Cessna®

150, 172, 175, 180,
182, AND 185 SERIES

100 - SERIES

SERVICE MANUAL

1962 AND PRIOR

THIS SUPERSEDES ALL PREVIOUS SINGLE ENGINE SERVICE MANUALS

1 FEBRUARY 1962

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LIST OF EFFECTIVE PAGES

Note: The portion of the text affected by the change is indicated by a vertical line in the outer margins of the page.

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Upon receipt of the second and subsequent changes to this book, personnel responsible for maintaining this publication in current status should ascertain that all previous changes have been received and incorporated.

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SERVICE MANUAL TITLE 100 SERIES 1962 AND PRIOR

SERVICE MANUAL NUMBER D138-13 DATED 1 FEBRUARY 1962

TEMPORARY CHANGE NO. 1

DATED: 18 OCTOBER 1977

This change consists of the following pages, which replace existing pages in the service manual and supersedes aerofiche information.

SERVICE MANUAL	FICHE/FRAME
page 12-1	
page 12-2	

File this page following "List of Effective Pages" in the front of your service manual as a record of pages affected by this temporary change.

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FOREWORD

This manual contains recommended procedures and instructions for ground handling, servicing and maintaining Cessna single-engine commercial aircraft prior to 1963 models. These include the Model 150, 172, 175, 180, 182, and 185. Although not specifically written for earlier models which have been discontinued, much of the information can be used as a guide for maintenance of the Model 120, 140 and 170. Besides serving as a reference for the experienced mechanic, this book also covers step-by-step procedure for the less experienced man. This manual should be kept in a handy place for ready reference. If properly used, it will better enable the mechanic to maintain Cessna single-engine aircraft and thereby establish a reputation for reliable service.

The material presented in this manual is divided into twenty sections. All sections and their major paragraph titles are listed in the table of contents at the front of the book. A section table of contents, listing each paragraph and the page on which it appears, is located at the front of each individual section. All information, illustrations, and specifications contained in this manual are based on the latest information available at the time of publication.

This information is supplemented and kept current by service letters and service news letters published by Cessna Aircraft Company. This information goes to all Cessna Dealers so that they have the latest authoritative information for servicing Cessna Airplanes. Therefore, Cessna recommends that all Cessna owners utilize the Cessna-trained Dealer Service Organization to the fullest, to receive the benefit of their knowledge and experience.

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SECTION 1

GENERAL DESCRIPTION

1-1. GENERAL DESCRIPTION. The Cessna single-engine aircraft described in this manual are similar in that all models are of a high-wing monoplane configuration, employing patented spring-steel main landing gear struts, opposed air-cooled Continental engines, and all-metal semi-monocoque airframe construction. Except for the Model 150 series aircraft, which have four-cylinder engines, these aircraft use six-cylinder engines. The Model 150 is two-place and all others except the Model 185 are four-place. The Model 185 is a multi-purpose aircraft, designed as a one-, two-, four-, or six-place aircraft. An auxiliary seat may be installed in most models. The Models 180 and 185 are equipped with tailwheels and the others have a tricycle-type landing gear. Beginning in 1960, Models 172, 175, and 182 series aircraft were designed with a marked degree of fin and rudder sweep-back. Other refinements, such as a lower ground attitude, wider main landing gear, engine and propeller model changes, and internal and external styling, have been made from time to time.

Leading particulars of each model, with dimensions based on gross weight, are given in the following charts. If these dimensions are used for constructing a hangar or computing clearances, remember that such factors as nose strut inflation, tire inflation, and load distribution may result in some dimensions that are considerably different from those listed. Control surface travels are listed in nominal degrees; refer to the applicable section of this manual for specific travels and tolerances.

MODEL 150

DESIGN GROSS WEIGHT	1500 lb
TOTAL FUEL CAPACITY	26 gal
OIL CAPACITY	6 qt
ENGINE MODEL (Continental)	O-200-A
HP RATING	100
RATED RPM	2750
MAIN WHEELS	5:00 x 5
Pressure	30 psi
NOSE WHEEL	5:00 x 5
Pressure	30 psi
AILERON TRAVEL	
Up	20°
Down	15°
FLAP TRAVEL	39°
RUDDER TRAVEL	
Right	16°
Left	16°
ELEVATOR TRAVEL	
Up	25°
Down	15°
ELEVATOR TRIM TAB TRAVEL	
Up	10°
Down	20°
PRINCIPAL DIMENSIONS	
Wing Span (prior to 1962)	33'4"
Wing Span (1962 & on)	33'6"
Tail Span	10'
Length	*21'6"
Height	**6'11"
Track Width	6'5"
BATTERY LOCATION	
Aft of baggage compartment	
SERIAL NUMBERS	
1959	17001 thru 17683
1960	17684 thru 17999 & 59001 thru 59018
1961 (150A)	15059019 thru 15059350
1962 (150B)	15059351 & on

*If bullet-shaped spinner is installed, add approximately 6" to length.
**If rotating beacon is installed on vertical fin, add approximately 3" to height.

MODEL 172

DESIGN GROSS WEIGHT
- Prior to 1962 . . . . . 2200 lb
- 1962 & on . . . . . 2250 lb

TOTAL FUEL CAPACITY . . . . . 42 gal
OIL CAPACITY . . . . . 8 qt
ENGINE MODEL (Continental)
- Prior to 1960 . . . . . O-300-A
- 1960 & on O-300-C
- 1961 & on (Skyhawk) O-300-D

HP RATING 145
RATED RPM 2700
MAIN WHEELS . . . . . 6:00 x 6
- Pressure . . . . . 23 psi

NOSE WHEEL . . . . . 5:00 x 5
- Pressure (tube type tire) . . . . . 26 psi
- Pressure (tubeless tire) . . . . . 35 psi

AILERON TRAVEL
- Up . . . . . 20°
- Down . . . . . 15°

FLAP TRAVEL . . . . . 39°
RUDDER TRAVEL
- Right . . . . . *16°
- Left . . . . . *16°

ELEVATOR TRAVEL
- Up . . . . . 28°
- Down . . . . . 26°

ELEVATOR TRIM TAB TRAVEL
- Up . . . . . 28°
- Down . . . . . 13°

PRINCIPAL DIMENSIONS
- Wing Span (prior to 1962) . . . . . 36'
- Wing Span (1962 & on) . . . . . 36'2"
- Tail Span . . . . . 10'8"
- Length (prior to 1960) . . . . . 25'
- Length (1960 & on) . . . . . 26'6"
- Height (prior to 1960) . . . . . **8'6"
- Height (1960) . . . . . **8'4"
- Height (1961 & on) . . . . . **8'
- Track Width . . . . . 7'2"

BATTERY LOCATION
- Forward left side of firewall

SERIAL NUMBERS
- 1956 . . . . . 28000 thru 29174
- 1957 . . . . . 29175 thru 29999 & 36000 thru 36215
- 1958 . . . . . 36216 thru 36965
- 1959 . . . . . 36966 thru 36999 & 46001 thru 46754
- 1960 (172A) . . . . . 46755 thru 47746
- 1961 (172B) . . . . . 17247747 thru 17248734
- 1962 (172C) . . . . . 17248735 & on

*Rudder travel on swept tails measured parallel to water line. When measuring perpendicular to hinge line, equivalent is 17°44'.

**If rotating beacon is installed on vertical fin, add approximately 3" to height.

MODEL 175

DESIGN GROSS WEIGHT
- Prior to 1962 . . . . . 2350 lb
- 1962 & on . . . . . 2450 lb

TOTAL FUEL CAPACITY . . . . . 52 gal
OIL CAPACITY . . . . . 10 qt
ENGINE MODEL (Continental)
- Prior to 1960 . . . . . GO-300-A
- 1960 & on GO-300-C
- 1961 (Skylark) GO-300-D
- 1962 & on (Skylark) GO-300-E

HP RATING 175
RATED RPM (Crankshaft) 3200
MAIN WHEELS . . . . . 6:00 x 6
- Pressure . . . . . 23 psi

NOSE WHEEL . . . . . 5:00 x 5
- Pressure (tube type tire) . . . . . 26 psi
- Pressure (tubeless tire) . . . . . 35 psi

AILERON TRAVEL
- Up . . . . . 20°
- Down . . . . . 15°

FLAP TRAVEL . . . . . 39°

MODEL 175 (Cont)

RUDDER TRAVEL	
Right	*16°
Left	*16°
ELEVATOR TRAVEL	
Up	28°
Down	26°
ELEVATOR TRIM TAB TRAVEL	
Up	28°
Down	13°
PRINCIPAL DIMENSIONS	
Wing Span (prior to 1962)	36'
Wing Span (1962 & on)	36'2"
Tail Span	10'8"
Length (prior to 1960)	25'
Length (1960 & on)	26'6"
Height (prior to 1960)	**8'6"
Height (1960 & on)	**8'
Track Width	7'2"
BATTERY LOCATION	
Aft of baggage compartment	
SERIAL NUMBERS	
1958	55001 thru 55703
1959	55704 thru 56238
1960 (175A)	56239 thru 56777
1961 (175B)	17556778 thru 17557002
1962 (175C)	17557003 & on

*Rudder travel on swept tails measured paralled to water line. When measuring perpendicular to hinge line, equivalent is 17°44'.

**If rotating beacon is installed on vertical fin, add approximately 3" to height.

MODEL 180

DESIGN GROSS WEIGHT	
Prior to 1957	2550 lb
1957 & on	2650 lb
TOTAL FUEL CAPACITY (prior to 1957)	60 gal
TOTAL FUEL CAPACITY (1957 & on)	65 gal
OIL CAPACITY	12 qt
ENGINE MODEL (Continental)	
Prior to 1955	O-470-A
1955	O-470-J
1956 thru 1959	O-470-K
1960 & 1961	O-470-L
1962 & on	O-470-R
HP RATING	
O-470-A and -J	225
O-470-K, -L, and -R	230
RATED RPM	
O-470-A, -K, -L, and R	2600
O-470-J	2550
MAIN WHEELS	6:00 x 6
Pressure	28 psi
TAILWHEEL	8:00 S.C.
Pressure	35 psi
AILERON TRAVEL	
Up	20°
Down	15°
FLAP TRAVEL	39°
RUDDER TRAVEL	
Right	24°
Left	24°
ELEVATOR TRAVEL	
Up	*25°
Down	*23°
STABILIZER TRAVEL (prior to 1960)	
Up	1°50'
Down	8°20'
STABILIZER TRAVEL (1960 & on)	
Up	0°45'
Down	8°45'
PRINCIPAL DIMENSIONS	
Wing Span (prior to 1962)	36'
Wing Span (1962 & on)	36'2"
Tail Span	10'10"
Length	25'6"
Fin Height	**7'6"
Track Width	7'8"
BATTERY LOCATION	
Aft of baggage compartment	
SERIAL NUMBERS	
1953	30000 thru 30639
1954	30640 thru 31260
1955	31261 thru 32150
1956	32151 thru 32661
1957 (180A)	32662 thru 32999 & 50001 thru 50105
1958 (180A)	50106 thru 50355
1959 (180B)	50356 thru 50661
1960 (180C)	50662 thru 50911
1961 (180D)	18050912 thru 18051063
1962 (180E)	18051064 & on

*With stabilizer full down.

