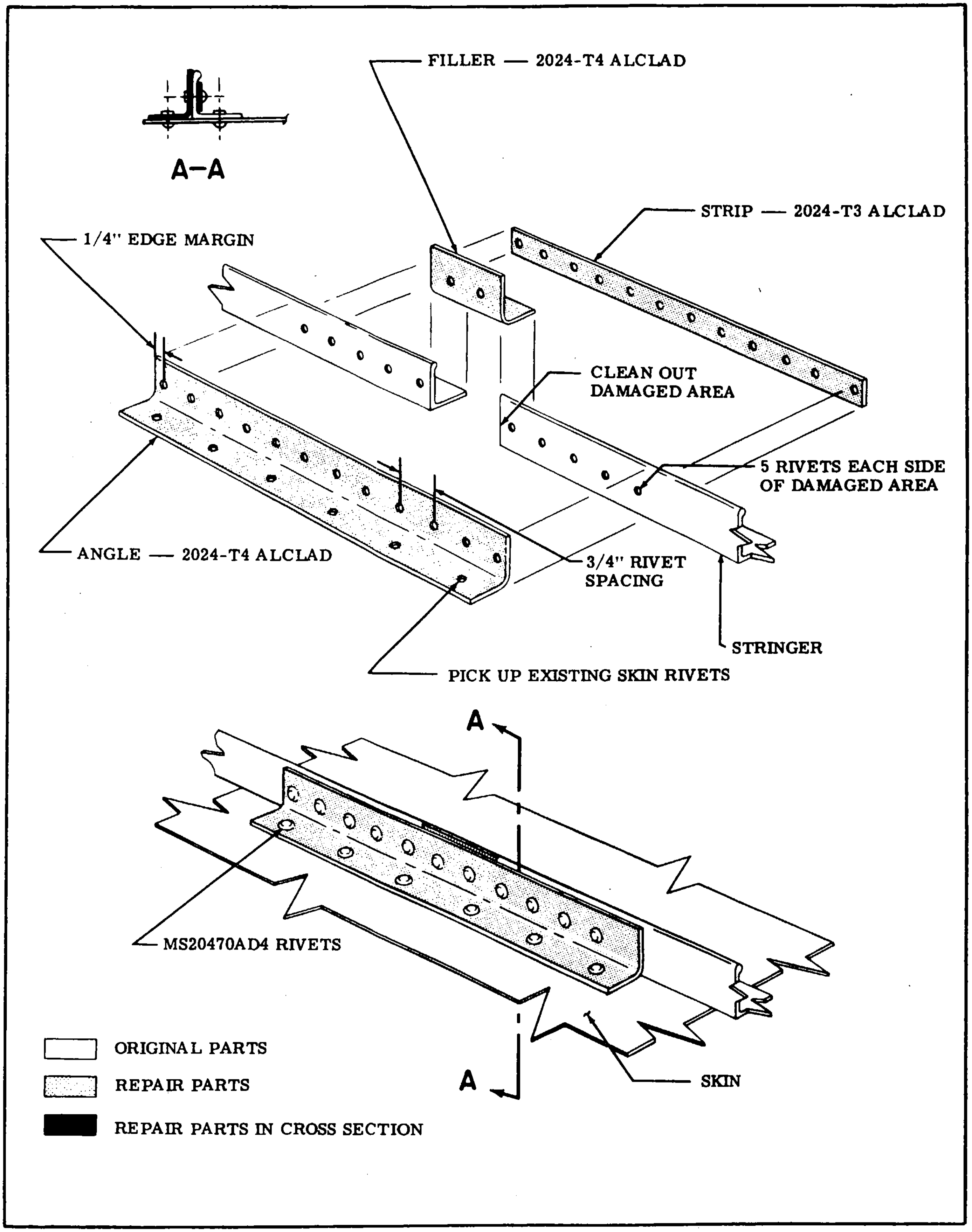


Figure 17-6. Stringer and Channel Repair (Sheet 2 of 4)

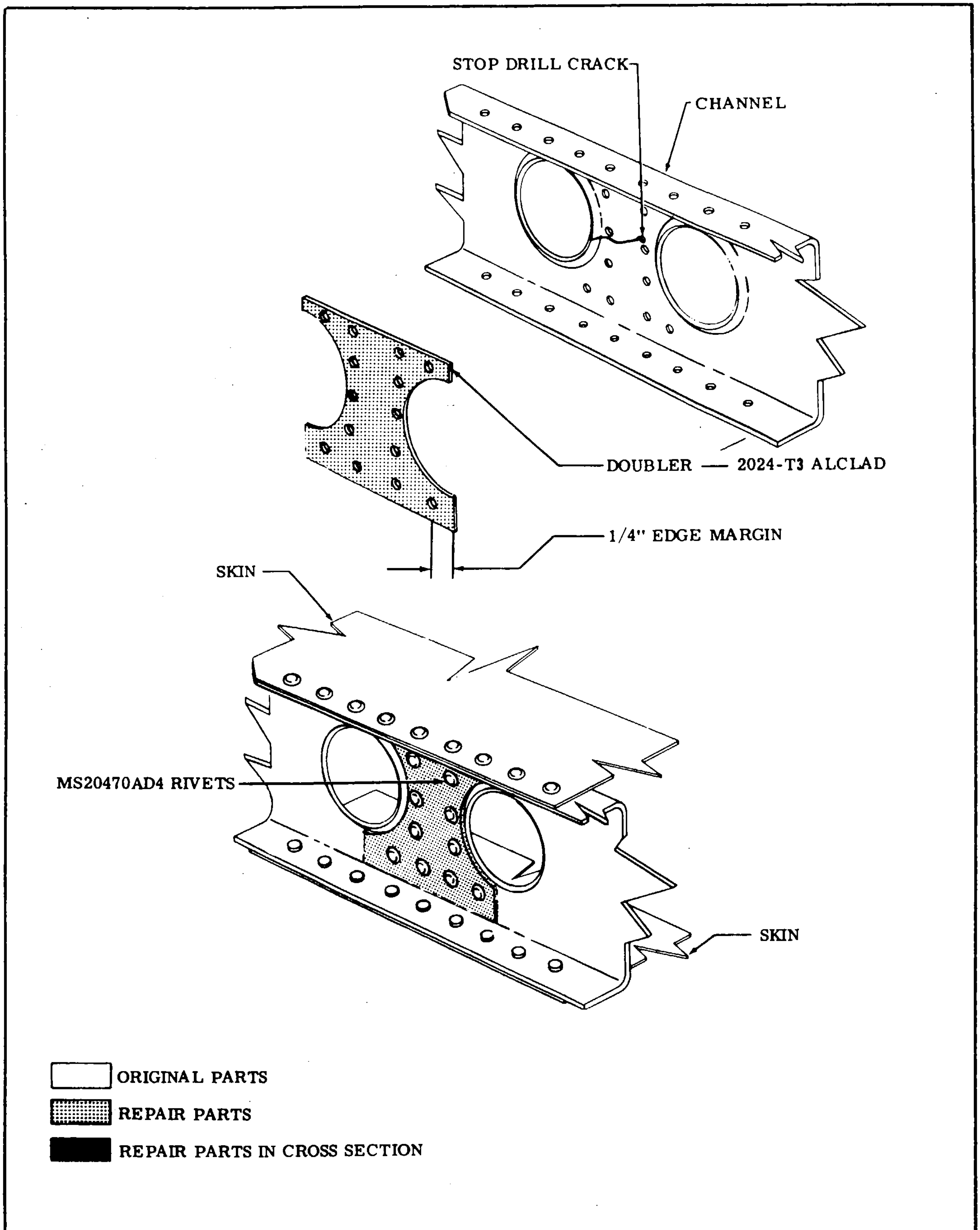


Figure 17-6. Stringer and Channel Repair (Sheet 3 of 4)

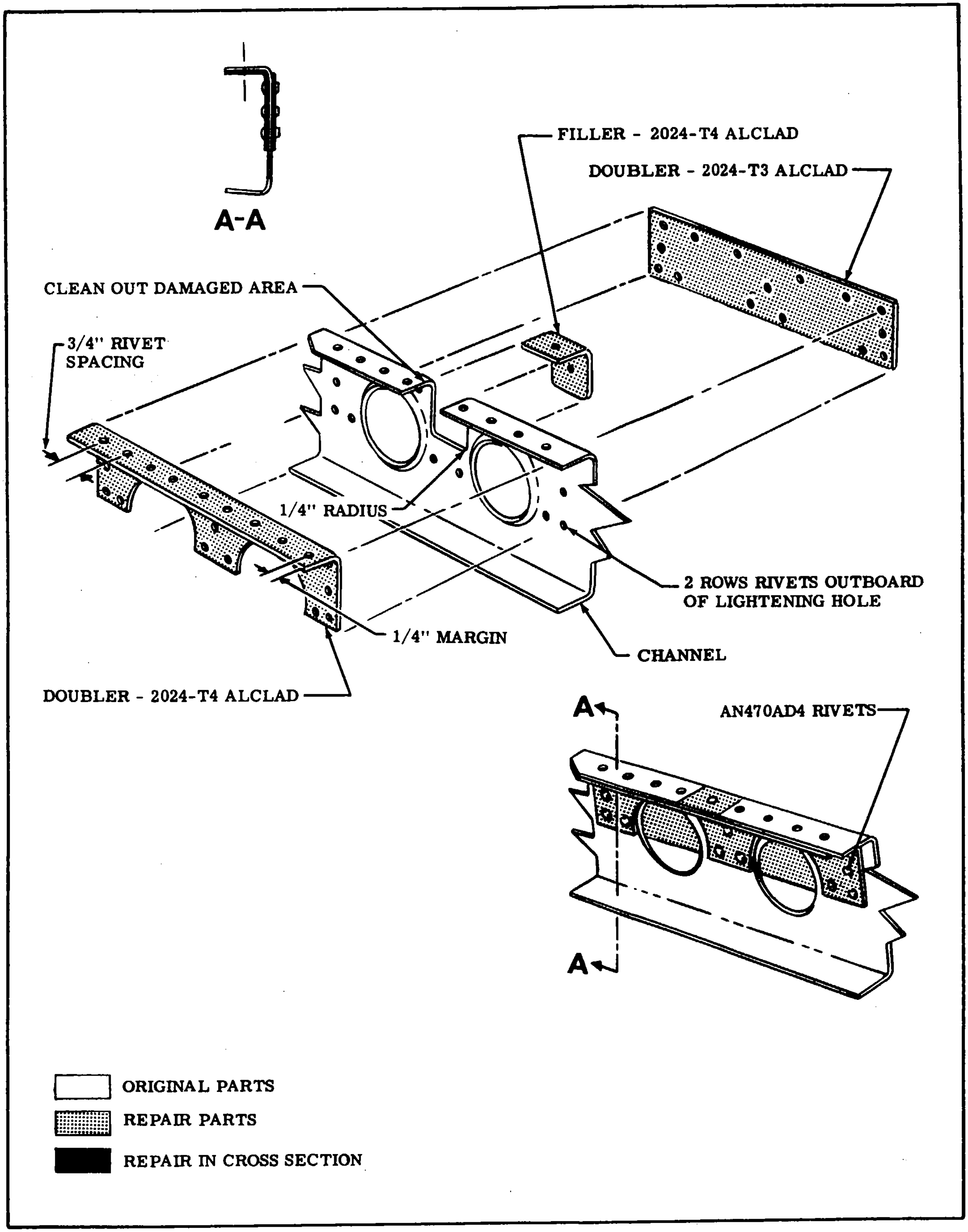


Figure 17-6. Stringer and Channel Repair (Sheet 4 of 4)

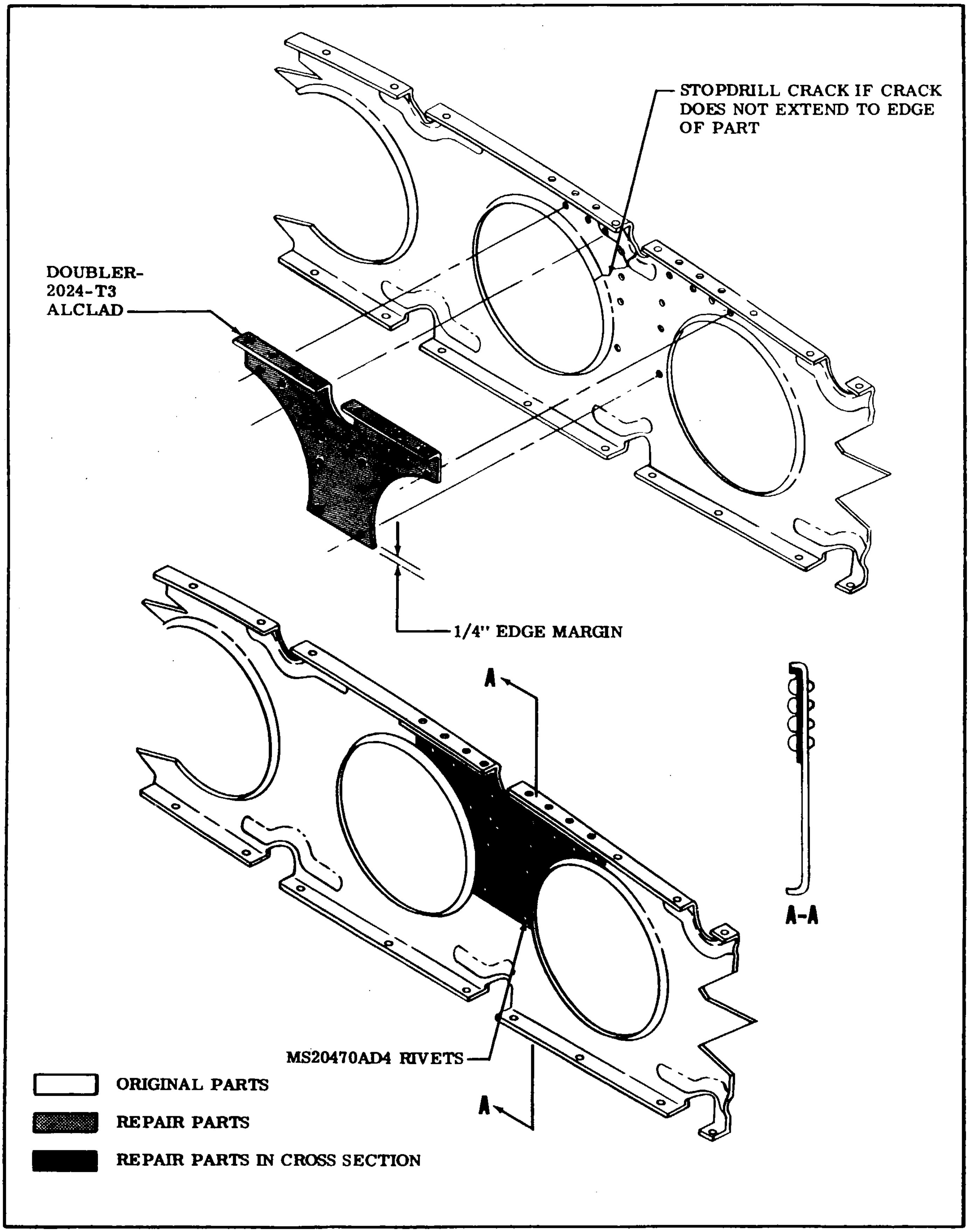


Figure 17-7. Rib Repair (Sheet 1 of 2)

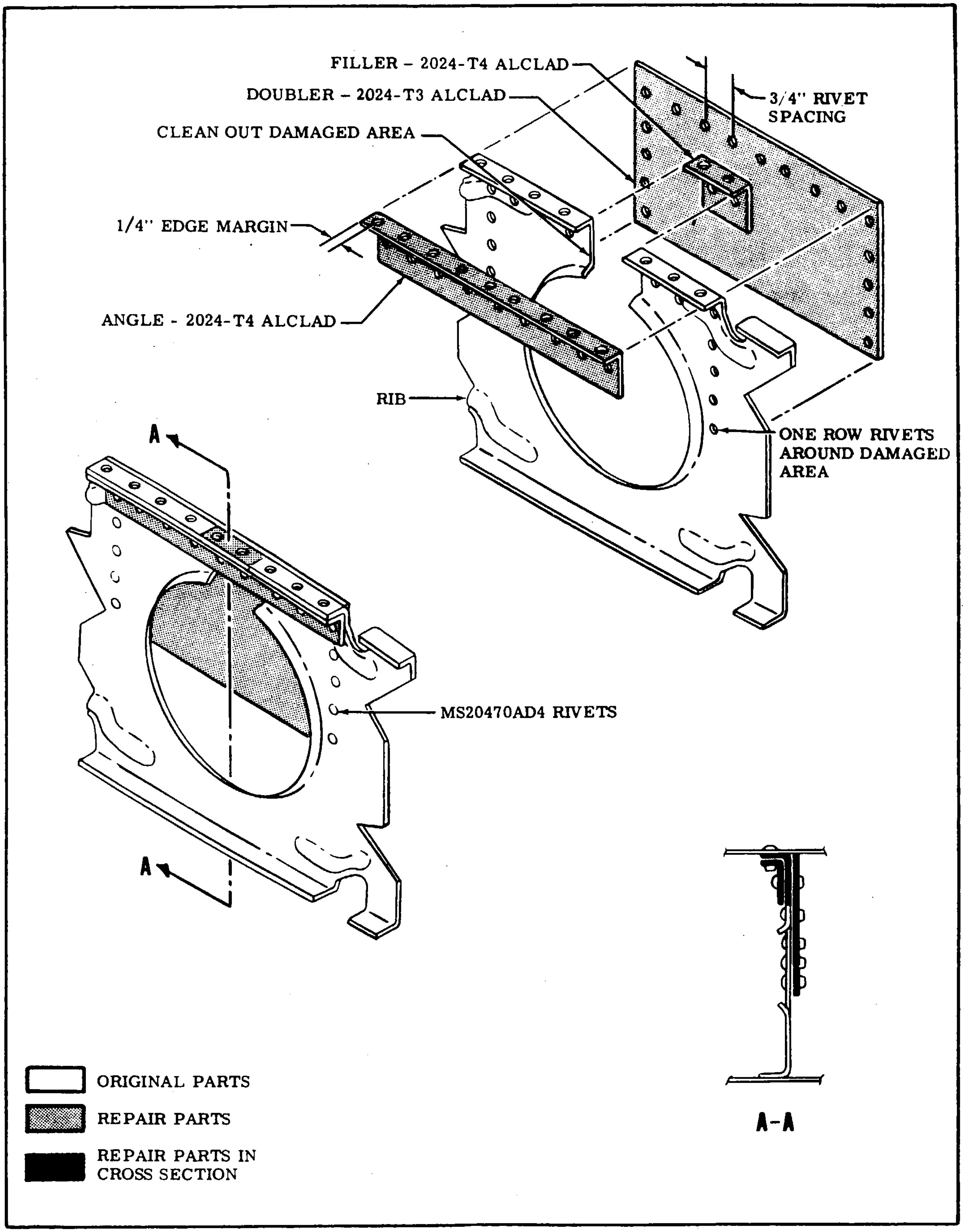


Figure 17-7. Rib Repair (Sheet 2 of 2)

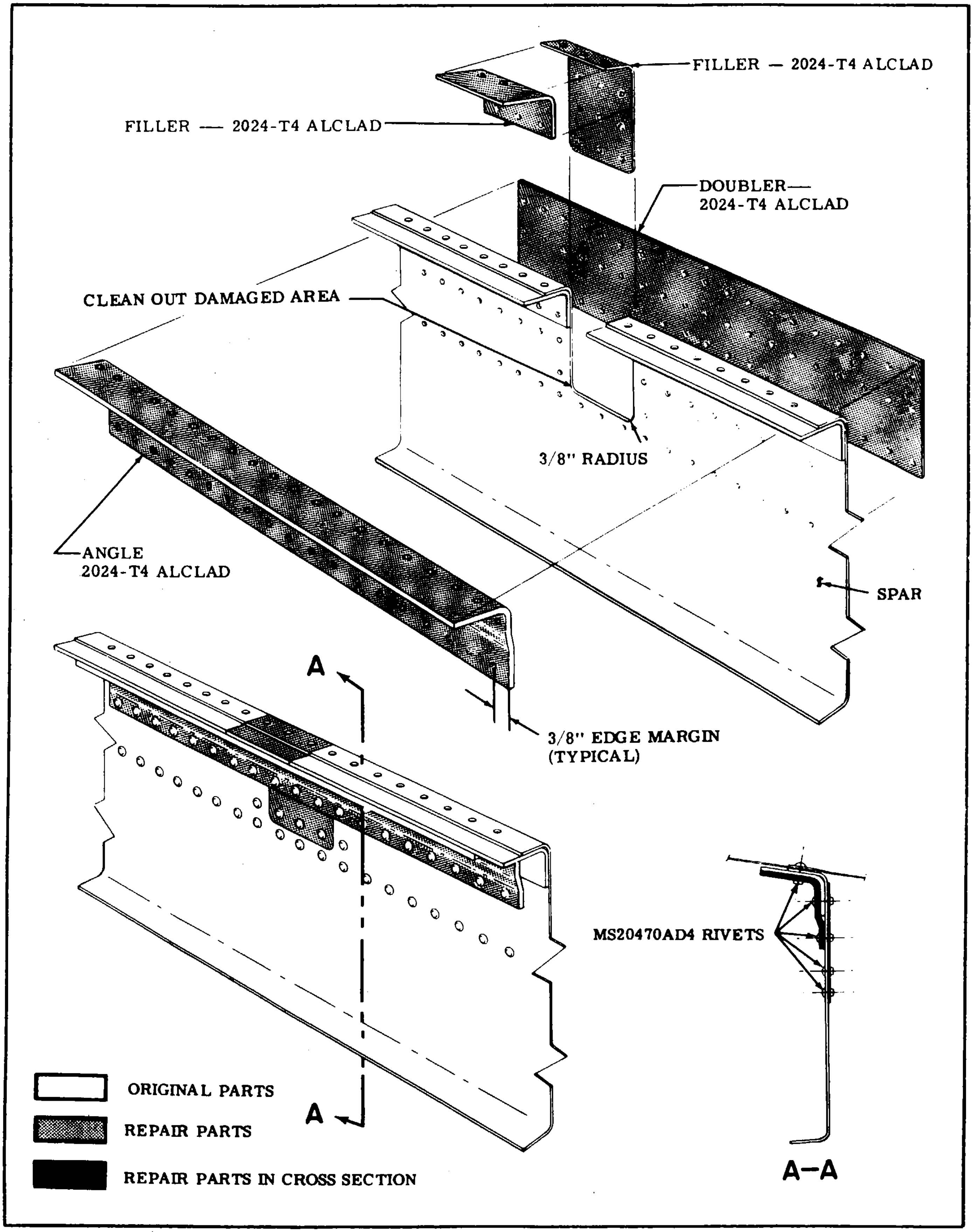


Figure 17-8. Wing Spar Repair (Sheet 1 of 3)

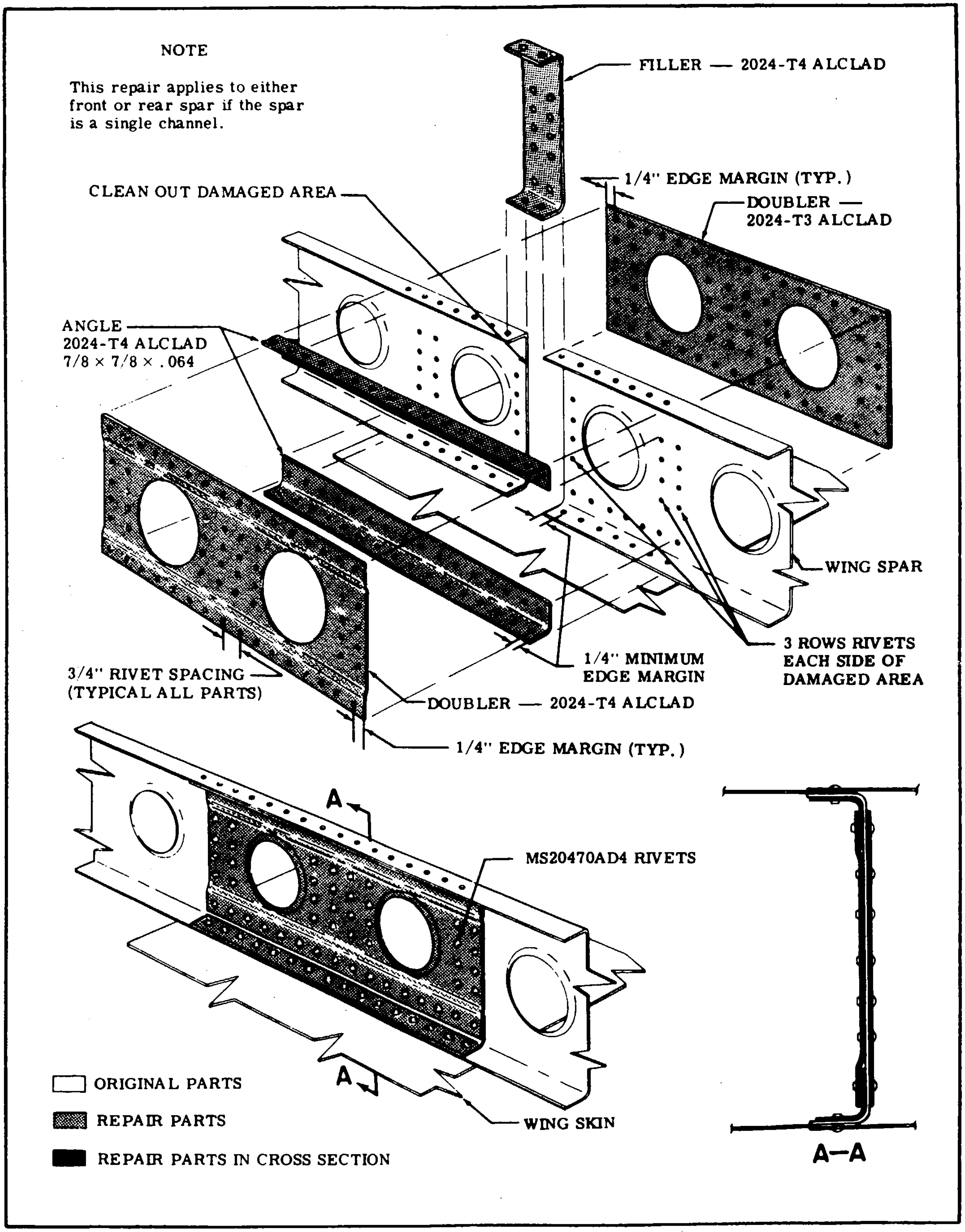


Figure 17-8. Wing Spar Repair (Sheet 2 of 3)

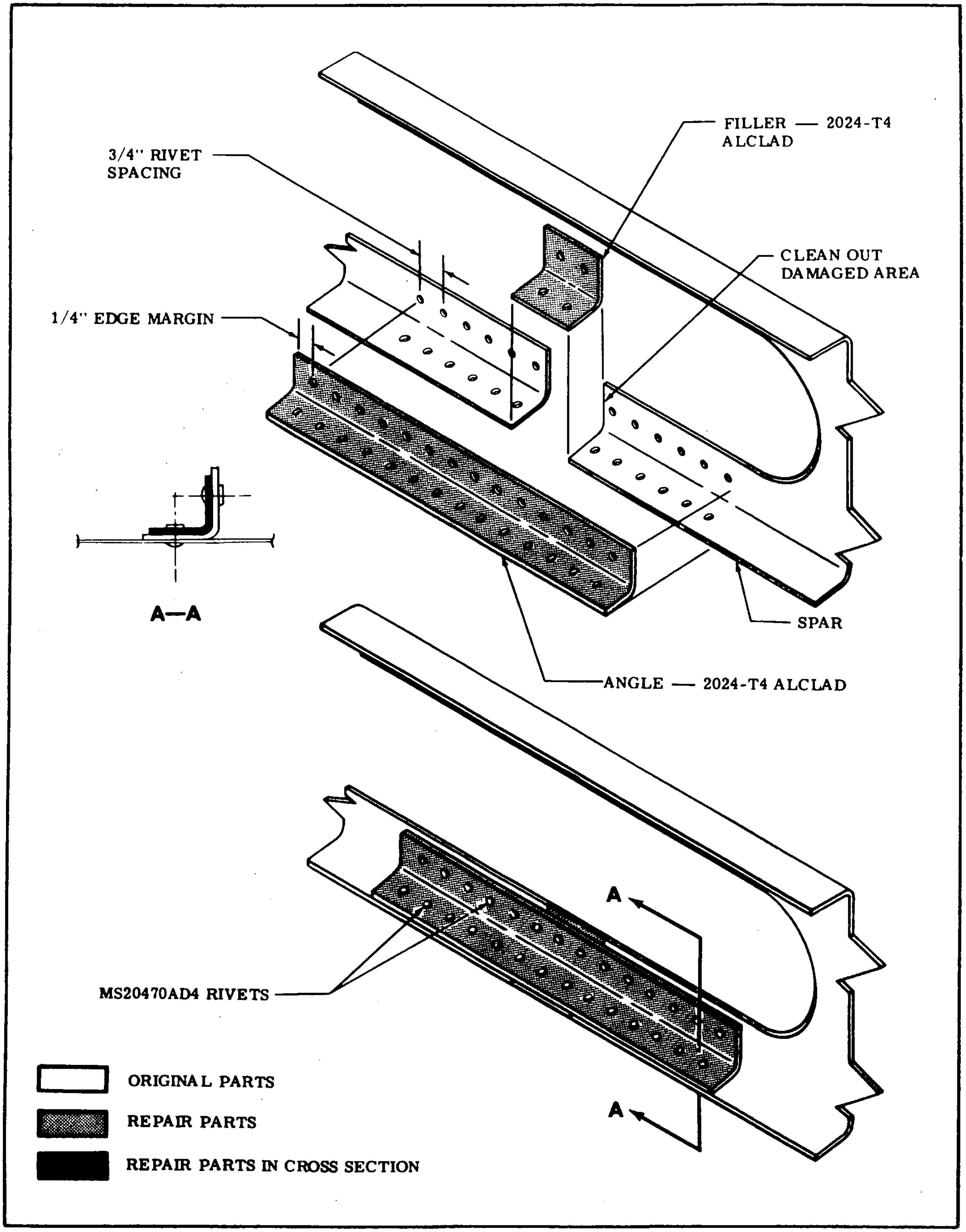


Figure 17-8. Wing Spar Repair (Sheet 3 of 3)

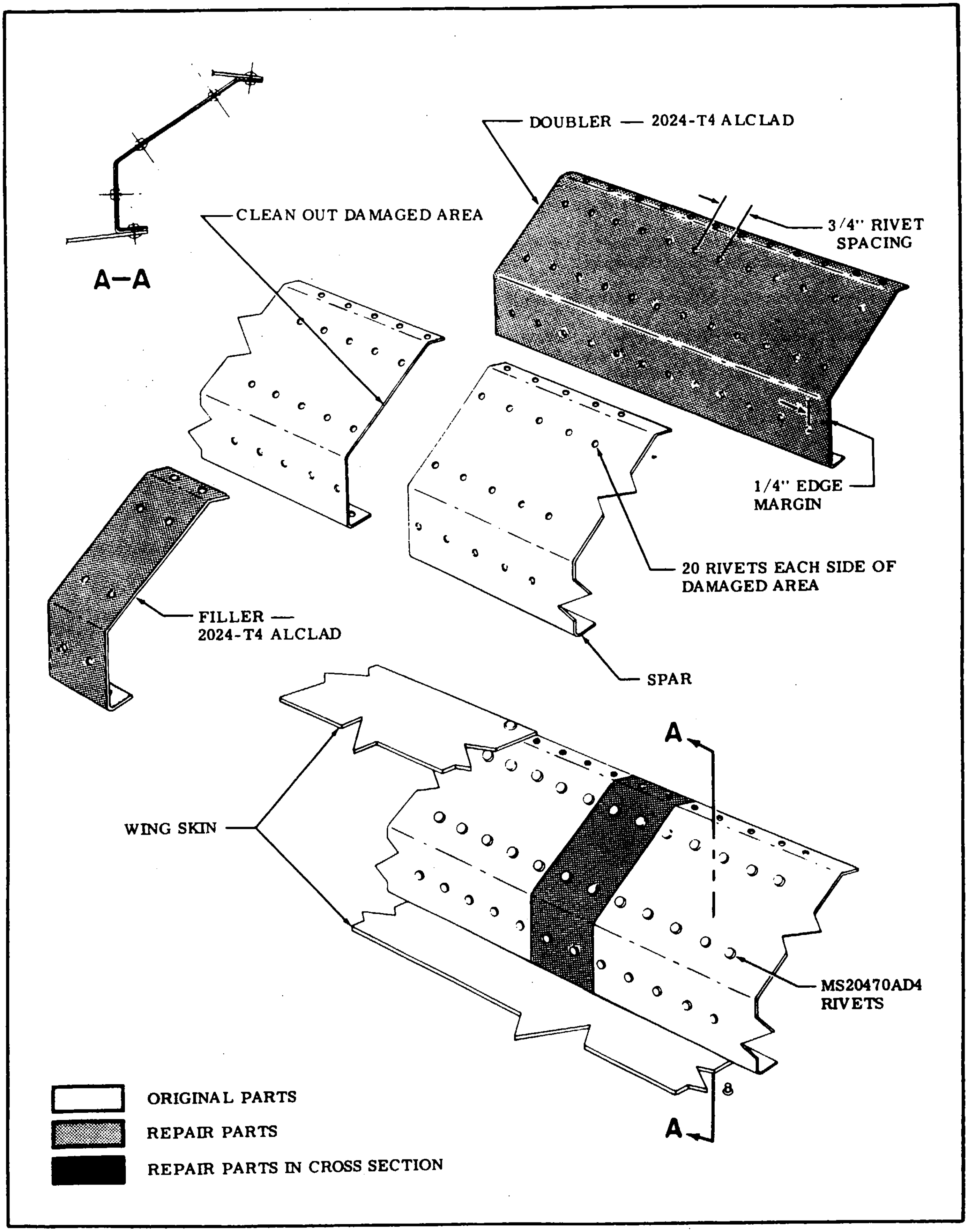


Figure 17-9. Auxiliary Spar Repair

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.

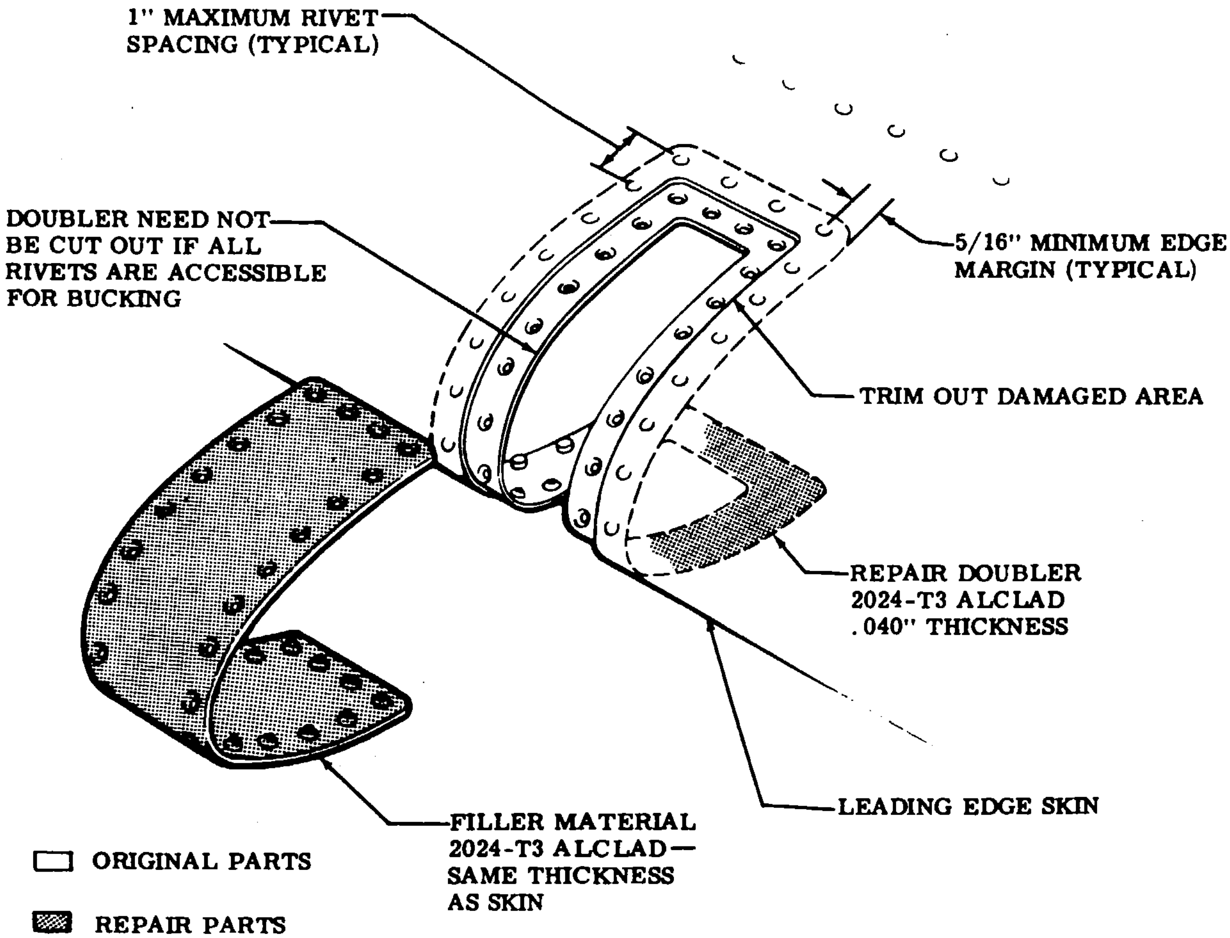


Figure 17-10. Leading Edge Repair

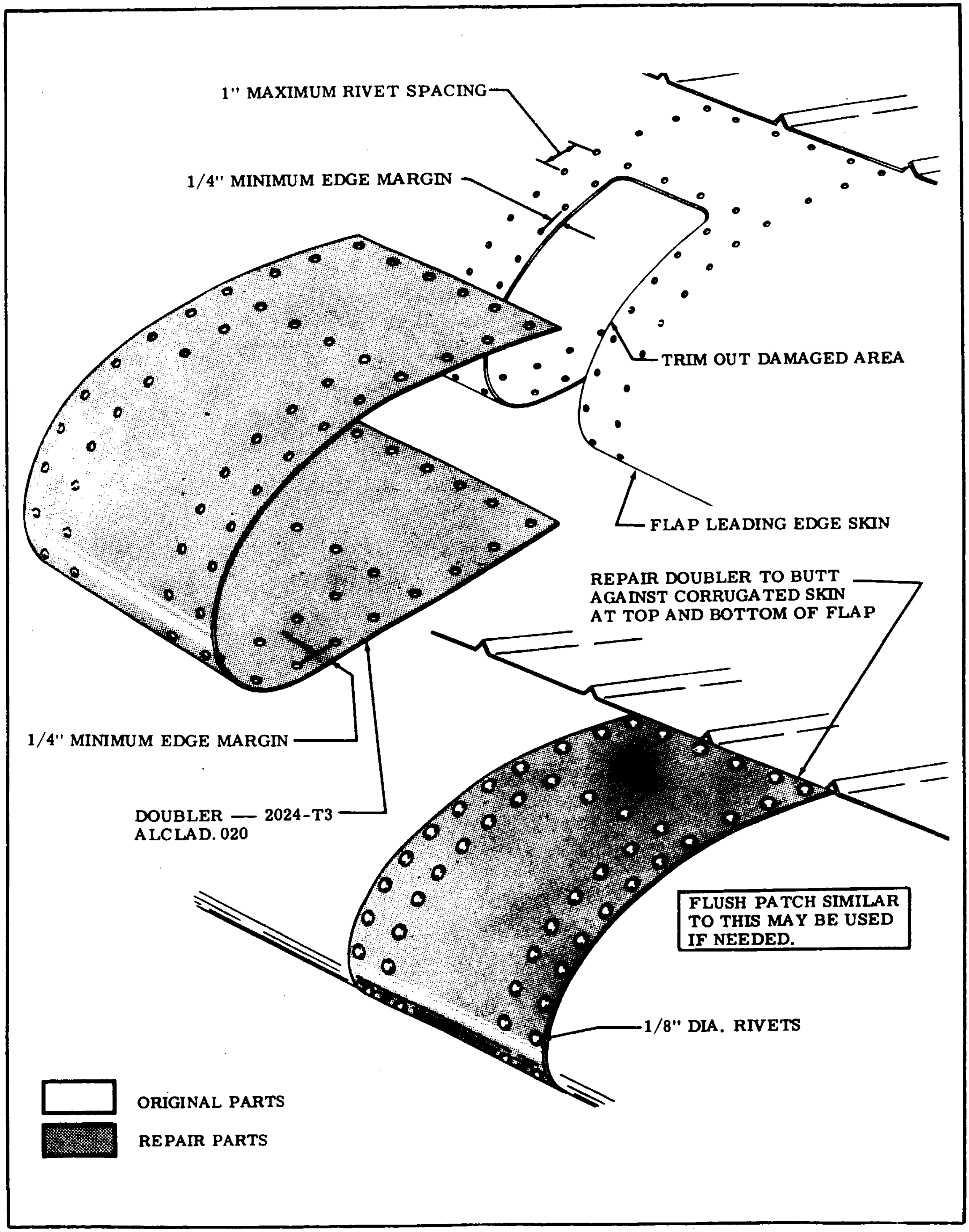
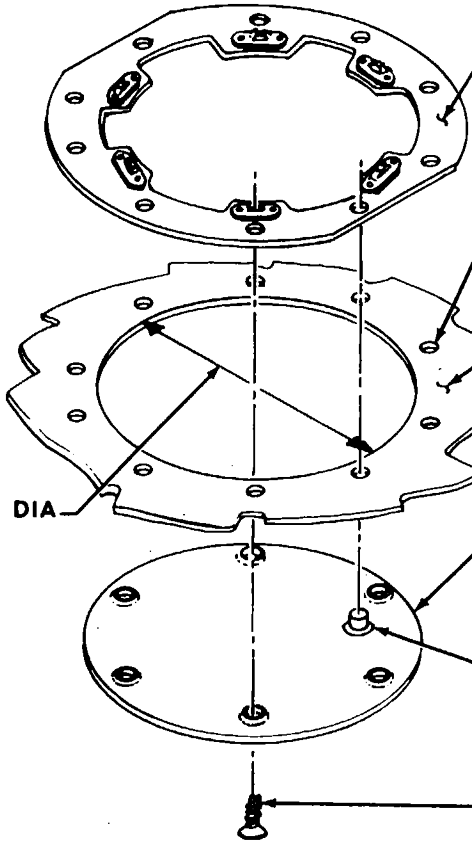


Figure 17-11. Flap Leading Edge Repair



PRECAUTIONS

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. 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 are 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.

a. Establish exact location for inspection cover and inscribe centerlines.

b. Determine position of doubler on wing skin and center over centerlines. Mark the ten rivet hole locations and drill to size shown.

c. Cutout access hole, using dimension shown.

d. Flex doubler and insert through access hole, and rivet in place.

e. Position cover and secure, using screws as shown.

Figure 17-12. Access Hole Installation

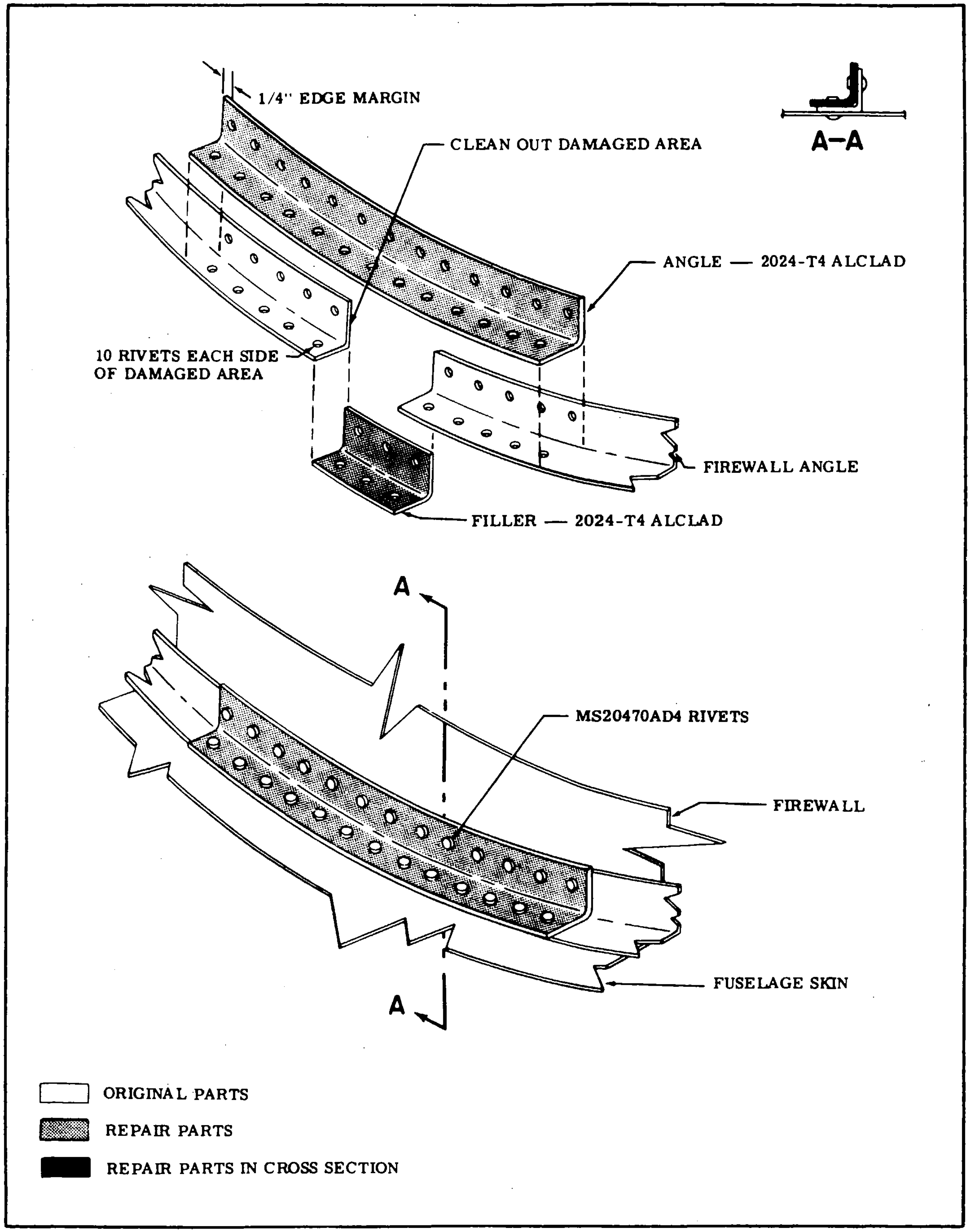


Figure 17-13. Firewall Angle Repair

SECTION 18

PAINTING

NOTE

A listing of standard factory materials and area of application is contained in this section. To determine paint color number, refer to Aircraft Trim Plate and Parts Catalog. In all cases determine the type of paint on the aircraft, because some paints are not compatible. These materials can be obtained from Cessna Service Parts Center.

TABLE OF CONTENTS — Page No. Aerofiche/Manual

MATERIAL	NO/TYPE	DOMESTIC	FRENCH	AREA OF APPLICATION
PAINT	✱ACRYLIC LACQUER	X		See note number 1.
	LACQUER		X	See note number 1.
	CES-1054-215 Heat Resistant Enamel	X	X	See note number 6.
	* CES-1054-812 VHT White Enamel	X	X	See note number 7.
PRIMER	P60G2 With R7K44 Reducer	X		See note number 2.
	Ex-Er-7 With T-Er-4 Reducer	X	X	See note number 2.
THINNER	T-8402A	X		See note number 4.
	T-6094A	X	X	See note number 3.
	Toluene	X	X	See note number 8.
SOLVENT	Methyl Ethyl Keytone (MEK)	X	X	See note number 5.

NOTES

1. Used on aircraft exterior.
2. Used with lacquer or acrylic lacquer on aircraft exterior.
3. Used to thin lacquer, for burndown, and to thin VHT enamel.
4. Used to thin acrylic lacquer and for burndown.
5. Used to clean aircraft exterior prior to priming.
6. Used on engine mount allover.
7. Used on designated areas of engine mount.
8. Used to thin VHT enamel.

* Beginning Serial R1722891 and FR1720631.

✱ THRU R1722776.

NOTE

Control surfaces, except for wing flaps, must be balanced after painting. Refer to Section 17, figure 17-3 for balancing procedures.

18-1. PAINTING OF FORMED ABS PLASTIC PARTS. The following procedures outline some basic steps which are useful during touchup or painting of formed ABS plastic parts.

18-2. INTERIOR PARTS (Finish Coat of Lacquer)

a. Painting of Spare Parts.

1. Ensure a clean surface by wiping with Naphtha to remove surface contamination.

CAUTION

Do not use strong solvents such as Xylol, Toluol or Lacquer Thinner since prolonged exposure can soften or embrittle ABS.

2. After the part is thoroughly dry it is ready for the lacquer topcoat. Paint must be thinned with lacquer thinner and applied as a wet coat to ensure adhesion.

b. Touch Up of Previously Painted Parts.

1. Light sanding is acceptable to remove scratches and repair the surface but care must be exercised to maintain the surface texture or grain.

2. Ensure a clean surface by wiping with Naphtha to remove surface contamination.

CAUTION

Do not use strong solvents such as Xylol, Toluol or Lacquer Thinner since prolonged exposure can soften or embrittle ABS.

3. After the part is thoroughly dry it is ready for the lacquer topcoat. Paint must be thinned with lacquer thinner and applied as a wet coat to ensure adhesion.

NOTE

Lacquer paints can be successfully spotted in.

18-3. EXTERIOR PARTS (Acrylic Topcoat)

a. Painting of Spare Parts.

1. Lightly scuff sand to remove scratches and improve adhesion.

2. Ensure a clean surface by wiping with Naphtha to remove surface contamination.

CAUTION

Do not use strong solvents such as Xylol, Toluol or Lacquer Thinner since prolonged exposure can soften or embrittle ABS.

3. After the part is thoroughly dry it is ready for the topcoat. Paint must be thinned with appropriate acrylic thinner and applied as a wet coat to ensure adhesion.

b. Touch Up of Previously Painted Parts.

1. Lightly scuff sand to remove scratches and improve adhesion.

2. Ensure a clean surface by wiping with Naphtha to remove surface contamination.

CAUTION

Do not use strong solvents such as Xylol, Toluol or Lacquer Thinner since prolonged exposure can soften or embrittle ABS.

3. Apply a compatible primer - surfacer and sealer.

4. After the part is thoroughly dry it is ready for the topcoat. Paint must be thinned and applied as a wet coat to ensure adhesion.

18-4. REFINISHING ENGINE MOUNTS. (See figure 18-1.) After completing engine mount repairs as outlined in Section 17 of this manual, refinish with Part Number EX2219 (Ameron-Enmar Finishes, 16116 East 13th St., Andover, Kansas 67230) (316) 733-1361 heat-resistant black enamel. Degrease and scuff sand or grit blast entire area to bare metal. Spray enamel to a dry film thickness of 0.001-inch to 0.0013-inch, and cure at 250°F for 15 minutes. Part can be handled as soon as cool to touch. For areas which are in close proximity to the engine exhaust stacks, paint with Sperex SP101 VHT White (Sperex Corp., 16131 So. Maple Ave., Gardena, Calif., 90248) (213) 323-6162. Refer to Cessna Single-Engine Service Letter No. SE 78-27 for surface preparation and painting procedures.

