CESSNA 182

Training Manual

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Red Sky Ventures and Memel CATS
© 2006
Second Edition © 2011

Published by Red Sky Ventures and Memel CATS

CreateSpace Paperback ISBN-13: 978-1463524128
CreateSpace Paperback ISBN-10: 1463524129
Lulu Paperback - ISBN 978-0-557-04524-2

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ACKNOWLEDGEMENTS:
Peter Hartmann, Aviation Center, Windhoek: Supply of technical information, maintenance manuals and CD's for authors research

Brenda Whittaker, Auckland New Zealand: Editor, Non Technical

Note-
ENGLISH SPELLING has been used in this text, which differs slightly from that used by Cessna. Differences in spelling have no bearing on interpretation.

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Terminology

Airspeed		
KIAS	**Knots Indicated Airspeed**	Speed in knots as indicated on the airspeed indicator.
KCAS	**Knots Calibrated Airspeed**	KIAS corrected for instrument error. Note this error is often negligible and CAS may be omitted from calculations.
KTAS	**Knots True Airspeed**	KCAS corrected for density (altitude and temperature) error.
Va	**Maximum Manoeuvering Speed**	The maximum speed for full or abrupt control inputs.
Vfe	**Maximum Flap Extended Speed**	The highest speed permitted with flap extended. Indicated by the top of the white arc.
Vno	**Maximum Structural Cruising Speed**	Sometimes referred to as "Normal operating range" Should not be exceeded except in smooth conditions and only with caution. Indicated by the green arc.
Vne	**Never Exceed Speed**	Maximum speed permitted, exceeding will cause structural damage. Indicated by the upper red line.
Vs	**Stall Speed**	The minimum speed before loss of control in the normal cruise configuration. Indicated by the bottom of the green arc. Sometimes referred to as minimum 'steady flight' speed.
Vso	**Stall Speed Landing Configuration**	The minimum speed before loss of control in the landing configuration, at the most forward C of G*. Indicated by the bottom of the white arc.
Vx	**Best Angle of Climb Speed**	The speed which results in the maximum gain in altitude for a given horizontal distance.
Vy	**Best Rate of Climb Speed**	The speed which results in the maximum gain in altitude for a given time, indicated by the maximum rate of climb for the conditions on the VSI.
Vref	**Reference Speed**	The minimum safe approach speed, calculated as 1.3 x Vso.
Vr	**Rotation Speed**	The speed which rotation should be initiated.
Vat	**Barrier Speed**	The speed nominated to reach before the 50ft barrier or on reaching 50ft above the runway.
	Maximum Demonstrated Crosswind	The maximum demonstrated crosswind during testing.
*forward centre of gravity gives a higher stall speed and so is used for certification		

Meteorological Terms		
OAT	**Outside Air Temperature**	Free outside air temperature, or indicated outside air temperature corrected for gauge, position and ram air errors.
IOAT	**Indicated Outside Air Temperature**	Temperature indicated on the temperature gauge.
	Standard Temperature	The temperature in the International Standard atmosphere for the associated level, and is 15 degrees Celsius at sea level decreased by two degrees every 1000ft.
	Pressure Altitude	The altitude in the International Standard Atmosphere with a sea level. pressure of 1013 and a standard reduction of 1mb per 30ft. Pressure Altitude would be observed with the altimeter subscale set to 1013.
	Density Altitude	The altitude that the prevailing density would occur in the International Standard Atmosphere, and can be found by correcting Pressure Altitude for temperature deviations.
Engine Terms		
BHP	**Brake Horse Power**	The power developed by the engine (actual power available will have some transmission losses).
RPM	**Revolutions per Minute**	Engine drive and propeller speed.
	Static RPM	The maximum RPM obtained during stationery full throttle operation
Weight and Balance Terms		
	Arm (moment arm)	The horizontal distance in inches from reference datum line to the centre of gravity of the item.
C of G	**Centre of Gravity**	The point about which an aeroplane would balance if it were possible to suspend it at that point. It is the mass centre of the aeroplane, or the theoretical point at which entire weight of the aeroplane is assumed to be concentrated. It may be expressed in percent of MAC (mean aerodynamic chord) or in inches from the reference datum.
	Centre of Gravity Limit	The specified forward and aft point beyond which the CG must not be located. The forward limit defines the controllability of aircraft and aft limits – stability of the aircraft.

	Datum (reference datum)	An imaginary vertical plane or line from which all measurements of arm are taken. The datum is established by the manufacturer.
	Moment	The product of the weight of an item multiplied by its arm and expressed in inch-pounds. The total moment is the weight of the aeroplane multiplied by distance between the datum and the CG.
MZFW	**Maximum Zero Fuel Weight**	The maximum permissible weight to prevent exceeding the wing bending limits. This limit is not always applicable for aircraft with small fuel loads.
BEW	**Basic Empty Weight**	The weight of an empty aeroplane, including permanently installed equipment, fixed ballast, full oil and unusable fuel, and is that specified on the aircraft mass and balance documentation for each individual aircraft.
SEW	**Standard Empty Weight**	The basic empty weight of a standard aeroplane, specified in the POH, and is an average weight given for performance considerations and calculations.
OEW	**Operating Empty Weight**	The weight of the aircraft with crew, unusable fuel, and operational items (galley etc).
	Payload	The weight the aircraft can carry with the pilot and fuel on board.
MRW	**Maximum Ramp Weight**	The maximum weight for ramp maneouvering, the maximum takeoff weight plus additional fuel for start taxi and runup.
MTOW	**Maximum Takeoff Weight**	The maximum permissible takeoff weight and sometimes called the maximum all up weight, landing weight is normally lower as allows for burn off and carries shock loads on touchdown.
MLW	**Maximum Landing Weight**	Maximum permissible weight for landing. Sometimes this is the same as the takeoff weight for smaller aircraft.
Other		
AFM	**Aircraft Flight Manual**	These terms are inter-changeable and refer to the approved manufacturers handbook. Cessna most often uses the term Pilot's Operating Handbook, early manuals were called Owners Manual and legal texts often use the term AFM.
POH	**Pilot's Operating Handbook**	
	Pilot Information Manual	A Pilot Information Manual is a new term, coined to refer to a POH or AFM which is not issued to a specific aircraft.

Conversion Factors

lbs to kg	1kg =2.204lbs	kgs to lbs	1lb = .454kgs
USG to lt	1USG = 3.785Lt	lt to USG	1lt = 0.264USG
lt to Imp Gal	1lt = 0.22 Imp G	Imp.Gal to lt	1Imp G = 4.55lt
nm to km	1nm = 1.852km	km to nm	1km = 0.54nm
nm to St.m to ft	1nm = 1.15stm 1nm = 6080ft	St.m to nm to ft	1 st.m = 0.87nm 1 st.m =5280ft
feet to meters	1 FT = 0.3048 m	meters to feet	1 m = 3.281 FT
inches to cm	1 inch = 2.54cm	cm to inches	1cm = 0.394”
Hpa(mb) to “Hg	1mb = .029536”	“ Hg to Hpa (mb)	1” = 33.8mb

AVGAS FUEL Volume / weight SG = 0.72					
Litres	Lt/kg	kgs	Litres	lbs/lts	Lbs
1.39	1	0.72	0.631	1	1.58

Wind Component per 10kts of Wind								
deg	10	20	30	40	50	60	70	80
kts	2	3	5	6	8	9	9	10

Useful Formulas

Celsius (C) to Fahrenheit (F)	C = 5/9 x(F-32), F = Cx9/5+32
Pressure altitude (PA)	PA = Altitude AMSL + 30 x (QNH-1013) Memory aid – Subscale up/down altitude up/down
Standard Temperature (ST)	ST = 15 – 2 x PA/1000 ie. 2 degrees cooler per 1000ft altitude
Density altitude (DA)	DA = PA +(-) 120ft/deg above (below) ST i.e. 120Ft higher for every degree hotter than standard
Specific Gravity	SG x volume in litres = weight in kgs

One in 60 rule	1 degree of arc ≅ 1nm at a radius of 60nm i.e degrees of arc approximately equal length of arc at a radius of 60nm
Rate 1 Turn Radius	R = GS/60/π ≅ GS/20
Rate 1 Turn Bank Angle (Rule of Thumb)	Degrees of Bank ≅ G/S/10+7
Percent to fpm	fpm ≅ % x G/S Or fpm = % x G/S x 1.013
Percent to Degrees	TANGENT (degrees in radians) x100 = Gradient in % INVERSE TANGENT (gradient in %/100) = Angle in Radians
Degrees to Radians	Degrees x π / 180 = radians
Approximate Cosine factors for angle in degrees	Cosine 60 = 0.5 (HWC); Sine 60 ≅ 0.9 (XWC) Cosine 45 ≅ 0.7 = Sine 45 ≅ 0.7 (HWC&XWC) Cosine 30 ≅ 0.9 (HWC); Sine 30 = 0.5 (XWC) Memory Aid = Think about the sides of the triangle made from the wind vector and the forward/aft and side components to determine which factor to use.
Gust factor (Rule of Thumb)	Vat = Vref+1/2HWC + Gust eg. Wind 20kts gusting 25 at 30 degrees to Runway: Vat = Vref +0.5x18+5 = Vref+14, If the Vref is 65kts, Vat should be 65+14 = 79kts

Pilot's Operating Handbook Information

The approved manufacturer's handbook, normally termed Pilot's Operating Handbook (POH), Aircraft Flight Manual (AFM), or Owners Manual, is issued to a specific model and serial number, and includes all applicable supplements and modifications. It is legally required to be on board the aircraft during flight, and is the master document for all flight information.

