

NAWEPs 01-40ALF-2

Handbook
Maintenance Instructions

NAVY MODELS

A-1H • A-1J

AIRCRAFT

SECTION I
GENERAL INFORMATION

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SECTION I

GENERAL INFORMATION

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Model AD-6 Airplane—BuNo. 134466-137632



Figure 1-1. Model AD-6 Airplane—BuNo. 139606 and Subsequent

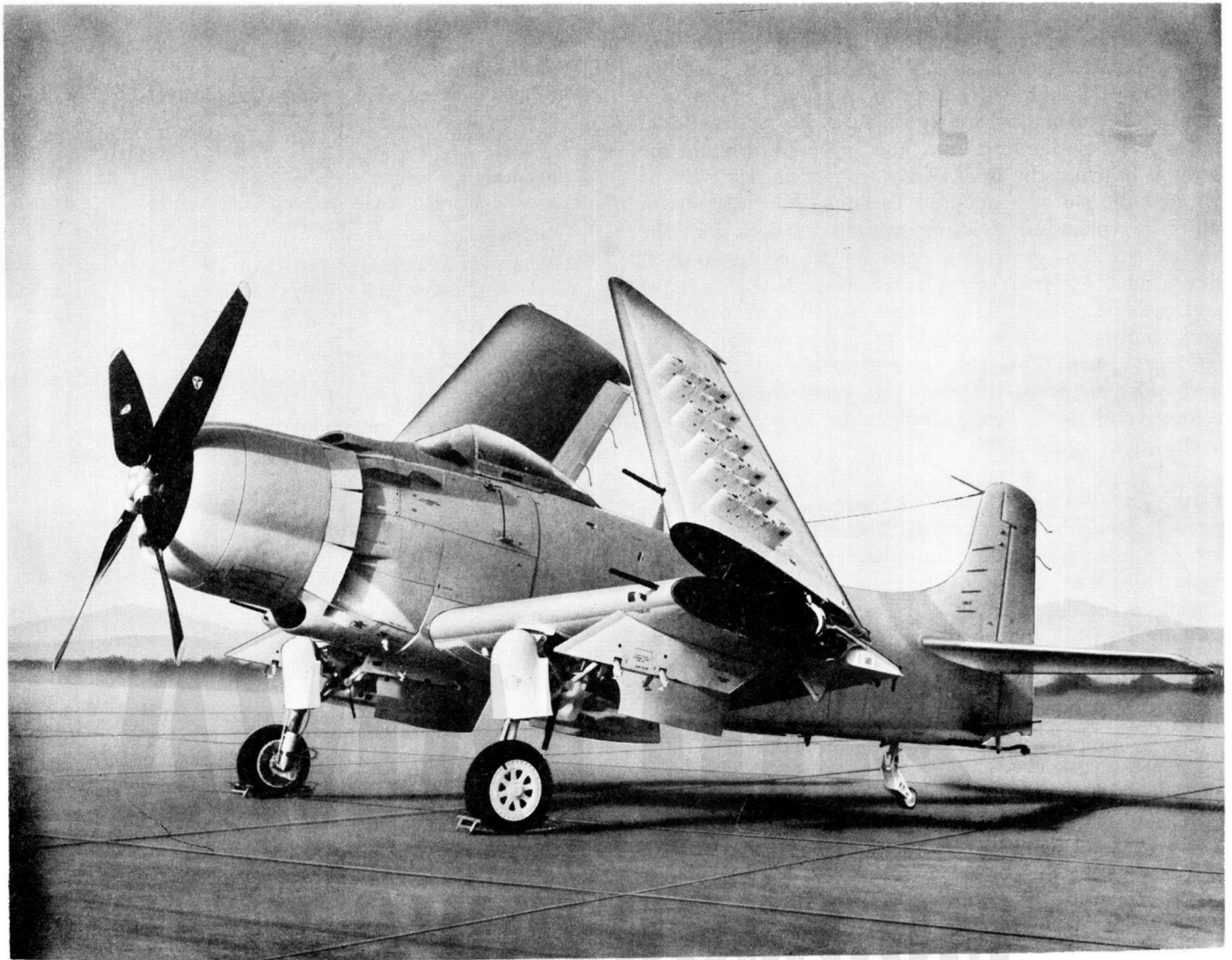


Figure 1-1A. Model AD-7 Airplane—BuNo. 142010 and Subsequent

Section I
Paragraphs 1-1 to 1-3

AN 01-40ALF-2

1-1. GENERAL DESCRIPTION. The model AD-6 and AD-7 airplanes are single engine, single place, low wing, all metal monoplanes, designed to carry out dive-bombing and/or missile, torpedo or special stores missions. The airplanes are equipped with conventional tail-wheel type landing gear, and can take off from the ground or from the deck of an aircraft carrier with or without the aid of a catapult. Landings can be made on an ordinary landing field, or on a carrier deck with the aid of arresting gear. The airplanes are equipped with fixed guns, external stores racks beneath the fuselage and each side of the wing center section, and combination bomb rack and rocket launchers under each wing outboard panel. The external appearance of the AD-6 and AD-7 airplanes is shown in figures 1-1 and 1-1A respectively; the general arrangement of the airplanes is shown in figure 1-2.

1-1A. The Table of Contents on page 1 preceding this section should be consulted to determine where specific information can be found within the section. The Alphabetical Index at the end of the handbook should also be consulted for determining where specific information is contained within the handbook.

1-2. WEIGHTS. The minimum and maximum weights differ slightly on the model AD-6 and model AD-7 airplanes as indicated in the following breakdown.

<i>Model</i>	<i>Effectivity</i>
AD-6	BuNo. 134466-134637
Minimum gross weight (Scout)	15,606 lb.
Maximum alternate gross weight (Long Range)	20,055 lb.
AD-6	BuNo. 135223-135406 and BuNo. 137492-137632 incl.
Minimum gross weight (Scout)	15,664 lb.
Maximum alternate gross weight (Long Range)	20,020 lb.
AD-6	BuNo. 139606-139821
Minimum gross weight (Scout)	15,774 lb.
Maximum alternate gross weight (Long Range)	20,213 lb.
AD-7	BuNo. 142010-142081
Minimum gross weight (Scout)	15,869 lb.
Maximum alternate gross weight (Long Range)	20,305 lb.

1-3. AIRCRAFT DIMENSIONS. (See figure 1-3.) Dimensions are given with the aircraft in level flight position unless otherwise stated.

<i>General</i>	
With wing spread:	
Span	50 ft. ¼ in.
Length (parallel to fuselage reference plane)	38 ft. 10½ in.
Length (parallel to static ground line)	39 ft. 2¾ in.
Height (FRP to vertical stabilizer tip)	10 ft. 2 in.
Height (tail wheel on ground, propeller blade vertical at top)	15 ft. 8 in.
Propeller ground clearance (flight attitude)	6¾ in.

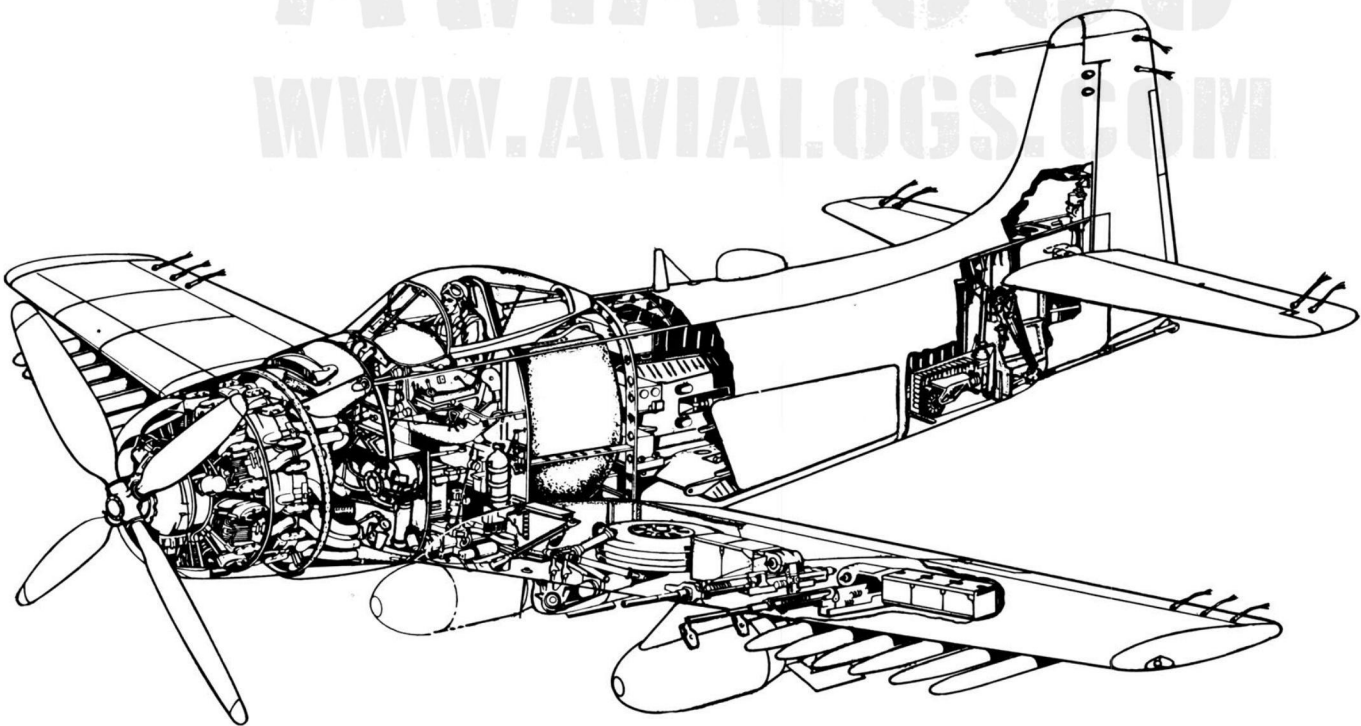


Figure 1-2. General Arrangement

With wing folded:	
Span.....	23 ft. 11 $\frac{1}{8}$ in.
Height.....	16 ft. 7 $\frac{7}{8}$ in.
Maximum height during folding.....	19 ft. 4 $\frac{1}{8}$ in.
<i>Wing</i>	
Airfoil section (curve identification).....	NACA 2417 at wing station 30; NACA 4413 at construction tip.
Chord at root section (wing station 30).....	121.688
Chord at construction tip section.....	64.512
Incidence:	
At root section (wing station 30).....	3°45'
At construction tip section.....	0°15'
Dihedral (measured at 50 per cent chord in chord plane).....	6°
Sweepback at leading edge of wing (projected).....	6°
<i>Horizontal Stabilizer</i>	
Span.....	19 ft. 10 in.
Maximum chord (at station 0).....	5 ft. 10 in.
Dihedral.....	0°
Incidence.....	0°
Incidence adjustment.....	6° up 3° down
<i>Fuselage</i>	
Width (maximum).....	5 ft. 0 in.
Height (maximum).....	6 ft. 3 in.
Length (without engine mount)	
Upper fire wall.....	31 ft. 5.25 in.
Lower fire wall.....	29 ft. 11.25 in.
<i>Areas</i>	
Wing (less aileron).....	368.68 sq. ft.
Ailerons (total—including tabs).....	31.65 sq. ft.
Aileron trim tab.....	0.94 sq. ft.
Flaps (total).....	32.49 sq. ft.
Horizontal stabilizer (including elevators).....	87.03 sq. ft.
Elevators (total).....	22.23 sq. ft.
Rudder (including tabs).....	18.99 sq. ft.
Rudder tabs.....	2.90 sq. ft.

1-4. ACCESS AND INSPECTION PROVISIONS. Access and service doors are provided throughout the airplane. (See figure 1-5.) Service doors for access to fuel cell filler caps, etc., are equipped with quick-action fasteners. Access doors for the purpose of periodic inspection are attached with screws. Refer to paragraph 1-4A for information pertaining to forward equipment compartment doors.

CAUTION

Adhere to approved removal and installation procedures for forward equipment compartment doors to prevent damage to fuel lines which would create a fire hazard.

1-4A. FORWARD EQUIPMENT COMPARTMENT DOORS.

1-4B. DESCRIPTION. (See figure 1-5.) The two elliptical shaped forward equipment compartment doors are located under the fuselage between stations 110 and 136. Both doors contain latching mechanisms and quick disconnect hinges. The right door also includes a safety catch that has to be depressed in order to gain complete entrance to the compartment. The right door is always removed first because fuel lines are located above the left door. The left door hinges are then released internally by working through the right access across the fuse-

lage ejector-rack pylon. Thus the left door is removed without damaging the fuel lines.

1-4C. REMOVAL.

- a. On right, forward-equipment-compartment door latch handle, press tab engraved "PUSH" to open.
- b. Pull handle forward to unlatch door.
- c. Push door partially open, and depress catch located outboard of latch on inside leading edge of door.
- d. Open door.
- e. Reach around door and move left-hand quick-disconnect hinge handle outboard and forward to disengage.
- f. Move right-hand quick-disconnect hinge handle inboard and forward to disengage.
- g. Grasp door in both hands, lift leading edge and twist sideways until door is upright and 180 degrees from closed position.
- h. Remove door from airplane and store for reinstallation.
- i. Through right access, reach across fuselage ejector-rack pylon, and move right-hand quick-disconnect hinge handle outboard and forward to disengage.
- j. Move left-hand quick-disconnect hinge handle inboard and forward to disengage.
- k. Move under left, forward-equipment-compartment door latch handle, and press tab engraved "PUSH"; latch handle will unfair.
- l. Pull handle forward to unlatch door.
- m. Push partially up on door, and grasp door in both hands.
- n. Pull door slightly forward and twist leading edge up toward fuselage ejector-rack pylon, adjusting door for obstructions until door is upright and 180 degrees from closed position.

o. Remove door from airplane and store for reinstallation.

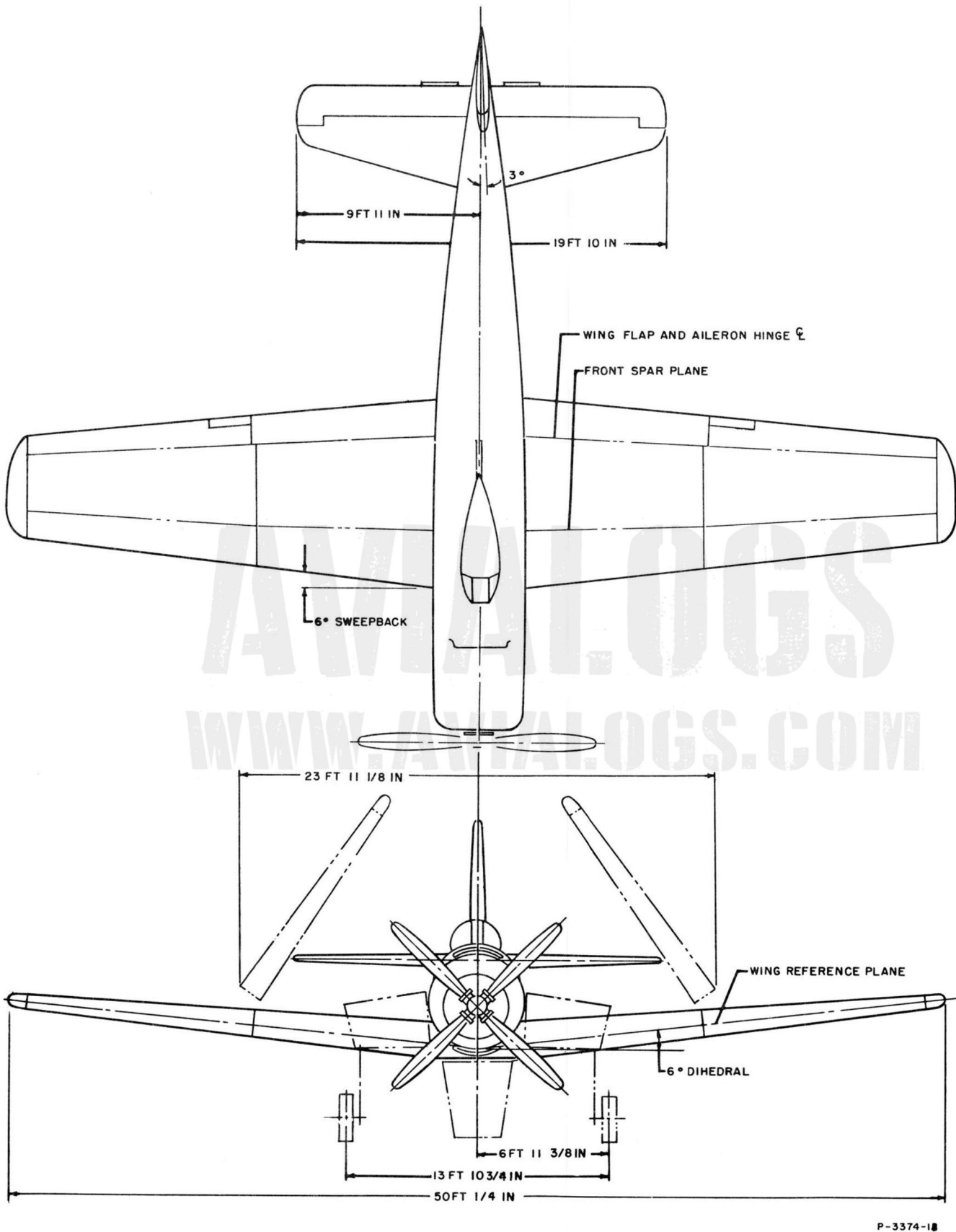
1-4D. INSTALLATION.

- a. Grasp left, forward-equipment compartment door in both hands so that forward end of door is up, and inside of door is facing right.
- b. Insert door into left, forward-equipment compartment access of airplane.
- c. Slide left side of door down under (Douglas 3551655) fuel line bringing door into closed position with hinge slots over hinge posts.
- d. Working through right access, across fuselage ejector-rack pylon, align door, press down on aft end of door, and release right and left quick-disconnect hinge handles.

CAUTION

Be sure left door, quick-disconnect hinge pins have latched properly before securing left door.

- e. Pull left, forward-equipment compartment door down with handle until it latches.



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Figure 1-3. Airplane Dimensions (Sheet 1)

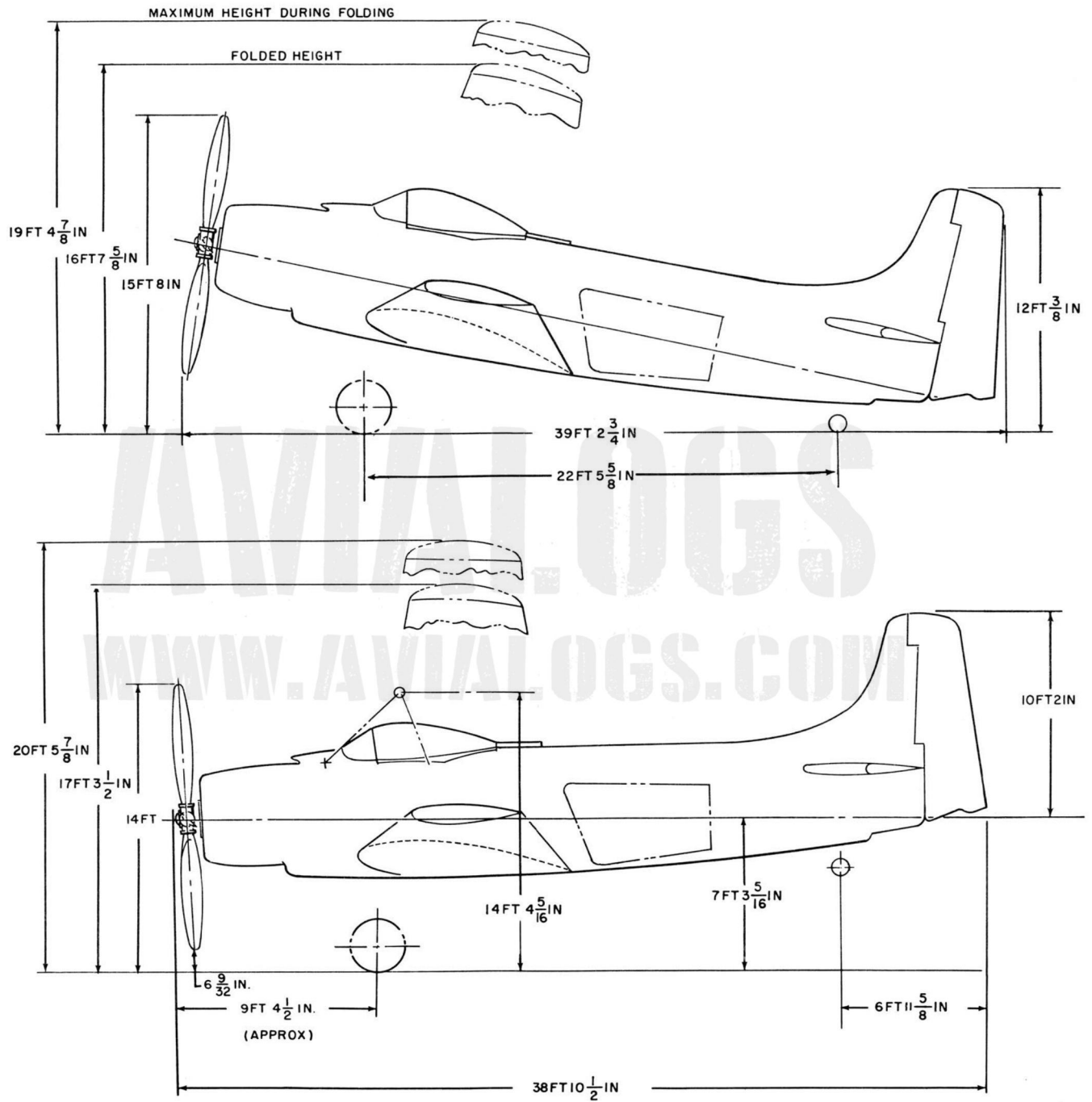
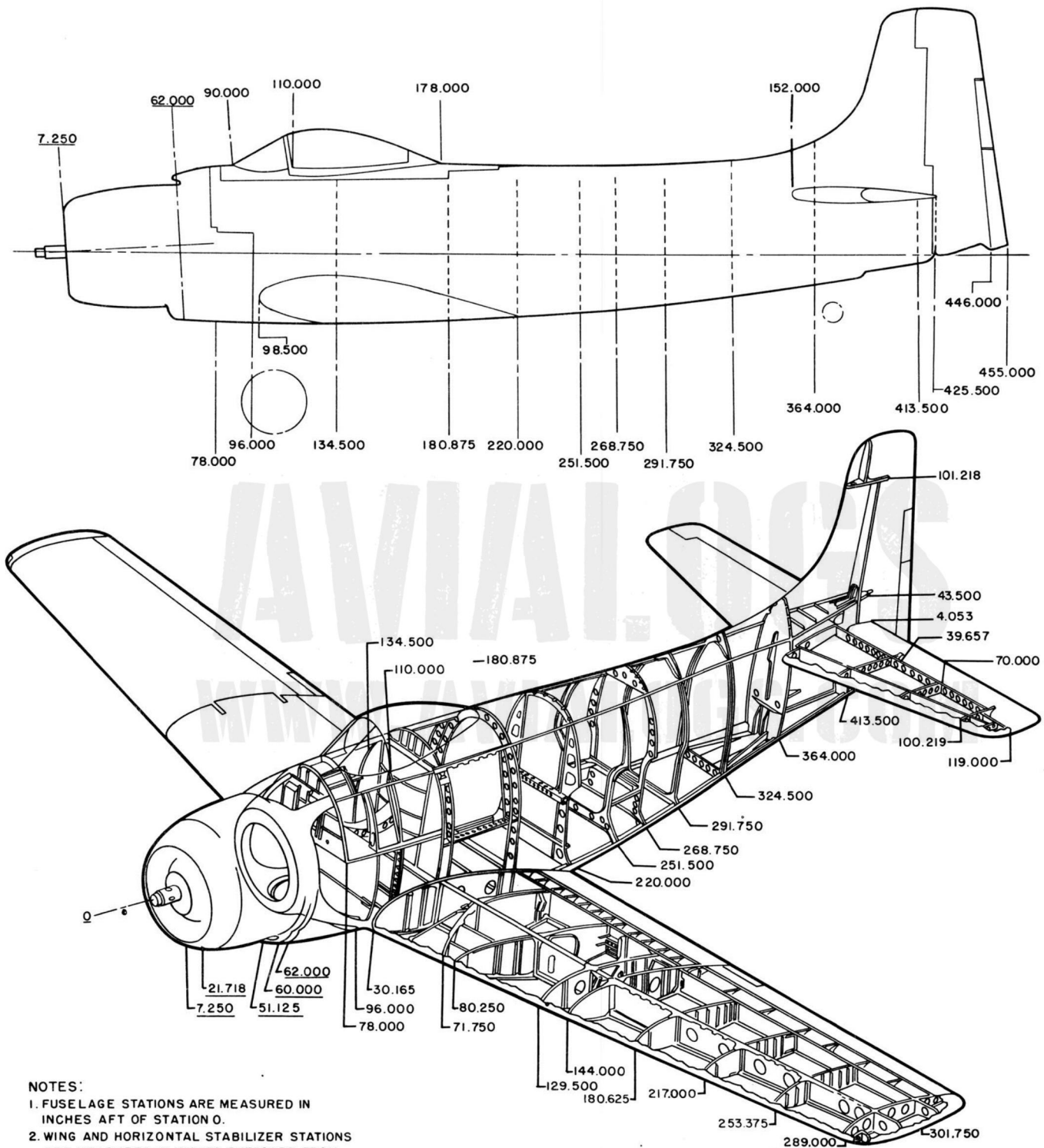


Figure 1-3. Airplane Dimensions (Sheet 2)



NOTES:

1. FUSELAGE STATIONS ARE MEASURED IN INCHES AFT OF STATION 0.
2. WING AND HORIZONTAL STABILIZER STATIONS ARE MEASURED IN INCHES OUTBOARD FROM FUSELAGE CENTER LINE.
3. VERTICAL STABILIZER STATIONS ARE MEASURED IN INCHES UP FROM HORIZONTAL REFERENCE PLANE.
4. ENGINE STATIONS ARE UNDERLINED.

EFFECTIVITY-BUNO.
FACTORY: ALL
SERV CHG: NONE

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Figure 1-4. Stations and Frames

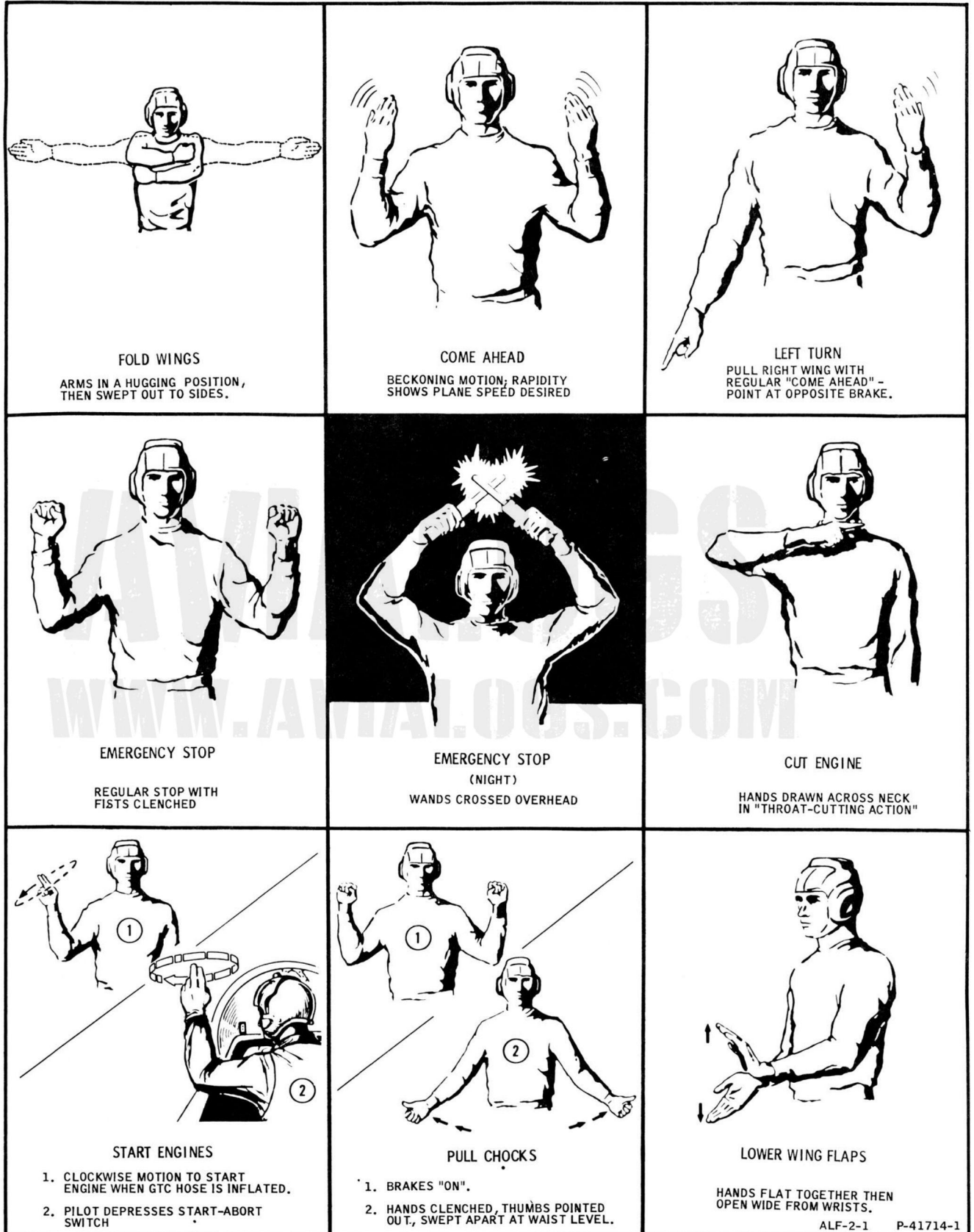
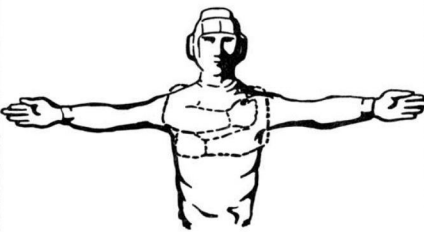
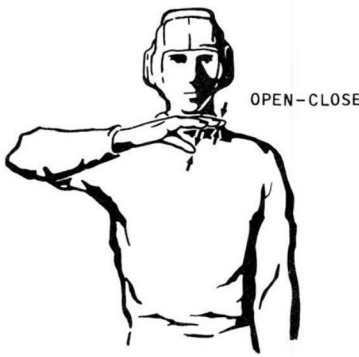

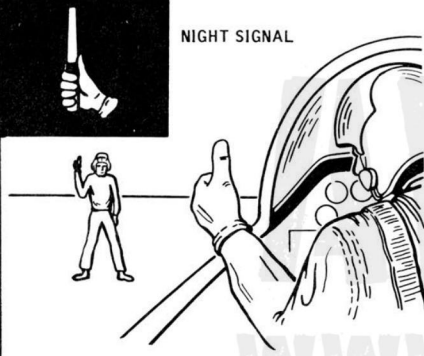



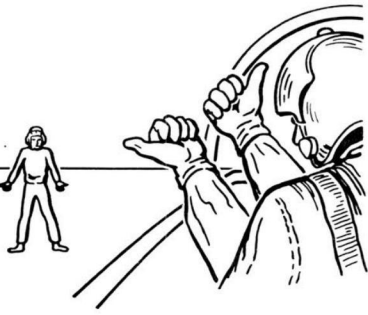


Figure 1-4A. Ground Handling Signals (Sheet 1)