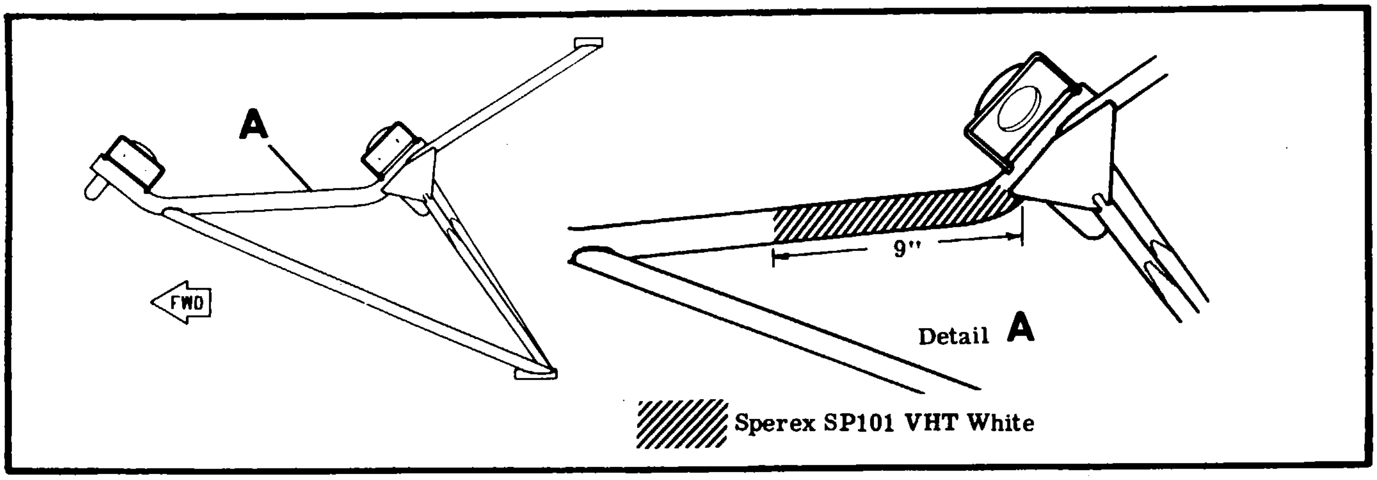


Figure 18-1. Refinishing Engine Mount.

BEGINNING R1722777.

IMRON MODIFIED URETHANE

MATERIAL	NO/TYPE	AREA OF APPLICATION
PAINT	IMRON ENAMEL	Used as corrosion proof topcoat
	IMRON 192S Activator	Catalyst for Imron Enamel
THINNER	IMRON Y8485S Reducer	Used to thin Imron Enamel
PRIMER	WASH PRIMER P60G2	Used to prime aircraft for Imron Enamel
REDUCER	Catalyst Reducer R7K44	Used to reduce P60G2

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.

REQUIRED MATERIALS

MATERIAL	NO/TYPE	AREA OF APPLICATION
STRIPPER	Strypeeze Stripper	Used to strip primer overspray
CLEANER	DX 440 Wax and Grease Remover	Used to clean aircraft exterior
	Imperial Cleaner	Used 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 clean 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

18-5. FACILITY. Painting facilities must include the ability to maintain environmental control; temperature at 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 is lower, curing time will be extended 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.

18-6. CLEAN UP.

a. Inspect airplane for any surface defects, such as dents or unsatisfactory previous repairs, and correct according to paragraph 18-13.

b. Wipe excess sealer from around windows and skin laps. 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.

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 removal of the overspray, clean the airplane with Methyl Ethyl Ketone (MEK) solvent in the prescribed manner.

NOTE

It is imperative that clean solvent be used in cleaning airplanes. Dispose of contaminated solvent immediately. Fresh solvent should be used on each airplane.

WARNING

Use explosion proof containers for storing wash solvents and other flammable materials.

18-7. PRE-PRIMING.

a. For all standard aircraft, P60G2 primer shall be mixed one part primer to one and one half parts R7K44 catalyst by volume. Mix only in stainless steel or lined containers. After mixing, allow primer to set for thirty minutes before spraying. Pot life of the mixed primer is six hours. All mixed material should be discarded if not used within this time. Pot pressure during spray operation should be approximately 10 ±1 psi. Air pressure should be 40 to 50 psi at the gun. Blow loose contaminant off the airplane with a jet of clean, dry air. Cover the flap tracks, nose gear strut tube, 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.

18-8. 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.

18-9. PREPAINTING.

a. On standard aircraft mix the required amount of Imron with Imron 192S Activator in a 3 to 1 ratio. Mix thoroughly (no induction time required before spraying). Imron shall be thinned with Y8485S Imron Reducer to obtain a spraying viscosity of 18 to 20 seconds on a No. 2 Zahn Cup. Viscosity should be checked after 4 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.

18-10. 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 approximately 2.0 mils. Films in excess of 3.0 mils are not desirable.

18-11. 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 sand paper. 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, 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 on Imron base coat will be Imron Enamel. Mix as outlined in paragraph 18-9.

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 1.5 to 2.0 mils.

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.

18-12. 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 panel as much as possible. Since urethane finishes cannot be "spotted in" repairs should be in sections extending to skin laps 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 Removal. All traces of stripper must be removed before refinishing.

18-13. 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.

NOTE

Refer to paragraph 18-4, for engine mount refinishing procedures and paint application.

NOTE

Refer to Section 17 for repair of damaged area(s). Dent repair as described in this Section is applicable only to smooth dents in the skin that are free from cracks, sharp corners, are not stress wrinkles and do not interfere with any internal mechanism.

NOTE

Application of a top coat thickness in excess of 5.0 mils, requires a control surface balance check.

SHOP NOTES:

SECTION 20
WIRING DIAGRAMS

12 VOLT

TABLE OF CONTENTS — Page No. Aerofiche/Manual

24 VOLT

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
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
M - Miscellaneous
  MA - Cowl Flaps
  MB - Electrically Operated Seats
  MC - Smoke Generator
  MD - Spray Equipment
  ME - Cabin Pressurization Equipment
  MF - Chem O_2 - Indicator
P - D. C. Power
  PA - Battery Circuit
  PB - Generator Circuits
  PC - External Power Source
Q - Fuel and Oil
  QA - Auxilliary 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

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.

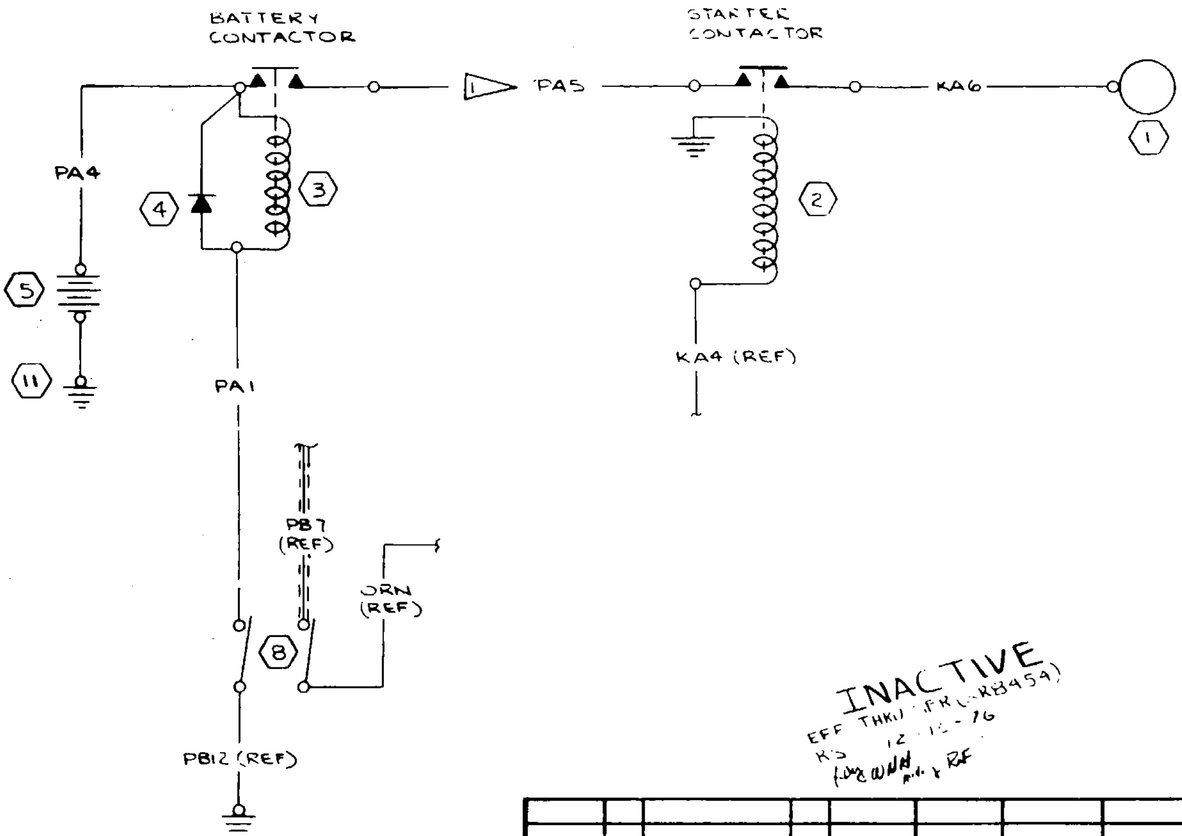
CROSS REFERENCE LISTING OF SERIAL REQUEST NUMBERS LISTED ON DIAGRAMS VS. AIRCRAFT SERIAL NUMBERS.

SR No.	AIRCRAFT SERIAL NO.
SR7692	17263459
SR7903	17265685 & F17201385
SR7904	FR17200562
SR8133	17267585 & F17201515
SR8134	FR17200591
SR8146	R1722000
SR8259	17265782 & F17201445
SR8453	17269310 & F17201640
SR8454	R1722825 & FR17200621
SR8490	17267585, F17201515, R1722000 & FR17200591
SR8552	17268213 & R1722141
SR8596	17269310 & R1722825
SR8773	17271235 & F17201750
SR8774	R1722910 & FR17200631

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV ADD NOTE 1, 0712605 WAS 0511319-1 (SR7904)	BLA 1-22-75	
B	BY REV: DELETE 0770719; ADD R172 (NOW SHOP PRACTICE) (SR8146)	2-25-76	RF

NOTES

1. SEE PAGE 4.6.0 WHEN OPTIONAL GROUND SERVICE INSTALLATION IS MADE



INACTIVE
EFF THRU FR (R8454)
12-15-76

54-0916

KA6	4		16	S-1367-6-13	S-1367-6-13	
PA5	4		190	S-1367-6-13	S-1367-6-13	
PA4	4		6	S-1367-6-14	S-1367-6-14	
PA1	22		138	S-1493-1	S-1367-1-8	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION
11	0412007	BATTERY GND
10		
9		
8	S-1994-1-1	SWITCH
6		
5	0712605	BATTERY
4	0770728	DIODE ASSY
3	S-1579-2	CONTACTOR
2	S-[illegible]1-1	CONTACTOR
1	[illegible]28482	STARTER

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 P 4.1.4

SUPERSEDED BY: 0570311 P A 1.0

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	12-11-74
GROUP	B. HARDEN	[illegible]
DRAWN	MERRICK	10-29-74
CHECK	J. YOKEL	12-6-74
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — BATTERY CIRCUIT

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570101

SCALE: NONE (SR7904) PAGE: 4.1.0

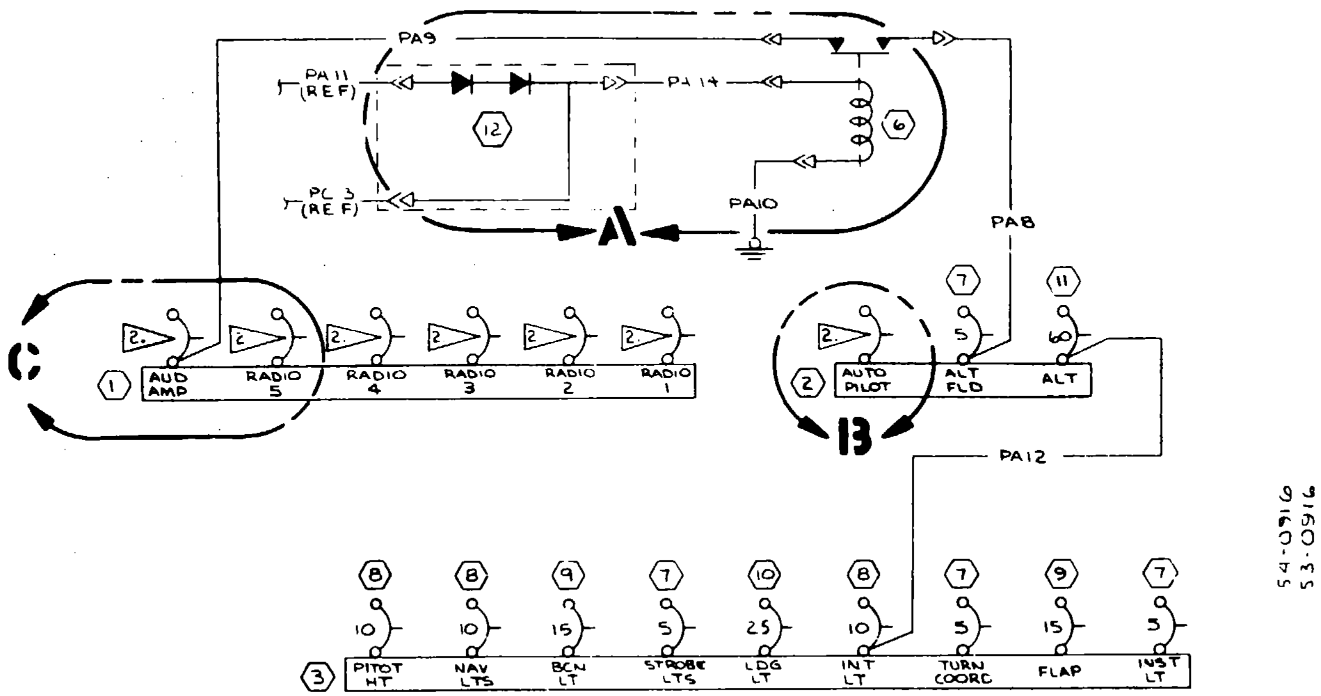
FR172, R172

NOTES:

1. ~~THIS LOCATION FOR FUEL PUMP CIRCUIT BREAKER ON FR172 ONLY~~

2. VALUE OF THESE CIRCUIT BREAKERS VARY WITH OPTIONAL EQUIPMENT INSTALLED

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: S-1360-15L WAS S-1360-10L AT BCN LT CKT BKR (SR7903)(SR7904)	BAH 5-13-75	
B	BY REV: ADD PA14; 1510043 WAS 0770719-2; DELETE S-2069-1 (SR8259)	RS 5-23-75	
C	BY REV: ADD DETAIL "A" S-2023-1, S-2064-1 & 0770719 (SR8259)	RS 6-16-75	
D	BY REV: DELETE NOTE 1 & PART NOS. FROM CKT BKRS REFERED TO BY NOTE 2; ADD NOTE 2 & DETAILS "B" & "C" (SR7904)	TMS 7-23-75	
E	BY REV: S-1360-25L WAS S-1360-20L ADD R172 (SR8133)(SR8134)(SR8146)	2-25-76	



INACTIVE
EFF THRU SER (SR8953)(SR8954)
RS 12-16-76

ITEM NO.	PART NO.	DESCRIPTION	
13	0770719	DIODE ASSY	
12	1510043	DIODE BOARD ASSY	
11	S-1596-60L	CIRCUIT BREAKER	
10	S-1360-25L	CIRCUIT BREAKER	
9	S-1360-15L	CIRCUIT BREAKER	
8	S-1360-10L	CIRCUIT BREAKER	
7	S-1360-5L	CIRCUIT BREAKER	
6	S-1917-1	RELAY	
5	S-2023-1	ADAPTER	
4	S-2064-1	CONNECTOR	
3	0570419-1	BUS BAR	
2	0570419-2	BUS BAR	
1	0570419-3	BUS BAR	

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PA14	18			S-1493-1	S-1493-1		SER (SR8259) & ON
PA12	8		6	S-1367-4-10	S-1367-4-10		
PA10	18		2	S-1493-1	S-1367-1-6		
PA9	12		22	S-1493-3	S-1367-3-6		
PA8	12		16	S-1493-3	S-1367-3-8		

WIRE TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 P 4.8.1
SUPERSEDED BY: 0570311 P 4.4.0

CONTRACT NO:

	NAME	DATE
DESIGN	G STAMM	12-11-74
GROUP	B HALDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J YOUEL	12-6-74
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

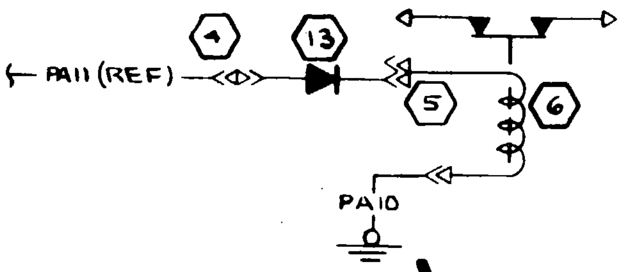
TITLE: WIRING DIAGRAM — BUS BAR, PRIMARY, ALTERNATOR & ELECTRONIC

SIZE: C | CODE IDENT. NO. 71379 | DWG NO 0570101

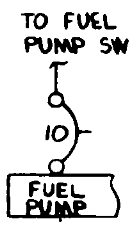
SCALE: NONE | (SR7903) (SR7904) | PAGE: 4.3.0

172, F172, FR172, R172

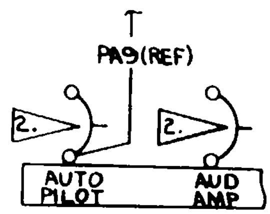
Bus Bar, Primary, Alternator & Electronic (Sheet 1 of 2)



DETAIL A
THRU SER (SR8259)(17265782 F17211445 & FR17205811)



DETAIL B
(APPLIES TO FR172 & R172 ONLY)



DETAIL C
(APPLIES TO FR172 & R172 ONLY)

CONTRACT NO:		
	NAME	DATE
DESIGN	G STAMM	12-11-74
GROUP	B HALDEN	1-15
DRAWN	MERRICK	10-31-74
CHECK	J YOUEL	12-6-74
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — BUS BAR, PRIMARY, ALTERNATOR & ELECTRONIC

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570101

SCALE: NONE (SR7905) (SR7904) PAGE: 4.3 O

Bus Bar. Primary. Alternator & Electronic (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL "A" (SR7904)	TMS 3-10-75	RF
B	BY REV: F WAS A+ & A+ WAS F (NOW SHOP PRACTICE)	RJP 10-8-75	RF
C	BY REV: DELETE NOTE 1, 0770719-2, ADD R172 (NOW SHOP PRACTICE) (SR8146)	2-25-76	RF

NOTES:

1. OBSERVE POLARITY SYMBOL ON DIODE WHEN INSTALLING ON SWITCH TO AVOID DIODE FAILURE
2. AMP TERM 42281-2 ON CONDUCTOR, AMP TERM 2-323931-2 ON SHIELD & GND WIRE

INACTIVE
EFF THRU SER (SR8453) (SR8454)
RS 12-16-76
RF

54-0916
53-0160

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
PB16	8	S-1562-8-9		S-1493-3	S-1367-4-12	
PB15	18S			S-1367-1-10 S-1367-2-10	2	
PB14	18S			S-1367-1-10 S-1367-2-10	2	
PB13	8S	S-1534-8-9		S-1945-2 S-1367-3-10	S-1367-4-10	
PB12	18		4	S-1367-1-8	S-1493-1	
PB11	16		4	S-1367-2-12	2	
PB10	8	S-1562-8-9	53	S-1493-3	S-1367-4-12	
PB9	18S		54	S-1367-1-10 S-1367-2-10	2	
PB8	18S		54	S-1367-1-10 S-1367-2-10	2	
PB7	18S		35	S-1493-1	S-1636-2 S-1636-2	
PB6	18S		3	S-1367-1-8 S-1367-1-8	2	
PB4	8S	S-1534-8-9		S-1945-2 S-1367-3-10	S-1367-4-10	
PB3	22		34	S-1635-1	42281-2	
PB1	22		6	S-1367-1-6	S-1635-1	

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
16	S-2135-1	LIGHT ASSY	
15	S-1360-5L	CIRCUIT BREAKER	
13	S-1596-60L	CIRCUIT BREAKER	
12	S-1637-2	HOUSING	
11	S-1637-1	HOUSING	
10	TVA-1315	CAPACITOR	
9	C593001-0101	OVERVOLTAGE SENSOR	
8	S-1994-1-1	SWITCH	
4	0770038-2	FILTER	
3	C611501-0102	ALTERNATOR ASSY	
2	C6AB-10A730A	HOUSING	
1	C611001-0201	REGULATOR	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: P 4.11.1
0500062 P 4.14.1

SUPERSEDED BY:
0510311 P 4.5.0

CONTRACT NO:

	NAME	DATE
DESIGN	G STAMM	12-11-74
GROUP	B HAKDEN	
DRAWN	MERRICK	10-31-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ		
APPD		
OTHER		

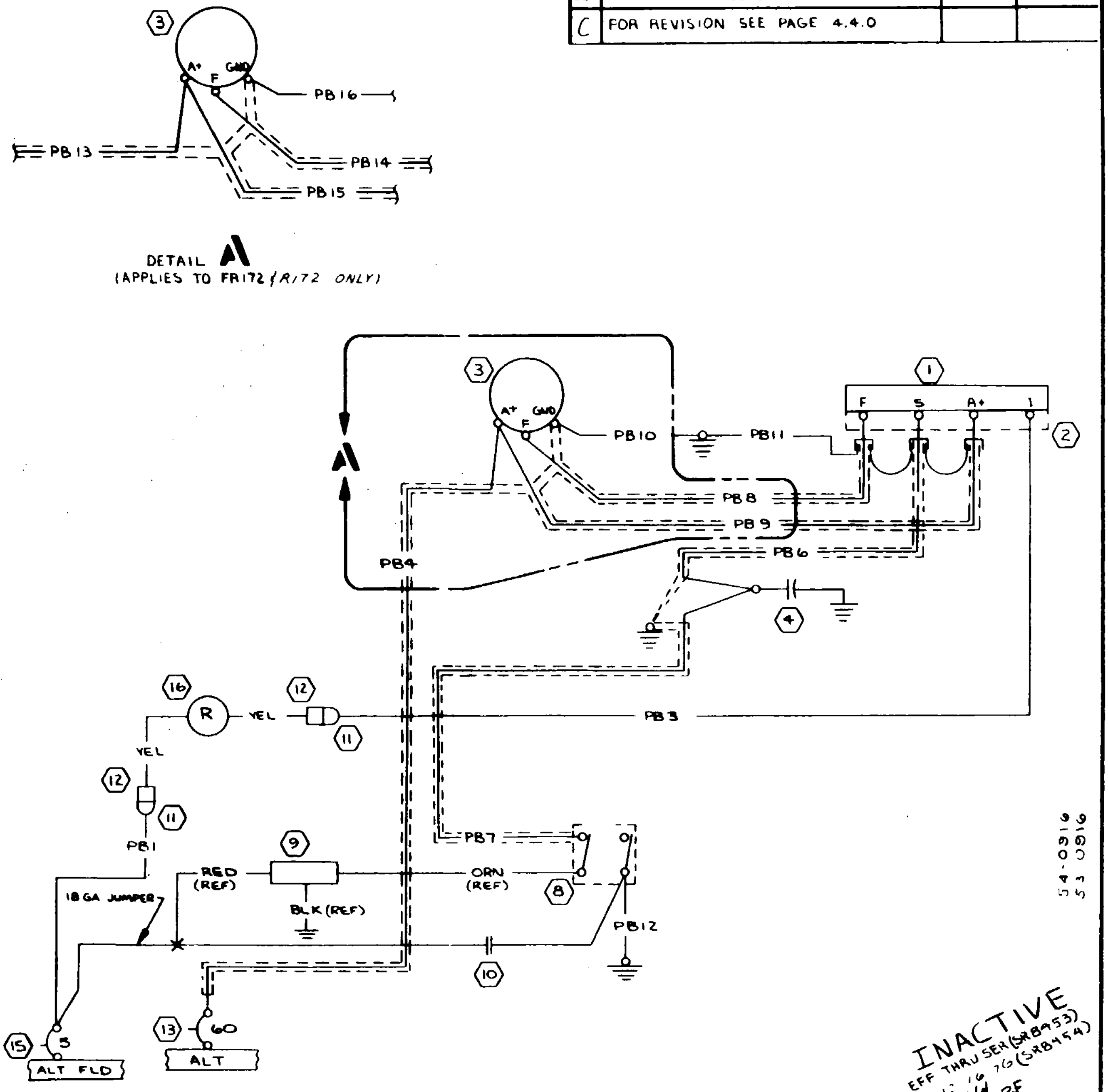
Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — ALTERNATOR SYSTEM, 60 AMP

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570101

SCALE: NONE (SR7904) PAGE: 4.4.0

REVISION			
LET	DESCRIPTION	DATE	APPD
C	FOR REVISION SEE PAGE 4.4.0		



INACTIVE
EFF THRU SER (SR8953) (SR8954)

CONTRACT NO.		
	NAME	DATE
DESIGN	G. STAMM	
GROUP		
DRAWN	MERRICK	10-31-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ		
APPD		
OTHER		

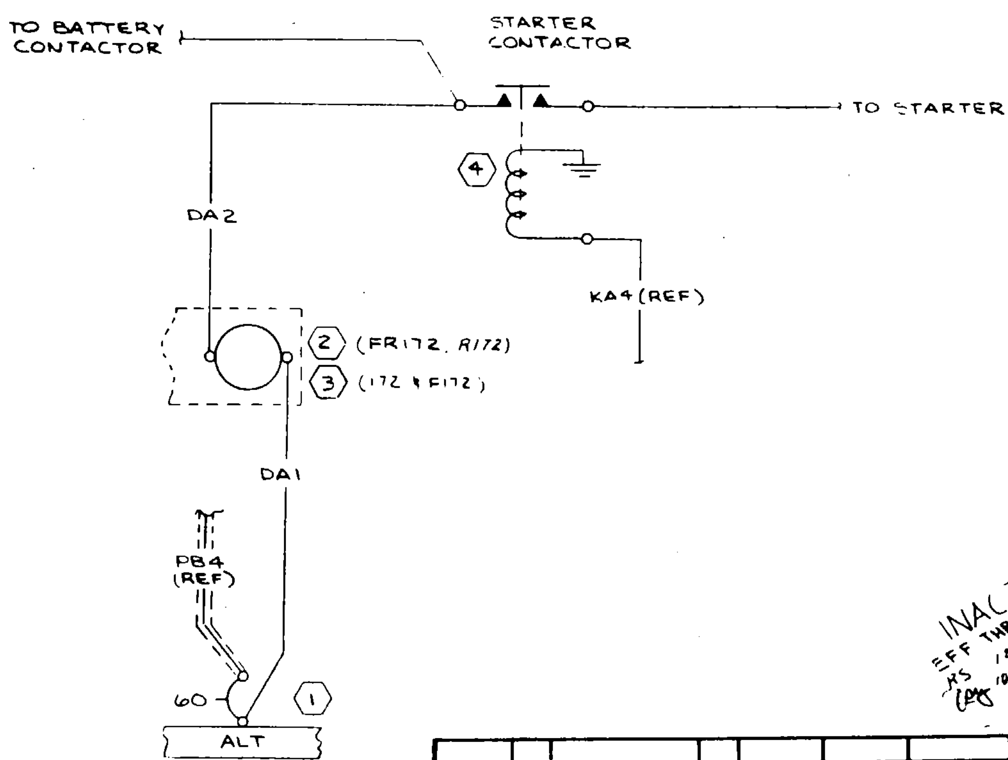
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM-ALTERNATOR SYSTEM, 60 AMP

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570101

SCALE NONE (SR1903)(SR1904) PAGE 4.4.1

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD R172 (SR 8146)	2-25-76	



INACTIVE
EFF THRU SER (SR8454)
12-16-76

54-0916
53-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
DA2	8		64	S-1367-4-10	S-1367-4-10	
DA1	8		15	S-1367-4-10	S-1367-4-10	

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
4	S-1991-1	CONTACTOR	
3	S-1320-5	INDICATOR	
2	C669514-0101	INST CLUSTER	
1	S-1596-60L	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: 0500062 P 4.15, P 4.16
SUPERSEDED BY: 0510311 P 4.6

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	12-11-74
GROUP		
DRAWN	MERRICK	10-31-74
CHECK	J. YOVEL	12-6-74
STRESS		
PROJ	P. FIFE	
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — AMMETER

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570101

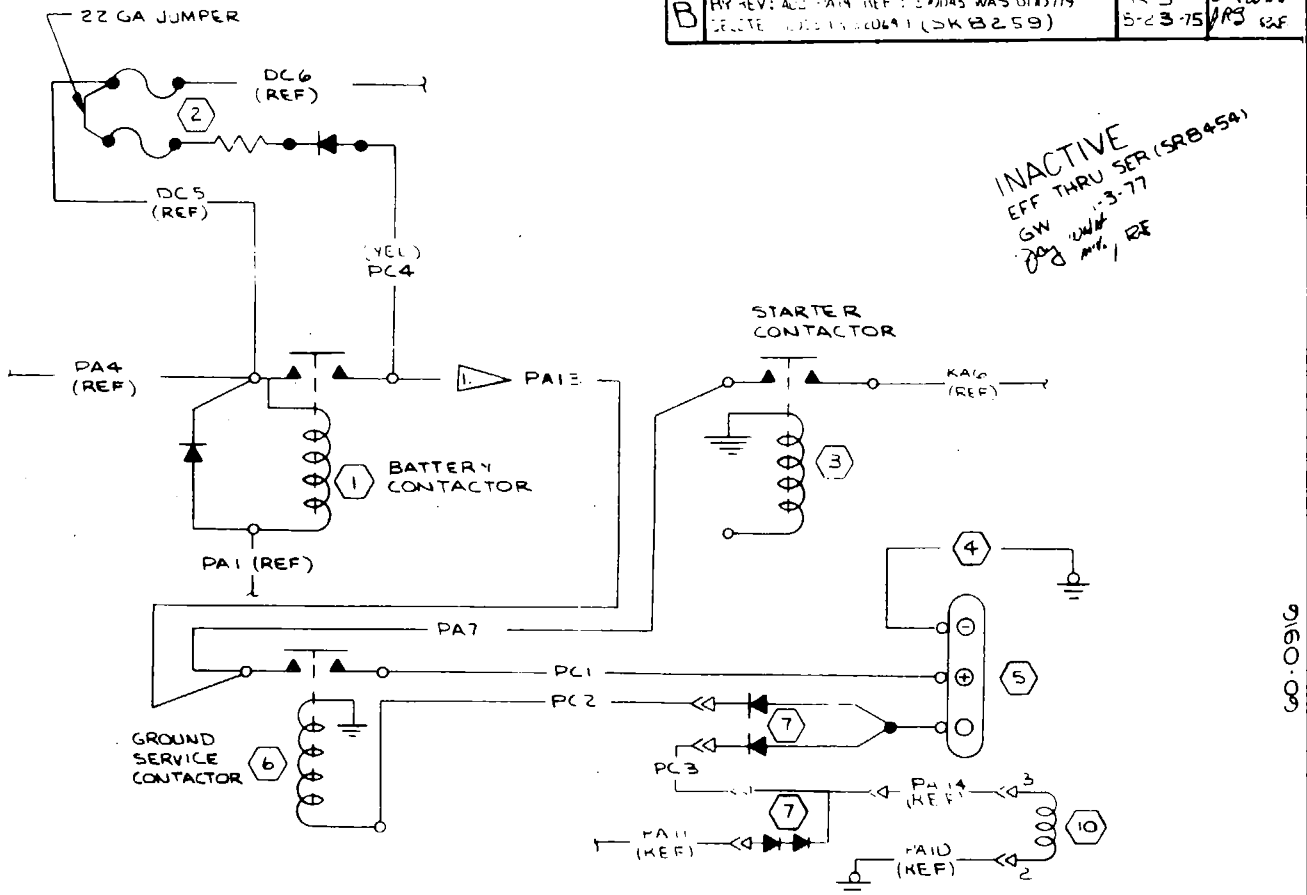
SCALE: NONE | (SR7903) (SR7904) | PAGE: 4.5.0

172, F172, FR172, R172

NOTES.

1. PA5 WIRE IS DELETED WHEN GROUND SERVICE RECEPTACLE IS NSTALLED (REF P 4.1.0)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV ADD NOTE . PA13 GA 4 WAS GA 2 (SR7904)	BLA -22-75	[illegible]
B	BY REV: ADD [illegible] WAS 0110719 DELETE [illegible] (SK8259)	RS 5-23-75	[illegible]



YEL PC4	18	-18-4	18	S-1367-1-13	SOLDER		
PC3	18		66	S-1493-1	S-1493-1		
PC2	18		12	S-1493-1	S-1367-1-10		
PC1	2		12	S-1367-7-14	S-1367-7-13		
PA13	4		158	S-1367-7-13	S-1367-7-13		
PA7	2		40	S-1367-7-13	S-1367-7-13		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
12	0770719	DIODE ASSY	
11			
10	S-1917-1	RELAY	
9			
8			
7	1570043	DIODE ASSY	
6	S-1660-1	CONTACTOR	
5	AN2552-3A	RECEPTACLE	
4	0312155	GROUND STRAP	
3	S-1991-1	CONTACTOR	
2	0712031	FUSE & DIODE ASSY	
1	S-1579-2	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: 0500062 P 4.4.3

SUPERSEDED BY: 0570311 PG 4.3

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	12-8-74
GROUP	B. ILLARDEN	1-2-15
DRAWN	MERRICK	10-29-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ	[illegible]	1-4-75
APPD	[illegible]	
OTHER		

Cessna. AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

TITLE
WIRING DIAGRAM — GROUND SERVICE RECEPTACLE (OPT)

SIZE: C | CODE IDENT. NO.: 71379 | DWG NO: 0570101

SCALE: NONE | (SR7904) | PAGE: 4.6.0

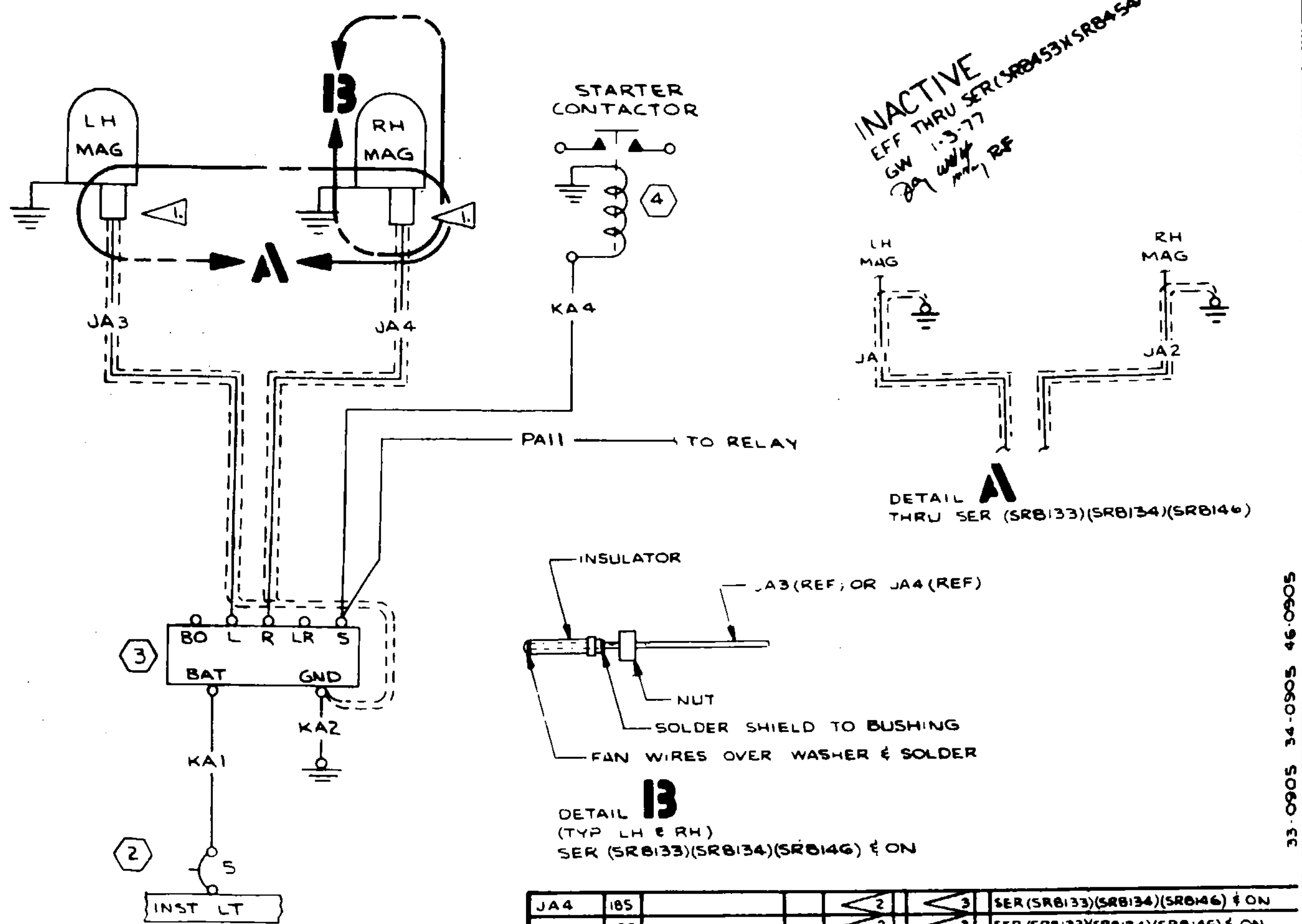
FR172

NOTES:

1. ADD S-1488-1 NIPPLES TO MAG END OF WIRES
2. S-1376-1-6 FOR CENTER CONDUCTOR
   S-1376-2-6 FOR SHIELDING
3. TERMINALS SUPPLIED WITH ENGINE

REVISION

LET	DESCRIPTION	DATE	APPD
A	BY REV. ADD JA3, JA4, DETAIL A & B & SER. SER OUT JA1 & JA2 ADD NOTE 2 & 3 (SRB133)(REF)(SRB134)(REF)(SRB146)(REF)	DLP 7-30-76	



33-0905 34-0905 46-0905

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS	
JA4	18S			2	3	SER (SRB133)(SRB134)(SRB146) & ON	
JA3	18S			2	3	SER (SRB133)(SRB134)(SRB146) & ON	
PA11	18		8	S-1367-1-6	S-1493-1		
JA2	18S		50	S-1367-1-6	S-1367-1-6 S-1367-2-6	THRU SER	(SRB133)(SRB134)(SRB146)
JA1	18S		45	S-1367-1-6	S-1367-1-6 S-1367-2-6	THRU SER	(SRB133)(SRB134)(SRB146)
KA4	18		52	S-1367-1-6	S-1367-1-10		
KA2	18		8	S-1367-1-6	S-1367-1-8		
KA1	22		16	S-1367-1-6	S-1367-1-6		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
4	S-1991-1	CONTACTOR	
3	C292501-0105	IGNITION SWITCH	
2	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: 0500062 P 5.1.1

SUPERSEDED BY: 0570311 PG 5.1

CONTRACT NO:

	NAME	DATE
DESIGN	G STAMM	12/11/74
GROUP	B HARLAN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J. TOUEL	12-6-74
STRESS		
PROJ	R FIFE	
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — MAGNETO SYSTEM

SIZE: C | CODE IDENT. NO. 71379 | DWG NO 0570101

SCALE: NONE | (SR7903)(SR7904) | PAGE: 5.1.0

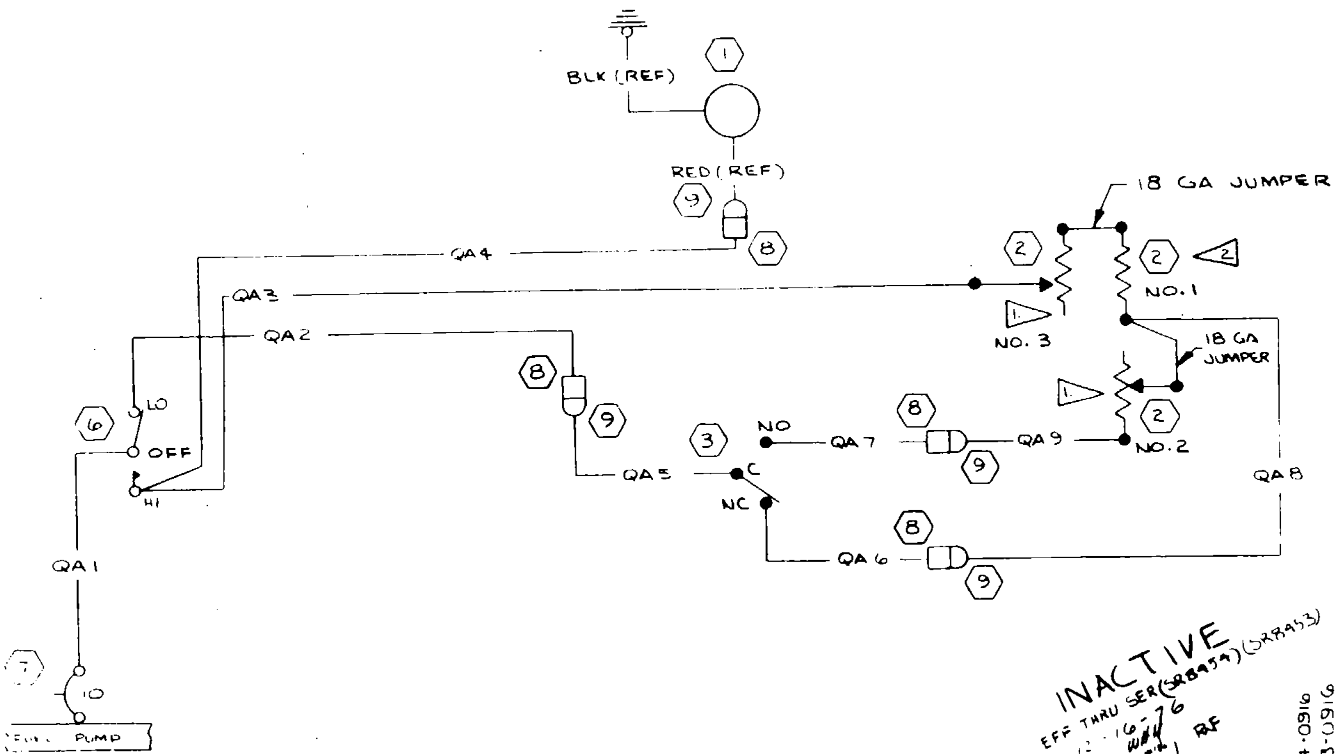
172, F172, FR172
17263683 F17201385, FR17200366 & 562

NOTES:

1. ENGINE NOT RUNNING. ASSURE THAT THROTTLE OPERATED SWITCH IS RIGGED PER 1550005 WITH 14.25 ± .25 VDC. EXTERNAL POWER APPLIED. THROTTLE IN OPEN POSITION, MIXTURE CONTROL IN FULL RICH POSITION. TURN MASTER SWITCH ON. PLACE AUXILIARY FUEL PUMP SWITCH IN LOW POSITION. ADJUST NO. 3 RESISTOR FOR 6 TO 6.5 GAL/HR FUEL FLOW. WITH THROTTLE SET AT POSITION WHICH REPRESENTS 18 INCHES OF MANIFOLD PRESSURE AND WITH THE THROTTLE ACTUATED SWITCH IN THE "N.O." POSITION, ADJUST NO. 2 RESISTOR FOR 2 GAL/HR FUEL FLOW

2. REMOVE WIPER FROM THIS RESISTOR

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV. C29 504-0101 WAS 4140-001 (SR7904)	BLA 22-75	
3	BY REV. REWRITE NOTE 1. RELOCATE QA4 QA3 & QA2 AT SWITCH	BAH 2-7-75	MTM



INACTIVE
EFF THRU SER (SR8454) (SR8453)

54-0916
53-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
QA9	18		30	S-1636-1	SOLDER		
QA8	↑		30	S-1636-1	SOLDER		
QA7			16	S-1635-1	SOLDER		
QA6			16	S-1635-1	SOLDER		
QA5			16	S-1636-1	SOLDER		
QA4			46	S-1367-1-6	S-1635-1		
QA3			45	S-1367-1-6	SOLDER		
QA2	↓		47	S-1367-1-6	S-1635-1		
QA1	18		10	S-1367-1-6	S-1367-1-6		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
9	S-1637-1	HOUSING	
8	S-1637-2	HOUSING	
7	S-1360-10L	CIRCUIT BREAKER	
6	MS35058-31	SWITCH	
3	S-1856-1	SWITCH	
2	AMOR20-1.5	RESISTOR	
1	C291504-0101	FUEL PUMP	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 P 7.2.2

SUPERSEDED BY: 0570311 P 7.1.0

CONTRACT NO:

	NAME	DATE
DESIGN	G STAMM	12/1/74
GROUP	B HAKDEN	1-2-75
DRAWN	MERRICK	10-3-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ	C FIFE	9-75
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — FUEL PUMP

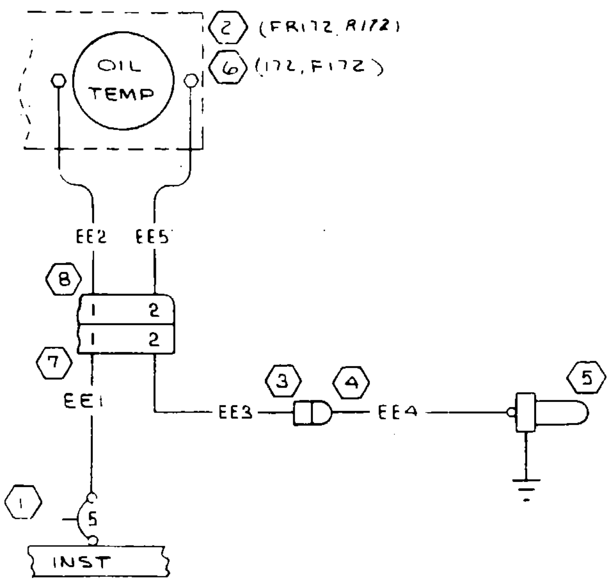
SIZE: C | CODE IDENT. NO.: 71379 | DWG NO: 0570101

SCALE: NONE | (SR7904) | PAGE: 7.1.0

FR172

REVISION

LET	DESCRIPTION	DATE	APPD
A	BY REV: C669512-0102 WAS C669511-0102; (SR7904)	BLA 1-22-75	
B	BY REV: DELETE EE2 (SR7903)(REF)(SR7904)(REF)	RJP 6-6-75	RF
C	BY REV: ADD EE2, EE5, S-1640-9 & S-1641-9; S-1636-1 WAS SOLDER/EE1 & EE3, S-1360-5L WAS S-1360-10L, S-1367-1-10 WAS SOLDER/EE5 & EE1, C669512-0103 WAS C669512-0101 (NOW SHOP PRACTICE)	RJP 10-8-75	RF
D	BY REV: ADD R172 (SR8146)	JJB 2-25-76	RF



INACIVE
EFF THRU SER (SR8453)(SR8454)
RS
RF

54-0916
53-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
EE5	20			S-1635-1	S-1367-1-10		
EE4	20			S-1635-1	S-1367-1-10		
EE3	20			S-1636-1	S-1636-1		
EE2	20			S-1635-1	S-1367-1-10		
EE1	20			S-1636-1	S-1367-1-8		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
8	S-1640-9	CONNECTOR
7	S-1641-9	CONNECTOR
6	C669512-0103	INST CLUSTER
5	S-1630-1	SENDING UNIT
4	S-1637-1	HOUSING
3	S-1637-2	HOUSING
2	C669512-0102	INST CLUSTER
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: 0570311 P 7.2.0

CONTRACT NO:

	NAME	DATE
DESIGN	G STAMM	1-2-75
GROUP	B HARDEN	-2-75
DRAWN	MERRICK	10-31-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ		
APPD		
OTHER		

COMMERCIAL AIRCRAFT DIV.
Cessna AIRCRAFT CO.
5800 E. PAWNEE
WICHITA, KANSAS

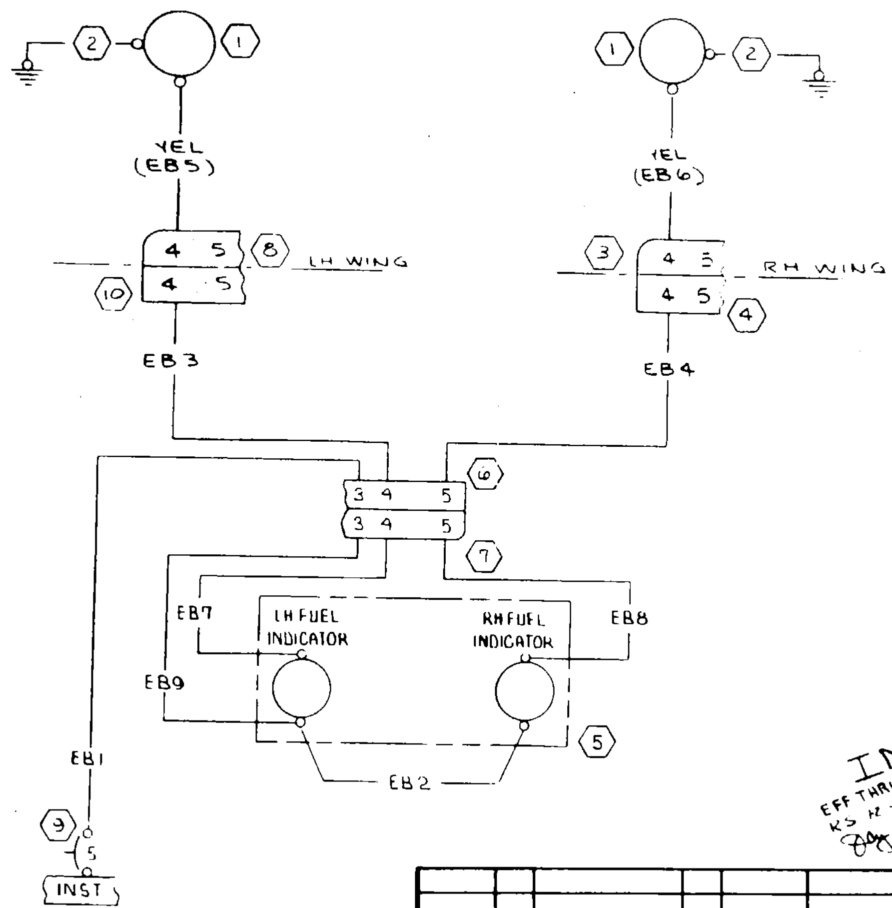
TITLE
WIRING DIAGRAM — OIL TEMPERATURE

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570101

SCALE: NONE | (SR7903)(SR7904) | PAGE: 7.2.0

172-56?5, F17201385, FR17200?60; 5?2

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD EB7, EB8, EB9, S-1640-9 & S-1691-9; S-1690-6 WAS S-1640-1, S-1636-1 WAS S-1367-1-10/EB1. S-1636-1 WAS S-1367-1-10/EB3&S-1636-1 WAS S-1367-1-10/EB4 (NOW SHOP PRACTICE)	RJF 10-8-75	JRS ZF