In 1975, the US General Aviation Manufacturer's Association introduced the 'GAMA Specification No. 1' format for the 'Pilot's Operating Handbook' (POH). This format was later adopted by ICAO in their Guidance Document 9516 in 1991, and is now required for all newly certified light aircraft by ICAO member states. Most light aircraft listed as built in 1976 or later, have provided Pilot's Operating Handbooks (POHs) in this format.

This format was designed for ergonomic purposes to enhance safety. It is recommended that pilots become familiar with the order and contents of each section, as summarised in the table below.

Section 1	General	Definitions and abbreviations
Section 2	Limitations	Specific operating limits, placards and specifications
Section 3	Emergencies	Complete descriptions of action in the event of any emergency or non-normal situation
Section 4	Normal Operations	Complete descriptions of required actions for all normal situations
Section 5	Performance	Performance graphs, typically for stall speeds, airspeed calibration, cross wind calculation, takeoff, climb, cruise, and landing
Section 6	Weight and Balance	Loading specifications, limitations and loading graphs or tables
Section 7	Systems Descriptions	Technical descriptions of aircraft systems, airframe, controls, fuel, engine, instruments, avionics and lights etc.
Section 8	Servicing and Maintenance	Maintenance requirements, inspections, stowing, oil requirements etc.
Section 9	Supplements	Supplement sections follow the format above for additional equipment or modification.
Section 10	Safety Information	General safety information and helpful operational recommendations which the manufacturer feels are pertinent to the operation of the aircraft

For use in ground training, or reference prior to flight, this text should be read in conjunction with the POH from on board the aircraft you are going to be flying. Even if you have a copy of a POH for the same model C182, the aircraft you are flying may have supplements for modifications and optional equipment which affect the operational performance.

Early owners manuals for the C182 contain very little information, and it is recommended for purposes of type transition training ground courses, to also review manuals from a later models.

Introduction

This training manual provides technical and operational descriptions for the Cessna 182 aircraft.

The information is intended as an instructional aid to assist with conversion training in conjunction with an approved training organisation and the POH from the aircraft you will be flying. The text is arranged according to standard training syllabi for ease of use and assimilation with training programs, rather than following the order of a POH which is designed for ergonomic reference and in-flight use.

This material does not supersede, nor is it meant to substitute any of the manufacturer’s operation manuals. The material presented has been prepared from the basic design data obtained in the pilot's operating handbook and from operational experience.

History

The Cessna aircraft company has a long and rich history. Founder Clyde Cessna built his first aeroplane in 1911, and taught himself to fly it!
He went on to build a number of innovative aeroplanes, including several race and award winning designs.

In 1934, Clyde's nephew, Dwane Wallace, fresh out of college, took over as head of the company. During the depression years Dwane acted as everything from floor sweeper to CEO, even personally flying company planes in air races (several of which he won!).
Under Wallace's leadership, the Cessna Aircraft Company eventually became the most successful general aviation company of all time.

Development of the C182

Due to it's versatility, load, and range, the Cessna 182 is one of the most popular 4 seat light aircraft in the private and recreational market.

Approximately 23,000 C182s have been built to date, with the C182 still in production at the time of writing. The production began in 1965, spanning 50 years with a brief break between 1987 and 1996. It is the second most popular Cessna built, after the Cessna 172 which dominates the training market.

The C182 began it's life as the tricycle conversion of the popular C180 tail wheel model, the first model very nearly resembling a C180 with the tail wheel removed. The name Skylane was first given to the C182A with deluxe options, and became the standard name later. Major changes to the airframe were made with the C182C and C182E, both bringing about the transformation in appearance to the resemble the modern day shape. Further changes throughout the series were mainly related to improvements in structure, systems, and fittings.

The Cessna 182 can be one of the safest and most rewarding aircraft that you may fly, providing you receive proper training, know the aircraft well, and operate according to the manufacturers recommendations. In this respect, make sure you understand the systems thouroughly, abide by the limitations, and never attempt to operate on or near the boundary of the aircraft's or your own limitation.

Models and Differences

As detailed on the previous page, the Cessna 182 model had a number of type variants during its production history. Additionally there are a number of post-manufacture modifications available for the airframe, instruments/avionics equipment and electrics.

Speeds often vary between models by one or two knots, sometimes more for significant type variants. Whenever maximum performance is required the speeds will also vary with weight, and density altitude. For simplification the speeds have been provided for the model C182 Skylane, which was produced in the largest numbers.

All speeds have been converted to knots and rounded up to the nearest 5kts. Generally multiple provision of figures can lead to confusion for memory items and this application is safer for practical use during conversion training.

During practical training reference should be made to the flight manual of the aeroplane you will be flying to ensure that the limitations applicable for that aeroplane are adhered to. Likewise when flying different models it should always be remembered that MAUW, flap limitations, engine limitations and speeds may vary from model to model. Before flying different models, particularly if maximum performance is required, the AFM should be consulted to verify differences.

Model History

We provide the following information to outline significant differences from an operational perspective. A detailed history is provided in the table following and in subsequent chapters.

C182

The early model C182 had the same fuselage as the C180 ("straight back"), without the rear window.

The main operational differences of the C182 are summarised here:

- manual flap lever and the limitation of 100mph (87kts) for all flap selections
- lower maximum all up weight (2550lbs)

Various minor airframe changes were made to gradually bring about the more commonly known version of the C182 including:

- C182A Weight increased to 2650lbs;
- C182C Third window on cabin, swept tail;
- C182E Wrap around rear window, re-profiled cowlings, improved fairings, electric flaps, weight increased to 2800lbs, flap limits increased to 110mph (95kts), optional 8-USGal fuel tanks;
-

The addition of the rear window, and swept tail, and later cowling and fairing modifications were mainly responsible for the present appearance of the C182.

- C182L Preselect flap control, first 10 degrees increased to 160mph (140kts);
- C182N Maximum takeoff weight increased to 2950lbs;
- C182P Tubular steel undercarriage increasing landing weight to 2950lbs, enlarged fin;
- C182Q Maximum rpm reduced to 2400 with O-470U designed for 100/130 fuel, vernier mixture control standard, electrical system changed to 28V and bladder tanks replaced with integral tanks with a higher standard fuel capacity of 88USGal;

- C182R Takeoff weight increased to 3100, 20 degrees flap limit increased to 120kts;
- C182S Fuel injection, first 10 degrees increased to 100kts, annunciator panel, or optional G1000 avionics;
- C182T G1000 avionics now standard equipment.

Major performance options were offered in the late 1970's including:

<u>C182RG (R182), 1977-1986</u>
Retractable version of the Skylane, improved speed but added responsibility.

<u>T182RG and T182, 1979-1986</u>
235hp turbo charged version, service ceiling 20,000 (with oxygen!), added power, added maintenance, increase in MAUW to 3100lbs.

When Cessna resumed production of it's single engine range in the 90's, a new and improved C182S was available.

<u>C182S, C182T, T182T 1997 on</u>
If you are lucky enough to find one of these it is really a dream to operate. After the recovery from public liability suits and the 80's recession, the C182 received upgraded systems and equipment to produce the same proven design with the latest accessories and support.

Significant differences include:

- IO540 fuel injected engine, providing 230hp at 2400rpm;
- Full IFR avionics as standard installation including auto pilot;
- Warning and caution annunciator panel indications or optional G1000 avionics suite;

The S and T have slightly lower load carrying capacity than earlier models due mainly to avionics installations, and the fuel injected system, although alleviating carburettor problems, can be quite complicated for the inexperienced pilot and differences training is highly recommended.