 <p>SPREAD WINGS</p> <p>ARMS IN STRAIGHT OUT POSITION THEN SWEEPED IN TO HUG SHOULDERS</p>	 <p>OIL COOLER DOOR</p> <p>HAND UNDER CHIN IN OPEN AND CLOSE MOTION</p>	 <p>TAIL WHEEL</p> <p>OPEN (UNLOCK) CLOSE (LOCK)</p>
 <p>NIGHT SIGNAL</p> <p>ACKNOWLEDGEMENT</p> <p>A CLENCHED FIST WITH THUMBS POINTING STRAIGHT UP INDICATES SATISFACTORY COMPLETION OF A CHECK ITEM. A CLENCHED FIST WITH THUMB POINTING DOWN INDICATES UNSATISFACTORY COMPLETION AND/OR DO NOT CONTINUE.</p>	 <p>INSERT / PULL EXTERNAL POWER</p> <p>PILOT PULLS FINGERS FROM OPEN PALM. SIGNAL MAN RESPONDS WITH SAME SIGNAL.</p>	 <p>OPEN COWL FLAPS</p> <p>OPEN PALMS OVER EARS IN OPEN AND CLOSE MOTION.</p>
 <p>LOCK WINGS SIGNAL</p> <p>PATting MOTION ON ELBOW</p>	<p>CARRIER FLIGHT DECK PERSONNEL COLOR CODING</p> <ul style="list-style-type: none"> RED SHIRTS - ORDNANCE, FUEL HANDLING AND CRASH CREW YELLOW SHIRTS - PRI FLTY, PLANE DIRECTORS, CATAPULT OFFICER AND ARRESTMENT OFFICER BLUE SHIRTS - PLANE HANDLERS (PUSHERS CHOCK MEN, ETC.) GREEN SHIRTS - AIRCRAFT MAINTENANCE, CATAPULT CREW, ARRESTMENT CREW BROWN SHIRTS - PLANE CAPTAINS WHITE SHIRTS - MEDICAL 	 <p>PULL CHOCKS</p> <p>PILOT MAKES SWEEPING MOTION OF FIST WITH THUMBS EXTENDED OUTWARD. SIGNALMAN SWEEPS FISTS APART AT HIP LEVEL WITH THUMBS EXTENDED OUTWARD.</p>

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Figure 1-4A. Ground Handling Signals (Sheet 2)

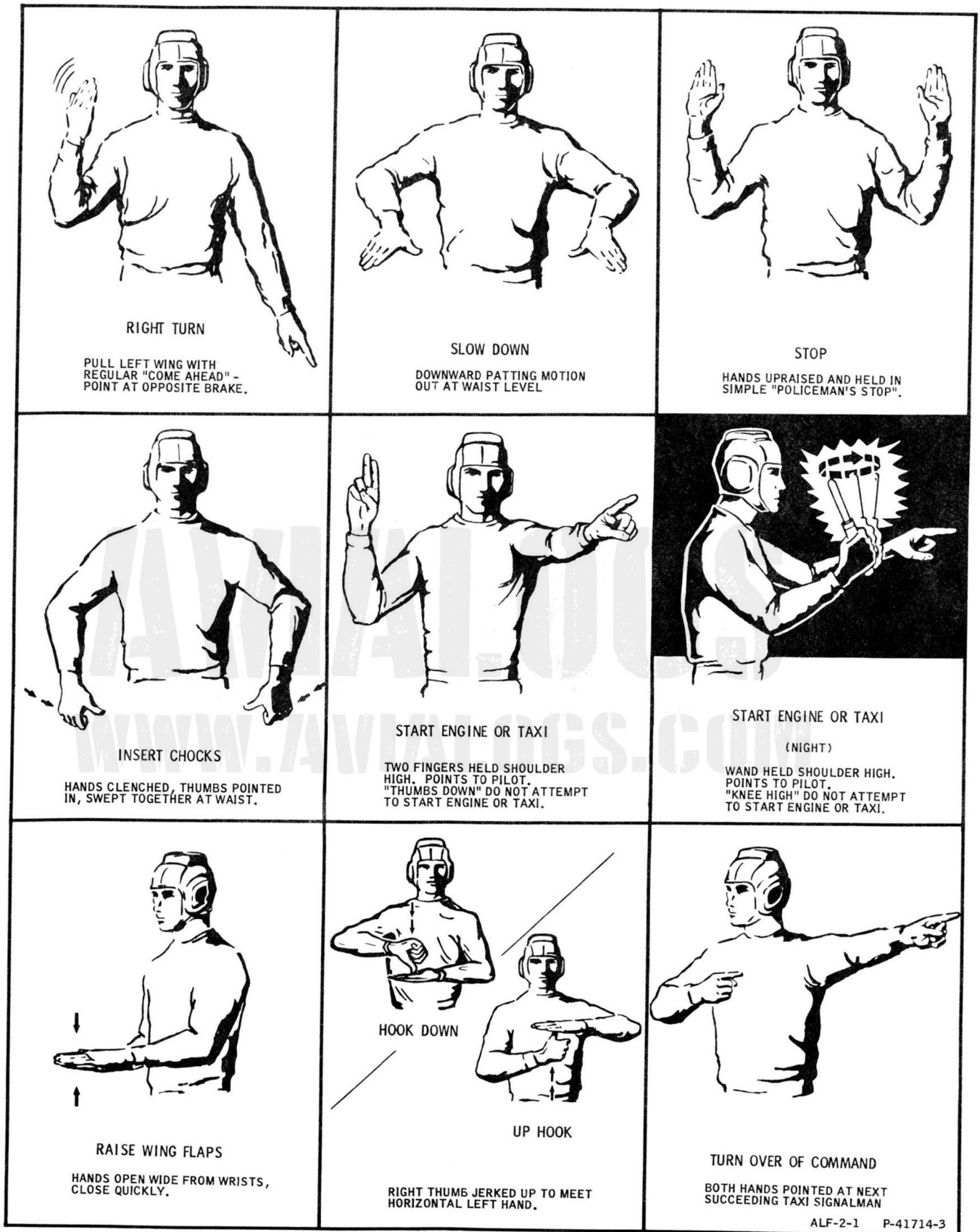
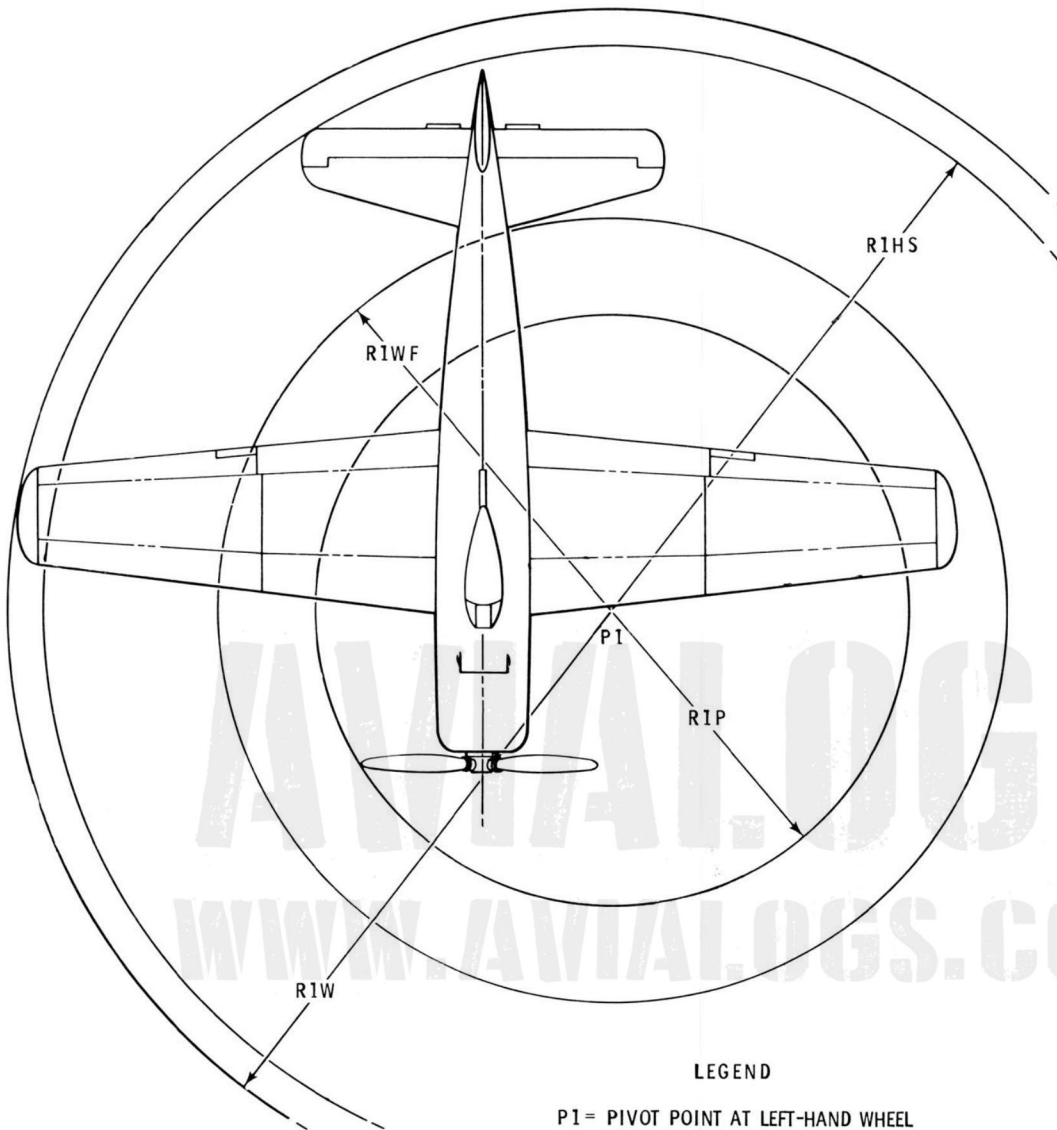


Figure 1-4A. Ground Handling Signals (Sheet 3)



LEGEND

P1 = PIVOT POINT AT LEFT-HAND WHEEL
(DIMENSIONS IDENTICAL USING
RIGHT-HAND WHEEL PIVOT POINT)

P = PROPELLER
WF = WINGS FOLDED
W = WINGS
HS = HORIZONTAL STABILIZER

P1 TO RIP = 15 FEET 11 INCHES
P1 TO RIWF = 20 FEET 8 INCHES
P1 TO RIW = 32 FEET 5 INCHES
P1 TO RIHS = 32 FEET

DIMENSIONS SHOWN ARE WITH AIRPLANE
AT THREE-POINT LANDED POSITION

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Figure 1-4B. Turning Radii

f. Push handle up into plate recess until handle is faired with skin surface; hold and press up on leading edge of tab engraved PUSH until handle latches in faired position.

g. Grasp right forward equipment compartment door in both hands so forward end is up, and inside of door is facing to right.

h. Insert door into right forward equipment compartment access of airplane.

i. Twist door into proper reclining position with hinge slots over hinge posts.

j. Align door, and release right and left quick-disconnect hinge handles.

CAUTION

Be sure right door, quick-disconnect hinge pins have latched properly before securing right door.

k. Grasp right forward equipment compartment door handle, and pull down until door latches.

l. Push handle up into plate recess until handle is faired with skin surface; hold and press up on leading edge of tab engraved PUSH until handle latches in faired position.

1-5. GROUND HANDLING.

1-5A. DESCRIPTION. Provisions are built into the airplane to facilitate ground handling. Wing folding and spreading are accomplished as outlined in paragraphs 1-6 and 1-7.

1-6. FOLDING WING. Wing folding requires hydraulic system pressure (2700 to 3000 psi).

a. Raise WING FOLD handle located in cockpit right-hand control panel. Operation of WING FOLD handle mechanically disengages latches from pins of wing-locking cylinders and extends wing-fold warning "flags."

b. Operate PULL TO FOLD handle located below WING FOLD handle. PULL TO FOLD handle operates wing-folding control valve, which directs hydraulic pressure to wing-locking cylinders to retract locking pins and to wing-folding cylinders to raise wing outboard panels to folded (125 degree) position.

CAUTION

After wing has been folded, leave wing fold handle in open (pulled) position to prevent possible closing of wing folding control valve when hydraulic pressure is low and subsequent inadvertent spreading of wing when pressure is restored.

c. Install jury struts. (See figure 1-7.)

1-7. SPREADING WING. Wing spreading requires hydraulic system pressure.

a. Remove jury struts. (See figure 1-7.)

b. Place PULL TO FOLD handle in closed position. PULL TO FOLD handle in closed position operates wing-folding control valve, which directs hydraulic pressure to wing-folding cylinders to lower wing outboard panels, and to wing-locking cylinders to extend wing-locking pins.

c. Place WING FOLD handle in closed position (flush with control panel) to engage locking-mechanism latches with wing-locking pins, and to retract warning flags into wing center section nose.

1-7A. GROUND HANDLING SIGNALS. (See figure 1-4A.) Standard hand signals are used to relay instructions to personnel towing, parking, spotting, or taxiing the airplane. Signaling wands are used for night operations in the same manner as the hand signals; the only exceptions are (1) crossed wands in place of clenched fists for an emergency stop and (2) wand held knee high in place of thumb down indicating do not start engine or taxi.

1-8. HOISTING PROVISIONS. (See figure 1-6.) Provisions have been made for hoisting the complete airplane, wing outboard panels, fuselage fuel cell, tail of the airplane, and demountable power plant.

1-9. HOISTING COMPLETE AIRPLANE. The complete airplane can be hoisted by use of the fuselage hoist. (See figure 1-6.) The fuselage hoist is a four-cable sling (K-54504) which can be attached to fuselage fittings located at the four corners of the cockpit. The sling is designed for a vertical load of four times the weight of the airplane at a 15 degree pull-off in any direction. The fuselage hoist can be installed as follows:

a. Install hoist aft cables by aligning cable fitting with hoisting eye at fuselage station 135.625. Insert and fasten stop pin in place with spring-loaded key and lockpin.

b. Install hoist forward cables by opening instrument access panels in front of windshield and inserting cable fitting post into hoisting trunnion at fuselage station 79.281. Engage locking pin.

CAUTION

When installing hoisting sling, care should be taken to keep hoist cables and ring from damaging cockpit enclosure.

c. Check weight of airplane and use only hoisting gear of sufficient capacity to raise entire airplane. If demountable power plant section has been removed, it may also be necessary to raise airplane tail by tail hoist to keep airplane level.

1-10. HOISTING DEMOUNTABLE POWER PLANT SECTION. A demountable power plant section hoisting sling (K-57202-501) is furnished as part of the ground handling equipment. (See figure 1-6.) The

Section I
Paragraphs 1-10 to 1-12

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sling consists of a beam, a hoisting ring and shackle, and forward and aft flexible cables. The beam contains 14 holes for the attachment of the hoisting ring and shackle. The proper hole to be used is marked on the beam and depends upon the attitude of the airplane and upon the portions of the power plant section to be removed. The demountable power plant section hoist can be installed as follows:

- a. Remove cowling left-hand panel.
- b. Shackle hoisting ring to appropriate hole in hoisting beam.
- c. Bolt hoist forward cable fittings to hoist brackets on forward inboard rocker boxes of No. 2 and No. 18 cylinders.
- d. Place hoist aft cable fittings over lower studs of rear rocker boxes of No. 2 and No. 18 cylinders.

e. Use only hoisting gear of sufficient capacity to support entire weight of demountable power plant.

Note

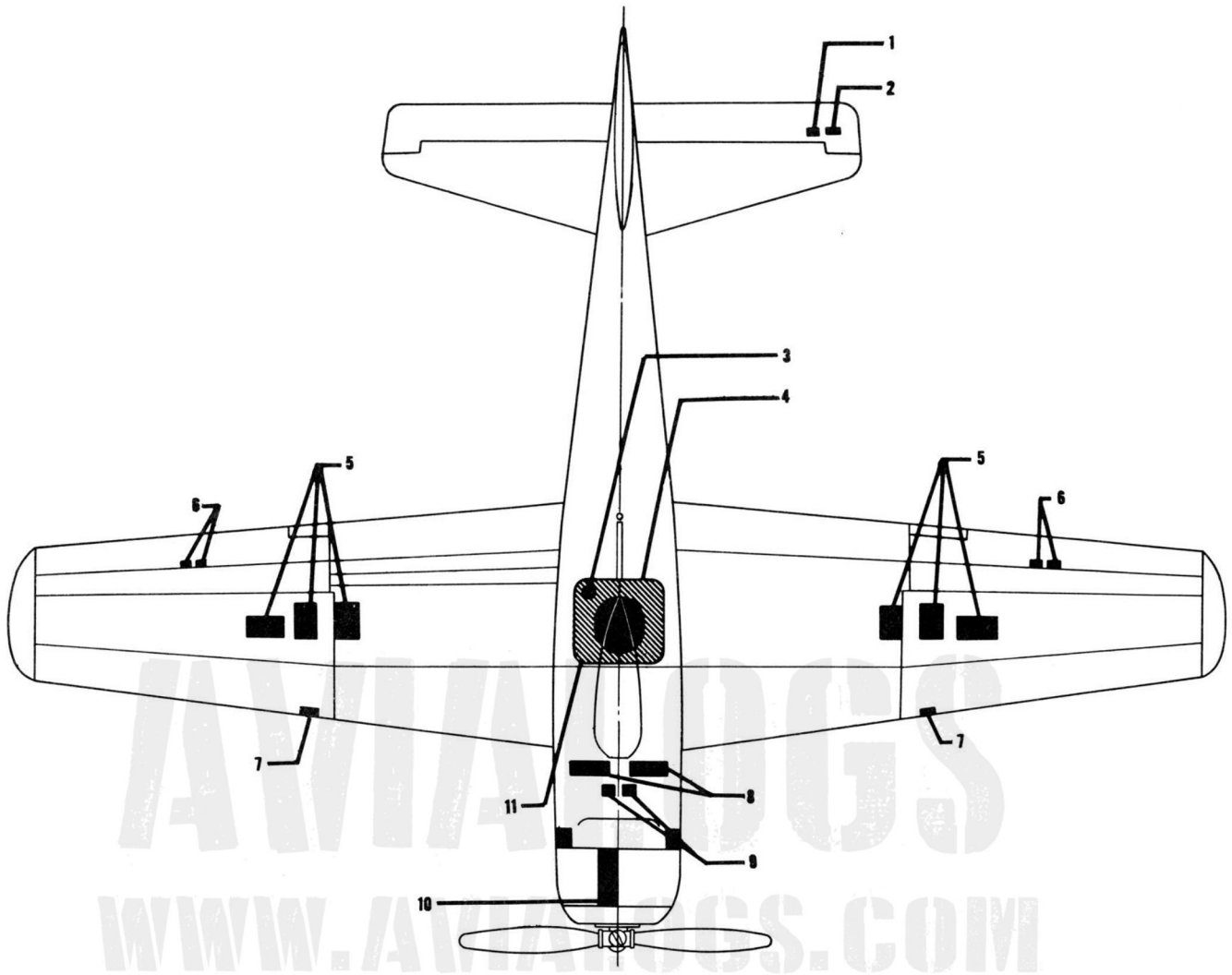
The hoist aft fittings are part of the hoisting sling and should remain with the sling when the sling is removed from the demountable power plant.

1-11. HOISTING WING OUTBOARD PANELS. Threaded hoisting fittings are installed in each wing outboard panel at wing stations 217. The fittings are designed to accommodate hoisting rings (figure 1-6), which are furnished as part of the ground handling equipment. To hoist the wing outboard panel, the hoisting ring should be screwed into the fitting and fastened to suitable hoisting gear.

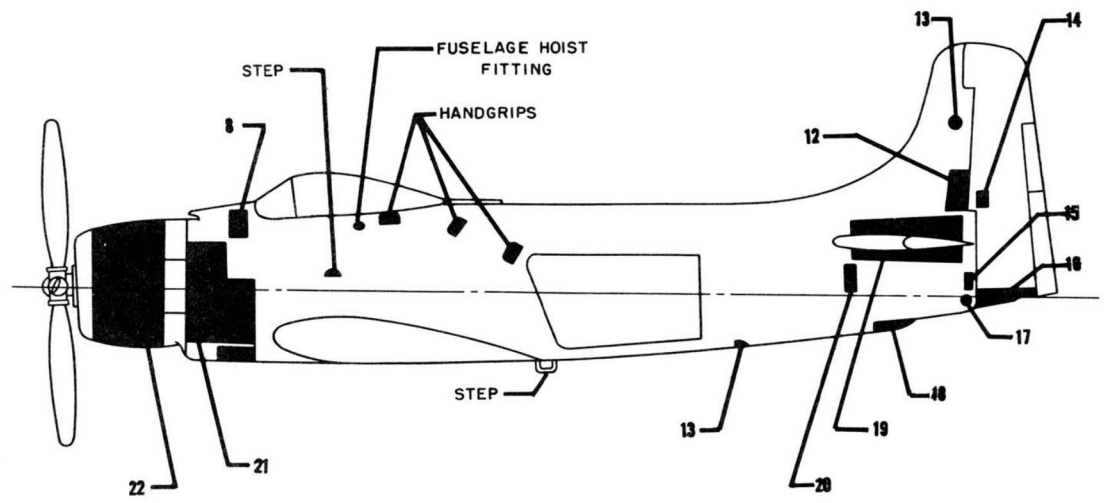
1-12. HOISTING TAIL OF AIRPLANE. A threaded hoisting fitting is installed in the upper left-hand plating

Index	Area or Purpose	Index	Area or Purpose
1	Elevator hinge	21	Engine accessory section cowling
2	Elevator balance weight	22	Engine side panel cowling
3	Fuel cell filler well	23	Antennas
4	Fuel cell	24	Radio compartment access door
5	Gun and ammunition	25	Fuel cell drain
6	Aileron hinge	25A	Water tank drain
7	Outboard wing gun	26	Wing flap adjustment
8	Instrument panel access	27	Boresight fitting
9	Air scoop	28	Outboard wing panel hinged access
10	Cowling fixed beam (access to No. 18 cylinder)	29	Provisions for antennas
11	Fuel cell cover	30	Landing gear well
12	Horizontal stabilizer operating mechanism	31	Gun camera access
13	Inspection and repair	32	External power receptacle
14	Rudder spring tab mechanism	33	Oil dilution manual shut-off valve access
15	Rudder mechanism	34	Oil cooler aft fairing
16	Rudder lower fairing	35	Forward equipment compartment doors
17	Arresting hook latch	36	Oil tank filler well
18	Arresting hook fairing	37	Empennage control
19	Stabilizer-to-fuselage fairing	38	Rudder trim tab fairing
20	Arresting hook filler	39	Rudder spring tab fairing
		40	Water tank filler

Figure 1-5. Access and Inspection Provisions (Sheet 1)



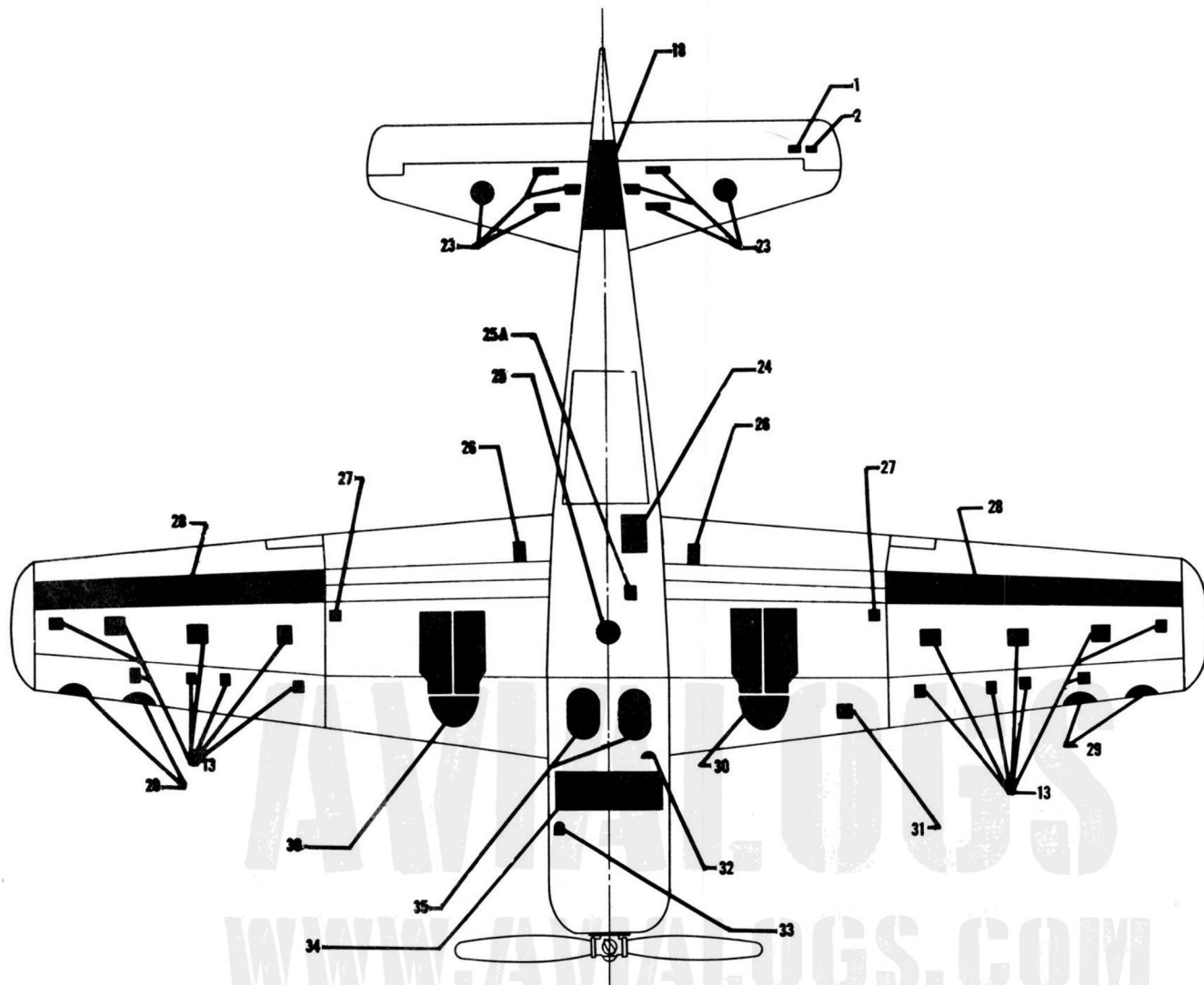
TOP



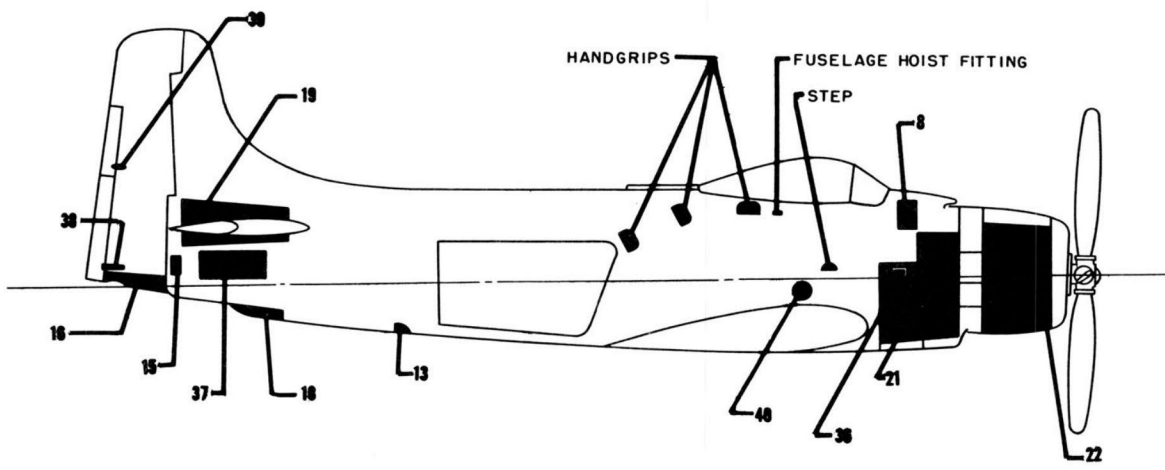
LEFT-HAND SIDE

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Figure 1-5. Access and Inspection Provisions (Sheet 2)



BOTTOM



RIGHT-HAND SIDE

Figure 1-5. Access and Inspection Provisions (Sheet 3)

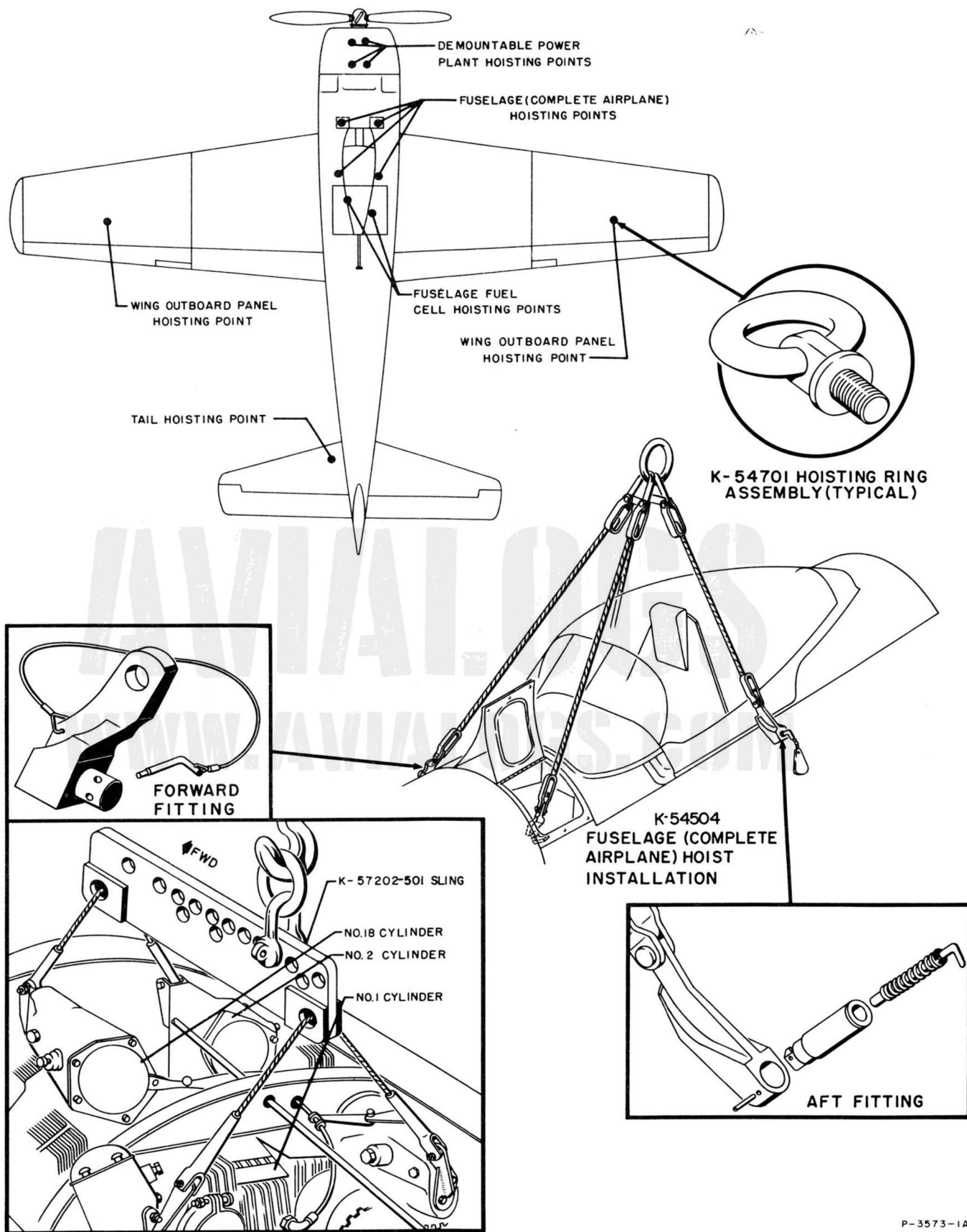


Figure 1-6. Hoisting Provisions

of the horizontal stabilizer to accommodate the hoisting ring and can be used for raising the tail of the airplane.

CAUTION

When hoisting tail of airplane above normal flight attitude position, care should be taken to prevent airplane from nosing over.