INACTIVE
EFF THRU SER (SR8453) (SR8459)
KS 12-16-76
10 Nov 76 ZF

54 0916
53 0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
EB9	22			S-1635-1	S-1367-1-10		
EB8	22			S-1367-1-10	S-1635-1		
EB7	22			S-1367-1-10	S-1635-1		
YEL EB6	22	-18-4	58	S-1635-1	S-1367-1-10		
YEL EB5		-18-4	38	S-1635-1	S-1367-1-10		
EB4			82	S-1636-1	S-1636-1		
EB3			45	S-1636-1	S-1636-1		
EB2			3	S-1367-1-10	S-1367-1-10		
EB1	22		16	S-1367-1-6	S-1636-1		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
10	S-1641-6	HOUSING	
9	S-1360-5L	CIRCUIT BREAKER	
8	S-1640-6	HOUSING	
7	S-1690-9	CONNECTOR	
6	S-1691-9	CONNECTOR	
5	C669511-0102	INST CLUSTER	
4	S-1641-6	HOUSING	
3	S-1640-6	HOUSING	
2	0413247	STRAP - GND	
1	0523557-1	XMTR - FUEL GAGE	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 P 8.1.2, P 8.1.3
SUPERSEDED BY: 0570511 P 8.1.0

CONTRACT NO:

	NAME	DATE
DESIGN	G STAMM	12-1-74
GROUP	B HARDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ		4-75
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — FUEL GAGE & TRANSMITTER

SIZE: C | CODE IDENT. NO. 71379 | DWG NO 0570101

SCALE: NONE | (SR7503) (SR7504) | PAGE: 8.1.0

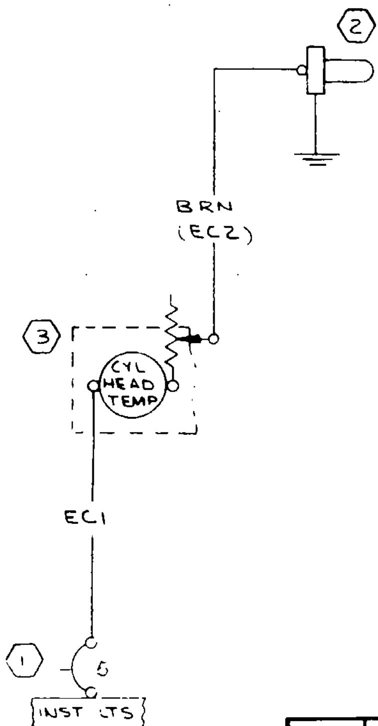
172, F172, FR172
172 & SERS. F172 01785, FR17200156 & ON

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV S1360-5L WAS S1360-10L. HT1921 IN NOTE 1 WAS HT1719 (SR7304)/REF)	JMS 10-8-75	JRG RF
B	BY REV: ADD NOTE (NOW SHOP PRACTICE)	-30-76	JRG RF

NOTES:

1. CRIMP S-1636-5 TERMINAL AROUND WIRE INSULATION, BEND 25 OF STRIPPED WIRE BACK OVER CRIMP & SOLDER PER CES 1040. USE MOLEX HT-1921 CRIMPING TOOL ONLY

2. MATERIAL IS ALPHA 5857-7 (VENDOR CODE 92194) OR BELDEN 83009-1 (VENDOR CODE 70903)



INACTIVE EFF THRU SER (SR8453)(SR8454) RS 12-16-76 RF

54-0916
53-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BRN EC2	18	2		S-1367-1-8	S-1636-5	1	
EC1	18			S-1367-1-8	S-1367-1-8		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
3	C669514-0101	INST CLUSTER
2	S-1372-2	TEMP BULB
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: 0500062 P 8.4

SUPERSEDED BY: 0570311 P 8.3.0

CONTRACT NO:

	NAME	DATE
DESIGN	G STAMM	1-2-75
GROUP	B HARDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ		1-4-75
APPD	JRG	
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — CYLINDER HEAD TEMP

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570101

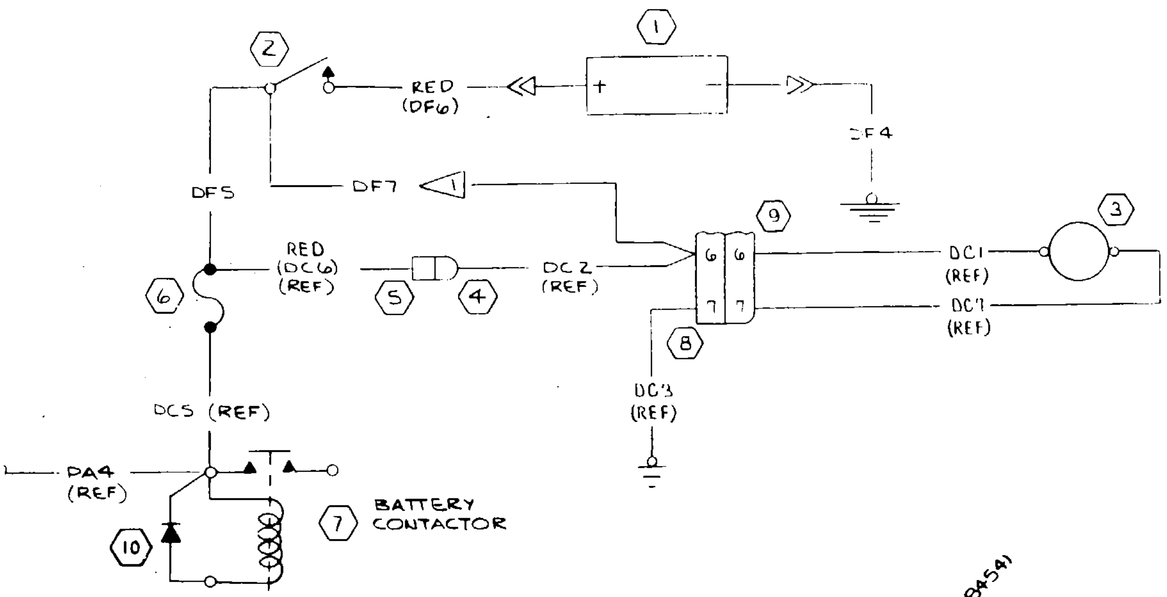
SCALE: NONE | (SR7304) | PAGE: 8.3.0

FR172

REVISION			
LET	DESCRIPTION	DATE	APPD
A	ADD S-1640-9, S-1641-9, DC1(REF) & DC7(REF); S-1636-2 WAS S-1367-1-6 / DF 7; ADD 0770728-1 (NOW SHOP PRACTICE)		
B	BY REV. RED (DF6) WAS DF6 (SR8656)	PH 9 21 76	

NOTES

1. WHEN OPTIONAL CLOCK IS INSTALLED, DF5 WIRE IS OMITTED & DF7 WIRE IS USED



INACTIVE EFF THRU SER (SR8454) 1-3-77 GW

04-231-0905

DF7	22			S-13671-6	S-1636-2		
RED (DF6)	22	22-2		S-1493-1	S-1367-1-8		
DF5	22			S-1367-1-6	SOLDER		
DF4	22		32	S-1493-1	S-1367-1-6		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
10	0770728-1	DIODE ASSY	
9	S-1640-9	CONNECTOR	
8	S-1641-9	CONNECTOR	
7	S-1579-2	CONTACTOR	
6	S-1091-1	FUSE	
5	S-1637-2	HOUSING	
4	S-1637-1	HOUSING	
3	S-1317NZ	CLOCK	
2	S-1711-1	SWITCH-OIL PRESS	
1	C664502-0101	HOURMETER	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 Pg. 8.3

SUPERSEDED BY: 0570311 PG 8.20

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	12-11-74
GROUP	B HAKDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J YOUEL	12-6-74
STRESS		
PROJ		75
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — HOURMETER (OPT)

SIZE: C | CODE IDENT. NO. 71379 | DWG NO 0570101

SCALE: NONE | (SR7904) | PAGE: 8.4.0

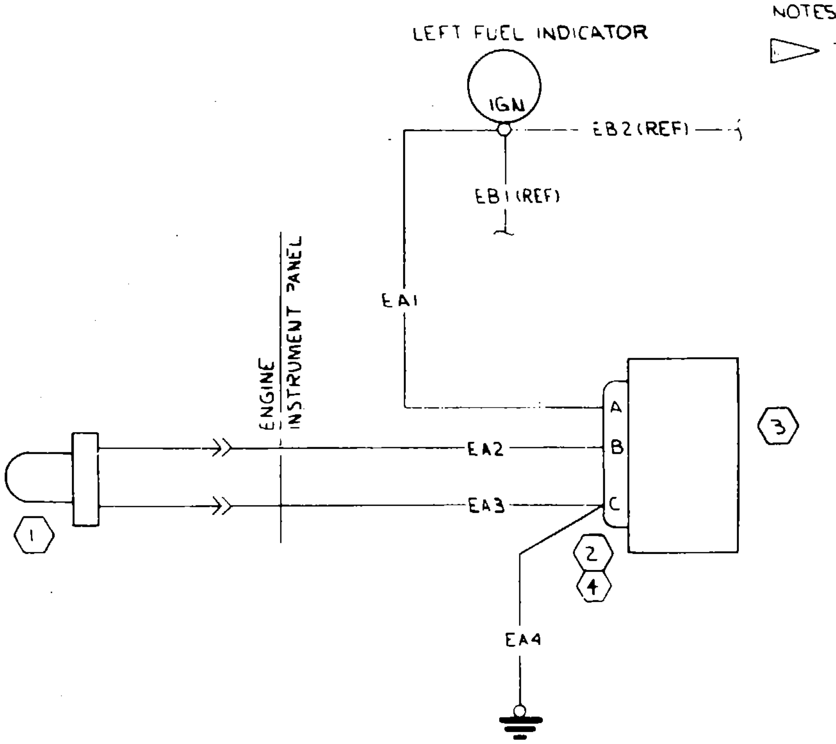
FR172

MODEL APPLICATION		
MODEL	BEGIN	END
172	SR7903	
FR172	SR7904	

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD EA4 TO S-1311-3 (SR7903)(REF)(SR7904)(REF)	JMS 10-13-75	
B	BY REV: ADD MS3057-6A CLAMP (NOW SHOP PRACTICE)	LSS 2-21-77	

NOTES:

[1] TERMINALS ARE YZ14-H AND FURNISHED BY VENDOR (09922)



INACTIVE
EFF THRU SER (SR8453)(SR8454)
RS 12-16-76

54-0916
53-0916

EA4	18			SOLDER	S-1367-1-8	
EA3	18			SOLDER	[1]	
EA2	18			SOLDER	[1]	
EA1	18			SOLDER	S-1367-1-10	
WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS		SERIALS

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
4	MS3057-6A	CLAMP
3	S-1311-3	INDICATOR
2	MS3106A-14S-7S	PLUG
1	0550209-1	PROBE-CARB AIR TEMP

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 PG 8.2

SUPERSEDED BY: 0570311 P 8.4.0

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	8-4-75
GROUP		8-23-75
DRAWN	WHITSON	7-31-75
CHECK	YOUEL	7-31-75
STRESS		
PROJ		8-25-75
APPD		
OTHER		

Cessna. AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

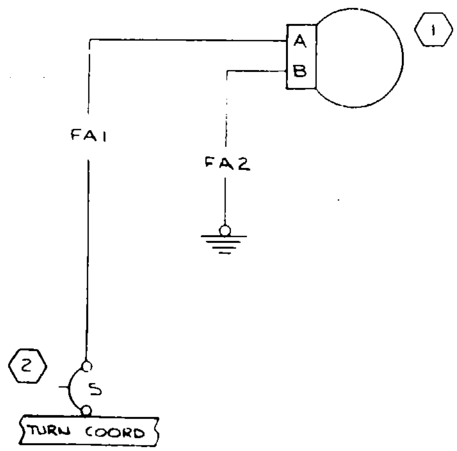
TITLE
WIRING DIAGRAM — CARBURETOR AIR TEMPERATURE GAUGE

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570101

SCALE: NONE   PAGE: 8.5

(SR7903)(REF)(SR7904)(REF)

REVISION			
LET	DESCRIPTION	DATE	APPD



INACTIVE
EFF THRU SER (SR8453X)(SR8454)
12-16-76
59.0916
53.0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
FA2	18		12	S-1367-1-8	SOLDER		
FA1	22		10	S-1367-1-6	SOLDER		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
2	S-1360-5L	CIRCUIT BREAKER	
1	C661003-0501	TURN COORDINATOR	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 P 9.3

SUPERSEDED BY: 0570311 P 9.1.0

CONTRACT NO:

	NAME	DATE
DESIGN	G STAMM	10-11-74
GROUP	D HARDEL	1-2-75
DRAWN	MERRICK	10-9-74
CHECK	J. YOUGL	12-6-74
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

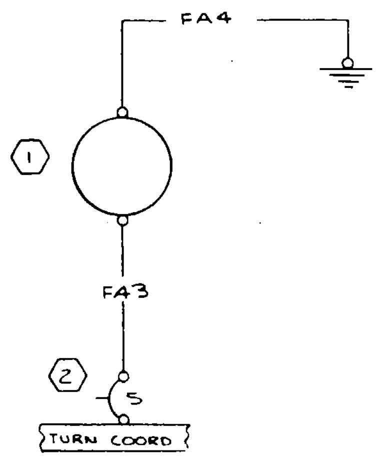
TITLE **WIRING DIAGRAM — TURN COORDINATOR**

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570101

SCALE: NONE (SR7903) (SR7904) PAGE: 9.1.0

172, F172, FR172
17265685, F1720085, FR17200360

REVISION			
LET	DESCRIPTION	DATE	APPD



INACTIVE
EFF THRU SER (SR8453) (SR8454)
RS 12-16-76

53-0916
59-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
FA4	18		12	S-1367-1-8	S-1367-1-8		
FA3	22		10	S-1367-1-6	S-1367-1-8		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
2	S-1360-5L	CIRCUIT BREAKER	
1	S-1413-2	TURN & BANK IND	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 P 9.4

SUPERSEDED BY: 0570311 P 9.1.0

CONTRACT NO:

	NAME	DATE
DESIGN	G STAMM	12-11-74
GROUP	B HARDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	SYDDEL	12-6-74
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

TITLE **WIRING DIAGRAM — TURN & BANK INDICATOR (OPT)**

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570101

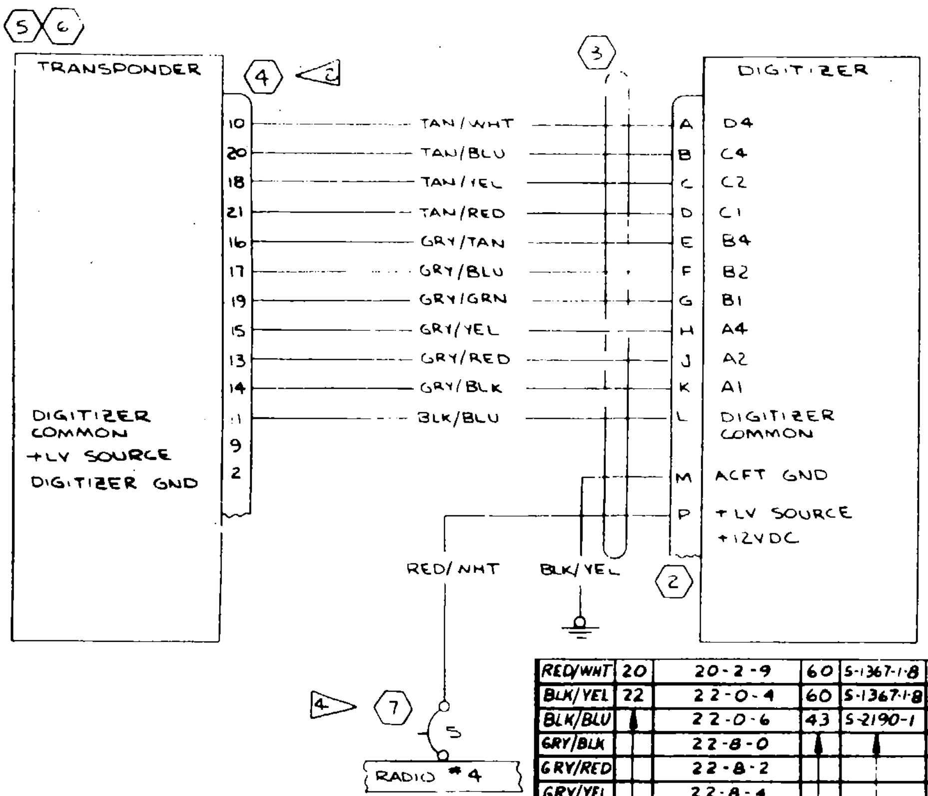
SCALE: NONE | (SR7503) (SR7504) | PAGE: 9.2.0

172 F172 FR172
17265685, F17201385, FR17200360 & SC2

NOTES:

1. ~~FOR WIRE & WIRE TERMINALS REFER TO 1270625 PAGE 9.1~~
2. TRANSPONDER CONNECTOR HOUSING IS PART OF TRANSPONDER CABLE ASSY
3. FOR WIRING DIAGRAM OF 300 & 400 TRANSPONDER REFER TO 3920143
4. ATTACH BOTH TRANSPONDER AND ENCODING ALTIMETER TO THE NO. 4 CIRCUIT BREAKER
5. PINS ARE CRIMP TYPE & ARE FURNISHED BY VENDOR WITH CONNECTOR

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD FR172 REQUIREMENTS (SR7904)	TMS 1-27-75	
B	BY REV: ADD RT-459A (SR8335)	JLP 2-5-75	RF
C	BY REV: ADD WIRE TABLE & NOTE 5; 1570312 WAS 1570312-3; DELETE NOTE 1 (SR7692)(REF)	GDS 6-18-76	RS RF



INACTIVE EFF THRU SER (SR8453)(SR8454) SER 7269309, F17201639 R1722824E FR17200620 GW 1-3-77

04-231-0905
03-231-0905

RED/WHT	20	20-2-9	60	S-1367-1-8	5	
BLK/YEL	22	22-0-4	60	S-1367-1-8		
BLK/BLU		22-0-6	43	S-2190-1		
GRY/BLK		22-8-0				
GRY/RED		22-8-2				
GRY/YEL		22-8-4				
GRY/GRN		22-8-5				
GRY/BLU		22-8-6				
GRY/TAN		22-8-10				
TAN/YEL		22-10-4				
TAN/RED		22-10-2				
TAN/BLU		22-10-6				
TAN/WHT	22	22-10-9	43	S-2190-1	5	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
7	S-1360-5L	CIRCUIT BREAKER
6	RT-459A	TRANSPONDER
5	RT-359A	TRANSPONDER
4	S-2189-1	CONNECTOR
3	1570312	CABLE ASSY
2	42816	CONNECTOR
1	EA-401A	ALT DIGITIZER

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 P 9.6

SUPERSEDED BY:

CONTRACT NO.

	NAME	DATE
DESIGN	G STAMM	11-8-74
GROUP	BILLARDEAU	
DRAWN	MERRICK	10-31-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — ENCODING ALTIMETER (OPT)

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570101

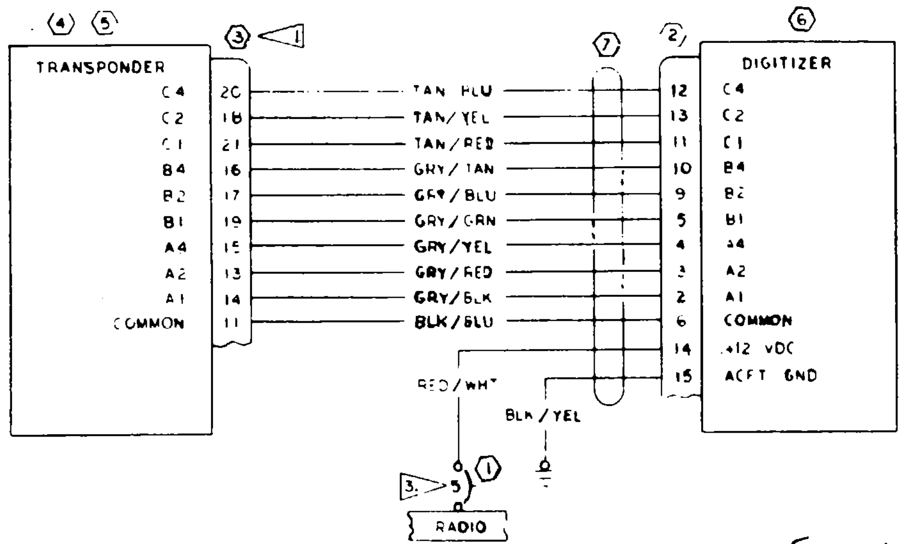
SCALE: NONE | (SR7903)(SR7904) | PAGE: 9.3.0

172, FR172

REVISION			
LET	DESCRIPTION	DATE	APPD

NOTES:

1. TRANSPONDER CONNECTOR HOUSING IS PART OF TRANSPONDER CABLE ASSY
2. FOR WIRING DIAGRAM OF 300 & 400 TRANSPONDER REFER TO 3920166
3. ATTACH BOTH TRANSPONDER AND ENCODING ALTIMETER TO THE NO. 4 CIRCUIT BREAKER



INACTIVE
EFF THRU SER (SR8453)(SR8454)
SER 17261309, R1722824, F17201639, R1722824, & FR17200620
KS 12-16-76

TAN/BLU	22	22-10-6		S-2190-1	SOLDER		
TAN/YEL		22-10-4					
TAN/RED		22-10-2					
GRY/TAN		22-8-10					
GRY/BLU		22-6-6					
GRY/GRN		22-8-5					
GRY/YEL		22 8-4					
GRY/RED		22-8-2					
GRY/BLK		22-8-0					
BLK/BLU		22-0-6		S-2190-1			
BLK/YEL		22 0-4		S 1367-1-8			
RED/WHT	22	22-2-9		S-1367-1-6	SOLDER		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION	
7	0470404	CABLE ASSY	
6	C744001-0101	ALT DIGITIZER	
5	RT-459A	TRANSPONDER	
4	RT-359A	TRANSPONDER	
3	S-2169-1	CONNECTOR	
2	DA-155	CONNECTOR	
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: 3920221

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	4-23-76
GROUP	W.H. Hudson	5-5-76
DRAWN	R. KLEIN	4-22-76
CHECK	Youel	4-22-76
STRESS		
PROJ		5-6-76
APPD		5-5-76
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

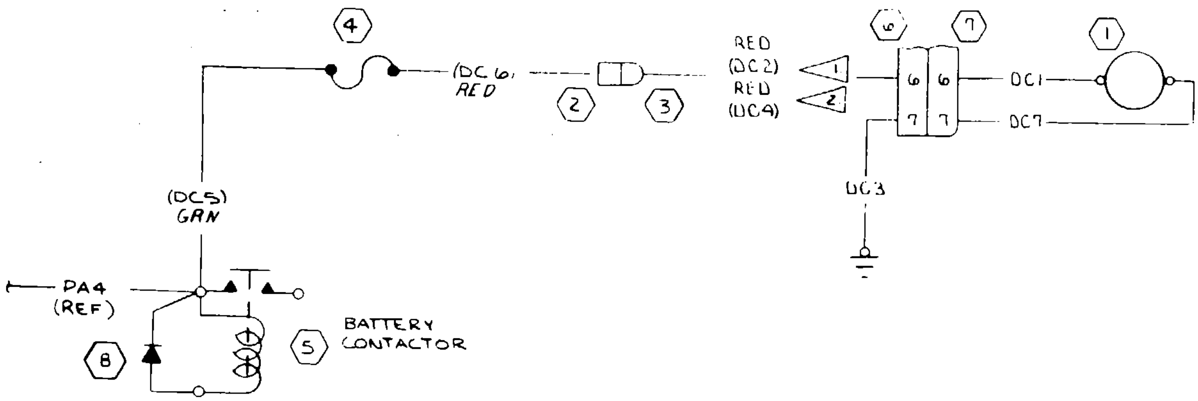
TITLE **WIRING DIAGRAM — BLIND ENCODER 172, F172, R172, FR172**

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570101
SCALE: NONE	SER (SR 8490)	PAGE: 9.4

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DC1, DC7, S-1640-9, S-1641-9, S-1636-2 WAS S-1367-1-8/DC2 & DC4, S-1636-1 WAS S-1367-1-8/DC3, C664508-0101 WAS S-1317N2; ADD 0770128-1 (NOW SHOP PRACTICE)	RJP 10-8-75	JCY JRS RF
B	BY REV: ADD R172 (SRB146)	2-25-76	JCY RF JRS

NOTES:

1. APPLIES TO FR172 & R172 ONLY
2. APPLIES TO 172 & F172 ONLY



INACTIVE
EFF THRU SER (SRB453)(SRB454) 2-16-76
RF

RED (DC6)	22	-22-2		SOLDER	S-1636-1		
GRN (DC5)	22	-22-4	10	S-1367-1-10	SOLDER		
RED (DC4)	22	-22-2	76	S-1635-1	S-1636-2		
DC3	22		18	S-1636-1	S-1367-1-6		
DC7	22			S-1367-1-8	S-1635-1		
RED (DC2)	22	-22-2	150	S-1635-1	S-1636-2		
DC1	22			S-1635-1	S-1367-1-8		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
8	0770128-1	DIODE ASSY	
7	S-1640-9	CONNECTOR	
6	S-1641-9	CONNECTOR	
5	S-1579-2	CONTACTOR	
4	S-1631-1	FUSE	
3	S-1637-1	HOUSING	
2	S-1637-2	HOUSING	
1	C664508-0101	CLOCK	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 P 10.2

SUPERSEDED BY: 0510311 P 101.0

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	12-11-74
GROUP	E. HAWDEN	1-2-75
DRAWN	MERRICK	10-3-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ		
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

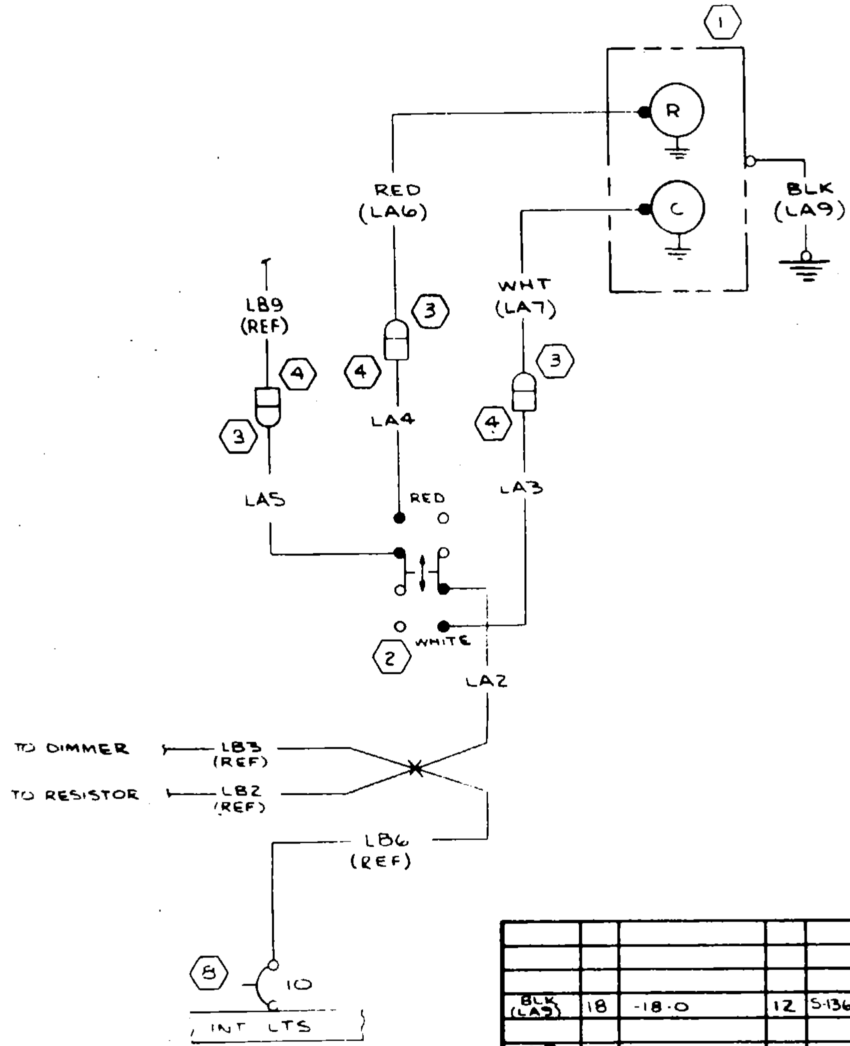
TITLE: **WIRING DIAGRAM — CLOCK (OPT)**

SIZE: C | CODE IDENT. NO.: 71379 | DWG NO: 0570101

SCALE: NONE | (SRB453) (SRB454) | PAGE: 10.1.0

172, F172, FR172, R172

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: DELETE: S-1640-6, S-1641-6, LA8, & LB11(REF); ADD LB9(REF) (NOW SHOP PRACTICE)	RJP 10-8-75	



INACTIVE
EFF THRU SER (SRB453)(SRB454)
RS 12-16-76
RF

54-0916
53-0916

BLK (LA9)	18	-18-0	12	S-1367-1-10	S-1367-1-8	
WHT (LA7)	18	-18-9	10	S-1635-2	SOLDER	
RED (LA6)	↑	-18-2	10	S-1635-2	SOLDER	
LA5			8	SOLDER	S-1635-1	
LA4			6	SOLDER	S-1636-1	
LA3	↓		7	SOLDER	S-1636-1	
LA2	18		7	SOLDER	SEE LB6	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS

WIRE TABLE

8	S-1360-10L	CIRCUIT BREAKER	
4	S-1637-2	HOUSING	
3	S-1637-1	HOUSING	
2	S-1501-1	SWITCH	
1	1470089-14	LIGHT ASSY	
ITEM NO.	PART NO.	DESCRIPTION	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 P11.1.3

SUPERSEDED BY: 0570311 P 11.10

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	12/74
GROUP	B. [illegible]	1-2-75
DRAWN	MERRICK	10-3-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ		
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM— MAP & AUXILLARY INSTRUMENT LIGHT (OPT)

SIZE C | CODE IDENT NO. 71379 | DWG NO 0570101

SCALE: NONE | (SR1505) (SR1504) | PAGE: 11.1.0

172, F172, FR172
17265685 F17201385 FR17200056 OF 562

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: 34003-55-3410 WAS 34003-55 DELETE 18 GA JUMPER (SR7903)(SR7904)	TMS 2-27-75	RF
B	BY REV: ADD S-1640-9, S-1641-9 & LB25; LB1 WAS LB14, LB7 WAS LB13, S-1636-1 WAS S-1370-3/LB8, S-1635-2 WAS S-1636-2/LB10, S-1635-1 WAS S-1636-1/LB10, BLU (REF) WAS BRN (REF) TAN (REF) WAS WHT (REF) DELETE LB11; ADD LAS (REF) (NOW SHOP PRACTICE)	RJP 10-8-75	JRG RF
C	BY REV: MS 15584-2 WAS 0511481, C60501-0101 WAS 0713068 ADD R172 DELETE C669513-0101 (SR8133)(SR8134)(SR8146)	2-25-76	JRG RF

NOTES:

1. THESE WIRES VENDOR FURNISHED
2. OPTIONAL WITH POST LIGHTS INSTL

INACTIVE
EFF THRU SER (SR8953)(SR8954)
RS 12-16-76
RF

54-0916
53-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
LB7	20		20	S-1635-1	S-1367-1-10		
LB12	18		4	SOLDER	S-1367-1-10		
LB10	20		76	S-1635-2	S-1635-1		
LB9	20		25	S-1636-1	SEE LB10		
LB8	18			S-1636-1	S-1829-1		
LB25	18			S-1370-3	S-1635-1		
LB1	18			S-1635-1	S-1829-1		
LB5	18		15	SOLDER	S-1636-1		
LB4	18		15	SOLDER	S-1635-1		
LB3	18		5	S-1635-1	SEE LB6		
LB2	18		13	SOLDER	SEE LB6		
LB6	18		5	S-1367-1-6	S-1370-2		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
20	S-1641-9	CONNECTOR	
19	S-1640-9	CONNECTOR	
18	C669514-0101	INST CLUSTER	
16	C669512-0103	INST CLUSTER	
15	1270479-12	LIGHT ASSY	
14	C669512-0102	INST CLUSTER	
13	C669511-0102	INST CLUSTER	
12	MS 15584-2	LAMP	
11	C660501-0101	COMPASS ASSY	
10	S-1640-6	HOUSING	
9	S-1641-6	HOUSING	
8	1570166-1	DIMMING ASSY	
7	S-1637-1	HOUSING	
6	S-1637-2	HOUSING	
5	1270479-10	LIGHT ASSY	
4	S2000B270J	RESISTOR	
3	S-2091-5	RESISTOR ASSY	
2	34003-55-3410	TERMINAL BOARD	
1	S-1360-10L	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: 0500062 P 11.2.4

SUPERSEDED BY: 0570311 P 11.10

CONTRACT NO:

	NAME	DATE
DESIGN	G STAMM	1-2-75
GROUP	B HAYDEN	1-3-75
DRAWN	MERRICK	10-31-74
CHECK	J YOUEL	12-6-74
STRESS		
PROJ	R FIFE	4-75
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

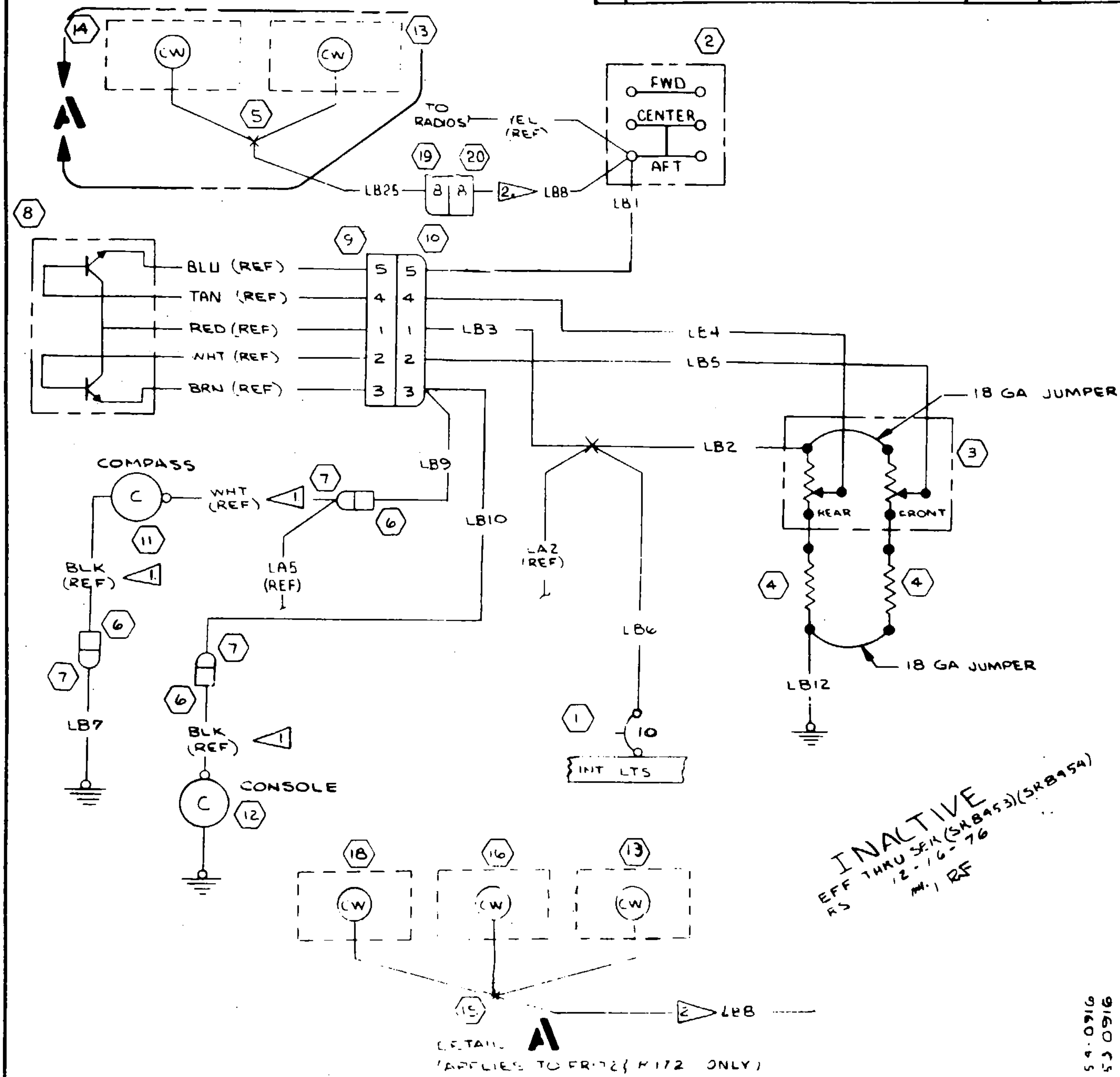
TITLE: WIRING DIAGRAM — COMPASS & INSTRUMENT LIGHTS

SIZE: C | CODE IDENT. NO.: 71379 | DWG NO: 0570101

SCALE: NONE | (SR7903) (SR7904) | PAGE: 11.2.0

172, F172, FR172, R172
17265685, F17201385, FR17200560 & 562

REVISION			
LET	DESCRIPTION	DATE	APPD
C	FOR REVISION SEE PAGE 11.2.0		



CONTRACT NO		
	NAME	DATE
DESIGN	G. STAMM	1-3-75
GROUP	B. HARDEN	1-3-75
DRAWN	MERRICK	10-31-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ	R. FIFE	1-4-75
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM– COMPASS & INSTRUMENT LIGHTS

SIZE	CODE IDENT NO	DWG NO
C	71379	0570101

SCALE: NONE (SR7303) (SR7304) PAGE: 11.2.1

172, F172, FR172, R172
17265685, F17201385, FR17200060 & SC2

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: DELETE S-1641-6, S-1640-6 & LB11(REF); ADD BLK/LB21 & 23, RED/YEL/LB22 & LB24; 0513454 WAS 0511481 & 1213379 WAS 1213379-9 (NOW SHOP PRACTICE)	RJP 10-8-75	JRB RF

NOTES:

1. SEE PG. 11.2.0 & PG 11.2.1 FOR INSTRUMENT CLUSTER LIGHTS

INACTIVE
EFF THRU SER (SR8453)(SR8454)
12-16-76
RS RF

54-0916
53-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
RED/YEL	22	-22-2-4		SOLDER	SOLDER		
BLK	22	-22-0		SOLDER			
RED/YEL (LB24)	22	-22-2-4		S-1635-1			
BLK (LB23)	22	-22-0		S-1636-1			
RED/YEL (LB22)	22	-22-2-4		S-1635-1			
BLK (LB21)	22	-22-0		S-1636-1	SOLDER		
LB20	22			S-1635-1	S-13671-8		
LB19	22			S-1635-1	S-1367-1-8		
LB18	22			S-1636-2	S-1636-1		
LB17	22			S-1636-1	SEE LB18		
LB16	18			S-1635-2	S-1635-1		
LB15	18			S-1636-1	S-1635-1		
LB14	18			S-1636-1	SOLDER		
LB13	18			S-1636-1	SOLDER		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
9	0513454	INST LT
8	S-1501-1	SWITCH
7	S-1641-6	HOUSING
4	1213379	POST LT ASSY
3	S-1640-6	HOUSING
2	S-1631-2	HOUSING
1	S-1631-1	HOUSING

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 P 11.2.5.1 P 11.2.5.0

SUPERSEDED BY: 0570311 P 11.3.0

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	1-2-75
GROUP	B. HARDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ		75
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

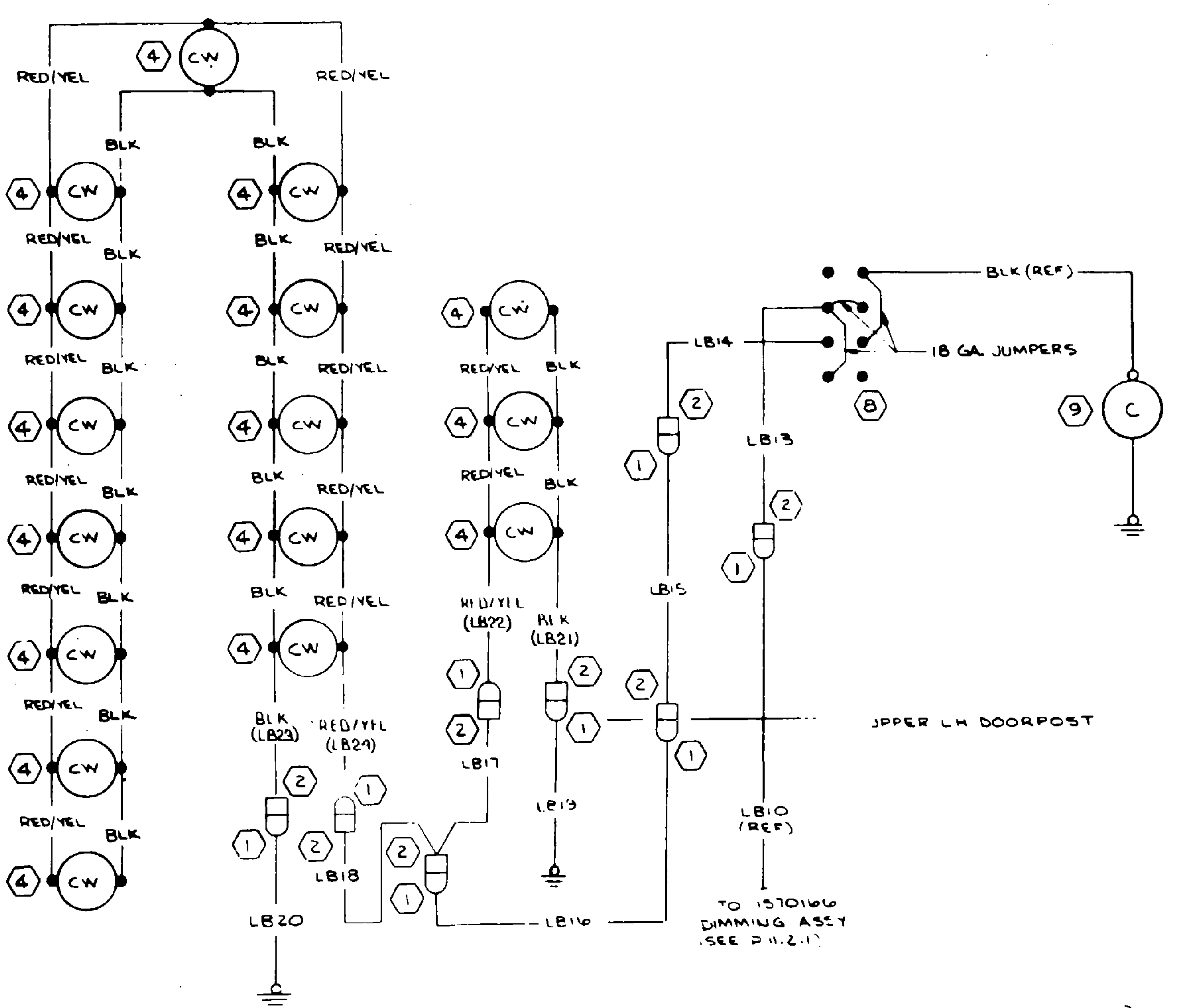
TITLE
WIRING DIAGRAM — INSTRUMENT PANEL POST LIGHTING (OPT)

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570101

SCALE: NONE | (SR7904)(SR7903) | PAGE: 11.3.0

172, F172, FR172
11265685, F172 01335, FR17200505 262

REVISION			
LET	DESCRIPTION	DATE	APPD
A	SEE P. 11.3.0 FOR REVISIONS		



INACTIVE
EFF THRU SER (SR8453)(SR8454)
RS 12-16-76
RF

CONTRACT NO		
	NAME	DATE
DESIGN		1-2-75
GROUP		
DRAWN	MERRICK	10-31-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ		1-4-74
APPD		
OTHER		

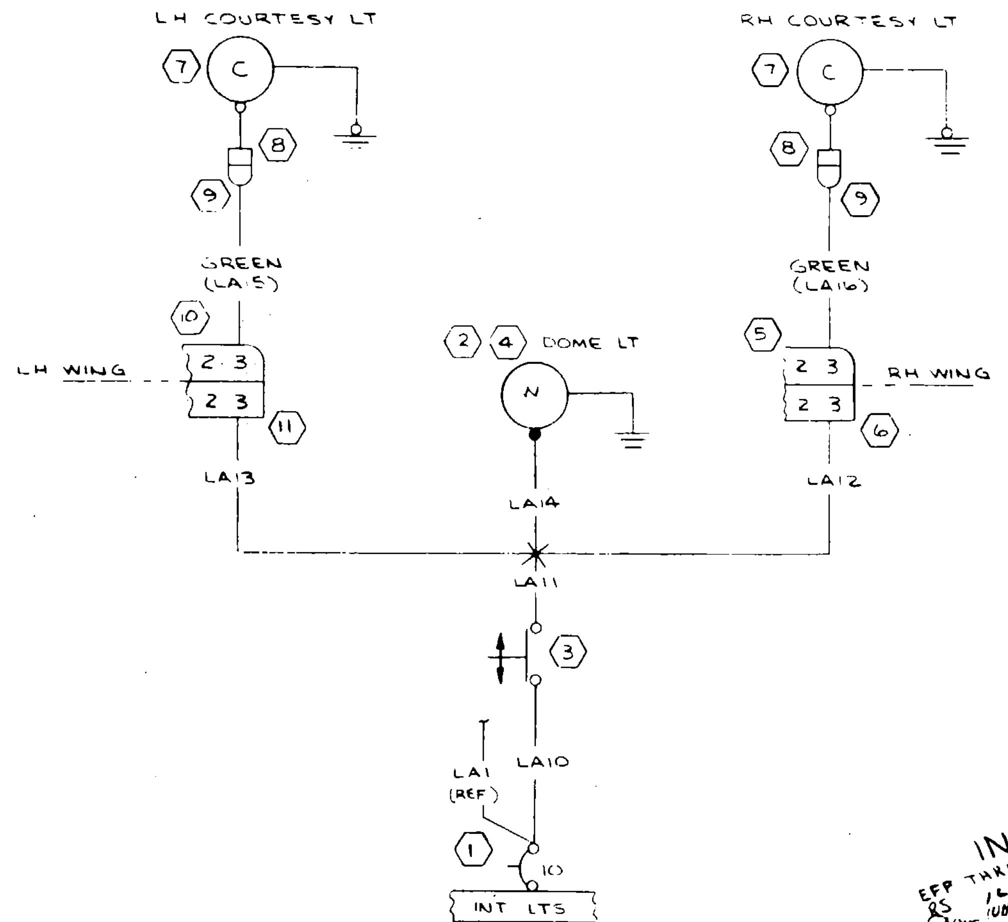
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM - INSTRUMENT PANEL POST LIGHTING (OPT)

SIZE	CODE IDENT NO	DWG NO
C	71379	0570101
SCALE NONE	(SR7904)(SR7903)	PAGE 11.3.1

172, F172, FR172
17265685, F17201385, FR17200560E 562

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD S-1876-1, 0513208 WAS 0511481 R172 (SR8133)(SR8134) (SR8146)	2-25-76	



INACTIVE
EFF THRU SER (SR8953)(SR8954)
12-16-76

54-0916
53-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
GREEN LA16	18	-18-5	117	S-1635-1	S-1635-1		
GREEN LA15		-18-5	117	S-1635-1	S-1635-1		
LA14			6	SOLDER	SEE LA11		
LA13			45	S-1636-1	SEE LA11		
LA12			45	S-1636-1	SEE LA11		
LA11			6	S-1830-1	S-1310-3		
LA10	18		84	S-1830-1	S-1362-1-6		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
11	S-1641-6	HOUSING	
10	S-1640-6	HOUSING	
9	S-1637-1	HOUSING	
8	S-1637-2	HOUSING	
7	0521101	COURTESY LT	
6	S-1641-9	HOUSING	
5	S-1640-9	HOUSING	
4	0513208	SOCKET	
3	S-1831-1	SWITCH	
2	S-1876-1	LIGHT	
1	S-1360-10L	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: 0500062 P 11.7.1

SUPERSEDED BY: 0570311 P 11.40

CONTRACT NO.

	NAME	DATE
DESIGN	G. STAMM	12-11-74
GROUP	B HARDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J. YOWEL	12-6-74
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM —
DOME & COURTESY LIGHTS

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570101
SCALE: NONE	(SR7903) (SR7904)	PAGE: 11.4.0

172, F172, FR172, R172
17265685, F17201385, FR17200560, 562, R172000

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: EXCHANGE TAXI LT & LDG LT, TAN(LE2) & GRAY(LC2), LE1 & LC1, LE4 & LC5, (SR7903)(SR7904)	TMS 3-10-75	RF
B	BY REV: ADD HC2(REF), 4522 WAS 4509 S-1360-25L WAS S-1360-20L ADD 2178 (SR8133)(SR8134)(SR8146)	MDS 2-25-76	RF
C	BY REV: INACT PAGE 11.5.1 & ADD PAGE 11.5.2 (SR8596)	JAS 8-17-76	RF

INACTIVE
EFF THRU SER (SR8453)(SR8454)
GW 1-3-77
RF

34-0905
33-0905
46-0905

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
TAN LE6	12	-12-8	36	S-1635-4	S-1367-3-8		SER (SR8596) & ON
LE5			50	S-1493-3	S-1636-4		SER (SR8596) & ON
BLK/WHT LC9		-12-0-9	28	S-1635-4	S-1367-3-6		SER (SR8596) & ON
BLK/WHT LC8		-12-0-9	33	S-1367-3-8	S-1636-4		SER (SR8596) & ON
GRAY LC7		-12-10	32	S-1636-4	S-1367-3-8		SER (SR8596) & ON
LC6			50	S-1493-3	S-1635-4		SER (SR8596) & ON
LC5	12			S-1493-3	S-1367-1-6		
LE4	12			S-1493-3	S-1367-1-6		
BLK/WHT LE3	12	-12-0-9	6	S-1367-3-8	S-1367-3-8		
TAN LE2		-12-8	36	S-1493-3	S-1367-3-8		THRU SER (SR8596)
LE1			50	S-1493-3	S-1493-3		THRU SER (SR8596)
BLK/WHT LC4		-12-0-9	28	S-1493-3	S-1367-3-6		THRU SER (SR8596)
BLK/WHT LC3		-12-0-9	33	S-1367-3-8	S-1493-3		THRU SER (SR8596)
GRAY LC2		-12-10	32	S-1493-3	S-1367-3-8		THRU SER (SR8596)
LC1	12		50	S-1493-3	S-1493-3		THRU SER (SR8596)

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
9	S-1637-3	HOUSING-SOCKET	
8	S-1637-4	HOUSING-PLUG	
7	4522	LAMP	
6	S2160-5	SWITCH	
5	4509	LAMP	
4	S-2064-1	CONNECTOR	
3	S-2160-4	SWITCH	
1	S-1360-25L	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: 0500062 P11.8.3

SUPERSEDED BY: 0570311 PG 11.5.0

CONTRACT NO.

