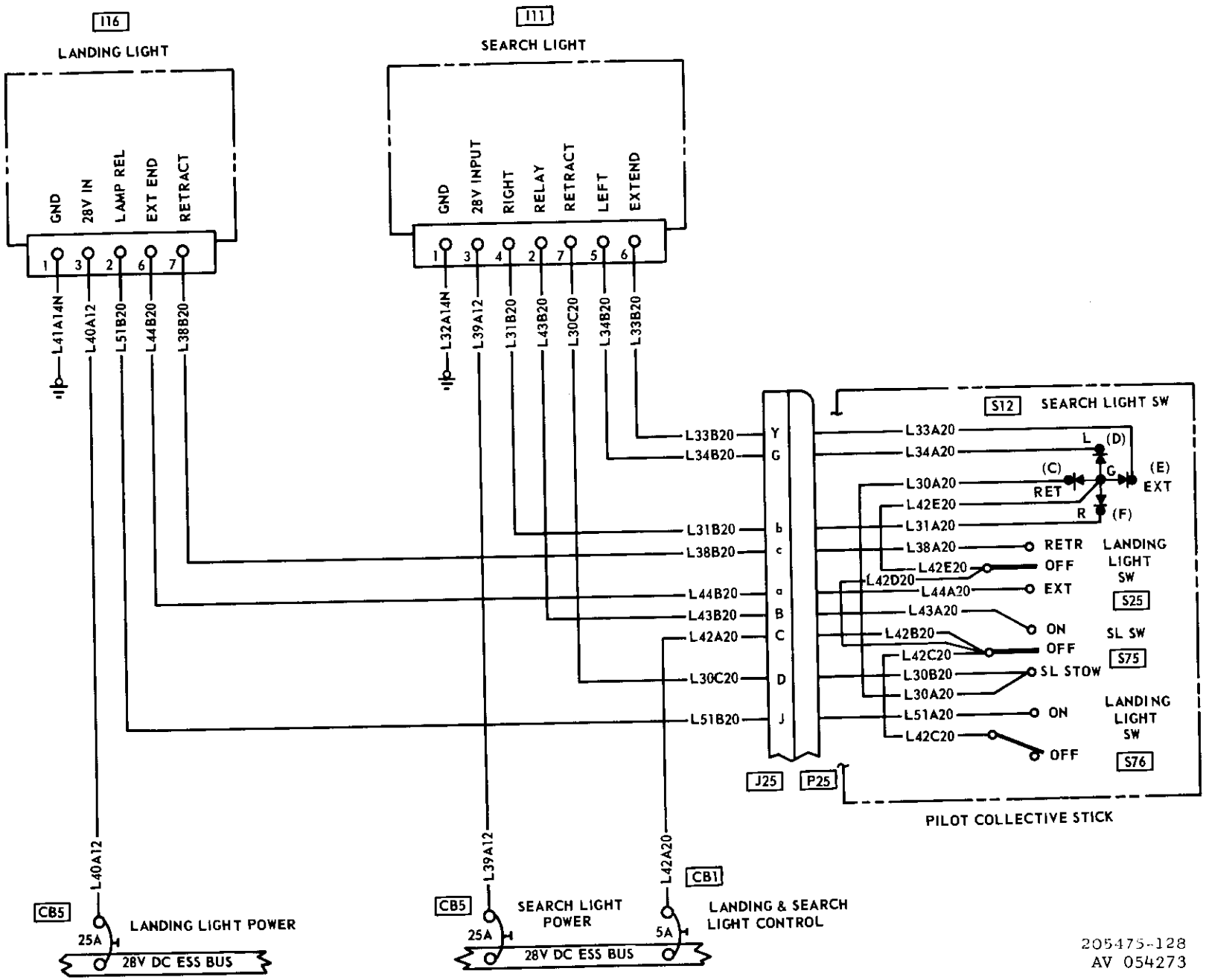


Figure 13-33. Landing and searchlights system

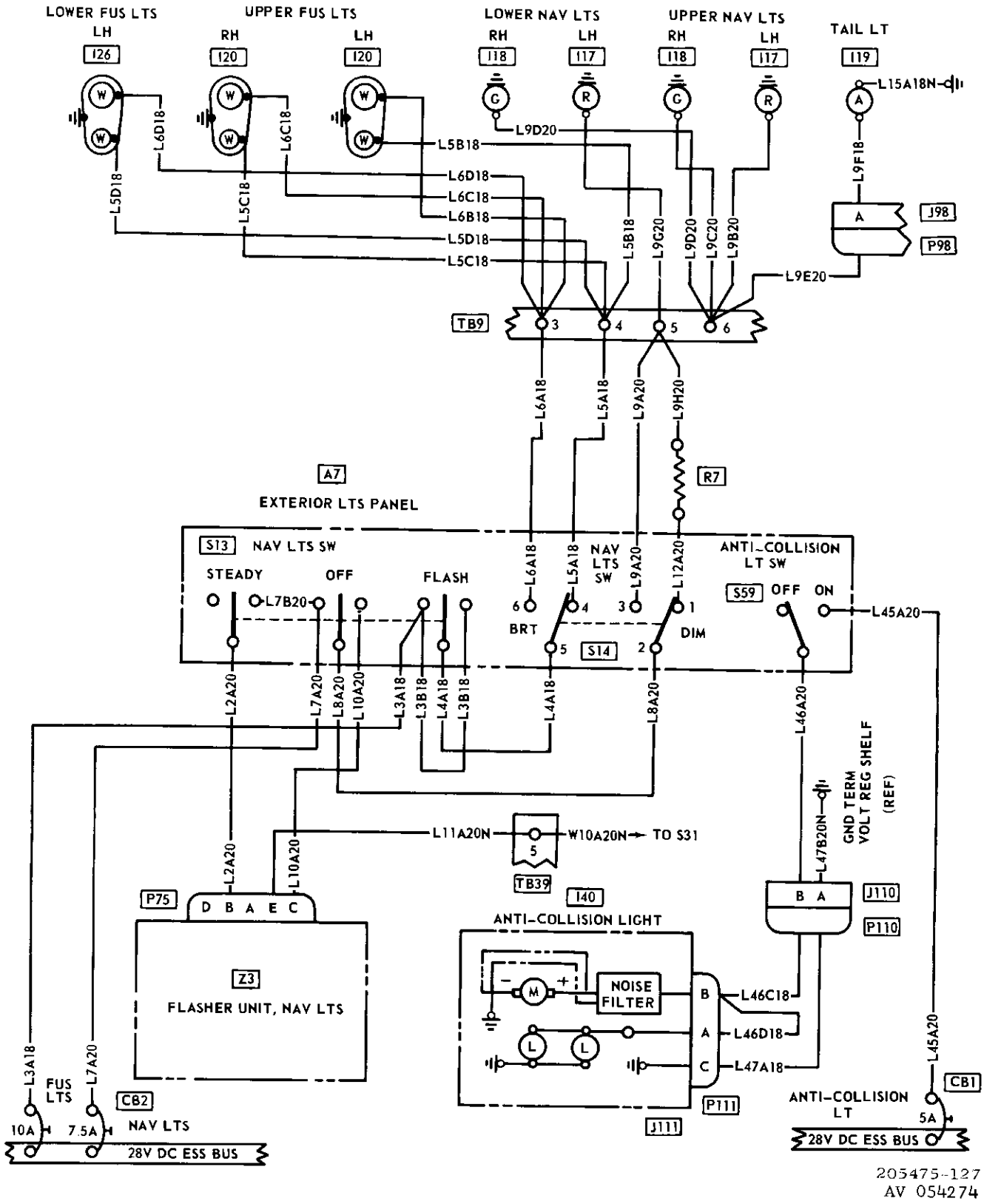


Figure 13-34. Navigation, fuselage and anti-collision lights system

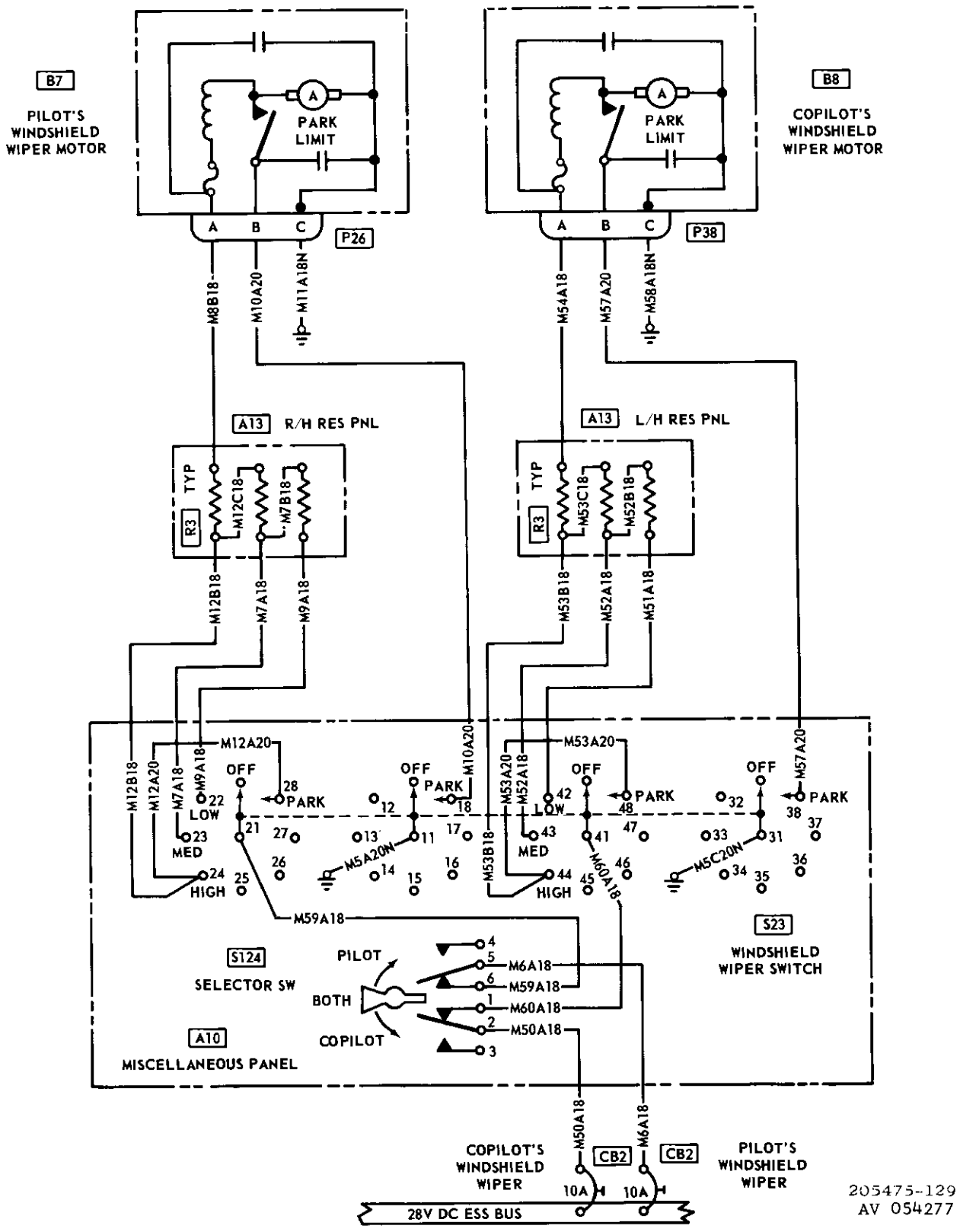


Figure 13-37. Windshield wiper system

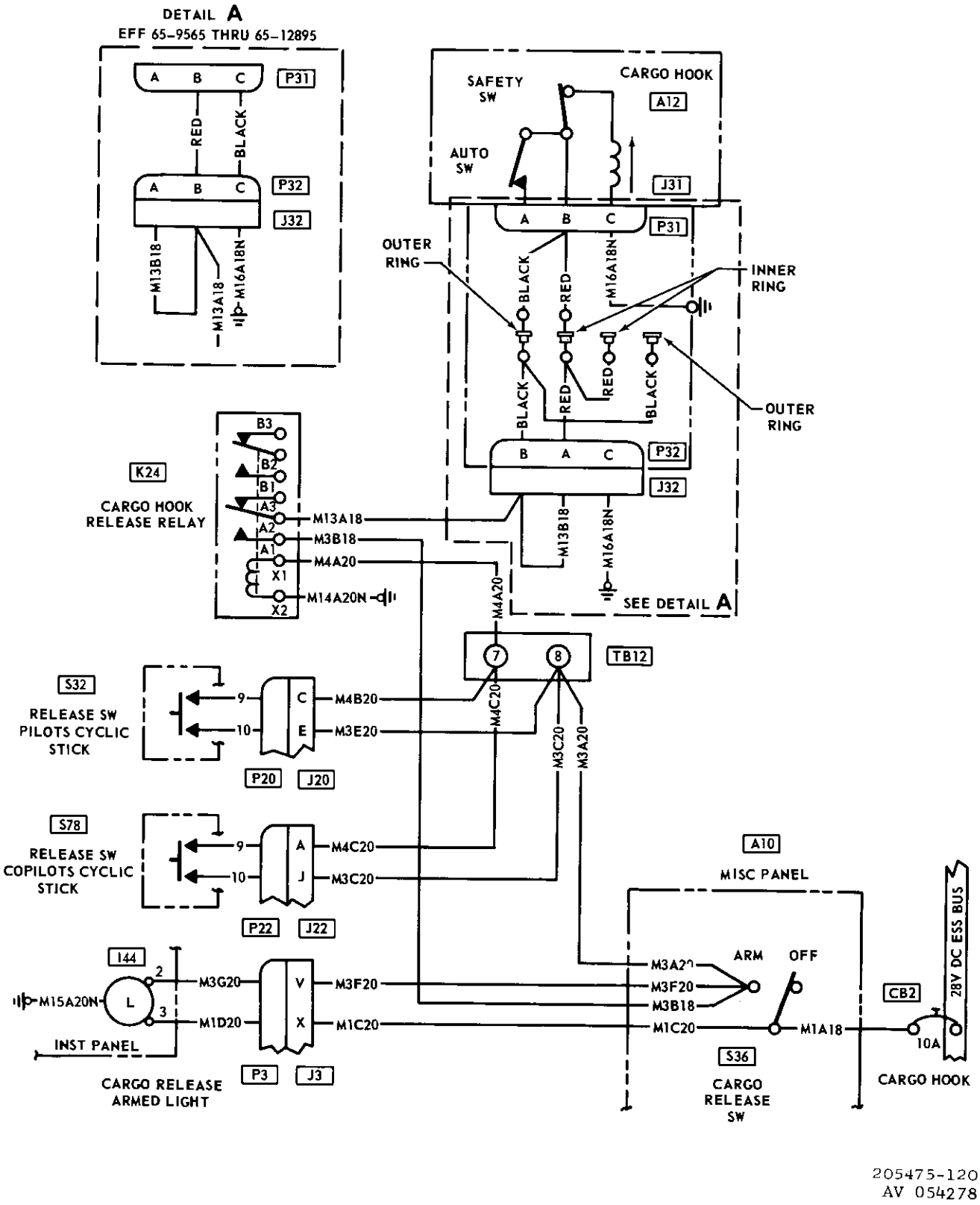


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Figure 13-38. Cargo hook system

# CHAPTER 14

# AVIONICS, PHOTOGRAPHY AND ARMAMENT

## 14-1. PURPOSE.

14-2. Refer to Appendix A for appropriate organizational maintenance manuals covering avionics and photography systems for Army Model UH-1D/H aircraft. This chapter contains organizational maintenance instructions for the armament system. Organizational maintenance of the armament subsystem will be performed by Aircraft Armament Repair men, MOS 45J.