1-13. HOISTING FUSELAGE FUEL CELL. Two hoisting fittings, threaded to accommodate hoisting rings, are provided in the fuselage fuel cell supporting structure for hoisting the fuselage fuel cell.

1-14. JACKING ARRANGEMENT. (See figure 1-7.) Jacking points are provided at the bottom of each main landing gear shock strut, at the bottom of the fuselage aft of the arresting hook, and in the left- and right-hand sides of the wing center section lower plating.

1-15. JACK PADS. (See figure 1-7.) Three removable jack pads are provided for use at the wing and tail jacking points. The jack pads (K-54801) are furnished as part of the ground handling equipment. A conventional hydraulic jack can be used for jacking the main wheels for servicing the landing gear, but a tripod jack is required for use at the wing and tail jacking points. Each wing jack should have a minimum capacity of seven and one half tons. The tail jack should have a minimum capacity of three tons. (Refer to table 1-5.) The following precautions should be observed when supporting the airplane on jacks:

- a. Lock tail wheel prior to jacking.
- b. Prevent yawing by passing ropes through wing and tail tie-down fittings and securing ropes to anchor points on ground.
- c. Prevent any movement of airplane while airplane is supported on jacks.
- d. If airplane is to remain supported and unattended, move ladders and other equipment far enough from airplane to prevent damage should jack fail.

1-16. PARKING AND TIE-DOWN. (See figure 1-7.) The airplane should be parked with the airplane nose downwind. Two 2-inch diameter tie-down fittings are located in the wing center section, inboard of the wing-fold joints. The fittings, which fold into the wing when not in use, are designed to hold the airplane in a 60-knot (70 mph) wind and to carry loads from tie-down lines leading down at 45 degrees in any direction. For turning radii information see figure 1-4B.

NOTE

Lines should be secured with sufficient slack to prevent damage to airplane structure or loss of control if a tire or strut deflates, with resultant elevation of opposite wing.

The tail of the airplane can be secured by a rope or cable passed through the catapult hold-back fitting (refer to paragraph 1-25). The procedure for parking and securing the airplane is as follows:

- a. Park airplane with tail in wind.
- b. Chock main wheels, lock tail wheel, and install main landing gear safety locks (K-3270156-501).
- c. Install aileron control locks (K-56103-501) and rudder gust locks (K-5442806).
- d. Fold wings and install jury struts (K-55702).
- e. Attach and secure tie-down lines.
- f. If airplane is to be down for extended periods of time, install cockpit cover (K-55002), engine cover (K-55201), and propeller hub cover (K-5270110).

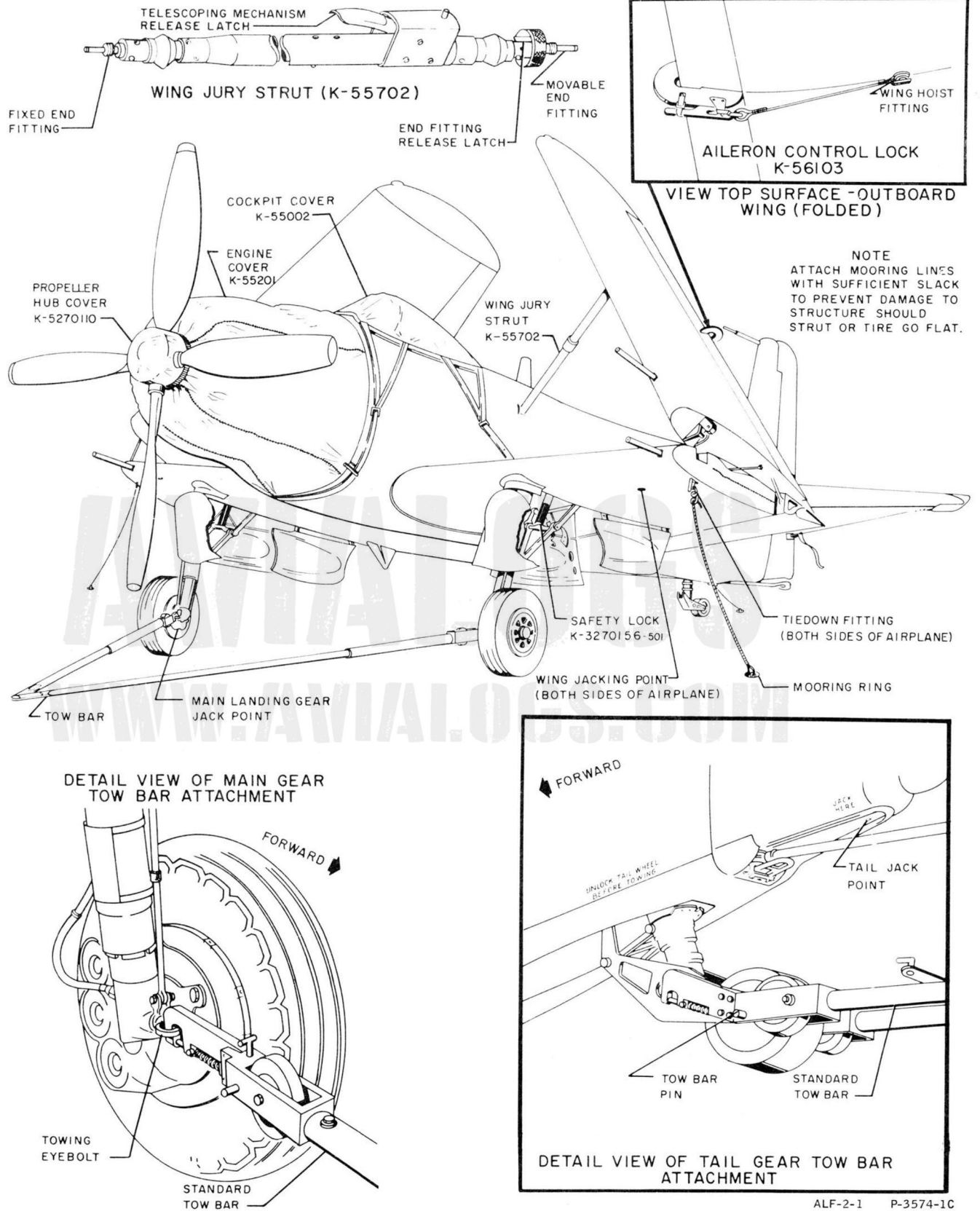
CAUTION

When pilot's lap belt is fastened between pilot's seat and control stick for purpose of securing control surfaces, extreme care must be taken while lowering pilot's seat to prevent damage to control stick and housing, resulting from unnecessary lap belt tension.

1-17. TOWING. (See figure 1-7.) The airplane can be towed by use of the tow bolts on the main landing gear shock struts or by a tow bar fastened to the tail wheel axle. The wheel brakes should be operated from the cockpit while the airplane is being towed. Towing operations are subject to the following restrictions:

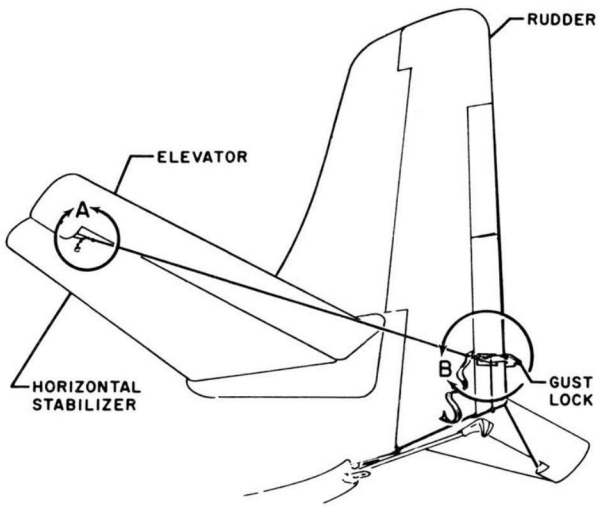
- a. Do not tow airplane over rough ground or while brakes are set.
- b. Do not push airplane forward by tail wheel.
- c. Do not tow airplane with tail wheel locked.
- d. Do not tow airplane by arresting hook.

1-18. LEVELING PROVISIONS. (See figure 1-8.) Leveling provisions consist of two calibrated plates mounted on the cockpit floor, and a slotted bracket mounted below the cockpit left-hand rail, from which a plumb bob can be suspended over the calibrated plates to determine both longitudinal and lateral attitude of the airplane. When used with a plumb bob, the forward plate indicates airplane attitude in the flight (horizontal) position and the aft plate indicates airplane attitude in the three-point position.

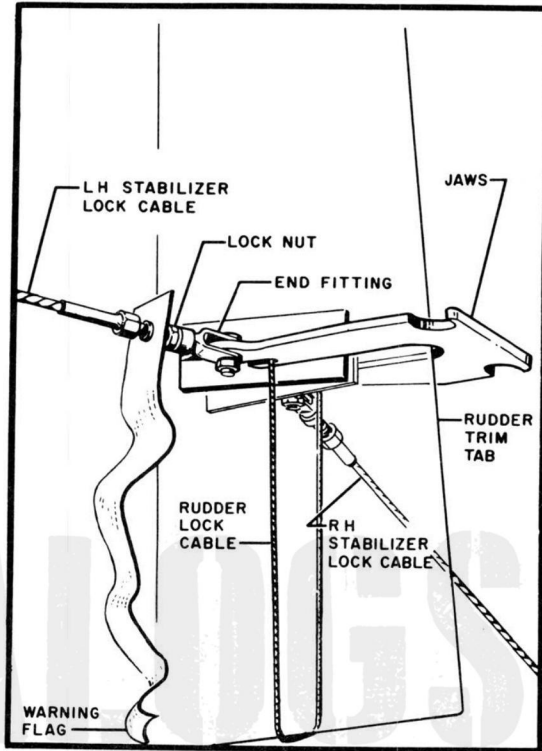


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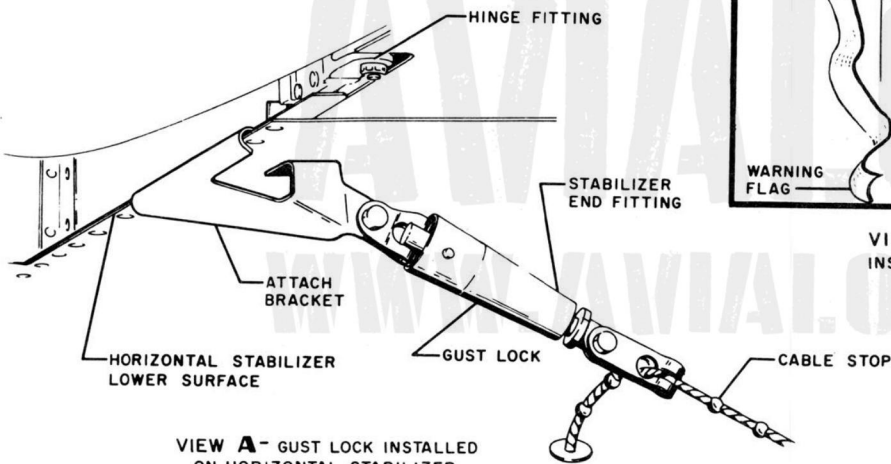
Figure 1-7. Jacking, Towing, and Tie-Down Provisions (Sheet 1)



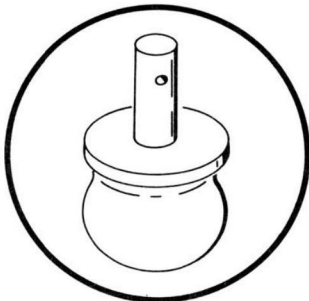
RUDDER GUST LOCK (K-5442806)
INSTALLED



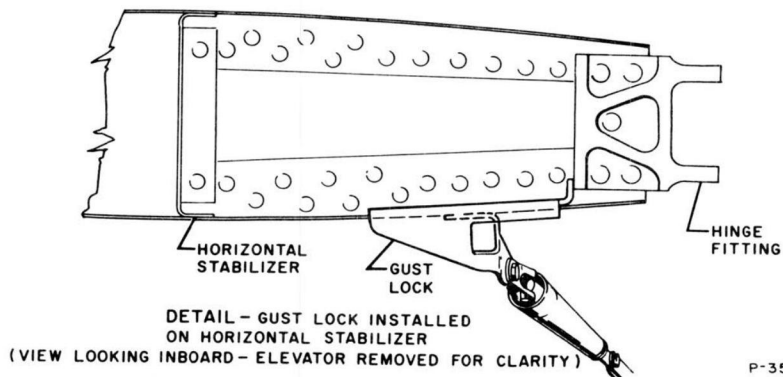
VIEW B - GUST LOCK
INSTALLED ON RUDDER



VIEW A - GUST LOCK INSTALLED
ON HORIZONTAL STABILIZER
(VIEW LOOKING FORWARD AND
INBOARD - ELEVATOR REMOVED
FOR CLARITY)



K-54801 JACK PAD
(SEE SHEET I FOR
INSTALLATION LOCATION)

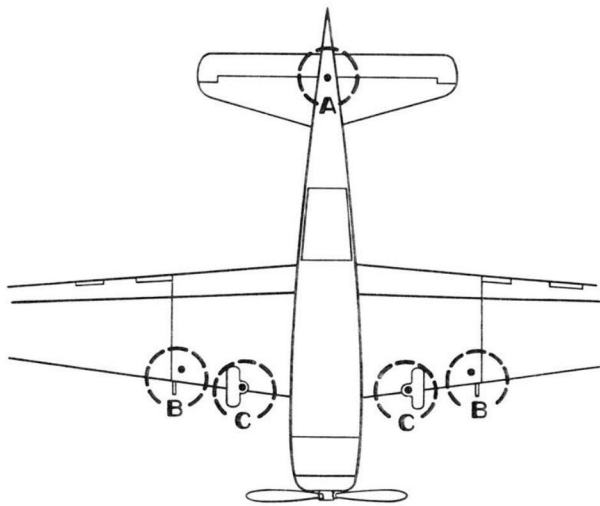


DETAIL - GUST LOCK INSTALLED
ON HORIZONTAL STABILIZER
(VIEW LOOKING INBOARD - ELEVATOR REMOVED FOR CLARITY)

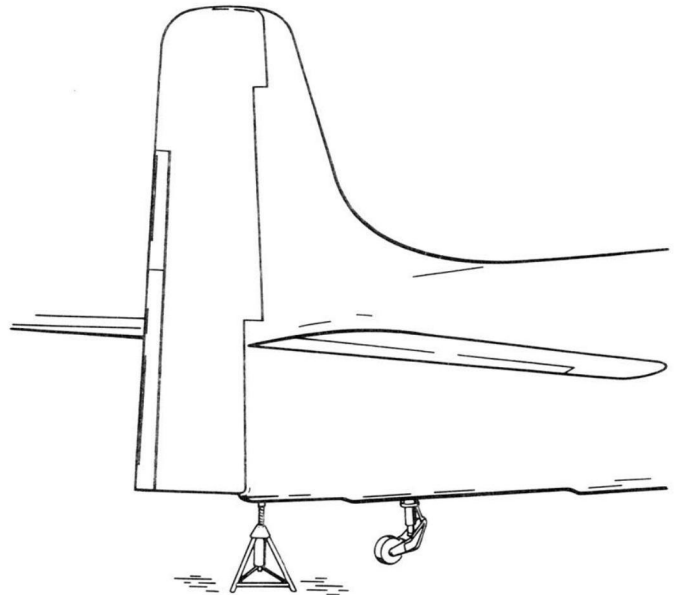
P-3574-2A

Figure 1-7. Jacking, Towing, and Tie-Down Provisions (Sheet 2)

● INDICATES JACK POINTS

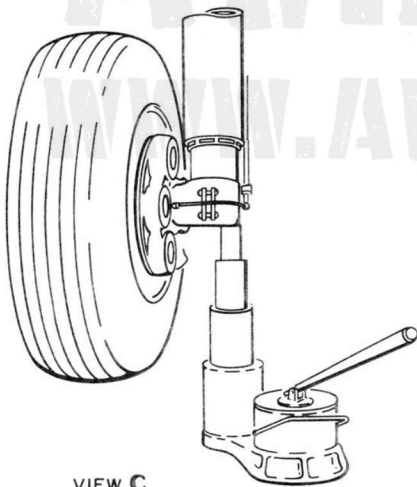


BOTTOM VIEW KEY



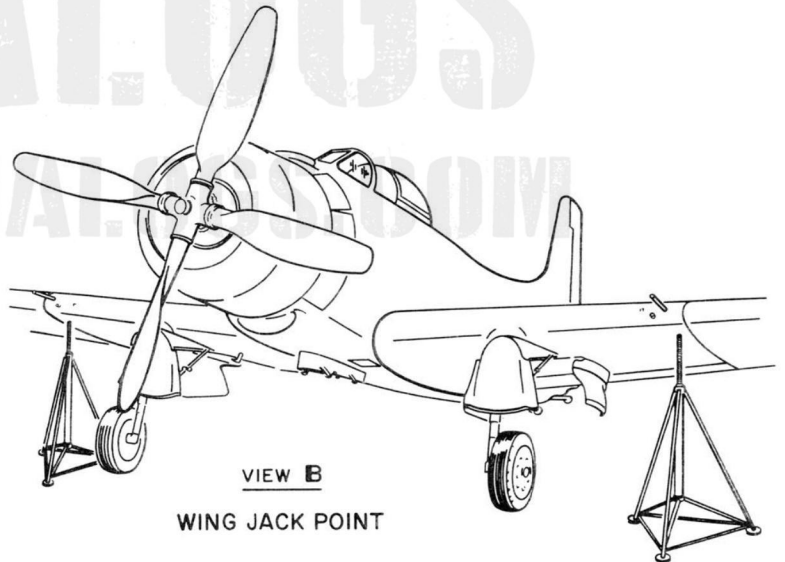
VIEW A

TAIL JACK POINT



VIEW C

MAIN LANDING GEAR JACK POINT



VIEW B

WING JACK POINT

JACK PAD STATION	TIRES FLAT AND STRUTS COMPRESSED (INCHES)	GROUND CLEARANCE (INCHES) TIRES INFLATED AND STATIC LOAD	TIRES INFLATED AND STRUTS EXTENDED (INCHES)	MAXIMUM JACKING LIFT FOR 2-INCH TIRE CLEARANCE (INCHES)	JACK CAPACITY (MINIMUM)	JACK TYPE
WING	60.301	64.593	78.740	20.439	7 1/2-TON	TRIPOD
WHEEL	8.060	10.857	13.170	7.110	10-TON	SINGLE SHAFT
TAIL	13.709	18.517	27.620	15.911	3-TON	TRIPOD

ALF-2-1 P-3574-3

Figure 1-7. Jacking, Towing, and Tie-Down Provisions (Sheet 4)

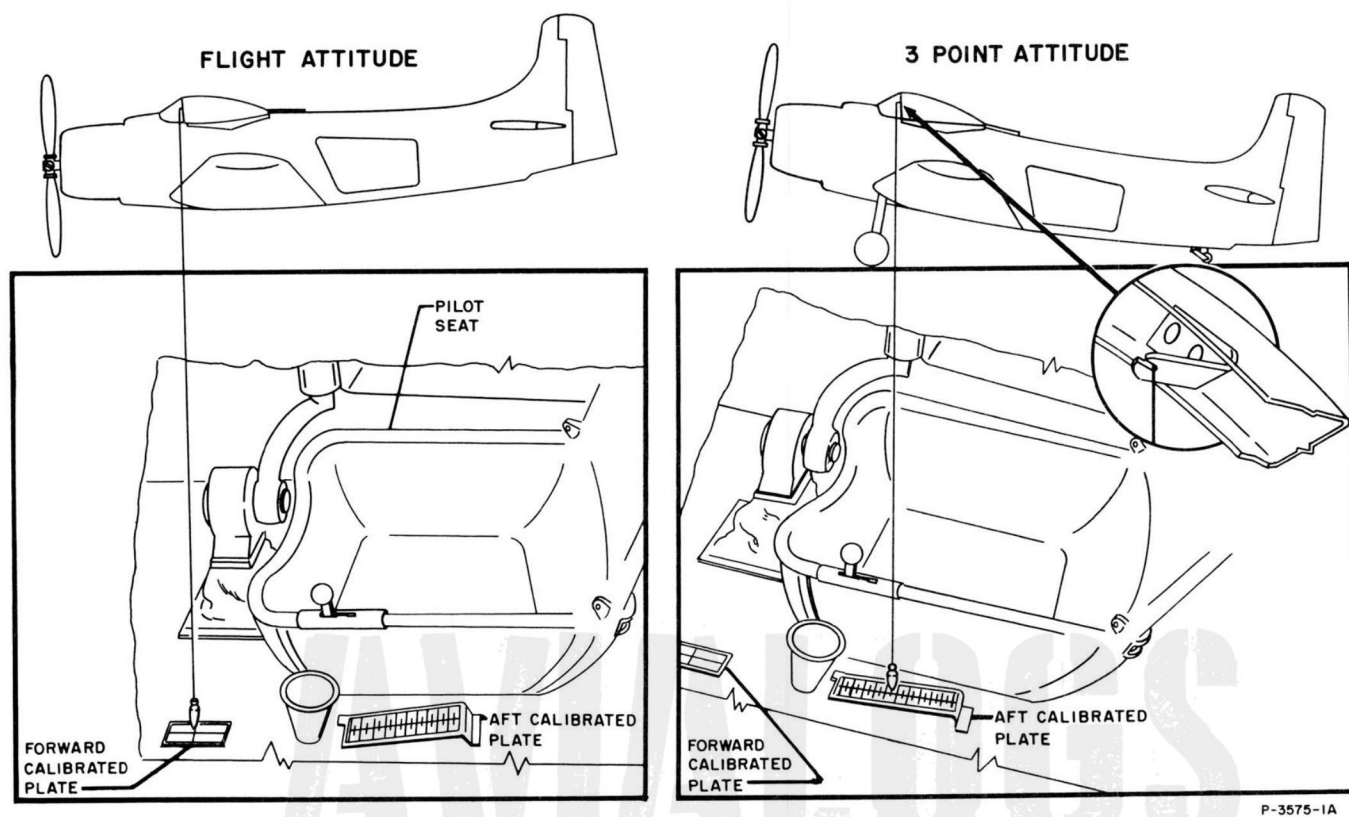


Figure 1-8. Leveling Provisions

1-19. CATAPULTING PROVISIONS.

1-20. DESCRIPTION. (See figure 1-9.) The airplane is designed to be catapulted and is equipped with catapult hooks (paragraph 1-21) and a catapult hold-back fitting (paragraph 1-25).

1-21. CATAPULT HOOKS.

1-22. DESCRIPTION. (See figure 1-9.) The catapult hooks are part of the airplane catapulting provisions and are installed on the lower surface of the wing center section.

1-23. REMOVAL. (See figure 1-9.)

- a. Remove closing rib panel from wing nose section. (Access to rib panel is through forward equipment compartment access door.)
- b. Remove screws which attach recessed fairing to catapult hook.
- c. Remove screws which attach channel and doubler to wing plating.
- d. Remove bolt from catapult hook clevis and pull hook out of wing.

1-24. INSTALLATION. (See figure 1-9.)

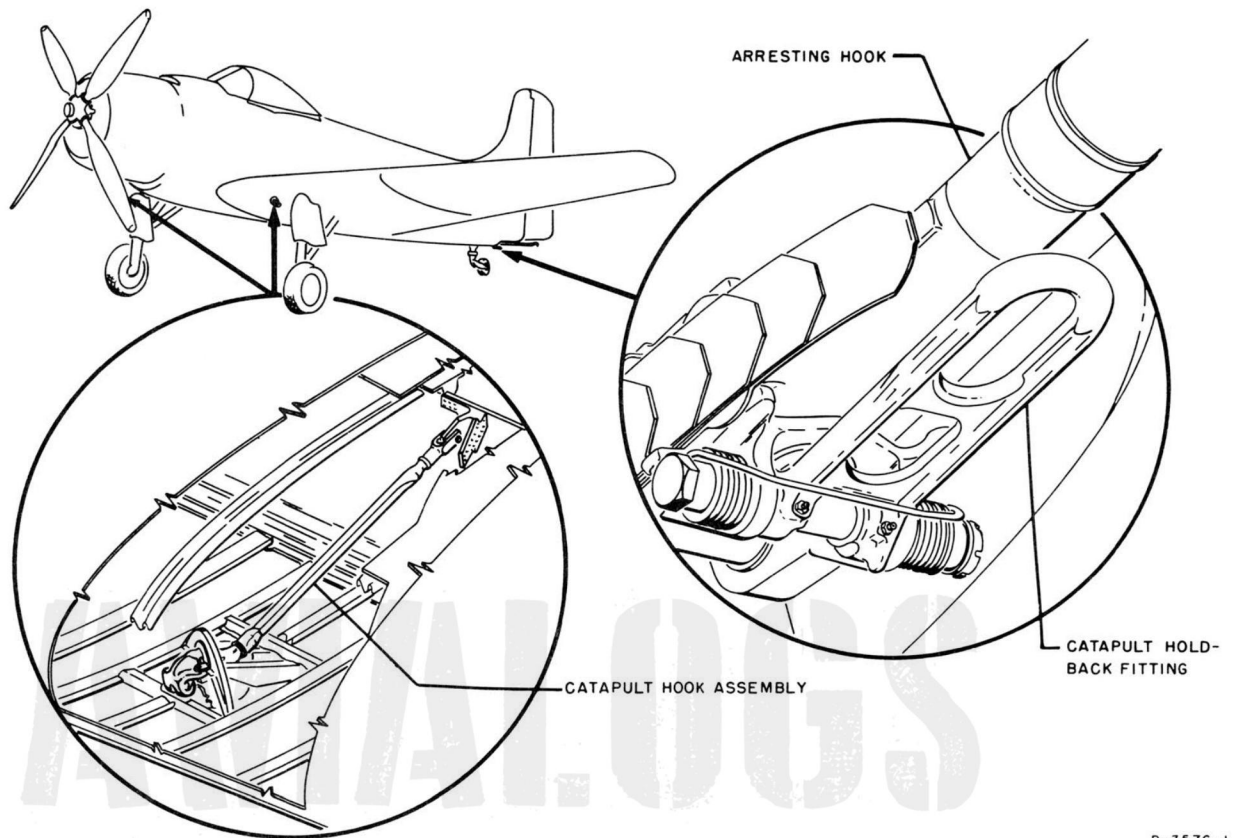
- a. Remove rib panel from wing nose section at wing station 30.165. (Access to rib panel is through forward equipment compartment access door.)
- b. Insert catapult hook through recessed fairing.
- c. Screw doubler and channel to wing plating.
- d. Bolt catapult hook clevis to spar fitting.
- e. Screw fairing to catapult hook.
- f. Install rib panel in wing nose section.

1-25. CATAPULT HOLD-BACK FITTING.

1-26. DESCRIPTION. (See figure 1-9.) The catapult hold-back fitting is mounted below the arresting hook attaching fitting and is attached to the lug on the bottom of the arresting hook clevis. The hold-back fitting is provided with a spring to hold the fitting against the arresting hook when the fitting is not in use.

1-27. REMOVAL. (See figure 1-9.)

- a. Remove bolt attaching hold-back fitting.
- b. Remove spring and remove hold-back fitting.



P-3576-1

Figure 1-9. Catapulting Provisions

1-28. INSTALLATION. (See figure 1-9.)

- a. Place hold-back fitting spring around lug on arresting hook.
- b. Install catapult hold-back fitting in line with spring and lug.
- c. Insert bolt, with washer and spacer, from left to right through spring, hold-back fitting, and attaching lug.
- d. Install second spacer and washer on bolt. Install and tighten nut, and secure nut with cotter pin.

1-29. SERVICING. See figure 1-10.

1-30. DESCRIPTION. The service information contained herein applies to the replenishment of expendable materials used in the airplane and includes the following listed equipment:

MAIN HYDRAULIC SYSTEM RESERVOIR
 MAIN HYDRAULIC SYSTEM ACCUMULATOR
 MAIN LANDING GEAR SHOCK STRUTS
 MAIN LANDING GEAR TIRES
 TAIL GEAR SHOCK STRUT
 ARRESTING HOOK HOLD DOWN CYLINDER
 ENCLOSURE EMERGENCY AIR BOTTLE
 FUSELAGE FUEL CELL
 EXTERNAL AUXILIARY FUEL TANK
 OIL TANK
 PROPELLER REGULATOR RESERVOIR
 BATTERY
 AN/ARC-27A RECEIVER-TRANSMITTER
 WINDSHIELD DEGREASING RESERVOIR
 OXYGEN CYLINDER
 PILOT'S DRINKING WATER CANTEN
 WATER INJECTION SYSTEM RESERVOIR

1-31 through 1-39, DELETED.