	NAME	DATE
DESIGN	G. STAMM	10-4-74
GROUP	B HARDEN	1-2-75
DRAWN	MERRICK	10-3-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ	P FIFE	1-4-75
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

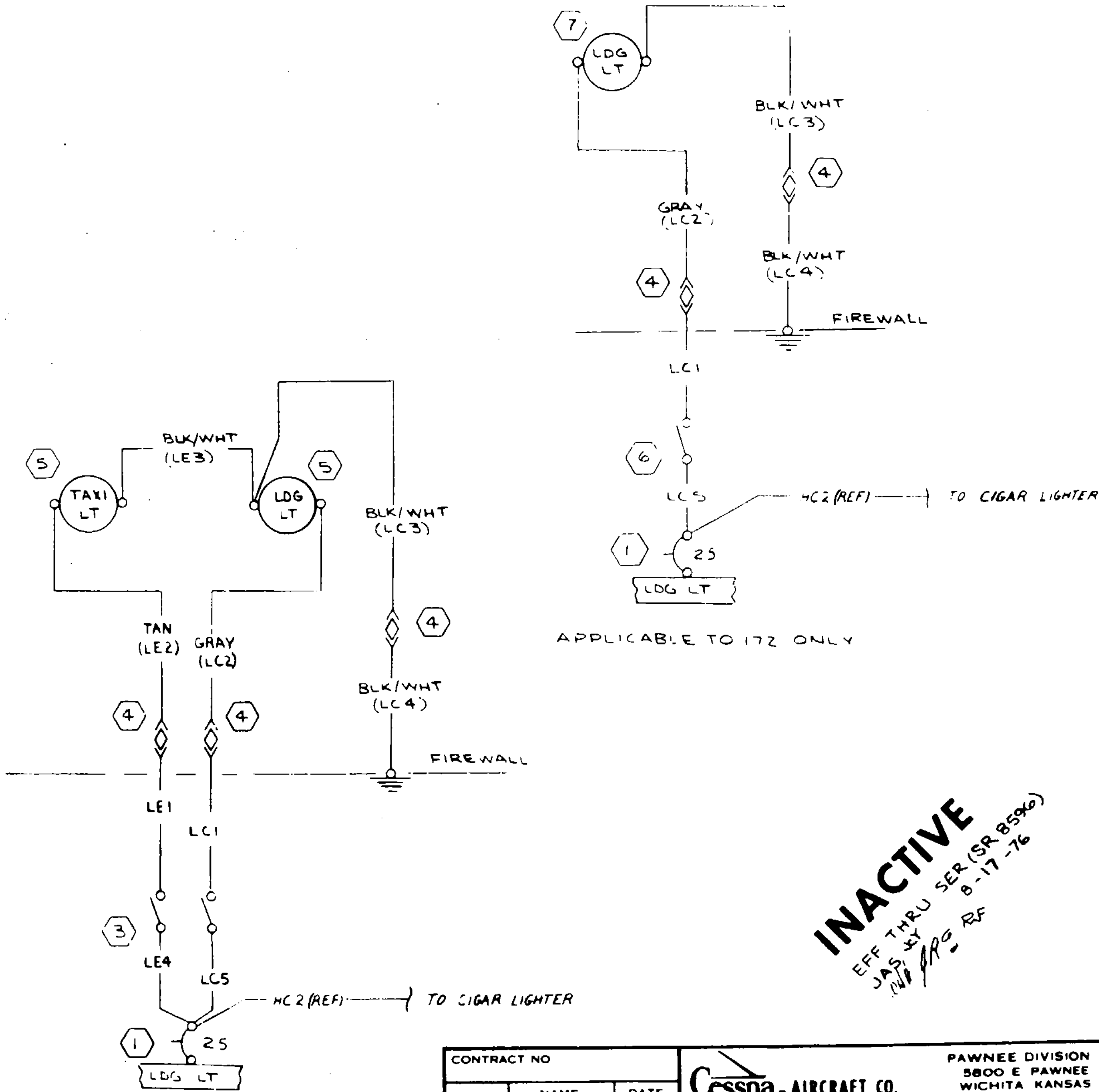
TITLE
WIRING DIAGRAM —
LANDING & TAXI LIGHT
(OPT)

SIZE: C
CODE IDENT. NO.: 71379
DWG NO: 0570101

SCALE: NONE (SR1903) (SR1904) PAGE: 11.5.0

172, F172, FR172, R172
.7265683, F17201385, FR17200560FF642, R1722000

REVISION			
LET	DESCRIPTION	DATE	APPD
C	FOR REVISION SEE SHEET 11.5.0		



46 0905

INACTIVE
EFF THRU SER (SR 8590) 8-17-76
JAS JCY RF

APPLICABLE TO F172; FR172, R172 & ALTERNATE OPTION ON 172

CONTRACT NO		
	NAME	DATE
DESIGN	G. STAMM	12-11-74
GROUP	B. HARDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ	R. FIFE	1-4-75
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

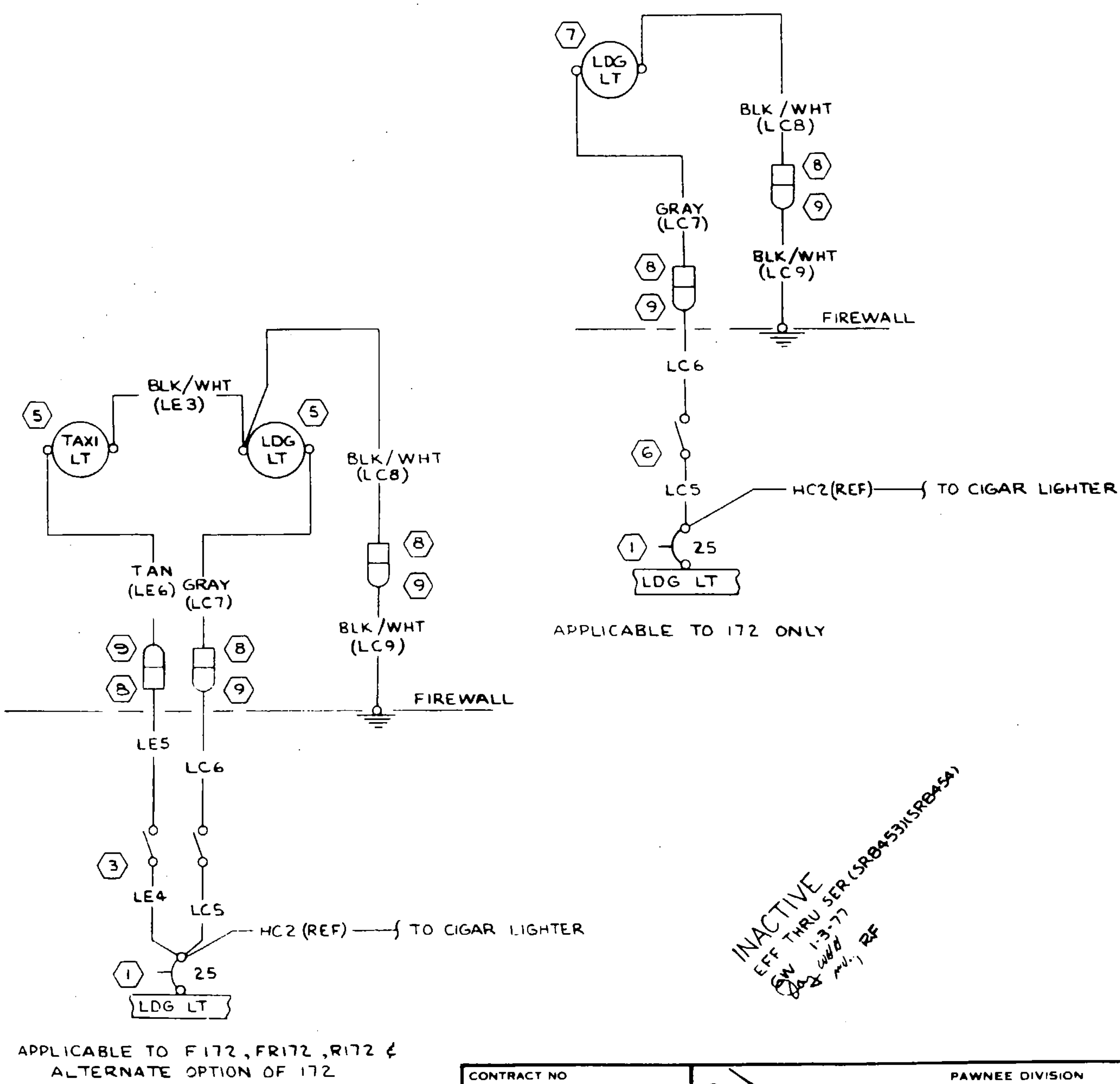
TITLE WIRING DIAGRAM LANDING & TAXI LIGHT (OPT)

SIZE	CODE IDENT. NO	DWG NO
C	71379	0570101

SCALE NONE (SR7903) (SR7590) PAGE 11.5.1

72, F172, FR172, R172
17262685 11201385 FR72550005G4 R1722000

REVISION			
LET	DESCRIPTION	DATE	APPD
C	FOR REVISION SEE SHEET 11.5.0		



CONTRACT NO		
	NAME	DATE
DESIGN		
GROUP		10-7-76
DRAWN	J. SCHMIT	8-23-76
CHECK	J. Yael	8-24-76
STRESS		
PROJ	FIFE	10-8-76
APPD	JRS	
OTHER		

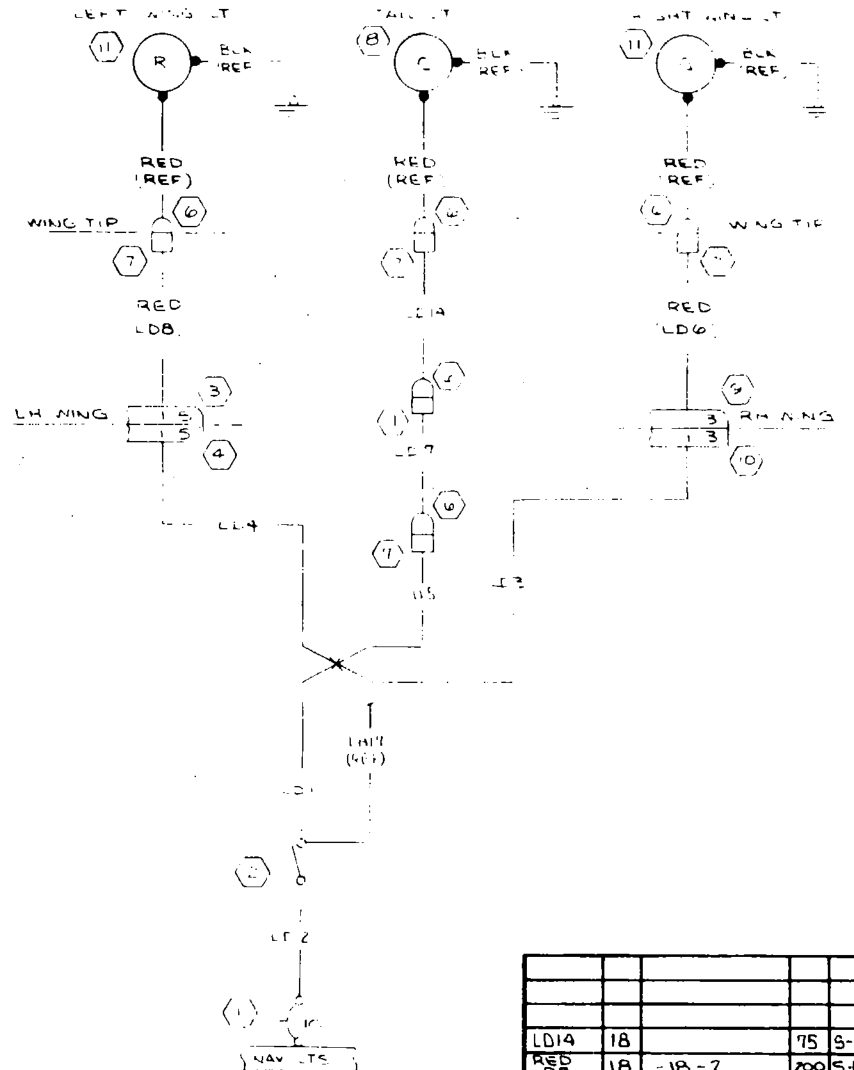
Cessna. AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

TITLE: WIRING DIAGRAM LANDING & TAXI LIGHT (OPT)

SIZE	CODE IDENT NO	DWG NO
C	71379	0570101

SCALE NONE (SR8596) PAGE: 11.5.2

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD LD14 & LD17 (REF); S-1635-1 WAS S-1636-1/LD7 & S-1636-1 WAS S-1635-1/LD5 (NOW SHOP PRACTICE)	RJP 10-8-75	



INACTIVE
EFF THRU SER (SR8453)(SR8454)
KJ 12-16-76
WHH RF

LD14	18		75	S-1635-1	S-1636-1		
RED LD8	18	-18-2	200	S-1635-1	S-1636-1		
LD7	↑		290	S-1635-1	S-1636-1		
RED LD6		-18-2	200	S-1635-1	S-1636-1		
LD5			18	S-1370-2	S-1636-1		
LD4	↓		40	SEE LD5	S-1636-1		
LD3	18		60	SEE LD5	S-1636-1		
LD2	18			S-1493-1	S-1367-1-6		
LD1	18		6	S-1493-1	SEE LD5		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
11	C622001-0202	WING LIGHT	
10	S-1641-9	HOUSING	
9	S-1640-9	HOUSING	
8	C622001-0102	TAIL LIGHT	
7	S-1637-2	HOUSING	
6	S-1637-1	HOUSING	
4	S-1641-6	HOUSING	
3	S-1640-6	HOUSING	
2	S-2160-1	SWITCH	
1	S-1360-10L	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: 0500062 P11.9.1

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	12-11-74
GROUP	B. HARDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ	C. FIFE	1-4-75
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

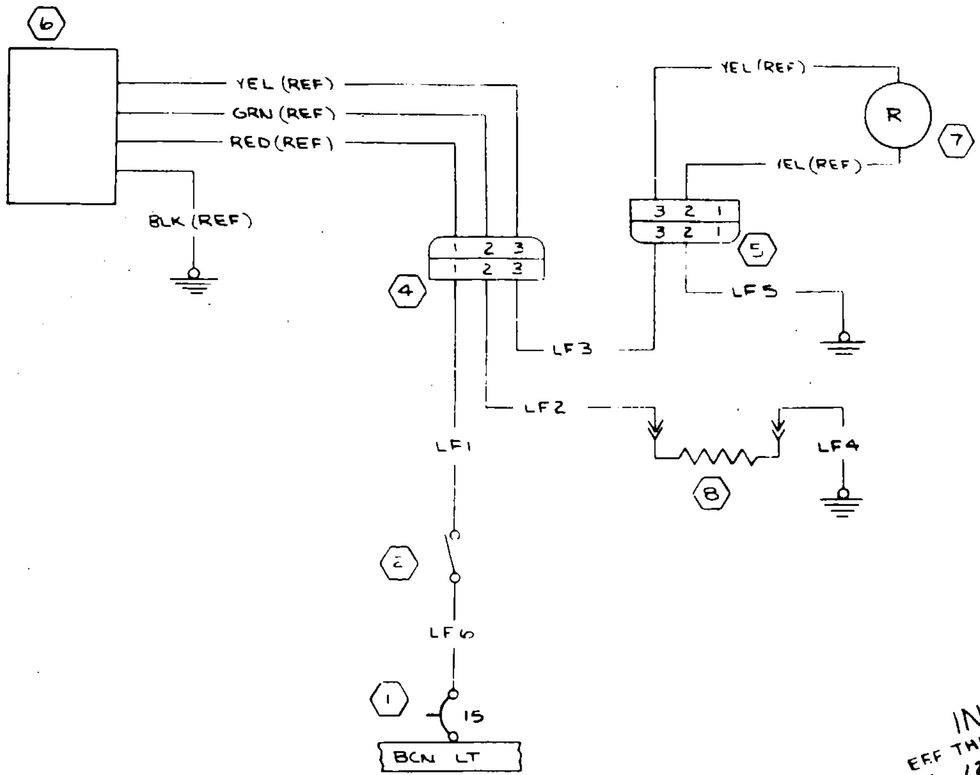
TITLE
WIRING DIAGRAM — NAVIGATION LIGHTS

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570101

SCALE: NONE (SR1903) (SR1904) PAGE: 11.6.0

172, F172, FR172
17265685, F17201385, FR17200560 & 562

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV S-1367-2-8 WAS S-1367-2-6 PER LF4 S-1367-2-6 WAS S-1367-2-8 PER LF5 (SR19113) (SR19114)	RS 2-6-75	
B	BY REV: S-1360-15L WAS S-1360-10L, LF1 & LF6/16 GA WIRE WAS 18 GA (SR7903)(SR7904)	BAH 5-13-75	
C	BY REV: C594502-0102 WAS C594502-0101 (SR8552)	GDS 8-2-76	



INACTIVE
EFF THRU SER (SR8453) (SR8454)
RS 12-16-76

LF6	16			S-1493-2	S-1367-2-6		
LF5	18		4	S-1635-2	S-1367-2-6		
LF4	18		8	S-1493-2	S-1367-2-8		
LF3	18		60	S-1635-2	S-1636-2	STD	
LF2	18		8	S-1493-2	S-1636-2		
LF1	16		250	S-1493-2	S-1635-2	STD	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

8	OR95-1.5	RESISTOR	
7	C621001-0106	LIGHT ASSY	
6	C594502-0102	FLASHER ASSY	
5	S-1638-2	HOUSING	
4	S-1638-1	HOUSING	
2	S-2160-1	SWITCH	
1	S-1360-15L	CIRCUIT BREAKER	
ITEM NO	PART NO.	DESCRIPTION	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 P11.10.2
SUPERSEDED BY: 0510311 P 11.7.0

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	12-11-74
GROUP	B. HARDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ	R. FIFE	1-4-75
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV 5800 E. PAWNEE WICHITA, KANSAS

TITLE **WIRING DIAGRAM — LIGHT- FLASHING BEACON (OPT)**

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570101

SCALE: NONE | (SR7903) (SR7904) | PAGE: 11.7.0

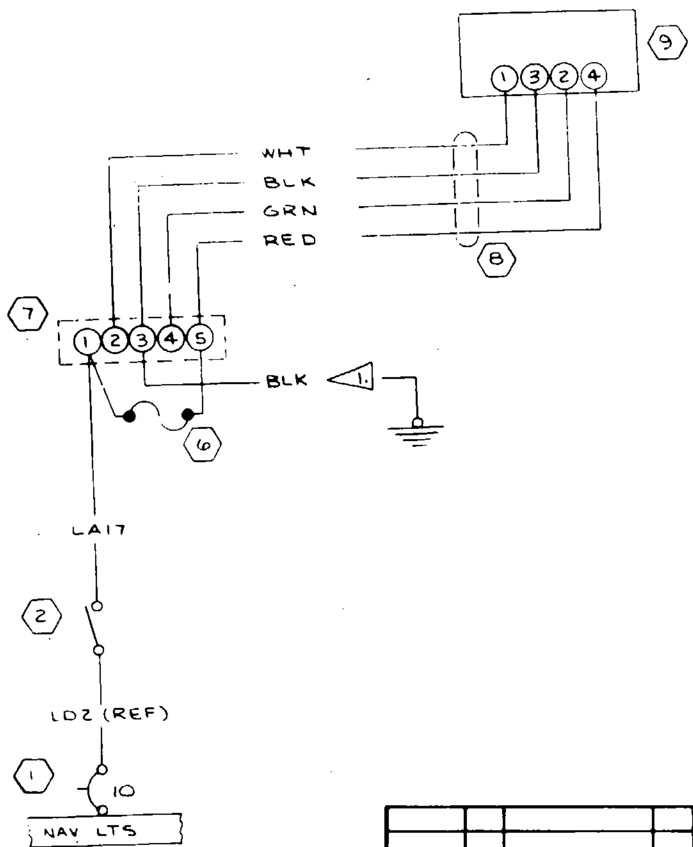
172, F172, FR172
172&S685, F17201385, FR17200563 & 562

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: 329636 WAS 329626/NOTE 2 NOW SHOP PRACTICE	2-7 6-11-75	

NOTES:

1. THIS WIRE NOT REQUIRED WHEN BOOM MIKE IS INSTALLED, REFER TO 0570400 PAGE 2.35 FOR REPLACEMENT WIRING WHEN BOOM MIKE IS INSTALLED

2. VENDOR FOR 320733 & 329636 IS (00779) VENDOR FOR 8409 IS (70903) VENDOR FOR 351-11-05-001 IS (71785)



INACTIVE
EFF THRU SER (SR8453) (SR8454)
RS 12-16-76

53-0916
53-0916

WHT		8409		320733	320733	2.	
BLK		↕		↕	↕	↕	
GRN		↕		↕	↕		
RED		8409		320733	320733		
BLK	20	-20-0	3	S-1367+-8	329626	↕	
LA17	20		8	329626	S-1493-1	2.	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
9	0570088-1	MAP LIGHT ASSY	
8	8409	CABLE	2.
7	351-11-05-001	TERMINAL STRIP	2.
6	1570141-1	FUSE ASSY	
2	S-2160-1	SWITCH	
1	S-1360-10L	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: 0500062 P 11.11.1

SUPERSEDED BY: 0570311 P 11.8.0

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	10-1-74
GROUP	B HARDEN	1-2-75
DRAWN	MERRICK	10-3-74
CHECK	J. YOUEL	12-6-74
STRESS		
PROJ	R FIFE	1-4-75
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

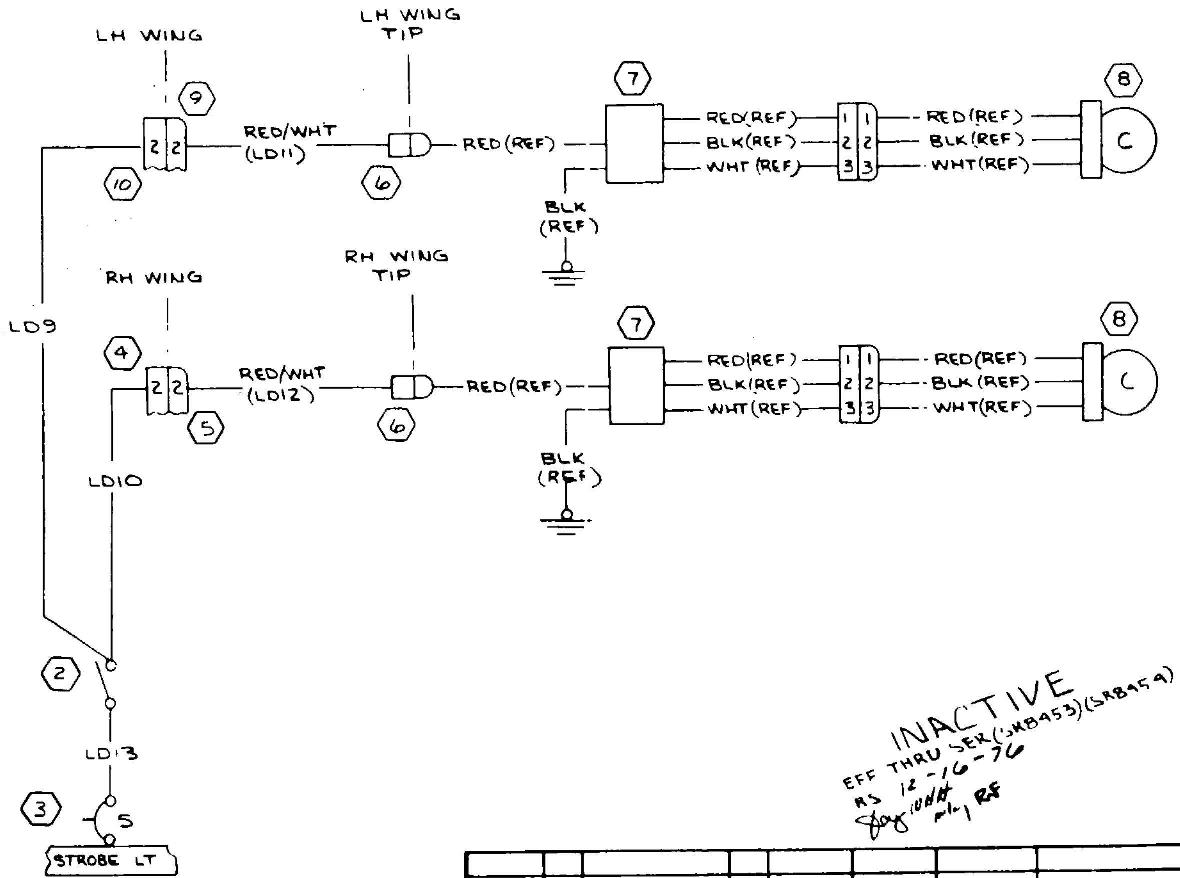
TITLE
WIRING DIAGRAM — MAP LIGHT - CONTROL WHEEL (OPT)

SIZE C | CODE IDENT NO. 71379 | DWG NO 0570101

SCALE: NONE | (SR7903) (SR7904) | PAGE: 11.8.0

172, F172, FR172

REVISION			
LET	DESCRIPTION	DATE	APPD



INACTIVE
EFF THRU SER (SR8453) (SR8454)
RS 12-16-76

54-0916
53-0916

LD13	22			S-1493-1	S-1367-6		
RED/WHT LD12	22	-18-2-9	216	S-1636-1	S-1635-1	(STD)	
RED/WHT LD11	22	-18-2-9	216	S-1636-1	S-1635-1	(STD)	
LD10	22		58	S-1493-1	S-1636-1	(STD)	
LD9	22		50	SEE LD10	S-1636-1	(STD)	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
10	S-1641-6	HOUSING	
9	S-1640-6	HOUSING	
8	C622006-0101	LAMP ASSY	
7	C622007-0101	POWER ASSY	
6	S-1637-2	HOUSING	
5	S-1640-9	HOUSING	
4	S-1641-9	HOUSING	
3	S-1360-5L	CIRCUIT BREAKER	
2	S-2160-1	SWITCH	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0500062 P 11.14.2

SUPERSEDED BY: 0570311 P 11.10.0

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	10-1-74
GROUP	B HARDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J YOUEL	12-6-74
STRESS		
PROJ	R FIFE	1-4-75
APPD		
OTHER		

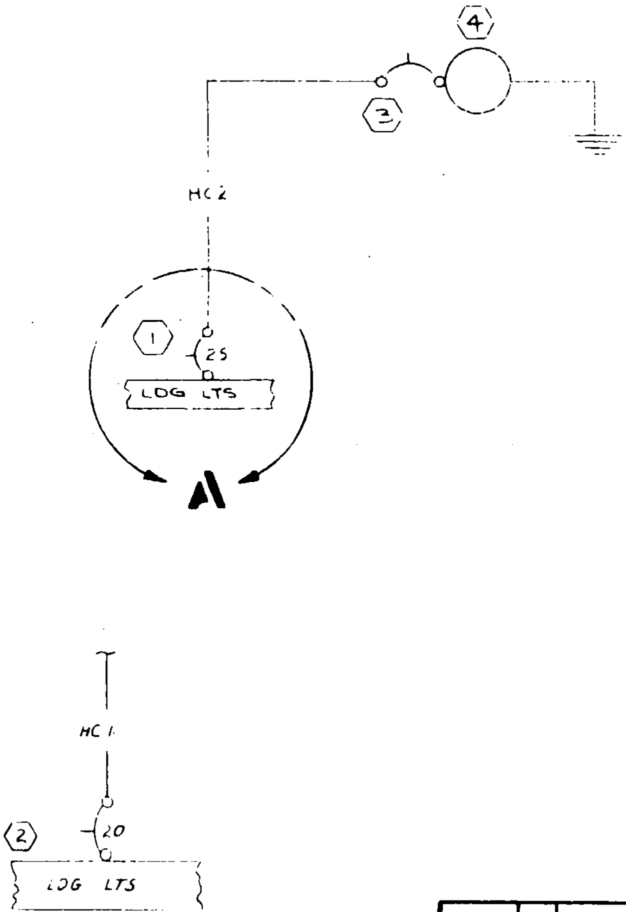
Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — WING TIP STROBE LIGHT (OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570101

SCALE: NONE (SR7903) (SR7904) PAGE: 11.9.0

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: SER OUT HC1, ADD HC2 & SER, DETAIL A & R172; S1360-25L WAS S1360-20L (SR8133)(SR8134)(SR8146)	2-2-76	JRS



DETAIL A
EFF THRU SER (SR8133)(SR8134)

INACTIVE
EFF THRU SER (SR8453)(SR8454)
RS 12-16-76

54 0916
53 0916

HC2	12		18	S-1367-2-10	S-1367-2-8		(SR8133)(SR8134) & ON
HC1	16		18	S-1367-2-10	S-1367-2-8		THRU (SR8133)(SR8134)
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
4	0513052-3	CIGAR LIGHTER	
3	60232-1	CIRCUIT BREAKER	
2	S-1360-20L	CIRCUIT BREAKER	
1	S-1360-25L	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: 0500062 P 13.1.1

SUPERSEDED BY: 0570311 P 13.1.0

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	12-4-74
GROUP	B HARDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J. TOWEL	12-6-74
STRESS		
PROJ	R FIFE	1-4-75
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

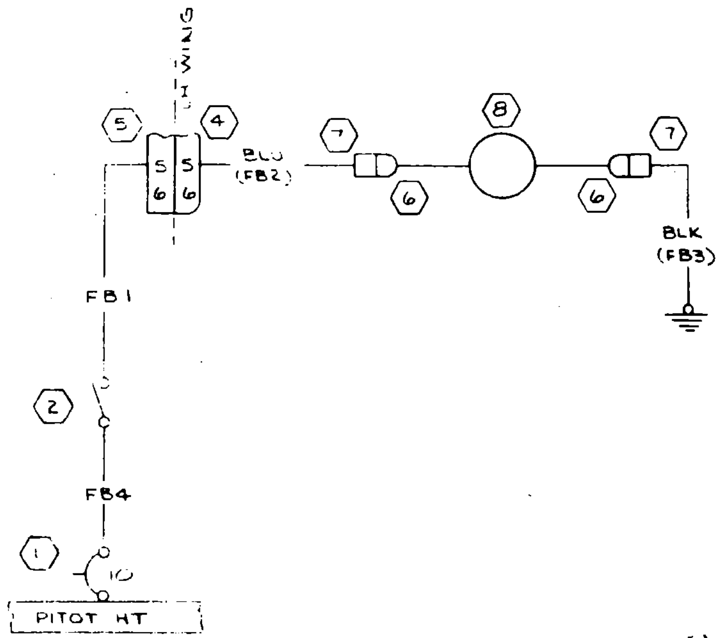
TITLE: WIRING DIAGRAM — CIGAR LIGHTER

SIZE: C | CODE IDENT. NO. 71379 | DWG NO 0570101

SCALE: NONE | (SR7903) (SR7904) | PAGE: 13.1.0

172, F172, FR172, R172
17265685, F17201385, FR17200560E562, R17220000

REVISION			
LET	DESCRIPTION	DATE	APPD



INACTIVE
EFF THRU SER (SR8453) (SR8454)
RS 12-16-76
RF

55-0916
53-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
FB4	18			S-1493-1	S-1367-1-6		
BLK FB3	18	-18-0	14	S-1636-2	S-1367-1-8		
BLU FB2	18	-16-6	48	S-1636-2	S-1636-2	(STD)	
FB1	18		48	S-1493-1	S-1635-2		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
8	0721105	PITOT HEATER	
7	S-1637-2	HOUSING	
6	S-1637-1	HOUSING	
5	S-1641-6	HOUSING	
4	S-1640-6	HOUSING	
2	S-2160-1	SWITCH	
1	S-1360-10L	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: 0500062 P 13.3.1

SUPERSEDED BY: 0570311 P 13.2.0

CONTRACT NO:

	NAME	DATE
DESIGN	G. STAMM	12-11-74
GROUP	B HARDEN	1-2-75
DRAWN	MERRICK	10-31-74
CHECK	J YOUEL	12-6-74
STRESS		
PROJ	R FIFE	1-4-75
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — PITOT-HEATED (OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570101

SCALE: NONE (SR7593) (SR7904) PAGE: 13.2.0

172, F172, FR172
17265685, F17201385, FR17200560 5562

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV SEE CC23 WAS S-1367-2-6 FOR CC24 S-1367-2-4 WAS S-1367-2-6 FOR CC23, CC22, CC21, CC20, CC19 AND CC18 (SR8133)	REH 3-20-76	[illegible]

NOTES:

1. THESE SWITCHES PART OF C301002-0101 ACTUATOR ASSY

INACTIVE
EFF THRU SER (SR8453) (SR8454)
RS 12-16-76
[illegible] 1 RF

54-0916
53-0916

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS			SERIALS
CC24	16			SEE CC23	S-1367-2-8		
CC23				S-1367-2-4	S-1367-2-4		
CC22				S-1367-2-4	S-1367-2-6		
CC21				S-1367-2-4	S-1636-2		
CC20				S-1367-2-4	S-1636-2		
CC19				S-1367-2-4	S-1636-2		
CC18				S-1367-2-4	S-1636-2		
BLK CC17		-16-0	13	S-1636-2	S-1493-2		
VIO CC16		-16-7	19	S-1493-2	S-1367-2-8		
VIO CC15		-16-7	19	S-1493-2	S-1367-2-8		
RED CC14		-16-2	13	S-1636-2	S-1635-2		
BLU CC13		-16-6	13	S-1635-2	S-1493-2		
GRN CC12		-16-5	13	S-1635-2	S-1493-2		
ORN CC11		-16-3	13	S-1635-2	S-1493-2		
RED CC10		-16-2	75	S-1636-2	S-1635-2		
BLU CC9		-16-6	75	S-1636-2	S-1635-2		
GRN CC8		-16-5	75	S-1636-2	S-1635-2		
ORN CC7	16	-16-3	75	S-1636-2	S-1635-2		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
10	C301002-0101	ACTUATOR ASSY	
9	S-1638-2	HOUSING	
8	S-1638-1	HOUSING	
7	S-1641-6	HOUSING	
6	S-1640-6	HOUSING	
5	S-1641-9	HOUSING	
4	S-1640-9	HOUSING	
3	S-1906-1	SWITCH	
2	S-1360-15L	CKT BKR	
1	V3-1-05	SWITCH	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: P 14.1.0

SUPERSEDED BY: 0570311 P 14.1.0

CONTRACT NO:

	NAME	DATE
DESIGN		
GROUP	[illegible]	2-4-76
DRAWN	PAPE	2-3-76
CHECK	J. YOUEL	2-3-76
STRESS		
PROJ	[illegible]	2-4-76
APPD		
OTHER		

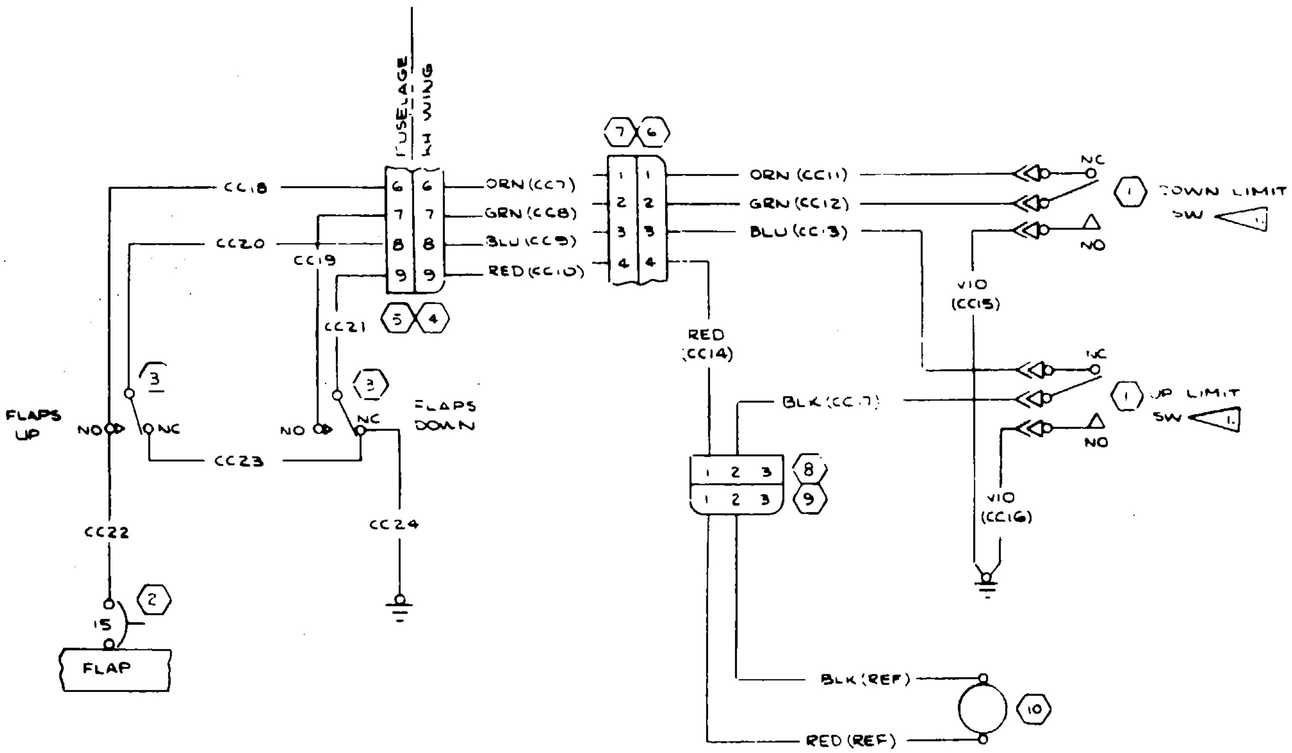
Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — WING FLAPS - ELECTRIC

SIZE: C
CODE IDENT. NO.: 71379
DWG NO: 0570101
SCALE: NONE
PAGE: 43.0

(SR8133)
17267585

REVISION			
LET	DESCRIPTION	DATE	APPD



INACTIVE
EFF THRU SER (SR8453) (SR8454)
RS 12-16-76

59-0916
53-0916

CONTRACT NO		
	NAME	DATE
DESIGN		
GROUP	W J Hassler	2-4-76
DRAWN	PAPE	2-3-76
CHECK	J. YOWEL	2-3-76
STRESS		
PROJ		2-4-76
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

TITLE: WIRING DIAGRAM — WING FLAPS — ELECTRIC

SIZE	CODE IDENT NO	DWG NO
C	71379	0570101

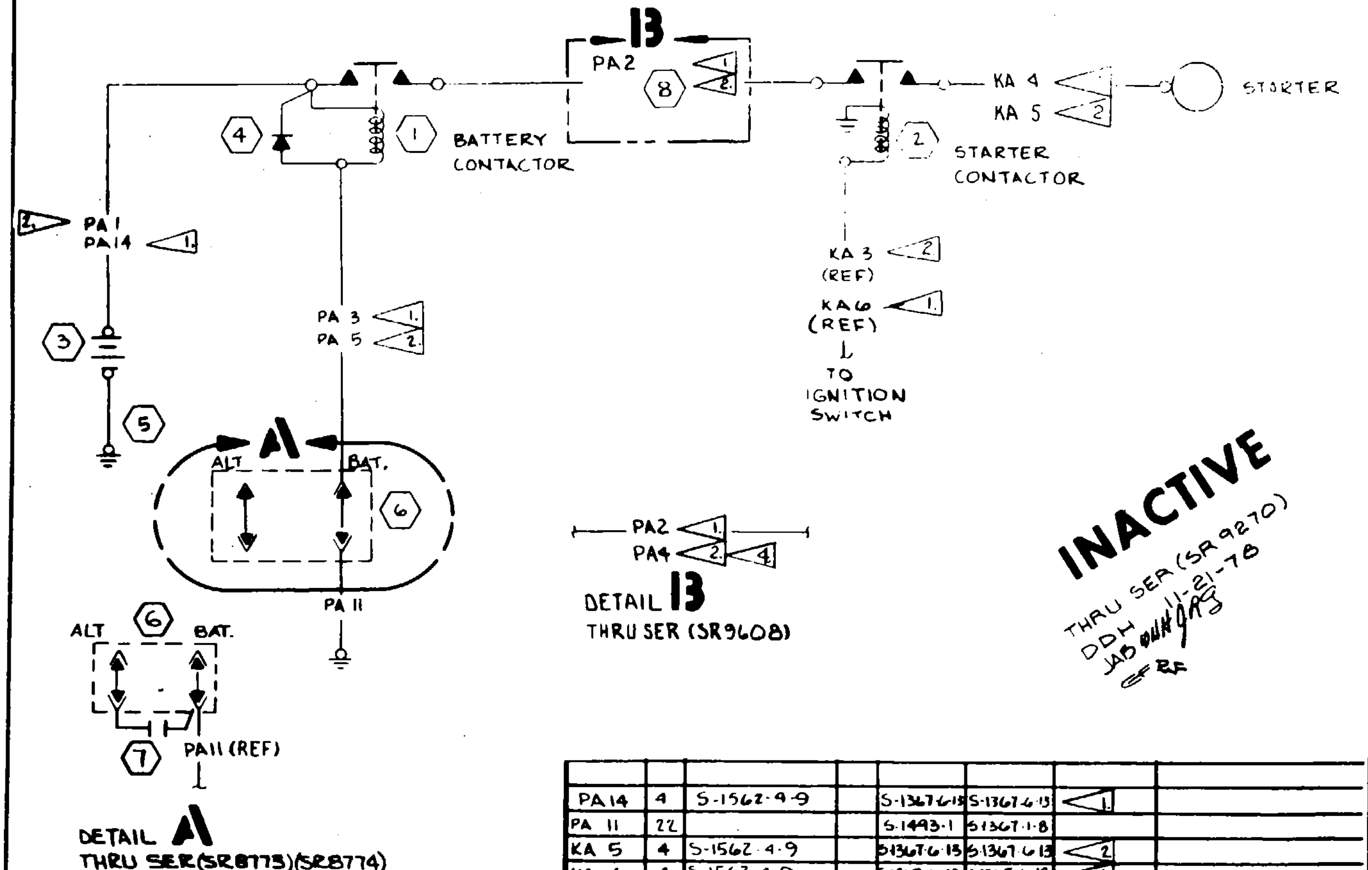
SCALE: NONE PAGE: 14.3.1

(SR8133)
172675RS

NOTES

1. APPLIES TO R172 & FR172 ONLY
2. APPLIES TO 172 & F172 ONLY
3. ~~SEE PAGE 4.3 WHEN OPT GROUND SERVICE INSTL IS MADE~~
4. 0570317 WIRE ASSY REPLACES 0570311PA4 WIRE AT SR9608 FOR SPARES ONLY

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV. ADD PA14 WIRE; DELETE FLAG NOTE 3. C614001-0101 WAS 0870060. (SR8861) (SR8453) (SR8454)	LSS 1-10-77	JAB RF
B	BY REV: SER OUT TVA-1315; ADD DETAIL "A"; C614001-0105 WAS C614001-0101 (SR8773) (SR8774) (SR9149)	RLY 4-10-78	JAB RF
C	BY REV: OBSOLETE PA4, ADD DETAIL B, 0570317-1, NOTE 4 (SR9608)	NTL 7-16-79	JAB RF



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PA 14	4	S-1562-4-9		S-1367-6-13	S-1367-6-13	1	
PA 11	22			S-1493-1	S-1367-1-8		
KA 5	4	S-1562-4-9		S-1367-6-13	S-1367-6-13	2	
KA 4	4	S-1562-4-9		S-1367-6-13	S-1367-6-13	1	
PA 5	22			S-1493-1	S-1367-1-10	2	
4 PA 4	4	S-1562-4-9		S-1367-6-13	S-1367-6-13	2	OBSOLETE THRU (SR9608)
PA 3	22			S-1493-1	S-1367-1-10	1	
PA 2	4	S-1562-4-9		S-1367-6-13	S-1367-6-13	1	
PA 1	4	S-1562-4-9		S-1367-6-13	S-1367-6-13		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
8	0570317	WIRE ASSY	4
7	TVA 1315	CAPACITOR	
6	S-1994-1-1	SWITCH	
5	0412007	BATTERY GROUND	
4	0770728	DIODE ASSY	
3	C614001-0105	BATTERY	
2	S-1571-1	STARTER CONTACTOR	
1	S-1580-1	BATTERY 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: 0570101 P 4.1.0

SUPERSEDED BY: 0570311 P. 4.11

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W.G. Harden	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOWEL	12-20-76
STRESS		
PROJ	FIFE	1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — BATTERY CIRCUIT

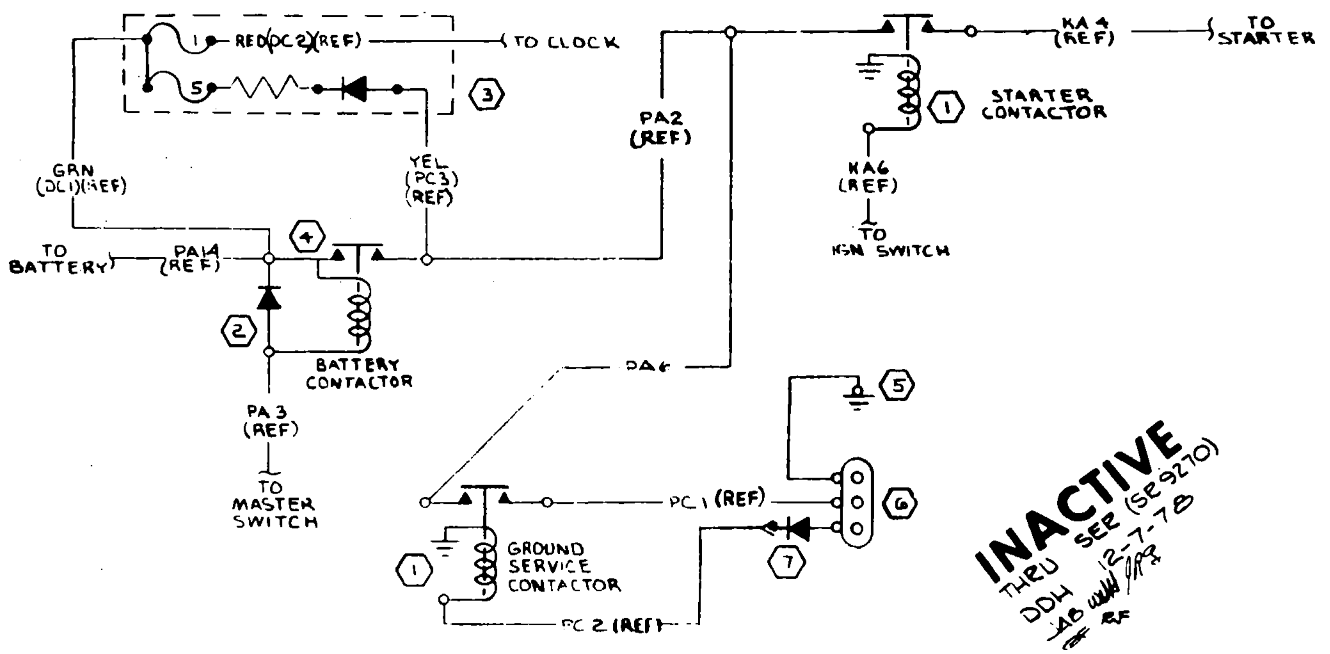
SIZE: C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE (SR8453) (SR8454) PAGE: 4.1

NOTES:

~~1. PA6 REPLACES PA2 WHEN GROUND SERVICE RECEPTACLE IS INSTALLED~~

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: DELETE PA7 WIRE & FLAG NOTE 1. (SR 5454)	LSS 4-20-77	RF
B	BY REV: RED DC2 (REF) WAS DC2 (REF); KA6(REF) WAS KA3 (REF); YEL PC3(REF) WAS YEL PC3; PC1(REF) WAS PC1; PC2(REF) WAS PC2 (NOW SHOP PRACT) INACT DWG (SE9270)	DDH 12-7-78	JAB RF



PA6	4	S-1562-4-9		S-1367-1	S-1367-1	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS

WIRE TABLE

7	1570043	DIODE BOARD
6	MS3506-1	RECEPTACLE
5	0312155	GROUND STRAP
4	S-1580-1	BATTERY CONTACTOR
3	0712031	FUSE & DIODE ASSY
2	0770728	DIODE ASSY
1	S-1577-1	CONTACTOR
ITEM NO	PART NO.	DESCRIPTION

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570101 PG 4.6.0

SUPERSEDED BY: 0570311 PG 4.14

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP		1-4-77
DRAWN	SWANSON	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	FIFE	1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — GROUND SERVICE RECEPTACLE (OPT) (R172 & FR172)

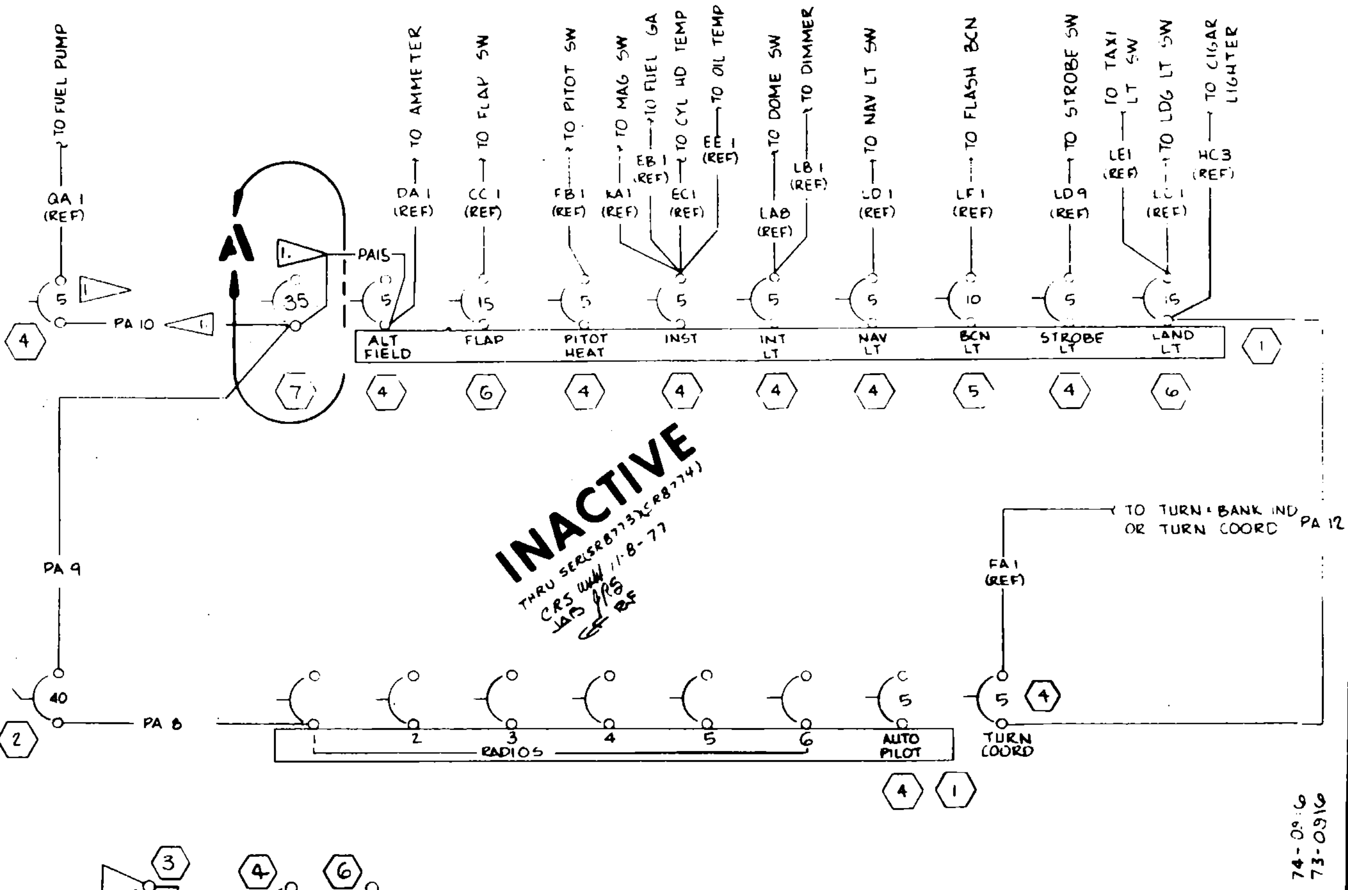
SIZE: C | CODE IDENT. NO. 71379 | DWG NO 0570311

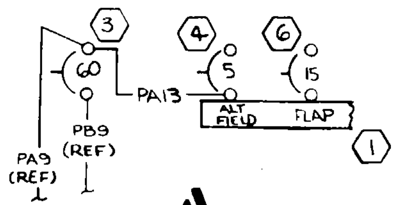
SCALE: NONE | (SR 5454) | PAGE: 4.3

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: REVISE DETAIL A PER 1978 MODEL CHANGE (SR 8453) (SR 8459)	LSS 4-20-77	
B	BY REV: DWG BECOMES INACTIVE, ADD PA15, NOW SHOP PRACTICE	CRS 11-8-77	JAB