**If rotating beacon is installed on vertical fin, add approximately 3" to height.

MODEL 182

DESIGN GROSS WEIGHT
- Prior to 1957 . . . . . 2550 lb
- 1957 thru 1961 . . . . . 2650 lb
- 1962 & on . . . . . 2800 lb

TOTAL FUEL CAPACITY (prior to 1957) . . 60 gal
TOTAL FUEL CAPACITY (1957 & on) . . . 65 gal
OIL CAPACITY . . . . . 12 qt
ENGINE MODEL (Continental)
- Prior to 1962 . . . . . O-470-L
- 1962 & on O-470-R

HP RATING 230
RATED RPM 2600
MAIN WHEELS . . . . . 6:00 x 6
- Pressure (prior to 1962) . . . . . 28 psi
- Pressure (1962 & on) . . . . . 32 psi

NOSE WHEEL . . . . . 5:00 x 5
- Pressure (tube type tire) . . . . . 29 psi
- Pressure (tubeless tire) . . . . . 45 psi

AILERON TRAVEL
- Up . . . . . 20°
- Down . . . . . 15°

FLAP TRAVEL . . . . . 39°
RUDDER TRAVEL
- Right . . . . . *24°
- Left . . . . . *24°

ELEVATOR TRAVEL (prior to 1962)
- Up . . . . . **25°
- Down . . . . . **23°

ELEVATOR TRAVEL (1962 & on)
- Up . . . . . 26°
- Down . . . . . 17°

STABILIZER TRAVEL (prior to 1960)
- Up . . . . . 1°50'
- Down . . . . . 8°20'

STABILIZER TRAVEL (1960 & 1961)
- Up . . . . . 0°45'
- Down . . . . . 8°45'

ELEVATOR TRIM TAB TRAVEL (1962 & on)
- Up . . . . . 25°
- Down . . . . . 15°

PRINCIPAL DIMENSIONS
- Wing Span (prior to 1962) . . . . . 36'
- Wing Span (1962 & on) . . . . . 36'2"
- Tail Span . . . . . 10'10"
- Length (prior to 1960) . . . . . 25'4"
- Length 1960 & 1961) . . . . . 27'4"
- Length (1962 & on) . . . . . 27'9"
- Height (1956) . . . . . ***9'3"
- Height (1957 thru 1960) . . . . . ***8'6"
- Height (1961) . . . . . ***7'5"
- Height (1962 & on) . . . . . ***7'10"
- Track Width (1956) . . . . . 7'8"
- Track Width (1957 thru 1961) . . . . . 8'2"
- Track Width (1962 & on) . . . . . 7'11"

BATTERY LOCATION
- Aft of baggage compartment

SERIAL NUMBERS
- 1956 . . . . . 33000 thru 33842
- 1957 (182A) . . . . . 33843 thru 34753
- 1958 (182A) . . . . . 34754 thru 34999 & 51001 thru 51556
- 1959 (182B) . . . . . 51557 thru 52358
- 1960 (182C) . . . . . 52359 thru 53007
- 1961 (182D) . . . . . 18253008 thru 18253598
- 1962 (182E) . . . . . 18253599 & on

*Rudder travel on swept tails measured parallel to water line. When measuring perpendicular to hinge line, equivalent is 27°13'.
**With stabilizer full down.
***If rotating beacon is installed on vertical fin, add approximately 3" to height.

MODEL 185

DESIGN GROSS WEIGHT . . . . . 3200 lb
TOTAL FUEL CAPACITY . . . . . 65 gal
OIL CAPACITY . . . . . 12 qt
ENGINE MODEL (Continental) IO-470-F
HP RATING 260
RATED RPM 2625
MAIN WHEELS . . . . . *6:00 x 6
- Pressure . . . . . *35 psi

TAILWHEEL . . . . . 10:00 x 3.50-4
- Pressure . . . . . 45 psi

AILERON TRAVEL
- Up . . . . . 20°
- Down . . . . . 15°

FLAP TRAVEL . . . . . 39°
RUDDER TRAVEL
- Right . . . . . 24°
- Left . . . . . 24°

ELEVATOR TRAVEL
- Up . . . . . **25°
- Down . . . . . **23°

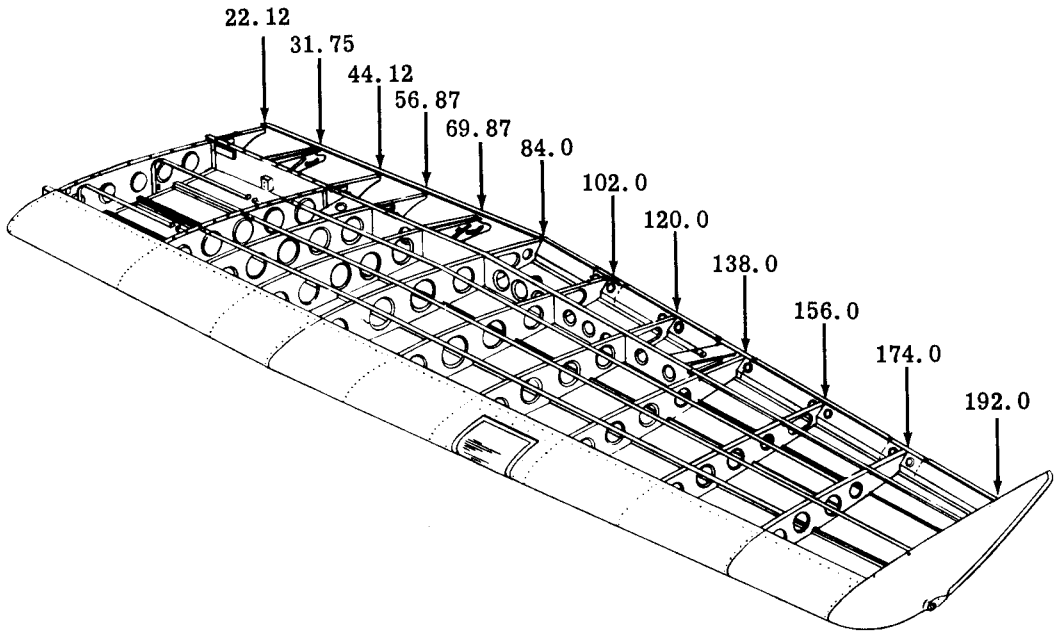
STABILIZER TRAVEL
- Up . . . . . 0°45'
- Down . . . . . 8°30'

PRINCIPAL DIMENSIONS
- Wing Span (prior to 1962) . . . . . 36'
- Wing Span (1962 & on) . . . . . 36'2"
- Tail Span . . . . . 10'10"
- Length . . . . . 25'6"
- Fin Height (including rotating beacon) . . . 7'9"
- Track Width . . . . . 7'7"

BATTERY LOCATION
- Aft of baggage compartment

SERIAL NUMBERS
- 1961 . . . . . 185-0001 thru 185-0237
- 1962 (185A) . . . . . 185-0238 & on

*8:00 x 6 tires are also available. Inflate to 25 psi.
**With stabilizer full down.



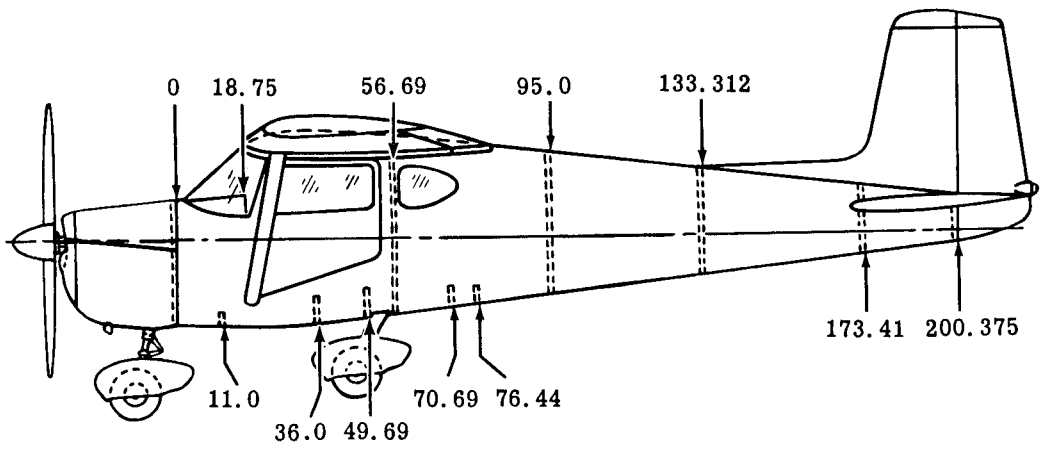
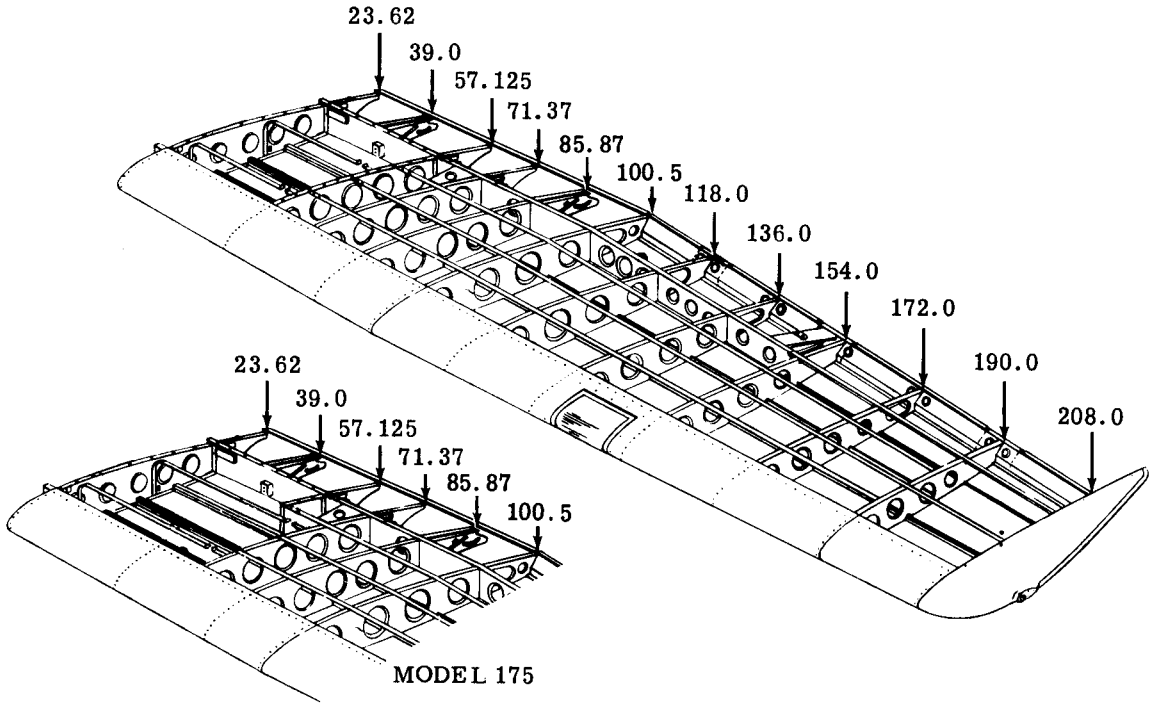