## 14-3. GUNNERY EQUIPMENT.

14-4. MACHINE GUN INSTALLATION - M6 7.62 MM M60C.

14-5. The Quad 7.62 MM, M60C, machine gun installation is designed for use on the Model UH-1D/H helicopter. It consists, basically of four M6 7.62 MM machine guns, two machine gun mounts equipped with turret adapters (3, figure 14-1) which are attached to each of the forward external stores support assemblies (4) described in paragraph 15-22. Also included in this installation are the ammunition feed group, the electrical-hydraulic power source, for control and operation of the machine guns, and the sighting station.

**Note**

This installation is not applicable to UH-1D/H serial numbers 63-8739 thru 63-8859.

14-6. MACHINE GUN - M6 7.62 MM M60C.

14-7. The M6 7.62 MM machine gun (see figure 14-1) is a basic M60 machine gun modified for use with the helicopter. Four guns are available in this installation. Normally, two guns are mounted on each side of the helicopter, one above the other. The gun cover assemblies on the left-hand guns face inboard, towards the helicopter, while those on the right-hand guns face outboard. Ammunition is fed to the guns from above and cartridge cases are ejected downward. The guns are attached to the mount assemblies in such a manner that they can be quickly and readily removed and replaced. All four machine guns are interchangeable and may be installed on either mount assembly. (Refer to TM9-1005-243-12.)

14-8. REMOVAL - M6 7.62 MM M60C MACHINE GUN.

a. Before removing the machine guns from the helicopter perform the following:

**Warning**

In order to guard against danger in case of accidental firing, all personnel should remain clear of the firing pattern. "NO-STEP" markings on armament should be observed at all times.

(1) Make sure that the helicopter master battery switch is in the "OFF" position and that external power is disconnected.

(2) Set the "OFF-SAFE-ARMED" switch to the "OFF" position.

(3) Make sure that control panel indicator lights are out.

(4) Make sure that all machine guns are in "out-of-battery" position.

b. Unload the machine guns as follows:

(1) Rotate the gun cover latch lever (6, figure 14-1) counterclockwise and open the gun cover (7).

(2) Depress spring loaded ammunition chute latches (8) on the machine gun ammunition receiver and disconnect ammunition chute from gun. Carefully fold loose end of ammunition chute over gun mount assembly.

c. Close the gun cover (7) and make sure that cover latch lever (6) locks the cover in place.

d. Use a 3/16 inch off-set drift pin, or other suitable tool, to depress plunger in aft end of charger cylinder assembly (9) piston. This action unlocks a detent inside the charger cylinder assembly, which relieves hydraulic pressure and permits disengagement of spring loaded finger latch (10) attaching charger cylinder assembly (9) to machine gun cocking handle (11) bolt. Disengage finger latch (10) and rotate latch and charger cylinder assembly piston to clear cocking handle bolt.

e. Press up on underside of firing solenoid (12) to trip sear. This action permits the gun bolt (13), cocking handle (11) and charger cylinder assembly (9) piston to move forward to "battery" position and remain in that position.

f. Disconnect electrical connector from mating receptacle on firing solenoid assembly (12).

g. Depress spring loaded safety latches on gun latch (14) and unlock gun latch. Disengage machine gun from gun latch pawls. Remove machine gun from helicopter.

**Note**

Removal of all four machine guns is the same.

**Note**

Refer to TM 9-1005-243-12 for cleaning, lubrication and detail maintenance procedures of the M-6 7.62 MM, M60C, machine guns.

14-9. INSTALLATION - M6 7.62 MM, M60C MACHINE GUN.

a. Before installing the machine guns on the helicopter perform the following:

(1) Make sure that the helicopter master battery switch is in the "OFF" position and that external power is disconnected.

(2) Set the "OFF-SAFE-ARMED" switch to the "OFF" position.

b. Depress spring loaded safety latches on gun latch (14, figure 14-1) and unlock gun latch. Position and engage machine guns in gun latch pawls. Close and lock spring loaded safety latches.

c. Connect electrical connector to mating receptacle on firing solenoid assembly (12).

d. Position spring loaded finger latch (10) aft of cocking handle (11) bolt. Engage finger latch with bolt.

e. Refer to paragraph 14-17 and TB 55-1520-208-10/3 for loading and arming machine gun.

**Note**

Installation of all four machine guns is the same.

14-10. MOUNT AND ADAPTER - M-6 7.62 MM, M60C MACHINE GUN.

14-11. The two gun mount assemblies (see figure 14-1) each support two 7.62 MM machine guns. They also contain necessary equipment for movement of machine guns and ammunition. Each mount is capable of moving the two guns through a vertical arc of plus nine degrees and minus 66 degrees from center line position. They can also move both guns horizontally from 12 degrees inboard to 70 degrees outboard. All four guns move simultaneously, but when either mount moves the attached guns to the 12 degree inboard position a solenoid switch is activated and movement and firing of those guns is automatically stopped. Movement of the guns is controlled by means of hydraulic power. Each gun mount is equipped with an electrically operated cartridge drive which moves the ammunition from the ammunition boxes to the machine guns. The inboard end of each gun mount is attached to a turret adapter (see figure 14-1), which, in turn, is attached to an external stores support assembly. A hinge at the junction of the mount and adapter permits the mount to be swung to one side for easy access to hydraulic and electrical connectors.

**Note**

Left-hand and right-hand gun mounts and turret adapters are not interchangeable.

14-12. REMOVAL - M6 7.62 MM, M60C MACHINE GUN MOUNT AND ADAPTER.

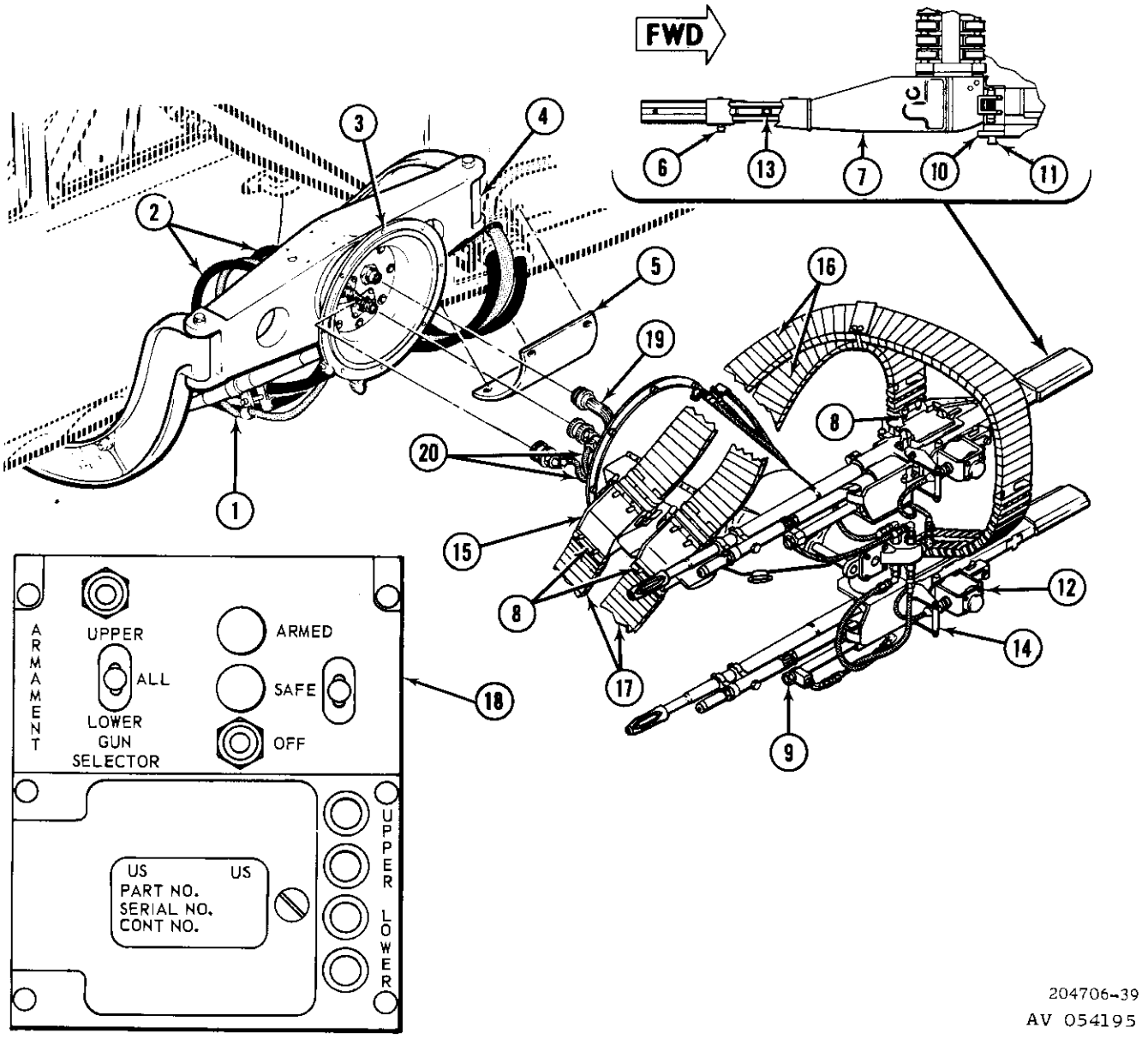
a. Remove 7.62 MM M60C machine guns. (Refer to paragraph 14-8.)