<u>Reims F182</u>
Like all Reims productions we have to admit this model is also an excellent version. Only 169 aircraft were produced.

Significant differences include:

- Lower stall speeds, similar to STOL equipped C182s;
- Slightly higher cruise speeds;
- Different airframe manufacturing processes.

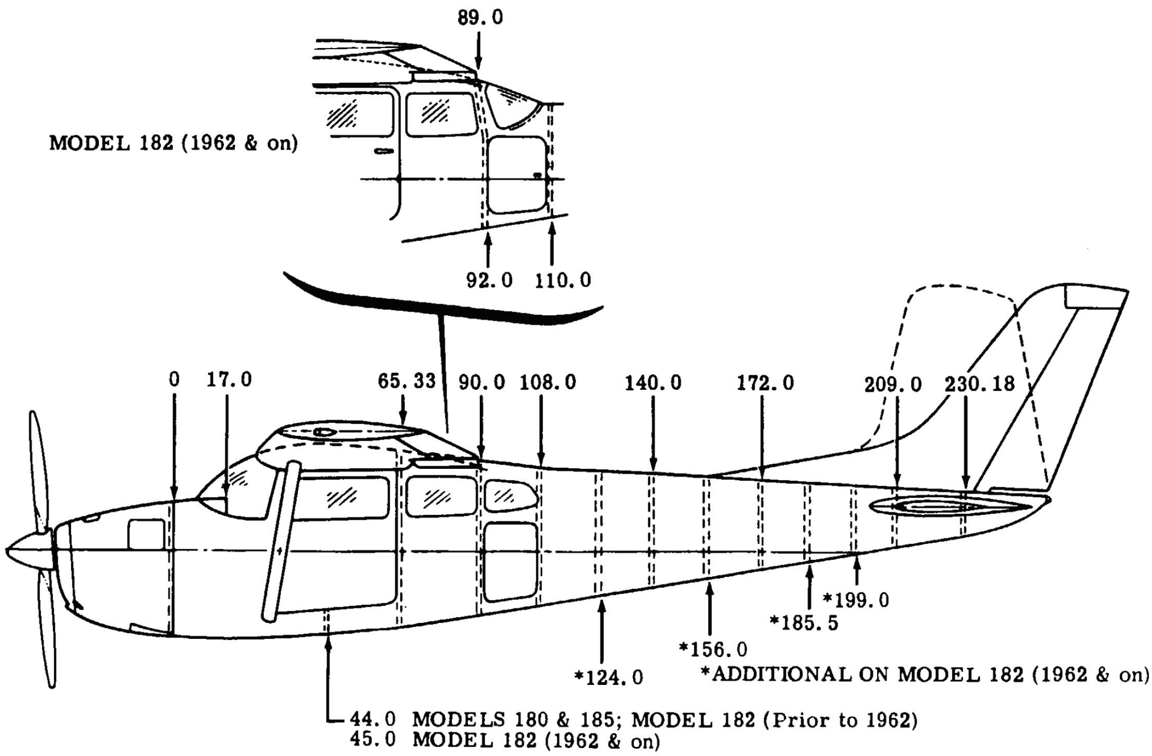
<u>Robertson STOL kits</u>
Additions of Robertson STOL Kits (Sierra Industries) to the C182 produce remarkable short field performance and stall speeds that approach that of a 152, however without any significant increase drag in the cruise. It is an impressive

modification, however must be taken carefully if you wish to use it to its limits. Care should be taken at low speed where operating near the wrong side of the drag curve, particularly when at MAUW and with high density altitudes.

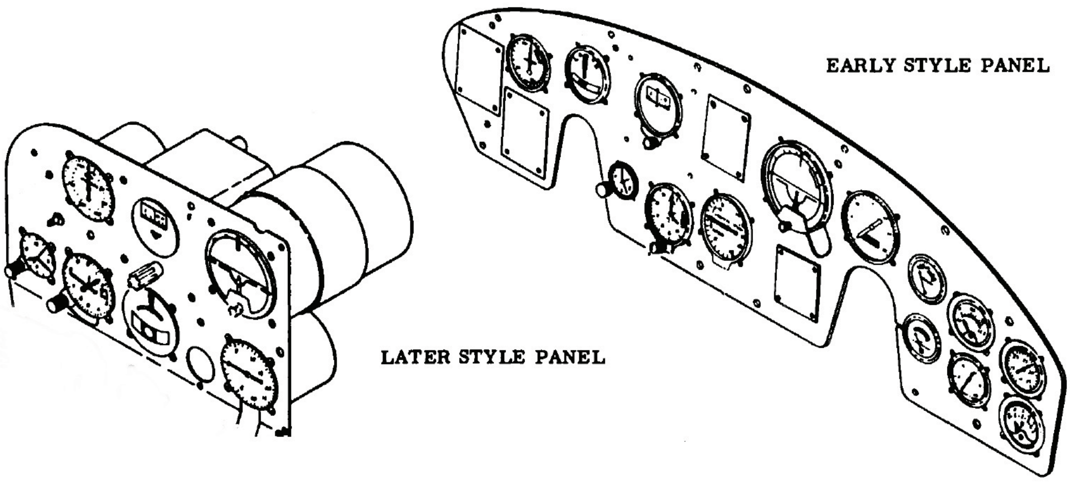
Model History Versus Serial Number

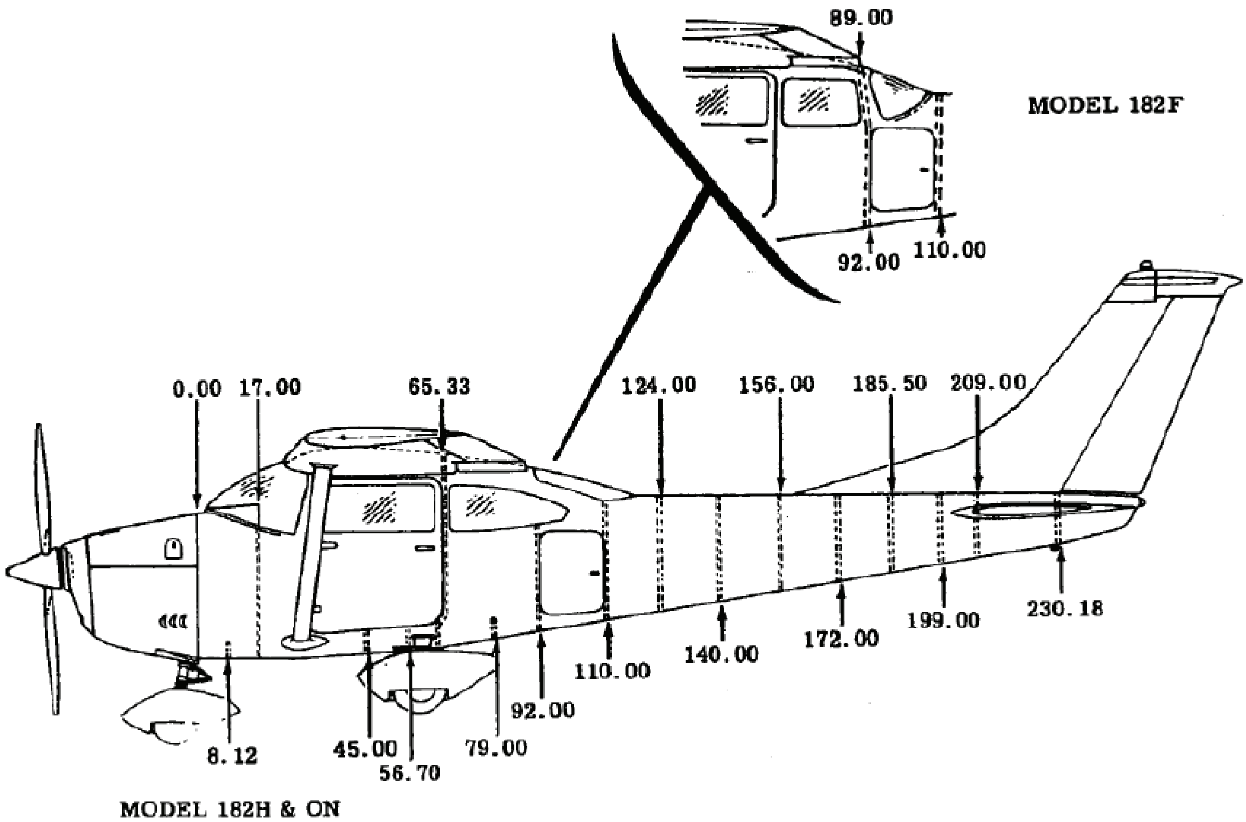
Model	Name	Year	Starting Serial Number	Significant Changes
C182		1956	18233000	2550lbs maximum weight, Continental 0470-L engine developing 230hp at 2600rpm, 14V electrical system.
C182A	Skylane for deluxe version only	1957	18233843	2650lbs maximum weight, increase from 60 to 65USgal fuel capacity, useable fuel remains at 55USgal. Some minor improvements to the airframe and fittings including modified instrument panel layout. Electrical fuel gagues and low voltage warning light standard.
		1958	18234754-34999	Skylane name introduced for deluxe model. Exhaust moved for improved cooling, rudder linkages changed to bungee type, and improved instrument lighting.
			18251001	
C182B		1959	18251557	Cowl flaps added.
C182C		1960	18252359	Tail fin and rudder changed to a swept tail shape and third cabin side window added on each side. Flush caps replaced with standard raised grip fuel caps. Minor interior changes including plastic control wheel grip, and major changes to fuselage and cowling designs to improve maintenance.