NOTES

1. APPLIES TO R172 & FR172 ONLY





DETAIL A
(APPLIES TO 172 & F172 ONLY)

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PA15	10	S-1562-10-9		S-1367-4-6	S-1367-4-6		
PA13	8	S-1562-8-9		S-1367-4-8	S-1367-4-6		
PA 12	18			S1367-1-6	S1367-1-6		
PA 10	18			S1367-1-10	S1367-1-6	1	
PA 9	10	S-1562-10-9		S-1367-3-10	S-1367-3-8		
PA 8	10	S-1562-10-9		S-1367-3-8	S-1367-3-6		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION
7	S-1360-35L	CIRCUIT BREAKER
6	S-1360-15L	CIRCUIT BREAKER
5	S-1360-10L	CIRCUIT BREAKER
4	S-1360-5L	CIRCUIT BREAKER
3	S-1707-60	CIRCUIT BREAKER
2	CM3589-40	SWITCH
1	0570419	BUS BAR

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570101 P. 43.0
SUPERSEDED BY: 0570311 P4.9 & 4.10

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W H Hardin	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	FIFE	1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — BUS BAR & AVIONICS MASTER SWITCH

SIZE: C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE (SR8453)(SR8459) PAGE: 4.4

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL "A" (SR8453) (SR8454)	LSS 4-20-77	JAB WHH GF RF
B	BY REV: SER IN PB12 & PB13; ADD DETAIL "B" & SERIAL, ADD PAIS (REF) (NOW SHOP PRACTICE) (SR9014) DWG BECOMES INACTIVE	GDM 11-8-77 CRS	JAB
C	BY REV: SER OUT PB6, PB2, PB13; SER IN PB27, PB28, PB29; ADD C593003-0103 (ALT) (SR9140) (SR9145)	GW 3-31-78	JAB

NOTES:

1. APPLIES TO R172 & FR172 ONLY
2. APPLIES TO 172 & F172 ONLY

INACTIVE
THRU (SR 8773) & (SR8774)
CRS 11-8-77
JAB

74-0816
73-0816

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PB27	8	S-1562-8-9		S-1943-3	S-1367-4-12		(SR9145) & ON & FOR ALL SPARES
PB28	22			S-1636-1	S-1367-1-10		(SR9145) & ON & FOR ALL SPARES
PB29	8	S-1562-8-9		S-1943-2	S-1367-4-8		(SR9145) & ON & FOR ALL SPARES
PB 13	8	S-1562-8-9		S-1943-2	S-1367-4-8		(SR9014) THRU (SR9145)
PB 12	8	S-1562-8-9		S-1943-3	S-1367-4-12		(SR9014) THRU (SR9145)
PB 11	8	S-1562-8-9		S-1367-4-10	S-1367-4-10		THRU (SR9014)
PB 10	22			S-1636-1	S-1367-1-10		
PB 9	8	S-1562-8-9		S-1367-4-12	S-1367-4-8		THRU (SR9014)
PB 8	10	S-1562-10-9		S-1367-3-12	S-1367-3-6		
PB 7	10	S-1562-10-9		S-1367-3-10	S-1367-3-12		
PB 6	22			S-1636-1	S-1367-1-10		THRU (SR9145)
PB 5				SEE PB3	S-1636-1		
PB 4				S-1493-1	S-1635-1		
PB 3				S-1636-2	S-1635-1		
PB 2				S-1493-1	S-1636-1		
PB 1	22			S-1367-1-6	S-1493-1		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
15	C593003-0103	OVERVOLT SENSOR (ALT)	
14	TVA 1315	CAPACITOR	
13	S-2135-2	LAMP ASSY	
12	C611503-0102	ALT ASSY	2
11	C611502-0203	ALT ASSY	1
10	C593003-0101	OVERVOLT SENSOR	
9	C611004-0101	VOLTAGE REGULATOR	
8	S-1638-1	HOUSING	
7	S-1638-2	HOUSING	
6	S-1637-2	HOUSING	
5	S-1637-1	HOUSING	
4	S-1994-1-1	SWITCH	
3	S-1360-5L	CIRCUIT BREAKER	
2	S-1707-60	CIRCUIT BREAKER	2
1	S-1360-35L	CIRCUIT BREAKER	1

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570101 P 4.4.0 & 4.4.1

SUPERSEDED BY: 0570311 PG 4.7

CONTRACT NO:

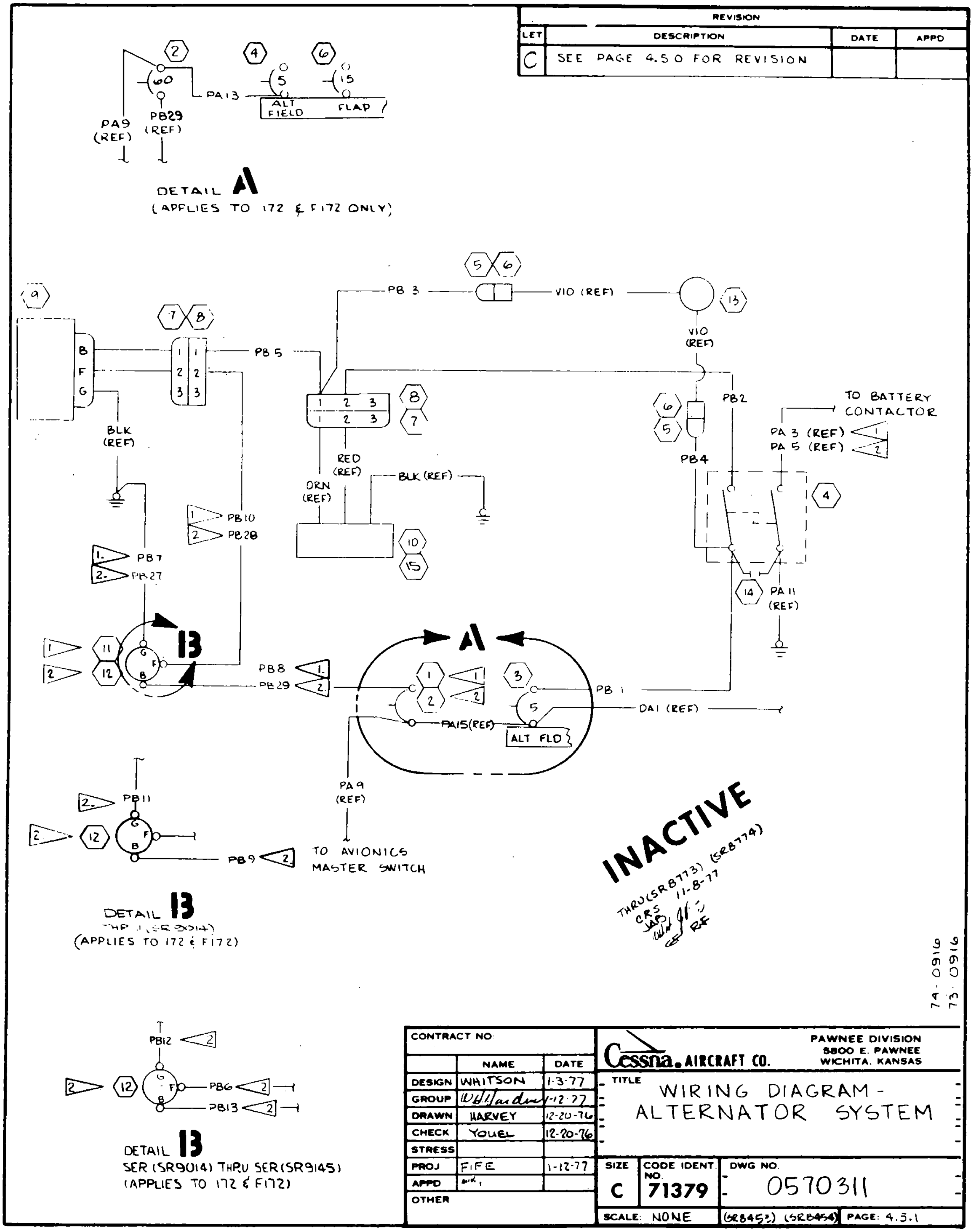
	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	[illegible signature]	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	FIFE	1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — ALTERNATOR SYSTEM

SIZE: C | CODE IDENT. NO. 71379 | DWG NO 0570311

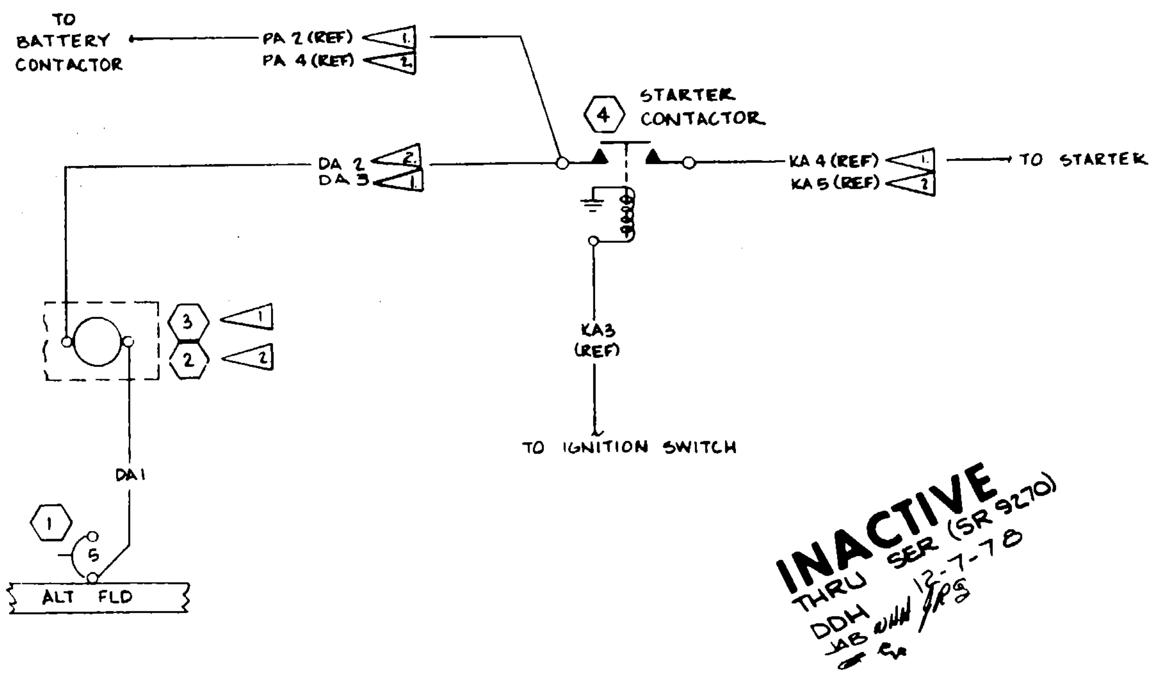
SCALE: NONE | (SR8453) (SR8454) | PAGE: 4.5.0


REVISION
LET
DESCRIPTION
DATE
APPD
C
SEE PAGE 4.5.0 FOR REVISION
PA13
ALT FIELD
FLAP
PA9 (REF)
PB29 (REF)
DETAIL A
(APPLIES TO 172 & F172 ONLY)
PB 3
VIO (REF)
VIO (REF)
PB 5
PB2
TO BATTERY CONTACTOR
PA 3 (REF)
PA 5 (REF)
PB4
BLK (REF)
RED (REF)
ORN (REF)
BLK (REF)
PB10
PB28
PB7
PB27
PA 11 (REF)
PB8
PB29
PB 1
DA1 (REF)
PA15(REF)
ALT FLD
PA9 (REF)
TO AVIONICS MASTER SWITCH
PB11
PB9
DETAIL B
(APPLIES TO 172 & F172)
INACTIVE
THRU (SR8773) (SR8774)
11-8-77
PB12
PB6
PB13
DETAIL B
SER (SR9014) THRU SER (SR9145)
(APPLIES TO 172 & F172)
74-0916
73-0916
CONTRACT NO
NAME
DATE
DESIGN WHITSON 1-3-77
GROUP 1-12-77
DRAWN HARVEY 12-20-76
CHECK YOUEL 12-20-76
STRESS
PROJ FIFE 1-12-77
APPD
OTHER
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS
TITLE
WIRING DIAGRAM - ALTERNATOR SYSTEM
SIZE C
CODE IDENT. NO. 71379
DWG NO. 0570311
SCALE: NONE
(SR8453) (SR8454)
PAGE: 4.5.1

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DA3 WIRE (SR8453) (SR8454)	LSS 4-20-77	

NOTES:

1. APPLIES TO R172 & FR172 ONLY
2. APPLIES TO 172 & F172 ONLY



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
DA3	8	S-1562-8-9		S-1367-4-10	S-1367-4-13	1	
DA 2	8	S-1562-8-9		S-1367-4-10	S-1367-4-13	2	
DA 1	8	S-1562-8-9		S-1367-4-8	S-1367-4-10		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
4	S-1577-1	STARTER CONTACTOR	
3	C669514	INST CLUSTER	1
2	S-1320-5	INDICATOR	2
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: 0570101 P 45.0

SUPERSEDED BY: 0570311 P 4.12

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W.H. Harder	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	FIFE	1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — AMMETER

SIZE: C | CODE IDENT. NO.: 71379 | DWG NO: 0570311

SCALE: NONE (SR8453) (SR8454) PAGE: 4.6

E	BY REV: ADD 0570451, DETAIL B & SER (SR9624)(SR9625) BY REV: ADD C611005-0102 (NOW SHOP PRACTICE)	RAO 1-21-80 SEB	JAB WHH QRS DALE RF
F	BY REV: DELETE 0570451 & DETAIL "B"; INACTIVATE DWG; RELEASED FOR PRODUCTION (SR9624) (SR9625)	RAO 3-5-80	JAB WHH QRS

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV PB25 WAS PB13. PB26 WAS PB8 (SR8773) (SR8774)	DLP 2-28-78	JAB WHH QRS GF RF
B	BY REV: PB27 WAS PB12; S-1943-3 WAS S-1493-2/PB27 (SR9145)	GW 3-31-78	JAB WHH QRS GF RF
C	BY REV: ADD DETAIL "A" & NOTE 4. S-1232-35 WAS S-1360-35L; S-1232-60 WAS S-1707-60 (SR9429),(SR9104)&(SR9105)	RLY NTL 10-18-78	JAB WHH QRS GF RF
D	BY REV: 20GA WAS 22GA/PB15, PB16, PB19 PB22; 16GA WAS 22GA/PB18, PB21 S-2099-8 WAS S-2099-6, S-1367-2-10 WAS S-1367-1-10 & S-1367-1-12 NOW SHOP PRACTICE ORN(PB20) WAS PB20, BLU(PB21) WAS PB21 YEL(PB15) WAS PB15, RED(PB16) WAS PB16 ORN PB17 WAS PB17, BLU(PB18) WAS PB18 (USE EXISTING STOCK)	RLK HHG 9-5-79	JAB WHH QRS DALE RF

NOTES:

1. PART OF BASIC AVIONICS KIT
2. FOR USE ON 172 & F172 ONLY
3. FOR USE ON R172 & FR172 ONLY
4. TERMINATE VENDOR FURNISHED WIRES WITH S-1636-1 PIN

INACTIVE
THRU SER (SR9624)(SR9625)
RAO 2-6-80 QRS
JAB WHH QRS

25-0916
24-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PB30	8	S-1562-8-9		S-1943-2	S-1943-3	2	SER (SR9429) ON
PB24	10	S-1562-10-9		S-1367-3-12	S-1367-3-12	3	
PB23	8	S-1562-8-9		S-1943-1	S-1943-2	2	
PB22	20			S-2099-6	S-1367-1-10	3	
BLU(PB21)	16	-16-6		S-2099-8	S-1367-2-10	3	
ORN(PB20)	20	-20-3		S-2099-6	S-1367-1-12	3	
PB19	20			S-2099-6	S-1367-1-10	2	
BLU(PB18)	16	-16-6		S-2099-8	S-1367-2-10	2	
ORN(PB17)	20	-20-3		S-2099-6	S-1367-1-12	2	
RED(PB16)	20	-20-2		S-2099-6	S-1493-1		
YEL(PB15)	20	-20-4		S-2099-6	S-1635-1		
PB14	22			S-1367-1-6	S-1635-1		
PB25	8	S-1562-8-9		S-1943-1	S-1367-4-8	2	
PB27	8	S-1562-8-9		S-1943-3	S-1367-4-12	THRU SER (SR9429) 2	
PB26	10	S-1562-10-9		S-1367-3-12	S-1367-3-8	3	
PB7	10	S-1562-10-9		S-1367-3-10	S-1367-3-12	3	
PB1	22			S-1493-1	S-1367-1-6		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
15	C611005-0102	ALT CONTROL UNIT	(ALT)
14	0570314	TERMINAL BOARD	
13	C611502-0203	ALTERNATOR ASSY	3
12	S-1232-35	CIRCUIT BREAKER	3
11	S-1915-1	CAPACITOR	1
10	C611503-0102	ALTERNATOR ASSY	2
9	S-1994-1-1	SWITCH	
8	S-1232-60	CIRCUIT BREAKER	2
7	S-1360-5L	CIRCUIT BREAKER	
6	S-2135-2	LAMP ASSY	4
5	S-1637-2	HOUSING	
4	S-1637-1	HOUSING	
3	S-2373-2	CONNECTOR	
2	S-2373-1	CONNECTOR	
1	C611005-0101	ALT CONTROL UNIT	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570311 PG 4.50 & 4.51

SUPERSEDED BY: 0570311 PG 4.17

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	11-29-77
GROUP	W H Hadley	12-13-77
DRAWN	C SHAVER	11-8-77
CHECK	BORLESKE	11-16-77
STRESS		
PROJ	R FIFE	12-19-77
APPD	QRS GF	
OTHER		

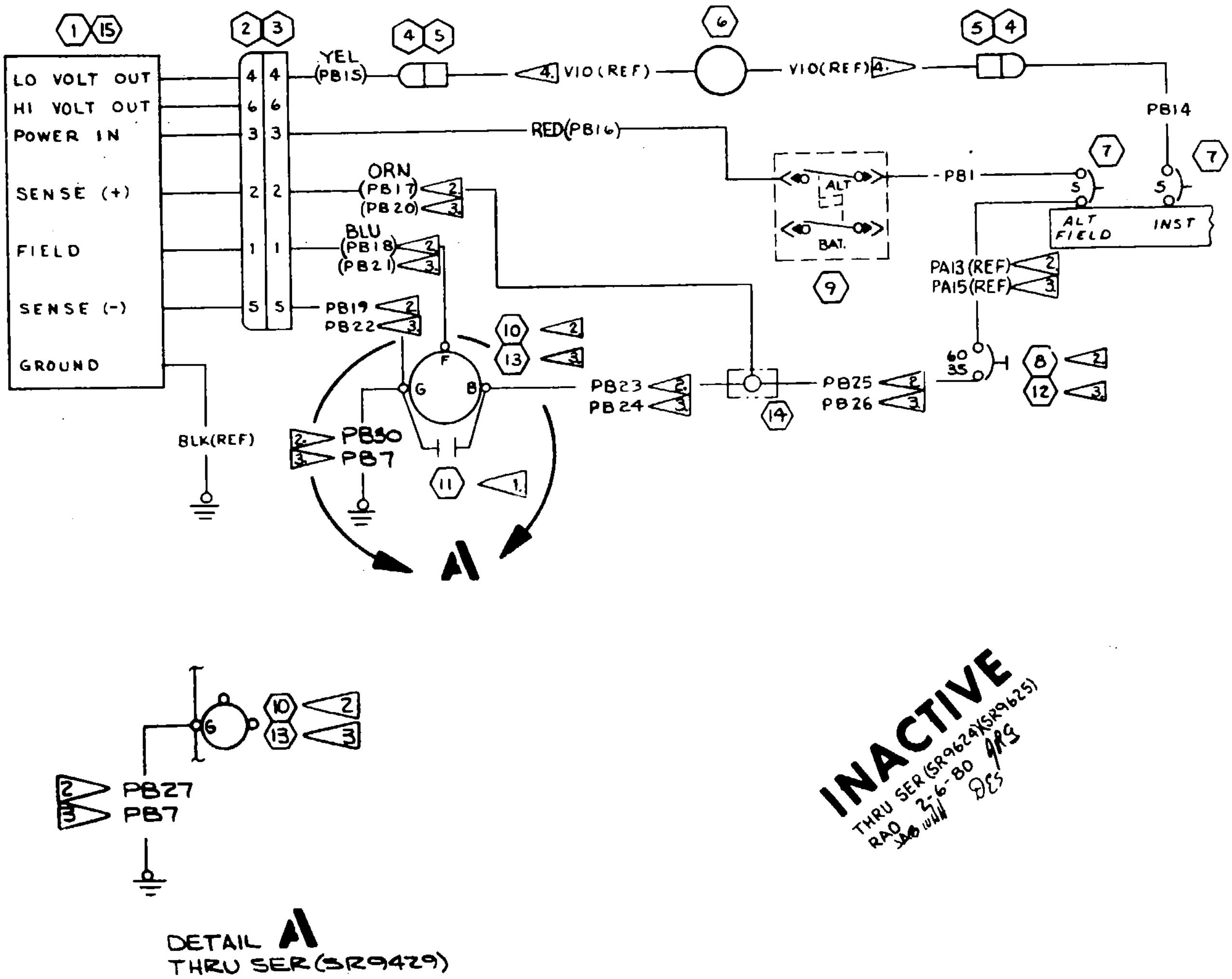
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE: WIRING DIAGRAM — ALTERNATOR SYSTEM 172 F172 R172 & FR172

SIZE: C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE | (SR8773)(SR8774) | PAGE: 4.7

Alternator System (Sheet 1 of 2)



CONTRACT NO:		
	NAME	DATE
DESIGN	WHITSON	11-29-77
GROUP	W.J. Hadley	12-1-77
DRAWN	C. SHAVER	11-8-77
CHECK	BORLESKE	11-16-77
STRESS		
PROJ	R. FIFE	12-19-77
APPD	ARS	
OTHER		

Cessna AIRCRAFT CO. — PAWNEE DIVISION, 5800 E. PAWNEE, WICHITA, KANSAS

TITLE: WIRING DIAGRAM— ALTERNATOR SYSTEM 172 F172 R172 & FR172

SIZE: C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE | (SR8773)(SR8774) | PAGE: 4.7

Alternator System (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: PB26(REF) WAS PB6. EB10 (REF) TO INST CLUSTERS WAS EB1(REF) TO FUEL GAUGES EA3(REF) TO CARB AIR TEMP WAS EC1(REF) → TO CYL HD TEMP. ADD DC2(REF) TO DIGITAL CLOCK ADD LA1(REF) TO AUX INST LT. 10 WAS 5 (FLAP) INST LT WAS INST LT. S-1232-35 WAS S-1360-36L. (SR2105)	MDK 5-24-79	JAE JRG RF
B	BY REV: EB21(REF) WAS EB10 (REF) (SR9742)	WAG 1-19-80	MDR RF JRB
	BY REV: ADD S-1232-5, 0570451, DETAIL A, B. & SER (SR9625)	RAO 1-21-80	

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PA17	18			S-1367-1-6	S-1367-1-6		
PA15	10			S-1367-3-6	S-1367-3-6	THRU SER	(SR9625)

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
8	0570451	BUS BAR	
7	S-1232-5	CIRCUIT BREAKER	
6	0570419	BUS BAR	
5	CM3589-40	SWITCH	
4	S-1360-10L	CIRCUIT BREAKER	
3	S-1360-15L	CIRCUIT BREAKER	
2	S-1232-35	CIRCUIT BREAKER	
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: 0570311 P 4.4

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN		
GROUP		11-15-77
DRAWN	C SHAVER	11-7-77
CHECK	BORLESKE	11-16-77
STRESS		
PROJ	R FIFE	12-1977
APPD		
OTHER		

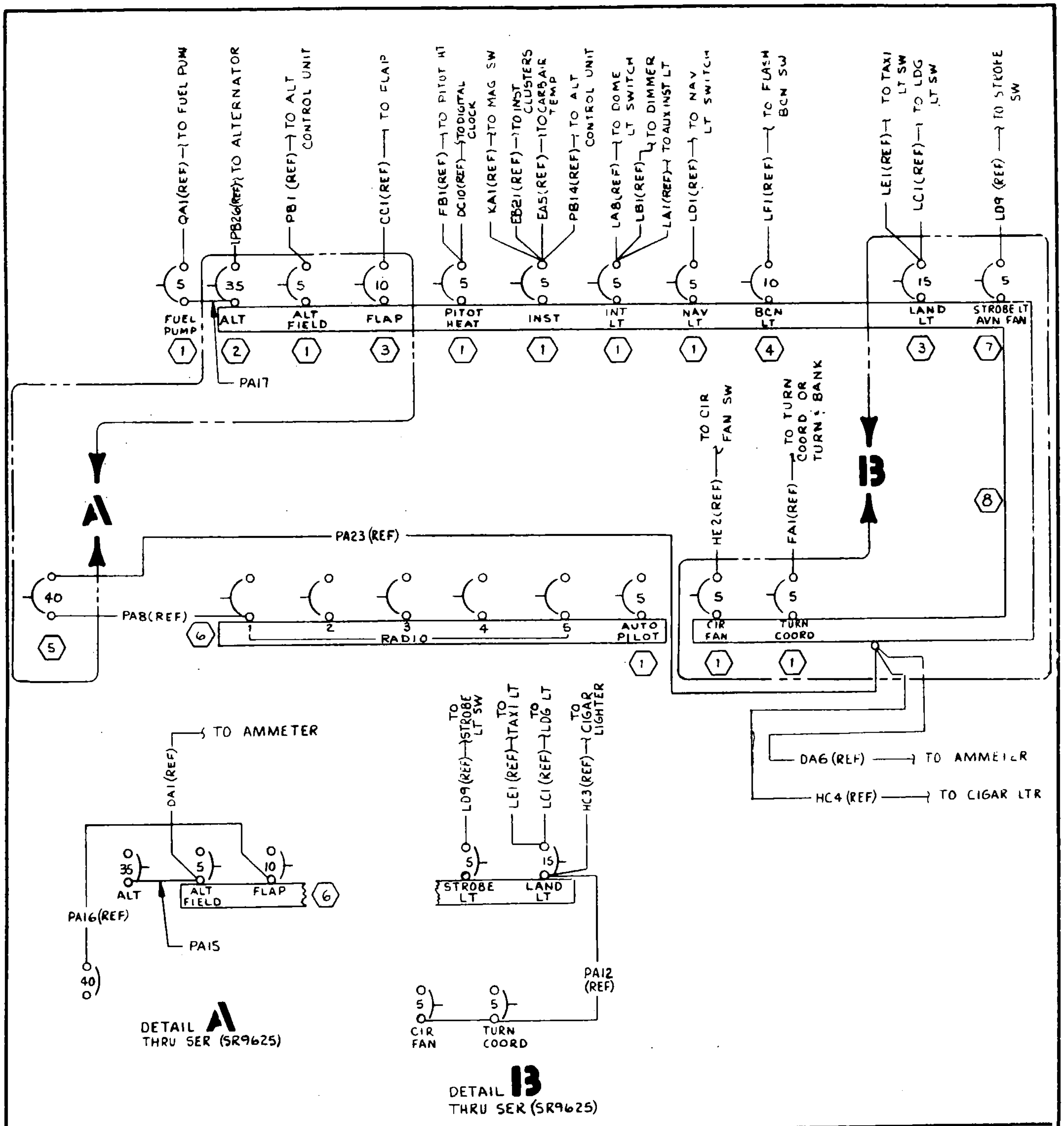
Cessna. AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — BUS BAR & AVIONICS MASTER SWITCH - R172 & FR172

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SR8774) PAGE: 4.10

Bus Bar & Avionics Master Switch (Sheet 1 of 2)



CONTRACT NO:		
	NAME	DATE
DESIGN		
GROUP	W. H. Harlow	11-15-77
DRAWN	C. SHAVER	11-7-77
CHECK	BORLESKE	11-16-77
STRESS		
PROJ	R FIFE	12-19-77
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — BUS BAR & AVIONICS MASTER SWITCH - R172 & FR172

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE | SR8774 | PAGE: 4.10

Bus Bar & Avionics Master Switch (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL A & SER, PA18, PA19, C614002-0101 (SR9104)(SR9105)	DDH 12-7-78	JAB RF
B	BY REV: S2447-4 WAS S-1367-6-13/ PA18, PA19 (SR9104)(SR9105	MDR 5-24-79	JAB RF
C	BY REV: ADD DETAIL "B" & SER OUT PA19 & PA18, PA20, PA3, PA21, PA5, SER IN PA23, PA24 PA25, PA26, PA27, PA28, PA29 & ADD S-2475-1 (SR9625)&(SR9624)	WAG 1-7-80	JAB RF
D	BY REV: ADD DETAIL C, KA12 & SER DELETE PA25 (ADV REL) (SR9624)(SR9625)	RAO 2-12-80	
E	BY REV: RELEASED FOR PRODUCTION (SR9624) (SR9625)	RAO 3-5-80	JAB DES

NOTES:

1. APPLIES TO R172 & FR172 ONLY
2. APPLIES TO 172 & F172 ONLY

CS-0916
ZA-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
KA12	4	S-1562-4-9		S-1367-6-13	S-2447-4	2	SER (SR9624) & ON
PA29	22			S1493-1	S-1367-1-10	2	SER(SR9624)&ON
PA28	22			S1493-1	S-1367-1-10	1	SER(SR9625)&ON
PA27	4	S-1562-4-9		S2447-4	S2447-4	1	SER(SR9625)&ON
PA26	4	S-1562-4-9		S-1367-6-13	S2447-4	2	SER(SR9624)&ON
PA24	4	S-1562-4-9		S2447-4	S2447-4	1	SER(SR9625)&ON
PA30	4	S-1562-4-9		S2447-4	S2447-4	2	SER(SR9624)&ON
PA19	4	S-1562-4-9		S2447-4	S1367-6-13	1	(SR9105) THRU (SR9625)
PA18	4	S-1562-4-9		S2447-4	S-1367-6-13	2	(SR9104) THRU (SR9624)
KA9	4	S-1562-4-9		S-1367-6-13	S-2447-4	1	
PA14	4	S-1562-4-9		S-1367-6-13	S-1367-6-13	1	THRU SER (SR9105)
PA 11	22			S-1493-1	S-1367-1-8		
KA8	4	S-1562-4-9		S-1367-6-13	S-2447-4	2	THRU SER (SR9624)
PA 5	22			S-1493-1	S-1367-1-10	2	THRU SER (SR9624)
PA21	4	S-1562-4-9		S-1367-6-13	S-2447-4	2	THRU SER (SR9624)
PA 3	22			S-1493-1	S-1367-1-10	1	THRU SER (SR9625)
PA20	4	S-1562-4-9		S-1367-6-13	S-2447-4	1	THRU SER (SR9625)
PA 1	4	S-1562-4-9		S-1367-6-13	S-1367-6-13	2	THRU SER (SR9104)

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
9	S-2475-1	BATT. CONTACTOR	
8	C614002-0101	BATTERY	
6	S-1994-1-1	SWITCH	
5	0412007	BATTERY GROUND	
4	0770728	DIODE ASSY	
3	C614001-0105	BATTERY	
2	S-2443-1	STARTER CONTACTOR	
1	S-1580-1	BATTERY 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: 0570311 P. 4.1

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	12-15-78
GROUP	D.D.Haun	12-14-78
DRAWN	D.D. HAUN	11-21-78
CHECK	BORLESKE	12-12-78
STRESS		
PROJ	R. PIFE	12-20-78
APPD	JRS GF	
OTHER		

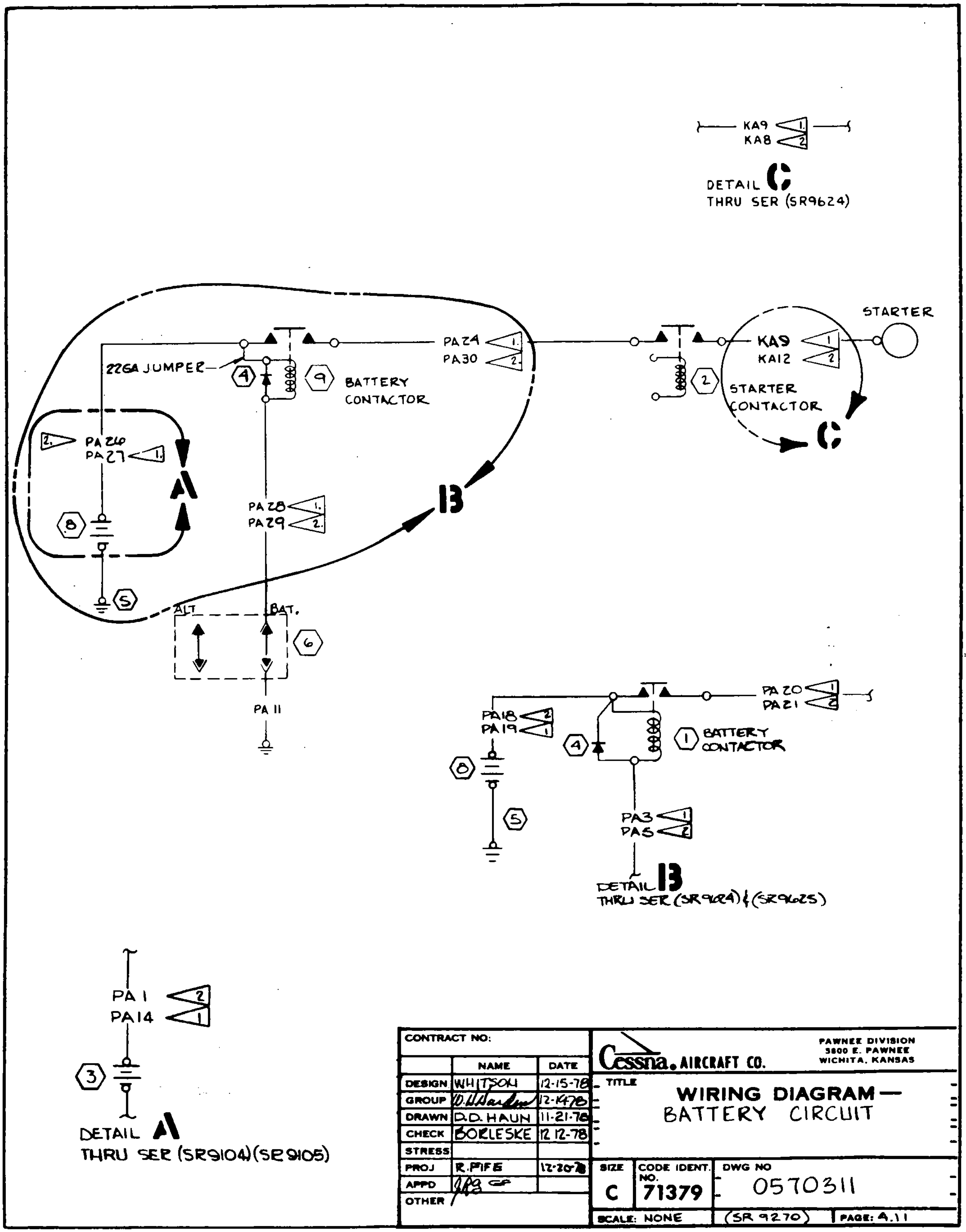
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — BATTERY CIRCUIT

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SR 9270) PAGE: 4.11

Battery Circuit (Sheet 1 of 2)



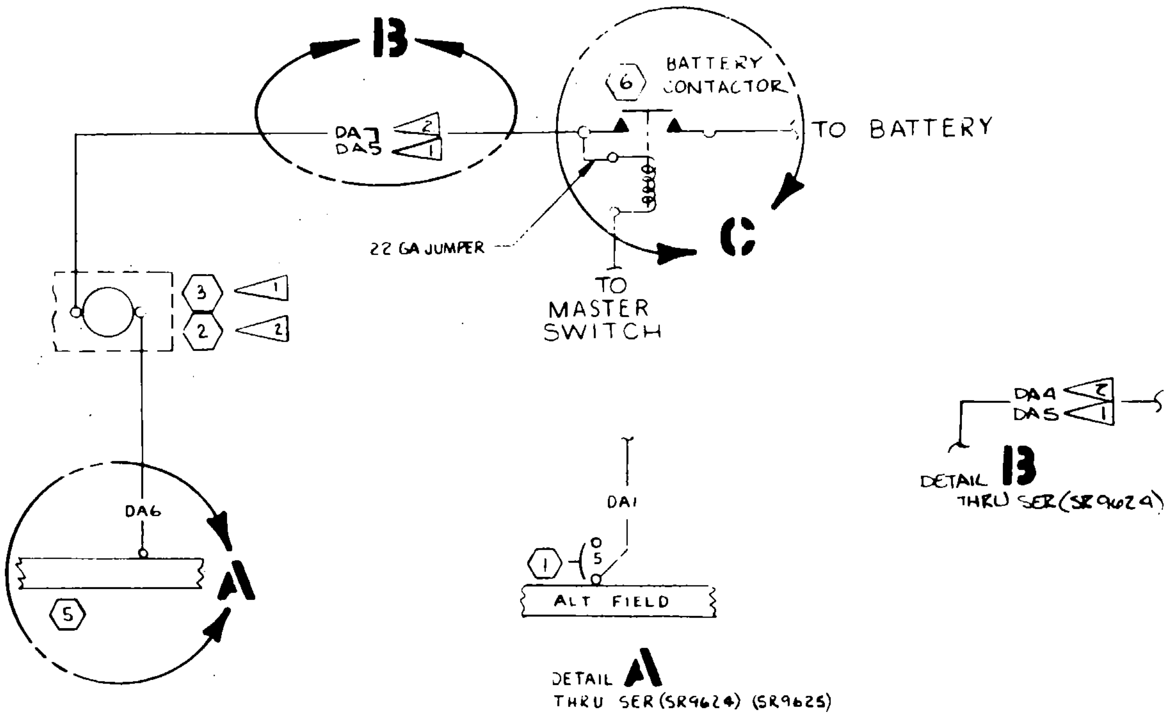
Battery Circuit (Sheet 2 of 2)

NOTES

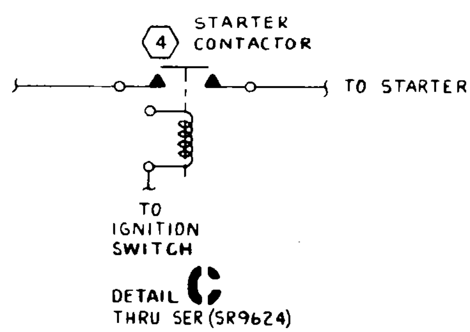
1 APPLIES TO R172 & FR172 ONLY

2 APPLIES TO 172 & F172 ONLY

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL "A" & "B" 0570451 SER IN PA6 PA7 SER OUT PA4 (SR9624) (SR9625)	1-7-80 RAO WAG	JAB RF
B	BY REV: ADD DETAIL "C" & S-2475-1 (ADV ZEL) (SR9624)	RAO 2-12-80	
C	BY REV: RELEASED FOR PRODUCTION (SR9624)	RAO 3-5-80	JAB DES



24-3916
25-096



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
DA7	8	S-1562-8-9		S-1367-4-10	S-2447-8	2	SER (SR9624) & ON
DA6	8	S-1562-8-9		S-1367-4-10	S-1367-4-10	SER	(SR9624) (SR9625) & ON
DA5	8	S-1562-8-9		S-1367-4-10	S-2447-8	1	
DA4	8	S-1562-8-9		S-1367-4-10	S-2447-8	2	THRU SER (SR9624)
DA1	8	S-1562-8-9		S-1367-4-8	S-1367-4-10	THRU SER	(SR9624) (SR9625)

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
6	S-2475-1	BATTERY CONTACTOR	
5	0570451	BUS BAR	
4	S-2443-1	STARTER CONTACTOR	
3	C669514	INST CLUSTER	1
2	S1320-5	INDICATOR	2
1	S1360-5L	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: 0570311 P 4.6

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	12-15-78
GROUP		12-19-78
DRAWN	D. HAUN	12-7-78
CHECK	BORLESKE	12-12-78
STRESS		
PROJ	R FIFE	12-20-78
APPD		
OTHER		

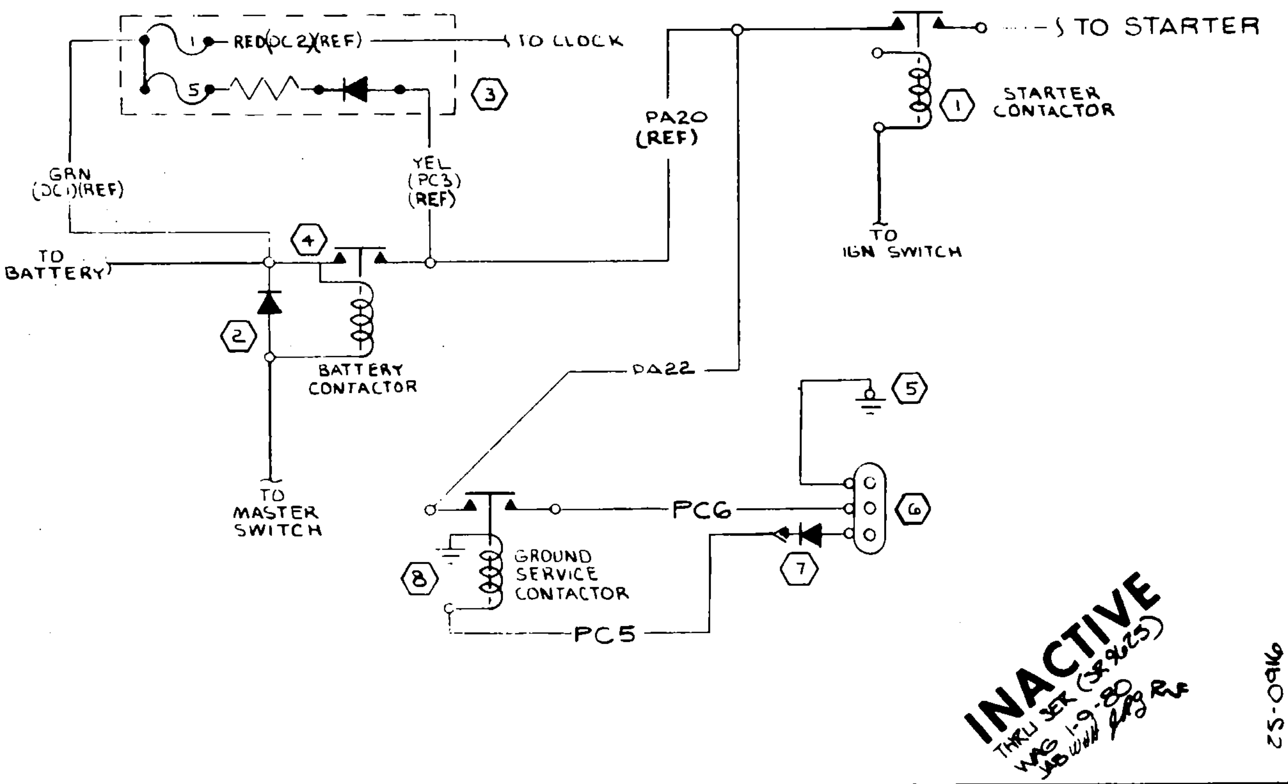
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — AMMETER

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE | SR9270 | PAGE: 4.2

REVISION			
LET	DESCRIPTION	DATE	APP'D
A	BY REV: PC6 WAS PC1 (REF) PC5 WAS PC2 (REF) (NOW SHOP PRACT) INACTIVATE DWG (SR9625)	WAG 1-9-80	JAB, JRG, RWF



PC6	4	S1562-4-9		S1367-6-14	S1367-6-13		
PC5	22			S1493-1	S1367-1-10		
PA 22	4	S-1562-4-9		S-1367-6-5	S-2447-4		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
8	S-1577-1	CONTACTOR	
7	1570043	DIODE BOARD	
6	MS3506-1	RECEPTACLE	
5	0312155	GROUND STRAP	
4	S-1580-1	BATTERY CONTACTOR	
3	0712031	FUSE & DIODE ASSY	
2	0770728	DIODE ASSY	
1	S-2443-1	STARTER CONT	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570311 PG 4.3

SUPERSEDED BY: 4.16

CONTRACT NO:

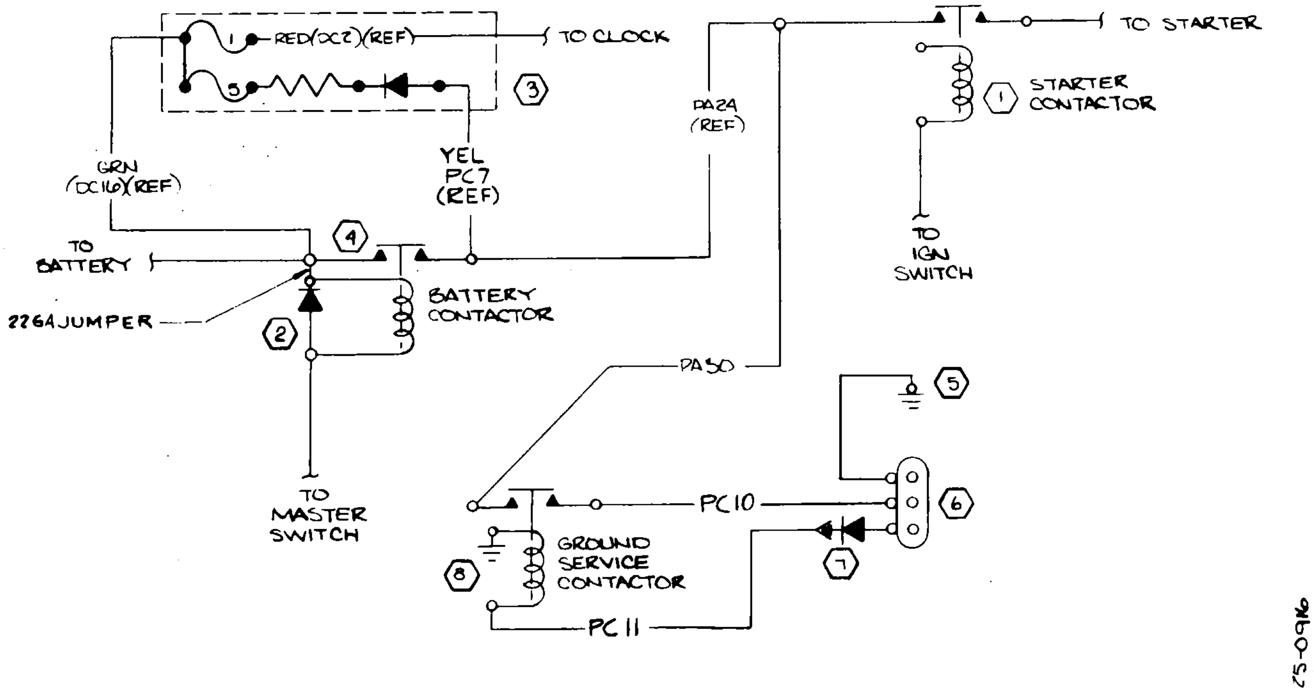
	NAME	DATE
DESIGN	WHITSON	12-15-78
GROUP	W. Holmden	12-14-78
DRAWN	D.D. HAUN	11-22-78
CHECK	BORLESKE	12-12-78
STRESS		
PROJ	R FIFE	12-20-78
APPD	JRG	
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — GROUND SERVICE RECEPTACLE (OPT) (R172 & FR172)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311
SCALE: NONE	(SR 9270	PAGE: 4.14

REVISION			
LET	DESCRIPTION	DATE	APPD



PC11	22			S-1493-1	S-1367-H0		
PC10	4	S-1562-4-9		S-1367-6-14	S-2447-4		
PA50	4	S-1562-4-9		S-2447-4	S-2447-4		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION
8	S-2475-1	EXT. PWR. CONTACTOR
7	1570043	DIODE BOARD
6	MS 3506-1	RECEPTACLE
5	0312155	GROUND STRAP
4	S-2475-1	BATTERY CONTACTOR
3	0712031	FUSE & DIODE ASSY
2	0770728	DIODE ASSY
1	S-2443-1	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: 0570311 PG. 414

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-9-80
GROUP	D.Hudson	1-14-80
DRAWN	GOINGS	1-7-80
CHECK	BORLESKE	1-8-80
STRESS		
PROJ	R. FIFE	1-14-80
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO.

PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — GROUND SERVICE RECEPTACLE (OPT)(R172)(FR172)

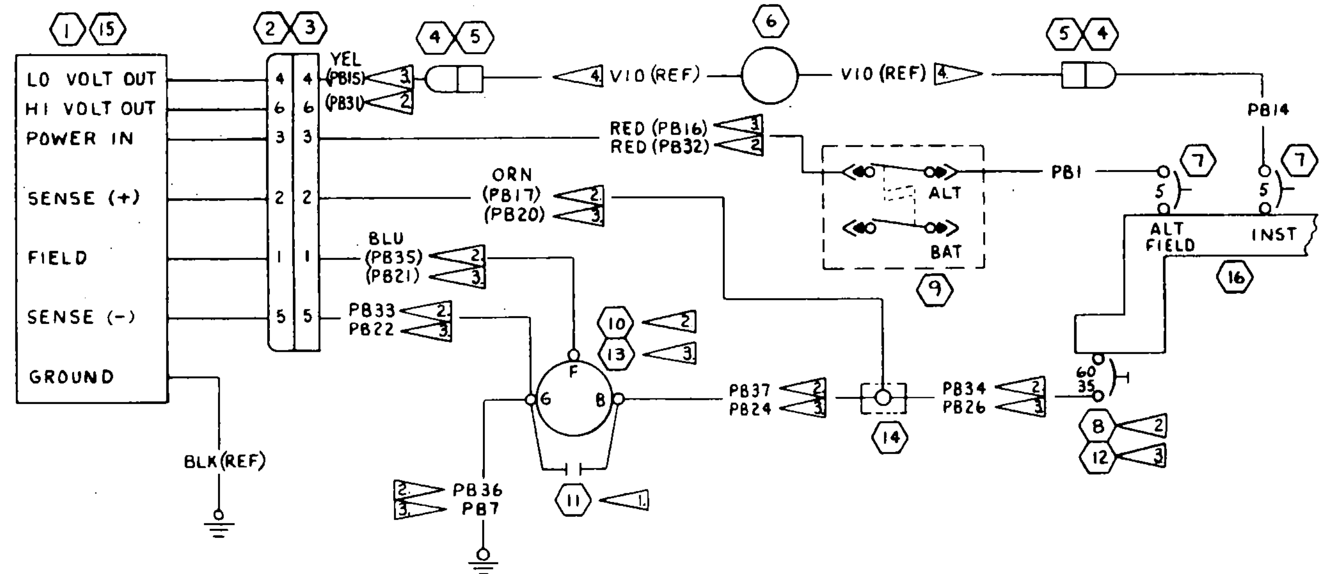
SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SR 9625) PAGE: 4.K0

LET	DESCRIPTION	DATE	APPD
A	BY REV: RELEASED FOR PRODUCTION (SR9624) (SR9625)	RAO 3-5-80	JAB DES

NOTES:

1. PART OF BASIC AVIONICS KIT
2. FOR USE ON 172 & F172 ONLY
3. FOR USE ON R172 & FR172 ONLY
4. TERMINATE VENDOR FURNISHED WIRES WITH S-1636-1 PIN



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	TERMINALS		SERIALS
PB37	8	S-1562-8-9		S-1943-1	S-1943-1	2	
PB36	8	S-1562-8-9		S-1943-1	S-1943-3	2	
BLU(PB35)	16	-16-6		S-2099-8	S-1367-2-10	2	
ORN(PB17)	20	-20-3		S-2099-6	S-1367-1-12	2	
PB34	8	S-1562-8-9		S-1943-1	S-1367-4-8	2	
PB33	20			S-2099-6	S-1367-1-10	2	
RED(PB32)	20	-20-2		S-2099-6	S-1493-1	2	
YEL(PB31)	20	-20-4		S-2099-6	S-1635-1	2	
PB24	10	S-1562-10-9		S-1367-3-12	S-1367-3-12	3	
PB22	20			S-2099-6	S-1367-1-10	3	
BLU(PB21)	16	-16-6		S-2099-8	S-1367-2-10	3	
ORN(PB20)	20	-20-3		S-2099-6	S-1367-1-12	3	
RED(PB16)	20	-20-2		S-2099-6	S-1493-1	3	
YEL(PB15)	20	-20-4		S-2099-6	S-1635-1	3	
PB14	22			S-1367-1-6	S-1635-1		
PB26	10	S-1562-10-9		S-1367-3-12	S-1367-3-8	3	
PB7	10	S-1562-10-9		S-1367-3-10	S-1367-3-12	3	
PB1	22			S-1493-1	S-1367-1-6		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
16	0570451	BUS BAR	
15	C611005-0102	ALT CONTROL UNIT	
14	0570314	TERMINAL BOARD	
13	C611502-0203	ALTERNATOR ASSY	
12	S-1232-35	CIRCUIT BREAKER	
11	S-1915-1	CAPACITOR	
10	C611503-0102	ALTERNATOR ASSY	
9	S-1994-1-1	SWITCH	
8	S-1232-60	CIRCUIT BREAKER	
7	S-1360-5L	CIRCUIT BREAKER	
6	S-2135-2	LAMP ASSY	
5	S-1637-2	HOUSING	
4	S-1637-1	HOUSING	
3	S-2373-2	CONNECTOR	
2	S-2373-1	CONNECTOR	
1	C611005-0101	ALT CONTROL UNIT	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570311 PG 4 7

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN		
GROUP	D. H. Warden	3-12-80
DRAWN	OBERMUELLER	2-12-80
CHECK	BORLESKE	3-5-80
STRESS		
PROJ	J. Tenfill	
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — ALTERNATOR SYSTEM 172 F172 R172 & FR172

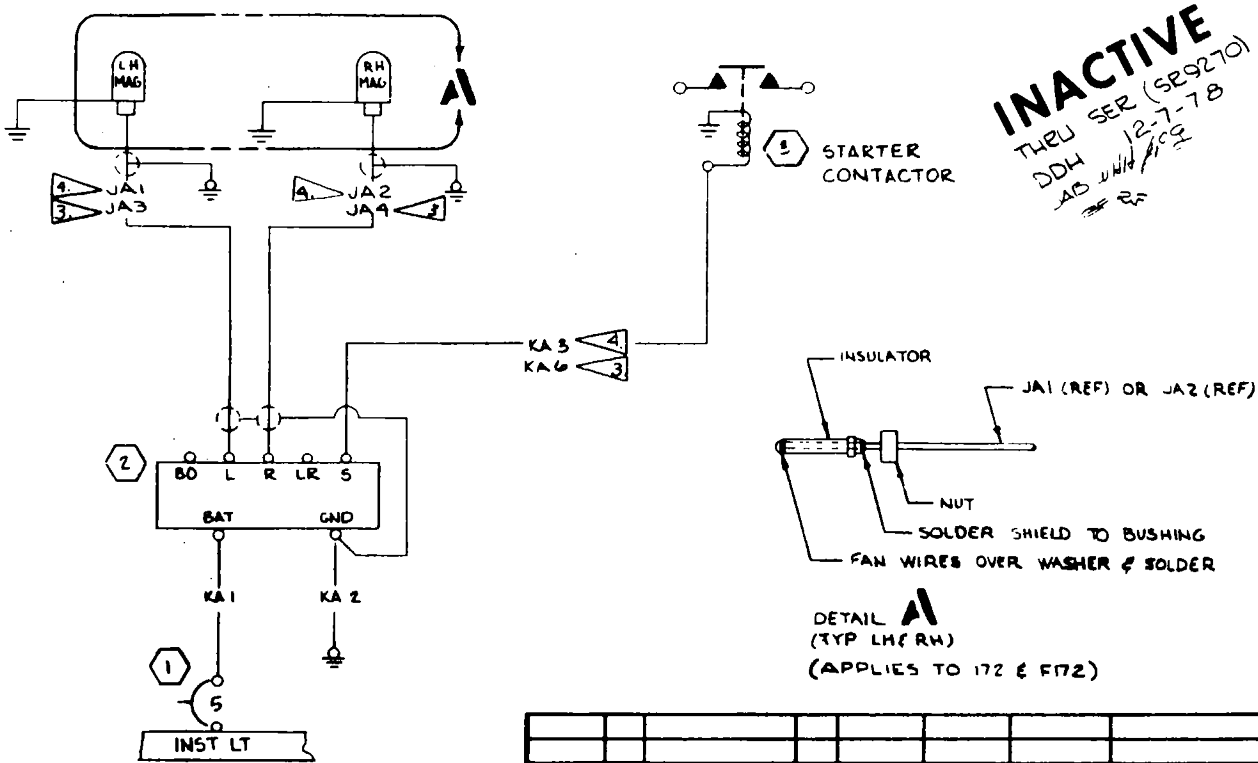
SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE (SR9624)(SR9625) PAGE: 4.17

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD JA3 & JA4 WIRE ADD FLAG NOTE 3 & 4; ADD KA6 WIRE (SR 8953) (SR 8954)	LSS 4-20-77	RF
B	BY REV: ADD FLAG NOTES (NOW SHOP PRACTICE) INACT DWG (SR 9270)	DDH 12-7-78	

NOTES:

1. TERMINATE CENTER CONDUCTOR WITH S-1367-1-6; TERMINATE SHIELDS WITH S-1367-2-6 (AT SWITCH)
2. TERMINALS SUPPLIED WITH ENGINE (172 & F172)
3. APPLIES TO R172 & FR172
4. APPLIES TO 172 & F172
5. TERMINATE CENTER CONDUCTOR WITH S-1367-1-8 TERMINATE SHIELDS WITH S1367-2-6 (AT MAG)



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
KA6	22			S-1367-1-6	S-1367-1-10	3	
JA4	18S			1	5	3	
JA3	18S			1	5	3	
JA 2	18S			1	2	4	
JA 1	18S			1	2	4	
KA 3	22			S-1367-1-6	S-1367-1-10	4	
KA 2	22			S-1367-1-6	S-1367-1-8		
KA 1	22			S-1367-1-6	S-1367-1-6		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
3	S-1577-1	STARTER CONTACTOR	
2	C292501-0105	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: 0570101 P 5.1.0

SUPERSEDED BY: 0570311 P 5.2

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W.d.Hand	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	FIFE	1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — MAGNETO SYSTEM

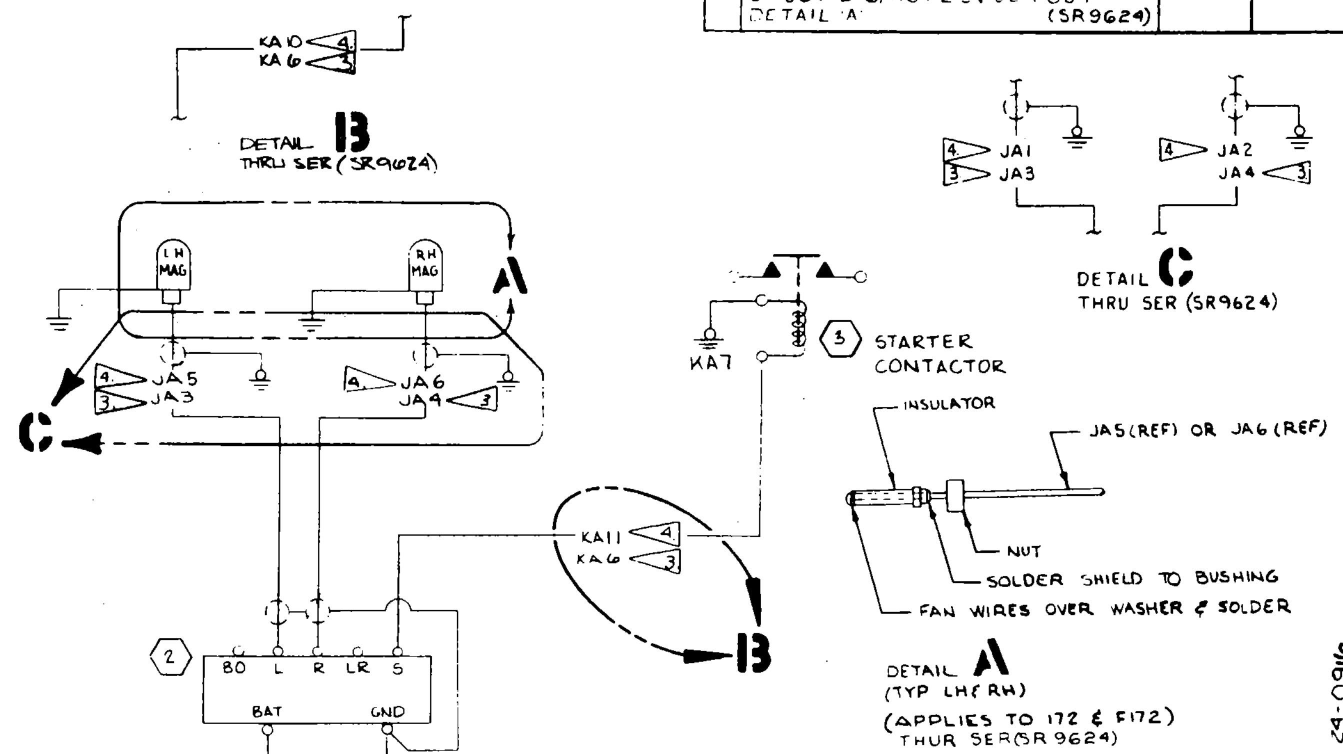
SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

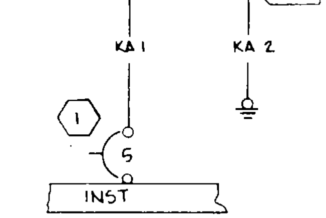
SCALE: NONE (SR 8453) (SR 8454) PAGE: 5.1

NOTES:

1. TERMINATE CENTER CONDUCTOR WITH S-1367-1-6; TERMINATE SHIELDS WITH S-1367-2-6 (AT SWITCH)
2. ~~TERMINALS SUPPLIED WITH ENGINE MFR (F172)~~
3. APPLIES TO R172 & FR172
4. APPLIES TO 172 & F172
5. TERMINATE CENTER CONDUCTOR WITH S-1367-1-10 TERMINATE SHIELDS WITH S1367-2-10 (AT MAG)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: INST WAS INST LT (NOW SHOP PRACTICE)	MOK 5-24-79	JAB RF
B	BY REV: SER OUT KA10, SER IN KA11 & ADD DETAIL "B" (SR9624)	WAG 1-7-80	JAB RF
C	BY REV: ADD DETAIL C, JA5, JA6 & SER (ADV REL) (SR9624)	RAO 2-12-80	JRG
D	BY REV: RELEASED FOR PRODUCTION (SR9624)	RAO 3-5-80	JAB JRG DES
E	BY REV: DELETE NOTE 2: S-1367-1-10 WAS S-1367-1-8, S1367-2-10 WAS S-1367-2-6/NOTE 5: SER OUT DETAIL 'A' (SR9624)	FAS 4-1-80	JAB JRG DES





WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
JA6	18S			1	5	4	SER (SR9624) & ON
JA5	18S			1	5	4	SER (SR9624) & ON
KA11	22			S-1367-1-6	S-1367-1-10		SER (SR9624) & ON
KA7	22			S1367-1-10	S1367-1-12		
KA6	22			S-1367-1-6	S-1367-1-10	3	
JA4	18S			1	5	3	
JA3	18S			1	5	3	
JA 2	18S			1	2	4	THRU SER (SR9624)
JA 1	18S			1	2	4	THRU SER (SR9624)
KA 10	22			S-1367-1-6	S-1367-1-10	4	THRU SER (SR9624)
KA 2	22			S-1367-1-6	S-1367-1-8		
KA 1	22			S1367-1-6	S-1367-1-6		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
3	S-2443-1	STARTER CONTACTOR
2	C292501-0105	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: 0570311 PG 5.1

SUPERSEDED BY:

CONTRACT NO:

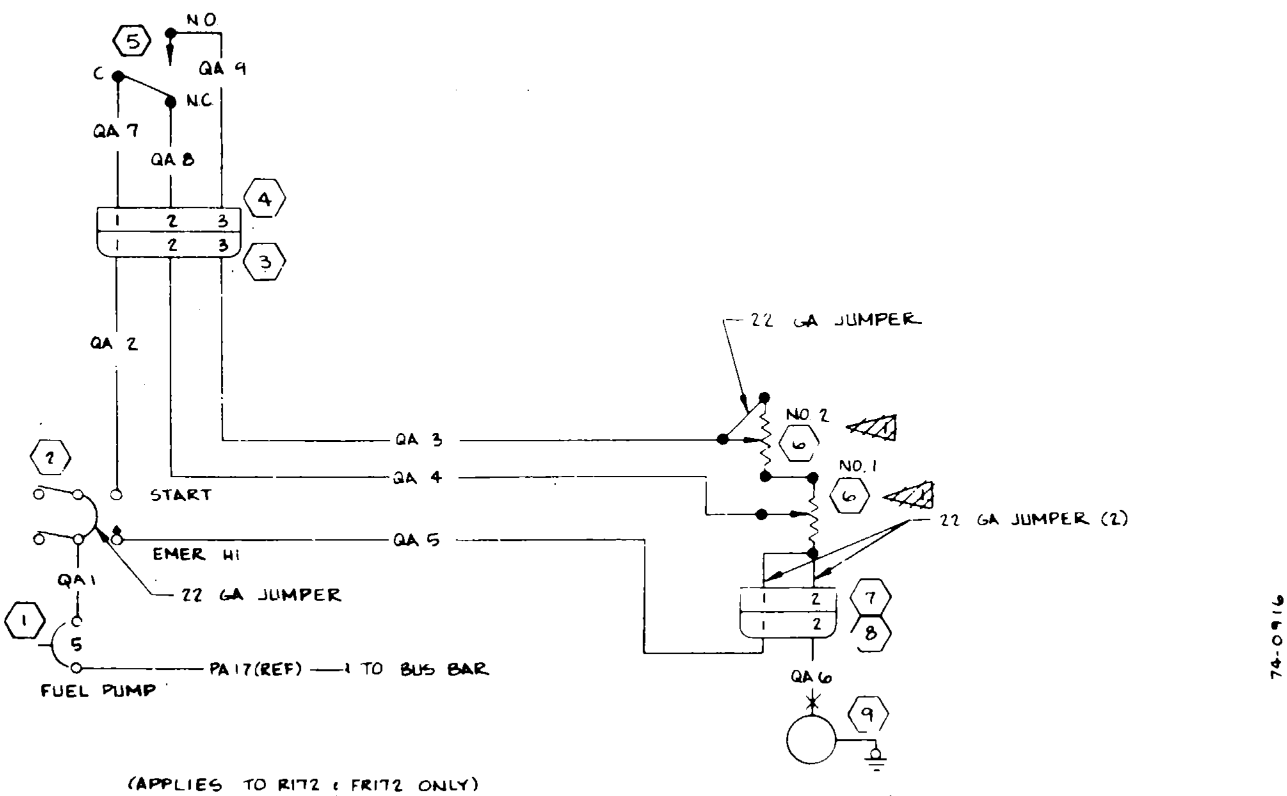
	NAME	DATE
DESIGN	WHITSON	12-15-78
GROUP	W.H. Amden	12-14-78
DRAWN	HAUN	12-7-78
CHECK	BORLESKE	12-7-78
STRESS		
PROJ	R FIFE	12-20-78
APPD	JRG GF	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — MAGNETO SYSTEM

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311
SCALE: NONE	SR 9270	PAGE: 5.2

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV : DELETE NOTE 1; PA17(REF) WAS PA10(REF) (SK 8774)	CRS 11-7-77	JAB RF



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
QA 9	22			SOLDER	S 1636 1		
QA 8				SOLDER	S 1636 1		
QA 7				SOLDER	S 1636 1		
QA 6				S 1635 1	S 1370 1		
QA 5				S 1493 1	S 1635 1		
QA 4				S 1635 1	SOLDER		
QA 3				S 1635 1	SOLDER		
QA 2				S 1493 1	S 1635 1		
QA 1	22			S 1367 1 6	S 1493 1		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
9	C291504 0201	FUEL PUMP	
8	S-2035-1	HOUSING	
7	S-2035-2	HOUSING	
6	AMOR-20 10	RESISTOR	
5	S-1856-1	SWITCH	
4	S-1638-1	HOUSING	
3	S-1638-2	HOUSING	
2	S-1846-3-2	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: 0570101 P 71.0

SUPERSEDED BY:

CONTRACT NO.

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	[illegible]	-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	FIFE	-12-77
APPD	[illegible]	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE **WIRING DIAGRAM — FUEL PUMP**

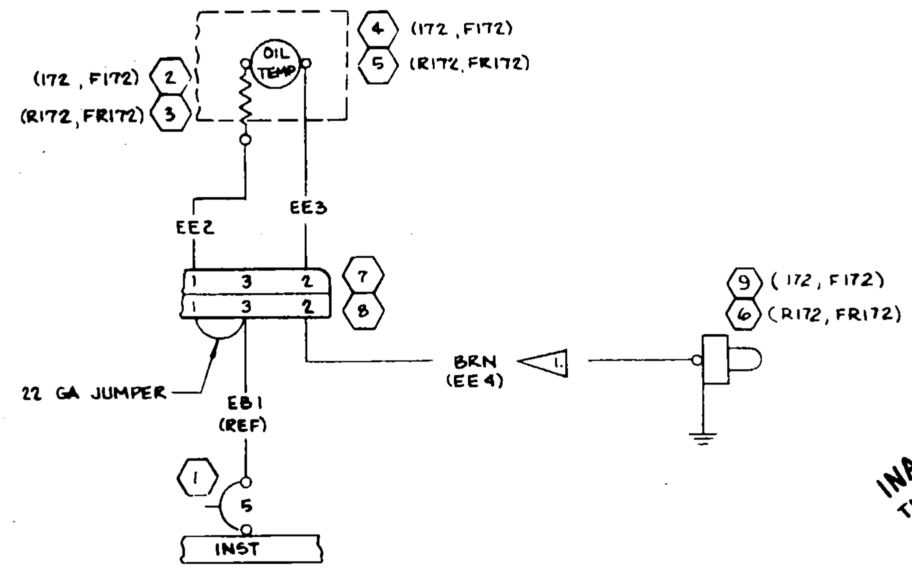
SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE | (SK8454) | PAGE: 7.1

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV. ADD S-1630-1 SENDING UNIT (SR 8453)	LSS 4-20-77	JAB RF
B	BY REV. ADD GND FOR SENDING UNIT INAC. DWG (SR9104)(SR9105)	NTL 10-18-78	JAB RF
C	BY REV: C669512-0104 WAS C669512-0102; S-1630-3 WAS S-1630-1 (SR9435)(REF)	NTL 2-19-79	RF

NOTES:

1. MATL IS ALPHA 5857-7 OR BELDEN 83009-1



INACTIVE THRU SER (SR9104)(SR9105) 10-18-78 NTL JAB RF

05-0916
04-0916

BRN (EE 4)	18	1		S-1636-1	S-1367-1-10		
EE 3	22			S-1367-1-10	S-1635-1		
EE 2	22			S-1635-1	S-1367-1-10		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
9	S-1630-3	SENDING UNIT	
8	S-1641-9	HOUSING	
7	S-1640-9	HOUSING	
6	S-1630-4	SENDING UNIT	
5	C669512-0103	INST CLUSTER	
4	C669512-0104	INST CLUSTER	
3	417813	RESISTOR	
2	819210	RESISTOR	
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: 0570101 P 7.2.0

SUPERSEDED BY: 0570311 P7.3

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP		1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ		1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — OIL TEMPERATURE

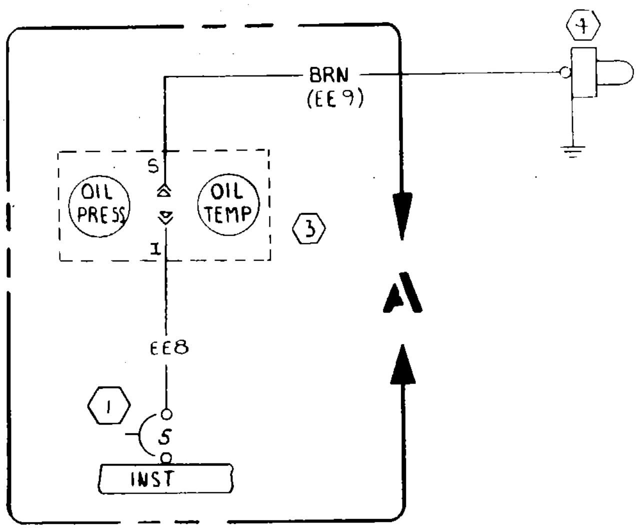
SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

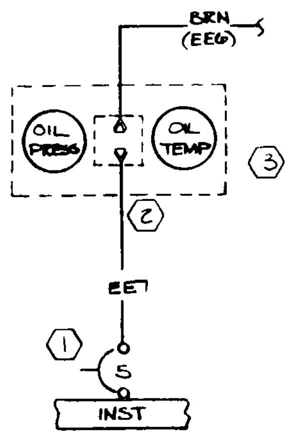
SCALE: NONE (SR8453)(SR8454) PAGE: 7.2

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD NOTE 2. DELETE (SR9105) FROM TITLE BLOCK (NOW SHOP PRACTICE)	MDR 5-24-79	JAB JRS RF
B	BY REV: ADD NOTE ◁3 & EE9, EE8 DETAIL "A" & SER (SR9742)	WAG 1-21-80	MDR
C	BY REV: ADD DETAIL "B", EE10 & SER (ADV REL) (SR9624)	RAO 2-12-80	JRS
D	BY REV: DELETE DETAIL "B", EE10 & SER; RELEASED FOR PRODUCTION (SR9624)	RAO 3-5-80	JAB JRS DES

NOTES:

1. ▷ MATERIAL IS ALPHA 5857-7 OR BELDEN 83009-1
2. THIS PAGE APPLIES ONLY TO 172 F172
3. ▷ COVER S1493-1 TERMINAL WITH S1694-6-1.0 HEAT SHRINK TUBING; TERMINAL DESIGNATIONS (S, I) TO BE STAMPED ON TUBING WITH WHITE INK





DETAIL A
THRU SER (SR9742)

24-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BRN (EE9)	18	◁1		S-1493-1	S1367-1-10	◁3	SER (SR9742) & ON
EE8	20			S-1367-1-6	S1493-1	◁3	SER (SR9742) & ON
BRN (EE6)	18	◁1		S2376-1	S-1367-1-10		THRU SER (SR9742)
EE 7	22			S-1367-1-6	S-2376-1		THRU SER (SR9742)

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION
4	S1630-5	SENDING UNIT
3	C669535-0101	INST CLUSTER
2	2965164	CONNECTOR
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: 0570311 P 7.2

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	11-20-78
GROUP	W. Harden	12-9-78
DRAWN	LANCASTER	10-9-78
CHECK	BORLESKE	10-19-78
STRESS		
PROJ	R. FIFE	12-11-78
APPD	JRS	
OTHER		

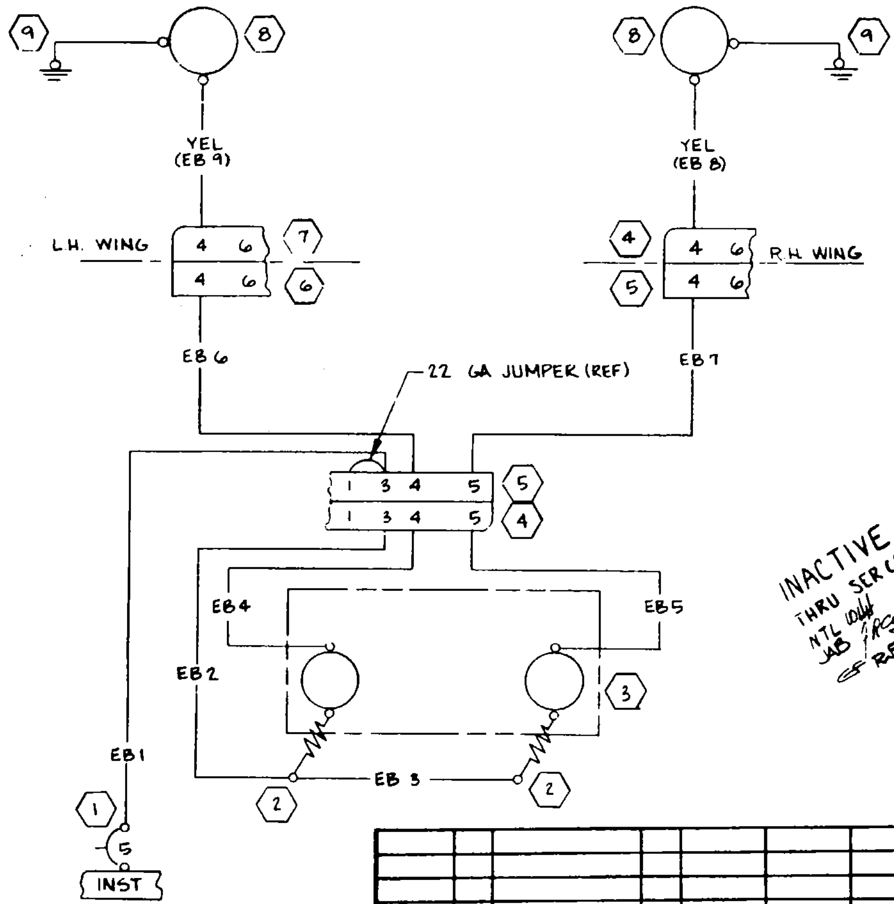
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — OIL TEMPERATURE

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE | (SR9104) -172 | PAGE: 7.3

REVISION			
LET	DESCRIPTION	DATE	APPD



INACTIVE
THRU SER (SR9104) (SR9105)
10-18-78
NTL
JAB
RF

04-0916
05-0916

YEL (EB 9)	20	-20-4		5-1635-1	5-1367-1-10		
YEL (EB 8)		-20-4		5-1635-1	5-1367-1-10		
EB 7				5-1636-1	5-1636-1		
EB 6	20			5-1636-1	5-1636-1		
EB 5	22			5-1635-1	5-1367-1-10		
EB 4				5-1635-1	5-1367-1-10		
EB 3				5-1367-1-8	5-1367-1-8		
EB 2				5-1635-1	5-1367-1-8		
EB 1	22			5-1367-1-6	5-1636-1		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

9	0413247	GROUND STRAP	
8	0523557	TRANSMITTER	
7	5-1640-6	HOUSING	
6	5-1641-6	HOUSING	
5	5-1641-9	HOUSING	
4	5-1640-9	HOUSING	
3	C669511	INST CLUSTER	
2	819210	RESISTOR	
1	5-1360-5L	CIRCUIT BREAKER	
ITEM NO.	PART NO.	DESCRIPTION	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570101 P. 8.1.0

SUPERSEDED BY: 0570311 P. 8.6

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W. Harden	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	[illegible]	1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — FUEL GAGES & TRANSMITTER

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SR8453)(SR8454) PAGE: 8.1

NOTES:

1. APPLIES TO R172 & FR172 ONLY
2. APPLIES TO 172 & F172 ONLY
3. ~~WHEN HOURMETER IS INSTALLED WITHOUT CLOCK, DELETE DF4 & USE EITHER DF1 OR DF2 WHEN HOURMETER IS INSTALLED WITH CLOCK DELETE DF1 OR DF2 & USE DF4~~
4. REQD ONLY WHEN OPT DIGITAL CLOCK IS INSTALLED

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: DELETE NOTE 3 OBS NEVER USE DF1 & DF2 "NOW SHOP PRACTICE"; C664503-0101 WAS C664502-0101; ADD NOTE 4, RED DF6, S1360-5L, C664511-0101, F682Z & DETAIL A (SR9080)(SR9187)	KLL CMK 7-13-78	GDA JAB JRS RF
B	BY REV: ADD DETAIL "A". DF7; RED (DC14)(REF) WAS RED (DC11)(REF) (SR8774)(REF) (SR9187)(REF) INAC DWG (SR9104)(SR9105)	NTL 10-18-78	JAB WHH JRS RF
C	BY REV: S-1367-1-10 WAS S-1493-1/ DF7 (NOW SHOP PRACTICE)	RLY 1-23-80	JAB JRS RF

INACTIVE THRU SER (SR9104)(SR9105) 10-18-78 NTL WHH JAB JRS RF

04 0916
05 0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
DF7	22			S1367-1-6	S-1367-1-10		(SR8774) & ON
RED DF6	22			S-1367-1-6	S-1635-2		4
DF5	22			S1493 1	S1367 1-6		
DF4	22			S-1367 1-6	S-1636-1		
RED (DF3)	22	-22-2		S-1367-1-6	S 1493 1		
DF2	22			S1635-1	S1367-1-6		OBS NEVER USED
DF1	22			S1635-1	S1367-1-6		OBS NEVER USED

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
12	C664511-0101	DIGITAL CLOCK	
11	S-1360-5L	CIRCUIT BREAKER	
10	0770728	DIODE ASSY	
9	C664508-0101	CLOCK	
8	S-1640-9	HOUSING	
7	S-1641-9	HOUSING	
6	C664503-0101	HOURMETER	
5	S-1637-1	HOUSING	
4	S-1637-2	HOUSING	
3	S-1711-1	PRESSURE SWITCH	
2	0712031	FUSE ASSY	
1	S-1580-1	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: 0570101 P. 8.4.0 & 8.2.0

SUPERSEDED BY: 0570311 P.8.7.0 & 8.7.1

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W.H. Harden	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	P. Fife	1-12-77
APPD		
OTHER		

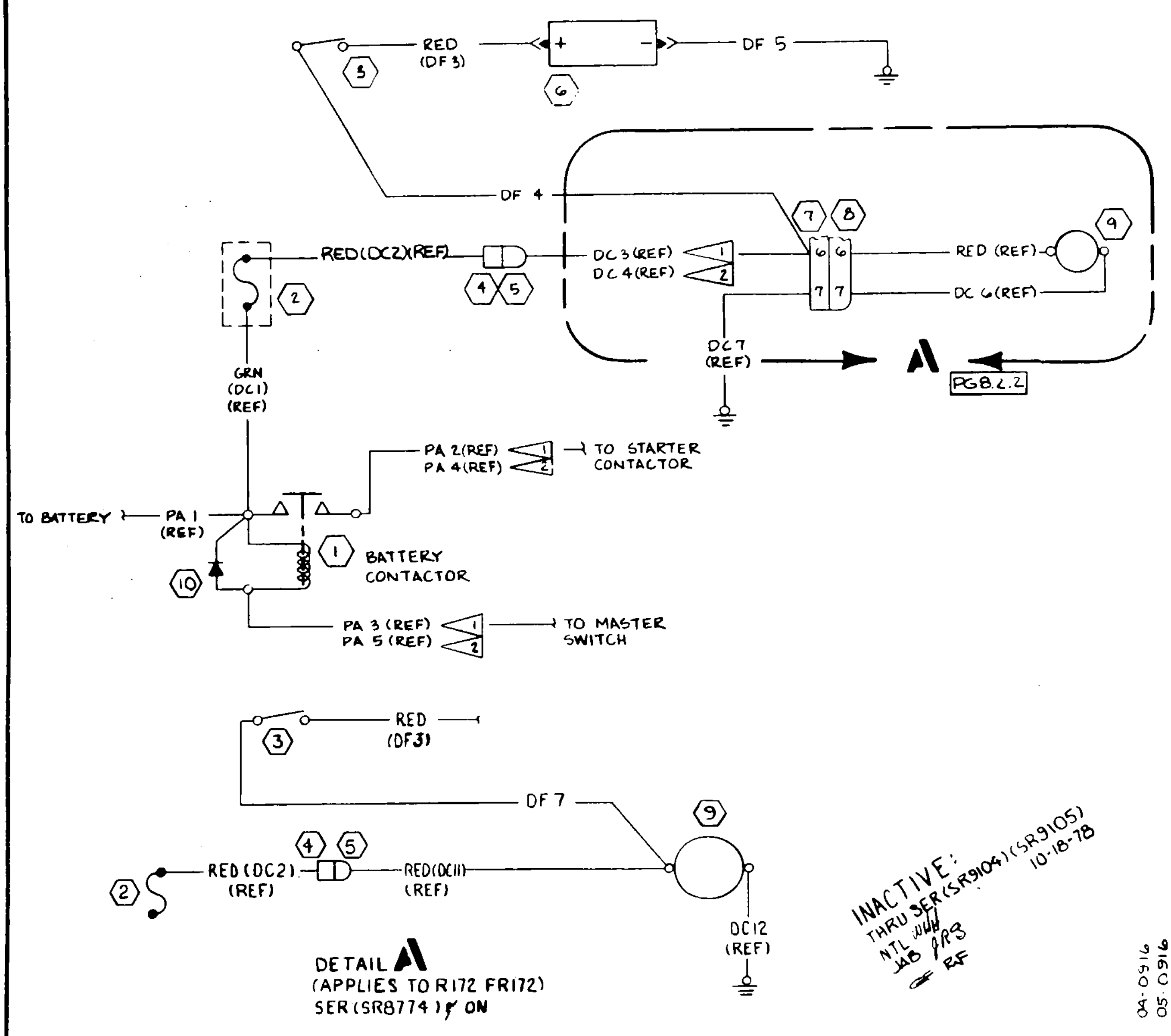
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — HOURMETER (OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SR8453) (SR8454) PAGE: 8.2.0

REVISION			
LET	DESCRIPTION	DATE	APPD
B	SEE SHEET 8.2.0 FOR REVISIONS		



CONTRACT NO		
	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W.H. Harden	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ		1-12-77
APPD		
OTHER		

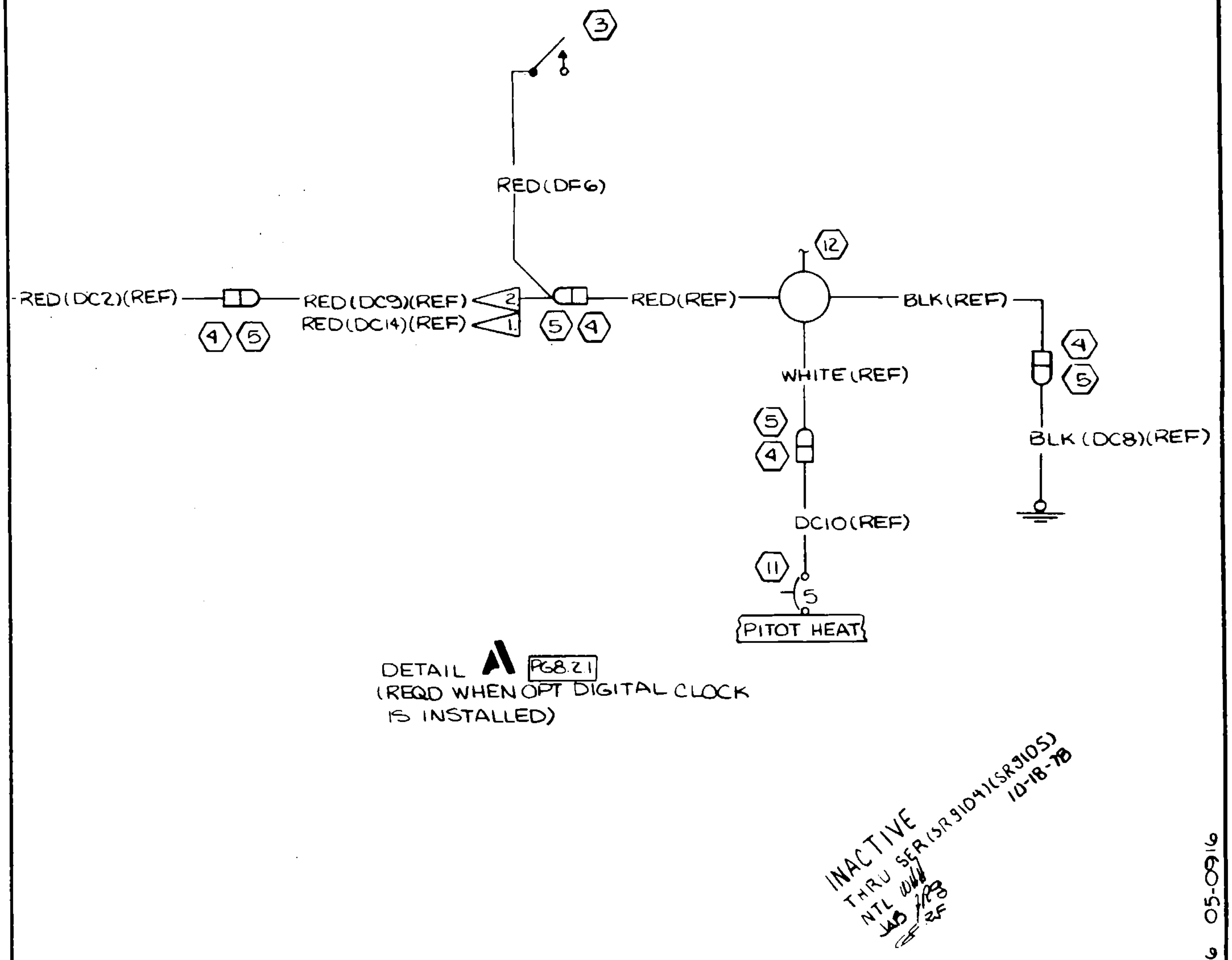
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM - HOURMETER (OPT)

SIZE	CODE IDENT. NO	DWG NO
C	71379	0570311

SCALE: NONE (SR8453) (SR8454) PAGE: 8.2.1

REVISION			
LET	DESCRIPTION	DATE	APPD
B	SEE PG 8.2.0 FOR REVISION		



DETAIL A PG8.2.1
(REQD WHEN OPT DIGITAL CLOCK IS INSTALLED)

CONTRACT NO.		
	NAME	DATE
DESIGN	G STAMM	7-20-78
GROUP	JRGrandfield	7-24-78
DRAWN	C KING	7-13-78
CHECK	BORLESKE	7-14-78
STRESS		
PROJ	R FIFE	7-28-78
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

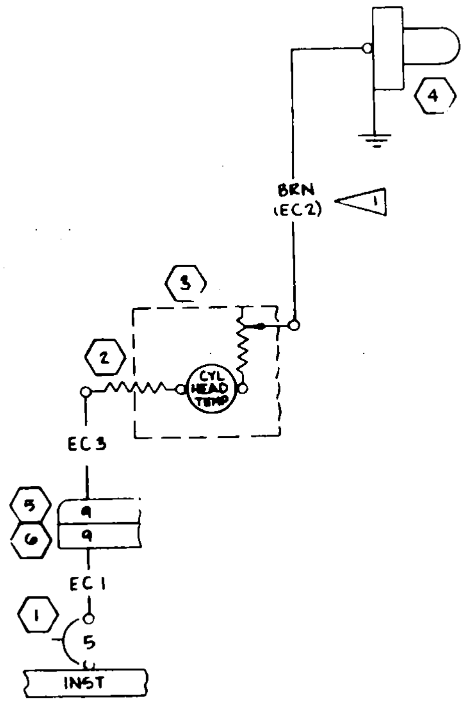
TITLE WIRING DIAGRAM - HOURMETER (OPT)

SIZE	CODE IDENT NO.	DWG NO.
C	71379	0570311
SCALE NONE	(SR9187)	PAGE 8.2.2

REVISION			
LET	DESCRIPTION	DATE	APPD

NOTES:

1. MATERIAL IS ALPHA 5857-7 OR BELDEN 83009-1
2. CRIMP 5-1636-5 TERMINAL AROUND WIRE INSULATION BEND .25 OF STRIPPED WIRE BACK OVER CRIMP & SOLDER PER CES1040. USE MOLEX HT-1921 CRIMPING TOOL ONLY



(APPLIES TO R172 & FR172 ONLY)

INACTIVE: THRU SER (SR8774) 1-31-78
DLP
JAB
GF RF

84 0916

EC 3	22			5-1635-1	5-1367-1-8		
BRN (EC 2)	18	1		5-1367-1-8	5-1636-5	2	
EC 1	22			5-1367-1-6	5-1636-1		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
6	5-1641-9	HOUSING	
5	5-1640-9	HOUSING	
4	5-1372-2	TEMP BULB	
3	C669514	INST CLUSTER	
2	819210	RESISTOR	
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: 0570101 P 8.3.0

SUPERSEDED BY: P 8.5

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	D.H. Borden	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	R.F.	1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — CYLINDER HEAD TEMP

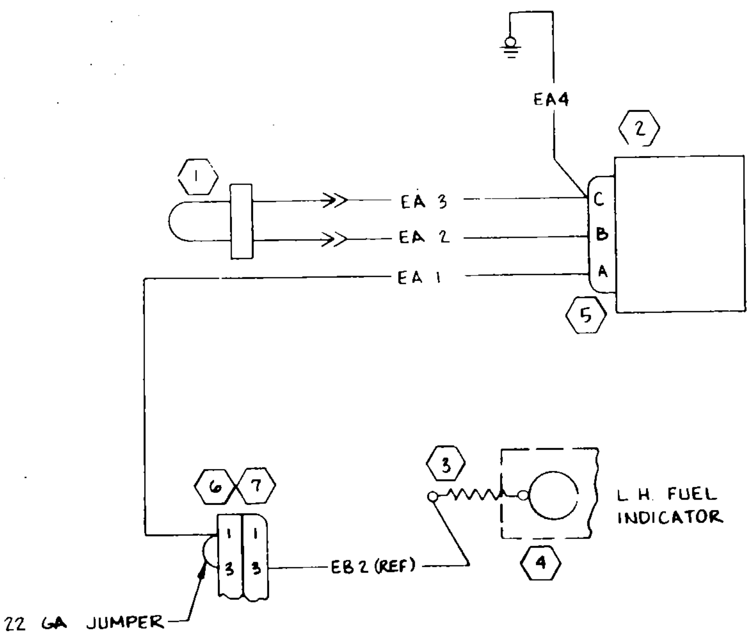
SIZE: C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE | (58845A) | PAGE: 8.3

REVISION			
LET	DESCRIPTION	DATE	APPD

NOTES

1. TERMINALS ARE YZ14-H FURNISHED BY VENDOR (09922)



INACTIVE THRU SER (SR9109) (SR9105) 10-18-78 NTL JAB PRB RF

04-0916
05-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
EA 4	22			SOLDER	S1367-1-8		
EA 3	22			SOLDER	1		
EA 2	22			SOLDER	1		
EA 1	22			SOLDER	S-1636-1		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
7	S-1640-9	HOUSING	
6	S-1641-9	HOUSING	
5	MS3106A-14S-7S	HOUSING	
4	C669511	INST CLUSTER	
3	819210	RESISTOR	
2	S-1311-4	INDICATOR	
1	0550209	PROBE	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO. S-XXX OR CMXXXX-CESSNA STD. NO.

SUPERSEDES: 0570101 P. 85

SUPERSEDED BY: 0570311 P. 8.8

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W.H. Harden	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	R. Fife	1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — CARB AIR TEMPERATURE GAGE

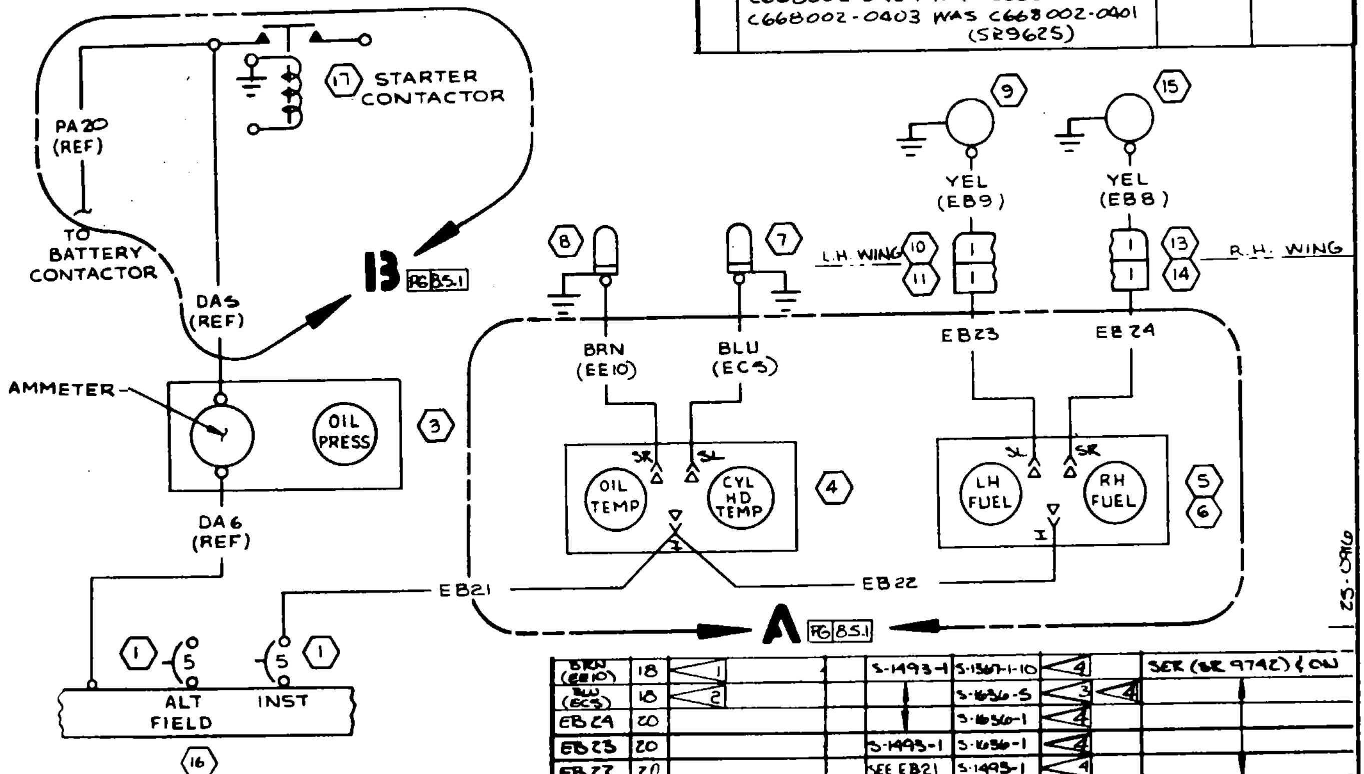
SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SR8453) (SR8458) PAGE: 8.4

NOTES:

1. MATERIAL IS ALPHA 5857-7 OR BELDEN 83009-1
2. MATERIAL IS ALPHA 5857-6 OR BELDEN 83009-6
3. CRIMP S-1636-5 TERM. AROUND WIRE INSULATION USING MOLEX HT-1921 CRIMPING TOOL. BEND BACK .25 OF STRIPPED WIRE OVER CRIMP & SOLDER PER CES1040
4. COVER S 1493-1 TERMINAL WITH S1494-6-1.0 HEAT SHRINK TUBING; TERMINAL DESIGNATIONS (SL, SR, I) TO BE STAMPED ON TUBING WITH WHITE INK

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: S-2376-1 WAS 92281-2 (NOW SHOP PRACTICE)	CMK 8-19-78	JAB GF RF
B	BY REV: ADD DETAIL "A" & "B" BRN (EE10), BLU (EC5) EB24, EB23, EB22 EB21 & NOTE ◁4 & S-2443-1 & PG 8.5.1 & 0570451 DAG (REF) TO BUS BAR WAS DA1 (REF) TO ALT FIELD CKT BKR AT BUS BAR (SR 9270)(SR 9742)(SR 9625)	WAG 1-7-80 RAO	JAB RF
C	BY REV: ADD ◁4 TO (EE10)(EC5). EB24 & EB23 (SR 9742) C668002-0404 WAS C668002-0402 C668002-0403 WAS C668002-0401 (SR 9625)	WAG 1-22-80 GW	RAO RF



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BRN (EE10)	18	◁1		S-1493-1	S-1367-1-10	◁4	SER (SR 9742) & ON
BLU (EC5)	18	◁2			S-1636-5	◁3 ◁4	
EB24	20				S-1636-1	◁4	
EB23	20			S-1493-1	S-1636-1	◁4	
EB22	20			SEE EB21	S-1493-1	4	
EB21	20			S-1367-1-6	S-1493-1	◁4	SER (SR 9742) & ON
EB10	22			S-1367-1-6	S-2376-1		THRU SER (SR 9742)
EB11	22			SEE EB10	S-2376-1		THRU SER (SR 9742)
EB13	20			S-2376-1	S-1636-1		THRU SER (SR 9742)
EB14	20			S-2376-1	S-1636-1		THRU SER (SR 9742)
YEL (EB8)	20	-20-4		S-1635-1	S-1367-1-10		
YEL (EB9)	20	-20-4		S-1635-1	S-1367-1-10		
BLU (EC4)	18	◁2		S-2376-1	S-1636-5	◁3	THRU SER (SR 9742)
BRN (EE5)	18	◁1		S-2376-1	S-1367-1-10		THRU SER (SR 9742)

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
17	S-2443-1	STARTER CONTACTOR	
16	0570451	BUS BAR	
15	C668002-0403	SENDING UNIT-R.H.	
14	S-1641-9	HOUSING	
13	S-1640-9	HOUSING	
12	S-1577-1	STRTR CONTACTOR	
11	S-1641-6	HOUSING	
10	S-1640-6	HOUSING	
9	C668002-0404	SENDING UNIT-L.H.	
8	S-1630-5	SENDING UNIT	
7	S-1372-4	SENDING UNIT	
6	C669537-0102	INST CLUSTER	(LONG RANGE)
5	C669537-0101	INST CLUSTER	(STD)
4	C669538-0101	INST CLUSTER	
3	C669527-0101	INST CLUSTER	
2	2965164	CONNECTOR	
1	S-1360-5L	CKT BKR	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: P 8.3

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	2-8-78
GROUP	D.N. Vinder	2-15-78
DRAWN	PAPE	1-31-78
CHECK	BORLESKE	1-31-78
STRESS	Weitzel	1-30-80
PROJ	R FIFE	2-16-78
APPD	JRS GF	
OTHER		

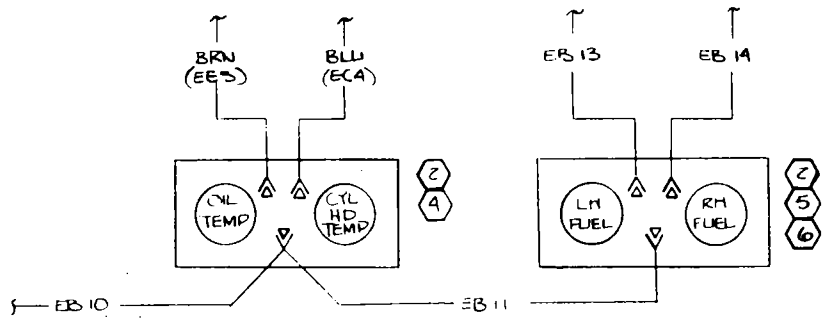
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — INSTRUMENT CLUSTERS & TRANSMITTERS

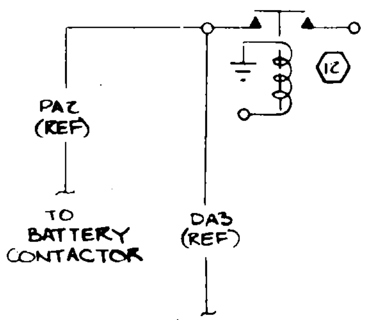
SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE | (SR8774) | PAGE: 8.5.0