b. Depress spring loaded ammunition chute latches (8, figure 14-1) at top and bottom of cartridge drives (15) and release ammunition chutes from cartridge drives. Remove cartridge drive to machine gun ammunition chutes (16) and place on helicopter aft cabin floor or other suitable location. Fold ammunition box to cartridge drive ammunition chutes (17) back onto aft cabin floor.

c. Remove eight nuts, washers, and bolts attaching gun mount to turret adapter (3). Carefully swing gun mount open.

**Note**

Use care not to damage hydraulic lines (20) at quick disconnects on turret adapter (3) and immediately cap or cover male and female connectors to prevent entrance of foreign material. Disconnect electrical cable from receptacle on turret adapter (3) and cap or cover electrical connector and receptacle to prevent entrance of foreign material.




1. Electrical Cable - Helicopter to Turret Adapter
2. Hydraulic Lines - Helicopter to Turret Adapter
3. Turret Adapter
4. External Stores Support
5. Cover Plate
6. Gun Cover Latch Lever
7. Gun Cover
8. Ammunition Chute Latches
9. Charger Cylinder Assembly
10. Finger Latch
11. Cocking Handle
12. Firing Solenoid Assembly
13. Gun Bolt
14. Gun Latch
15. Cartridge Drive
16. Ammunition Chute - Cartridge Drive to Machine Gun
17. Ammunition Chute - Ammunition Box to Cartridge Drive
18. Control Panel
19. Electrical Cable - Machine Gun to Turret Adapter
20. Hydraulic Lines - Machine Gun to Turret Adapter

**Figure 14-1. Machine gun adapter kit and controls installation**

**Caution**

Each gun mount weighs approximately 60 pounds. Use two men to remove each mount as outlined in the following step d.

d. Position one man on each side of the gun mount and carefully raise the mount from the hinge pins on the turret adapter (3). Move gun mount to location where it will not be damaged.

e. Disconnect hydraulic lines (2) at helicopter fuselage quick disconnects. Cap or cover lines and connectors to prevent entrance of foreign material.

f. Back off check nuts connecting hydraulic lines (2) to turret adapter (3) quick disconnects. Disconnect hydraulic lines from quick disconnects. Remove, and cap or cover hydraulic lines and connectors to prevent entrance of foreign material.

g. Disconnect electrical cable (1) from receptacle to prevent entrance of foreign material.

h. Remove eight nuts, washers and bolts attaching turret adapter (3) to external stores support assembly (4) and remove turret adapter.

**Note**

Turret adapter (3) may be inspected by Fluorescent Penetrant method, Specification MIL-I-6866. Before proceeding with such inspection complete the following steps i. and j.

i. Back off check nut attaching electrical receptacle to adapter plate and remove receptacle and attached cable (1).

j. Remove four nuts, washers and bolts attaching each hydraulic mounting flange to turret adapter and remove mounting flanges. Back off quick disconnect check nuts and remove hydraulic quick disconnects from turret adapter.

k. Refer to TM 9-1005-243-12 for further information.

14-13. INSTALLATION - M6 7.62 MM, M60C MACHINE GUN MOUNT AND ADAPTER.

**Note**

If turret adapter (3, figure 14-1) has been completely disassembled, complete steps a. and b.

a. Position hydraulic quick disconnect in turret adapter (3) and install check nuts. Position hydraulic mounting flange over each check nut and install four attaching bolts, washers and nuts.

b. Thread electrical cable (1) through turret adapter (3) and position electrical receptacle. Install attaching check nut.

c. Position turret adapter (3) to external stores support assembly (4) and install eight attaching bolts, washers and nuts.

d. Uncap or uncover electrical cable (1) connector and receptacle at helicopter fuselage skin. Connect electrical cable to receptacle.

e. Uncap or uncover hydraulic lines (20), turret adapter (3) quick disconnects and helicopter fuselage quick disconnects. Connect lines (20) to quick disconnects.

**Caution**

Each gun mount weighs approximately 60 pounds. Use two men to install each mount as outlined in the following step f.

f. Position one man on each side of the gun mount and carefully engage the gun mount half hinge on the turret adapter (3) hinge pins.

g. Uncap or uncover electrical cable connector and turret adapter (3) receptacle and connect electrical cable (19) to receptacle.

h. Uncap or uncover hydraulic lines and turret adapter (3) quick disconnects and connect hydraulic lines (20) to quick disconnects.

**Caution**

Use extreme care when closing the gun mount assembly to avoid pinching or kinking the hydraulic hoses and to assure that they do not interfere with servo valves in the gun mount assembly. Make certain that the small two-pin plug is properly mated with the receptacle on the charger control valve. DO NOT force gun mount assembly into position.

i. Carefully swing gun mount to the closed position and install eight bolts, washers and nuts attaching the gun mount to the turret adapter (3).

j. Position loose end of ammunition box to cartridge drive ammunition chutes (16) to bottom of

cartridge drives (15). Depress spring loaded ammunition chute latches (8) and connect ammunition chutes (17) to cartridge drives (15).

k. Position cartridge drive to machine gun ammunition chutes (16) to top of cartridge drives (15). Depress spring loaded ammunition chute latches (8) and connect ammunition chutes (16) to cartridge drives (15).

l. Install M6 7.62 MM M60C machine guns. (Refer to paragraph 14-9.)

m. Refer to TB 55-1520-208-10/3 and TM 9-1005-243-12 for further information.

14-14. AMMUNITION FEED GROUP - M6 7.62 MM, M60C MACHINE GUN.

14-15. The ammunition feed group (see figure 14-2) consists, basically, of eight ammunition chutes, twelve ammunition boxes and an ammunition box tray equipped with three hold-down strap assemblies. Four ammunition chutes, two on each side of the helicopter, connect the top of the cartridge drive assemblies to the machine guns. A comparable installation connects the ammunition boxes to the bottom of the cartridge drive assemblies. The chutes connecting the ammunition boxes to the bottom of the cartridge drive assemblies pass through an opening in the cargo floor and the fuselage. The ammunition boxes are mounted on the ammunition box tray, located in the helicopter cargo area, and are held firmly in place by three hold-down strap assemblies. The sheet metal ammunition boxes are arranged in three groups of four boxes each. Each box is capable of holding approximately 450 rounds of ammunition, with a total capability of 5434 rounds, weighing 353.21 pounds. The ammunition box tray is attached to the helicopter cargo area floor by means of 16 screws. The three hold-down strap assemblies secure the ammunition boxes and tray to footman's loops in the cargo area floor.