Model	Name	Year	Starting Serial Number	Significant Changes



C182D		1961	18253008*	The last of the 'straight back' models. The instrument panel layout improved, with the artificial horizon in a more direct line of sight from the left seat. Cowling fastenings changed to quick release type. Pull starter replaced by key starter.



<table>
<tr><th>Model</th><th>Name</th><th>Year</th><th>Starting Serial Number</th><th>Significant Changes</th></tr>
<tr><td>C182E</td><td></td><td>1962</td><td>18253599</td><td>Maximum weight increased to 2800lbs
Optional 84 USG tank (80 USG useable)
Cut down rear fuselage and added "omni-vision" wraparound rear window, flap limit increased on all stages from 100mph to 110mph (95kts), manual flap replaced by electric flap with a toggle switch and indicator. Pull contactor master switch change to a rocker type. Engine changed to 0470-R.</td></tr>
<tr><td colspan="5">
</td></tr>
<tr><td>C182F</td><td rowspan="4">C182 or Skylane</td><td>1963</td><td>18254424</td><td>Optional autopilot available. Improved overhead instrument lighting.</td></tr>
<tr><td>C182G</td><td>1964</td><td>18255059</td><td>One piece rear window fitted, aft cabin windows enlarged.</td></tr>
<tr><td>C182H</td><td>1965</td><td>55845</td><td>Pointed spinner replaces rounded shape. Horizontal stabiliser and elevator width increased. One piece front windshield.</td></tr>
<tr><td>C182J</td><td>1966</td><td>56685</td><td>Rotary door latches fitted, larger cowl access panel provided for easier maintenance.</td></tr>
</table>

Model	Name	Year	Starting Serial Number	Significant Changes
C182K		1967	57626	An alternator replaces the generator for electrical power supply.
C182L		1968	58506	Flap toggle switch replaced by a "pre-select" lever and floating arm indicator, flap limiting speed on first 10 degrees increased to 160mph (140kts). AH moved to central position, to resemble later more ergonomic instrument panel configurations. Sump fuel stainer control moved from instrument panel to beside oil dipstick.
A182J	Argentine C182	1966	A182-001	Argentinian built C182.
A182K		1967	A182-057	
A182L		1968	A182-097 on	
C182M	C182 or Skylane	1969	18259306	Generator output increased to 60 Amps.
C182N		1970	18260056	Maximum takeoff weight increased to 2950lbs, landing weight remains 2800lbs. Split rocker master switch installed to isolate battery from alternator.
C182N		1971	18260446	Shoulder harnesses standard in front seats, 80lbs baggage permitted in aft compartment, total still 120lbs.
C182P	C182 or Skylane	1972	18260826	Flat spring steel main landing gear struts replaced with tubular steel. Landing weight increased to 2950lbs to match takeoff weight. Baggage in aft compartment now total 200lbs (120 in forward part and 80 in aft part of compartment). Landing lights shifted from wing to nose cowling. Engine gauge markings relabelled with arcs for improved ergonomics. High voltage sensor and 'High Voltage' warning light replaces the generator warning light.
		1973	18261426	Factory installed avionics upgraded from 100 channel to 200 channel.
		1974	18262466	Door handles now close flush with armrest in locked position.

Model	Name	Year	Starting Serial Number	Significant Changes
		1975	18263476	Engine changed to O-470-S. Improved cowling and fairing design increases reported cruise speed approximately 5kts. Lower profile glareshield.
C182	Skylane only	1976	18264296	Airspeed indicator changed from mph to kts, flap limit placards converted from 110mph to 95kts. Optional electric trim.
F182P	Reims	1976	F1820001-F1820025	Built by Reims in France
A182M	Argentine C182	1969	Not assigned	Argentinian models.
A182N		1970	A1820117-A182136	
A182N		197	Not assigned	
A182N		1972	Not assigned	
A182N	AMC182	1973	A1820137-A182146	
A182N		1974-1976	Not assigned	
C182Q	Skylane or Skylane II	1977	18265176-18265965	Changed to Avgas 100/130 engine design with Continental O-470-U, developing 230hp at 2400rpm, maximum rpm reduced primarily for noise, but also a reported improved climb performance. Vernier mixture control now standard.
C182Q		1978	18265966-18266590 &18263479	Electrical system changed from 14 to 28 Volts, battery capacity 24V, 12.75 or 15.5 amp-hr. Engine configured for Avgas 100LL/100. Avionics master switch installed. Window latch redesigned to sit flush with window indent.
C182Q		1979	18266591-18267300	Integral fuel tank replaces bladder tank and capacity increased to 92USgal, 88USgal usable. Alternator control unit changed to integral unit, 'high voltage' warning light relabelled 'low voltage'.

Model	Name	Year	Starting Serial Number	Significant Changes
C182Q		1980	18267301, 18267302-18267715	New audio panel with marker beacons. A pull type alternator circuit breaker fitted.
F182P	Reims/ Cessna Skylane/II	1977	F18200026-F18200064	Built by Reims in France.
F182Q	F Skylane	1978	F18200065-F18200094	
F182Q	F Skylane II	1979	F18200095-F18200129	
F182Q		1980	F18200130-F18200169	
C182R /T182	Skylane or Turbo Skylane/ Skylane II or Turbo Skylane II/ Skylane or Turbo Skylane -With Value Group A	1981	18267716-18268055 &18267302	Maximum weight increased to 3100lbs for takeoff, landing weight remains 2950lbs. Introduction of optional turbo-charged engine with designator T182. Door latch redesigned to include an upper latching pin.
		1982	118268056	
		1983	18268294	Low Vacuum warning light fitted, flap speed for 20 degrees increased to 120kts.
		1984	18268369	Rear shoulder harnesses standard.
		1985	18268434	
		1986	18268542-18268586	
R182/ TR182	Skylane RG	1978-1986	R18200002-R18202039	Retractable version and turbo retractable version, with Lycoming O-540-J3C5D, 235hp at 2400rpm.

Note 1: Unlike most Cessna's which have the suffic RG to designate retractable, Cessna termed the retractable version of the Cessna 182 "R182", unfortunately this is easily confused with the C182R and also can be confused with terminology used to designate the C172 military and Hawk XP version - "R172" which is not retractable. In this text the term C182RG has been used to refer to the retractable version to avoid confusion.

Model	Name	Year	Starting Serial Number	Significant Changes
182S	Skylane	1997-2001	18280001	Engine changed to Lycoming IO-540-AB1A5, fuel injected, 230hp at 2400rpm, dual vacuum system, annunciator panel or optional G1000 avionics. Maximum ramp weight increased to 3110Lbs, takeoff and landing remain unchanged. First 10 degrees flap limit increased to 100kts.
182T	Skylane	2001 on	18280945	Minor modifications to engine cowling, wheel fairings and step. G1000 avionics now standard equipment.
T182T	Skylane TC	2001 on	T18208001	Lycoming TIO540-AK1A, turbo, fuel injected, 235hp at 2400rpm, 4 place oxygen system.
Note 2: The designator T182/TR182 was given to models from 1978 on which were fitted with a turbocharger, again this should not be confused with the later design C182T which is normally aspirated.				