Figure 1-1. Reference Stations - Model 150



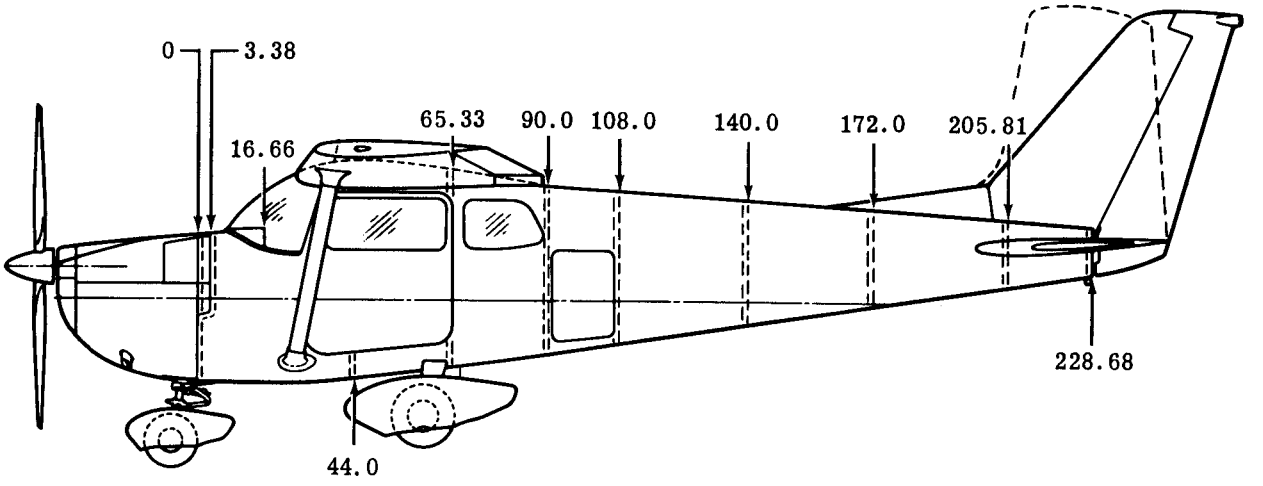


Figure 1-2. Reference Stations - Models 172 & 175

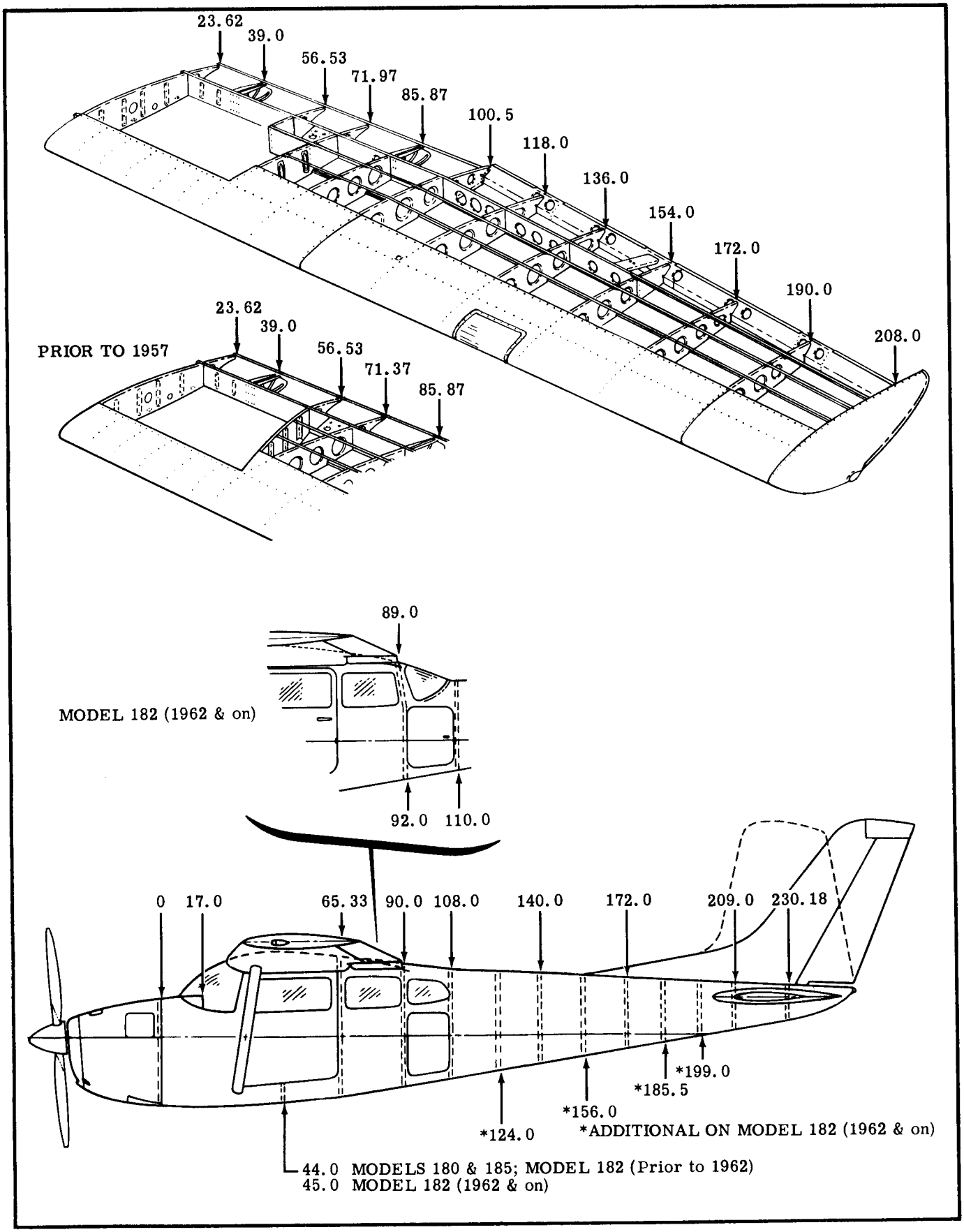


Figure 1-3. Reference Stations - Models 180, 182 & 185

TORQUE VALUES IN POUND-INCHES

FINE THREAD SERIES

BOLT SIZE (See Note 1)	STANDARD TYPE NUTS (See Note 2)	STANDARD TYPE NUTS Alternate Values AN310 (See Note 4)	SHEAR TYPE NUTS MS20364, AN320 AN316, AN7502	SHEAR TYPE NUTS Alternate Values AN320 (See Note 4)
10-32	20-25	20-28	12-15	12-19
1/4-28	50-70	50-75	30-40	30-48
5/16-24	100-140	100-150	60-85	60-106
3/8-24	160-190	160-260	95-110	95-170
7/16-20	450-500	450-560	270-300	270-390
1/2-20	480-690	480-730	290-410	290-500
9/16-18	800-1000	800-1070	480-600	480-750
5/8-18	1100-1300	1100-1600	660-780	660-1060
3/4-16	2300-2500	2300-3350	1300-1500	1300-2200
7/8-14	2500-3000	2500-4650	1500-1800	1500-2900
1-14	3700-5500	3700-6650	2200-3300	2200-4400
1-1/8-12	5000-7000	5000-10000	3000-4200	3000-6300
1-1/4-12	9000-11000	9000-16700	5400-6600	5400-10000

CAUTION

These torque values are derived from oil-free cadmium-plated threads.

COARSE THREAD SERIES

BOLT SIZE (See Note 1)	STANDARD TYPE NUTS (See Note 3)	SHEAR TYPE NUTS MS20364, AN320, AN316
8-32	12-15	7-9
10-24	20-25	12-15
1/4-20	40-50	25-30
5/16-18	80-90	48-55
3/8-16	160-185	95-100
7/16-14	235-255	140-155
1/2-13	400-480	240-290
9/16-12	500-700	300-420
5/8-11	700-900	420-540
3/4-10	1150-1600	700-950
7/8-9	2200-3000	1300-1800
1-8	3700-5000	2200-3000
1-1/8-8	5500-6500	3300-4000
1-1/4-8	6500-8000	4000-5000

NOTES:

(1) AN3, AN23, AN42, AN173, MS20004, NAS334, NAS464 Series bolts; AN502, AN503, NAS220 and NAS517 Series Screws.

(2) AN310, AN315, AN345, AN362, AN363, MS20365, AN366, "EB","1452", "Z1200," "UWN" and other self-locking nuts.

(3) AN310, AN340, MS20365, AN366 and other self-locking anchor nuts.

(4) When using AN310 and AN320 castellated nuts where alignment between bolt and cotter pin holes is not reached using normal torque values, use alternate torque values or replace nut.

These torque values are recommended for all procedures contained in this book except where other values are stipulated.

SECTION 2

GROUND HANDLING, SERVICING, LUBRICATION AND INSPECTION

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2-1. GROUND HANDLING.