14-16. REMOVAL - AMMUNITION FEED GROUP.

a. Accomplish paragraph 14-8 steps a. and b.

b. Depress the spring loaded ammunition chute latches (8, figure 14-1) which connect the chutes (16) to the top of the cartridge drives (15), and disengage chutes from cartridge drives.

Note

Ammunition chute clamps may be removed from chutes before storage.

c. Depress the spring loaded ammunition chute latches (8) which connect the chutes (17) to the bottom of the cartridge drives (15) and the ammunition boxes. Withdraw chutes through opening in the cargo floor and fuselage.

Note

Ammunition chute clamps may be removed from chutes before storage.

Note

Removal of the right and left-hand ammunition chutes is the same.

d. Release three ammunition box hold-down strap assemblies (3, figure 14-2) at lower, forward side of ammunition box tray (5). Remove strap assemblies (3) and ammunition box clamps (1).

e. Remove ammunition boxes from helicopter.

f. Remove 16 screws attaching ammunition box tray (5) to cargo area floor and remove tray from helicopter.

14-17. INSTALLATION - AMMUNITION FEED GROUP.

a. Position ammunition box tray (5, figure 14-2) in helicopter and install 16 attaching screws.

Note

The two existing screws (forward and aft of the ammunition tray) which comprise the second group inboard from the left-hand side of the helicopter, must be replaced.

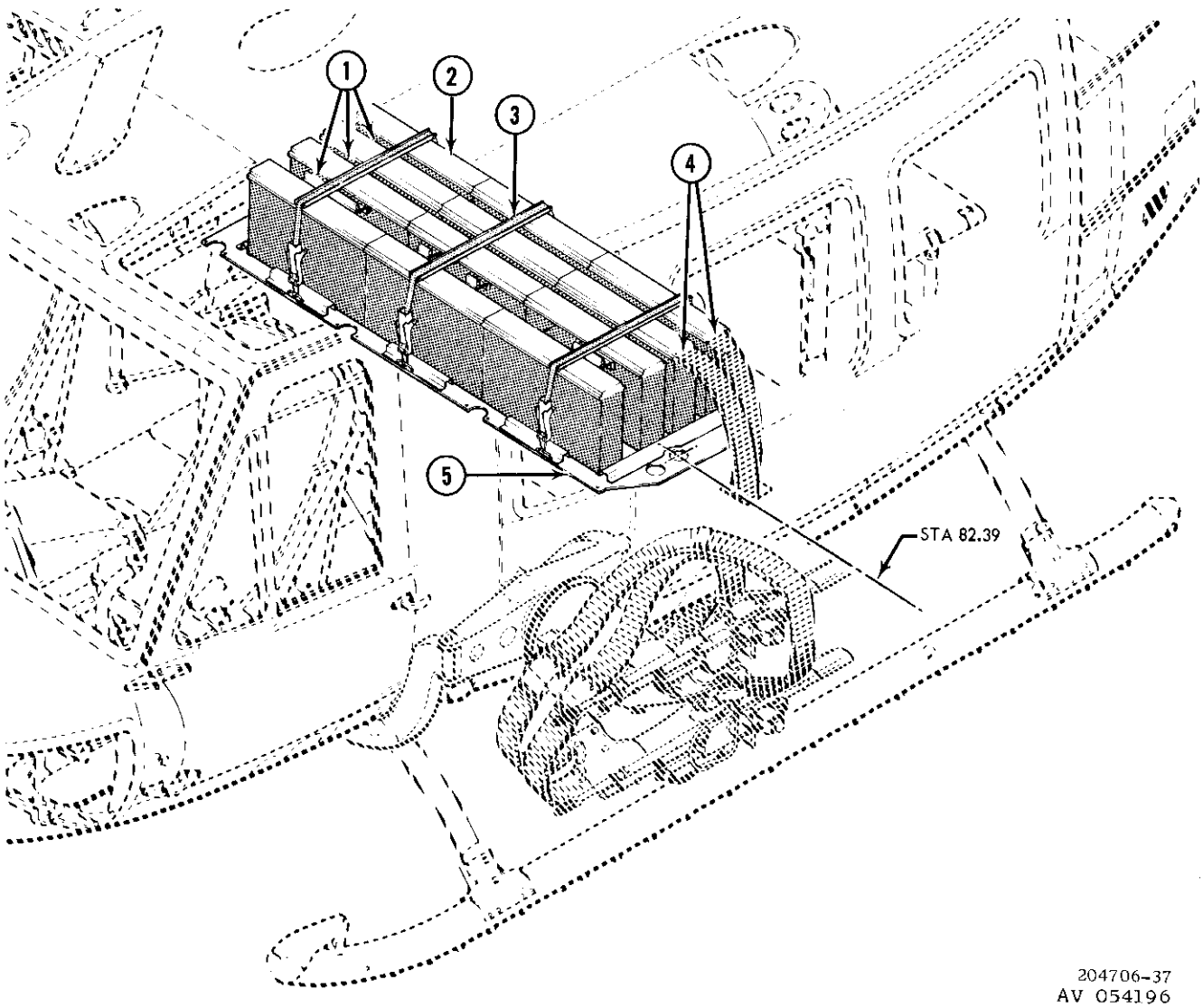
b. If ammunition boxes are not loaded, complete the following:

(1) Unsnap clamps (1) on top of ammunition box covers and remove covers.

(2) Fold the allowable maximum quantity of ammunition into boxes with links up, single-link end first. Projectiles must point to the left for feed to the left-hand machine guns and to the right for feed to the right-hand guns.

(3) Position the twelve ammunition boxes (2) on the ammunition box tray (5).

(4) Connect the ammunition belts together at adjoining boxes.




1. Ammunition Box Clamps
2. Ammunition Boxes
3. Strap Assemblies
4. Ammunition Chute Latches
5. Ammunition Box Tray

**Figure 14-2. Ammunition feed group**

(5) Crimp over the trailing link hanging out of the end of the third box in each row with a pair of pliers. Inspect all ammunition to make sure that it is laying properly in all boxes.

(6) Install covers on all ammunition boxes.

c. Position ammunition box clamps (1). Hook three hold-down strap assemblies to footman's loops along aft side of ammunition box tray (5) and position snugly over ammunition boxes. Position other ends of strap assemblies footman's loops forward of ammunition box tray (5). Tighten and secure hold-down strap assemblies (3).

d. Position one end of ammunition chutes (16, figure 14-1) to top of cartridge drives (15). Depress ammunition chute latches (8) and connect chutes to drives. Allow opposite ends of these two chutes to hang over the gun mount assembly.

e. Position one end of ammunition chutes (17) to bottom of cartridge drives (15). Depress ammunition chute latches (8) and connect chutes to drives At a short distance behind the gun mount assembly, grasp the two ammunition chutes and position the lower chute on top of the upper chute. Secure in this position with an ammunition chute clamp approximately midway between the gun mount assembly and the opening in the helicopter fuselage.

f. Extend free ends of left-hand ammunition chutes through the opening in the helicopter fuselage and cargo area floor into the cargo area. Connect the lower machine gun chute to the end box of the second row of ammunition boxes and the upper machine gun chute to the end box of the first row of ammunition boxes. (Refer to figure 14-2.)

**Note**

Installation of left and right hand machine gun ammunition chutes is the same, except the right-hand lower gun chute is connected to the end box of the fourth row of ammunition boxes and the right-hand upper gun chute is connected to the end box of the third row of ammunition boxes.

14-18. CONTROL PANEL.

14-19. The control panel (18, figure 14-1) is located in the lower left-hand corner of the instrument pedestal between the pilot and copilot. It contains the "OFF-SAFE-ARMED" switch, a gun selector switch, an "ARMED" (red) safelight, a "SAFE" (green) light and necessary fuses, amplifiers and resistors.