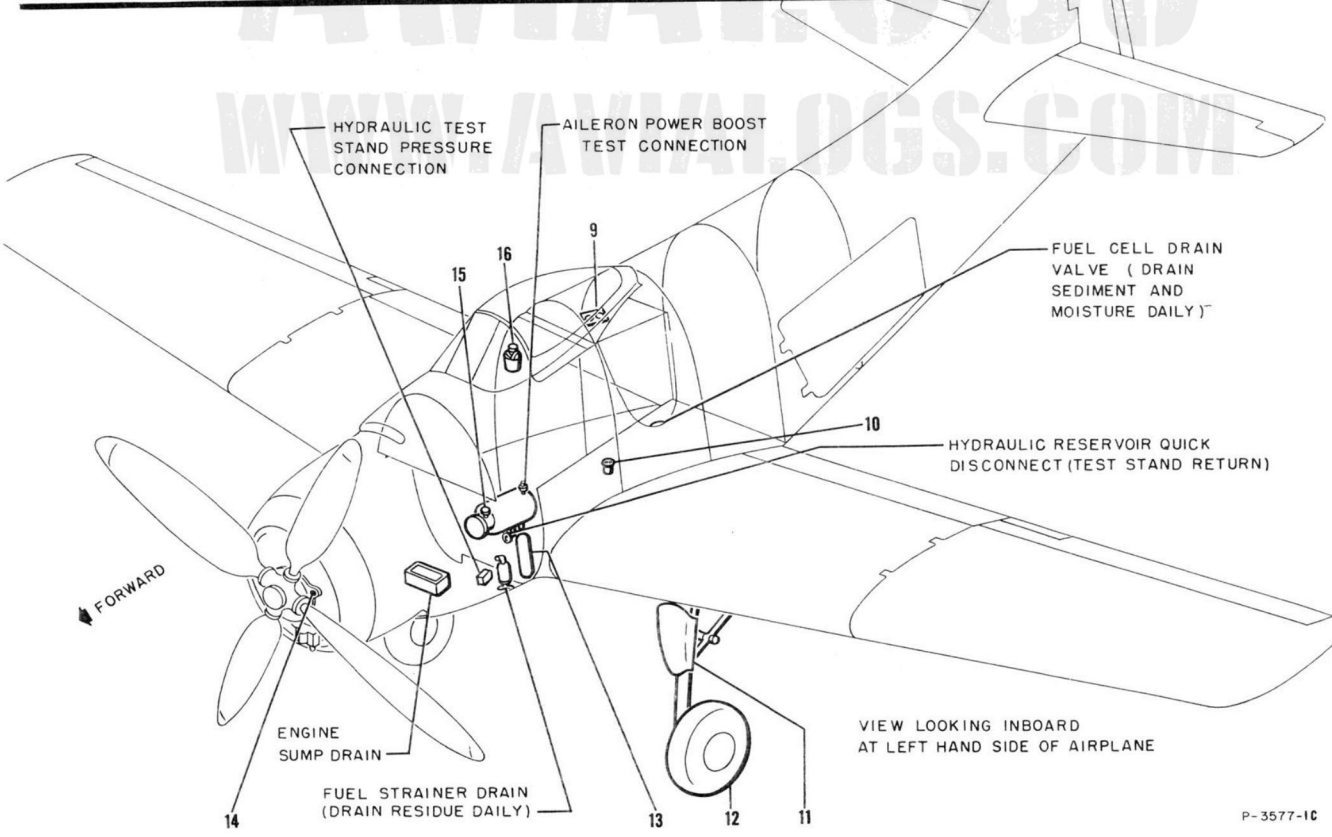
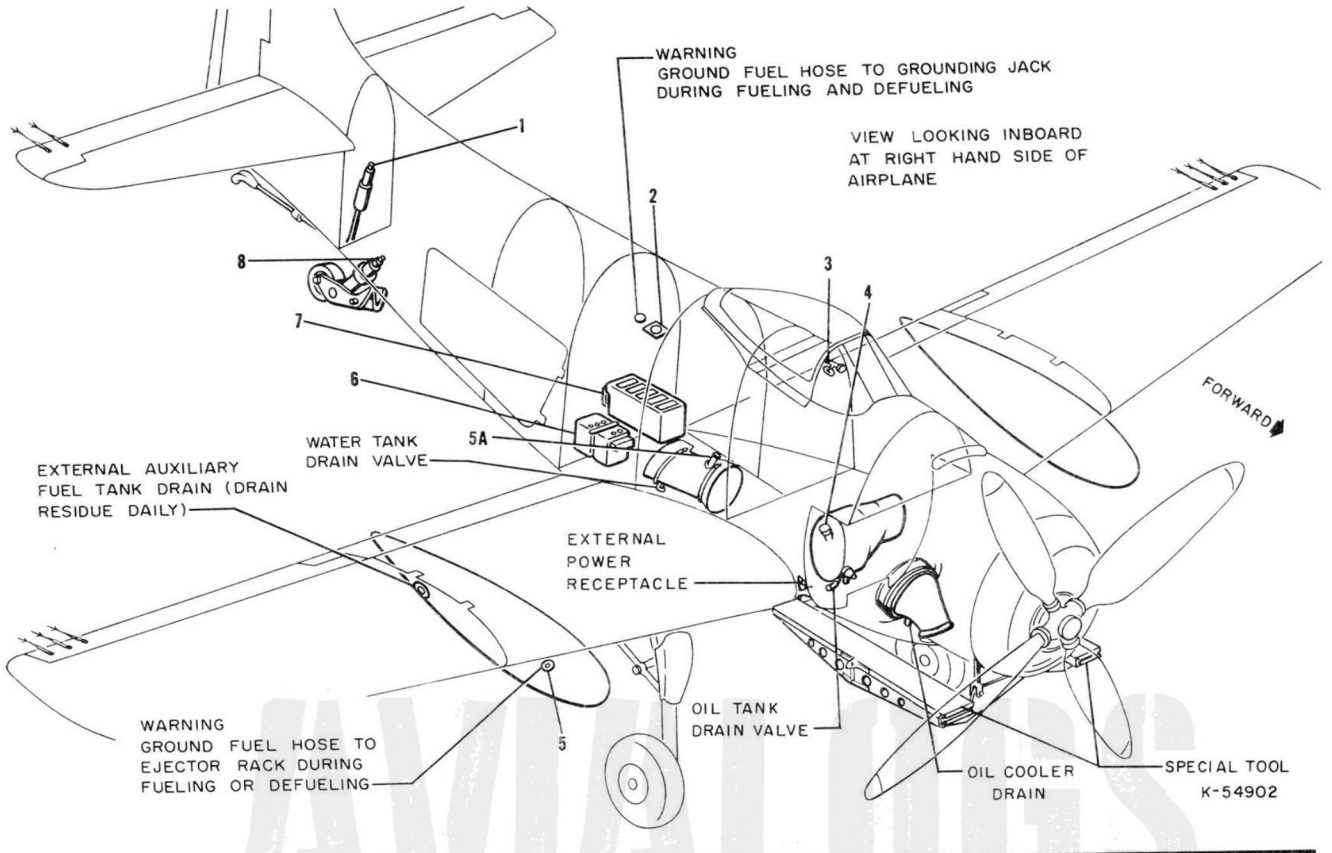


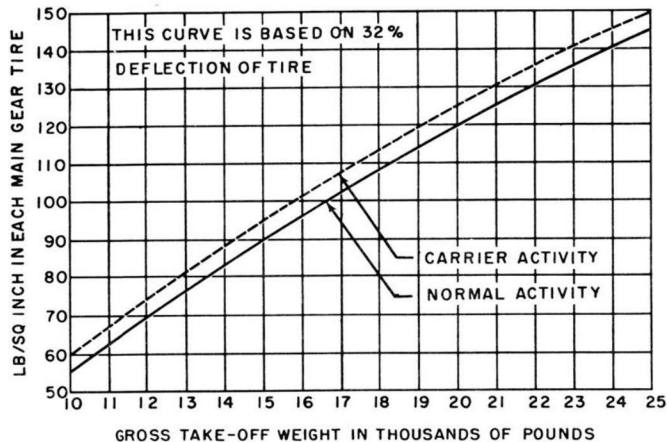
Figure 1-10. Service and Drain Points (Sheet 1)

INDEX	UNIT	CONTENTS	SPECIFICATION	CAPACITY			REMARKS
				US.	IMPERIAL	METRIC	
1.	Arresting hook hold-down cylinder	Hydraulic fluid and compressed air	MIL-H-5606	1 pt.	0.8 pt.	0.473	Fill to overflow with piston compressed (See VII on sheet 4)
2.	Fuselage fuel cell	Fuel	MIL-O-5572 Grades 115/145	380 gals.	316 gals.	1438.464	Before servicing, fuel hose must be grounded to grounding jack installed adjacent to filler well
3.	Oxygen cylinder	Oxygen		514 cu. in. cyl.			Charge to 1800 psi at 21°C (70°F) (See VIII on sheet 5)
4.	Oil tank	Oil	MIL-L-6082 See Note A	36 gals.	30 gals.	136.275	
5.	AERO 1A (5434628-503) and/or MK 12 external auxiliary fuel tank or AERO 1A (5265098-507) and/or MK 8 MOD 1 external auxiliary fuel tank	Fuel	MIL-O-5572 Grades 115/145	150 gals.	125 gals.	567.804	Before servicing fuel hose must be grounded
		Fuel	MIL-O-5572 Grades 115/145	300 gals.	250 gals.	1135.608	Before servicing fuel hose must be grounded (Refer to note A on sheet 5)
5A.	Water tank	Water, 50% Methanol, 50%	O-M-232	20 gals.	16 gals.	75.708	Water-alcohol mixture is a deadly poison. Do not take internally
6.	Battery	Distilled water					Maintain electrolyte level 3/8 inch above plates
7.	AN/ARC-27A receiver-transmitter	Compressed air		5 psi			
8.	Tail gear shock strut	Hydraulic fluid and compressed air	MIL-H-5606	1-3/4 pts.	1-1/2 pts.	0.828	(See III and V on sheet 3)
9.	Enclosure emergency air bottle	Compressed air					Charge to 1980 psi. Leakage must not exceed 25 psi in 24 hours
10.	Windshield degreasing reservoir	Stoddard solvent	TT-T-291 or P-D-680	1 pt.	0.8 pt.	0.473	
11.	Main landing gear shock strut	Hydraulic fluid and compressed air	MIL-H-5606	4 qts.	3.33 qts.	3.785	(See III and IV on sheet 3)
12.	Main landing gear tires	Compressed air					(See I on sheet 3)
13.	Main hydraulic system accumulator	Compressed air					(See II on sheet 3)
14.	Propeller regulator reservoir	Hydraulic fluid	MIL-H-6083				(See VI on sheet 4)
15.	Main hydraulic system reservoir	Hydraulic fluid	See Note B	5.8 gals.	4.8 gals.	22.239	
16.	Pilot's drinking water canteen	Water					

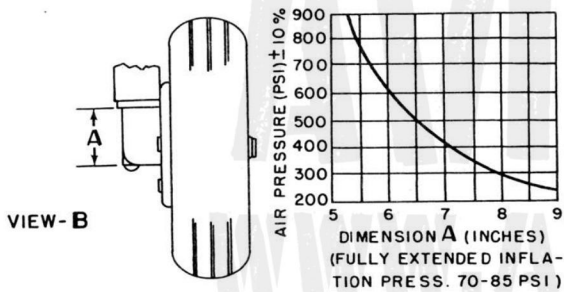
NOTE A: Reciprocating Engine, Grade 1100 lubricating oil shall be used in all reciprocating engines for ground starting temperatures down to 2°C (35°F). When temperatures below 2°C (35°F) are expected, or if it would be necessary to use oil dilution, use grade 1065 lubricating oil. When using grade 1065 lubricating oil, inlet temperatures shall be maintained between 65°C (149°F) and 75°C (167°F) during operation to obtain proper engine lubrication and to prevent accumulation of moisture and volatile products of oxidation in the oil. If it is not possible to maintain these limits, main oil pressure should be maintained within the normal operational range and oil temperature should be kept above 60°C (140°F). Grade 1065 oil will generally require preheating for starting below -18°C (0°F). If the conditions described above cannot be met or if equipment is not available for preheating, oil dilution may be accomplished as an alternate procedure. On A-1H and A-1J Airplanes reworked to A-1/ASC 670, either grade oil may be used by positioning oil transfer switch in proper position.

NOTE B: On all airplanes reworked to A-1/ASC 520, use MIL-H-5606, hydraulic fluid. Refer to nameplate on reservoir. Do not mix different types of hydraulic fluid.

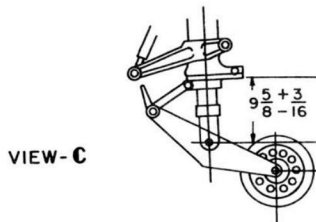
Figure 1-10. Service and Drain Points (Sheet 2)



VIEW-A TIRE PRESSURE INFLATION GRAPH



MAIN GEAR SHOCK STRUT SERVICING



TAIL GEAR SHOCK STRUT SERVICING

P-3577-30

I. TIRE INFLATION

For filling the main landing gear tires to correct pressure relative to gross take-off weight, see view A.

II. HYDRAULIC SYSTEM ACCUMULATOR CHARGING

- Relieve system pressure by pulling manual hydraulic relief valve handle up.
- With flaps up put flap control lever in "DOWN" position.
- Charge accumulator with air to 1500-1900 psi. If flaps reach end of travel before accumulator is charged, move lever to flaps "UP" position and continue charging.

III. FILLING MAIN AND TAIL GEAR SHOCK STRUTS

- Remove air valve cap and make certain that $\frac{5}{8}$ -inch hex nut is securely tight.
- Remove valve core from stem with Schrader Valve Core Tool No. 3263.
- Back off $\frac{5}{8}$ -inch hex nut not more than $\frac{3}{4}$ turn to exhaust air; amount nut loosened governs rate of discharge of air.
- When strut is fully depressed, remove lockwire and remove air valve by turning $\frac{3}{4}$ -inch hex nut.
- Support airplane on jacks.
- Fully extend strut and add hydraulic fluid (Spec. MIL-O-5606) to level of filler port. (Capacity of main gear strut is approximately 4 U.S. quarts.)
- Attach hose to strut filler port. Place free end of hose in can filled with hydraulic fluid (Spec. MIL-O-5606).
- Collapse and extend strut 10 or 12 times to expel all air trapped in strut. Compress strut slowly each time; allow strut to extend by its own weight.
- Lower jacks slowly allowing airplane wheels to assume weight of airplane.
- Remove hose and replace valve assembly (including valve core) and tighten $\frac{3}{4}$ -inch hex nut to 100-110 inch-pounds and lockwire. Torque $\frac{5}{8}$ -inch hex nut to 50-70 pounds.
- Inflate with air as noted below.

IV. INFLATING MAIN GEAR SHOCK STRUT

- Remove air valve cap; attach air filling chuck and gage to air valve, and loosen $\frac{5}{8}$ -inch hex nut not more than $\frac{3}{4}$ turn.
- Add air to strut until strut extends at least 5 inches.
- Note air pressure on gage.
- From strut inflation chart (view B), read correct dimension "A" for strut pressure noted in B.
- Inflate or bleed strut until dimension "A" agrees with dimension on inflation chart.
- Inspect around air valve body for leaks, torque $\frac{5}{8}$ -inch hex nut to 50-70 inch-pounds and install air valve cap to extreme finger-tightness.

CAUTION

Do not over-inflate strut.

V. INFLATING TAIL GEAR SHOCK STRUT

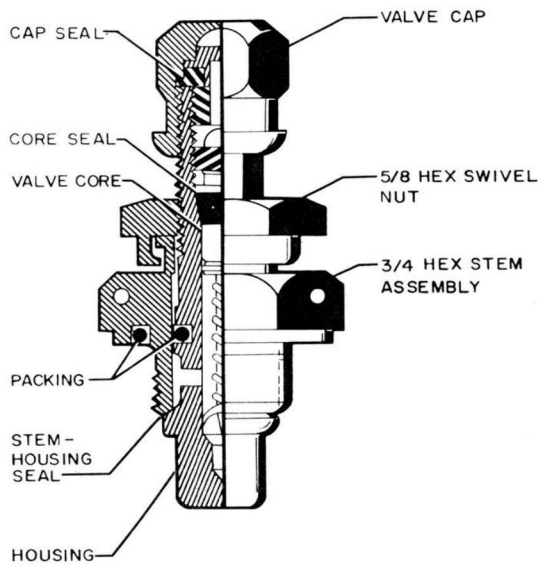
- Remove air valve cap, attach air filling chuck and pressure gage to air valve, and loosen $\frac{5}{8}$ -inch hex nut not more than $\frac{3}{4}$ turn.
- With weight of airplane on strut, add air until strut piston extends as shown in view C.

Note

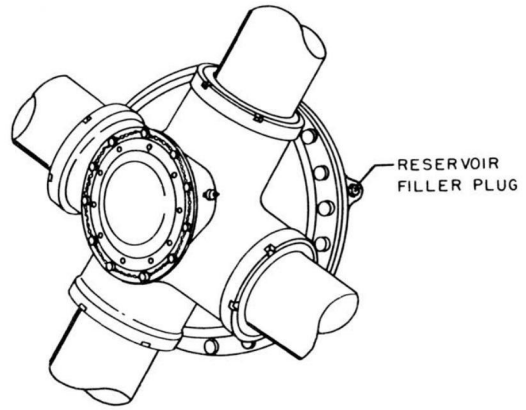
Air pressure should be approximately 650 psi.

- Inspect around air valve body for leaks, torque $\frac{5}{8}$ -inch hex nut to 50-70 inch-pounds and install air valve cap to extreme finger-tightness.

Figure 1-10. Service and Drain Points (Sheet 3)



CUTAWAY VIEW OF AIR VALVE



VIEW - D

PROPELLER REGULATOR RESERVOIR FILLING

ALF-2-1 P-3577-4B

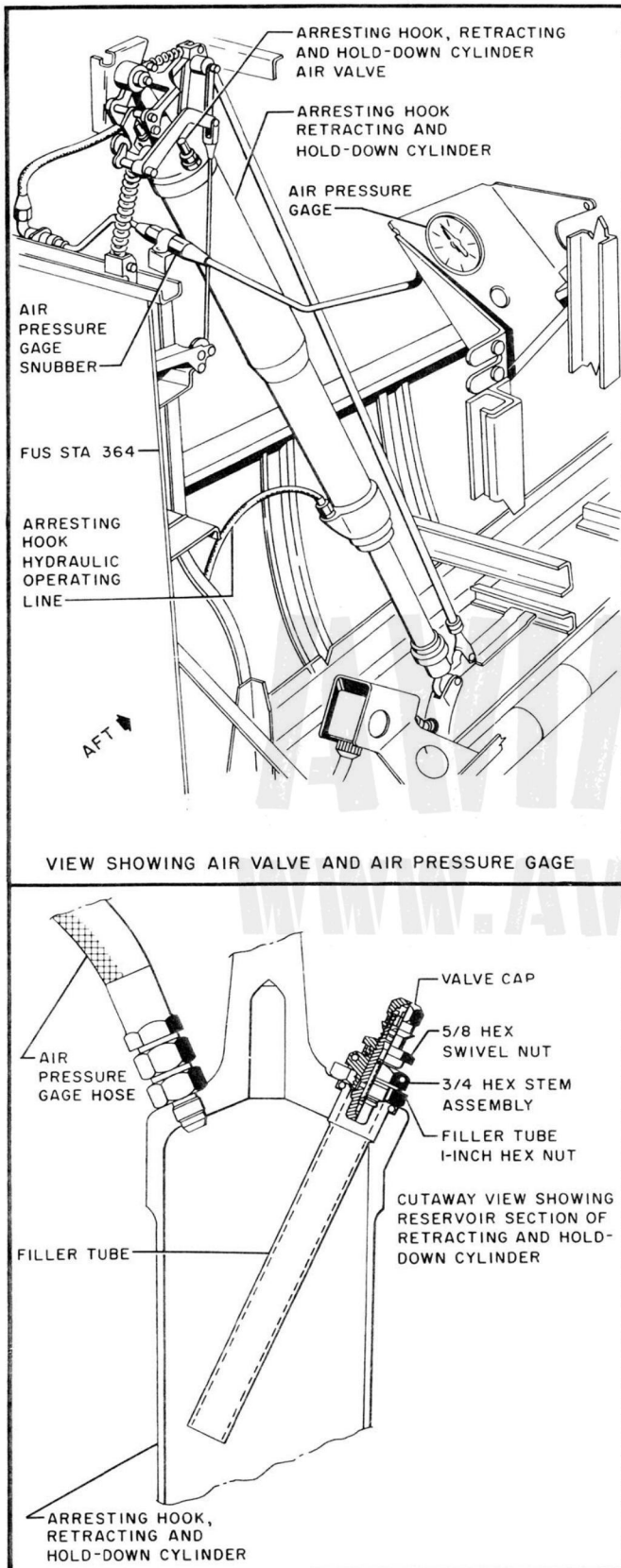
VI. PROPELLER REGULATOR RESERVOIR FILLING

- a. Position propeller as shown in view D so filler plug is horizontal on left-hand side.
- b. Remove reservoir filler plug and fill propeller reservoir with hydraulic fluid (Spec. MIL-H-6083) until fluid overflows from filler port.

- c. Replace reservoir filler plug and tighten plug to 100 to 125 inch-pounds torque.

VII. (Deleted)

Figure 1-10. Service and Drain Points (Sheet 4)



ALF-2-1 P-3577-5A

VIII. FILLING AND INFLATING ARRESTING HOOK RETRACTING AND HOLD-DOWN CYLINDER (Applies to all airplanes reworked to A-1/ASC 475.)

- a. Retract arresting hook.
- b. Remove air valve cap from air valve on retracting and hold-down cylinder.

NOTE

Check air valve 5/8-inch hex swivel nut on air valve assembly to determine that nut is securely tight (turn nut clockwise).

- c. Remove air valve core from air valve stem using Schrader Valve Core Tool No. 3263.

CAUTION

Do not remove air valve assembly secured with 3/4-inch hex nut before step d is accomplished.

- d. Back off air valve 5/8-inch hex swivel nut and allow air in retracting and hold-down cylinder to exhaust itself.

CAUTION

Do not disturb the filler tube one-inch hex nut.

- e. After air is completely exhausted from retracting and hold-down cylinder reservoir, cut lockwire securing air valve assembly 3/4-inch hex nut, and remove air valve assembly.
- f. Fill reservoir to overflow with hydraulic fluid (Spec. MIL-H-5606). Reservoir capacity is approximately 1 US. pint.
- g. Extend and retract hook several times to remove air bubbles from hydraulic fluid. Recheck fluid level when cylinder is compressed; add fluid if necessary.
- h. Install air valve, and secure air valve 3/4-inch hex nut with lockwire.
- i. Install air valve core in air valve stem using Schrader Valve Core Tool No. 3263.
- j. With arresting hook retracted, charge retracting and hold-down cylinder reservoir with air until a pressure of 250 to 270 psi is attained.
- k. Tighten air valve 5/8-inch hex swivel nut, and replace air valve cap.
- l. Check valve for air leakage.

Figure 1-10. Service and Drain Points (Sheet 5)

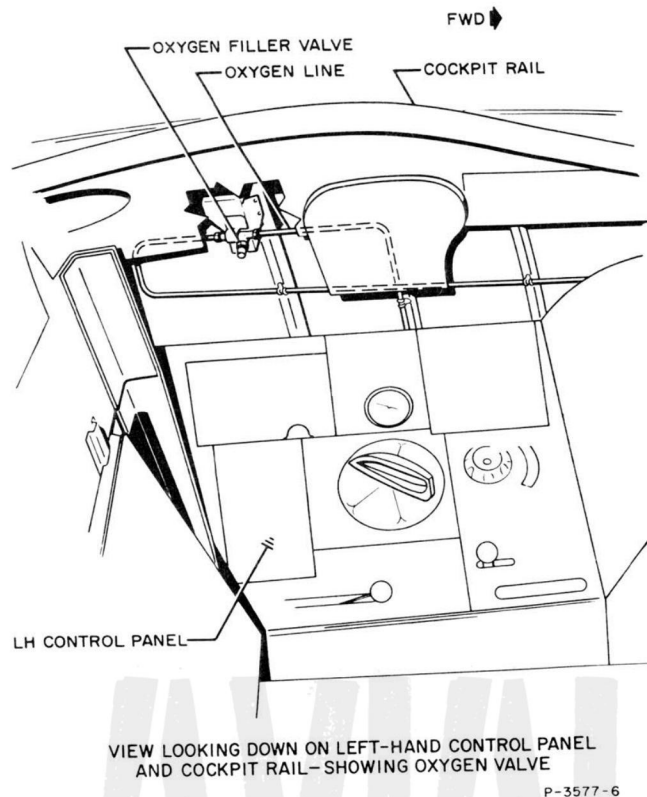


Figure 1-10. Service and Drain Points (Sheet 6)

IX. CHARGING OXYGEN CYLINDER

To fully charge the oxygen supply cylinder, filling should be done at a pressure which will provide an ultimate cylinder pressure of 1800 psi at a temperature of 21° C (70° F). Charging pressure in relation to ambient air temperatures is as follows:

Air Temperature	Filling Pressure (Psi)	Air Temperature	Filling Pressure (Psi)
-18°	0°	21°	70°
-12°	10°	27°	80°
-7°	20°	32°	90°
-1°	30°	38°	100°
4°	40°	43°	110°
10°	50°	49°	120°
16°	60°	54°	130°
			1,925
			1,950
			2,000
			2,050
			2,100
			2,150
			2,200

WARNING

Clear aircraft of all personnel when charging oxygen cylinder. Do not allow oil or grease to come in contact with oxygen connections.

- a. Connect outside source of oxygen to oxygen filler valve, located below cockpit left-hand rail. Fully charge cylinder from outside source of oxygen to pressure indicated in foregoing table.

Note

If the pressure in the supply cylinder has been reduced below 50 psi, the cylinder must be replaced with a fully charged cylinder to prevent contamination of the system.

CAUTION

Handle cylinder with extreme care. Remove any dust or contamination from line and cylinder fittings before connecting line.

1-40. APPLYING WINDSHIELD RAIN REPELLENT.

Rain repellent compound (Specification MIL-K-6882), applied to the windshield panels, is effective for approximately two hours in rain or for one week under ordinary conditions, if not subjected to cleaning, de-icing, or degreasing fluids, or to salt spray. Materials required are packaged in kit form (stock No. R83K710075) and can be used as follows:

- Wash windshield with soap and water.
- Clean windshield with solvent glass cleaner, in kit, or isopropanol, using clean, soft rag.

CAUTION

Do NOT permit cleaner to drop on painted surface.

- Polish windshield with clean, soft rag.
- Rub windshield sparingly with bond paste, using clean, soft rag. Work bond paste completely over surface.
- Polish until all black of bond paste is removed.
- Apply stick repellent by rubbing completely over surface.
- Polish with a clean, soft rag until clear.

Note

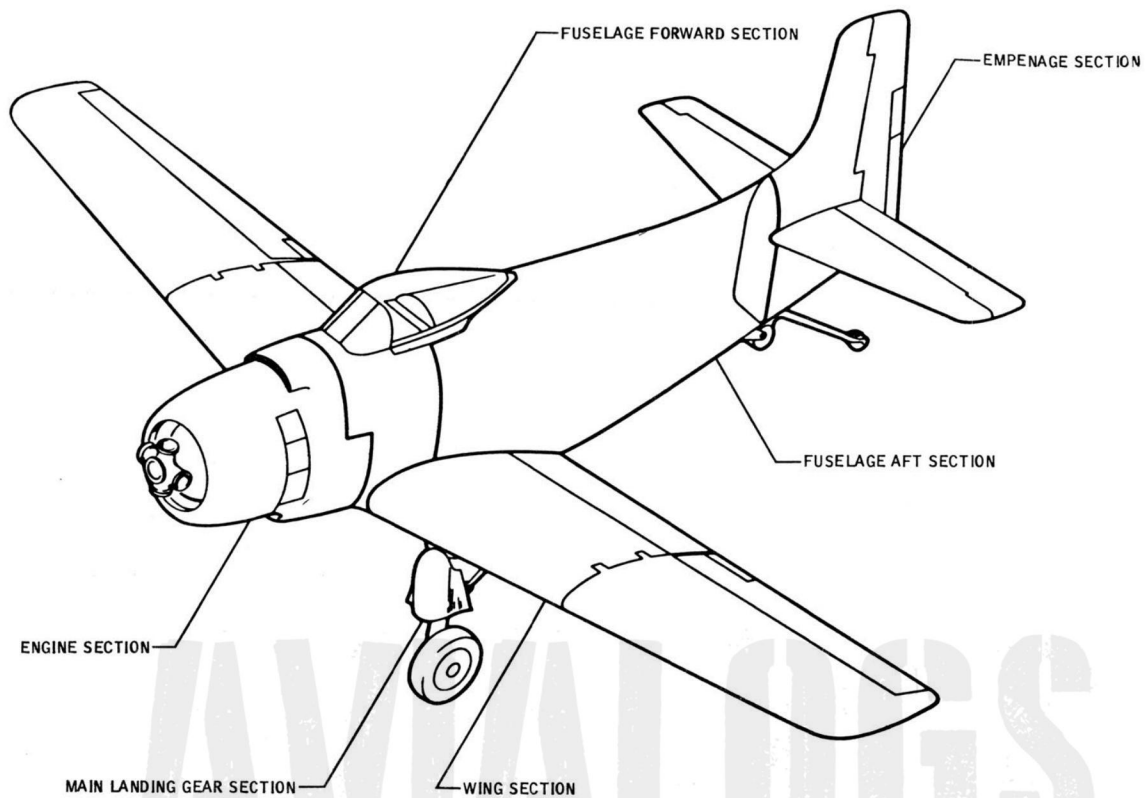
To recoat, repeat steps b through g.

1-41. D-C EXTERNAL POWER RECEPTACLE. The d-c external power receptacle is installed on the lower right-hand side of the airplane at the wing root. The three pronged receptacle should be connected to a 28-volt d-c external power source. D-c power is used for starting the engine and for operating airplane equipment that utilizes direct current and constant frequency alternating current. (See figure 10-59.)

1-41A. A-C EXTERNAL POWER RECEPTACLE. The a-c external power receptacle is installed adjacent to the d-c external power receptacle on the lower right-hand side of the airplane at the wing root. The six pronged receptacle should be connected to a 115-200-volt, 400-800-cycle a-c external power source. The variable frequency alternating current is used for various electronic equipment carried on the airplane. (See figure 10-71.)

1-42. HYDRAULIC EXTERNAL POWER CONNECTIONS. Two hydraulic system quick-disconnect power couplings are located in the engine accessory section left-hand side. The couplings are provided for ground checking operation of the airplane hydraulic equipment. One coupling is installed in the hydraulic main pressure supply line; the other coupling is installed in the aileron power boost hydraulic system pressure line.

1-43. LUBRICATION. Periodic lubrication requirements for the airplane are shown on figure 1-11.



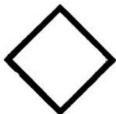
FREQUENCY SYMBOLS



DAILY



INTERMEDIATE



MAJOR



SPECIAL

APPLICATION SYMBOLS



GREASE GUN
(ZERK OR ALEMITE)



OIL CAN



HAND



BRUSH

TABLE OF LUBRICANTS

IDENTIFICATION LETTER	SPECIFICATION	TYPE OF LUBRICANT
CT	MIL-C-16173	CORROSION PREVENTIVE COMPOUND
GB	MIL-G-7711	GREASE
GGA	MIL-G-7187	GREASE
GH	MIL-G-3545	GREASE
GSG	MIL-G-7118	GREASE
GLT	MIL-G-3278	GREASE
GPS	MIL-G-4343	GREASE
OGP	MIL-L-7870	OIL, LUBRICATING
OHC	MIL-H-6083	FLUID, HYDRAULIC
OEAL	MIL-L-6082	OIL, LUBRICATING
OGR	MIL-L-6086	OIL, LUBRICATING

AFL-2-2 P-3578-1D

Figure 1-11. Lubrication Chart (Sheet 1)

1. GENERAL INFORMATION

- a. This lubrication chart shows all lubrication requirements for all parts of the aircraft requiring periodic lubrication. The chart indicates type of lubricant, inspection period at which lubrication is to be done, and method of application. However, the lubrication information in this handbook does not include information requiring disassembly of individual component parts. For information concerning lubrication of a component part during assembly refer to the applicable overhaul handbook of the individual component part.
- b. The lubrication work sheets which accompany this chart provide a convenient check list for accomplishing periodic lubrication and for signifying that the work has been accomplished.
- c. The lubricants designated in the chart must be used since these lubricants have been developed to meet extremes in performance required by aircraft design.
- d. Before lubricating, wipe grease fitting with clean cloth.
- e. Force new grease into fitting until all old grease is extruded from bearing area; then wipe away excess extruded grease.
- f. Remove surplus lubricant from all movable parts to prevent fouling by combination of dust, dirt, or sand with oil or grease.
- g. Do not apply lubricant to rusted or corroded surfaces.
- h. Keep grease guns, oil cans, and brushes clean and free of any substance but lubricant applicable to use.
- i. In addition to lubrication at frequencies noted on chart, lubricate all equipment during major overhaul in accordance with manufacturer's instructions.

2. CONTROL CABLES

- a. Regularly inspect corrosion preventive compound coating on aircraft cables. Touch up cables with CT (Spec. MIL-C-16173 Grade 4) corrosion-preventive compound where cable condition indicates need for compound, and cables are not sufficiently dirty to warrant cleaning as noted in Table 1-2 Aircraft Cleaning Chart. Make certain touch-up compound is sufficiently fluid to penetrate between cable strands.
- b. When cables are extremely dirty, clean them as noted in Table 1-2 Aircraft Cleaning Chart prior to application of corrosion preventive compound. After cables are thoroughly cleaned and dried apply CPH corrosion-preventive compound to cables and allow compound to penetrate between the strands of the cables.
- c. Remove excess compound from cables using a cloth moistened with solvent, Fed. Spec. P-D-680.
- d. Apply OGP (Spec. MIL-L-7870) to all cable clevis bolts and pins.

3. ELECTRICAL EQUIPMENT

- a. Unless so indicated on chart, do not lubricate electrical equipment until major overhaul.
- b. At major overhaul, repack electrical equipment in accordance with instructions of manufacturer.

4. SEALED BEARINGS

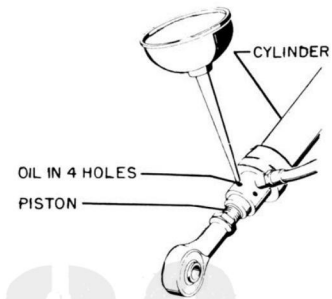
- a. Inspect all sealed bearings at major overhaul and replace, if necessary.

5. HYDRAULIC CONTROL VALVES

- a. At each intermediate inspection, apply GLT (Spec. MIL-G-23827) to both ends of each control valve slide.
- b. With no pressure in system, manually operate each slide five times through full extend-and-retract cycle.

6. HYDRAULIC CYLINDER FELT WIPERS

- a. If airplane is idle, lubricate felt wipers at piston rod ends with OHC (MIL-H-6083) at least once a week as shown.
- b. If lubrication holes are not provided in the cylinder, back off packing nut to permit oiling.