2-2. Moving the aircraft by hand is accomplished by using the wing struts and landing gear as push points. On tricycle gear airplanes, a tow bar attached to the nose gear should be used for steering and maneuvering the airplane. Never turn the nose gear more than 30 degrees in either direction or damage will result. 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 airplane can be turned by pivoting it about the main gear.

CAUTION

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.

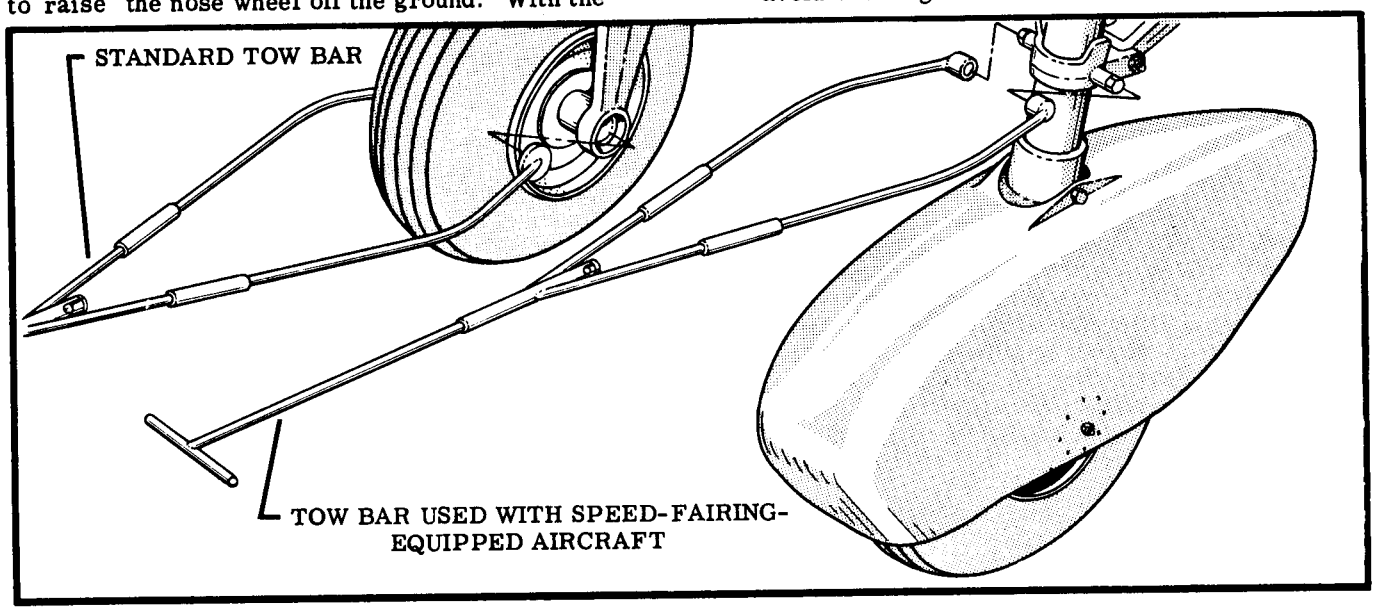


Figure 2-1. Typical Tow Bars

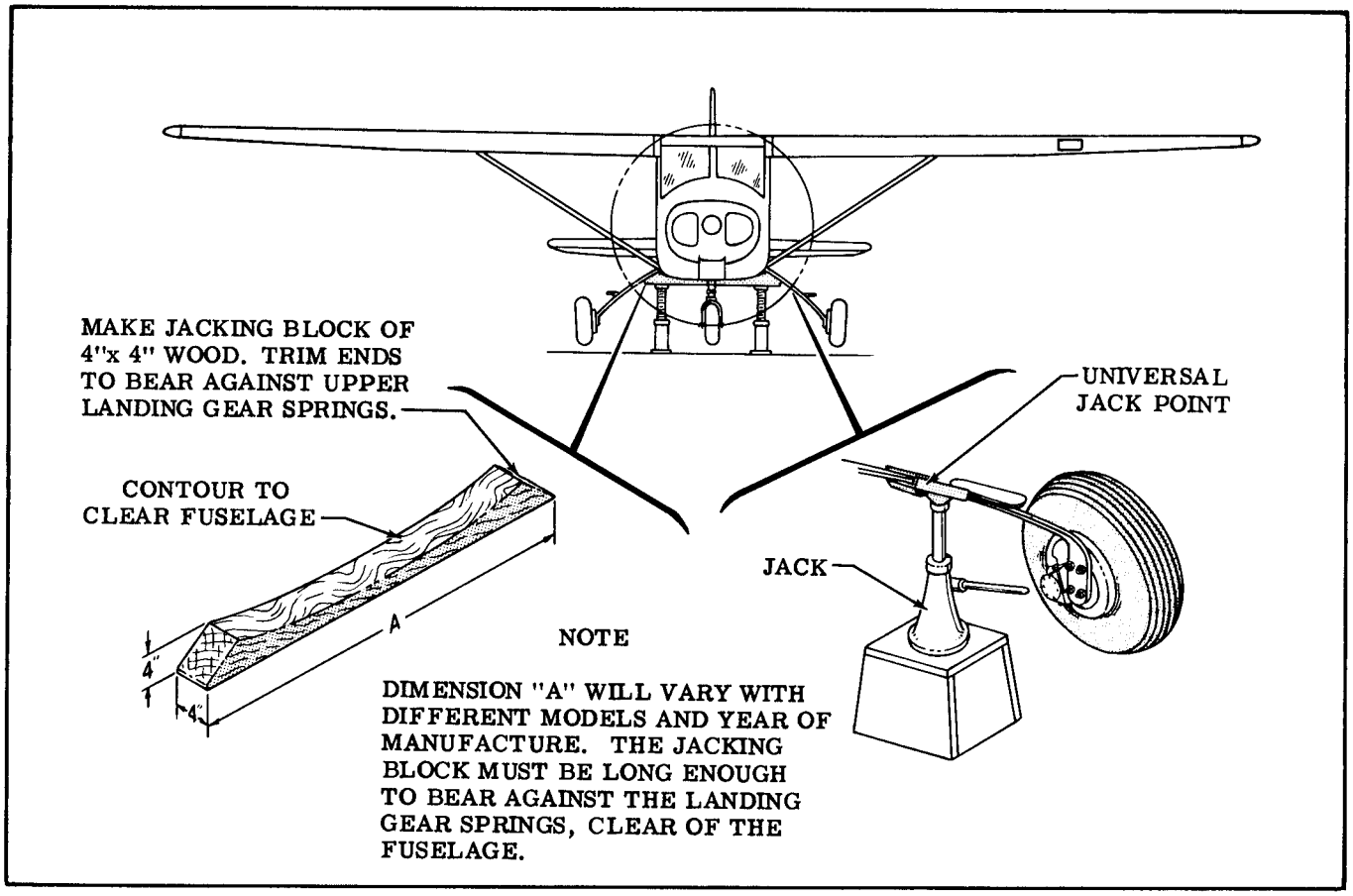


Figure 2-2. Jacking Details

2-3. HOISTING. The airplane may be hoisted with hoists of two-ton capacity, either by using hoisting rings (optional equipment) or by using suitable slings. The front sling should be attached 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.

2-4. JACKING. A special main gear jack point which slips over the main gear strut may be used to jack one wheel at a time. DO NOT use the brake casting as a jacking point.

CAUTION

Flexibility of the gear strut will cause the main wheel to slide inboard as the wheel is raised, tilting the jack. The jack must then be lowered for a second jacking operation. Jacking both wheels simultaneously with universal jack points is not recommended. To jack both wheels use the jacking block illustrated in figure 2-2. Keep the airplane from tipping while using this block.

On tricycle gear aircraft, the nose wheel may be lifted by weighting the tail down.

2-5. PARKING precautions depend principally on local conditions. As a general precaution, it is wise to set the parking brake and install a control lock if available. In severe weather, follow tie-down and storage procedures described below if inside storage is not available.

2-6. TIE-DOWN should be accomplished in anticipation of high winds. Tie down aircraft as follows:

a. Tie ropes or chains to the wing tie-down fittings located at the upper end of each wing strut. Secure the opposite ends of the ropes or chains to ground anchors.

b. Secure a tie-down line through the nose gear tie-down ring. On tricycle gear aircraft without a nose gear tie-down ring, use a rope (no chains or cables) to secure the outer strut to ground anchors.

c. On tricycle gear aircraft, secure the middle of a length of rope to ring at tail. Pull each end of rope away at a 45° angle and secure to ground anchors at each side of tail. On aircraft with conventional tailgear, tie down the tailwheel.

d. Install surface control locks between flap and aileron and over fin and rudder. Be sure electric flaps are not operated inadvertently.

e. Install control lock on pilot's control column if available; if control lock is not available, tie pilot's control wheel back with front seat belt.

f. If rain, sleet, snow, or blown dust are anticipated, cover the pitot tube.

2-7. HANGAR STORAGE. The aircraft stored in a hangar will require little attention. The following operations will maintain it in serviceable condition.

NOTE

If the airplane is to be stored for a long period, see EXTENDED STORAGE instructions.

a. Turn the propeller over by hand every few days to maintain an oil film on the internal parts of the engine.
b. Keep the fuel tanks full to prevent moisture condensation in the tanks.
c. Keep the battery fully charged to prevent it from freezing in an unheated hangar.

2-8. OUTSIDE STORAGE. Short-term outside storage of the aircraft requires secure tie-down combined with the precautions listed in paragraph 2-6. In addition, suitable protective covers, if available, should be installed.

2-9. EXTENDED STORAGE. Lengthy storage requires the following precautions besides good tie-down or hangaring.

a. Engine:
1. Warm up engine and drain engine oil.
2. Fill sump with pre-heated corrosion preventive oil (Continental recommends Cosmoline No. 1223, supplied by E. F. Houghton & Co, 310 W. Lehigh Ave, Philadelphia, Pa.).
3. Operate engine five minutes at 1200-1500 rpm with 215-225°F oil temperature.
4. Remove air cleaner and inject corrosion-preventive oil into induction airbox at the rate of 1/2 gallon per minute until smoke comes from the exhaust stack, then increase spray until the engine stops. Do not turn crankshaft after engine stops.

CAUTION

Injecting oil too fast can cause a hydrostatic lock.