14-20. REMOVAL - ARMAMENT CONTROL PANEL ASSEMBLY.

a. Make sure that the helicopter master battery switch is in the "OFF" position and that external power is disconnected.

b. Release quick-disconnect fasteners attaching armament control panel assembly to instrument pedestal and carefully raise panel assembly from pedestal.

c. Disconnect electrical connectors at back of panel and remove panel assembly. Cap or cover electrical connectors to prevent entrance of foreign material.

14-21. INSTALLATION - ARMAMENT CONTROL PANEL ASSEMBLY.

a. Uncap or uncover electrical connectors and connect to back of control panel assembly.

b. Position control panel assembly in instrument pedestal and engage quick-disconnect fasteners.

14-22. SIGHTING STATION.

14-23. The sighting station is attached to the cabin roof above and forward of the copilot's station. The purpose of this equipment is remote alignment of machine guns.

14-24. REMOVAL - SIGHTING STATION.

a. Make sure that the helicopter master battery switch is in the "OFF" position and the external power is disconnected.

b. Disconnect electrical connector from receptacle on sighting station mounting pad bracket and cap or cover connector and receptacle to prevent entrance of foreign material.

**Caution**

The sighting station is a delicate, precision instrument. Do not drop or jar at any time.

c. Manually support the sighting station and remove the four bolts and washers attaching it to the mounting pad on the cabin roof.

d. Carefully remove sighting station from the helicopter.

14-25. INSTALLATION - SIGHTING STATION.

**Caution**

The sighting station is a delicate, precision instrument. Do not drop or jar at any time.

**Note**

Thick edge of the mounting plate must be forward toward the nose of the helicopter.

a. Carefully position sighting station and align mounting holes. Install four attaching washers and bolts.

b. Uncap or uncover electrical connector and receptacle and engage connector with receptacle.

14-26. GUN FIRING RELAY.

14-27. The gun firing relay is mounted on a bracket inside the instrument pedestal at approximate center. Two terminal blocks are provided for electrical wiring interconnection.

14-28. REMOVAL - GUN FIRING RELAY.

a. Make sure that the helicopter master battery switch is in the "OFF" position and that external power is disconnected.

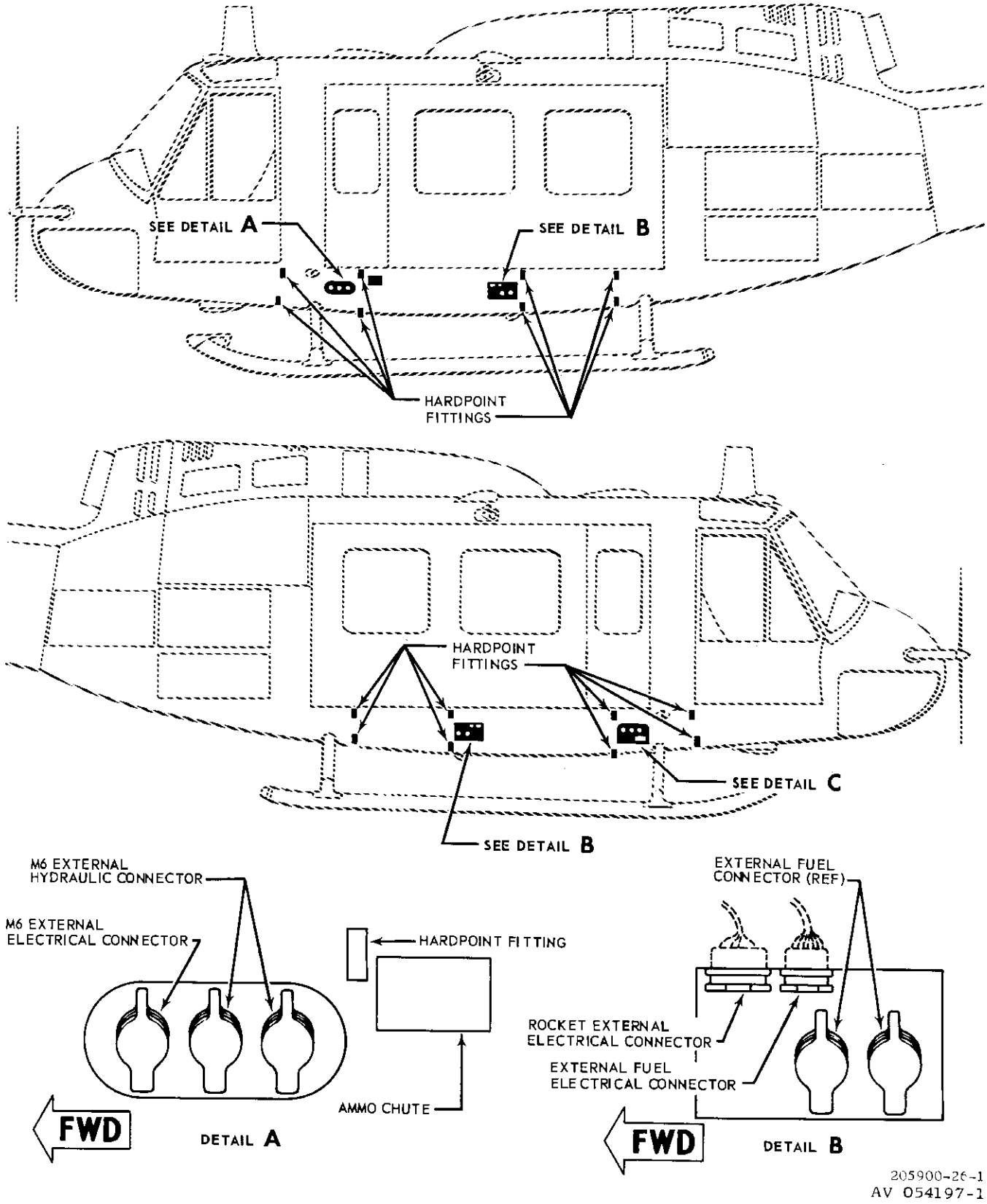



Figure 14-3. External connections arm and fuel kit (Sheet 1 of 2)