Common Modifications Table

There are over 500 STCs on the C182, it would not be useful to list them all here. This table attempts to identify a few of the more commonly used and more widely beneficial modifications available.

TYPE	***NAME and MANUFACTURER***	***DIFFERENCES and FEATURES***
Any	Air Research Technology Inc STOL kit	Increases weight to 2950, useful on older models, extends the wing by 37 inches, which also increases performance.
Any	Ski's/Floats (Various)	C182s (unlike the less suitable C172) unfortunately never had a factory float plane option available, however a number of STC's are available for full conversion to seaplane operation.
	Flight Bonus speed kit (available from Horton STOLcraft)	Reported to improve cruise speed 12-18kts.
Any	Drag reduction kits (Various)	Various – normally involving speed fairings to reduce form drag, there are various drag reduction kits available to improve cruise speeds.

TYPE	***NAME and MANUFACTURER***	***DIFFERENCES and FEATURES***
	Engine Modifications, (Various)	Various engine refits are available, the most common being the IO470, IO520, and IO550 engines, for improved performance. All these also being fuel injected, additionally address carburettor and carb-ice issues.
Any	Horton STOL	Tip and wing surface modifications to permit lower stall speed, take-off and landing speeds and thus lower distances.
Any	Robertson STOL	Increased lift, more speed, added stability, and lower stall speed, take-off and landing speeds and distances.
Any	Vortex Generators (Micro Aerodynamics)	Reduction in surface drag and induced drag, improving boundary layer adherence, and decreasing stall speed, improved performance.
Note: All manufacturers of performance related modifications will have full information available on the increases projected from the kit, in terms of speed, takeoff and landing, fuel burn, and climb enhancements. It is recommended that these figures be reviewed carefully in terms of desire attributes. Aircraft fitted with performance modifications must have POH supplements indicating difference – these supplements must referred to in the relevant main sections of the POH where applicable.		
Any	Low Fuel Warning System, O & N Aircraft Modifications	Warns when fuel remaining is less than approximately 7USGal for older models (restarts have a low fuel warning system).
Any	Fuel Cap Monarch Air	Umbrella style fuel caps which fix problems with leaks, predominantly occurring in older flush mounted caps, (available for most Cessna types)
1956-76 engines only	Autogas modification, Various	Engine modification to permit operation on autogas (available to engines were certified for operation with 80/87 octane, 1976 and prior). There is an increased tendency for carb icing and fuel vaporisation, and a slight power reduction, but Autogas can provide much lower costs and convenience in many countries

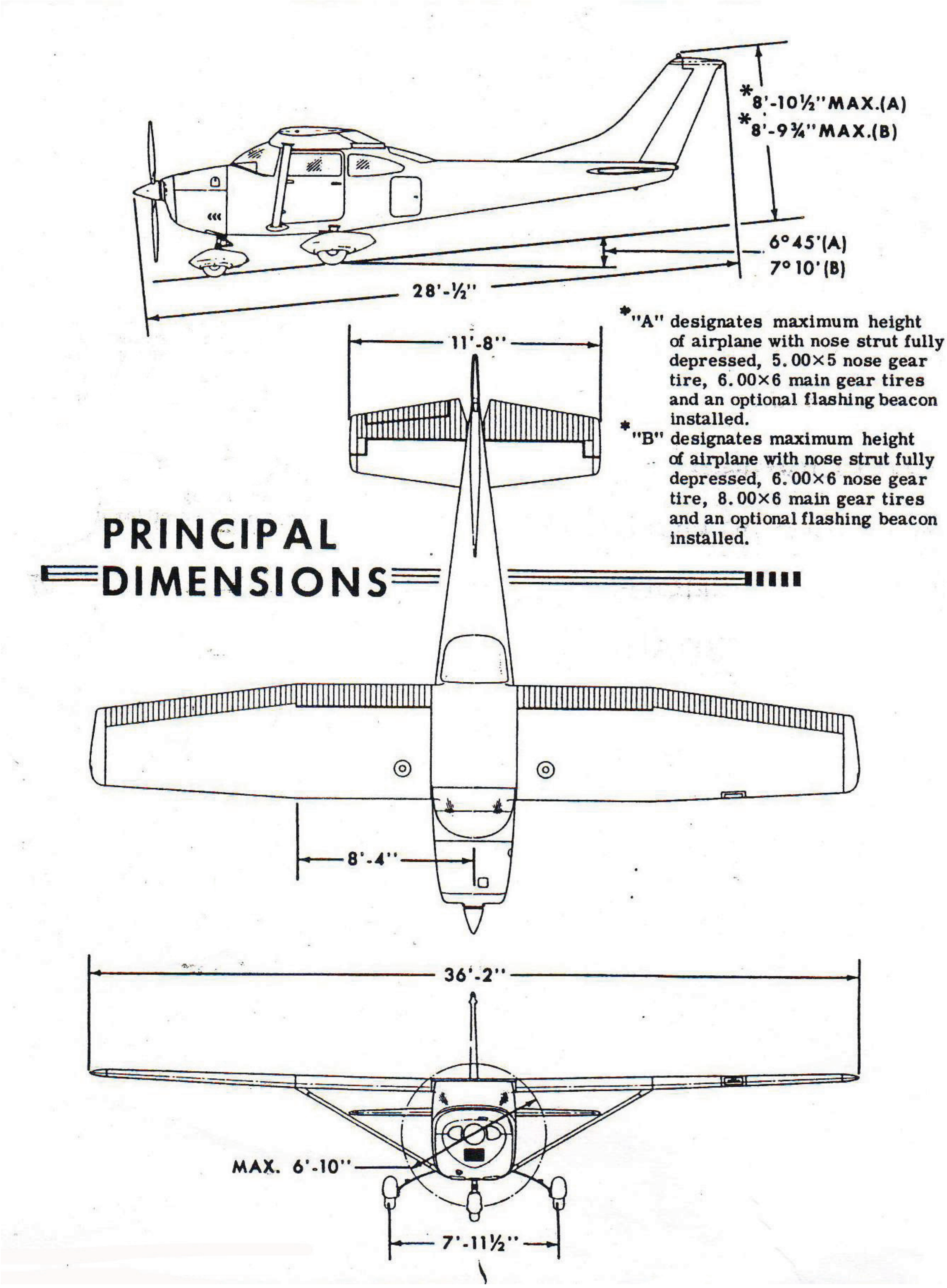
Early Model Straight-back/no Swept Tail C182

C182RG Skylane with Rear Window

AIRCRAFT TECHNICAL INFORMATION

General

The Cessna 182 aeroplane is a single engine, four seat, high wing monoplane aircraft, equipped with tricycle landing gear, and is designed for general utility purposes.



Airframe

The airframe is a conventional design similar to other Cessna aircraft you may have flown (for example the C152, C172).