5. Remove spark plugs and spray corrosion-preventive oil into upper spark plug holes, then into lower spark plug holes.
6. Replace lower plugs or install solid plugs.
7. Install dehydrator plugs in upper spark plug holes.
8. Install shipping plugs or other suitable covers over detached spark plug cable terminals.
9. Cover all engine and accessory openings.
10. Drain corrosion-preventive oil from sump and replace plug.
11. Post a conspicuous warning against propeller movement on the aircraft.

b. Airframe:
1. Lubricate all airframe items.
2. Seal and cover all openings.

c. Battery:
1. Remove from aircraft and service periodically.

d. Block up fuselage to take weight off tires.

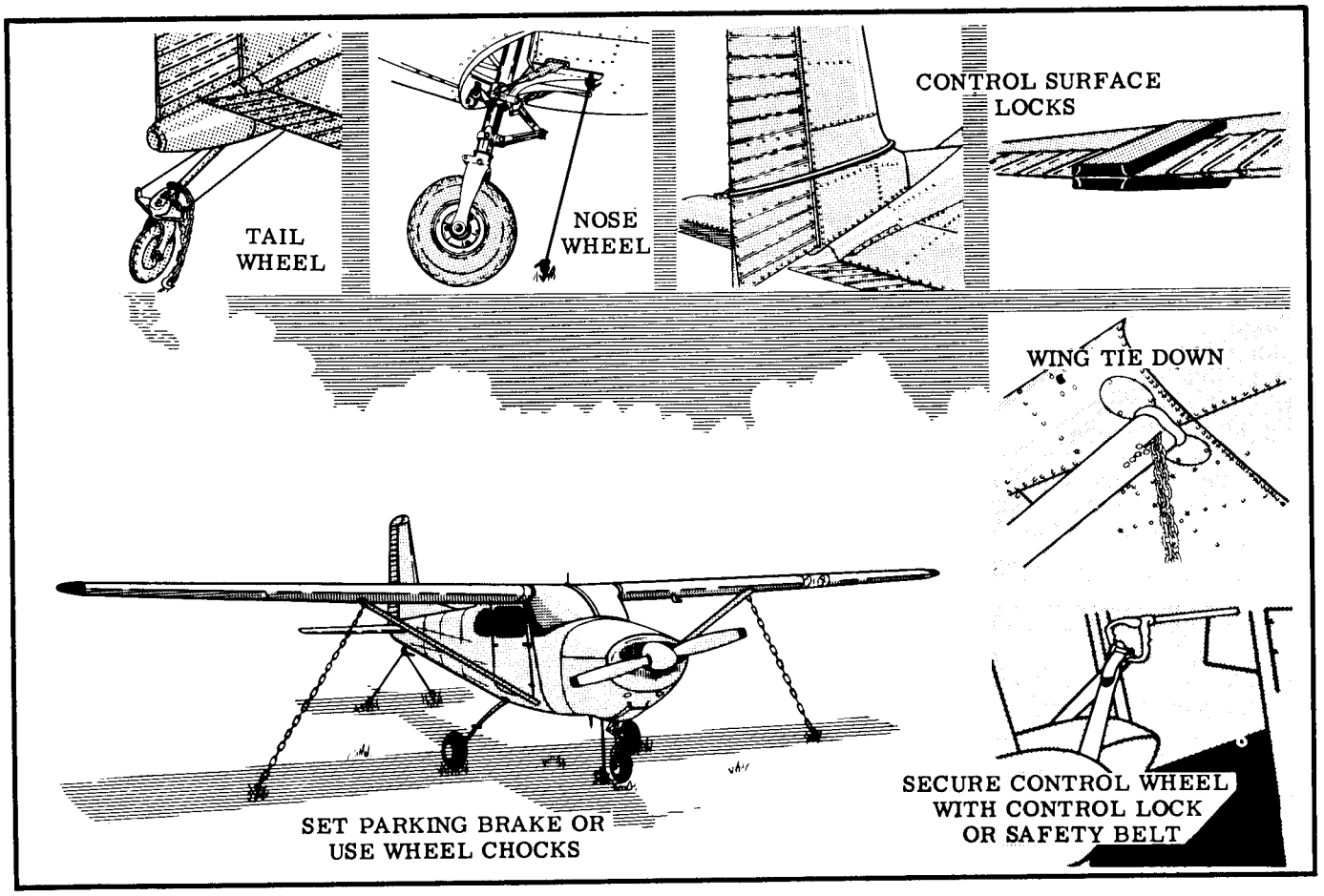


Figure 2-3. Tie-Down Details

NOTE

Tires will take a set, causing wheels to become out-of-round, if an airplane is left parked for more than a few days. For this reason a stored airplane should not have its weight on the tires.

2-10. LEVELING. An upper cabin door sill may be used to level the aircraft longitudinally, and corresponding points on both sills may be used to level the aircraft laterally.

2-11. SERVICING. (See figure 2-4.)

2-12. FUEL TANKS should be filled immediately after flight to lessen moisture condensation. Tank capacities are given below in U.S. gallons. Some aircraft have optional larger tanks.

MODEL	150	172	175	180, 182 & 185
TOTAL CAPACITY	26	42	52	65
CAPACITY EACH TANK	13	21	26	32.5

RECOMMENDED FUEL GRADE: 80/87 octane minimum, aviation grade, for all except the Model 185, which requires 100/130 octane, aviation grade.

NOTE

Fuel capacity for Models 180 and 182 prior to 1957 is 60 gallons total, 30 gallons each tank.

2-13. FUEL DRAINS are located at various points in the fuel systems to provide for drainage of water and sediment. Each airplane is equipped with a fuel strainer drain valve, fuel line or selector valve drain plugs or valves, and fuel tank sump drain plugs or valves. In many aircraft the fuel strainer drain valve may be operated by a control located at the instrument panel.

2-14. ENGINE OIL should be checked with the oil dipstick 5 to 10 minutes after shutdown to allow the oil to flow back to the sump. When adding or changing oil, use the following aviation grades:

Below 40° F (150, 172, 175)	SAE 20
Below 40° F (180, 182, 185)	SAE 30
Above 40° F (150, 172, 175)	SAE 40
Above 40° F (180, 182, 185)	SAE 50

Oil capacities for the various models are given below. If the aircraft is equipped with an external filter, one additional quart is required when the filter element is changed. When servicing the oil system, oil should be added if the oil level is below the minimum-for-flight quantities listed. Oil should be added to the full mark on the dipstick if extended flight is planned.

MODEL	150	172	175	180, 182 & 185
Total Capacity (quarts)	6	8	10	12
Add oil if below	4	6	6	9

Oil should be changed every 25 hours. At the time of oil change, remove the engine oil screen and wash with solvent (Fed. Spec. P-S-661). On aircraft equipped with a Fram oil filter, the oil should still be changed at 25-hour intervals and the filter element should be replaced every 100 hours. On aircraft equipped with a Winslow or AC full-flow oil filter, change engine oil and filter element at 50-hour intervals. Change oil every four months even though less than 50 hours have accumulated. Reduce these periods for prolonged operation 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 replace filter element whenever oil on dipstick appears dirty.

It is recommended that detergent oil not be used during the first 25 hours of engine operation, in order to permit piston rings to seat properly. This applies to an overhauled engine as well as a new one. After the first 25 hours, either straight mineral oil or detergent oil may be used. If a detergent oil is used, it must conform to Continental Motors Corporation Specification MHS-24.

2-15. INDUCTION AIR FILTERS keep dust and dirt from entering the induction system. They should be serviced every 25 hours, oftener under dusty conditions. Under extremely dusty conditions, daily maintenance of the filter is recommended.

a. Remove the filter and wash in solvent (Fed. Spec. P-S-661). The newer "dry" filters used on some models may be cleaned by blowing with compressed air (not over 100 psi) from the back side, or they may be washed with mild household detergent and warm water.

b. Drain and dry, then dip flock-coated screen filters in same grade of oil used in engine, and drain off the excess oil. The newer type should be allowed to dry if washed.

c. Be sure airbox is clean, inspect filter and replace if necessary, then install. Maximum recommended life of the dry (paper element) filters is 300 hours.

NOTE

Keeping a supply of clean, serviced filters on hand will speed up air filter servicing. Refer to figure 2-5.

2-16. BATTERY servicing involves adding distilled water to maintain the electrolyte even with the horizontal baffle plate or split ring at the bottom of the filler holes, checking the battery cable connections,

and neutralizing and cleaning off any 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 noticed. Distilled water, not acid or "rejuvenators" should be used to maintain electrolyte level. Check the battery every 25 hours (or at least every 30 days), oftener in hot weather.

2-17. TIRES should be maintained at the air pressures specified below in psi. When checking tire pressure, examine tires for wear, cuts and bruises.

MODEL	150	172	175	180	182	185
MAIN TIRES	30	23	23	28	*28	**35
NOSE (OR TAIL) TIRES	30	***26	***26	35	***29	45

*32, 1962 and on.
**35, for 6:00 x 6 tires; 25, for 8:00 x 6 tires.
***These pressures are used for tube-type tires and magnesium nose wheels only. The pressures for tubeless tires and aluminum nose wheels are: 172 and 175, 35 psi; 182, 45 psi. The older, magnesium wheels used on these models can be easily identified by the presence of six webs which are evenly spaced between the rim and center hub. The newer, aluminum wheels do not have these webs. The higher pressures help prevent damage to wheel flanges.

NOTE

Since low tire pressure may result in leakage around tubeless tire beads, the recommended tire pressures should be maintained. Especially in cold weather, remember that any drop in temperature of the air inside a tire causes a corresponding drop in pressure.

2-18. NOSE GEAR STRUTS require periodic checking to ensure that the strut is filled with hydraulic fluid and is inflated to the correct air pressure. The servicing procedure is stated on the strut placard, or the following procedure may be used.
a. Remove valve cap and release all air.
b. Remove valve housing assembly.
c. Compress strut completely (that is, with the stops in contact with the outer barrel hub).
d. Fill strut level to valve hole with MIL-H-5606 hydraulic fluid.
e. Lift nose of aircraft and extend strut.
f. Replace valve housing assembly and inflate the strut with nose wheel off the ground. Inflate to 35 psi (20 psi on the Model 150 and 50 psi on the Model 182, 1962 and on).

NOTE

Keep the nose gear shock strut, especially the exposed portion of the strut piston, wiped off with a clean dry cloth to remove dust and grit which may cut the seals in the strut barrel. Do not wipe the strut with hydraulic fluid, since this tends to collect even more dust and grit.