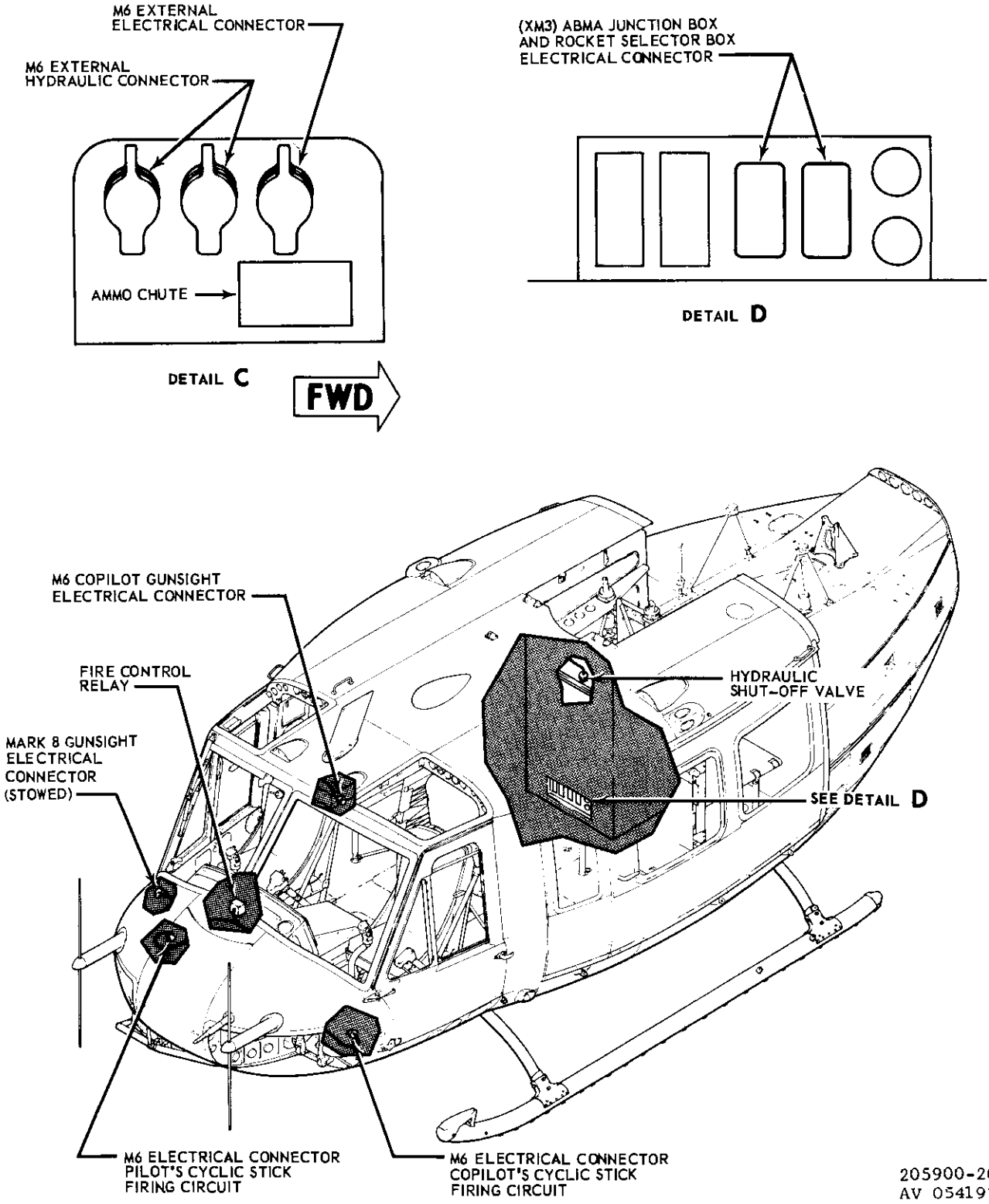



**Figure 14-3. External connections arm and fuel kit (Sheet 2 of 2)**

b. Release quick disconnect fasteners and remove access panel from floor under pilot's seat.

c. Disconnect electrical wiring from relay and cover wire ends with tape.

d. Remove four attaching nuts, washers and screws and remove relay.

14-29. INSTALLATION - GUN FIRING RELAY.

a. Position gun firing relay in instrument pedestal and install four attaching screws, washers and nuts.

b. Remove tape from wire ends and connect electrical wiring to relay.

c. Position access panel to floor and engage fasteners.

14-30. ROCKET INSTALLATION - 2.75 INCH, XM3, FIXED.

14-31. Complete electrical provisions for installing the XM3, 2.75 rocket installation are included in helicopter Serial No. 63-12956 through 63-13002. The 2.75 inch, XM3, fixed rocket installation includes two launcher pods (1, figure 14-4), one on each side of the helicopter. Each pod consists of four modules, each of which contains six launcher tubes, thus giving the helicopter a total armament capability of forty-eight modified Navy Type Mark IV, Mod VI, rockets (figure 14-4). Each launcher pod may be adjusted from plus six degrees to minus six degrees by manually operating the adjustable link assembly (3, figure 14-4) the aft end of which is pinned to the actuator bracket (4, figure 14-4). Manually adjustable back-up bearings act as mechanical stops to limit the launcher at plus 8 degree to minus 18 degrees relative to the helicopter. Launcher pods can be jettisoned by means of explosive bolts. Each pod is attached to an adapter assembly (5, figure 14-4) by means of four quick release attachment pins. Each adapter assembly is attached to a crank assembly (6, figure 14-4) which mates to the center hole in the external stores support assembly (7) crossbeam. The external stores support assembly is attached to the aft "hardpoints" on the helicopter fuselage structure. Other components of this installation include an armament control panel assembly and a sight light panel assembly, located in the lower left-hand corner of the instrument pedestal; a Mark 8 sight assembly, mounted on the right-hand side of the instrument panel just above the helicopter altimeter; cyclic control stick trigger switches; a junction box, and necessary electrical wiring, circuit breakers and relays. The system is capable of selective firing from the cabin, by either the pilot or copilot in the following modes:

a. Pair, single - one from each pod.

b. Ripples of 1-2-3-4-6 or 24 pairs (up to 48 rounds).

14-32. ROCKET - 2.75 INCH.

14-33. The 2.75 inch folding-pin aircraft rocket (see figure 14-4) (FFAR) used with the XM3 fixed system is a standard Navy Type IV, Mod VI, which has been modified to impart a ballistic spin of fifteen revolutions per second by scarfing the thrust nozzles at a twenty-four degree angle. Each rocket weighs 18 pounds, with the warhead containing 1.4 pounds of HEX-1 explosive. A shear release of 100 pounds is required for the shear wire in the detent rod. Rockets are fired with an average thrust of 761 pounds and have a burning distance of 6000 feet.

14-34. REMOVAL - 2.75 INCH ROCKETS.

a. Set the helicopter master battery switch to the "OFF" position.

**Note**

Handling of the 2.75 inch FFAR is similar to that of other aircraft rockets. It should be transported to and from the assembly area and loaded and unloaded in accordance with standard handling practices.

**Warning**

The following safety precautions are to be observed at all times:

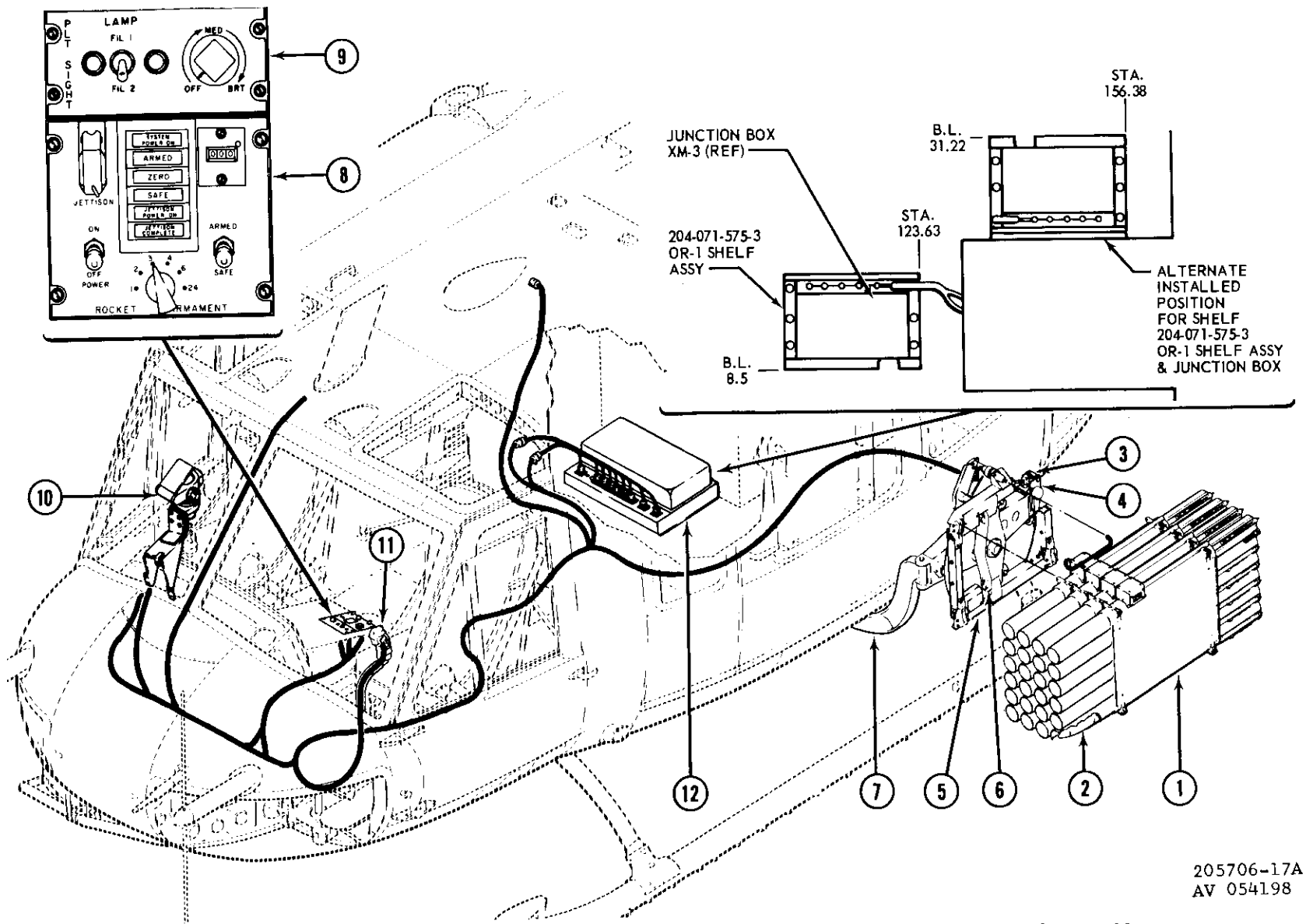
(1) Before removing an unfired round from the launcher, make sure that the firing circuit has been made safe at the rocket armament control panel and that the rocket jettison circuit breakers have been pulled.