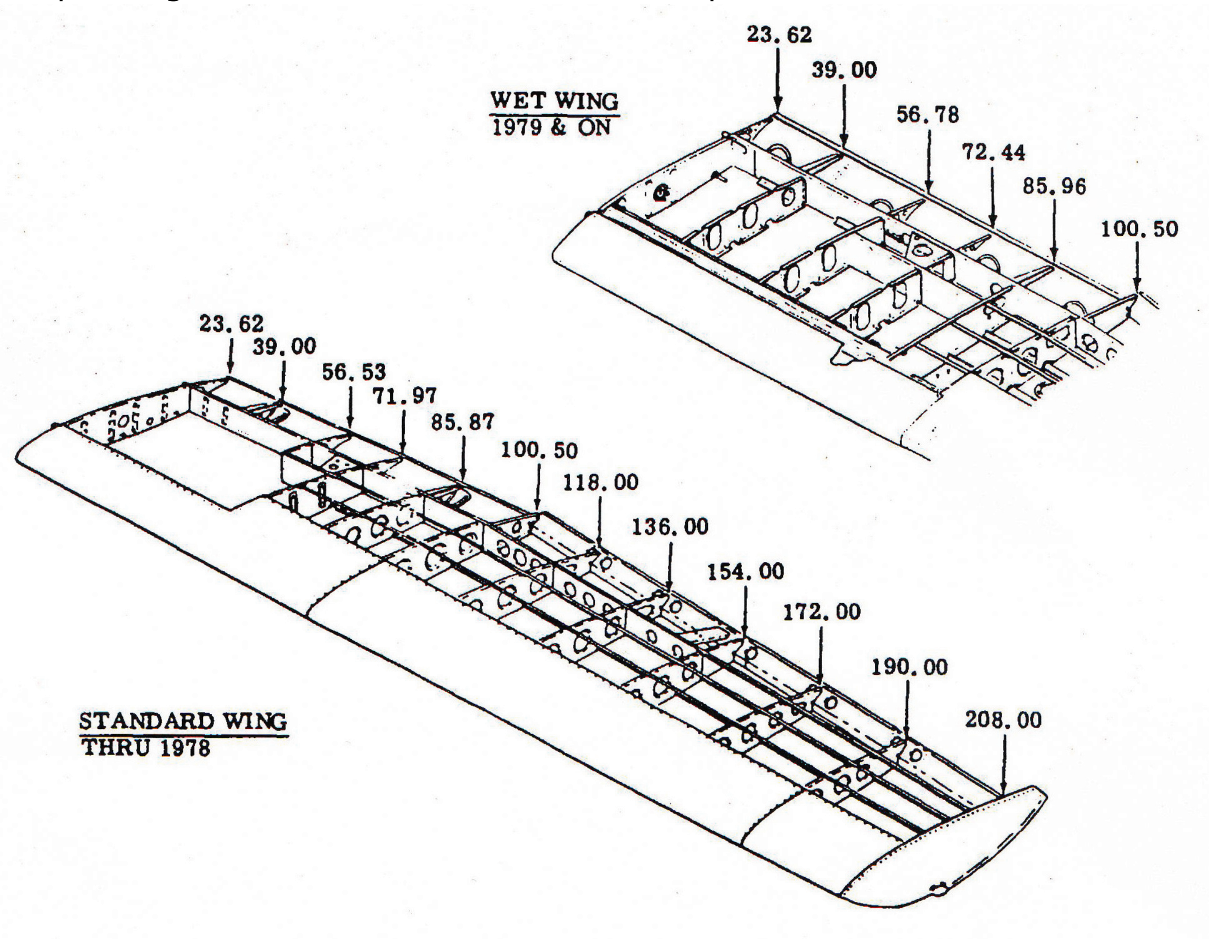
The construction is a semi-monocoque type consisting of formed sheet metal bulkheads, stringers and stressed skin.

Semi-monocoque construction is a light framework covered by skin that carries much of the stress. It is a combination of the best features of a strut-type structure, in which the internal framework carries almost all of the stress, and the pure monocoque where all stress is carried by the skin.

The fuselage forms the main body of the aircraft to which the wings, tail section and undercarriage are attached. The main structural features are:

- front and rear carry through spars for wing attachment;
- a bulkhead and forgings for landing gear attachment;
- a bulkhead and attaching plates for strut mounting;
- four stringers for engine mounting attached to the forward door posts.

The wings are all metal, semi-cantilever type with struts spanning the inner section of the wing. The wings contain either bladder or integral ie. non bladder type fuel tanks depending on the model as detailed in the picture below.



The empennage or tail assembly consists of the vertical stabilizer and rudder, horizontal stabilizer and elevator.

The construction of the wing and empennage sections consists of:

- ✈ a front (vertical stabilizer) or front and rear spar (wings/horizontal stabilizer);
- ✈ formed sheet metal ribs;
- ✈ doublers and stringers;
- ✈ wrap around and formed sheet metal/aluminum skin panels;
- ✈ control surfaces, flap and trim assembly and associated linkages.

Seats and Seat Adjustment

The pilot and copilot seats are adjustable in forward and aft position, and in most models also for both seat height and back inclination. Seat back and height should be adjusted to ensure adequate visibility and control before start-up.

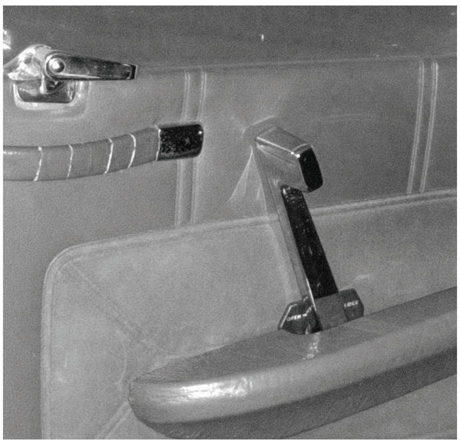
When adjusting the seats forward and aft it is of vital importance to ensure the positioning pin is securely in position. As a result of accidents involving slipping of seat position during critical phases of flight, seat locks are available and installed on many aircraft. The seat lock must be disengaged before the seat can travel rearwards.

Seat stops should be installed on all aircraft as detailed in the picture adjacent to prevent seats derailing, however on many aircraft these are missing. Care should be taken not to derail seats when making adjustments and ensure both sides are secure if using the most forward or aft positions. Where possible consult with maintenance on seat stop installation.

Doors

There are two entrance doors provided, one on the left and one on the right, and a baggage door at the rear left side of the aircraft.

The door latch on early models did not have a locked position, and doors on these models are simply pulled closed to latch. Positive pressure should be applied to the door to ensure it is locked. The door handle is lifted to release the latch.

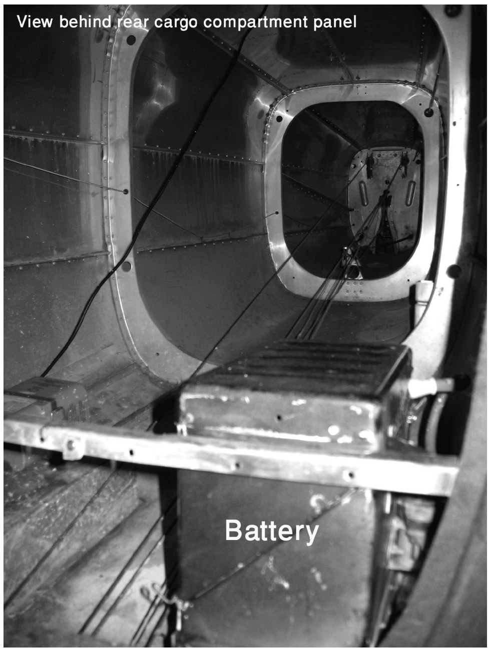


In later models a rotary handle with a locked position is fitted. Pulling the door closed latches the door, and rotating the handle approximately 90 degrees provided a locked position.

In the later models, the latching mechanism is similar in most single engine Cessna aircraft and is provided

Electrical System

Electrical energy for the aircraft is supplied by a direct-current, single wire, negative ground, electrical system with a lead acid battery.



The system is either

For models before 1967:
- ✈ 14 Volt system:
- ✈ 35, or 50 amp generator;
- ✈ 12 volt battery with 25 or 33 amp-hour capacity.

For models after 1967, and before 1978:
- ✈ 14 Volt system;
- ✈ 52 or 60 amp alternator;
- ✈ 12 volt battery with a 25 or 33 amp-hour capacity.

For models 1979 and later:
- ✈ 28 volt system;
- ✈ 60 amp alternator;
- ✈ 24 volt battery with a 12.75 or optional 15.5 amp-hour capacity.

Additionally for models equipped with G1000 avionics:
- ✈ 24 volt standby battery (for operation of the G1000 essential bus only).

Battery

The battery supplies power for starting and furnishes a reserve source of power in the event of alternator failure.

Battery capacity in amp-hours provides a measure of the amount of load the battery is capable of supplying. This capacity provides a certain level of current for a certain time. A 25 amp-hour battery is capable of steadily supplying a current of 1 amp for 25 hours and 5 amp for 5 hours and so on.

In all models the battery is located behind the rear cargo compartment panel, similar to the position in the picture above.

Standby Battery (G1000 Equipped Aircraft)

With G1000 equipped aircraft, a small standby battery is installed for the purpose of maintaining electrical power to the G1000 essential bus. This powers the primary flight display (PFD) and essential avionics and engine instruments in back up mode only, in case of an electrical supply fault or failure of the main battery circuit.

The G1000 essential bus provides power to the PFD, AHRS, ADC, COM1, NAV1, Engine and Airframe Unit, and standby instrument lights.
The 24 volt standby battery, provides approximately 30 minutes power for operation of the G1000 in back up mode.
The standby battery will automatically take over electrical supply when the main battery falls below approximately 20 volts. It may also be manually selected after failure of the alternator, providing automatic load shedding and conserving main battery power, with full availability of electrical equipment, for use during more critical stages of flight.

Power Supply

An engine-driven alternator or generator is the normal source of power during flight and maintains a battery charge, controlled by a voltage regulator/alternator control unit. The charging system capacity (28 or 14 volt), is the output from the alternator or generator after voltage regulation. This is always slightly more than the battery (24 or 12 volt) to ensure continuous charge to the battery when using the electrical system in normal operations.