2-19. NOSE GEAR SHIMMY DAMPENERS should be serviced at least every 100 hours. The dampener must be filled completely with fluid, free of entrapped air, to serve its purpose. Two types of dampeners were used, one of which must be removed to check fluid level and refill. If the dampener has a filler plug, refill as follows:
a. Remove the filler plug.
b. Using the tow bar, turn the nose gear in the direction that places the dampener piston at the end opposite the filler plug.
c. Fill with MIL-H-5606 hydraulic fluid.
d. Install and safety the filler plug.
If the dampener does not have a filler plug, refill as follows:
a. Remove the dampener from the airplane.
b. Pull the fitting end of the dampener shaft to its travel limit.
c. Fill through the opposite end with MIL-H-5606 hydraulic fluid, while holding the dampener vertical.
d. Push the shaft upward slowly to seal off the filler hole, and reinstall the dampener on the airplane. Be sure to keep the shaft protruding through the filler hole until the dampener is installed.
An alternate method of filling either type shimmy dampener is to submerge it in clean hydraulic fluid and work the dampener shaft back and forth (filler plug removed) to expel air and fill completely with fluid.

NOTE

Keep the shimmy dampener, especially the exposed portions of the dampener shaft wiped off with a clean dry cloth to remove dust and grit which may cut the seals in the dampener barrel. Do not wipe the shaft with hydraulic fluid, since this tends to collect even more dust and grit.

2-20. HYDRAULIC BRAKE SYSTEMS should be checked for fluid at least every 100 hours. Add MIL-H-5606 hydraulic fluid at the brake master cylinders as required. Brakes should be bled of entrapped air whenever there is a spongy response to the brake pedals.

2-21. OXYGEN CYLINDER. Some aircraft are equipped with an optional oxygen system. The oxygen cylinder should be refilled when oxygen system pressure is below 300 psi. When fully charged, the cylinder contains 48 cubic feet of oxygen at 1800 psi at 70°F. To refill the oxygen cylinder:
a. Unfasten baggage compartment rear wall or access plate to gain access to the oxygen cylinder.
b. Turn off oxygen cylinder valve by turning it full clockwise.
c. Disconnect oxygen line from cylinder.
d. Loosen clamps securing cylinder and remove cylinder.
e. Refill cylinder with aviators' breathing oxygen (Fed. Spec. BB-O-925, or equivalent).
f. Reverse the above steps to install the cylinder.

WARNING

Oil, grease, or other lubricants in contact with oxygen create a serious fire hazard, and such contact must be avoided. Only a thread compound approved under MIL-T-5542 can be used safely on oxygen systems. Apply only to the first three threads of male fittings to prevent thread seizure.

NOTE

Some oxygen systems are equipped with a filler valve so the system may be refilled without removing the oxygen cylinder.

2-22. OXYGEN FACE MASKS. Disposable oxygen face masks are normally stowed in a plastic bag on the baggage shelf. Oxygen servicing should include checking the condition of the face masks and a replenishment of the supply as required.

2-23. CLEANING.

2-24. Keeping the aircraft clean is important. Besides maintaining the trim appearance of the airplane cleaning lessens the possibility of corrosion and makes inspection and maintenance easier.

2-25. WINDSHIELDS AND WINDOWS should be cleaned carefully with plenty of fresh water and soap, using the palm of the hand to feel and dislodge any caked dirt or mud. A sponge, soft cloth or chamois may be used, but only as a means of carrying water to the plastic. Dry with a clean, damp chamois. Rubbing with a dry cloth will build up an electrostatic charge which will attract dust particles. Oil and grease may be removed by rubbing lightly with a kerosene-moistened cloth.

CAUTION

Do not use gasoline, alcohol, benzene, acetone, carbon tetrachloride, fire extinguisher fluid, de-icer fluid, lacquer thinner or glass window cleaning spray. These solvents will soften and craze the plastic.

2-25A. PLASTIC CONTROL WHEELS and other plastic parts, such as some fuel valve handles, should be cleaned with soap and water. Observe the precautions listed in the preceding paragraph.

2-26. ALUMINUM SURFACES require a minimum of care, but should never be neglected. The airplane may be washed with clean water to remove dirt, and with carbon tetrachloride or other 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.

2-27. PAINTED SURFACES are best cared for by washing with clean water and a mild soap, then waxing with any good automotive wax. Use only clean, cold water and a mild soap during the initial curing period of the paint, which may be as long as 90 days.

2-28. ENGINE COMPARTMENT cleaning is essential to minimize any danger of fire, and for proper inspection of components. The engine and engine compartment may be washed down with a suitable solvent, then dried thoroughly.

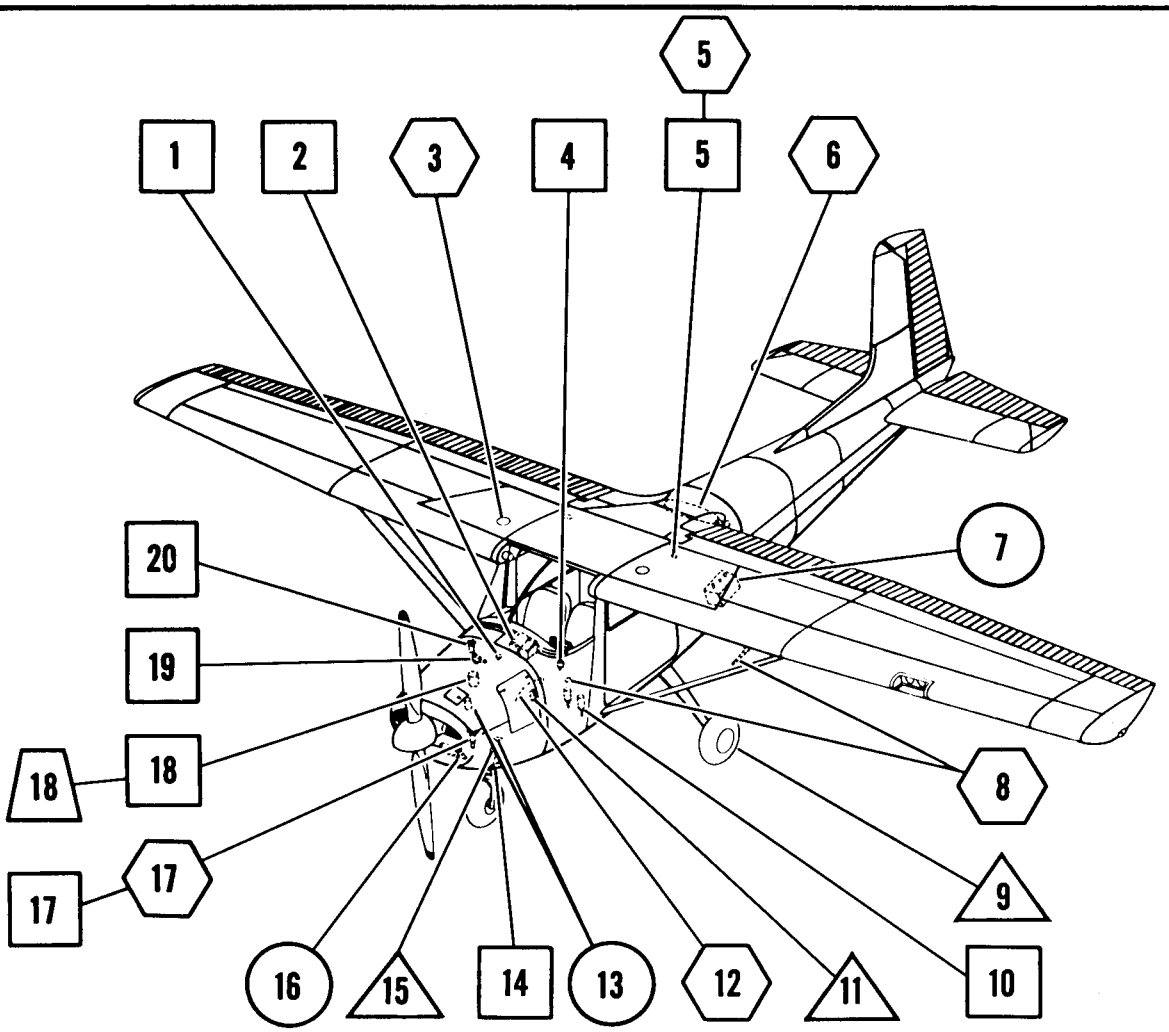
2-29. UPHOLSTERY AND INTERIOR cleaning prolongs the life of upholstery fabrics and interior trim. To clean the interior:

a. Empty the ash trays.
b. Brush out or vacuum clean the carpeting and upholstery to remove dirt.
c. Wipe off leather, Royalite, and plastic surfaces with a damp cloth.
d. Soiled upholstery fabrics and carpeting may be cleaned with a foam-type detergent, used according to the manufacturer's instructions.
e. Oily 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 a volatile solvent; it may damage the padding and backing materials.
f. Scrape off sticky materials with a dull knife, then spot clean the area.

2-30. PROPELLERS should be wiped off occasionally with an oily cloth to clean off grass and bug stains. In salt water areas this will assist in corrosion-proofing the propeller.

2-31. WHEELS should be washed off periodically and examined for corrosion, chipped paint, and cracks or dents in the wheel castings. Sand smooth, prime, and repaint minor defects.

2-32. LUBRICATION. (See figure 2-4.)



DAILY

3 FUEL TANK FILLERS

Fill after each flight. Keep full to retard condensation. Refer to paragraph 2-12 for tank capacities and fuel grades.

5 FUEL TANK SUMP DRAINS

If optional quick-drain valves are installed, drain off any water and sediment before the first flight of the day.

6 OXYGEN CYLINDER

Check for anticipated requirements before each oxygen flight. Refer to paragraph 2-21 for detailed servicing instructions.

8 PITOT AND STATIC PORTS

Check for obstructions before first flight of the day.

SERVICING

Figure 2-4. Servicing and Lubrication - Sheet 1 of 5

12 OIL DIPSTICK

Check on preflight. Add oil as necessary.

17 FUEL STRAINER

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

25 HOURS

7 BATTERY

Check level of electrolyte every 25 hours (or at least every 30 days), oftener in hot weather. Maintain level of electrolyte even with the horizontal baffle plate or split ring at the bottom of the filler holes by adding distilled water only.

13 OIL FILLER AND DRAIN

Change engine oil and clean oil screen every 25 hours, oftener under severe operating conditions. Refer to paragraph 2-14 for detailed servicing instructions.

16 INDUCTION AIR FILTER

Service every 25 hours, oftener under dusty conditions. Refer to paragraph 2-15 for detailed servicing instructions.

50 HOURS

18 WINSLOW OR AC OIL FILTER

Change engine oil and replace filter element every 50 hours. Refer to paragraph 2-14 for oil filter servicing.