REVISION			
LET	DESCRIPTION	DATE	APPD
B	SEE PAGE 8.S.D FOR REVISIONS		



DETAIL **A**
THRU SER (SR 9742)



DETAIL **B**
THRU SER (SR 9270)

25-0016

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
	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	Whitson	1-9-80
GROUP	W.H.Baden	1-14-80
DRAWN	GOINGS	1-7-80
CHECK	BORLESKE	1-8-80
STRESS		
PROJ	R. FIFE	1-14-80
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — INSTRUMENT CLUSTERS & TRANSMITTERS

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311
SCALE: NONE	(SR 9625)	PAGE: 8.S.1

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL B & C664511-0102 DETAIL C & S-2475-1 (SR 9583)(SR9602A (SR 9625)	HHG WAG 1-9-80	
B	BY REV: ADD DC18 (REF) DC17 WAS DC15 (ADV ZEL) (SR9624)	RAO 2-12-80	
C	BY REV: RELEASED FOR PRODUCTION (SR9624)	RAO 3-5-80	DES

NOTES:

1. APPLIES TO R172 & FR172
2. APPLIES TO 172 & F172
3. REQD ONLY WHEN OPT. DIGITAL CLOCK IS INSTALLED

24-0916
25-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
DF 7	22			S-1367-1-6	S-1367-1-10		
RED(DF6)	22	-22-2		S-1367-1-6	S-1635-2	3	
DF 5	22			S-1493-1	S-1367-1-6		
RED(DF3)	22	-22-2		S-1367-1-6	S1493-1		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
12	S-2475-1	CONTACTOR	
11	C664511-0102	DIGITAL CLOCK	
10	C664511-0101	DIGITAL CLOCK	
9	S-1360-5L	CIRCUIT BREAKER	
8	C664503-0101	HOURMETER	
7	C664508-0102	CLOCK	
6	0770728	DIODE ASSY	
5	S-1637-1	HOUSING	
4	S-1637-2	HOUSING	
3	S-1711-1	PRESSURE SWITCH	
2	0712031	FUSE ASSY	
1	S-1580-1	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: 0570311 P.8.2.0, 8.2.1 & 8.2.2

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	11-20-78
GROUP	W.H. Harder	12-8-78
DRAWN	LANCASTER	10-18-78
CHECK	BORLESKE	10-19-78
STRESS		
PROJ	R. FIFE	12-11-78
APPD		
OTHER		

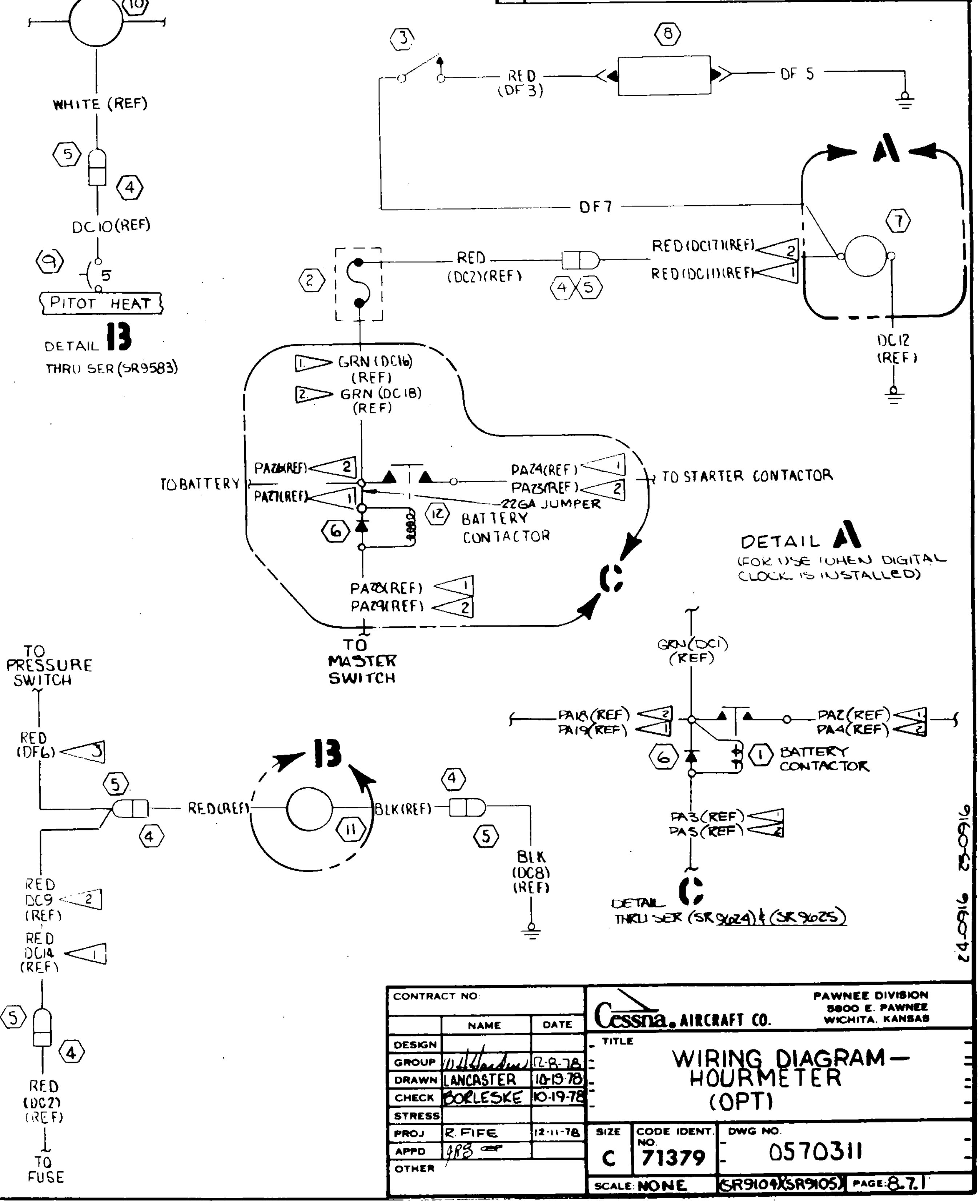
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — HOURMETER (OPT)

SIZE	CODE IDENT NO.	DWG NO
C	71379	0570311

SCALE: NONE (SR9104) (SR9105) PAGE: 8.7.0

REVISION			
LET	DESCRIPTION	DATE	APPD
C	SEE PAGE 8.7.0 FOR REVISION		



CONTRACT NO		
	NAME	DATE
DESIGN		
GROUP	[illegible]	12-8-78
DRAWN	LANCASTER	10-19-78
CHECK	BORLESKE	10-19-78
STRESS		
PROJ	R. FIFE	12-11-78
APPD	[illegible]	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — HOURMETER (OPT)

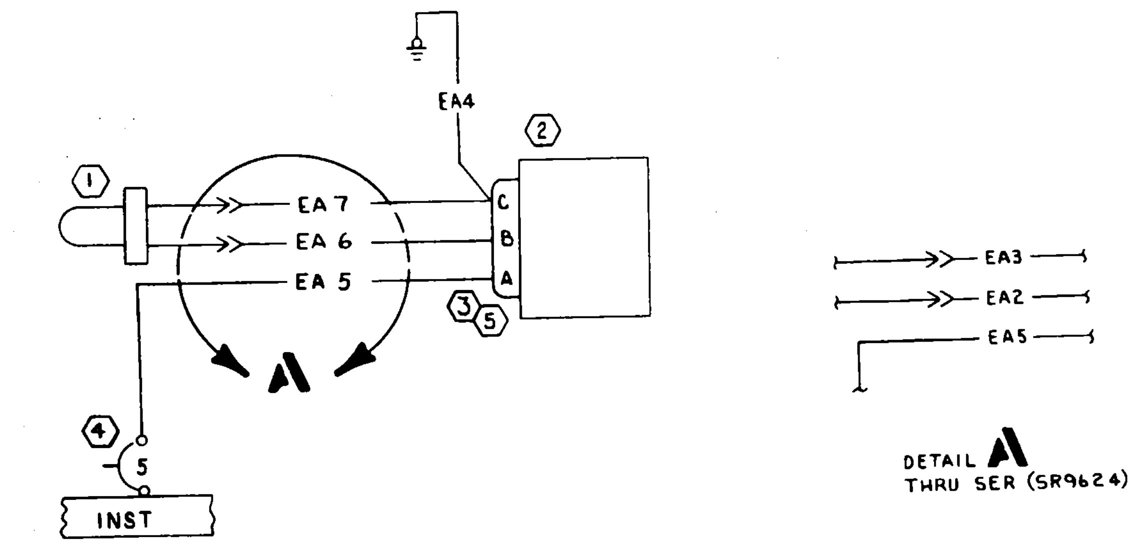
SIZE	CODE IDENT. NO.	DWG NO.
C	71379	0570311

SCALE: NONE (SR9104)(SR9105) PAGE: 8.7.1

NOTES:

1. TERMINALS ARE YZ14-H & FURNISHED BY VENDOR (09922)
2. THIS PAGE APPLIES ONLY TO 172 & F172

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD NOTE 2. DELETE (SR9105) FROM TITLE BLOCK. (NOW SHOP PRACTICE)	MDR 5-24-79	JAB WBB JRG RF
B	BY REV: ADD DETAIL A, EA6, EA7 & SER (SR9624) (ADV REL)	RAO 2-12-80	JRG
C	BY REV: RELEASED FOR PRODUCTION (SR9624)	RAO 3-5-80	JAB WBB JRG DES



9160-2

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
EA 7	22			SOLDER	1	SER (SR9624) & ON
EA 6	22			SOLDER	1	SER (SR9624) & ON
EA 5	22			S-1367-1-6	SOLDER	
EA 4	22			SOLDER	S-1367-1-8	
EA 3	22			SOLDER	1	THRU SER (SR9624)
EA 2	22			SOLDER	1	THRU SER (SR9624)

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
5	MS3057-6A	CLAMP	
4	S-1360-5L	CIRCUIT BREAKER	
3	MS3106A-14S-7S	HOUSING	
2	S-1311-4	INDICATOR	
1	0550209	PROBE	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570311 P. 8.4

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	11-20-78
GROUP	W.J. Harden	12-8-78
DRAWN	LANCASTER	10-19-78
CHECK	BORLESKE	10-20-78
STRESS		
PROJ	R. FIFE	12-11-78
APPD	JRG	
OTHER		

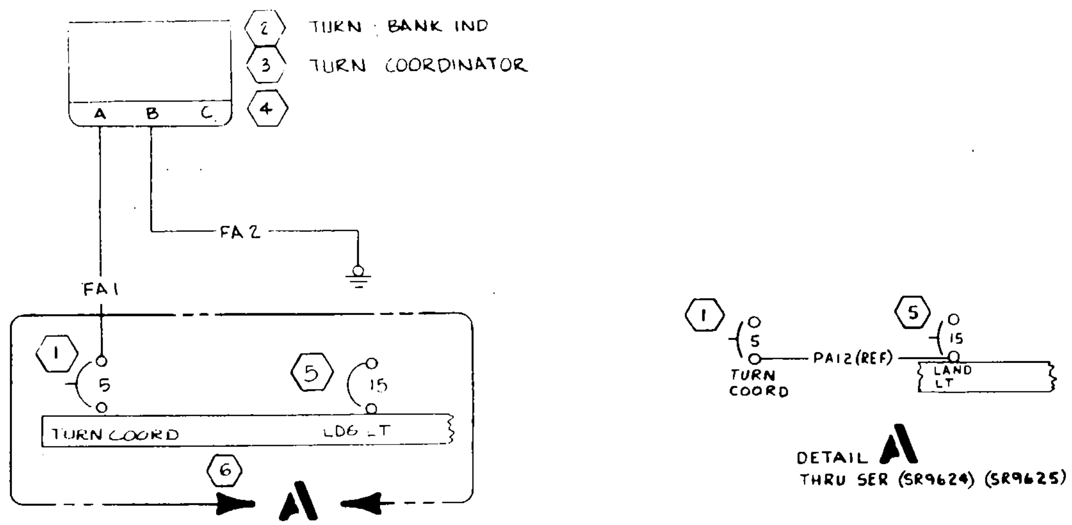
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE **WIRING DIAGRAM — CARB AIR TEMPERATURE GAGE**

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE (SR9104) PAGE: 8.8

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: TURN COORD CALLOUT WAS (BUS BAR) TURN COORD CALL OUT. ADD PA12(REF) WIRE & LD6 LT CIRCUIT BREAKER (SR8453) REF (SR8454) REF	MDR 5-24-79	JAB RF
B	BY REV: ADD 0570451, DETAIL A & SER (SR9624) (SR9625)	RAO 1-21-80	JAB RF



25-0916
24-0916

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS		SERIALS
FA 2	22			SOLDER	S1367-1-8	
FA 1	22			S1367-1-6	SOLDER	

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION
6	0570451	BUS BAR
5	S-1360-15L	CIRCUIT BREAKER
4	MS3106A10SL-3S	CONNECTOR
3	C661003-0505	TURN COORD
2	S1303-2	TURN & BANK IND
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: 0570101 P910 19.2.0

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W.H. Harden	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ		1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — TURN COORDINATOR & TURN & BANK IND

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE (SR8453) (SR8454) PAGE: 9.1

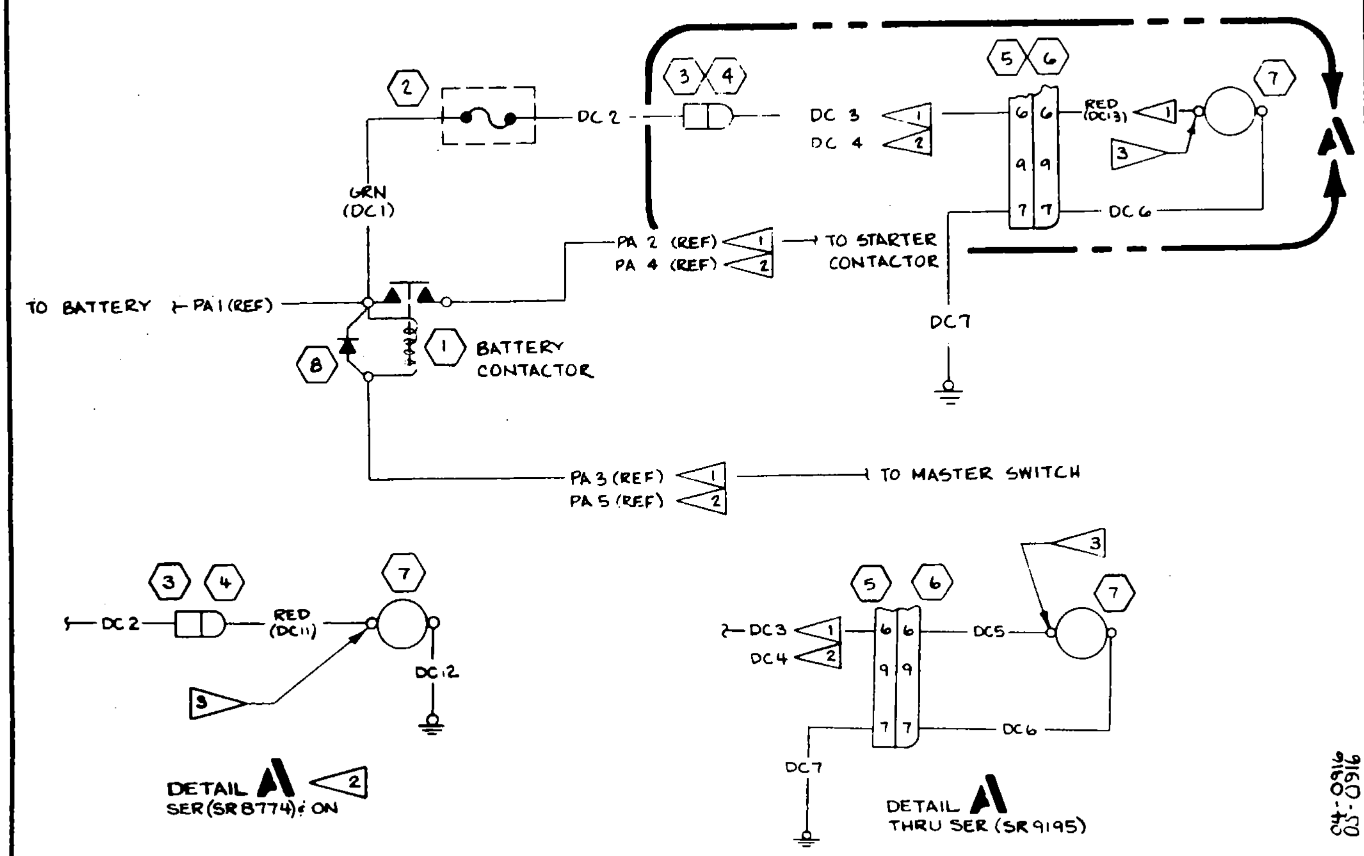
NOTES:

1 APPLIES TO F172 & 172 ONLY

2 APPLIES TO FR172 & R172 ONLY

3 CAUTION — POWER WIRE MUST BE CONNECTED TO "BATT" TERMINAL OF CLOCK, OTHERWISE INTERNAL DAMAGE TO UNIT WILL RESULT

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: CLOCK (STD) WAS CLOCK (OPT) (SR8453)(REF) (SR8454)(REF) S-1367-1-6/DC5 & DC6 WAS S-1367-1-8 (NOW SHOP PRACTICE) ADDED DETAIL "A" (2), DC11, DC12, DC13 & NOTE 3 (SR 9195)(SR 8774)	TFS 4-28-78	JBM / JRB / GF / RF



INACTIVE THRU SER (SR9104)(SR9105) 10-19-78 NTL WDH JAB JRS GF RF

RED (DC13)	22	-22-2		S-1635-1	S-1367-1-6		(SR 9195) & ON
DC 12	↑			S-1367-1-6	S-1367-1-10		(SR 8774) & ON
RED (DC11)		-22-2		S-1635-1	S-1367-1-10		(SR 8774) & ON
DC 7				S 1636 1	S 1367 1 8		
DC 6				S 1635-1	S 1367-1-6		
DC 5				S-1635-1	S 1367 1-6		THRU (SR 9195)
DC 4				S-1635-1	S-1636-1		THRU (SR 8774)
DC 3				S-1635-1	S-1636-1		
DC 2	↓			SOLDER	S-1636-1		
GRN (DC 1)	22	-22-5		S-1367-1-13	SOLDER		
WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
8	0770728	DIODE ASSY	
7	C664508-0102	CLOCK	
6	S-1640-9	HOUSING	
5	S-1641-9	HOUSING	
4	S-1637-1	HOUSING	
3	S-1637-2	HOUSING	
2	0712031	FUSE ASSY	
1	S-1580-1	BATTERY CONTACTOR	

EQUIPMENT TABLE

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W. Whitson	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	Youel	12-20-76
STRESS		
PROJ	[illegible]	1-12-77
APPD	[illegible]	
OTHER		

Cessna. AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — CLOCK

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE | (SR8453) (SR8454) | PAGE: 10.1

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO. S-XXX OR CMXXXX-CESSNA STD. NO.

SUPERSEDES: 0570101 P. 10.10

SUPERSEDED BY: 0570311 P. 10.3

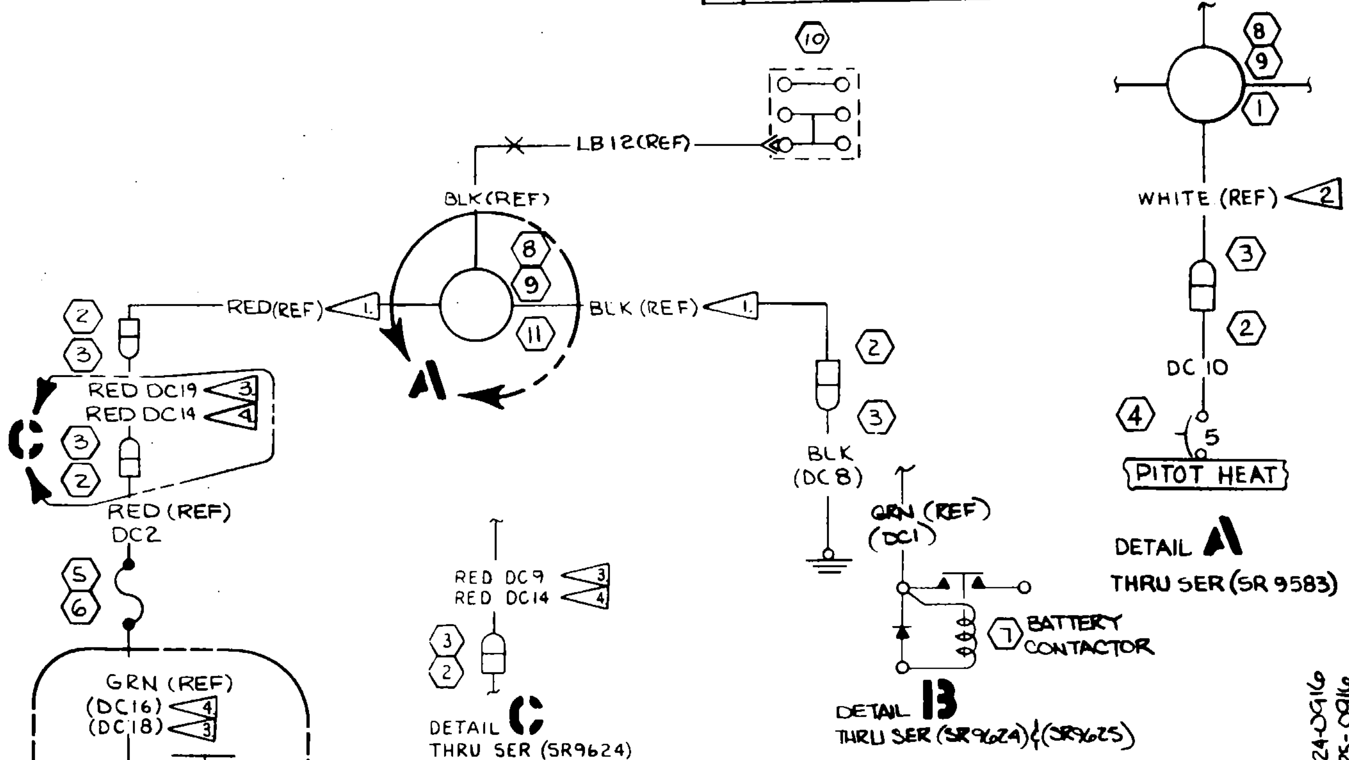
D	BY REV: ADD DETAIL "C", DC19 & SER (ADV ZEL) (SR9624)	RAO 2-12-80	JRS
E	BY REV: RELEASED FOR PRODUCTION (SR9624)	RAO 3-5-80	JAB DWH JRS DES

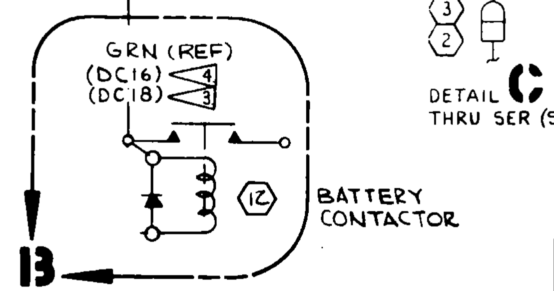
REVISION

LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD NOTE 3,4 & RED DC11; WHITE (REF) WAS RED (REF); RED (REF) WAS BLU (REF); RED DC9 WAS BLU DC9; GRN (DC1)(REF) WAS GRN DC1 (SR9187)	CMK 7-13-78	JAB/RS RF
B	BY REV: RED(DC14) WAS RED(DC11) (SR9187) (REF)	NTL 10-18-78	JAB DWH JRS GF RF
C	BY REV: ADD DETAIL "A" & "B" & S-2475-1 & C664511-0102 (SR9624)(SR9625)(SR9583)	HHG 1-7-80 WAG	JAB DWH JRS RF

NOTES:

1. INSTALL S-1636-1 ON VENDOR WIRE
2. INSTALL S-1635-1 ON VENDOR WIRE
3. APPLIES TO F172 & 172 ONLY
4. APPLIES TO FR172 & R172 ONLY





WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
RED DC19	22	-22-2		S-1635-1	S-1635-1	3	SER (SR9624) & ON
RED ~~DC14~~	22	-22-2		S-1635-1	S-1635-1	4	
DC10	18			S-1367-1-6	S-1636-1		THRU SER (SR9583)
BLK(REF)						1	
WHITE(REF)						2	THRU SER (SR9583)
RED(REF)						1	
RED ~~DC9~~	22	-22-2		S-1635-1	S-1635-1		THRU SER (SR9624)
BLK ~~DC8~~	18	-18-0		S-1635-1	S-1367-1-8		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
12	S-2475-1	BAT. CONTACTOR
11	C664511-0102	DIGITAL CLOCK
10	34003-817	TERMINAL BLOCK
9	S-2413-1	SOCKET
8	MS25231-1819	LIGHT
7	S-1580-1	CONTACTOR
6	S-1091-1	FUSE
5	S-1090-22	FUSEHOLDER
4	S-1360-5L	CIRCUIT BREAKER
3	S-1637-1	HOUSING
2	S-1637-2	HOUSING
1	C664511-0101	DIGITAL CLOCK

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	G. STIMM	4-12-78
GROUP	W. WIEGAND	4-12-78
DRAWN	R. YOUNGERS	4-11-78
CHECK	BORLESKE	4-11-78
STRESS		
PROJ	R. FIFE	4-17-78
APPD	JRS GF	
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM —
DIGITAL CLOCK (OPT)

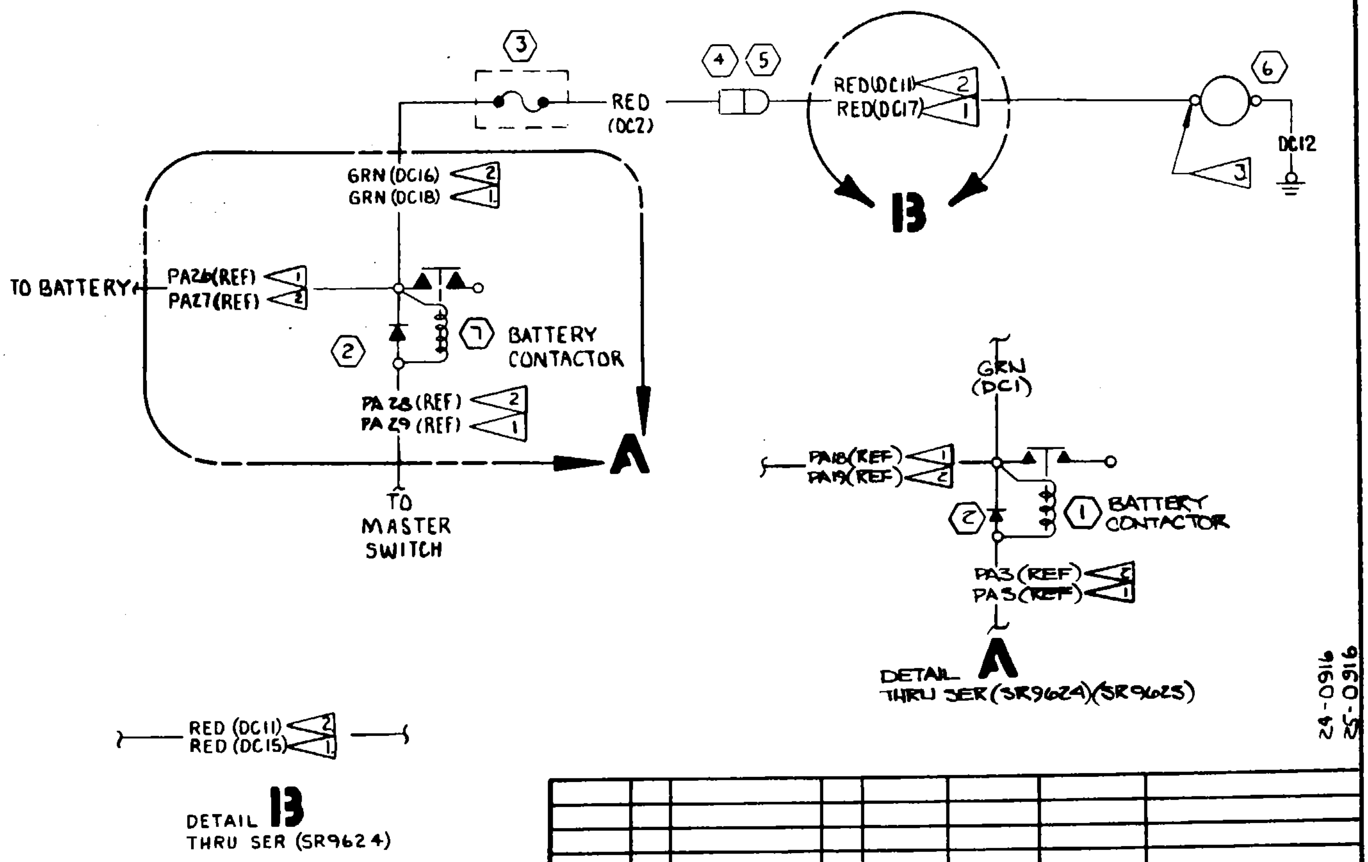
SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SR9187) PAGE: 10.2

NOTES:

1. APPLIES TO F172 & 172 ONLY
2. APPLIES TO FR172 & R172 ONLY
3. CAUTION – POWER WIRE MUST BE CONNECTED TO "BATT" TERMINAL OF CLOCK, OTHERWISE INTERNAL DAMAGE TO UNIT WILL RESULT

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: S-1367-1-6 WAS S-1367-1-10/ DC11 & DC15 (SR9104)(SR9105)	MDR 5-24-79	JAB WHH JRG BF
B	BY REV: ADD DETAIL "A" & S-2475-1 (SR9624)(SR9625)	WAG 1-7-80	JAB WHH JRG RF
C	BY REV: ADD DETAIL B, DC17, DC18 & SER (ADV REL) (SR9624)	RAO 2-12-80	JRG
D	BY REV: RELEASED FOR PRODUCTION SR9624	RAO 3-5-80	JAB WHH JRG DES



GRN (DC18)	22	-22-5		S-1367-1-13	SOLDER	1	SER (SR9624) & ON
RED (DC17)	22	-22-5		S-1635-1	S-1367-1-6		SER (SR9624) & ON
GRN (DC16)	22	-22-5		S-1367-1-13	SOLDER		(SR9624)(SR9625) & ON
RED (DC15)	22	-22-2		S1635-1	S-1367-1-6	1	THRU SER (SR9624)
DC12	22			S-1367-1-6	S-1367-1-10		
RED (DC11)	22	-22-2		S-1636-1	S-1367-1-6	2	
RED (DC2)	22	-22-2		SOLDER	S-1636-1		
GRN (DC1)	22	-22-5		S-1367-1-13	SOLDER		THRU (SR9624)(SR9625)
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION
7	S-2475-1	BATT. CONTACTOR
6	C664508-0102	CLOCK
5	S-1637-1	HOUSING
4	S-1637-2	HOUSING
3	0712031	FUSE ASSY
2	0770728	DIODE ASSY
1	S-1680-1	BATTERY 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: 0570311 R 101

SUPERSEDED BY:

CONTRACT NO:

Cessna. AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

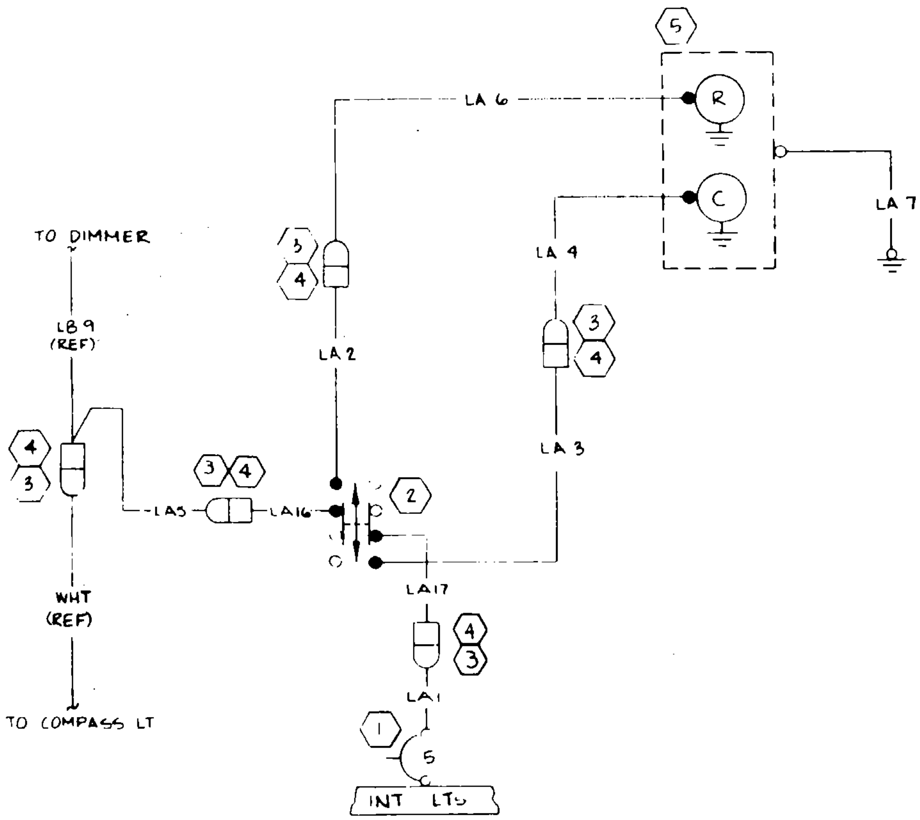
	NAME	DATE
DESIGN	WHITSON	11-20-78
GROUP	WH Hardin	12-8-78
DRAWN	LANCASTER	10-19-78
CHECK	BORLESKE	10-20-78
STRESS		
PROJ	R. FIFE	12-11-78
APPD	JRG	
OTHER		

TITLE: WIRING DIAGRAM — CLOCK

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SR9104)(SR9105) PAGE: 1 OF 1

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD LA16 & LA17 WIRE (SR8453) (SR8454)	LSS 4-20-77	RF



54 0916
53 0916

LA17	22			S-1636-1	SOLDER	
LA16	22			S-1636-1	SOLDER	
LA 7	22			SOLDER	S1367-1-8	
LA 6	↑			S 1635 1	SOLDER	
LA 5	│			S-1635-1	S 1636-1	
LA 4	│			S 1635 1	SOLDER	
LA 3	│			SOLDER	S 1636 1	
LA 2	│			SOLDER	S 1636 1	
LA 1	22			S1367-1-6	S-1635-1	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
5	1470089	LIGHT ASSY	
4	S-1637-2	HOUSING	
3	S-1637-1	HOUSING	
2	S-1501-1	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: 0510101 P 11.10

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	[signature]	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	[signature]	1-12-77
APPD	[signature]	
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM —
MAP & AUX INSTRUMENT
LIGHT (OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SR8453)(SR8454) PAGE: 11.1

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: S-2000C201J WAS S-2000B271J (SR8968) C669527 WAS C669514, C669538 WAS C669512, C669537 WAS C669511. ADD S-1637-1 & S-1637-2 TO DETAIL A (SR8774)	CRS 10-3-77	JAB GAS GF RF
B	BY REV: ADD LB12, NOTE 1, MS25231-1819 & S2413-1 (SR9187)	CMK 7-13-78	JAB GAS RF
C	BY REV: LB12 WAS 20GA S1829-1 WAS S-1824-1. (SR9187)(REF) C669537 WAS C669512 & C669535 WAS C669511. (SR9105)(SR9104)	NTL 10-20-78	JAB GAS GF RF
D	BY REV: DELETE 22GA JUMPER/ S2000C201J (NOW SHOP PRACTICE)	NTL 10-15-79	JAB GAS RF

NOTES:

1. REQ D ONLY WHEN OPTIONAL DIGITAL CLOCK C664511 IS INSTALLED

05-0916-40
05-0916

ITEM NO.	PART NO.	DESCRIPTION	
21	S-2413-1	SOCKET	1.
20	MS25231-1819	LIGHT	1.
19	C669527	INST CLUSTER	
18	C669538	INST. CLUSTER	
17	S-1641-9	HOUSING	
16	S-1640-9	HOUSING	
15	C669537	INST CLUSTER	
14	C669537	INST CLUSTER	
13	C669535	INST CLUSTER	
12	1270419	LAMP ASSY	
11	MS25237-327	LAMP	
10	S-1360-5L	CIRCUIT BREAKER	
9	S-1640-6	HOUSING	
8	S-1641-6	HOUSING	
7	S-1637-1	HOUSING	
6	S-1637-2	HOUSING	
5	MS-15584-15	LAMP	
4	S2000C201J	RESISTOR	
3	34003-817	TERMINAL BLOCK	
2	1570166	DIMMING ASSY	
1	S2091-7	RESISTOR ASSY	

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
LB12	22			S-1829-1	S-1370-1	1.	
LB11	22			S-1635-1	S-1367-1-8		
LB10	22			SEE LB9	S-1635-1		
LB9	22			S-1635-2	S-1636-2		
LB8	22			SOLDER	S-1367-1-8		
LB7	22			S-1635-1	SEE 1270419		
LB6	22			S-1829-1	S-1636-1		
LB5	22			SOLDER	S-1635-1		
LB4	22			SOLDER	S-1635-1		
LB3	22			S-1635-1	S-1829-1		
LB2	22			SOLDER	S-1635-1		
LB1	22			S-1367-1-6	SOLDER		

WIRE TABLE

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W. Harden	1-12-77
DRAWN	SWANSON	12-20-76
CHECK	Youel	12-20-76
STRESS		
PROJ		1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — COMPASS & INSTRUMENT LIGHTS

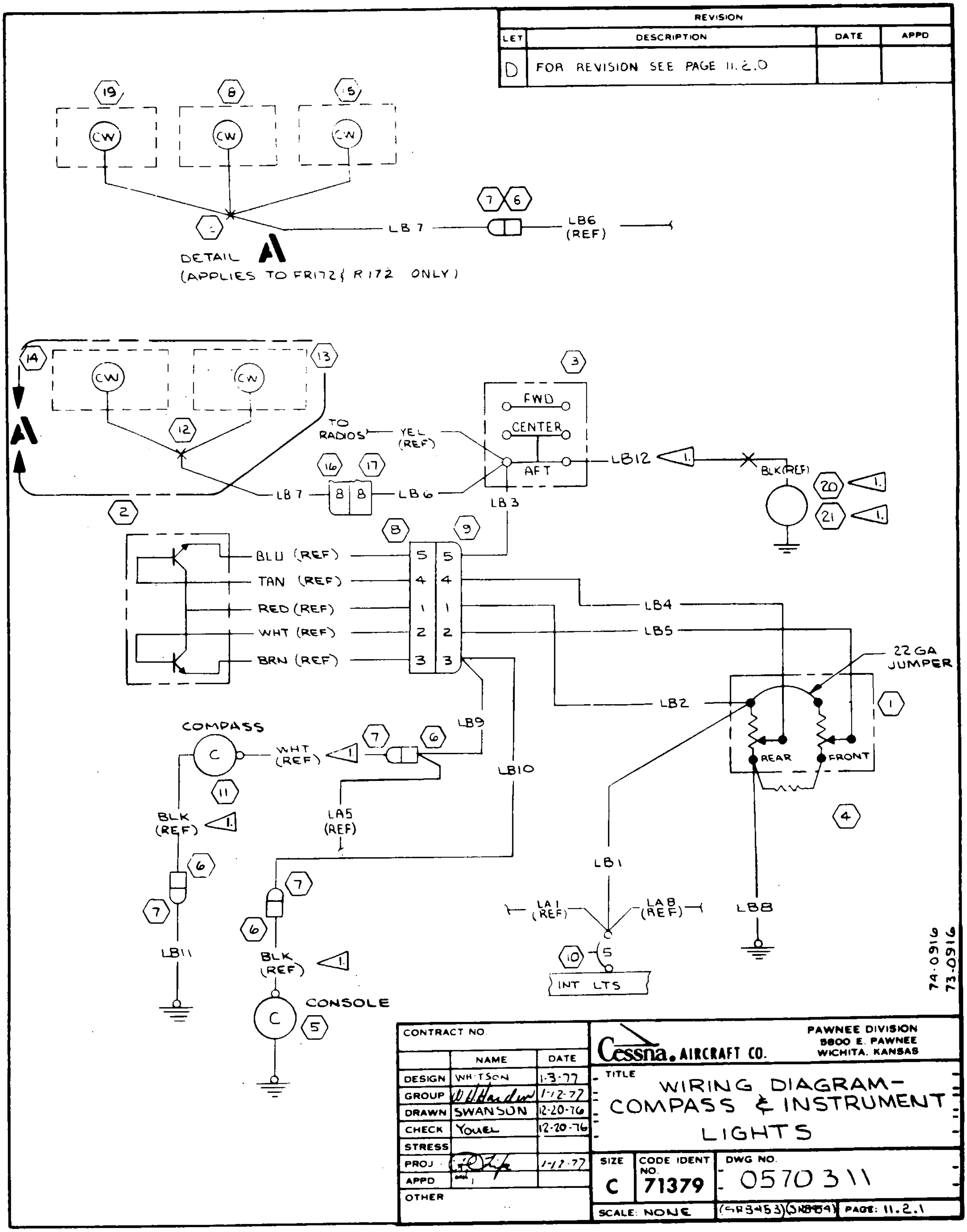
CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570101 PG 11.2.0 & 11.2.1

SUPERSEDED BY:

SIZE: C | CODE IDENT NO. 71379 | DWG NO 0570311

SCALE: NONE (SR8453) (SR8454) PAGE: 11.2.0


REVISION
LET
DESCRIPTION
DATE
APPD
D
FOR REVISION SEE PAGE 11.2.0
DETAIL A
(APPLIES TO FR172 & R172 ONLY)
CW
LB 7
LB6 (REF)
FWD
CENTER
AFT
TO RADIOS
YEL (REF)
LB6
LB3
LB12
BLK(REF)
BLU (REF)
TAN (REF)
RED (REF)
WHT (REF)
BRN (REF)
LB4
LB5
LB2
22 GA JUMPER
REAR
FRONT
COMPASS
WHT (REF)
LB9
LB10
LA5 (REF)
BLK (REF)
LB11
LB1
LA1 (REF)
LA8 (REF)
LB8
INT LTS
CONSOLE
74-0916
73-0916
CONTRACT NO.
NAME
DATE
DESIGN WHITSON 1-3-77
GROUP 1-12-77
DRAWN SWANSON 12-20-76
CHECK YOUEL 12-20-76
STRESS
PROJ 1-12-77
APPD
OTHER
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS
TITLE
WIRING DIAGRAM-
COMPASS & INSTRUMENT
LIGHTS
SIZE C
CODE IDENT NO. 71379
DWG NO. 0570311
SCALE: NONE
PAGE: 11.2.1

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD BLK(LB23), S-1637-2, S-1637-1 (SR9104)(REF)(SR9105)(REF)	HHG 8-9-79	JAB DALE RF

NOTES:

1. THIS LAMP IS NOT USED ON FR172 OR R172

53-0916
54-0916

WIRE TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK(LB23)	22	-22-0		SOLDER	S-1635-1		
BLK	22	-22-0		SOLDER	SOLDER		
RED/YEL	22	-22-5-4		SOLDER	SOLDER		
BLK (LB22)	22	-22-0		SOLDER	S-1636-1		
RED/YEL (LB21)	22	-22-5-4		SOLDER	S-1635-1		
RED/YEL (LB20)	22	-22-5-4		SOLDER	S-1635-1		
BLK (LB19)	22	-22-0		SOLDER	S-1636-1		
LB18	22			S-1635-1	S-1367-1-8		
LB17	22			S-1635-1	S-1367-1-8		
LB16	22			S-1636-2	S-1636-1		
LB15	22			S-1635-1	SEE LB16		
LB14	22			SOLDER	S-1636-1		
LB13	22			SOLDER	S-1636-1		

EQUIPMENT TABLE

ITEM NO	PART NO.	DESCRIPTION	
5	MS-5584-15	LAMP	
4	MS25237-327	LAMP	
3	S-1501-1	SWITCH	
2	S-1637-2	HOUSING	
[illegible]	S-1637-1	HOUSING	

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570101 PG 11.30 & 11.3.1

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	D.H.Harden	1-12-77
DRAWN	SWANSON	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	[illegible]	1-12-77
APPD	[illegible]	
OTHER		

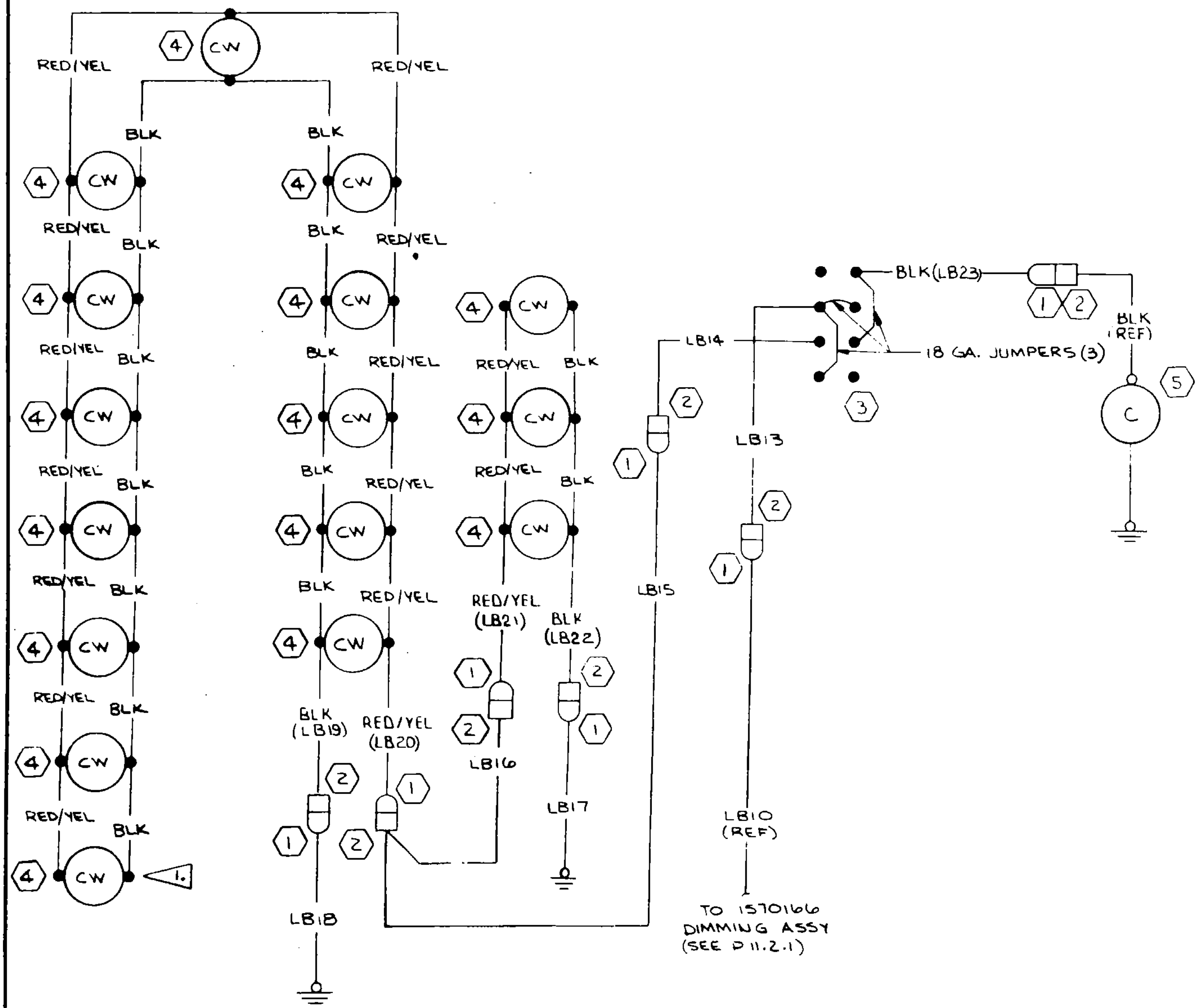
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — INSTRUMENT PANEL POST LIGHTING (OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE | SR8453 (SR8454) | PAGE: 11.3.0

REVISION			
LET	DESCRIPTION	DATE	APPD
A	SEE SHT 11.3.0 FOR REVISION		



54-0916
53-0916

CONTRACT NO.		
	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W.H. Handen	1-12-77
DRAWN	SWANSON	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	F. Fife	1-12-77
APPD		
OTHER		

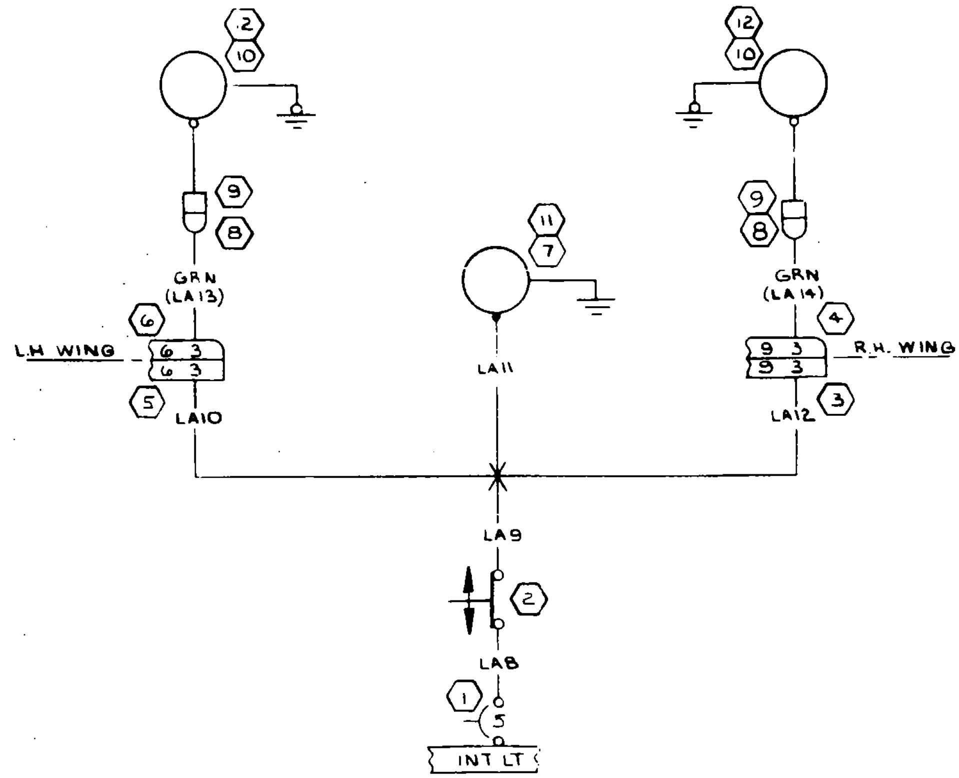
Cessna AIRCRAFT CO. — PAWNEE DIVISION, 5800 E. PAWNEE, WICHITA, KANSAS

TITLE: WIRING DIAGRAM - INSTRUMENT PANEL POST LIGHTING (OPT)

SIZE	CODE IDENT. NO.	DWG NO.
C	71379	0570311

SCALE: NONE | SR8453 SR8454 | PAGE: 11.3.1

REVISION			
LET	DESCRIPTION	DATE	APPD



GRN (LA14)	22	-22-5		S-1635-1	S-1635-1	(STD)	
GRN (LA13)	22	-22-5		S-1635-1	S-1635-1	(STD)	
LA12	22			S-1636-1	SEE LA9	(STD)	
LA11	22			SOLDER	SEE LA9		
LA10	22			S-1636-1	SEE LA9	(STD)	
LA9	22			S-1830-1	S-1370-2		
LA8	22			S-1361-1-6	S-1830-1		
WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
12	MS15584-15	LAMP	
11	MS25231-313	LAMP	
10	0521101	COURTESY LT INSTL	
9	S-1637-2	HOUSING	
8	S-1637-.	HOUSING	
7	0413138	SOCKET	
6	S-1640-6	HOUSING	
5	S-1641-6	HOUSING	
4	S-1640-9	HOUSING	
3	S-1641-9	HOUSING	
2	S-1831-1	SWITCH	
1	S-1360-5L	CKT BKR	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570101 PG 11.4.0