TYPICAL LUBRICATION OF HYDRAULIC CYLINDER FELT WIPERS
P-3578-2C

7. HYDRAULIC CYLINDERS AND SHOCK STRUTS—EXPOSED RECIPROCATING PARTS

- a. Wipe exposed piston surfaces of cylinders and struts clean and dry with clean dry cloth immediately prior to each flight.
- b. Upon return from each flight, wipe exposed piston surfaces of cylinders and struts clean and dry and apply hydraulic fluid OHC (MIL-H-6083) to these surfaces. The film of fluid should be liberal enough to assure complete coverage of exposed surfaces without dripping.
- c. Clean shock struts and cylinder pistons and lubricate them with OHC (MIL-H-6083) at least once a week when airplane is idle.

8. HINGED ACCESS DOORS

- a. Lubricate all small access door hinges with OGP (Spec. MIL-L-7870) at each major inspection period, then wipe off any excess oil.
- b. Large access doors are shown on subsequent pages of this chart.

9. SPECIAL LUBRICATION

- a. Unless otherwise specified, parts with SPECIAL lubrication symbol are lubricated by manufacturer, and lubrication is expected to last for life of part.
- b. When inspection of parts with SPECIAL lubrication symbol reveals need for lubrication, and no other time interval is noted on chart, lubricate part according to instructions in applicable overhaul manual for individual component part.

Figure 1-11. Lubrication Chart (Sheet 2)

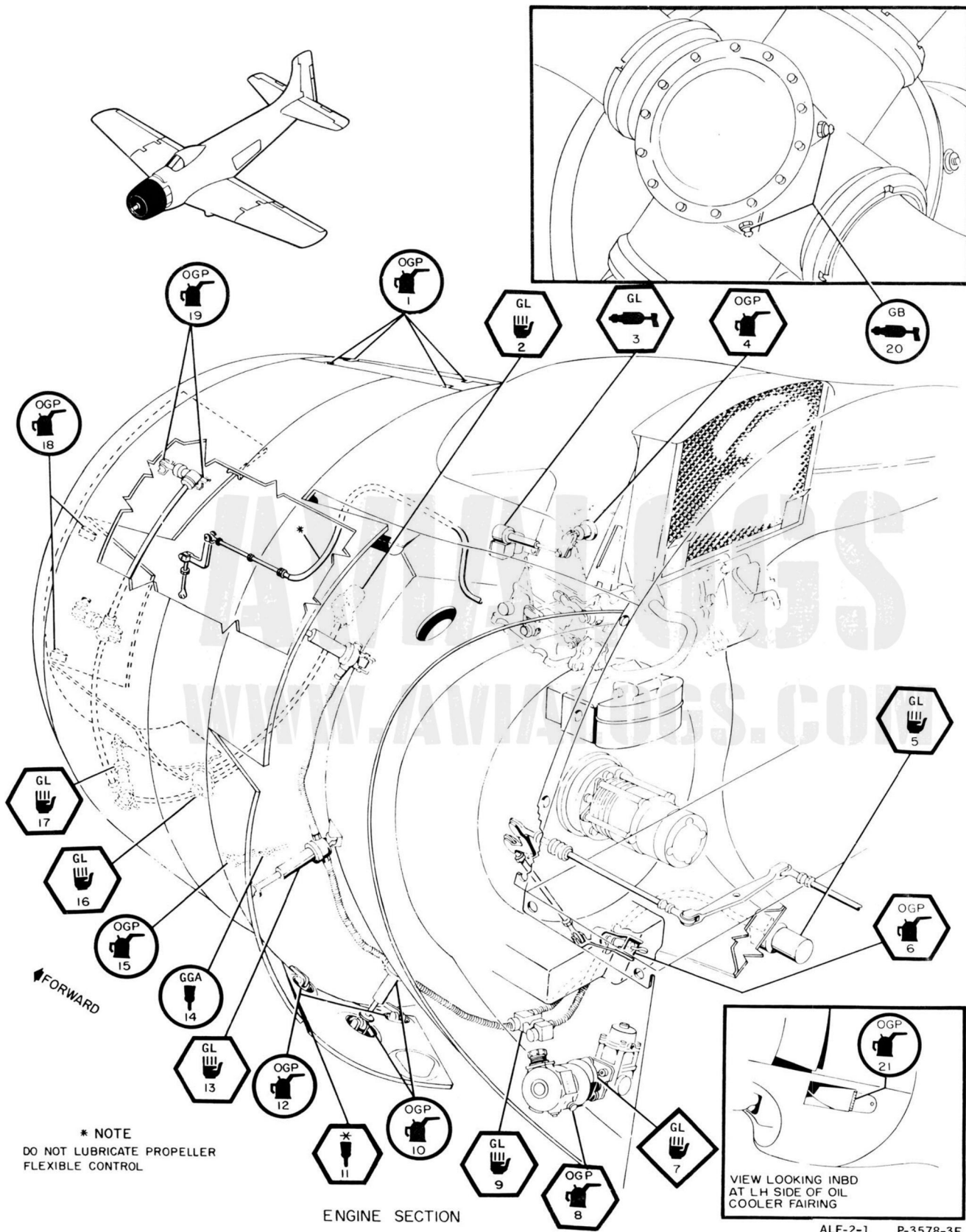


Figure 1-11. Lubrication Chart (Sheet 3)

A-1H AND A-1J AIRCRAFT - PERIODIC LUBRICATION CHECK SHEET

ENGINE SECTION






















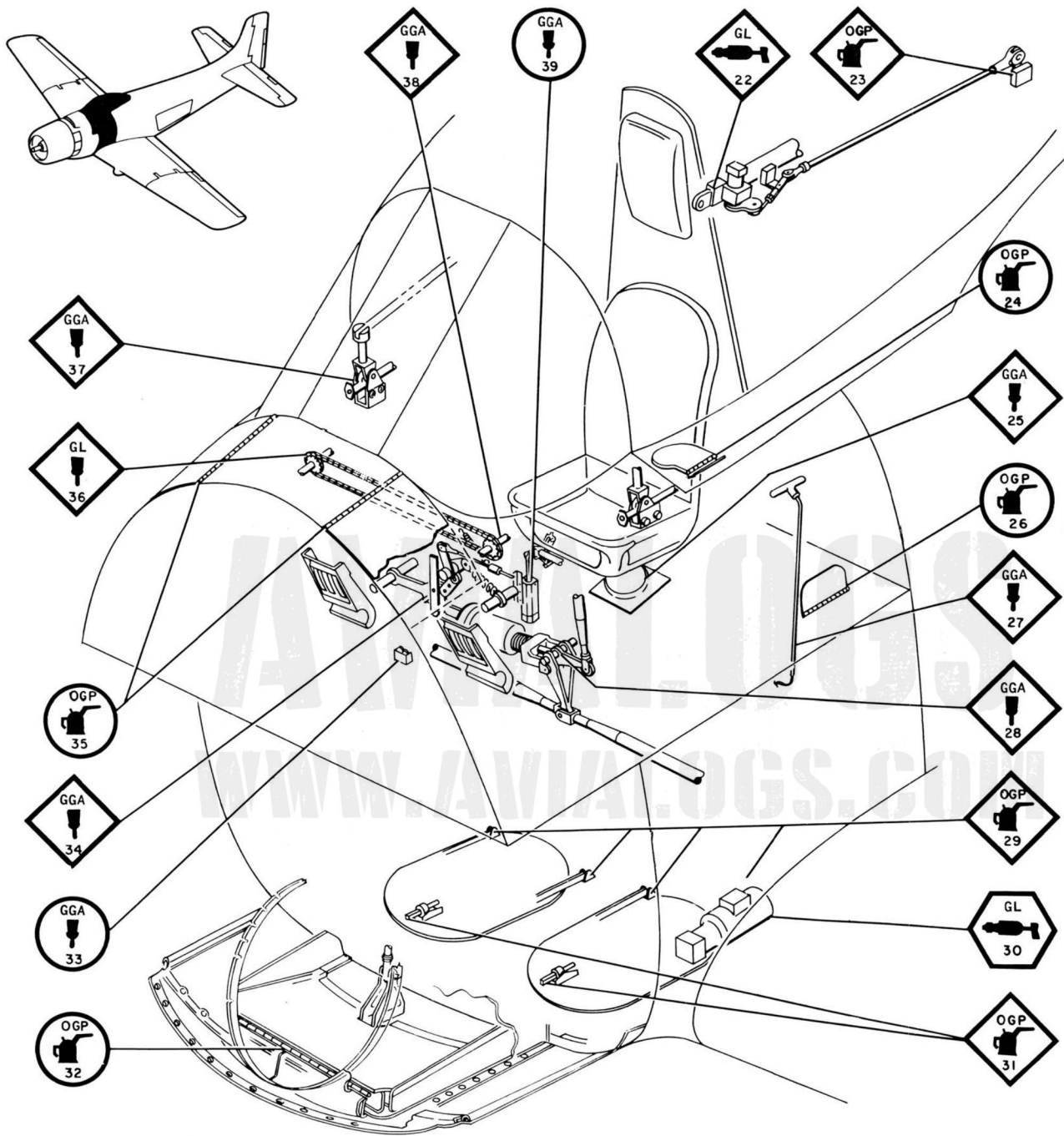
Index	Lubricant	Application	Part Name	No. of Fittings	Inspection Period				Remarks
					D	I	M	S	
1	OGP		Cowl and fixed beam hinges (4)			X			
2	GL		Nose cowl flap actuating motor drive gears					X	Pack gear case from 1/3 to 1/2 full. Refer to item 9 on sheet 2.
3	GL		Carburetor air door actuator attachment					X	Lubricate after installation. Refer to item 9 on sheet 2.
4	OGP		Carburetor air door pivot points					X	Lubricate after installation. Refer to item 9 on sheet 2.
5	GL		Side cowl flap actuating motor drive gears					X	Pack gear case from 1/3 to 1/2 full. Refer to item 9 on sheet 2.
6	OGP		Supercharger control mechanism					X	Lubricate after installation.
7	GL		Auxiliary fuel pump gear box				X		
8	OGP		Auxiliary fuel pump motor gear shaft oil wick					X	Refer to item 9 on sheet 2.
9	GL		Side cowl flap gear box gears					X	Pack gear case from 1/3 to 1/2 full. Refer to item 9 on sheet 2.
10	OGP		Side cowl flap jackscrew attach hinges (12)			X			
11	*		Side cowl flap rub strips (12)					X	*Graphite Lacquer Base Lubetex No. 10. Clean rub strips with solvent and wipe dry prior to lubrication.
12	OGP		Side cowl flap hinges (12)			X			
13	GL		Side cowl flap jackscrew trunnion gears					X	Refer to item 9 on sheet 2.
14	GGA		Side cowl panel latches and hooks (2)			X			Apply light film of grease to mating surfaces.
15	OGP		Side cowl panel latch turning point (2)			X			
16	GL		Nose cowl flap gear box gears					X	Pack gear case from 1/3 to 1/2 full. Refer to item 9 on sheet 2.
17	GL		Nose cowl flap jackscrew trunnion gears					X	Refer to item 9 on sheet 2.
18	OGP		Nose cowl flap hinges (12)			X			
19	OGP		Nose cowl flap jackscrew attach hinges (12)			X			
20	GB		Propeller hub	Three Fittings		X			Remove two upper grease fittings and inject grease through lower fitting until grease extrudes through upper openings. Install fittings in upper openings.
21	OGP		Oil dilution valve access door hinge			X			

Figure 1-11. Lubrication Chart (Sheet 4)



FUSELAGE FORWARD SECTION

ALF-2-1 P-3578-4E

Figure 1-11. Lubrication Chart (Sheet 5)



















A-1H AND A-1J AIRCRAFT - PERIODIC LUBRICATION CHECK SHEET									
FUSELAGE FORWARD SECTION									
Index	Lubricant	Application	Part Name	No. of Fittings	Inspection Period				Remarks
					D	I	M	S	
22	GL		Enclosure cylinder head	One			X		
23	OGP		Enclosure cylinder latch				X		
24	OPG		Pilot's arm rest hinge			X			
25	GGA		Pilot's seat actuating cylinder				X		
26	OGP		Step hinges (2)			X			
27	GGA		Bomb manual release cable				X		Apply light film of grease to cable.
28	GGA		Aileron power boost cylinder fork				X		Apply light film of grease to mating surfaces.
29	OGP		Forward equipment compartment door hinges (4)				X		
30	GL		Windshield degreaser pump motor	One				X	Refer to item 9 on sheet 2.
31	OGP		Forward equipment compartment door latches (2)				X		
32	OGP		Oil cooler door hinge			X			
33	GGA		Rudder pedal adjust rollers and slots			X			Apply light film of grease to mating surfaces.
34	GGA		Aileron power boost disengage hooks and rollers				X		Apply light film of grease to mating surfaces and turning points.
35	OGP		Instrument panel access door hinges (2)			X			
36	GL		Rudder pedal adjustment chain and gears				X		Apply light film of grease to chain and gears.
37	GGA		Enclosure trucks (2)				X		Apply light film of grease to rollers.
38	GGA		Rudder pedal adjust barrel fitting threads				X		
39	GGA		Elevator control load feel bungee			X			Apply light film of grease to rod and turning points.

Figure 1-11. Lubrication Chart (Sheet 6)

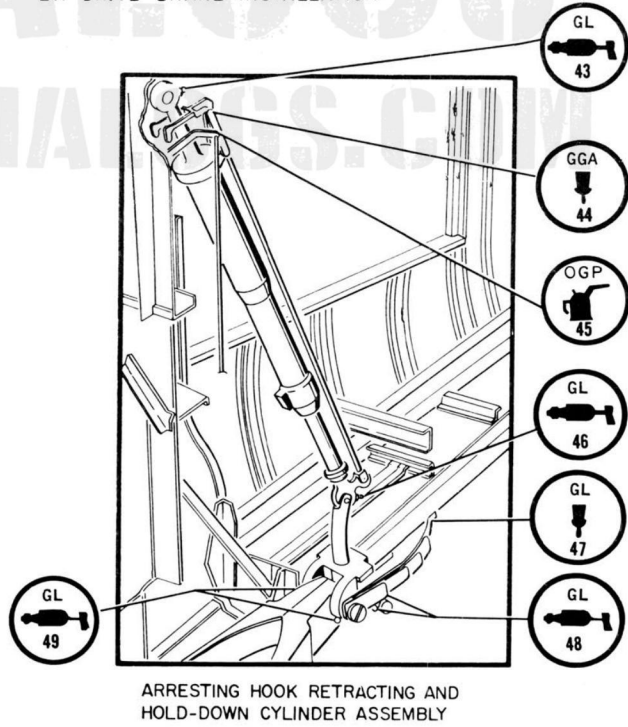
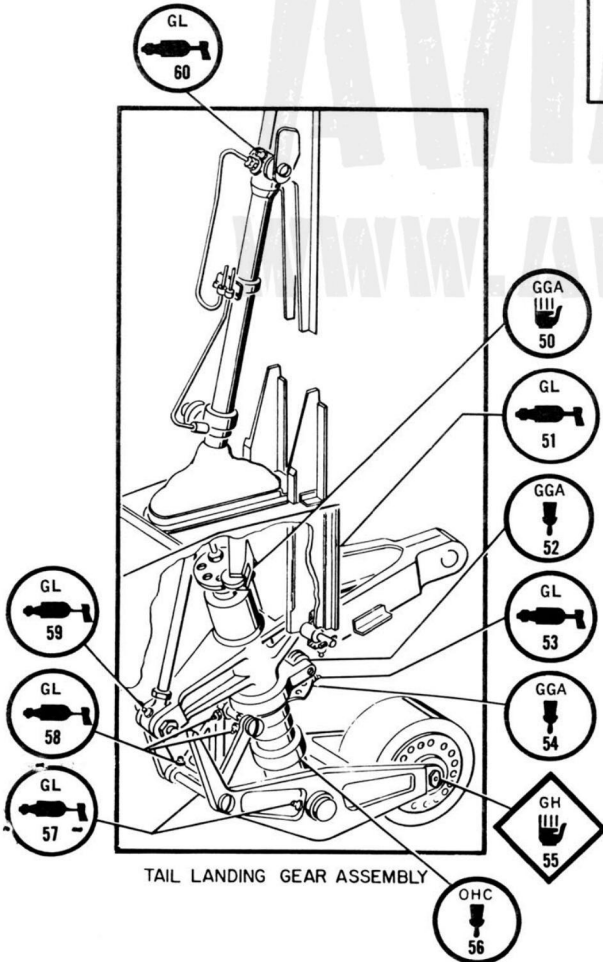
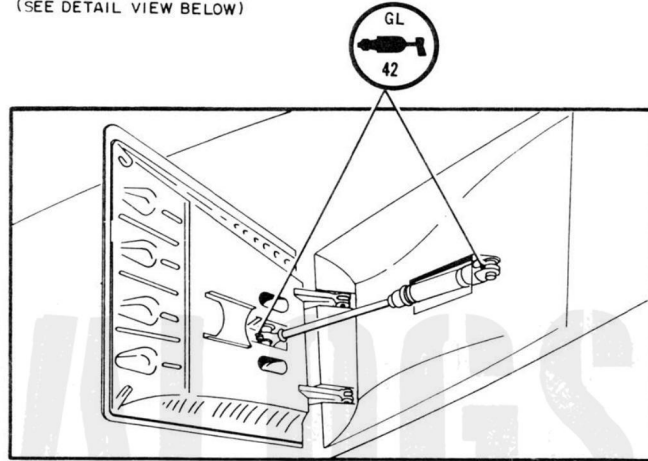
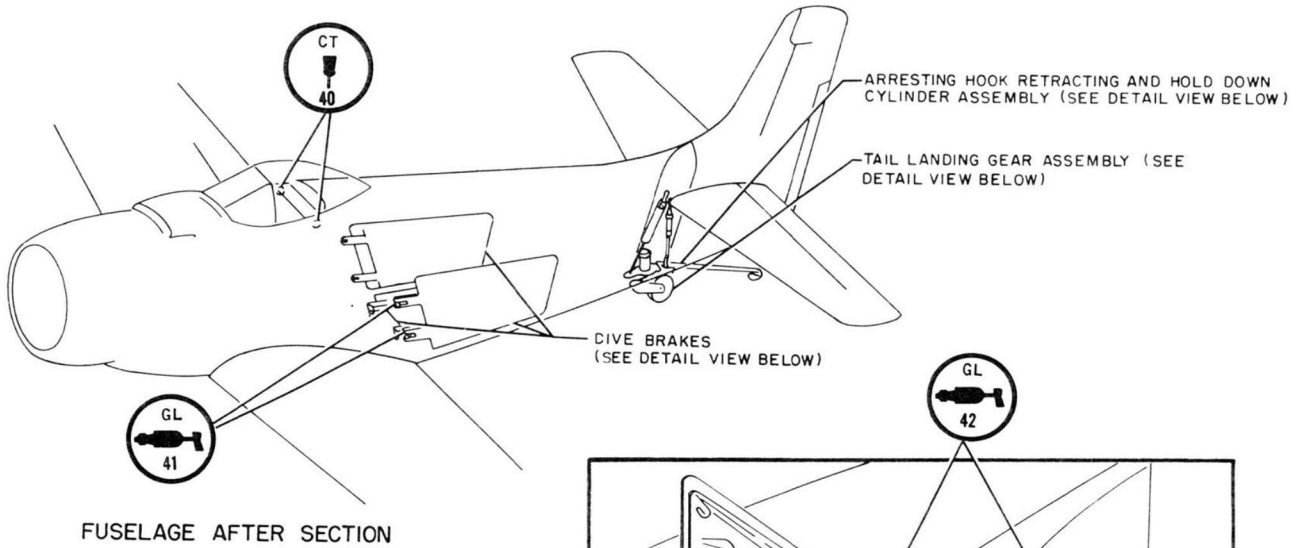


Figure 1-11. Lubrication Chart (Sheet 7)

A-1H AND A-1J AIRCRAFT - PERIODIC LUBRICATION CHECK SHEET

FUSELAGE AFTER SECTION






















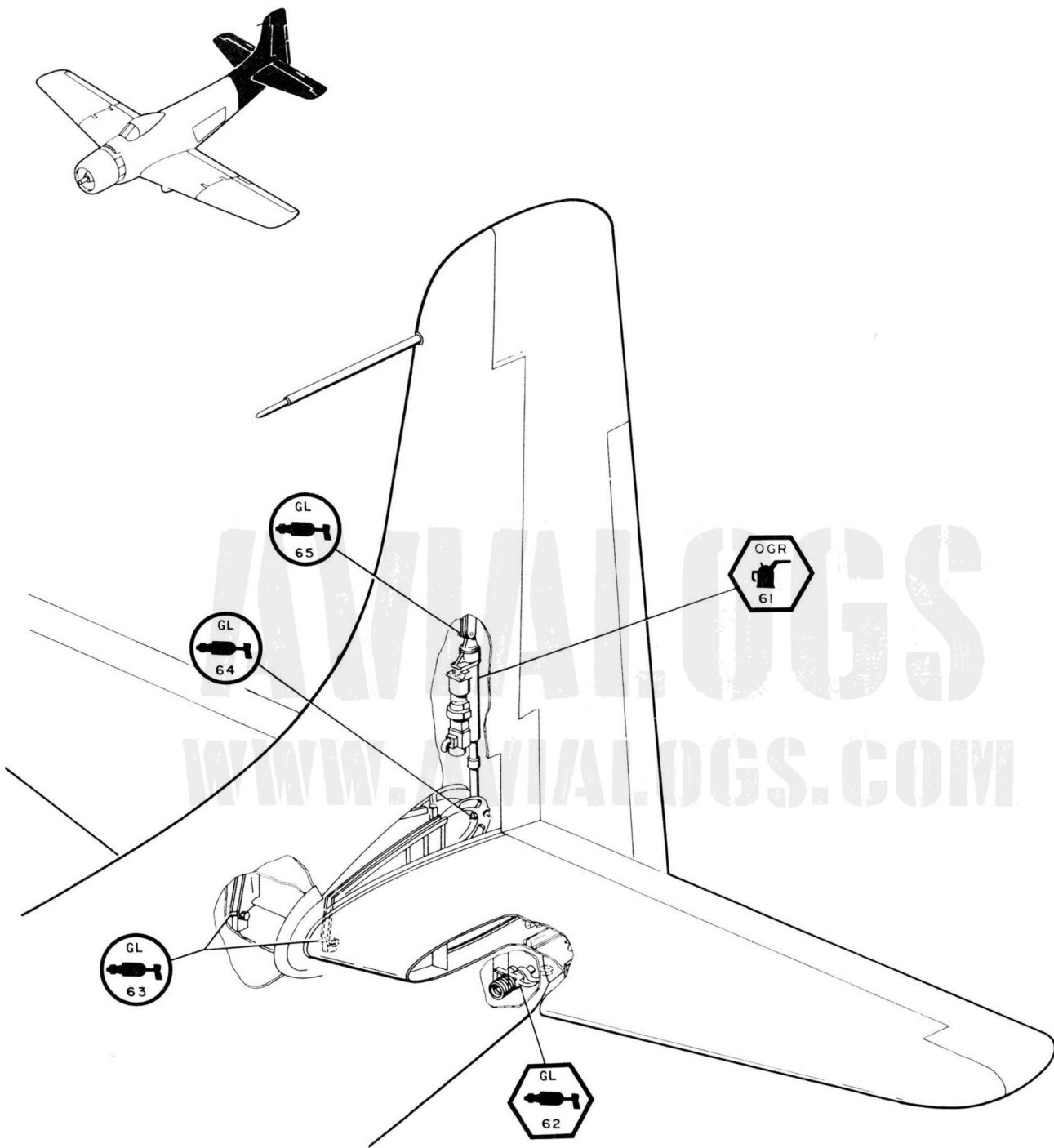
Index	Lubricant	Application	Part Name	No. of Fittings	Inspection Period				Remarks
					D	I	M	S	
40	CT		Jury strut sockets (2)			X			Apply light film of compound to sockets, 2 places.
41	GL		Dive brake hinge fittings	Six fittings, two each brake		X			
42	GL		Dive brake actuating cylinder fittings	Six fittings, two each cylinder		X			Bottom dive brake cylinder head is accessible inside fuselage.
43	GL		Arresting hook retracting and hold-down cylinder head	One		X			
44	GGA		Arresting hook latch mechanism			X			Apply light film of grease to hook and roller mating surfaces.
45	OGP		Arresting hook latch mechanism turning points			X			
46	GL		Arresting hook hold-down cylinder eyebolt			X			
47	GL		Arresting hook centering springs (2)			X			Apply light film of grease to hook and spring mating surfaces.
48	GL		Catapult hold-back fittings	Two grease fittings		X			
49	GL		Arresting hook attaching fitting	Three grease fittings		X			
50	GGA		Tail landing gear strut centering cam and roller			X			Apply light film of grease to cam and roller mating surfaces.
51	GL		Tail landing gear wheel yoke	Two grease fittings		X			
52	GGA		Tail landing gear torque spring			X			Apply light film of grease to spring.
53	GL		Tail landing gear wheel centering lock lever	One		X			
54	GGA		Tail landing gear centering lock			X			Apply light film of grease to lock mating surfaces.
55	GH		Tail landing gear axle			X			Apply small amount of grease through axle hole in seal to both bearings. Do not disassemble wheel.
56	OHC		Tail landing gear shock strut piston			X			Apply light film of oil to piston and wipe off excess oil with clean cloth.
57	GL		Tail landing gear yoke turning points	Two grease fittings		X			
58	GL		Tail landing gear torque link	Four grease fittings		X			
59	GL		Tail landing gear actuating cylinder piston rod end			X			
60	GL		Tail landing gear actuating cylinder head			X			

Figure 1-11. Lubrication Chart (Sheet 8)



EMPENNAGE SECTION

ALF-2-1 P-3578-6C

Figure 1-11. Lubrication Chart (Sheet 9)

A-1H AND A-1J AIRCRAFT - PERIODIC LUBRICATION CHECK SHEET

EMPENNAGE SECTION






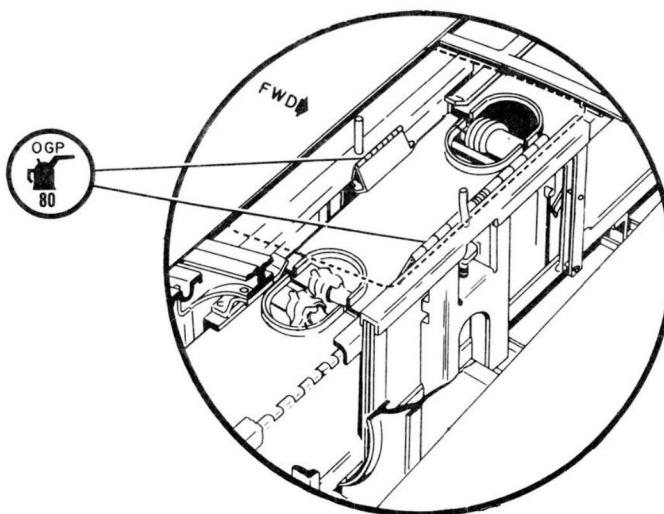
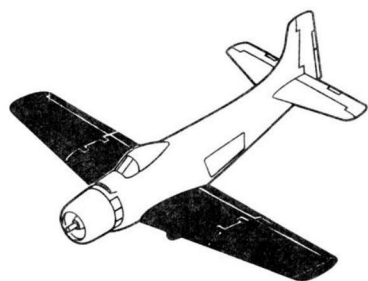
Index	Lubricant	Application	Part Name	No. of Fittings	Inspection Period				Remarks
					D	I	M	S	
61	OGR		Horizontal stabilizer actuator shaft					X	Refer to item 9 on sheet 2.
62	GL		Rudder trim tab lead screw	One				X	Refer to item 9 on sheet 2.
63	GL		Horizontal stabilizer hinges (2)	One fitting each hinge		X			Hinge fittings are accessible from within fuselage after section.
64	GL		Horizontal stabilizer actuator lower attachment	One		X			
65	GL		Horizontal stabilizer actuator head attachment	One		X			

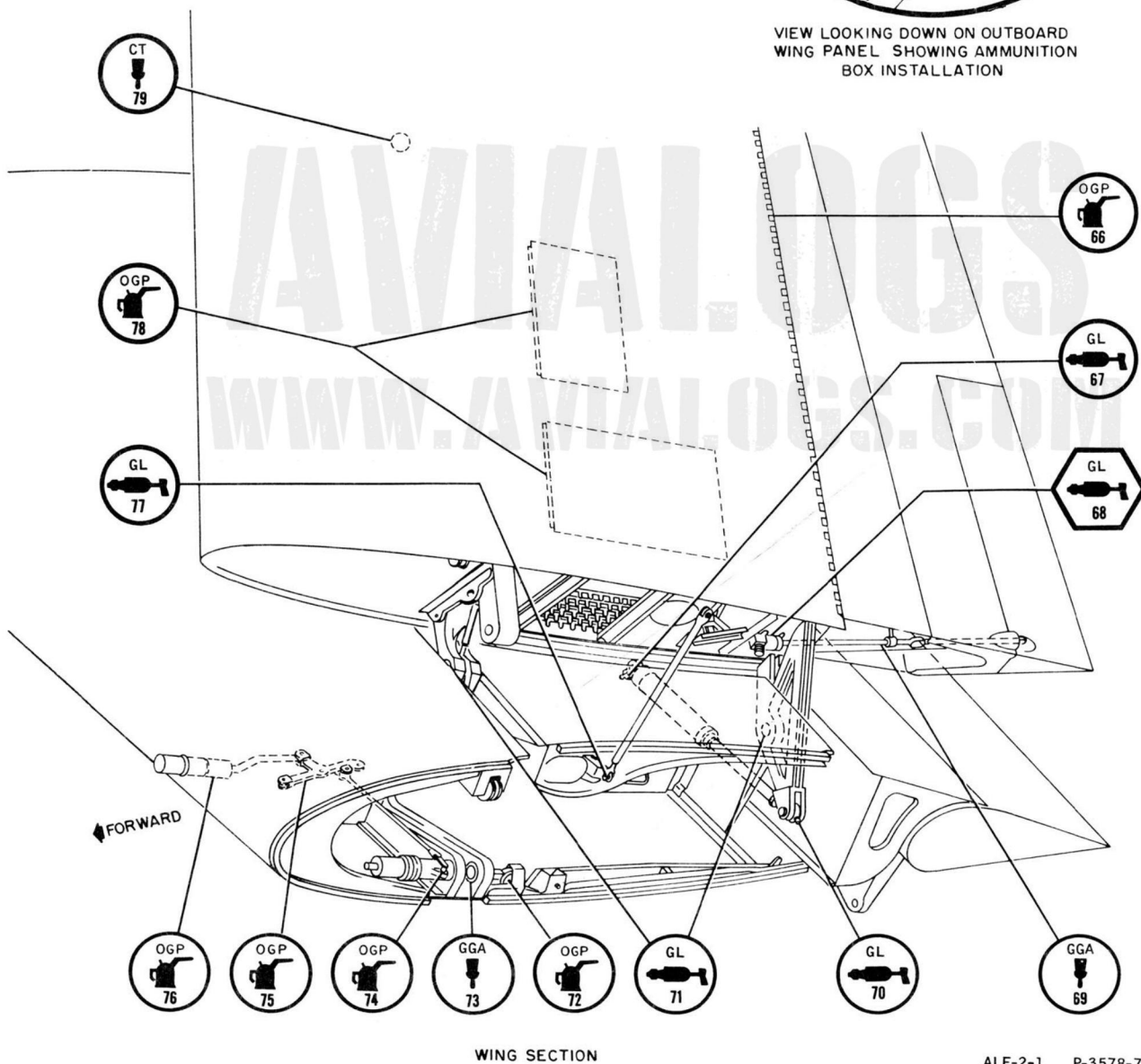
Figure 1-11. Lubrication Chart (Sheet 10)

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VIEW LOOKING DOWN ON OUTBOARD WING PANEL SHOWING AMMUNITION BOX INSTALLATION



WING SECTION

ALF-2-1 P-3578-7E

Figure 1-11. Lubrication Chart (Sheet 11)