100 HOURS

1 FUEL/AIR CONTROL UNIT SCREEN

Every 100 hours, remove and clean the screen in the bottom of the fuel/air control unit on fuel injection engines, then reinstall and resafety the screen.

2 GYRO INSTRUMENT AIR FILTERS

Replace every 100 hours and when erratic or sluggish responses are noted with normal suction gage readings.

4 FUEL LINE DRAIN PLUGS OR VALVES

Every 100 hours, remove plugs, drain off any water and sediment, reinstall plugs, and resafety. Some aircraft use drain valves instead of drain plugs.

5 FUEL TANK SUMP DRAINS

If quick-drain valves are not installed, remove plugs and drain off any water and sediment every 100 hours. Reinstall and resafety plugs.

SERVICING

Figure 2-4. Servicing and Lubrication - Sheet 2 of 5

10 BRAKE MASTER CYLINDERS

Every 100 hours, check fluid level and refill if required with MIL-H-5606 hydraulic fluid.

14 SHIMMY DAMPENER

Every 100 hours, check fluid level in shimmy dampener, refill if required. Refer to paragraph 2-19 for detailed instructions.

17 FUEL STRAINER AND ELECTRIC FUEL PUMP SCREENS

Disassemble and clean strainer bowl and screen every 100 hours. On fuel injection aircraft, remove and clean screens in electric fuel pumps every 100 hours.

18 FRAM OIL FILTER

Replace filter element whenever oil on dipstick appears dirty; maximum interval, 100 hours. Refer to paragraph 2-14 for detailed instructions.

19 VACUUM SYSTEM OIL SEPARATOR

Remove, flush with solvent, dry with compressed air every 100 hours.

20 SUCTION RELIEF VALVE SCREEN

Every 100 hours, check inlet screen for cleanliness. Remove, flush with solvent, and dry with compressed air if required.

△ AS REQUIRED

9 TIRES

Maintain proper tire inflation as given in paragraph 2-17. Remove oil and grease with soap and water; periodically check tires for wear, cuts, and bruises.

11 GROUND SERVICE RECEPTACLE

Connect to 12-volt, DC, negative-ground power unit for cold weather starting and lengthy ground maintenance of the electrical system. Master switch should be turned on before connecting a generator type external power source; it should be turned off before connecting a battery type external power source.

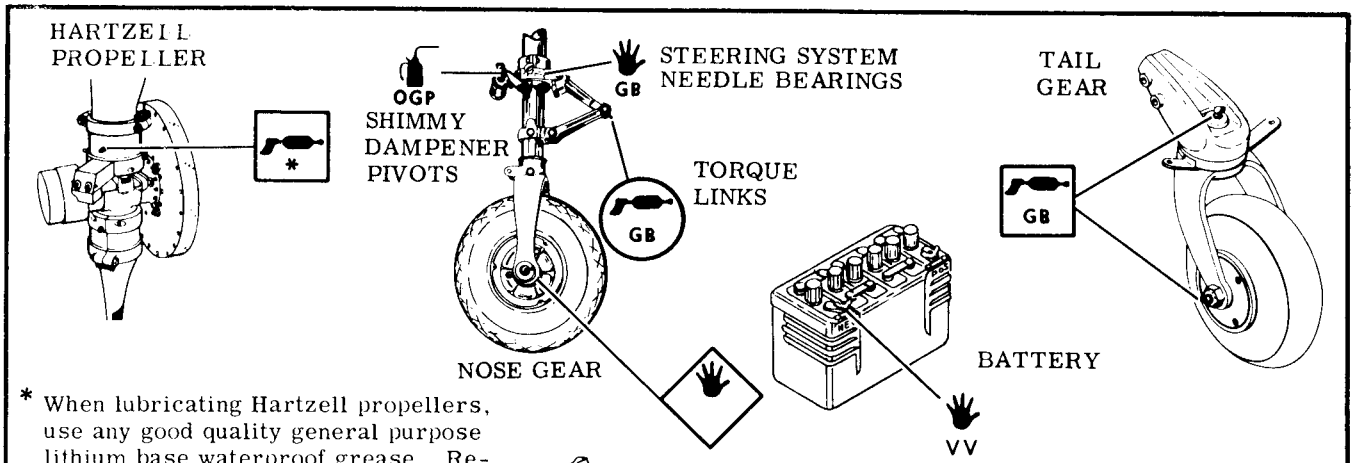
15 NOSE GEAR SHOCK STRUT

Keep strut filled and inflated to correct pressure. Refer to paragraph 2-18 for servicing instructions.

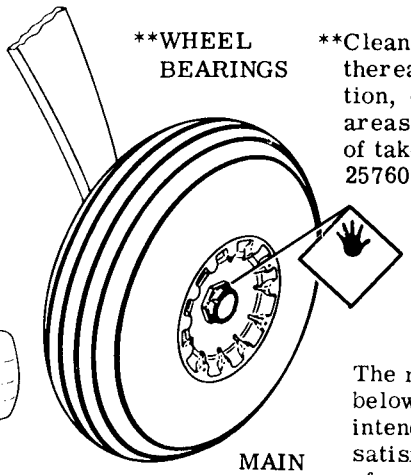
The military specifications listed throughout this book are not mandatory, but are intended as guides in choosing satisfactory materials. Products of most reputable manufacturers meet or exceed these specifications.

SERVICING

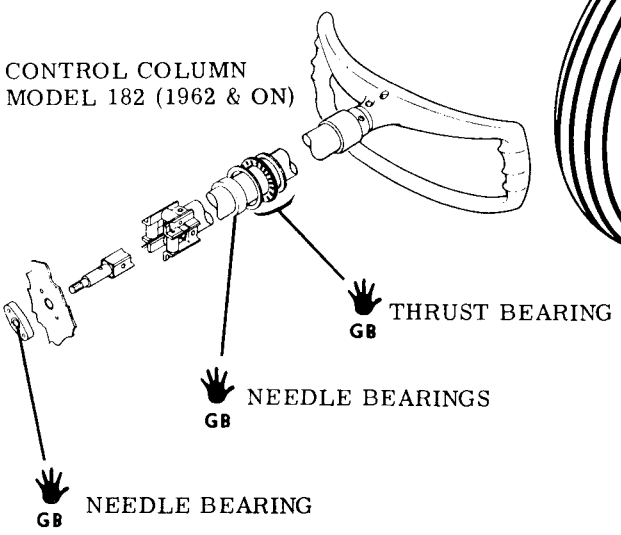
Figure 2-4. Servicing and Lubrication - Sheet 3 of 5



* When lubricating Hartzell propellers, use any good quality general purpose lithium base waterproof grease. Remove grease fitting adjacent to the fitting being greased and fill until the grease oozes from adjacent hole. The newly-designed Hartzell propellers should be lubricated in the same way.



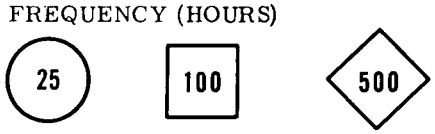
**Clean and repack at first 100-hours; thereafter, at each 500-hour inspection, or more often in dusty or humid areas, or if more than usual number of take-offs are made. Use MIL-G-25760 (or equivalent) grease.



NOTE

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

FREQUENCY (HOURS)



METHOD OF APPLICATION

HAND — GREASE GUN — OIL CAN — SYRINGE (FOR POWDERED GRAPHITE)

NOTE

Sealed bearings require no lubrication.

McCauley propellers are lubricated at overhaul and require no other 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.

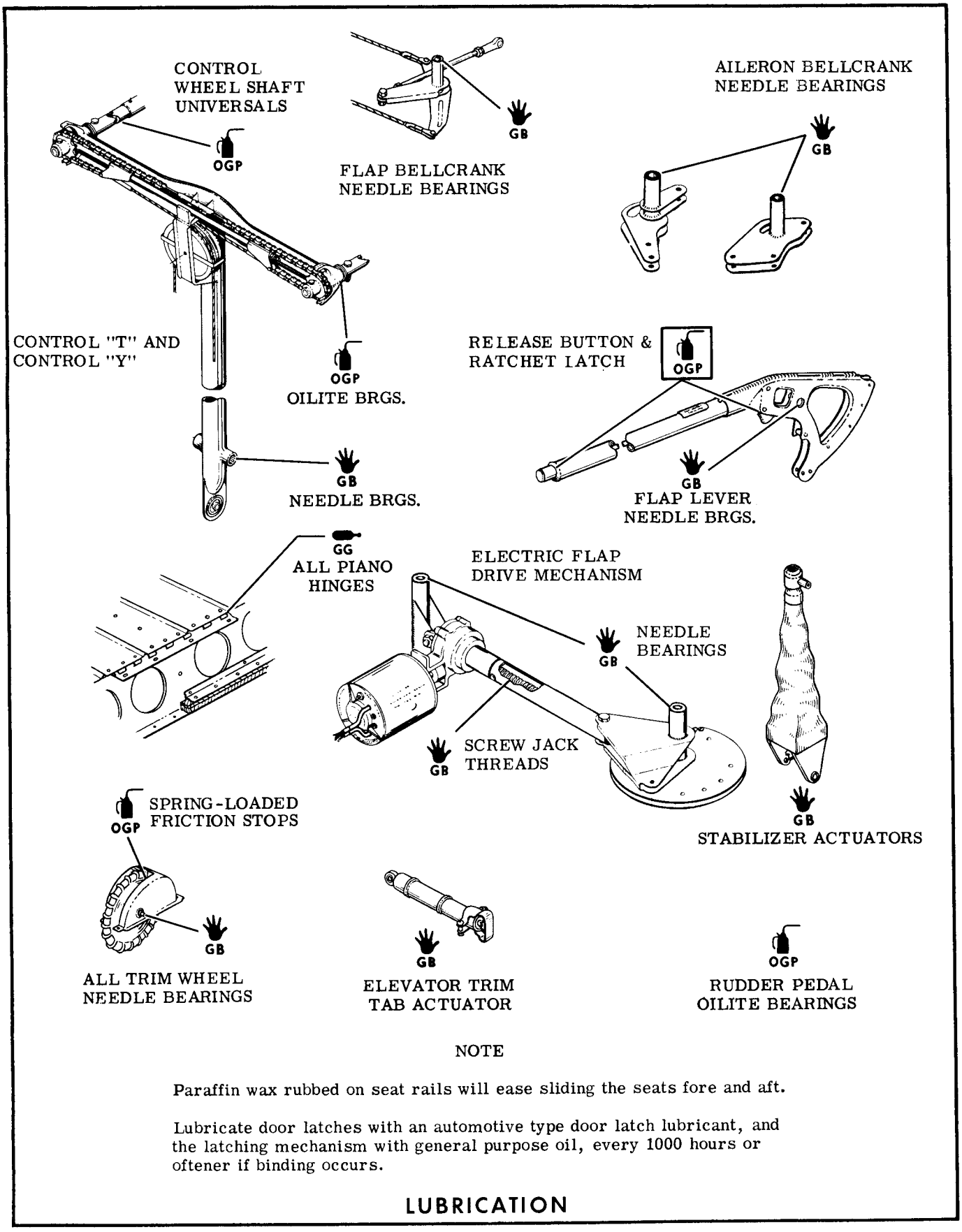
LUBRICANTS

GG — POWDERED GRAPHITE
GB — MIL-G-7711 GREASE
OGP — MIL-L-7870 GENERAL PURPOSE OIL
VV — PETROLATUM

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

LUBRICATION

Figure 2-4. Servicing and Lubrication - Sheet 4 of 5



NOTE

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

Lubricate door latches with an automotive type door latch lubricant, and the latching mechanism with general purpose oil, every 1000 hours or oftener if binding occurs.