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W. Wasden	1-12-77
DRAWN	SWANSON	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	[illegible]	1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — DOME & COURTESY LIGHTS

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE | SR8453 (SR8454) | PAGE: 11.4

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD 4553 LAMP; DELETE 4596 LAMP (SR 8953) (SR 8954)	LSS 4-20-77	JAB WH RF
C	BY REV: 4596 WAS 4553, 4594 WAS 4591 (SR9104)(SR9105)	GW 11-21-78	JAB WH JRG RF
D	BY REV: HCI (REF) TO CIGAR LTR WAS CONN TO BUS BAR AT LDG LT CIRCUIT BREAKER 4553 WAS 4596 (SR9624)(SR9626)	RAO 1-21-80	JAB WH JRG RF
E	BY REV: ADD DETAIL A, B, LC6, LC7, LE5, NOTE 1, 2 & SER (ADV REL) (SR9624)	RAO 2-12-80	JRG
F	BY REV: RELEASED FOR PRODUCTION (SR9624)	RAO 3-5-80	JAB WH JRG DES

NOTES:

1. APPLIES TO R172 & FR172 ONLY
2. APPLIES TO 172 & F172 ONLY

25-0916
24-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
LE 5	16			S-1635-2	S-1367-2-8	2	SER (SR9624) & ON
LC 7	16			S-1367-2-8	S-1635-2	2	SER (SR9624) & ON
LC 6	16			S-1635-2	S-1367-2-8	2	SER (SR9624) & ON
LE 4	16			S-1367-2-8	S-1367-2-8		
LE 3				S-1635-2	S-1367-2-8	1	
LE 2				S-1493-2	S-1636-2		
LE 1				S-1367-2-6	S-1493-2		
LC 5				S-1636-2	S-1367-2-8		
LC 4				S-1367-2-8	S-1635-2		
LC 3				S-1635-2	S-1367-2-8		
LC 2				S-1493-2	S-1635-2		
LC 1	16			S-1367-2-6	S-1493-2		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
7	4594	LAMP (100 W)	
6	4553	LAMP (250 W)	
5	S-1638-1	HOUSING	
4	S-1638-2	HOUSING	
3	S-2160-5	SWITCH	
2	S-2160-4	SWITCH	
1	S-1360-15L	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: 0570101 P.11.50 : 11.51

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	William Lew	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	JDF	1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

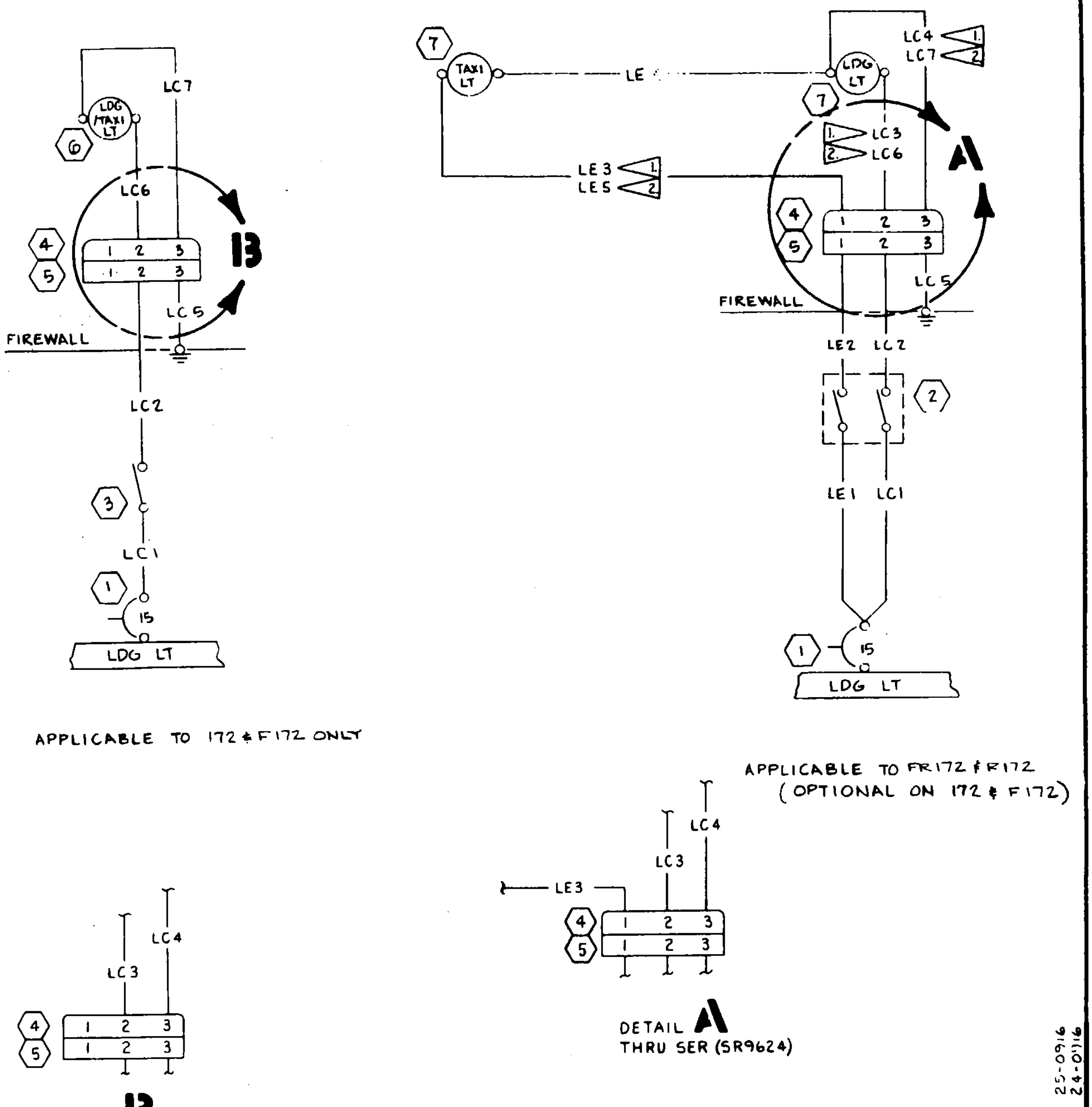
TITLE

WIRING DIAGRAM — LANDING & TAXI LIGHT (OPT)

SIZE: C | CODE IDENT. NO.: 71379 | DWG NO: 0570311

SCALE: NONE (SR8453) (SR8454) PAGE: 11.5.0

REVISION			
LET	DESCRIPTION	DATE	APPD
B	BY REV ... LIGHTS WERE STD ON F172 (SR8453)(REF)	GDM 11-2-77	
F	SEE SHT 11.5.0 FOR REVISION		



DETAIL A
THRU SER (SR9624)

DETAIL B
THRU SER (SR9624)

25-0916
24-0916

CONTRACT NO:		
	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP		1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ		1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM LANDING & TAXI LIGHT (OPT)

SIZE	CODE IDENT. NO.	DWG NO.
C	71379	0570311

SCALE NONE (SR8453) (SR8464) PAGE: 11.5.1

REVISION			
LET	DESCRIPTION	DATE	APPD

54 0916
55 0916

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS			SERIALS
RED (LD 8)	22			S 1635·1	S 1636 1		
LD 7				S·1635·1	S·1636 1		
RED (LD 6)				S·1635·1			
LD 5				S·1829·1			
LD 4				S 1829 1			
LD 3				S·1829·1	S·1636·1		
LD 2				S 1493·1	S·1829 1		
LD 1	22			S 1567·1·6	S·1493·1		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
13	MS35478 307	LAMP	
12	C622001·0102	LIGHT ASSY	
11	MS25309·T512	LAMP	
10	C622001·0202	LIGHT ASSY	
9	S 1637·1	HOUSING	
8	S 1637·2	HOUSING	
7	S 1640·9	HOUSING	
6	S·1641·9	HOUSING	
5	S 1640·6	HOUSING	
4	S·1641·6	HOUSING	
3	S4003·55·S410	TERMINAL BLOCK	
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: 0570101 P. 11.6.0

SUPERSEDED BY:

CONTRACT NO:

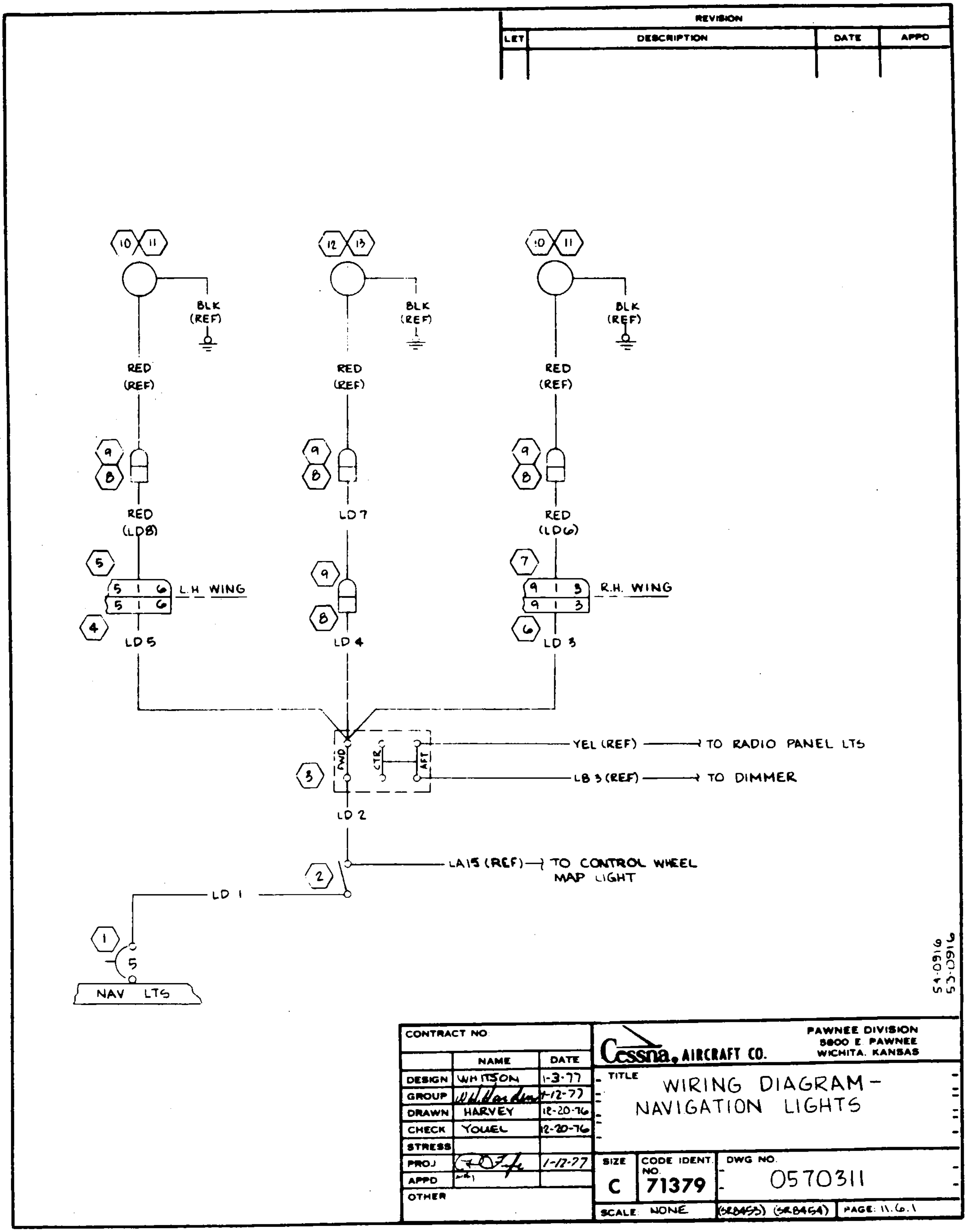
	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W H Harden	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	[illegible]	1-12-77
APPD	[illegible]	
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

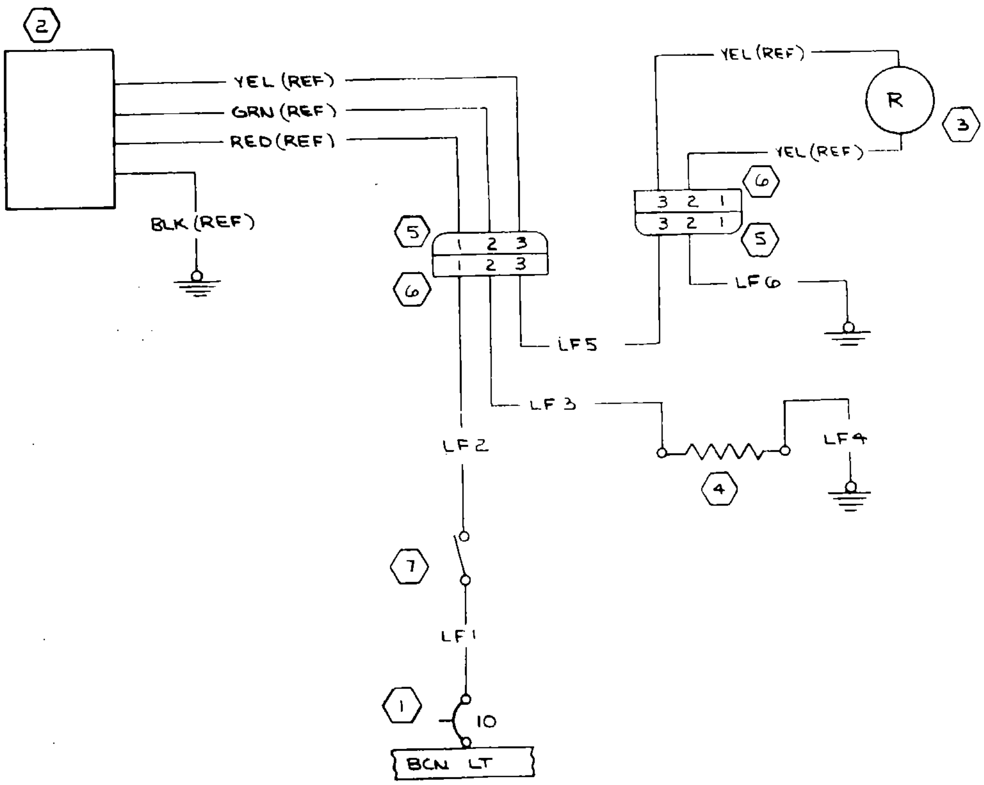
TITLE
WIRING DIAGRAM — NAVIGATION LIGHTS

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SE8453)(SE8454) PAGE: 11 6.0


REVISION
LET
DESCRIPTION
DATE
APPD
BLK (REF)
RED (REF)
RED (LD8)
LD 7
RED (LD6)
L.H. WING
R.H. WING
LD 5
LD 4
LD 3
FWD
CTR
AFT
YEL (REF) TO RADIO PANEL LTS
LB 3 (REF) TO DIMMER
LD 2
LA15 (REF) TO CONTROL WHEEL MAP LIGHT
LD 1
NAV LTS
CONTRACT NO
NAME
DATE
DESIGN WHITSON 1-3-77
GROUP 1-12-77
DRAWN HARVEY 12-20-76
CHECK YOUEL 12-20-76
STRESS
PROJ 1-12-77
APPD
OTHER
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS
TITLE
WIRING DIAGRAM - NAVIGATION LIGHTS
SIZE C
CODE IDENT. NO. 71379
DWG NO. 0570311
SCALE NONE
PAGE

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: S-1636-1/LF2 & LF3 WAS S-1635-1 (SRB453)(REF)(SRB454)(REF)	GW 6-27-79	[illegible] RF



54-0916
53-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
LF6	18			S-1635-1	S-1367-1-8		
LF5	18			S-1635-1	S-1636-1		
LF4	18			S-1493-1	S-1367-1-8		
LF3	18			S-1636-1	S-1493-1		
LF2	18			S-1493-1	S-1636-1		
LF1	18			S-1367-1-6	S-1493-1		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
7	S-2160-1	SWITCH	
6	S-1638-1	HOUSING	
5	S-1638-2	HOUSING	
4	OR95-6	RESISTOR	
3	C621001-0102	LIGHT ASSY	
2	C594502-0102	FLASHER ASSY	
1	S-1360-10L	CKT BKR	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570101 PG 11.1.0

SUPERSEDED BY:

CONTRACT NO:

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

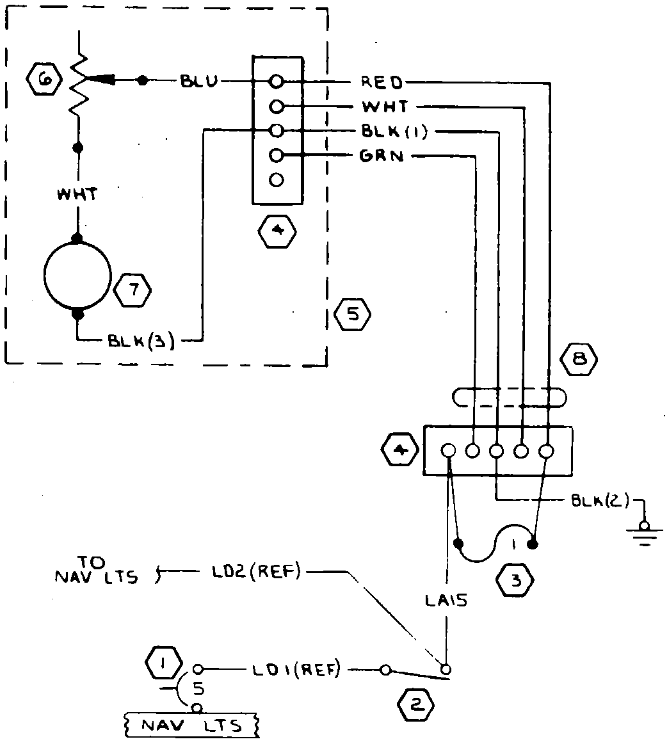
	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W. H. [illegible]	1-12-77
DRAWN	SWANSON	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	[illegible]	1-12-77
APPD		
OTHER		

TITLE: **WIRING DIAGRAM — LIGHT-FLASHING BEACON (OPT)**

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SRB453)(SRB454) PAGE: 11.7

REVISION			
LET	DESCRIPTION	DATE	APPD



NOTES:

1. MATERIAL IS 8409 CABLE (70903)
2. VENDOR FOR 329639 IS 00779
3. APPLIES TO R172 & FR172 ONLY

54-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK(3)	22	-22-0		329639	SOLDER	2	
LA15	22			↕	S-1493-1	↕	
BLK(2)	22	-22-0			S-1367-1-8		
GRN	.1				329639		
BLK(1)	.1				↕		
WHT	.1						
RED	.1			329639	329639	2.	
WHT	22	-22-9		SOLDER	SOLDER		
BLU	22	-22-6		SOLDER	329639	2.	

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
8	8409	CABLE	
7	24RB	LAMP	
6	3859A-282-152A	RHEOSTAT	
5	0501068	CONTROL WHEEL ASSY	
4	351-11-05-001	TERM STRIP	
3	1570141	FUSE ASSY	
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:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W. Haudan	1-12-77
DRAWN	SWANSON	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	G. Olfe	1-12-77
APPD		
OTHER		

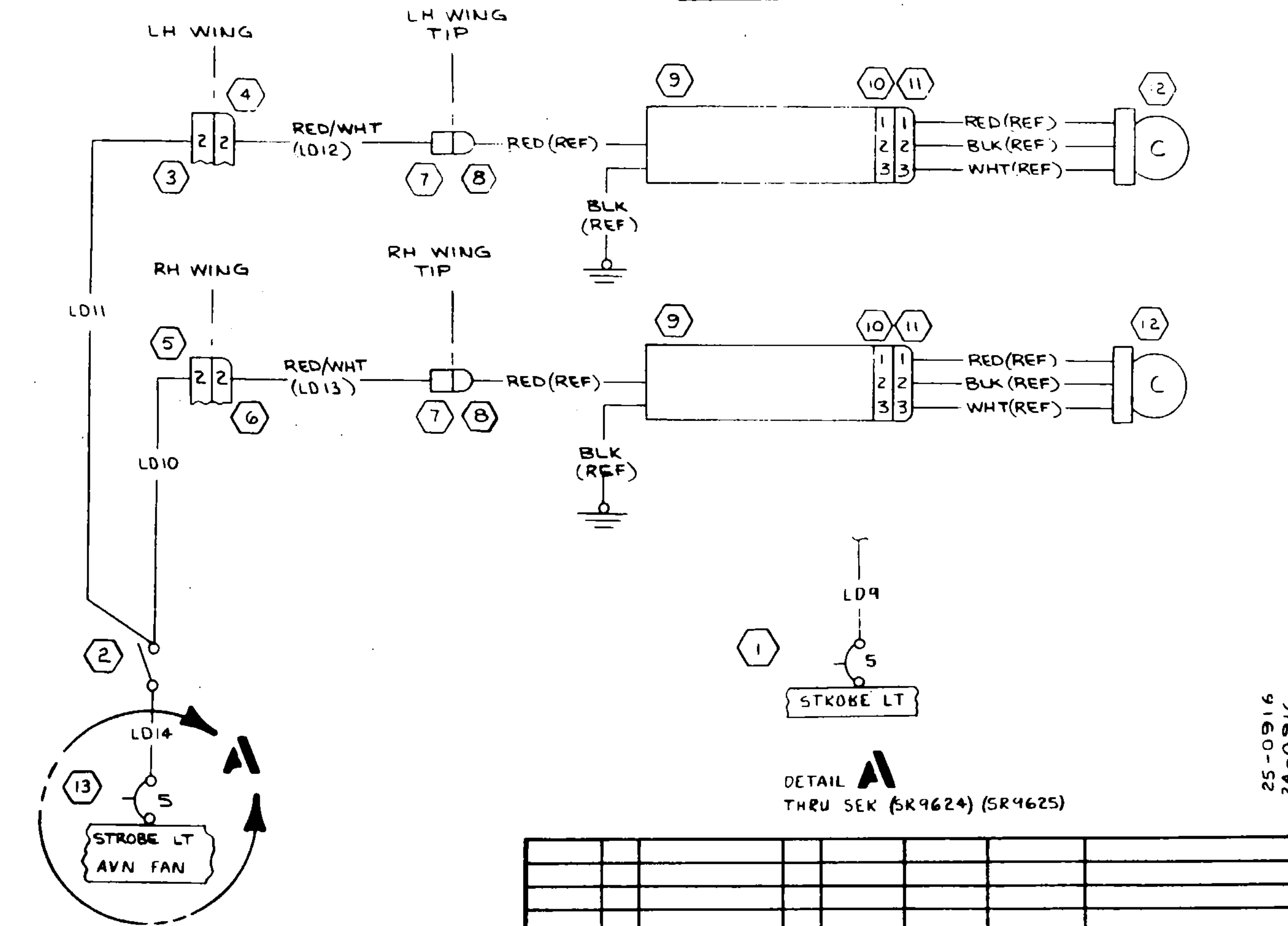
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE **WIRING DIAGRAM — MAP LIGHT — CONTROL WHEEL (OPT)**

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE (SR8454) PAGE: 11.9

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV C622006 0107 WAS 0101 DELETE "PIGTAIL"/C622008 0102 (SR8453)(REF)(SR8454)(REF)	DLP 6 5 78	JAS WAH JRS RF
B	BY REV ADD DETAIL "A", S-1235-5 SER IN LD14 (SK9624) (SK9625)	RAO 1-9-80	WAH RF



13	S-1235-5	CIRCUIT BREAKER	
12	C622006-0107	LAMP ASSY	
11	S-1638-2	HOUSING	
10	S-1638-1	HOUSING	
9	C622008-0102	STROBE PWR SUPPLY	
8	S-1637-1	HOUSING	
7	S-1637-2	HOUSING	
6	S-1640-9	HOUSING	
5	S-1641-9	HOUSING	
4	S-1640-6	HOUSING	
3	S-1641-6	HOUSING	
2	S-2160-1	SWITCH	
1	S-1360-5L	CKT BKR	
ITEM NO.	PART NO.	DESCRIPTION	

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
LD14	22			S-1367-1-8	S-1493-1	SER	(SR9624)(SR9625) & ON
RED/WHT (LD13)	22	-22-2-9		S-1635-1	S-1636-1	(STD)	
RED/WHT (LD12)	22	-22-2-9		S-1635-1	S-1636-1	(STD)	
LD11	22			SEE LD10	S-1636-1		
LD10	22			S-1493-2	S-1636-1		
LD9	22			S-1367-1-6	S-1493-1	THRU SER	(SR9624) (SR9625)

WIRE TABLE

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W H Hunder	1-17-77
DRAWN	SWANSON	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	[illegible]	1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

TITLE
WIRING DIAGRAM — WING TIP STROBE LIGHT (OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

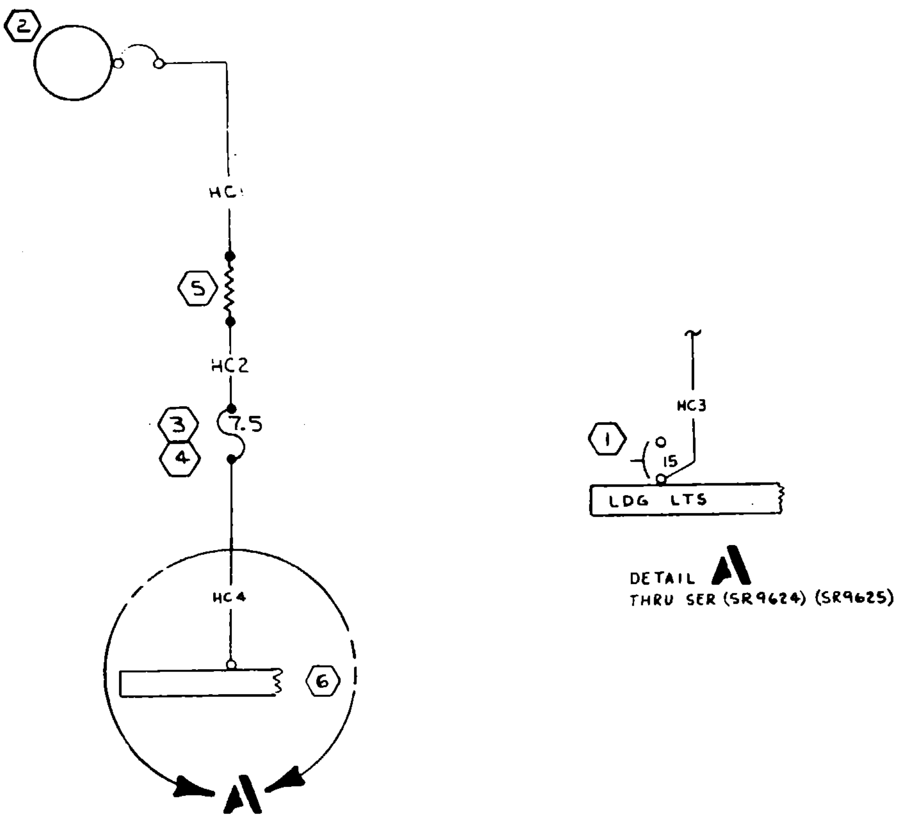
SCALE: NONE (SR8453)(SR8454) PAGE: 11.10

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570101 PG 11.9.0

SUPERSEDED BY:

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: S-2374-7.5 WAS HHH-A, S-2375-7.5 WAS SFE 7.5 (S-1000 CHG) ADD 6 MAX./HC3	CS 10-4-79	RF
B	BY REV: ADD 0570451, HC4, DETAIL A & SER (SR9624) (SR9625)	RAO 1-21-80	RF



25-0916
24-0916

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS			SERIALS
HC4	18		6 MAX.	S-1367-1-10	SOLDER	SER	(SR9624) (SR9625) & ON
HC3	18		6 MAX.	S-1367-1-6	SOLDER	THRU SER	(SR9624) (SR9625)
HC2	18			SOLDER	SOLDER		
HC1	18			SOLDER	S-1367-1-6		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
6	0570451	BUS BAR
5	S-2041-50-1.6	RESISTOR
4	S-2375-7.5	FUSE
3	S-2374-7.5	FUSE HOLDER
2	0513052	LIGHTER ASSY
1	S-1360-15L	CKT BKR

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570101 PG 13.1.0

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	W.H. Harden	1-12-77
DRAWN	SWANSON	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ		1-12-77
APPD		
OTHER		

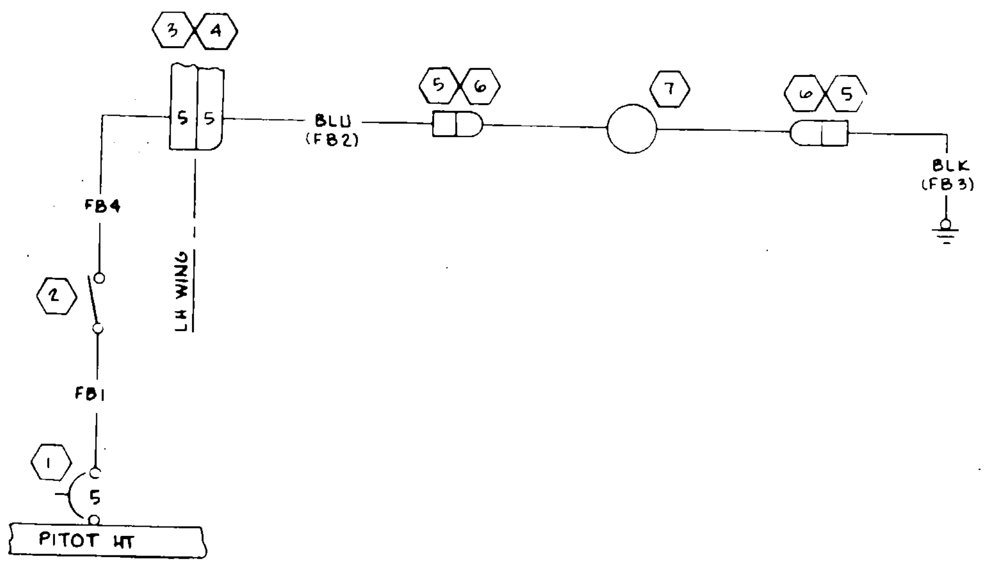
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE **WIRING DIAGRAM — CIGAR LIGHTER**

SIZE C | CODE IDENT. NO. 71379 | DWG NO 0570311

SCALE: NONE | (SR8453) (SR8454) | PAGE: 13.1

REVISION			
LET	DESCRIPTION	DATE	APPD



54 0916
53 0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
FB 4	22			S 1493 1	S-1636-1		
BLK (FB 3)	22	-22-0		S-1636 1	S1367-1-8		
BLU (FB 2)	22	-22-6		S 1635 1	S-1636 2		
FB 1	22			S1367-1-6	S 1493 1		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
7	0721105	PITOT HEATER	
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-1360-5L	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: 0570101 P 13 2.0

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	[illegible]	1-12-77
DRAWN	HARVEY	12-20-76
CHECK	YOWEL	12-20-76
STRESS		
PROJ	[illegible]	1-12-77
APPD	[illegible]	
OTHER		

Cessna. AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

TITLE **WIRING DIAGRAM — PITOT - HEATED (OPT)**

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

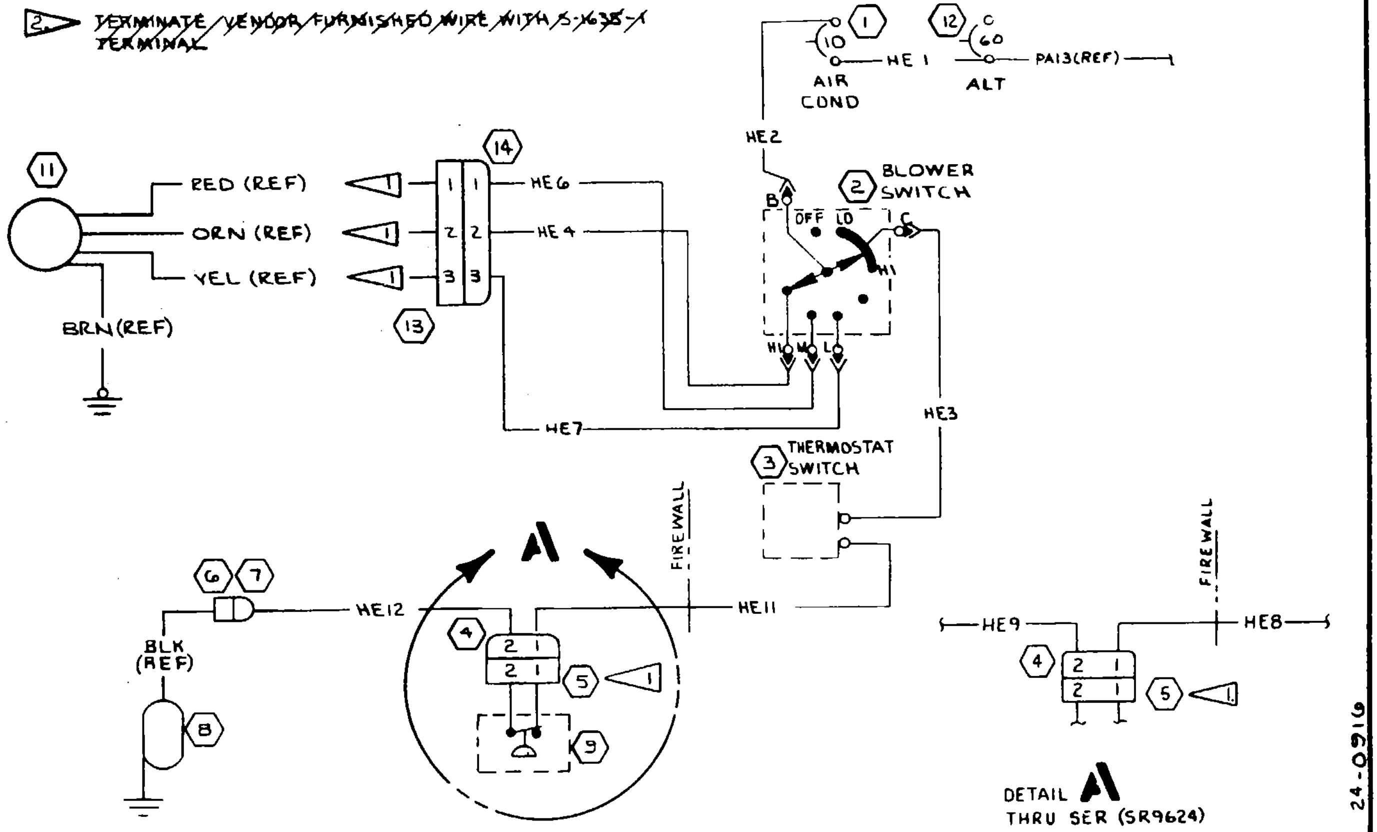
SCALE: NONE (SR8453) (SR8454) PAGE: 13.2

C	BY REV: ADD DETAIL 'A', HE11, HE12 & SER (SR9624) (ADV REL)	RAO 2-12-80	JAB
D	BY REV: RELEASED FOR PRODUCTION (SR9624)	RAO 3-5-80	JAB DES

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: DELETE 1120003, 0882706 & HE5; ADD 1120059, S-1638-1, S-1638-2, RED(REF), ORN(REF), YEL(REF), BRN(REF); S-1635-1 WAS S-1493-1/HE4, HE6 & HE7 (SR8453) (REF)	RLY 4-20-77	RF
B	BY REV: DELETE NOTE 2. S-1367-1-8 WAS S-1367-1-6/HE1 (NOW SHOP PRACTICE)	CRS 11-7-77	JAB RF

NOTES:

1. REMOVE & DISCARD VENDOR FURNISHED TERMINALS, TERMINATE WITH S-1636-1 TERMINALS
2. ~~TERMINATE VENDOR FURNISHED WIRE WITH S-1635-1 TERMINAL~~



14	S-1638-2	HOUSING	
13	S-1638-1	HOUSING	
12	S-1707-60	CKT BKR	
11	1120059	BLOWER	
10			
9	0882862	HIGH PRESS. SWITCH	
8	SD508	COMPRESSOR	
7	S-1637-1	HOUSING	
6	S-1637-2	HOUSING	
5	S-2035-2	HOUSING	
4	S-2035-1	HOUSING	
3	1247243	(ARA) SWITCH	
2	0882590	(ARA) SWITCH	
1	S-1360-10L	CKT BKR	
ITEM NO	PART NO.	DESCRIPTION	

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
HE12	18			S-1635-1	S-1635-1		SER (SR9624) & ON
HE11	18			S-1493-1	S-1635-1		SER (SR9624) & ON
HE9	18			S-1635-1	S-1635-1		THRU SER (SR9624)
HE8	18			S-1493-1	S-1635-1		THRU SER (SR9624)
HE7	18			S-1635-1	S-1493-1		
HE6	18			S-1635-1	S-1493-1		
HE4	18			S-1635-1	S-1493-1		
HE3	18			S-1493-1	S-1493-1		
HE2	18			S-1367-1-6	S-1493-1		
HE1	18			S-1367-1-6	S-1367-1-8		

WIRE 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	WHITSON	1-3-77
GROUP		1-12-77
DRAWN	SWANSON	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ		1-12-77
APPD		
OTHER		

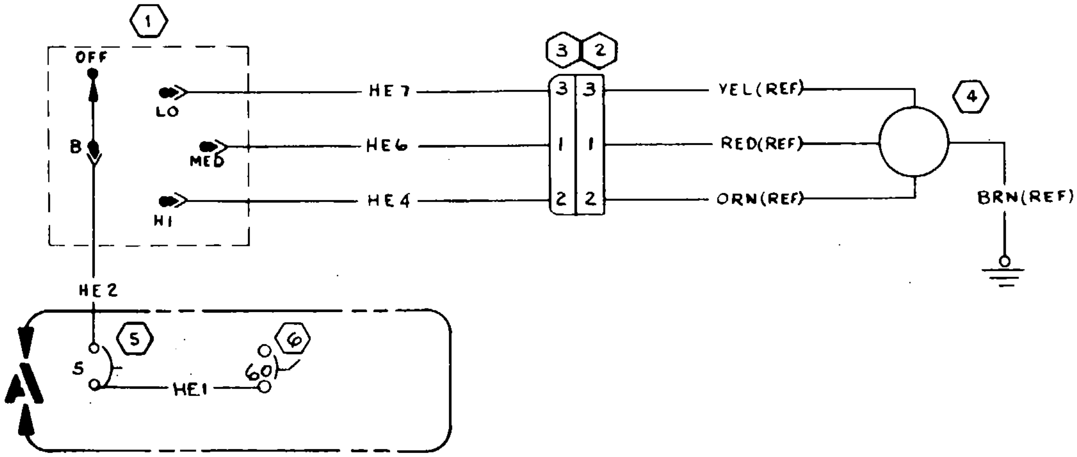
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

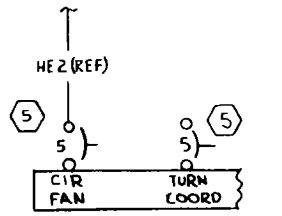
TITLE: WIRING DIAGRAM — AIR CONDITIONER (OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

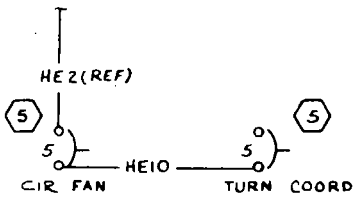
SCALE: NONE (SR8453) PAGE: 13.3

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD 0570451 ; SER OUT DETAIL A & SER IN DETAIL A (SR9625)	RAO 1-21-80	JAB JRS RF





DETAIL A
(APPLIES TO R172 ONLY)
SER (SR9625) & ON



DETAIL A
(APPLIES TO R172 ONLY)
THRU SER (SR9625)

25-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
HE2	18			S1367-1-6	S1493-1		
HE1	18			S1367-1-6	S1367-1-8		
HE7	18			S-1635-1	S-1493-1		
HE6	18			S1635-1	S-1493-1		
HE4	18			S-1635-1	S-1493-1		
HE10	18			S-1367-1-6	S-1367-1-6	THRU SER	(SR9625)

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION
7	0570451	BUS BAR
6	S-1707-60	CIRCUIT BREAKER
5	S-1360-5L	CIRCUIT BREAKER
4	0412540	BLOWER ASSY
3	S-1638-2	HOUSING
2	S-1638-1	HOUSING
1	0882590	SWITCH

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	Whitson	12-13-77
GROUP	Williams	12-13-77
DRAWN	C SHAVER	11-7-77
CHECK	BORLESKE	11-16-77
STRESS		
PROJ	R FIFE	12-19-77
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — CIRCULATION FAN (OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SR8773)(SR8774) PAGE: 13.4

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: C301002-0108 WAS C301002-0102 S1906-2 WAS V3-1-09 NOW SHOP PRACTICE INACTIVATE DWG (SR9104)(SR9105)	NTL 10-18-78	JAB 10 HF gg RF

NOTES:

1. THESE SWITCHES ARE PART OF C301002-0102 ACTUATOR ASSY

INACTIVE THRU SER (SR9104)(SR9105) 10-18-78 NTL JAB RF

04-0916
05-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
VIO (CC18)	16	-16-7		S-1493-2	SEE CC17		
VIO (CC17)	16	-16-7		S-1493-2	S-1367-2-8		
BLK (CC16)	16	-16-0		S-1636-2	S-1493-2		
RED (CC15)	16	-16-2		S-1635-2	S-1636-2		
BLU (CC14)	16	-16-6		S-1635-2	S-1493-2		
GRN (CC13)	16	-16-5		S-1635-2	S-1493-2		
ORN (CC12)	16	-16-3		S-1635-2	S-1493-2		
RED (CC11)	16	-16-2		S-1635-2	S-1636-2		
BLU (CC10)	16	-16-6		S-1635-2	S-1636-2		
GRN (CC9)	16	-16-5		S-1635-2	S-1636-2		
ORN (CC8)	16	-16-3		S-1635-2	S-1636-2		
CC7	16			S-1367-2-4	S-1367-2-8		
CC6	16			S-1367-2-4	S-1367-2-4		
CC5	16			S-1367-2-4	S-1636-2		
CC4	16			S-1367-2-4	S-1636-2		
CC3	16			S-1367-2-4	S-1636-2		
CC2	16			S-1367-2-4	S-1636-2		
CC1	16			S-1367-2-6	S-1367-2-4		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
10	C301002-0108	ACTUATOR ASSY	
9	S-1638-2	HOUSING	
8	S-1638-1	HOUSING	
7	S-1641-6	HOUSING	
6	S-1640-6	HOUSING	
5	S-1641-9	HOUSING	
4	S-1640-9	HOUSING	
3	S-1906-1	SWITCH	
2	S-1360-15L	CKT BKR	
1	S-1906-2	SWITCH	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 0570101 PG. 14.30 & 14.3.1

SUPERSEDED BY: 0570311 P. 14.2

CONTRACT NO:

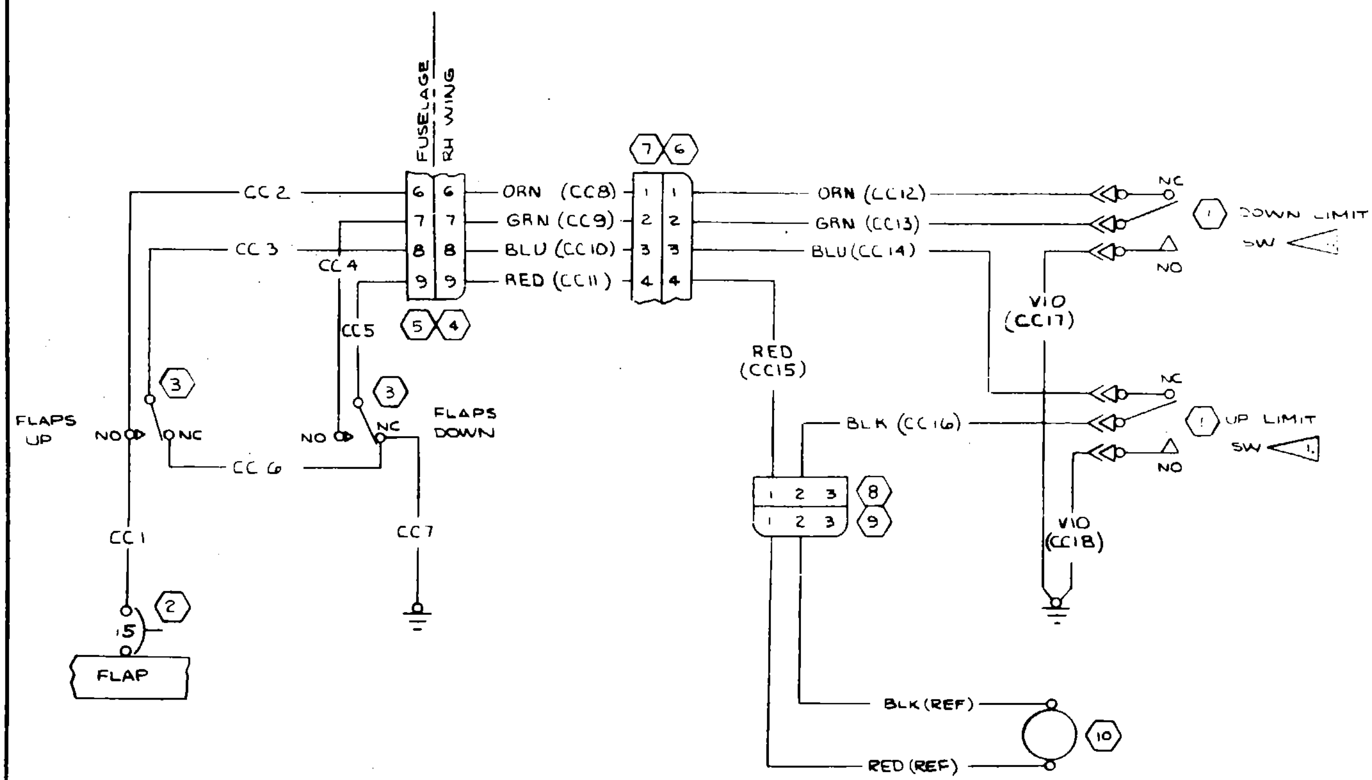
	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP	[illegible signature]	1-12-77
DRAWN	SWANSON	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ	[illegible signature]	1-12-77
APPD	[illegible signature]	
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE: WIRING DIAGRAM — WING FLAPS — ELECTRIC

SIZE: C
CODE IDENT. NO.: 71379
DWG NO: 0570311
SCALE: NONE
SR8453 SR8454
PAGE: 14.1.0

REVISION			
LET	DESCRIPTION	DATE	APPD



INACTIVE
THRU SER (SR9104)(SR9105)
10-19-78
NTL WH
JAB

04-0916
05-0916

CONTRACT NO.		
	NAME	DATE
DESIGN	WHITSON	1-3-77
GROUP		1-12-77
DRAWN	SWANSON	12-20-76
CHECK	YOUEL	12-20-76
STRESS		
PROJ		1-12-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

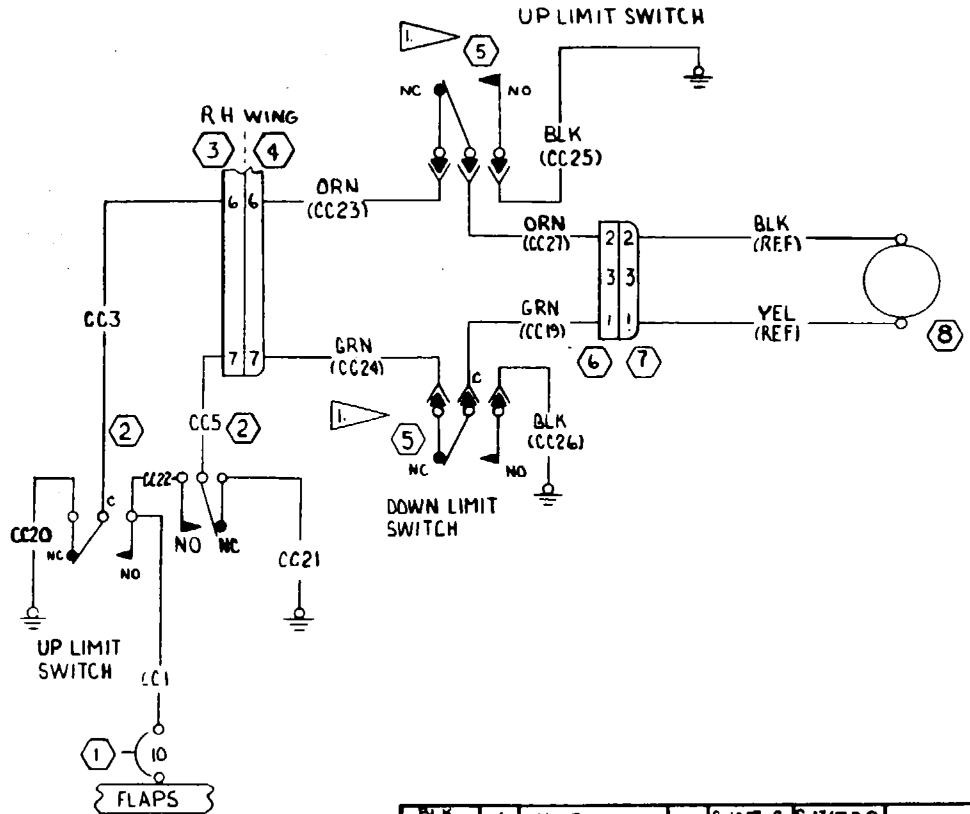
TITLE WIRING DIAGRAM — WING FLAPS — ELECTRIC

SIZE	CODE IDENT. NO.	DWG NO.
C	71379	0570311
SCALE: NONE	SRB453 SRB454	PAGE: 14.1.1

REVISION			
LET	DESCRIPTION	DATE	APPD

NOTES:

1. THESE SWITCHES ARE PART OF C301002-0108 ACTUATOR ASSY.



04-0916
05-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK (CC26)	16	-16-0		S-1493-2	S-1367-2-8		
BLK (CC25)	16	-16-0		S-1493-2	S-1367-2-8		
ORN (CC27)	16	-16-3		S-1493-2	S-1636-2		
GRN (CC24)	16	-16-5		S-1635-2	S-1493-2		
ORN (CC23)	16	-16-3		S-1635-2	S-1493-2		
CC22	16			S-1367-2-4	S-1367-2-4		
CC21	16			S-1367-2-4	S-1367-2-8		
CC20	16			S-1367-2-4	S-1367-2-8		
GRN (CC19)	16	-16-5		S-1493-2	S-1636-2		
CC5	16			S-1367-2-4	S-1636-2		
CC3	16			S-1367-2-4	S-1636-2		
CC1	16			S-1367-2-6	S-1367-2-4		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
8	C301002-0108	ACTUATOR ASSY	
7	S-1638-2	HOUSING	
6	S-1638-1	HOUSING	
5	S-1906-2	SWITCH	
4	S-1640-9	HOUSING	
3	S1641-9	HOUSING	
2	S-1906-1	SWITCH	
1	S-1360-10L	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: 0570311 P. 14.1.0 & 14.1.1

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	11-20-78
GROUP	[illegible]	12-8-78
DRAWN	LANCASTER	10-19-78
CHECK	BORLESKE	10-20-78
STRESS		
PROJ	R. FIFE	12-11-78
APPD	[illegible]	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE

WIRING DIAGRAM — WING FLAPS ~ ELECTRIC

SIZE	CODE IDENT. NO.	DWG NO
C	71379	0570311

SCALE: NONE (SR9104)(SR9105) PAGE: 14.2