A-1H AND A-1J AIRCRAFT - PERIODIC LUBRICATION CHECK SHEET

WING SECTION















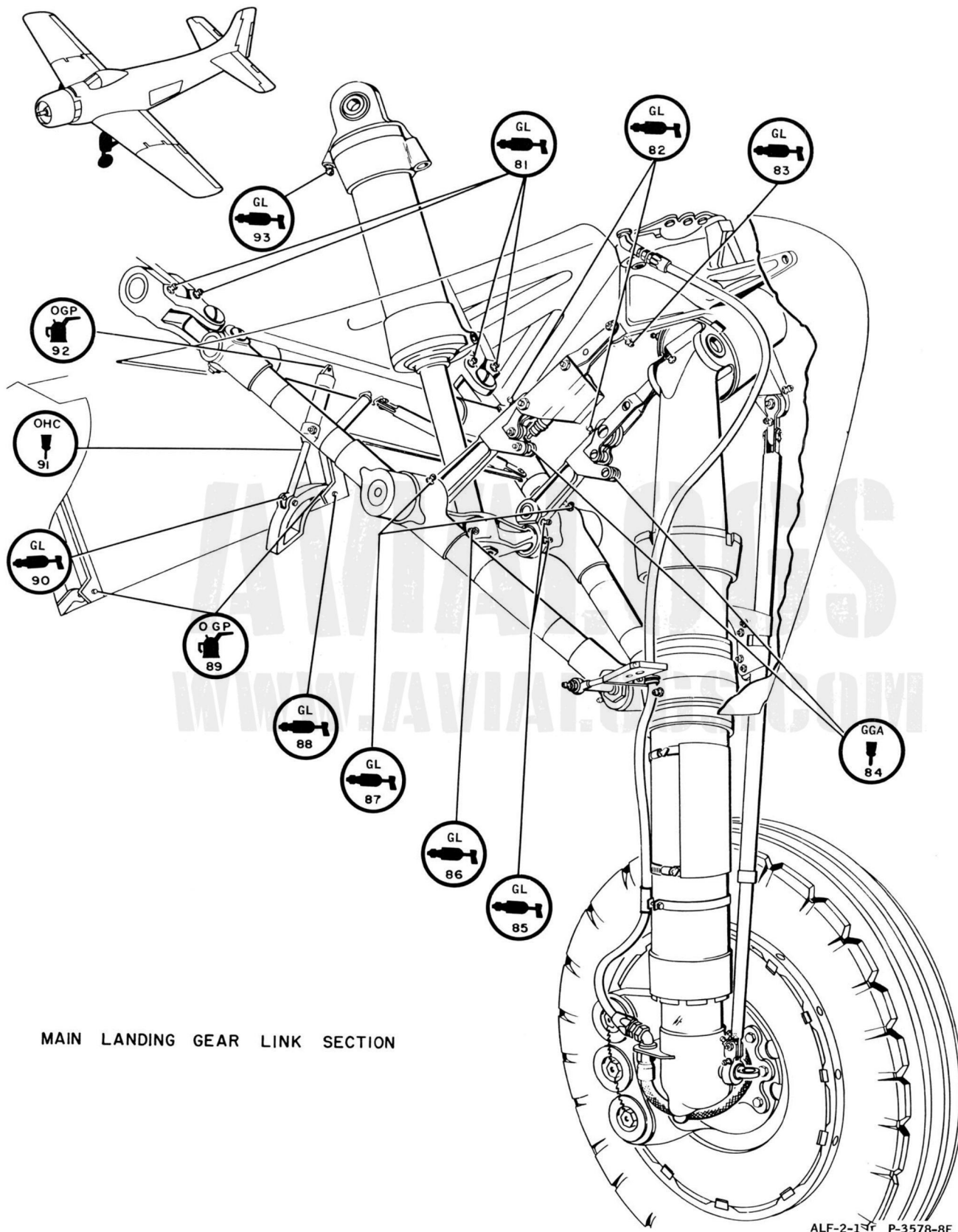
Index	Lubricant	Application	Part Name	No. of Fittings	Inspection Period				Remarks
					D	I	M	S	
66	OGP		Aileron access door hinge (each outboard wing panel)			X			
67	GL		Wing folding cylinder heads	Two fittings		X			One fitting at each wing fold joint area.
68	GL		Aileron trim tab gear box	One fitting				X	Trim tab gear box located at left-hand wing fold joint only.
69	GGA		Aileron tab control rod (control rod located at left-hand wing-fold joint only)			X			Apply light film of grease to control rod sliding surfaces.
70	GL		Wing folding cylinder eyebolts	Two fittings		X			One fitting at each wing fold joint area.
71	GL		Wing hinges (4)	Four fittings		X			Two fittings at each wing fold joint area.
72	OGP		Wing tie down ring mechanism (one ring at each wing fold joint area)			X			Apply oil to turning points.
73	GGA		Wing locking pin spar fittings (one fitting located at each wing fold joint area)			X			Apply light film of grease to pin spar mating surfaces.
74	OGP		Wing locking cylinder latches (one latch located at each wing fold joint area)			X			
75	OGP		Wing fold warning flag bell-cranks (one bellcrank located at each wing fold joint area)			X			Apply oil to crank turning points.
76	OGP		Wing fold warning flags (one flag located at each wing fold joint area)			X			Apply light film of oil to sliding surfaces.
77	GL		Aileron control rod swivel fittings	Two fittings		X			One fitting at each wing fold joint area.
78	OGP		Wing access door hinges			X			
79	CT		Wing jury strut sockets (one socket each wing fold joint area)			X			Apply light film of compound to sockets.
80	OGP		Ammunition box hinges			X			

Figure 1-11. Lubrication Chart (Sheet 12)



MAIN LANDING GEAR LINK SECTION

ALF-2-1 P-3578-8E

Figure 1-11. Lubrication Chart (Sheet 13)

A-1H AND A-1J AIRCRAFT - PERIODIC LUBRICATION CHECK SHEET

MAIN LANDING GEAR LINK SECTION














Index	Lubricant	Application	Part Name	No. of Fittings	Inspection Period				Remarks
					D	I	M	S	
81	GL		Drag link upper end grease fittings	Eight fittings, four each gear area		X			
82	GL		Lock link center joint fittings	Four fittings, two each gear area		X			
83	GL		Lock link upper attachment grease fittings	Four fittings, two each gear area		X			
84	GGA		Lock link rollers (four rollers, two each gear area)			X			Apply light film of grease to roller mating surfaces.
85	GL		Lock link lower attachment grease fittings	Eight fittings, four each gear area		X			
86	GL		Actuating cylinder piston rod-cross beam attachment	One fitting each gear area		X			
87	GL		Drag link center pivot point grease fittings	Four fittings, two each gear area		X			
88	GL		Door forward hinges	Four fittings, two each gear area		X			
89	OGP		Door aft hinge turning points			X			Apply oil to four places each gear area, and wipe off excess oil.
90	GL		Door actuating cylinder rod ends	Four fittings, two each gear area		X			
91	OHC		Door actuating cylinder rods			X			Apply light film of grease to rods, two each gear area.
92	OGP		Door actuating cylinder upper attach ends			X			Apply oil to cylinder upper attach ends, two places each gear area.
93	GL		Actuating cylinder head end fittings	Two fittings, one each gear area		X			

Figure 1-11. Lubrication Chart (Sheet 14)

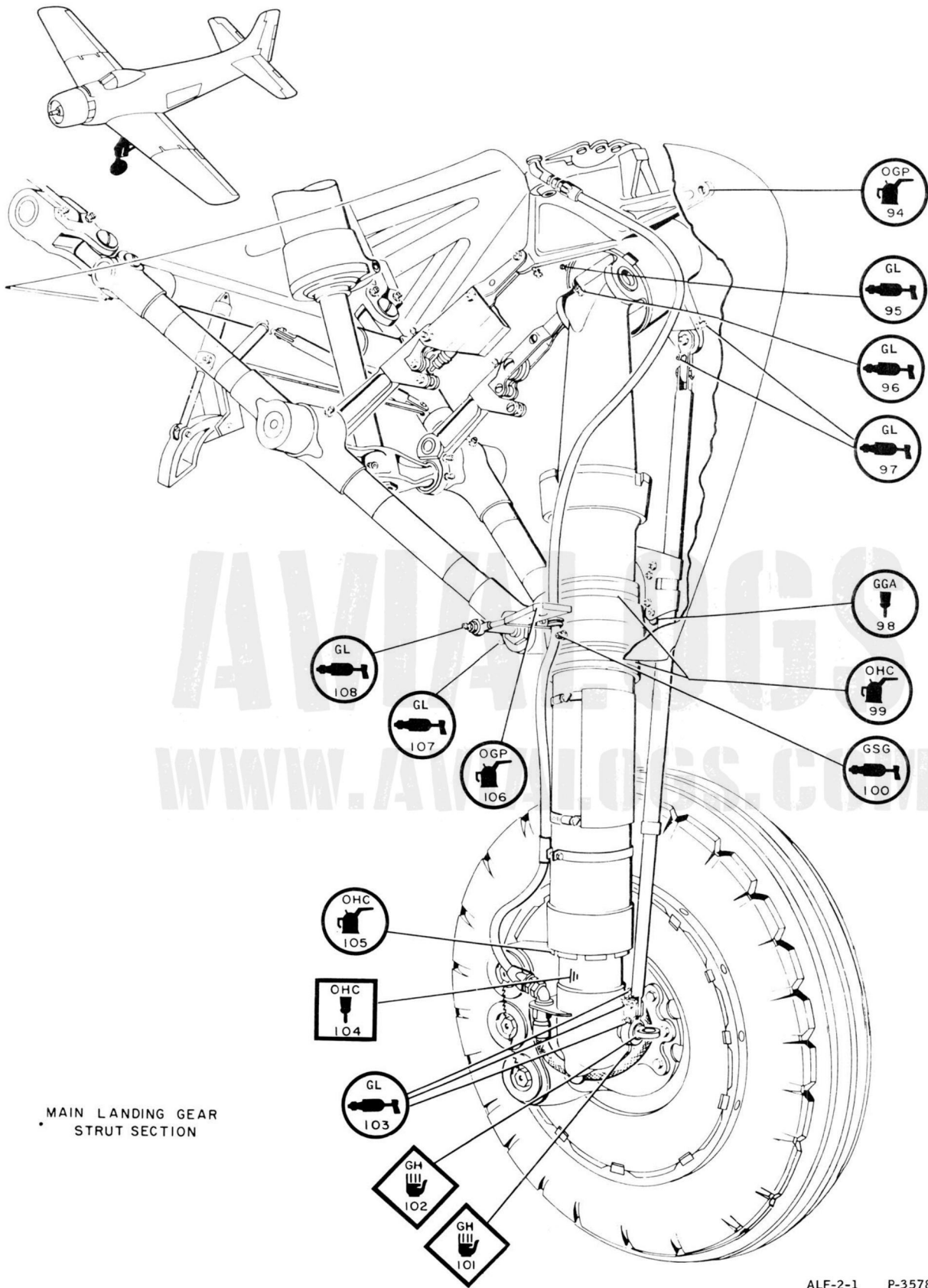


Figure 1-11. Lubrication Chart (Sheet 15)

A-1H AND A-1J AIRCRAFT - PERIODIC LUBRICATION CHECK SHEET

MAIN LANDING GEAR STRUT SECTION
















Index	Lubricant	Application	Part Name	No. of Fittings	Inspection Period				Remarks
					D	I	M	S	
94	OGP		Fairing upper attachments			X			Located at each gear area.
95	GL		Strut attaching fitting	One fitting each gear area		X			
96	GL		Shock strut head grease fittings	Two fittings, one active fitting each gear area		X			
97	GL		Telescoping mechanism upper attachment grease fittings	Four fittings, two each gear area		X			
98	GGA		Telescoping mechanism roller			X			Apply light film of grease to roller surface.
99	OHC		Shock strut turning points			X			Lubricate four felt wipers, two each strut.
100	GSG		Shock strut torque collar grease fittings	Two fittings, one each gear area		X			
101	GH		Axle				X		Apply light film of grease to axle, each gear area.
102	GH		Wheel bearings (two bearings each gear area)				X		Hand pack wheel bearings.
103	GL		Telescoping mechanism lower grease fittings	Six fittings, three each gear area		X			
104	OHC		Shock strut pistons		X				One piston each gear area.
105	OHC		Shock strut piston felt wipers (one wiper each shock strut)			X			Remove lockring lower metal wiper ring, and lubricate felt wiper.
106	OGP		Fairing lower attachments			X			Located at each gear area.
107	GL		Drag link lower end grease fittings	Four fittings, two each gear area		X			
108	GL		Fairing attachment bracket grease fittings	Four fittings, two each gear area		X			

Figure 1-11. Lubrication Chart (Sheet 16)

TABLE 1-1. SPECIAL TOOLS AND GROUND HANDLING EQUIPMENT

Tool No.	Name	Figure No.	Federal Stock No.
K-24305	Wrench - Main Landing Gear Axle Nut	2-51	RM5120-094-1303-SDGA
K-2445659	Aligner - Horizontal Stabilizer Fuselage Attach Fitting	2-44	RM4920-041-9610-SDGA
K-2447828	Starter Cap - Wing Rear Hinge Bolt	2-16	RM5120-091-2715-SDGA
K-2448370	Spinner - Generator Nut	7-3A	RM5120-041-9611-SDGA
K-2449972	Wrench - Canopy Cartridge	2-8	R5120-339-5294-SDGA
K-2545640	Fitting - Jury Strut Swivel End Inner		R1730-303-6198-SDGA
K-32315	Wrench - Generator and Carburetor Attaching Nuts	5-5, 7-3A, 7-7	RM5120-436-2900-SDGA
K-3270143	Adjusting Tool - Rudder Pedal	2-39	RM4920-094-1341-SDGA
K-3270156-501	Safety Lock - Main Landing Gear Down	1-7	RM1730-714-1320-SDGA
K-3270186	Stick - Fuel Measurement	5-27	RM5210-505-8236-SDGA
K-33410	Aligner - Main Spar Hinge	2-16	RM5120-436-2901-SDGA
K-33411	Aligner - Main Spar Hinge Pin	2-16	RM4920-436-2902-SDGA
K-3382553	Locator - External Sight Post Dots	2-4	R1730-323-3097-SDGA
K-3446730	Puller - Wire Actuating Cylinder Pin	2-18	RM5120-041-9619-SDGA
K-3663822	Wrench - Lock Pin Cylinder Adjust	4-27	R5120-630-9509-SDGA
K-3670700	Retainer - Hose Reel	4-27	R1730-633-0523-SDGA
K-3673128	Reel - In Snubber Valve Retainer	4-27	R1730-675-5315-SDGA
K-38902	Wrench - Allen Type, Lower Engine Mounts	5-1	RM5120-436-2908-SDGA
K-38903	Wrench - Allen Type, Upper Engine Mounts	5-1	RM5120-436-2909-SDGA
K-40202	Wrench - Rocket Launcher Adapter	9-5	RM5120-094-1352-SDGA
K-40510	Wrench - Wing Actuating Cylinder Nut	2-18	RM5120-436-2913-SDGA
K-4270144	Protractor - Rudder Rigging Spring Tab	2-39	RX5210-094-1356-SDGA
K-4270199	Wrench - Fuel Valve		R5210-031-4177-SDGA
K-4435767	Puller - Wing Fold Pin	2-18	RM5120-037-0255-SDGA
K-4447774	Puller - Wing Rear Hinge Bolt	2-16	RM5120-041-9629-SDGA
K-49502	Gage - Alignment Landing Gear Drag Links	2-50	RM5220-037-0263-SDGA
K-4670701	Retractor - Lock Pin Cylinder	4-27	R5120-632-9451-SDGA
K-5270110	Cover - Propeller Hub	1-7	RM1730-037-0270-SDGA
K-5270115	Protractor - Rigging, Rudder	2-39	R5210-340-3450-SDGA
K-5442806	Lock - Rudder Gust	1-7	RM1730-041-9636-SDGA
K-54501	Fitting - Airplane Hoisting	1-6	RM1730-037-0302-SDGA
K-54701	Ring - Hoisting	1-6	RM1730-436-2925-SDGA
K-54801	Jack Pad - Wing and Tail	1-7	RM1730-223-9979-SDGA
K-54903	Platform - Power Plant	1-10	RM1730-037-0303-SDGA

TABLE 1-1. SPECIAL TOOLS AND GROUND HANDLING EQUIPMENT (Continued)

Tool No.	Name	Figure No.	Federal Stock No.
K-55002	Cover - Cockpit	1-7	R1680-037-0304-SDGA
K-55201	Cover - Engine	1-7	R2995-436-2932-SDGA
K-55702-501	Strut - Wing Jury	1-7	RH1730-341-8832-SDGA
K-55901	Adapter - QECU	5-35	RM1730-436-2942-SDGA
K-5552678	Propeller Guard	4-27	R1730-571-5142-SDGA
K-5552692-503	In-Flight Fueling Electrical Tester	4-28	R4920-672-6817-SDGA
K-5559411	Propeller Lock	4-27	R1730-630-9507-SDGA
K-56103	Lock - Aileron Control Surface Harness	1-7	RM1730-037-0327-SDGA
K-5666682	C8 - Drogue Handle	4-27	R4920-627-6584-SDGA
K-57202-501	Sling - QECU and Engine Hoisting	1-6	RM1730-094-1361-SDGA
K-57501	Smoke - Generator Aircraft Leak Test	2-2	RM1730-038-0547-SDGA
K-62601	Wrench - Socket, Wing Installation	2-16	RM5120-436-2951-SDGA
K-63101	Extractor - Wing Actuating Cylinder Nut	2-16	RS5120-436-2963-SDGA
K-66701	Protractor - Aileron Rigging	2-31	RX5210-094-1404-SDGA
K-66703	Protractor - Flap Rigging	2-49	RX5210-094-1406-SDGA
K-66704	Protractor - Elevator Rigging	2-35	RX5210-094-1407-SDGA
K-70601	Wrench - Holding, Lord Mount Bolts	5-35	RM5120-436-2968-SDGA
K-70701	Wrench - Spanner, Breech Receptacle	9-3	RM5120-436-2969-SDGA
K-70801	Wrench - Tail Wheel Shock	2-55	RM5120-436-2970-SDGA
K-71002	Wrench - Arresting Hook Hinge Pin	2-61	RM5120-094-1409-SDGA
K-7552668-505	In-Flight Fueling Store Container and Dolly	4-26	R8115-676-3478-SDGA

TABLE 1-2. AIRCRAFT CLEANING CHART

1. CLEANING OF AIRPLANE EXTERIOR BLUE PAINTED SURFACES
(Applicable to Airplanes BuNo. 134466 through 137632)

REMOVAL OF LIGHT TO MEDIUM DEPOSITS OF SURFACE SOIL AND GREASE

a. Wash aircraft with solution of Spec. MIL-C-18687 cleaning compound and fresh water. Use in concentrations of 0.5 to 1.0 ounces of compound to 1 gallon of water. As an alternate means, wash aircraft with solution consisting of Spec. MIL-C-7122, and Fed. Spec. TT-T-291. Use in concentrations of 1 part of MIL-C-7122, to 6 to 9 parts of Fed. Spec. VV-K-211 kerosene. Apply with soft cloths or sponge and with minimum amount of rubbing. Rinse cleaned surfaces immediately after cleaning with clean, fresh water and air dry.

CAUTION

Cleaning to be accomplished in shaded area if possible. Avoid solution contacting cockpit enclosure when cleaning around cockpit area. Lubricate items as noted in figure 1-11 after cleaning.

b. Apply cleaner as required to prepare finish for Spec. MIL-W-18723 wax.

CAUTION

Do not apply cleaner to National Insignia.

c. Apply Spec. MIL-W-18723 wax to cleaned surfaces by spray, brush, or by wiping-on with cloth wetted with compound. Allow wax to dry and polish with clean, soft cloth to a lustre.

1A. CLEANING OF AIRPLANE EXTERIOR GRAY-WHITE PAINTED SURFACES
(Applicable to Airplanes BuNo. 139606 and Subsequent)

REMOVAL OF LIGHT TO MEDIUM DEPOSITS OF SURFACE SOIL AND GREASE

a. Wash aircraft with solution of Spec. MIL-C-7122 cleaning compound and fresh water. Use in concentrations of 1 part cleaning compound to 6 to 9 parts of Fed. Spec. TT-T-291. Apply solution using suitable brush; rinse cleaned surface with fresh water.

CAUTION

Do not allow cleaning solution to remain on airplane for more than ten minutes before rinsing with fresh water.

2. COCKPIT PLASTIC ENCLOSURE

GENERAL CLEANING—SALT, DUST AND MUD

a. Flush plastic enclosure with fresh water. Apply cleaning soap, Fed. Spec. P-S-602 and fresh, clean water to enclosure, using bare hand to detect and remove dirt before it scratches plastic enclosure. A soft cloth, sponge or chamois may be used in cleaning only to carry soapy water to plastic.

CAUTION

Cleaning to be accomplished in shaded area if possible. Do not rub dry plastic with dry cloth.

GENERAL CLEANING—GREASE AND OIL

a. Remove grease and oil from plastic cockpit enclosure using cloth saturated with transparent plastic cleaning and polishing compound Spec. MIL-C-18767. Rub lightly to avoid scratching plastic enclosure.

CAUTION

Cleaning to be accomplished in shaded and ventilated area. Do not use acetone, alcohol, benzene, hexane, carbon tetrachloride, de-icing fluid, fire extinguisher fluid, gasoline, lacquer thinner or window cleaner on plastic enclosure because they will soften plastic and cause crazing.

3. CONTROL CABLES

GENERAL

a. Wipe control cables with clean, dry cloth to remove dirt. When cables require more specialized cleaning, wipe clean using clean cloth saturated with solvent, Fed. Spec. P-D-680. Allow cables to dry.

b. When cables are thoroughly dry apply thin coat of corrosion-preventive compound (Spec. MIL-C-16173, Grade 4).

4. MAIN LANDING GEAR, TAIL GEAR AND ARRESTING GEAR

CLEANING PISTON SURFACES

a. Wipe exposed piston surfaces of cylinders and struts clean and dry with clean dry cloth immediately prior to each flight.

b. Upon return from each flight, wipe exposed piston surfaces of cylinders and struts clean and dry and apply hydraulic fluid, Spec. MIL-H-6083 to surfaces. Film of fluid should be liberal enough to assure complete coverage of exposed surfaces without dripping.

TABLE 1-2. AIRCRAFT CLEANING CHART (Continued)

CLEANING LINKAGE AND CYLINDER BARRELS

a. Use solvent, Fed. Spec. P-D-680 on linkage, barrel portions of main landing gear, tail gear and arresting gear actuating cylinders, struts, wheel castings, yoke of tail gear and arresting hook. Carefully apply with clean cloth to avoid solvent contacting piston surfaces of cylinder and struts.

CAUTION

Use with adequate ventilation and avoid prolonged breathing. Keep away from open flames. Avoid spilling solvent on tires. If solvent is spilled on tires, wipe with dry cloth and wash tires with soap and water. Prevent solvent from contacting any electrical units or wiring.

b. After cleaning, lubricate main landing gear, tail gear and arresting gear. See figure 1-11.

5. MAIN LANDING GEAR BRAKES

GENERAL CLEANING

NOTE

Remove brakes before cleaning. See figure 2-51.

- a. Use compressed air to blow dirt or other foreign matter out of housing.
- b. Disassemble and clean all metal parts by washing in solvent, Fed. Spec. P-D-680. Apply solvent to parts with soft brush.

CAUTION

Keep away from flames. Do not wash rubber packing rings or felt gaskets in gasoline or solvent.

c. Clean all rubber packing rings and felt gaskets in de-natured alcohol, Spec. MIL-A-6091. Apply alcohol to parts with soft brush.

WARNING

Do not take alcohol internally. Internal consumption will cause death. Use in well-ventilated area.

6. TIRES

GENERAL CLEANING

a. Wash tires with fresh water and cleaning soap, Fed. Spec. P-S-602. Apply cleaning soap and water with soft brush, rinsing cleaned surface immediately after cleaning with clean, fresh water.

b. Allow tire to dry in shade.

7. WING LOCKS AND HINGES

GENERAL CLEANING

a. Wipe exposed cylinder and locking pin piston surfaces and hinges clean with a clean, dry cloth.

b. After cleaning apply hydraulic fluid, Spec. MIL-H-6083, to these surfaces.

NOTE

The film of fluid should be liberal enough to assure complete coverage of exposed surfaces without dripping.

8. ENGINE

GENERAL CLEANING

a. Use cleaning solvent, Fed. Spec. P-D-680 on all metal engine parts. As an alternate means use kerosene, Fed. Spec. VV-K-211.

b. Apply cleaning agents with small brush, similar to paint brush. Start at uppermost part of engine and work down.

c. Wipe excess solvent from engine with dry cloths. Lubricate engine after cleaning as noted in figure 1-11.

CAUTION

Work is to be accomplished in well-ventilated area. Keep solvent away from open flame. Do not permit solvents to contact electrical wiring, rubber hoses, electrical components (switches, control units, motors) or heating and ventilating ducts.

9. ENGINE OIL TANK

CLEANING INTERIOR OF TANK

NOTE

It is recommended that the oil tank be removed and cleaned prior to installing a new or overhauled engine. Refer to section V of manual for tank removal instructions.

a. Remove oil tank from airplane. Refer to section V.

TABLE 1-2. AIRCRAFT CLEANING CHART (Continued)

b. Remove diverter valve from tank and pour two gallons of solvent, Fed. Spec. P-D-680 through left-hand port of tank diverter valve (opening into hopper section of tank).

c. Roll tank to dislodge oil and foreign particles in hopper; then open drain valve and allow solvent and foreign particles to drain from tank. After tank has drained, close drain valve.

d. Open oil tank filler well and pour three gallons of solvent, Fed. Spec. P-D-680, through filler well into tank main section.

e. Roll oil tank to dislodge oil and foreign particles in tank main section; open drain valve and allow solvent and foreign particles to drain from tank. After tank has drained, close drain valve.

f. Install diverter valve on oil tank and install oil tank in airplane. Refer to installation instructions in section V.

CAUTION

Work to be accomplished in well-ventilated area. Keep solvent away from open flames.

10. ENGINE OIL COOLER

CLEANING INTERIOR OF COOLER

NOTE

It is recommended that oil cooler be removed and flushed when an engine change other than QECU is made and no metal chips are evident in oil. When metal chips are evident, oil cooler should be replaced.

- a. Remove oil cooler from airplane. Refer to section V.
- b. Remove bypass valve from cooler and pour solvent, Fed. Spec. P-D-680, through cooler bypass valve opening into cooler.
- c. Remove drain plug from bottom of cooler and allow solvent to drain from cooler.
- d. Install drain plug and bypass valve on oil cooler.
- e. Install cooler in airplane. Refer to section V.

CAUTION

Work to be accomplished in well ventilated area. Keep solvents away from open flames.

11. COCKPIT AREA

GENERAL CLEANING

- a. Remove dust and dirt from cockpit interior using suitable vacuum cleaner.

12. A-C GENERATOR

LIGHT CLEANING

a. Remove cover from generator terminals and inspect interior for dirt and foreign matter. Make certain interior is clean and generator lead connections are clean and tight before replacing terminal cover.

b. Disconnect cooling air duct at end cover and remove any accumulated dust and foreign matter from tube.

13. FUSELAGE EJECTOR RACK

CLEANING BREECH RECEPTACLE, CARTRIDGE CONTAINER AND PISTON-AND-FOOT ASSEMBLIES

NOTE

Wash parts after every firing.

- a. Wash with fresh, cold water to remove carbon. Dry with clean rag.
- b. Wash parts further with solvent, Fed. Spec. P-D-680, and dry with a clean rag.
- c. Apply thin film of grease, Spec. MIL-G-7711, to parts.

CLEANING SLEEVE ASSEMBLIES

NOTE

Clean after every 60 shots.

- a. Wash sleeve assemblies in same manner as noted in steps a, b, and c for breech receptacle, cartridge container and piston-and-foot assemblies.

CLEANING COMPLETE EJECTOR RACK

NOTE

Wash clean at each major overhaul.

- a. Wash complete ejector rack in same manner as noted in steps a, b, and c for breech receptacle, cartridge container and piston-and-foot assemblies.

CAUTION

Do not lubricate any part of ejector until carbon has been removed.

TABLE 1-2. AIRCRAFT CLEANING CHART (Continued)

14. FUEL TANK GROUNDING RECEPTACLE.

NOTE

Grounding receptacle should be kept clean to provide good electrical contact.

a. Remove receptacle from airplane by working through fuel cell inspection window. Remove hoses to filler well, if necessary.

b. Clean by washing receptacle in solvent Fed. Spec. P-D-680.

c. Remove mild corrosion with 400 grit wet or dry sandpaper.

d. If badly corroded, replace receptacle.

e. Reinstall receptacle by working through fuel cell inspection window.

15. STAINLESS STEEL TUBING.

NOTE

Exposed stainless steel tubing should be kept clean to prevent corrosion and pitting. Corrosive pitting if not treated will result in rupture of the line.

a. Wipe lines with clean cloth dampened with cleaning solution (Fed. Spec. TT-C-490), removing all rust spots.

b. Inspect for pitting.

CAUTION

Replace line if pit depth exceeds 10 percent of wall thickness.

c. Allow 1 to 4 hours for solvent to evaporate and coat lines with light film of Petro-tech Amber (Spec. MIL-C-16173, Grade 4). Wipe on with cloth or industrial type tissue. Use enough compound to produce continuous and visible film.

1-44. SPECIAL TOOLS AND GROUND HANDLING EQUIPMENT. Special tools and ground handling equipment provided for the airplane are listed in table 1-1.

1-44A. CLEANING. The methods and materials required for cleaning, surface treatment and protection of finishes against deterioration are outlined in table 1-2. Particular attention should be given to areas such as exhaust trails, gun-blast surfaces, rocket-blast areas, wheel wells and areas subjected to excessive temperature and/or corrosive fumes. Cleaning of the airplane should be performed as often as necessary to keep it free from foreign matter such as engine oil, exhaust carbon, salt spray and dirt. Refer to Section VIII of this manual for general cleaning instructions for electrical and electronic components, electrical leads, panels, and mechanical parts that comprise the electronic system.

1-44B. LANDING GEAR WHEEL BRAKE FIRES. The following fire fighting procedures are recommended when ignition of organic brake linings, hydraulic fluid, rubber tires, bearing lubricants or magnesium, is caused by transmission of excessive heat during landing or taxiing operations:

a. Evacuate all personnel not essential to fire fighting and cooling operations from immediate area at once.

WARNING

Do not approach wheel in line with axle. Approach from fore or aft direction only. Explosion of wheel or assembly may damage equipment and cause serious or fatal injury to personnel.

NOTE

If tire is flat, explosive failure of tire or wheel is improbable.

b. Use dry chemical extinguishing agent, or water discharged under high pressure (fog) to extinguish fire.

CAUTION

Do not discharge additional extinguishing agent after fire is extinguished.

c. Cool assembly immediately after fire is extinguished by directing straight stream of water to brake. Apply water in 10 to 15 second bursts, separated by waiting periods of 30 to 60 seconds for a minimum of three to five bursts.

NOTE

If water is not available, any other non-flammable liquid cooling agent may be used.

CAUTION

Do not use CO₂ for cooling. Application of this chemical will cause serious damage to assembly.

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d. After properly cooling brake, allow wheel to continue cooling in ambient air.

NOTE

A cross wind or forced air from a blower will aid in cooling the wheel.

CAUTION

Do not move airplane for at least 15 minutes after cooling applications.

NOTE

If it is not possible to perform the preceding cooling procedures, allow wheel to cool for a period of 45 to 60 minutes at ambient temperature.

1-44C. **CLEANING.** After fire is extinguished and brake assembly is properly cooled, clean wheels and brakes thoroughly as follows:

- a. Disassemble wheel and brake assembly (refer to section II).
- b. Remove dry chemical residue by application of high pressure air-stream.
- c. Clean all parts thoroughly with soap and water.
- d. Re-assemble wheel and brake assembly (refer to section II).

1-44D. ANTI-ICING AND DEICING-DEFROSTING.

1-44E. The following paragraphs provide instructions for the use of anti-icing and deicing-defrosting to prevent the formation of, and for removal of, frost and ice from the exterior surfaces of airplanes on the ground. Instructions are also included for the use of anti-icing and deicing-defrosting fluids for glass windshields, propellers, carburetors.