LUBRICATION

Figure 2-4. Servicing and Lubrication - Sheet 5 of 5

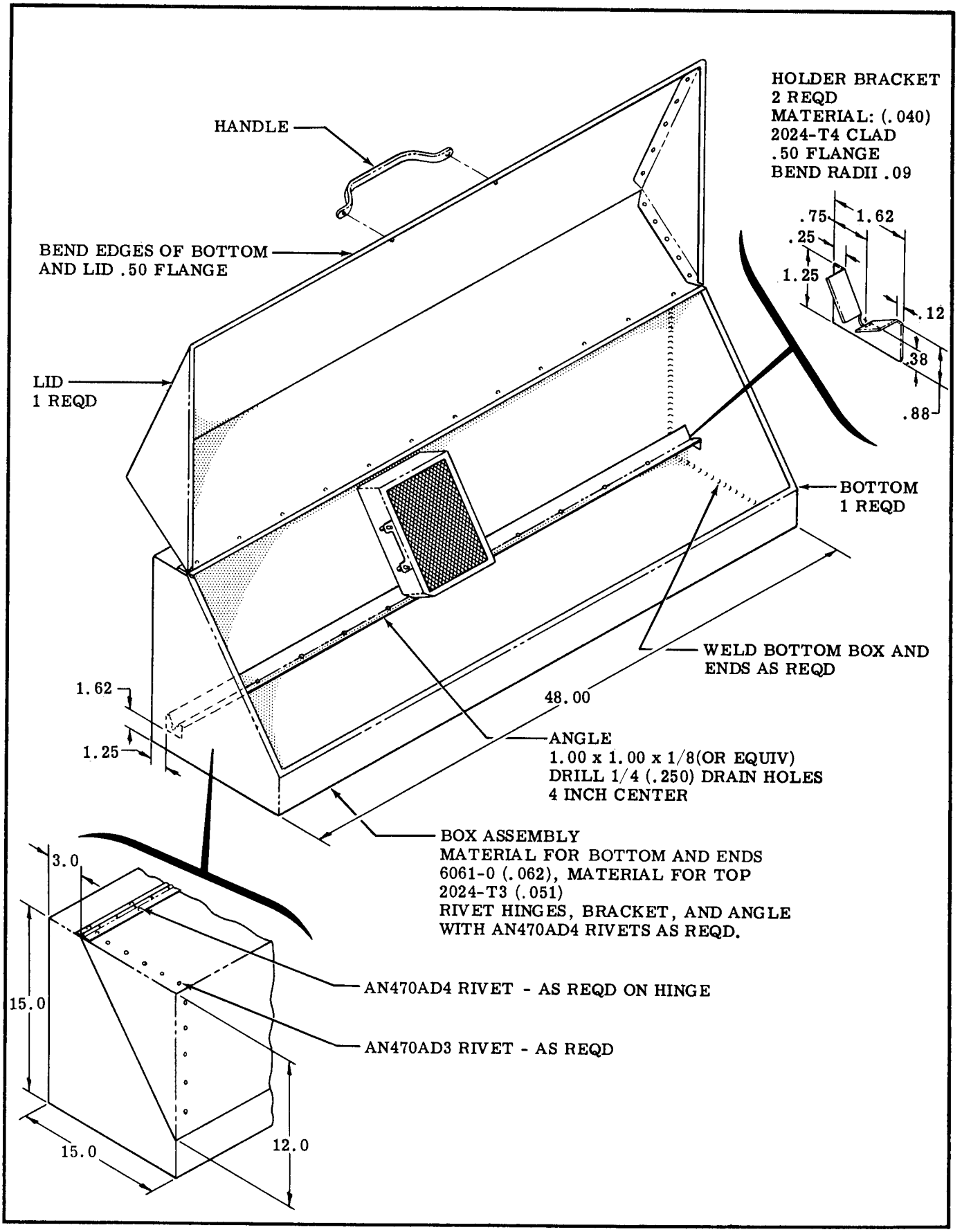


Figure 2-5. Construction of Induction Air Filter Servicing Box

INSPECTION

25-HOUR INSPECTION

Before beginning the inspection, determine that engine and propeller performance is normal and that all systems function properly.

1. Engine and engine compartment for fuel and oil leaks, security of parts, correct engine and propeller control travel, proper safetying, and visible defects.
2. Propeller and spinner for apparent damage or defects.
3. Remainder of airplane for security of attaching bolts, screws, and rivets, broken spot-welds, fuel leaks, and apparent exterior damage or defects.
4. Items for servicing and lubrication in accordance with Figure 2-4 as required at 25-hour intervals.

NOTE

50-hour and 75-hour inspections are 25-hour inspections repeated at these intervals. Also check any items of servicing and lubrication required at these intervals.

100-HOUR INSPECTION

The 100-hour (periodic) inspection is a thorough, searching inspection of the entire airplane. Unless the progressive inspection method is used, it is required every twelve months as a periodic inspection or every 100 hours, if the airplane is operated for hire, in accordance with Civil Air Regulations.

ENGINE RUN-UP.
Before beginning the inspection proper, start, run up, and shut down the engine in accordance with instructions in the Owner's Manual. During the run-up observe the following, making note of any discrepancies or abnormalities:

1. Engine temperatures and pressures.
2. Static rpm.
3. Magneto drop; note particularly any difference between the drop on the two magnetos.
4. Engine response to changes in power.
5. Any unusual engine noises.
6. Propeller response through pitch range.
7. Fuel tank selector or shut-off valve; operate engine on each tank and off positions long enough to make sure the valve functions properly.
8. Idling speed and mixture; proper idle cut-off.
9. Generator warning light or ammeter.
10. Suction gage.
11. Fuel flow indicator.

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

PREPARATION.
Remove engine cowling, and loosen or remove all fuselage, wing, empennage, and upholstery inspection doors, plates, and fairings as necessary to accomplish the inspection. Replace after the inspection has been completed.

ENGINE COMPARTMENT.

1. Engine oil for changing, screen for cleaning, filler cap, dipstick, drain plug, and screen for security and safetying as required. Refer to Figure 2-4 for aircraft equipped with external oil filters.

NOTE

Examine oil screens, filters, and sump oil for metal particles or contamination that could indicate internal damage to the engine.

2. Oil cooler for security, leaks, and obstructed air passages.
3. Induction air filter for servicing, proper fit, security, cracks in frame, and tears or bare spots in filter element. Paper element "dry" filters for replacement every 300 hours.
4. Entire engine assembly for cleanliness.
5. Induction airbox for internal cleanliness, cracks, and security; air valve and doors for operation and sealing; controls for security and operation.
6. Cold air and hot air flexible hoses for security, kinks, holes, chafing, and burnt spots.
7. Engine baffles for security, sealing, cracks, metal deformation, and attachment of sealing strips.
8. Cylinders for security, cracks, broken cooling fins; rocker box covers and push rod housings for security, oil leaks, cracks, and dents.
9. Crankcase, oil pan, reduction gear housing, and accessory section for security, oil leaks, safetying; front crankshaft seal for oil leakage.
10. All lines and hoses for security, leaks, cracks, dents, kinks, corrosion, hose deterioration, and chafing.
11. Intake system for security, leaks, deteriorated hoses, and loose or corroded clamps; manifold drains for proper operation, drain lines and hoses for security, leaks, and chafing.
12. Exhaust system for security, leaks, cracks, and burned-out spots. Refer to paragraph 12-74.
13. Ignition harness for security, chafing, burning, defective insulation, and loose or broken terminals.
14. Spark plugs for proper gap, cleanliness, and evidence of reliable operation. (Also see paragraph 12-40.)
15. Crankcase and vacuum system breather lines for security, obstructions, corrosion, cracks, and chafing.
16. All electrical wiring in the engine compartment for security, chafing, defective insulation, and loose or broken terminals.
17. Vacuum pump for security, oil leaks, and safetying.
18. Vacuum relief valve for security and the inlet screen for cleanliness, holes, corrosion, and safetying.
19. Vacuum system oil separator for security, cracks, oil leaks, and servicing.
20. Engine and propeller controls and linkage for security, proper rigging, binding, excessive wear, cracks, misalignment, corrosion, safetying, and chafing.
21. Engine shock mounts for security, safetying, deterioration; engine mount for cracks, corrosion, dents, bends, and evidence of overheating; ground straps for security, corrosion, fraying of braided straps, and cracking of metal straps.
22. Cabin heater valve and door for proper operation, sealing, cracks, and deformation; controls for security, binding, proper rigging, and alignment.
23. Starter for security, oil leaks, tight electrical connections; engagement lever for proper rigging and return spring tension. Every 200 hours, check starter brushes for sufficient length, binding; brush leads for fraying, chafing; commutator for glaze, pits, grooves, high mica, and cleanliness.
24. Generator for security and oil leaks if generator is fastened to accessory case; drive belt for cuts, fraying, and excessive wear; electrical connections for security. Every 200 hours, check generator brushes for sufficient length, binding; brush leads for fraying, chafing; commutator for glaze, pits, grooves, high mica, and cleanliness.
25. Voltage regulator for security and tight electrical connections. Every 200 hours, check contact points for discoloration, pits, and corrosion.
26. Starting vibrator for security and tight electrical connections. Every 500 hours, check vibrator contact points for discoloration, pits, and corrosion.