External Power

An external power receptacle is available as an option on all models. The external power receptacle provides convenient connection of external power to supplement the battery, for starting and stationary ground operation.

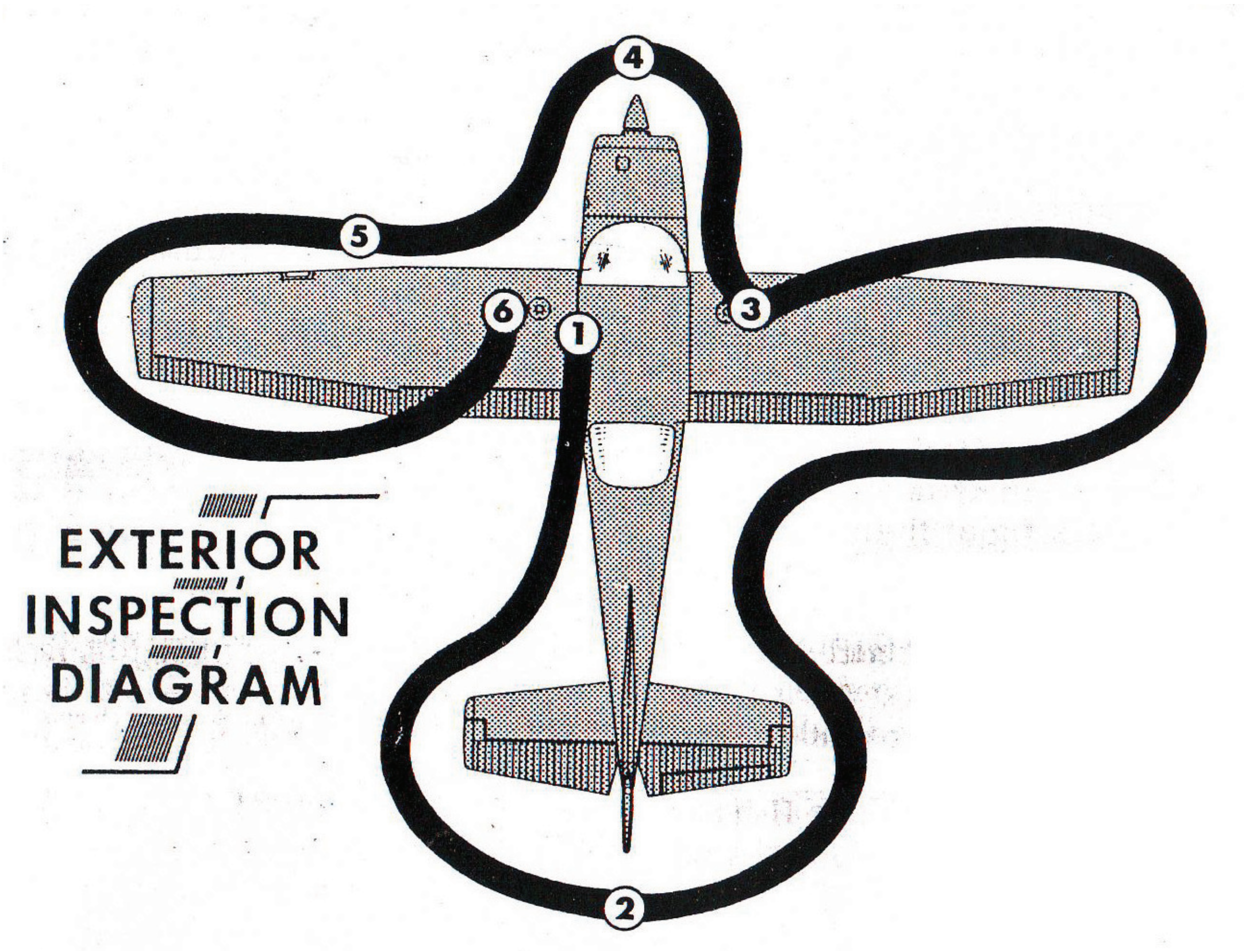
External power is useful for avionics training purposes to operate the aircraft on the ground without the engine running for extended periods, or when dealing with a weak or flat battery, and for maintenance.

The external power receptacle is on the rear cowling near the baggage compartment door nearest to the battery.

NORMAL PROCEDURES

Pre-Flight Check

The preflight inspection should be done in anticlockwise direction as indicated in the flight manual, beginning with the interior inspection.



(1) Cabin

Ensure the required documents (certificate of airworthiness, maintenance release, radio license, weight and balance, flight folio, flight manual, and any other flight specific) are on board and valid. Perform a visual inspection of the panel from right to left to ensure all instruments and equipment are in order.
If night flight is planned ensure internal lights are operational.

Control lock – REMOVE
Ignition switch – OFF
Lights - OFF except beacon

Master switch – ON
Fuel quantity – CHECK
Flaps lever – DOWN
Master switch – OFF
Fuel shutoff valve – ON

G1000 Models

Additionally for G1000 equipped aircraft the following items need to be checked after selecting the master switch on:
Ensure PFD display visible, check the required annunciators are displayed.
Confirm both avionics fans are operational – turn on each of the avionics buses separately and confirm the fan can be heard.
Turn the master switch OFF
Test the standby battery – hold in the TEST position for approx 20 seconds ensure green light remains on. (This test is described before start in the POH, however if the standby bettery is required for flight it is preferable to complete the test now).

C182RG

Confirm gear is down _before_ turning master switch on.

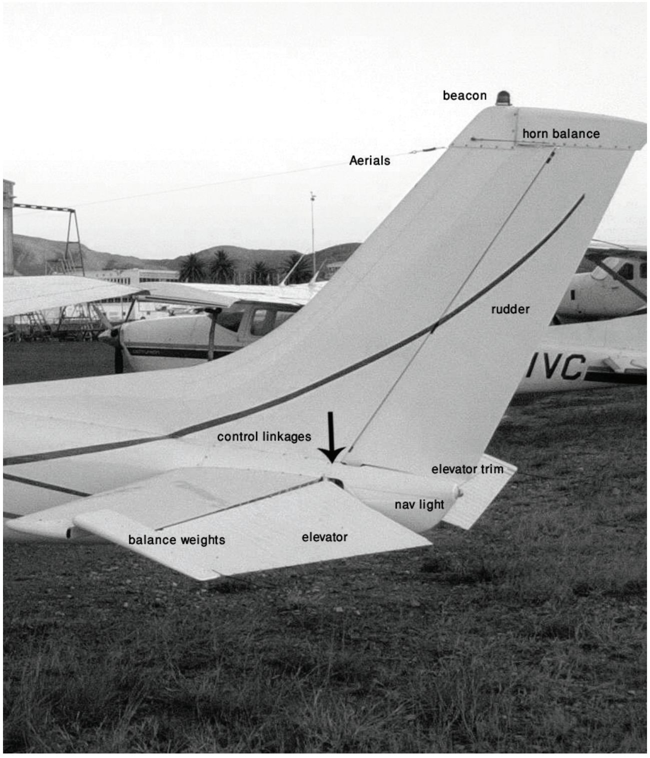
Operational Check of Lights

Before turning master switch off if lights are required, switch all lights on, confirm visually, then turn all off again except beacon. This is required for a night flight and a good idea for all flights.

Exterior Inspection

Visually check the aircraft for general condition during the walk-around inspection, ensuring all surfaces are sound and no signs of structural damage, worked rivets, missing screws, lock wires or loose connections.

If night flight is planned ensure all required lights are operational and crew torch is carried by each crew member.



(2) Tail Section

Check top, bottom, and side surfaces for any damage, balance weights secure.

Rudder, elevator, and elevator trim secure and undamaged, linkages free, full and free movement of control.

Linkage and turnbuckles secure, free of obstruction, lock wires in place.

Elevator and horn balance weights secure.

Beacon, aerials and rear navigation light undamaged and secure.

(3) Right Wing

Check top, bottom, and side surfaces for any damage. Aerials undamaged and secure.