1-44F. **PRECAUTIONARY MEASURES.** Although anti-icing and deicing-defrosting fluids are non-flammable, non-toxic, non-corrosive, and will not injure fabric, the fluids contain a solid ingredient. Therefore, care shall be taken to avoid coating engine surfaces; to avoid penetration into air ducts leading to carburetors, oil coolers, etc., and to avoid coating the surfaces of transparent materials where visibility through the materials might be impaired. Care shall be taken to keep alcohols away from fire, sparks, etc. Care also shall be taken to ensure that alcohols do not contact acrylic materials because alcohol will cause cracking or crazing. Alcohols are toxic and shall not be taken internally, and care shall be taken to avoid breathing alcohol vapors to excess. All alcohol fluids have an irritating effect on the eyes, throat, and nasal passages, and care shall be taken to prevent contact with mucous membranes. Personnel applying alcohol shall wear an approved type of respirator and eye protection.

1-44G. **ANTI-ICING AND DEICING-DEFROSTING FLUIDS (FOR USE DOWN TO 10°F).**

1-44H. Deposits of frost on the exterior surfaces of aircraft on the ground may be removed by the application of deicing-defrosting fluid (Spec. MIL-D-19418). When the deposits have been removed, the fluid remaining on the treated surfaces should provide protection for approximately 12 hours, provided the temperature does not fall below 10°F. Spec. MIL-D-19418 is not efficient at temperatures below 10°F.

1-44J. **METHOD OF APPLICATION.** Spec. MIL-D-19418 may be applied by swabbing, brushing, or spraying. At low temperatures and under unfavorable wind conditions, swabs or brushes should be used, but care must be exercised to prevent the swabs or brushes from freezing to the aircraft surfaces. Spec. MIL-D-19418 is supplied ready-mixed but may be diluted with water, if required, for spraying, up to a maximum of 2 percent. Dilution decreases the ice- or frost-melting efficiency.

CAUTION

To prevent stress-corrosion cracking, contact between Spec. MIL-D-7946 and Spec. MIL-D-19418 and high-strength low alloy steels shall be avoided. If contact is made, the steel shall be washed down with denatured alcohol (Spec. MIL-A-6091).

1-44K. **ANTI-ICING AND DEICING-DEFROSTING FLUIDS (FOR USE BELOW 10°F).**

1-44L. Deicing-defrosting fluid (Spec. MIL-D-7946) should be used for preventing the formation of, and for removing deposits of, frost, ice, etc., on the exterior surfaces of aircraft on the ground at temperatures below 10°F. Spec. MIL-D-7946 is very efficient at temperatures down to 15°F, and is effective down to -65°F, but rate of ice-melting decreases as the temperature decreases. For anti-icing, Spec. MIL-D-7946 should be applied prior to expected ice or snow conditions. When Spec. MIL-D-19418 is not available, Spec. MIL-D-7946 may be used at temperatures between 32°F and 10°F.

1-44M. **METHOD OF APPLICATION.** Spec. MIL-D-7946 is ready-mixed and may be applied by swabbing or brushing. If wind conditions permit, high-pressure spray equipment may be used. If required, for low pressure spraying, Spec. MIL-D-7946 may be diluted with water to a maximum of three percent. Dilution increases the ice- or frost-melting efficiency. One gallon of Spec. MIL-D-7946 (undiluted) will cover approximately 500 square feet with an applied film thickness of 0.003-inch. This thickness (0.003-inch) will suffice for most purposes. If the noted fluids are not available, anti-icing fluid (Fed. Spec. TT-I-735 or Spec. MIL-A-6091) may be used.

1-44N. **ANTI-ICING FLUID (FOR USE IN FREEZING RAIN).**

1-44P. A two-part anti-icing fluid, Spec. MIL-A-23051, should be used on aircraft temporarily parked

in freezing rain. Spec. MIL-A-23051 shall be mixed in the proportion of two parts Spec. MIL-D-7946 to one part Spec. MIL-A-23051 to form a water-in-oil emulsion.

1-44Q. METHOD OF APPLICATION. After mixing, Spec. MIL-A-23051 may be applied by swabbing or brushing. If wind conditions permit, high-pressure spray equipment may be used.

1-44R. ANTI-ICING AND DEICING-DEFROSTING FLUIDS (FOR USE ON WINDSHIELDS, PROPELLERS, AND CARBURETORS).

1-44S. Isopropyl alcohol, Fed. Spec. TT-I-735, shall be used for anti-icing and deicing glass windshields, propellers, and for carburetors, requiring fluid deicing. Use Fed. Spec. TT-I-735 full strength. If Fed. Spec. TT-I-735 is not available, Spec. MIL-A-6091 may be used. Fed. Spec. TT-I-735 is the preferred fluid.

NOTE

The noted alcohols may be mixed together in any proportion, and it will not be necessary to drain tanks or modify equipment in changing from one alcohol to another alcohol. The noted alcohols may be diluted with a maximum of 10 percent water to facilitate salt removal from glass windshields in flight without unduly impairing the anti-icing or deicing properties.

1-45. CORROSION OF DISSIMILAR METALS.

1-46. DESCRIPTION. (See figure 1-14.) The majority of aircraft parts are given special treatment to improve their resistance against corrosion. Steel parts are cleaned, sandblasted or pickled and then cadmium plated or chromium plated and finally painted. Aluminum and aluminum alloys are either anodized or chromated. If the corrosion preventives are insufficient or have been destroyed by wear of the parts, corrosion may occur. All metals have an inherent electrical potential, with some metals having potentials higher than others. The dissimilar metals are those metals with potential differences strong enough to create an electrolytic reaction between them when they are in contact with each other and are exposed to moisture (electrolyte). When the two contacting metals are bridged by moisture, the electrolyte reaction causes an electrolytic corrosion to take place. The metal with the highest potential will be destroyed by electrolytic corrosion. Magnesium and aluminum alloys have the highest electrical potential and, therefore, will be the first to corrode. Metals that have practically the same potential are considered as similar metals because they do not have a strong tendency to electrolytically corrode. The appearance of corrosion can be detected on magnesium and aluminum alloys by pitting and a white, chalky film; on brass and its alloys by a greenish film; and on steel and its alloys by rust.

CAUTION

Carbon pencil and crayons with metallic pigments must not be used in marking corrosion resistant steel. Electrolytic attack on marked zone results in cracking of metal.

1-47. Intergranular corrosion is a type of electrochemical corrosion that progresses along the grain boundaries of an alloy, usually because the grain boundary regions contain material anodic to the center region of the grains. For example, after welding, the metal adjacent to the weld is subject to intergranular attack, whereas the weld metal itself and the base metal outside the heat affected zone are virtually free from attack.

1-48. DISSIMILAR METAL GROUPING. The grouping of dissimilar metal shows similar and dissimilar metal combinations. (Refer to table 1-3.)

a. Members of same group shall be considered similar and are not subject to electrolytic corrosion when in contact with each other.

b. Members of different groups shall be considered as dissimilar and are subject to electrolytic corrosion when in contact with each other.

1-49. CLEANING CORRODED SURFACES. Corroded surfaces must be thoroughly cleaned before applying the refinishing treatment, otherwise a good paint bonding surface will not be obtained. The paint should be removed from corroded surfaces with thinner (Specification MIL-T-6095). A cleaner from NAVWEPS 07-1-503 should then be applied to the surface. Badly corroded surfaces may be cleaned by hand rubbing with abrasive paper no coarser than No. 300 grit.

CAUTION

Prior to application of surface treatment solutions and zinc chromate primer all superficial corrosion products should be removed by sanding the area with 400 grit wet or dry sandpaper. Inspect the sanded area for evidence of corrosion products remaining in pits or sub-surface cavities as indicated by dull or non-shiny areas. When present and the depth is determined by exploratory grinding or filing to be excessive, replace the part.

Refinishing operations shown in the metals refinishing table should follow the cleaning procedure. (Refer to table 1-4.)

1-50. Corroded bolts, rivets, pins, etc., must be replaced. All steel bolts and steel parts must be cadmium plated, unless otherwise specified, and are to be coated with primer before installing with dissimilar metals. However, no preventive or paint need be applied to working surfaces or to adjustable parts that require lubrication.

1-51. Plastics and rubber are non-conductors of electrolytic reaction and are therefore sometimes used to separate dissimilar metal contacts.

TABLE 1-3. GROUPING OF METALS	
Group	Metals
I	Magnesium alloys
II	Aluminum alloys
III	Cadmium Zinc Lead Steel Tin
IV	Copper and its alloys Nickel and its alloys Chromium Corrosion-resistant steel (18-8)

NOTE

Metal is classified by external finish only. Thus, a cadmium-plated steel part is considered to be a cadmium part and not a steel part.

1-52. **REFINISHING CORRODED SURFACES.** Before refinishing any corroded surface, clean the part affected as described in paragraph 1-49. The metal refinishing table (table 1-4) describes the refinishing procedures for corroded dissimilar metal contacts.

NOTE

If cadmium-plated steel parts continue to rust, it will then be necessary to coat such parts with corrosion preventive compound (Spec. MIL-C-16173).

1-53. **ANTICORROSION FOR PIANO HINGE INSTALLATION.** To improve corrosion protection and prevent stress cracking of piano hinge installations the following procedures must be used:

a. Apply Spec. MIL-C-16173 material using procedures that will insure the material will reach all of the hinge pin surface insofar as is practical.

1-54. The latest revisions of MS-20001, MS-20253 and MS-20257 provide for protection of the hinge pin holes and cadmium plating of the hinge pins. The frequency of application to exterior parts must be weekly for carrier based aircraft. Other aircraft and interior installations should receive re-application at regular intervals. Airplanes undergoing overhaul or modification must conform to applicable instructions outlined above. Overhaul personnel must ensure that replacement parts conform with the revised Military Standards.

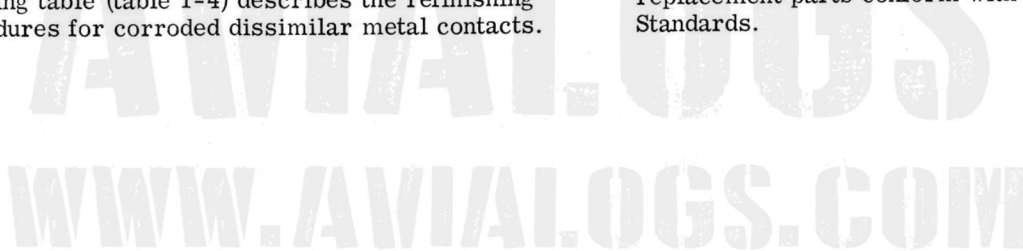


TABLE 1-4. METAL REFINISHING

Metals to be Treated	Metals Contacted											
	Zinc	Titanium	Tin	Steel	Nickel	Magnesium	Lead	CRES (18-8)	Copper	Chromium	Cadmium	Aluminum
Aluminum	A	B	B	B	B	B	B	B	B	B	A	A
Cadmium		F			F	H		F	F	F		D
Chromium	F		F	F		H	F				F	F
Copper and its alloys	F		F	F		H	F				F	F
Corrosion resistant steel (18-8)	F		F	F		H	F				F	F
Lead		F			F	H		F	F	F		
Magnesium	C	C	C	C	C		C	C	C	C	C	C
Nickel and its alloys	F		F	F		H	F				F	F
Steel		F			F	G		F	F	F		E
Tin		F			F	H		F	F	F		F
Titanium	F		F	F		H	F				F	F
Zinc		F			F	H		F	F	F		D

Note: The code letter given in the square where the columns intersect indicates the recommended treatment outlined below.

Code

A Treatment for ALUMINUM:
Apply MIL-C-5541 Brush-on Type, rinse and allow to dry. Paint one coat zinc chromate primer† each surface.

B Treatment for ALUMINUM:
Apply MIL-C-5541 Brush-on Type, rinse and allow to dry. Paint three coats zinc chromate primer† and a brush coat of primer around boundary where further paint finishes will not be applied.

C Treatment for MAGNESIUM:
Apply a brush coat of Dow No. 1 chrome pickle solution*; allow it to remain 30 seconds; then wipe off with a damp cloth. Touch up with three coats of zinc chromate primer.†

D Treatment for CADMIUM and ZINC:
Apply one coat zinc chromate primer.†

E Treatment for STEEL:
Apply JAN-C-490 Type IV and wipe dry. Paint two coats of zinc chromate primer.†

F Treatment for MISCELLANEOUS METALS:
If not subjected to heat or not used for working surface, apply two coats zinc chromate primer.†

Code

G Treatment for STEEL:
Apply JAN-C-490 Type IV and wipe dry. Apply three coats zinc chromate primer.†

H Treatment for MISCELLANEOUS METALS:
Use gasket material or sealing compound such as zinc chromate compound or three coats of zinc chromate primer.†

CAUTION

When refinishing surfaces with chromic acid solution (Specification MIL-C-5541) or with chromic pickle solution (Specification MIL-M-3171, Type I), make certain that solutions are not permitted to run between faying metal surfaces. If they do, they will help to corrode unprotected metal surfaces. If necessary, apply solution with a piece of cotton to prevent it from running into inaccessible places.

†Zinc chromate primer (Specification MIL-P-6889).

TABLE 1-5. JACK LIST

Jacking Point	Type	Capacity	Federal Stock No.
Tail	Hydraulic Tripod	3 Ton	RX1730-294-3669-S030
			RX1730-391-7906-S030
			RX1730-391-7897-S030
			RX1730-391-7932-S030
			RX1730-391-7933-S030
			RX1730-391-7934-S030
			RX1730-566-4589-S030
Main Landing Gear	Hand Mechanical Axle	3 Ton	RX5120-391-7892-S030
	Hydraulic Axle	10 Ton	RX5120-391-7914-S030
			RX5120-391-7915-S030
			RX5120-391-7916-S030
			RX5120-391-7917-S030
			RX5120-391-7898-S030
			RX5120-391-7907-S030
Wing	Hydraulic Tripod	7-1/2 Ton	RX5120-391-7941-S030
			RX1730-391-7895-S030
			RX1730-391-7921-S030
			RX1730-675-0044-S030
			RX1730-391-7923-S030
			RX1730-391-7902-S030
			RX1730-391-7912-S030
	Hydraulic Tripod	10 Ton	RX1730-566-5450-S030
			RX1730-391-7940-S030
	Hydraulic Tripod	12 Ton	RX1730-516-2019-S030
			RX1730-391-7918-S030
	Tripod	20 Ton	RX1730-391-7919-S030
			RX1730-391-7920-S030
RX1730-391-7903-S030			
RX1730-391-7894-S030			
			RX1730-685-0125-S030
			RX1730-391-7908-S030
			RX1730-516-2016-S030

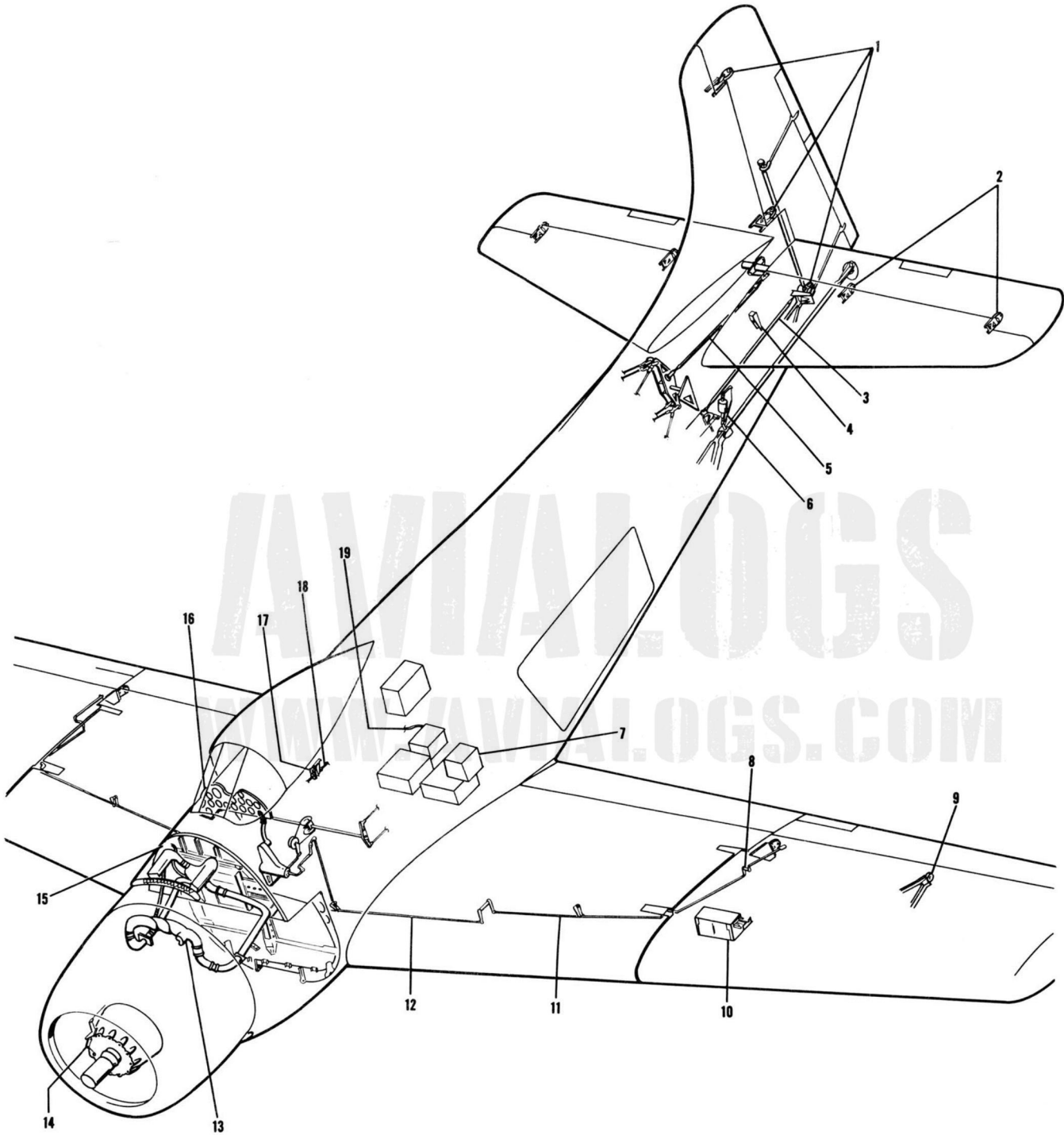


Figure 1-12. Dissimilar Metals Corrosion Inspection Chart (Sheet 1)


Key to Figure 1-12. Dissimilar Metals Corrosion Inspection Chart

<i>Index</i>	<i>Description</i>	<i>Material</i>	<i>Code (Table 1-4)</i>
1	Vertical Stabilizer Hinge Assy Bracket Assy Bushing	AL 14-ST (forging) Steel (outer surface cadmium plated)	A D
2	Elevator Hinge Assy Bracket Assy Bushing	AL 14-ST (forging) Steel (outer surface cadmium plated)	A D
3	Rudder Push Pull Tube Assy (fus. sta. 364 to 423.5) Tube End	AL 24-ST Steel (cadmium plated)	A D
4	Horizontal Stabilizer Hoist Fitting Assy Fitting Fuselage Plating	Steel (cadmium plated) AL 24-ST	D A
5	Elevator Push Pull Tube Assy (fus. sta. 364 to 408.25) Tube End	AL 24-ST Steel (cadmium plated)	A D
6	Arresting Hook Tension Link	Steel Tubing	E
7	All Radio and Electrical Bonding Support Installation Mounts	AL 24-ST Corrosion Resistant Steel	B F
8	Wing Fold Joint Aileron Control Tube Assy (wing sta. 55.5) Tube End	AL 24-ST Steel (cadmium plated)	A D
9	Aileron Hinge Assy Bracket Assy Bushing	AL 75-ST (forging) Steel (outer surface cadmium plated)	A D
10	Gun Chute Assy Chute Plating	Corrosion Resistant Steel AL 75-ST	F B
11	Aileron Push Pull Tube Assy (wing sta. 55.5 to 95.5) Tube End	AL 24-ST Steel (cadmium plated)	A D
12	Aileron Push Pull Tube Assy (wing sta. 0 to 55.5) Tube End	AL 24-ST Steel (cadmium plated)	A D
13	Air Conditioning Duct Bracket Assy Brackets Clamps	AL 24-ST Corrosion Resistant Steel	B F
14	Engine Crankcase Assy Housing Propeller Control Bracket	Magnesium AL 61-ST	C B
15	Firewall Assy Firewall Angles	Corrosion Resistant Steel AL 24-ST	F B
16	Pilot's Instrument Panel Assy Panel Instrument Mounting Screws	Magnesium Steel (cadmium plated)	C H
17	Oxygen Line Installation Bracket Check Valve	AL 24-ST Brass	B F
18	Oxygen Line Installation Lines Clips	Copper Steel	F F
19	Battery Ground Connection Channel Cable End	AL 24-ST Alloy Steel	B E
20	Inspect aluminum wiring shown in Section X for corrosion		

Figure 1-12. Dissimilar Metals Corrosion Inspection Chart (Sheet 2)

REPLACEMENT TUBING ASSEMBLIES

FLARED TUBING

SCOPE:

This section provides general information useful in fabricating replacement tubing assemblies in the field.

Specific instructions and limiting data are based on procedures which conform to applicable military specifications but which, in some cases, provide additional margins of safety.

Information applicable to oxygen tubing only is covered separately.

Larger size tubing, such as ducting and vent lines, is not covered.

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TUBING ASSEMBLIES

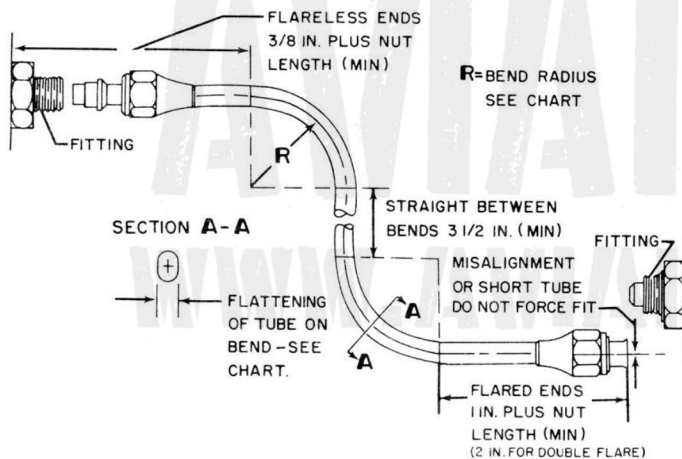
GENERAL INFORMATION

(APPLIES TO BOTH FLARED AND FLARELESS TUBING)

TUBING SUBSTITUTIONS ALLOWABLE						
HIGH PRESSURE STEEL LINES					LOW PRESSURE ALUMINUM LINES	
TUBE SIZE O.D. (IN.)	TUBING WALL THICKNESS MIN. (INCHES)				FLARELESS TUBING ALL O.D. SIZES	
	FACTORY		SUBSTITUTE		FACTORY	SUBSTITUTE
	STEEL CRS MIL-T-6845	STEEL CRS MIL-T-6846	STEEL CM MIL-T-6736	ALUMINUM [†] 6101-T AMS 4083	6061-T6 (WW-T-789) .035 WALL	5052-0 (WW-T-787) .035 WALL
1/4	.016*	.026	.022	.035	FACTORY 5052-0 WW-T-787 .035 WALL	SUBSTITUTE ANY .035 WALL OR THICKER BUT NOT 6061-T6 (IT WILL CRACK ON FLARING)
5/16	.020*	.032	.028	.049		
3/8	.028	.038	.035	.058		
1/2	.035	.050	.049	.072		
5/8	.042	.062	.058	.095		

*FOR COILED LINES OF 1/4 OR 5/16 IN. O.D. USE .028 CORROSION RESISTANT STEEL.

† ALUMINUM ALLOWABLE ONLY WHERE HEAT RESISTANCE AND FLEXIBILITY NOT ESSENTIAL.

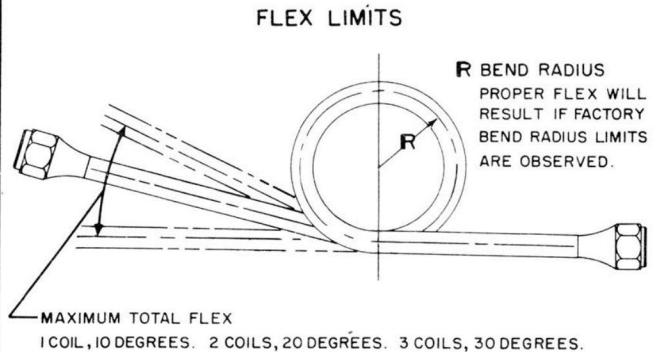


BEND, FLATTENING & SUPPORT LIMITS					
TUBE SIZE O.D. (IN.)	BEND RADIUS AND 10III (IN.)*		FLATTENING ALLOWABLE ON BEND 5 PER CENT (IN.)*	MAXIMUM SPACING BETWEEN SUPPORTS MIL-H-5440B (IN.)	
	FACTORY STANDARD	ABSOLUTE MINIMUM		ALUMINUM	STEEL
1/8		3/8	.006	9 1/2	11 1/2
3/16	1	7/16	.009	12	14
1/4	1	9/16	.013	13 1/2	16
5/16	1 1/8	11/16	.016	15	18
3/8	1 3/8	15/16	.019	16 1/2	20
1/2	1 1/2	1 1/4	.025	19	23
5/8	2	1 1/2	.031	22	25 1/2
3/4	2 1/2	1 3/4	.038	24	27 1/2
1	3	3	.050	26 1/2	30
1 1/4		3 3/4	.063	28 1/2	31 1/2
1 1/2		5	.075	29 1/2	32 1/2

*FOR EMERGENCY HAND FORMING, WHEN MANDREL CAN NOT BE USED, INCREASE BEND RADIUS TO APPROXIMATELY SIX TIMES TUBE O.D. AND INCREASE FLATTENING LIMIT ON 1/4 INCH OR LESS O.D. TO 10 PER CENT.

**WHERE TUBES SUPPORT FITTINGS, REDUCE SPACING TO MAXIMUM 20 PER CENT.

TUBE SIZE O.D. (IN.)	HIGH PRESSURE		LOW PRESSURE	
	STEEL CORROSION RESISTANT MIL-T-6845 (PSI)	ALUMINUM ALLOY 6061-T AMS 4083 (PSI)	ALUMINUM ALLOY 6061-T6 WW-T-789 (PSI)	ALUMINUM ALLOY 5052-0 WW-T-787 (PSI)
	1/4	6000	6000	6000
5/16	6000	6000	6000	3000
3/8	6000	6000	4500	2400
1/2	6000	6000	3500	1500
5/8	6000	6000	3000	750
3/4	6000	6000	2500	750



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Figure 1-13. Tubing Assembly and Installation Data (Sheet 2)

TUBING ASSEMBLIES

GENERAL PRECAUTIONS

(APPLY TO BOTH FLARED AND FLARELESS TUBING)

TUBING STOCK INSPECTION

Before fabricating replacement tubing assemblies, inspect for damage or imperfections in tubing stock. Reject if tubing is imperfect as follows:

1. Corrosion, scale or discoloration on interior or exterior.
2. Splits, cracks, pits, die or tool marks, coarse seams, or porous (orange peel) appearance.
3. Oval, or egg-shaped tubing.
4. Nicks, scratches or other mechanical damage deeper than 5 percent of tubing wall thickness.
5. Dents, deeper than 10 percent of tubing O.D.

Note

If equipment and personnel are available, tubing with nicks, scratches or other mechanical damage up to 10 percent of wall thickness, or with dents up to 20 percent of O.D. may be reworked and used if it then meets the requirements.

LEAKAGE AT JOINTS AND FITTINGS

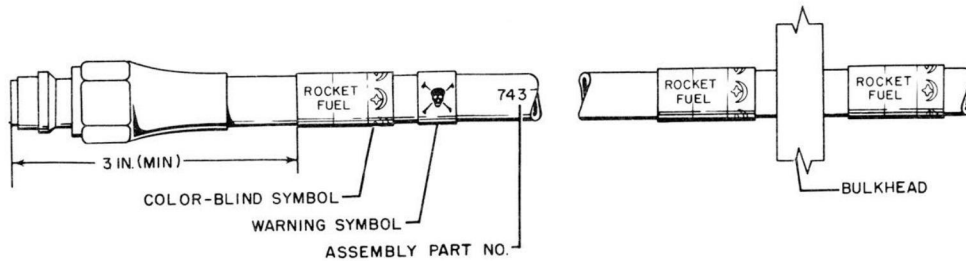
COMMON CAUSES	PREVENTION
1. OVERTIGHTENING - RESULTING IN DAMAGE TO SLEEVE, FLARE, OR THREADS	ADHERE TO TIGHTENING INSTRUCTIONS AND TORQUE LIMITS
2. IMPROPER ASSEMBLY - MISALIGNMENT (CROSS THREADING) OF ANY THREADED JOINT OR OF JAM NUT ON UNIVERSAL TYPE FITTING	START ANY THREADED CONNECTION CAREFULLY. DO NOT FORCE. PROPERLY MATED AND LUBRICATED PARTS SHOULD BOTTOM BY HAND
3. LINE TOO SHORT - RESULTING IN DAMAGE TO SLEEVE OR FLARE IF TIGHTENED. THERE IS NO TOLERANCE ON STRAIGHT LENGTHS	CHECK FOR EXACT LENGTH BEFORE TIGHTENING EITHER END
4. TUBE IMPROPERLY FORMED - RESULTING IN TUBING END BEING OUT OF LINE WITH CONNECTOR FITTING. IF CONNECTED, THE TENSION MAY CAUSE FLARE OR SLEEVE TO CRACK	DO NOT FORCE FIT. TUBING END SHOULD HOLD POSITION ON FITTING WITHOUT PRESSURE
5. SELECTION OF WRONG GASKET - IN CLUSTER OR UNIVERSAL TYPE FITTING	DO NOT SUBSTITUTE FOR SPECIFIED GASKET DO NOT USE OLD OR DAMAGED GASKETS
6. FAULTY MACHINING OF BOSS OR FITTING - RESULTING IN DAMAGED GASKET RELIEF OR HANGING THREADS WHICH CUT INTO GASKET	EXAMINE BOSSES AND FITTINGS FOR PERFECT THREADS AND FOR SMOOTH GASKET RELIEFS
7. IMPROPER INSTALLATION OF UNIVERSAL TYPE FITTING - TOO DEEP OR TOO SHALLOW IN BOSS, ALLOWING THREADS TO CUT GASKET	FOLLOW INSTALLATION INSTRUCTIONS TO BE SURE THAT GASKET IS CONTAINED IN GASKET RELIEF

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Figure 1-13. Tubing Assembly and Installation Data (Sheet 3)

IDENTIFICATION OF TUBING LINES

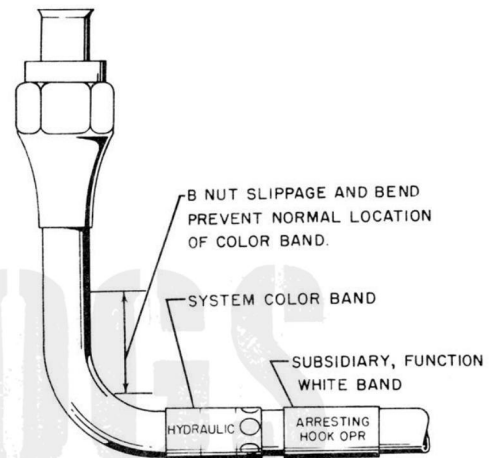
INSTALLATION OF COLOR BANDS



GENERAL INSTRUCTIONS:

Install color bands on all rigid tubing assemblies as follows:

1. Install 3 inches from each end—but not over any portion of part number, nor within normal slippage of B-nut, nor on any bend. If bend interferes, install just beyond radius.
2. On tubing assemblies 6 inches or less—none.
3. On tubing assemblies 6 to 24 inches long—one, at midpoint, provided both ends are within same compartment.
4. Install so that at least one band is visible in each compartment.
5. Install at bulkheads—on each side, if necessary, and particularly where lines enter and emerge from closed compartments.
6. On filler, drain, vent or pressure transmitter lines—use same color band as on system of which individual line is a part.



INSTALLATION SEQUENCE

- A. Make sure tubing is free from dirt, oil or moisture.
- B. Separate color band from paper backing, (by hand or use tape dispensing machine).
- C. Cut color band to proper length, (circumference of tube, plus 1/8 inch minimum overlap, but so as to include one complete block of lettering).
- D. Activate adhesive backing on color band.
With tape dispensing machine or small sponge, apply Cyclohexanone, Scotchlite A-2 (Minnesota Mining and Mfg. Co., St. Paul, Minn.), or other suitable solvent.

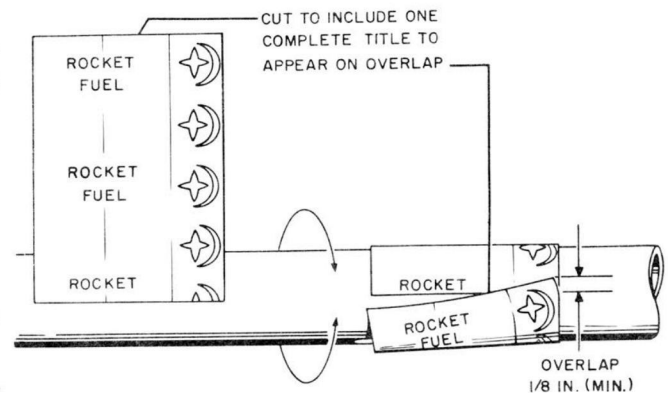
Note

Color band must be installed within 3 minutes of activating adhesive backing.

- E. Wrap color band around tubing with content wording on top of overlap.
(Press down firmly, removing bubbles and wrinkles, but taking care not to disfigure color band.)

CAUTION

Do not install identification tape in high heat (550°F) areas of engine compartments or in any location where it might be drawn into any engine intake. (Use approved paint and omit symbols.)



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Figure 1-13. Tubing Assembly and Installation Data (Sheet 4)

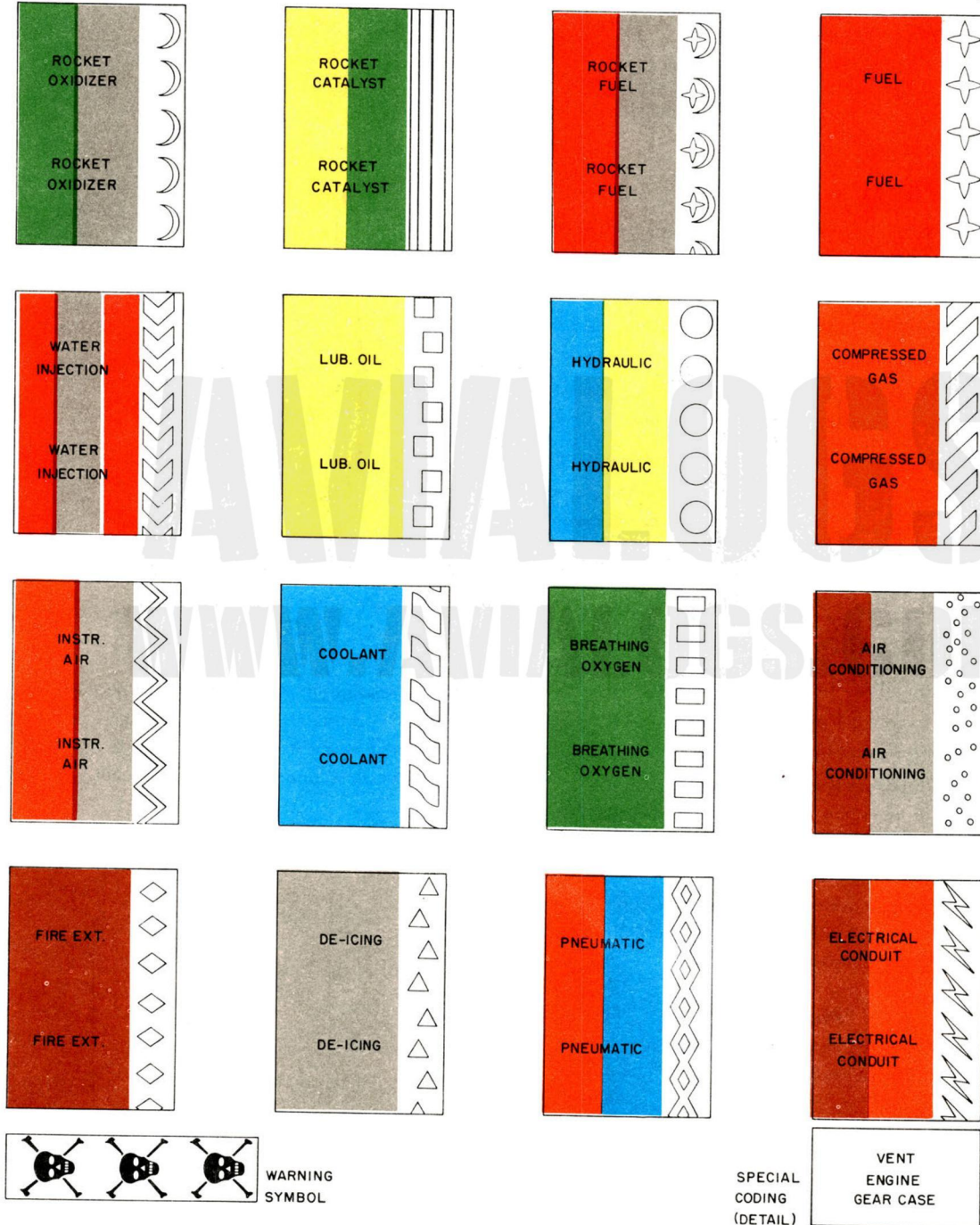
IDENTIFICATION OF TUBING LINES

IDENTIFICATION COLOR BANDING TAPE (AND 10375) (MIL-D-8634)

Basic color bands, as shown, designate the system, or main function, of tubing lines.

Subsidiary functions may be obtained by additional words stamped or printed:

(1) on the basic color band applicable, or (2) on a white, special coding band installed adjacent to the color band. Warning symbol band, if available, may be installed adjacent to the color band on lines considered dangerous to maintenance personnel.



PS-8891-5

Figure 1-13. Tubing Assembly and Installation Data (Sheet 5)

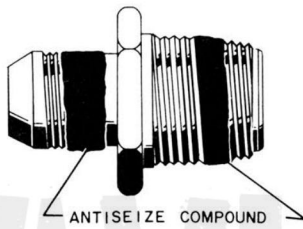
ANTISEIZE DATA

ANTI-SEIZE TREATMENT FOR MATING PARTS ON TUBING LINES (FOR OXYGEN LINES—REFER TO SHEET 14)

To prevent seizure or galling on assembly, and to facilitate removal, reducing danger of twisting tube, apply proper anti-seize compound (see chart) as follows:

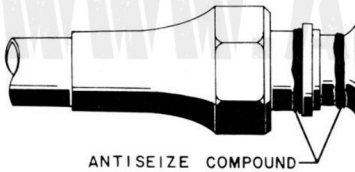
1. Apply to male threads only, of threaded mating parts.

On straight threads—omit first two; evenly fill remaining threads.

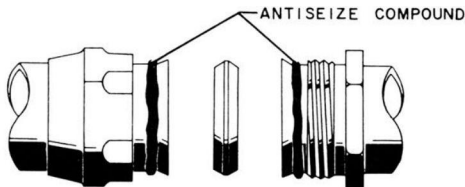


On tapered pipe threads—evenly fill first three; omit remaining threads.

2. Apply sparingly to back surfaces of flared tubing ends and to back surfaces of sleeves.



3. On special tube joint couplings, where two flared ends meet on double chamfered ring, apply sparingly to backs of flares; not to the ring.



4. Apply antiseize with small, stiff brush or paddle, sparingly, so that it evenly fills threads.
5. After tightening any fitting, carefully wipe off excess antiseize to prevent it from dripping on other lines or wiring.

ANTISEIZE MATERIALS	
FUNCTION	SPECIFICATION
GENERAL LINES-LOW TEMPERATURE (BELOW 300° F) LINES CARRYING FUEL, ENGINE OIL, ALCOHOL, FIRE EXTINGUISHER FLUIDS OR WATER, (OTHER THAN FOR DRINKING PURPOSES)	TT-A-580
HIGH TEMPERATURE LINES (300° TO 800° F) HOT AIR LINES, COMBUSTION HEATERS, EXHAUST SYSTEMS	MIL-C-5544
VERY HIGH TEMPERATURE LINES (800° OR ABOVE) THREADED JOINTS IN ENGINE AREAS. ALSO AS LUBRICANT FOR SLIDING SURFACES, ETC. IN ENGINE AREAS	(COMMERCIAL) FEL-PRO C-5 (FELT PRODUCTS CO) CHICAGO ILL. THREADSEAL WR-7200 (RICHFIELD OIL CO.)
HYDRAULIC LINES THREADED JOINTS. ALSO AS O-RING GASKET LUBRICANT	MIL-H-5606
PNEUMATIC SYSTEMS THREADED JOINTS ONLY	MIL-T-5542
INSTRUMENT LINES REFER TO PROCEDURES FOR THE SYSTEM TO WHICH INSTRUMENT IS CONNECTED	TT-A-580 OR-SAME AS INDICATED FOR SYSTEM INVOLVED
DRINKING WATER LINES NORMALLY NONE NECESSARY	NONE - OR PETROLATUM

CAUTION

Do not attempt to seal a faulty joint with anti-seize; it will eventually leak. (Depend on proper mating, alignment, torque and cleanliness for leakproof joints.)

Take extreme care to prevent any antiseize from entering tubing. It will contaminate fluid, and plug orifices, screens and filters. Carefully clean contaminated tubing.

ALF-2-1 P-41715-1

Figure 1-13. Tubing Assembly and Installation Data (Sheet 6)

TUBING CORROSION PREVENTION

EXPOSED TUBING AND FITTINGS

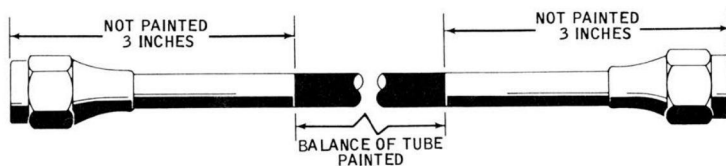
PAINTING OF TUBING ASSEMBLIES

ALL TUBING ASSEMBLIES IN EXPOSED LOCATIONS:

All tubing of any kind, and fittings, visible in cockpit personnel areas and in exterior exposed locations, (such as wheel well and wing fold areas) after being assembled and torqued, shall be painted to match background finishes.

HYDRAULIC ALUMINUM TUBING ASSEMBLIES—NOT IN EXPOSED LOCATIONS:

Hydraulic aluminum tubing assemblies, more than 9 inches long, shall be painted to match background finishes— except that paint shall be omitted from all sleeves, fittings and other connections, and from the tubing for a space 3 inches from each end.



HYDRAULIC ALUMINUM TUBING ASSEMBLIES—IN HIGH HEAT LOCATIONS:

Hydraulic aluminum tubing assemblies, located in areas where high temperatures are generated, are primed, not painted.

ALL OTHER ALUMINUM TUBING ASSEMBLIES:

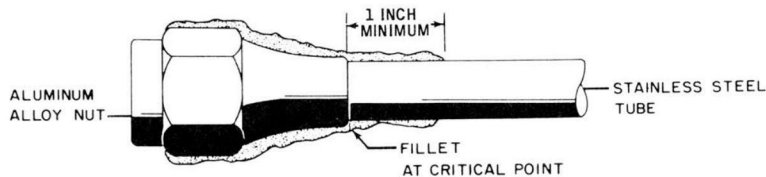
All other aluminum tubing assemblies, and fittings, shall be painted to match background finishes.

ANTICORROSION TREATMENT

FITTINGS AND TUBING OF DISSIMILAR METALS, EXPOSED:

Stainless steel tubing with aluminum alloy nuts, visible in exposed locations, (such as wheel well and wing fold areas) shall receive the following anticorrosion treatment after being installed, torqued and painted:

- A. Clean nut and at least 1 inch of tubing behind nut with solvent, (Fed Spec -P-D-680) or equivalent.
- B. Brush-coat nut and tubing with hard film, corrosion-preventive compound, (Spec MIL-C-16173) making sure that a good fillet of compound is formed at point where tubing enters nut.



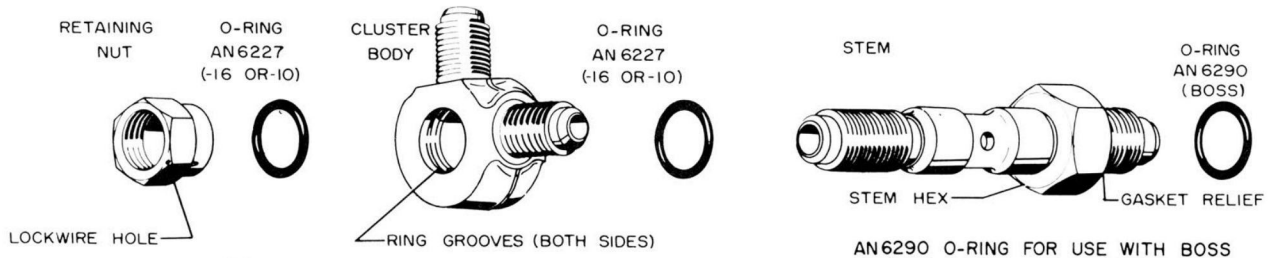
Note

Connections protected in this manner must be re-treated if fillet is broken. The surfaces touching where the tube enters the nut are subject to rapid corrosion.

ALF-2-1 P-41715-2

Figure 1-13. Tubing Assembly and Installation Data (Sheet 7)

UNIVERSAL CLUSTER FITTINGS COMPONENTS



Note

There are two series:
 High-flow (stem Dia 13/16 inch) with AN6227-16 O-Ring,
 Low-flow (stem Dia 1/2 inch) with AN6227-10 O-Ring.

ASSEMBLY SEQUENCE

- A. Lubricate O-rings.
 For air lines—use grease (Spec MIL-G-3545).
 For other lines—use fluid of system.
- B. Install O-rings in both ring grooves within cluster body.
- C. Lubricate stem.
 For hydraulic system—use hydraulic fluid (Spec MIL-H-5606).
 For other systems—use hydraulic fluid (Spec MIL-H-6083).
- D. Slip body onto stem. (Drawing shows two-body assembly.)
- E. Install retaining nut with spacer end against cluster body.
 Do not tighten until after installation of system lines.

Note

For bulkhead or bracket installation, assembly must be made at location of supports. (Installation step C.)

INSTALLATION SEQUENCE:

- A. If assembly mounts to female port, boss, lubricate and install boss gasket (AN6290) O-ring in gasket relief on stem.
- B. Engage stem with port, or boss, and tighten until hex bottoms on boss. (Slight gap is acceptable.)
- C. If assembly mounts between line connections, install with supports. (Omit boss gasket.)

Note

- For bulkhead or bracket installation, locate supports adjacent to cluster bodies, between, or on either side of them. Do not use more than two supports. Maximum total thickness (one or two supports), 0.083 inch.
- D. Install all system lines.
 - E. Tighten retaining nut snugly and install lockwire. (Where lockwire cannot be installed because of inaccessibility, install elastic stopnut AN364 in place of retaining nut.)

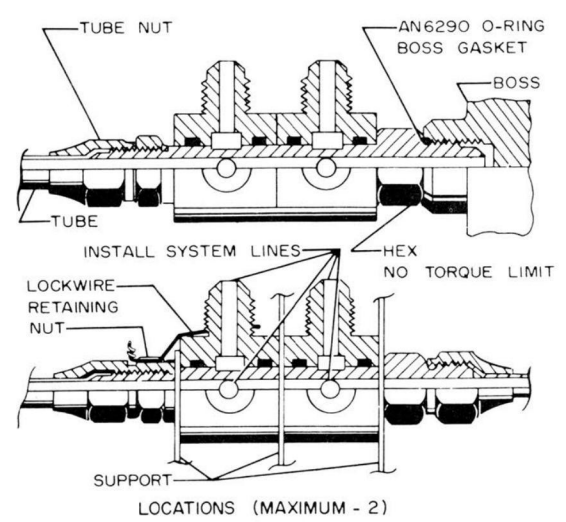
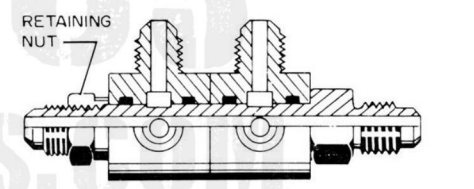
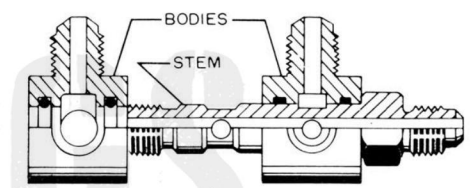
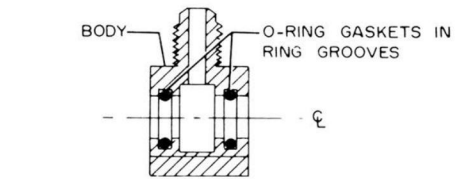
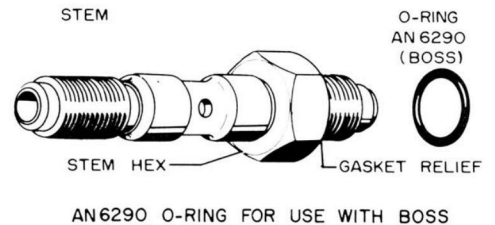


Figure 1-13. Tubing Assembly and Installation Data (Sheet 8)

UNION AND UNIVERSAL TYPE CONNECTIONS

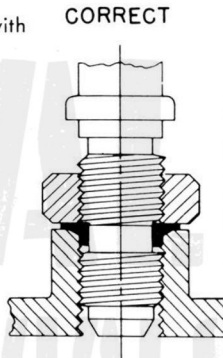
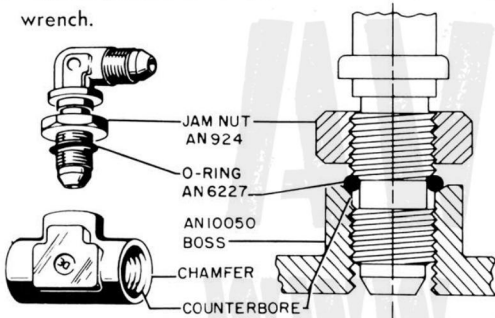
ASSEMBLY AND INSTALLATION

LOW PRESSURE UNIVERSAL TYPE

- Inspect fitting and boss for damage to threads or gasket reliefs.
- Inspect boss chamfer and counterbore for angle and depth (AND 10050).
- Turn jamnut back on fitting to clear O-ring gasket relief.
- Lubricate O-ring and threads with system fluid.
(On air lines, use grease, Spec MIL-G-3545)
- Install O-ring in O-ring gasket relief on fitting.
- Turn fitting into boss until resistance is felt, indicating that O-ring is lightly wedged between fitting thread and boss chamfer.
- Align fitting (elbow, tee, etc.) with system tubing by backing it out, but no more than one full turn.
- Tighten jamnut lightly.
- Assemble system line to fitting (elbow, tee, etc.).
- Tighten jamnut to torque limit in chart, holding fitting with wrench.

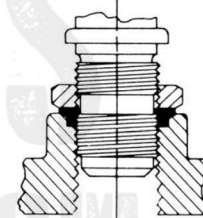
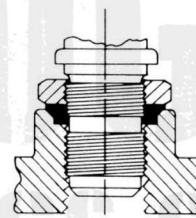
TORQUE AND GASKET REQUIREMENTS FOR UNION AND UNIVERSAL TYPE FITTINGS CONNECTING TO AND 10050 BOSS					
TUBE SIZE OD (IN)	UNION TYPE		UNIVERSAL TYPE WITH JAM NUT		
	HIGH OR LOW PRESSURE		JAM NUT SIZE (IN)	LOW PRESSURE	
	TORQUE ON FITTING	GASKET O-RING AN6290		TORQUE JAM NUT AN924 (IN POUNDS)	GASKET O-RING AN6227 (DASH NO.)
3/16		AN6290-3	5/8	28	AN6227-6
1/4	NO	-4	1/16	50	-8
5/16	TORQUE	-5	3/4	78	-8
3/8	LIMIT	-6	15/16	112	-9
1/2		-8	1	200	-12
5/8		-10	1 1/8	312	-15
3/4		-12	1 3/8	450	-17
1		-16	1 5/8	600	-20

TUBE SIZE OD	HIGH PRESSURE	
	TORQUE JAM NUT AN6289	GASKET O-RING AN6290
1/4	NO	DASH-4
ONLY	TORQUE LIMIT	BACK-UP-RING AN6291



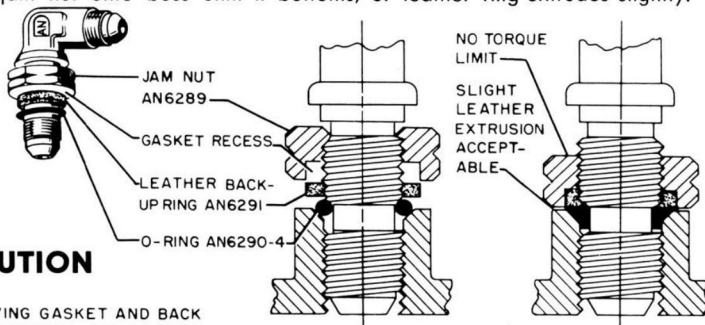
INCORRECT-

FITTING THREADS, CUTTING INTO O-RING, WILL EVENTUALLY CAUSE LEAK



HIGH PRESSURE UNIVERSAL TYPE

- Follow inspection and assembly steps (A thru F) as for low pressure type.
Exception:—Install leather back-up ring before installing O-ring on fitting.
- Turn fitting in an additional half turn.
- Align fitting with system tubing by turning it in not more than one additional turn.
- Assemble system tubing to fitting.
- Tighten jam nut onto boss until it bottoms, or leather ring extrudes slightly.

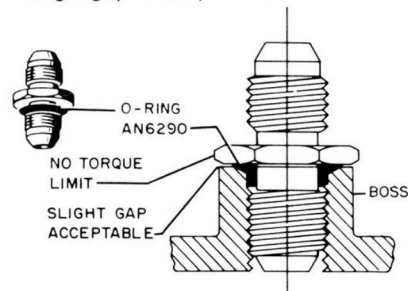


CAUTION

WHEN REMOVING GASKET AND BACK UP RING FROM FITTING, CUT OR PULL THEM OFF. (FORCING THEM OFF WITH NUT MAY DAMAGE THREADS)

UNION TYPE LOW OR HIGH PRESSURE

- Inspect fitting and boss as for other types.
- Lubricate and install O-ring in gasket relief.
- Tighten fitting to boss until it bottoms (slight gap is acceptable).



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Figure 1-13. Tubing Assembly and Installation Data (Sheet 9)

FLARED TUBING

ASSEMBLY AND INSTALLATION

ASSEMBLY

- A. Cut tube square, ($90 \pm 1/2$ degrees) to exact length.
- B. Remove burrs and smooth tube end, inside and outside.
- C. Form tube to template.

Note

Bends should be no closer to tube ends than length of B-nut plus 1 inch for single flare, or length of B-nut plus 1 1/4 inch for double flare.

- D. Install proper B-nut or nut-and-sleeve on tube.
- E. Flare tube. (Refer to detail dimensions chart, sheet 11.)
- F. Test for leaks. (Refer to proof-test pressure chart, sheet 2.)
- G. Clean and dry tube, and, unless assembly is for immediate installation in system, install end plugs.

INSTALLATION

- A. Apply anti-seize to male threads. (Refer to sheet 6.)
- B. Seat tube squarely against fitting cone.

Note

Flared end should fit snugly against cone and require no pressure to keep it in place. If too short or out of line, do not force fit; fabricate a new assembly.

- C. Turn nut onto fitting by hand until it bottoms.
- D. Tighten nut with torque wrench to proper torque limit. (See chart.)

TORQUE LIMITS FLARED TUBE FITTINGS				
"B" NUT TORQUE				
TUBE O.D. SIZE (IN.)	"B" NUT HEX SIZE (IN.)	TUBING		
		HIGH PRESSURE STEEL		LOW PRESSURE ALUMINUM
		NUT	NUT	NUT
		STEEL AN 817	ALUMINUM AN 818	ALUMINUM AN 817 AN 818
3/16	7/16		80	28
1/4	9/16	125	105	50
5/16	5/8	160	160	78
3/8	11/16	230	230	112
1/2	7/8	430	430	200
5/8	1	700	700	312
3/4	1 1/4		1000	450
1	1/2			600

- E. Paint pink torque stripe 1/8 inch wide across nut and fitting to detect connection overtightened or loosened in service. (Synlac, No. 7766, Baby Pink, W. P. Fuller and Co., San Francisco, Calif., or equivalent.)
- F. If connection leaks, remove torque stripe with paint stripper, disconnect and locate cause. (Do not use torque wrench to disconnect.) Clean, repair, or replace assembly as necessary.

CAUTION

Do not exceed torque limit to stop leak.

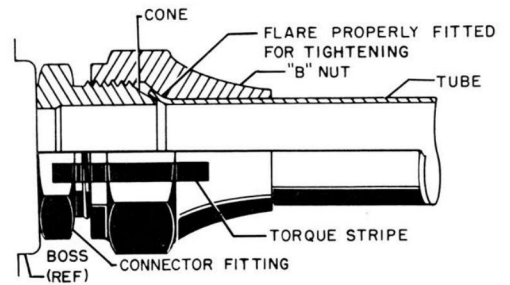
Exception: On steel connections, a 1/6 additional turn (one hex side) is permitted. When this is done, do not alter torque stripe. (Misalignment warns that absolute limit has been reached.)

INSPECTION OF ASSEMBLY AND FITTINGS:

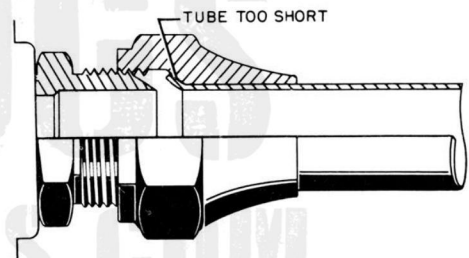
Reject flared tube assemblies for following causes:

1. Flare scratched or rough inside, cracked, split, distorted into thread way, out of round, or eccentric to tube O.D. or at different angle from fitting cone.
2. Sleeve (if any) split or cracked.
3. Fitting cone rough or scratched.
4. Threads of union or nut dirty or damaged.

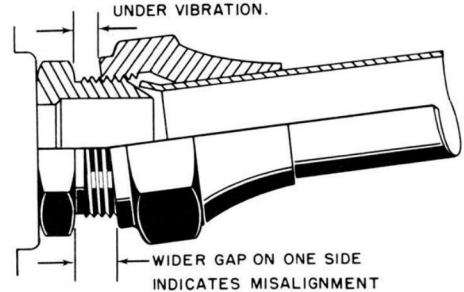
CORRECT



INCORRECT - IF TIGHTENED, WILL PULL OFF OR DISTORT FLARE



INCORRECT - IF TIGHTENED, WILL DAMAGE FLARE, OR THREADS, OR CAUSE SLEEVE TO CRACK UNDER VIBRATION.



Note

If assembly connects to boss, torque B-nut without holding connector fitting. (This imparts same torque to both.) Torque stripe nut-to-connector only—not connector-to-boss.

COMMON CAUSES OF LEAKS IN FLARED TUBE ASSEMBLIES:

Foreign material under flare. Flare rough, cracked, split or eccentric. Torque limit exceeded. Thread seizure, preventing contact. (Refer also to leakage chart, sheet 3.)

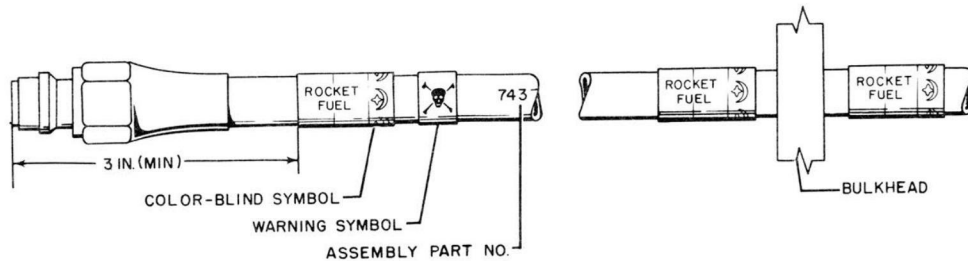
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Figure 1-13. Tubing Assembly and Installation Data (Sheet 10)

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IDENTIFICATION OF TUBING LINES

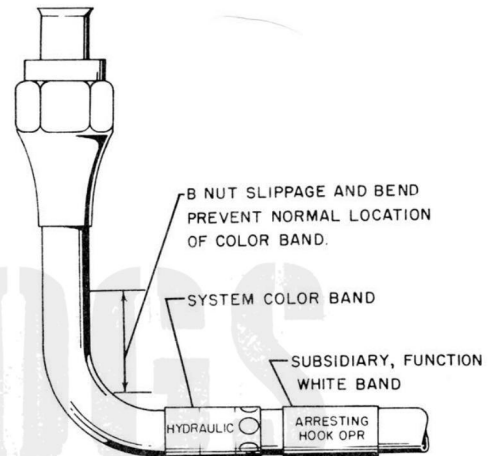
INSTALLATION OF COLOR BANDS



GENERAL INSTRUCTIONS:

Install color bands on all rigid tubing assemblies as follows:

1. Install 3 inches from each end—but not over any portion of part number, nor within normal slippage of B-nut, nor on any bend. If bend interferes, install just beyond radius.
2. On tubing assemblies 6 inches or less—none.
3. On tubing assemblies 6 to 24 inches long—one, at midpoint, provided both ends are within same compartment.
4. Install so that at least one band is visible in each compartment.
5. Install at bulkheads—on each side, if necessary, and particularly where lines enter and emerge from closed compartments.
6. On filler, drain, vent or pressure transmitter lines—use same color band as on system of which individual line is a part.



INSTALLATION SEQUENCE

- A. Make sure tubing is free from dirt, oil or moisture.
- B. Separate color band from paper backing, (by hand or use tape dispensing machine).
- C. Cut color band to proper length, (circumference of tube, plus 1/8 inch minimum overlap, but so as to include one complete block of lettering).
- D. Activate adhesive backing on color band. With tape dispensing machine or small sponge, apply Cyclohexanone, Scotchlite A-2 (Minnesota Mining and Mfg. Co., St. Paul, Minn.), or other suitable solvent.

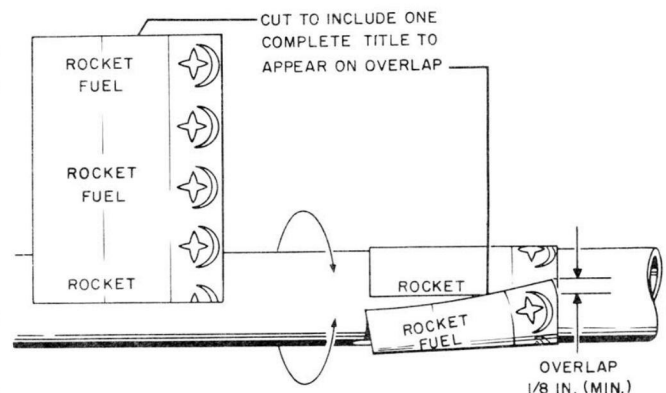
Note

Color band must be installed within 3 minutes of activating adhesive backing.

- E. Wrap color band around tubing with content wording on top of overlap. (Press down firmly, removing bubbles and wrinkles, but taking care not to disfigure color band.)

CAUTION

Do not install identification tape in high heat (550°F) areas of engine compartments or in any location where it might be drawn into any engine intake. (Use approved paint and omit symbols.)



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Figure 1-13. Tubing Assembly and Installation Data (Sheet 4)