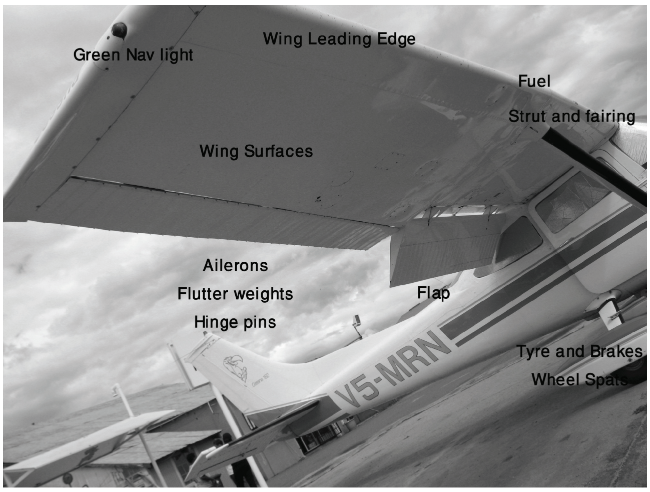
Ensure flap does not retract if pushed, flap rollers allow small amount of play in down position.

Check for damage to surface and flap tracks, free of operating linkage and security of all nuts.

Check for damage to surface and security of all hinges and flutter weights.

Condition, security and colour of navigation light.

Condition and security of fairing and strut.

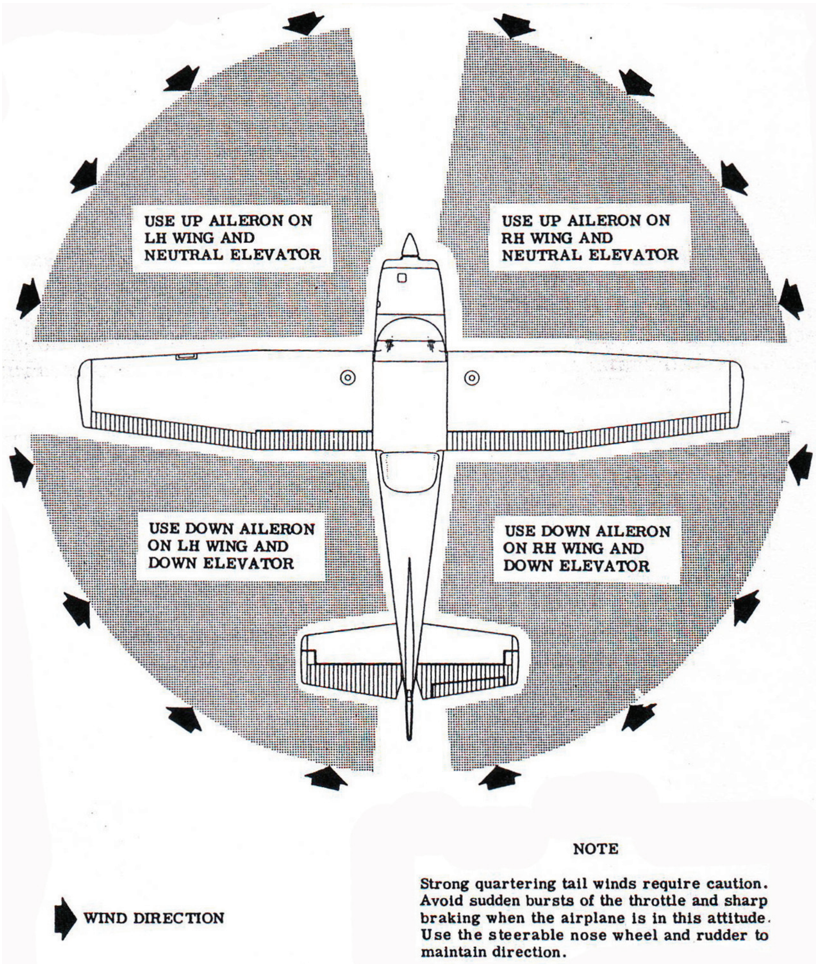


Test the brakes as soon as possible after the aircraft begins moving.
Brake use should be kept to a minimum by anticipation of slowing down or stopping followed by reduction of power to idle prior to applying brakes. Normally, power and brakes should never be used together since both are acting in opposition. Using brakes and power together adds to the wear and maintenance on the brakes, and excessive brake use will cause brake heating and deteriorate their effectiveness for stopping in the case of an aborted takeoff.

Controls should be held to prevent buffeting by the wind. Elevators should be held fully aft when taxiing over rough surfaces, bumps or gravel to reduce loads on the nose wheel and propeller damage. In all other cases the diagram below illustrates positions of controls in consideration of wind for the best aerodynamic effects during taxi.

The following phrase may be helpful as a memory aid:

CLIMB INTO wind, DIVE AWAY from the wind



During the taxi an instrument check should be completed to confirm all flight and navigation instruments are functional. This check is essential for IFR flight, and good airmanship for a VFR flight. Instrument checks should be completed at any convenient time during the taxi, prederably during a required turn, alternatively a shallow turn should be initiated.

Takeoff and Maximum Power Setting for Fuel Injected Engines (C182S and C182T)

A normally aspirated fuel injected engine will typically have a maximum power versus fuel flow placard, like the one from the C182T illustrated opposite.

MAXIMUM POWER FUEL FLOW	
ALTITUDE	FUEL FLOW
S.L.	20.5 GPH
2000 Feet	19.0 GPH
4000 Feet	17.5 GPH
6000 Feet	16.5 GPH
8000 Feet	15.5 GPH
10,000 Feet	14.5 GPH
12,000 Feet	13.5 GPH

The takeoff procedure for a normally aspirated engine from the Cessna POH stipulates "the mixture should be leaned to give maximum rpm at full throttle, this should provide a fuel flow to closely match the placard" and further for a maximum power climb "for maximum power, the fuel flow should be set in accordance with the placard, this is a minimum required fuel flow". For normal operations, the engine fuel flow may be set at run-up rpm for departure, thereafter the fuel flow checked against the maximum power placard. For maximum performance, however, a full power setting will not only ensure the mixture is set correctly, but also enable a full power engine check prior to departure.

In the turbo engine, the recommended fuel flow and power setting do not change with altitude, since the pressure developed in the manifold is the same at altitude as it is at sea level up to the maximum certified take-off altitude. The mixture must therefore be set fully rich for takeoff, and the fuel flow checked against that specified in the flight manual. The recommended takeoff power for the turbo-charged T182T is 32" manifold and 24GPH fuel flow.

Wing Flaps Setting for Takeoff

Takeoff may be made with 0, 10, or 20 degrees of flap. Using the flaps for takeoff will shorten ground roll but will reduce climb performance of aircraft.
During testing, it is established which flap settings will be most favourable and the associated performance is tabulated.

Using 20º wing flaps on C182 reduces the total takeoff distance to 50ft obstacle clearance considerable, however if there is rising terrain after the 50ft point climb performance should be considered.
Use of flap on soft or rough surfaces will assist with reducing the frictional drag considerably.
Flap deflections greater than 20º are not approved for takeoff.

If flaps are used for takeoff, they should not be retracted below 300ft AGL and not before a safe flap retraction speed has been reached. On flap retraction the aircraft loses lift and with insufficient speed may sink down. The AFM does not specify a flap retraction speed, 80mph is recommended.

ABNORMAL AND EMERGENCY PROCEDURES

General

The main consideration in any emergency should be given to flying the aircraft. Primary attention should be given to altitude and airspeed control and thereafter to the emergency solution.
Rapid and proper handling of an emergency will be useless if the aircraft is stalled and impacts with the ground due to loss of control. This is most critical during takeoff, approach and landing.
The check lists in this section should be used as a guide only. The emergency checklist and procedures for your particular aircraft model specified in the aircraft Pilots Operating Handbook should be consulted for operational purposes.

Emergency During Takeoff

Any emergency or abnormality during takeoff calls for the takeoff to be aborted.
The most important thing is to stop the aeroplane safely on the remaining runway.

After the aircraft is airborne, re-landing should be considered only if sufficient runway is available for this purpose. As a general rule, the runway is sufficient, if the end of the runway can be seen in front of the aircraft. Where no sufficient runway is available, the engine failure after takeoff procedure should be followed.

Engine Failure after Takeoff

In the event of an engine failure after takeoff first fly the aircraft:
Promptly lower the nose and establish a glide attitude to maintain 70kts.
Landing should be planned straight ahead and within ±30° to either side.
The turn, if required, should be made with no more than 15° of bank.
If adequate time exists secure the fuel and ignition system prior to touchdown to reduce the possibility of fire after touchdown, in accordance with the procedure below.

Any attempt to restart the engine depends on altitude available.
A controlled descent and crash landing on an unprepared surface is more preferable to uncontrolled impact with the ground in the attempted engine start.

✈ After engine failure:

- **Airspeed** – 70kts (or the applicable recommended engine failure immediately after takeoff speed);