(2) Handling of the rockets shall be confined to trained personnel.

(3) Smoking shall be prohibited in the vicinity of rockets at all times.

(4) No spark producing devices or power tools shall be used in the vicinity of rockets at any time.

(5) Precautions shall be taken in handling unshielded rockets in the vicinity of radio and radar transmitters, as there is the possibility of squibs actuating prematurely.




1. Launcher Pods
2. 2.75 Inch Rocket
3. Adjustable Link Assembly
4. Actuator Bracket
5. Adapter Assembly
6. Crank Assembly
7. External Stores Support Assembly
8. Armament Control Panel Assembly
9. Sight Light Panel Assembly
10. Mark 8 Sight Assembly
11. Cyclic Control Stick Trigger Switches
12. Junction Box

**Figure 14-4. 2.75 x M3 fixed rocket installation**

(6) A motor or rocket which has been dropped shall not be used but shall be labeled "Dropped Round", stored apart from usable rounds, and proper personnel contacted for disposition.

(7) Unnecessary personnel shall be kept well away from the front and rear of loaded launchers and launchers in the process of being loaded or unloaded.

(8) The helicopter shall not be fueled when rockets are nearby or in the launchers.

(9) While launchers are being loaded or unloaded the helicopter shall be pointed away from personnel and installations.

b. Disconnect the main battery plug from the battery.

c. Electrically ground the helicopter to an earth ground.

d. Release the launcher firing pin assembly from the fin retainer assembly and swing the firing pin assembly clear of the breech.

e. Release and remove aluminum shear wire from detent rod.

**Note**

Rocket may be loaded and unloaded from either the muzzle or the breech end of the launcher tube.

f. Release launcher latch and carefully remove rocket from launcher tube.

g. Install fin protector as soon as rocket has been removed from launcher tube.

h. Visually inspect synchronized elevator and forward section of tail boom for possible damage caused by rocket debris.

14-35. INSTALLATION - 2.75 INCH ROCKETS.

a. Observe all safety precautions outlined in paragraph 14-34.

**Note**

Handling of the 2.75 inch FFAR is similar to that of other aircraft rockets. It should be transported to and from the assembly area and loaded and unloaded in accordance with standard handling practices.

b. Make sure that the armament control panel counter reads 000 and the ZERO indicators on the panel and junction box are illuminated.

c. Pull out the two rocket jettison circuit breakers.

d. Set the helicopter master battery switch to the "OFF" position.

e. Disconnect the main battery plug from the battery.

f. Electrically ground the helicopter to an earth ground.

g. Make sure the JETTISON switch cover on the armament control panel is wired with copper break wire.

h. Make sure the launcher firing pin assembly is clean and will make good electrical contact. Swing the firing pin assembly clear of the breech

i. Remove the fin protector from the rocket fins. Make sure the fin retainer and contact button are in place and that the launcher latch retaining groove and contact disc are free from grease and foreign material.

**Warning**

If a gap exists between the front end of the rocket motor and the rocket head when assembled hand-tight, the rocket shall not be used.

**Note**

Rocket may be loaded and unloaded from either the muzzle or the breech end of the launcher tube.

j. Push the rocket into the launcher tube until the launcher latch seats firmly in the launcher latch retaining groove on the rocket.

k. Position aluminum shear wire in detent rod and crimp to retain.

**Warning**

Shear wire has been especially designed and constructed for this purpose. Be sure to use proper part. Use of improper wire may cause rocket to hang up and not launch.

l. Swing the launcher firing pin assembly back in place until the pin assembly snaps into the fin retainer assembly.

14-36. LAUNCHER AND ADAPTER.

14-37. A launcher and adapter (see figure 14-4) are attached to each side of the helicopter fuselage. Each launcher contains four six rocket modules which are attached to the adapter assembly. All modules are interchangeable with respect to attachment points and alignment. Switch boxes are on top of the module on the left-hand side of the helicopter (looking down range) and on the bottom on the right-hand side. The adapter assembly is an open, rectangular, aluminum frame which is attached to the crank by means of two explosive bolts.

14-38. REMOVAL - LAUNCHER AND ADAPTER.

a. Remove all unfired rockets. (Refer to paragraph 14-34.)

b. Disconnect electrical connectors from explosive bolts, adapter assembly and switch box on inside module. Cap or cover connectors to prevent entrance of foreign material.

c. Remove module assemblies by pulling attachment pins.

d. Cut safety wire and remove two explosive bolts attaching adapter assembly to crank assembly. Remove adapter assembly.

14-39. CLEANING - LAUNCHER AND ADAPTER. Launcher tubes should be cleaned, after each day's firing, with bore cleaner, or hot, soapy water. The firing contacts should be examined after each day's firing and thoroughly cleaned. Wipe the firing contacts with waste or rags soaked in bore cleaner until clean of all residue. Use a wire brush to aid in cleaning the firing contacts.

**Note**

Do not use dry cleaning solvents or mineral spirits paint thinner near an open flame. Keep such petroleum products as bore cleaner, dry cleaning solvent, mineral spirits paint thinner and lubricants off electrical components, wiring and rubber parts.

14-40. INSTALLATION - LAUNCHER AND ADAPTER.

a. Position adapter assembly to crank assembly and install attaching explosive bolts. Lock-wire bolts.

b. Assemble module assemblies to adapter assembly with attachment pins.

c. Uncap or uncover electrical connectors and connect connectors to switch box on inside module and to adapter assembly.

**Note**

Do not connect electrical connectors to explosive bolts until just before flight.

14-41. ADJUSTABLE LINK, ACTUATOR BRACKET AND CRANK ASSEMBLY.

14-42. Each launcher has an adjustable link (see figure 14-4) with the forward end mounted in a yoke formed by the upper end of the crank and the plate and spacer assembly. The aft end of the adjustable link is pinned to the actuator bracket. The actuator bracket is an open box type structure with extended sides which form lugs for pinning the aft end of the adjustable link to the aft end of the cross beam. The actuator bracket also receives the threaded ends of the adjustable backup bearings. The crank assembly is an aluminum box section unit. In conjunction with a steel shaft, bearings and other miscellaneous components, the crank assembly is attached to the cross beam of the external stores support and serves as the mounting point for the adapter assembly.

14-43. REMOVAL - ADJUSTABLE LINK, ACTUATOR BRACKET AND CRANK ASSEMBLY.

a. Remove launcher and adapter. (Refer to paragraph 14-38.)

b. Cut lockwire and remove bolt attaching the forward end of the adjustable link to the yoke formed by the upper end of the crank and the plate and spacer assembly.

c. Remove nut, washer and bolt attaching aft end of the adjustable link to the actuator bracket. Remove adjustable link.

d. Remove teflon bearings from threaded holes in actuator bracket.

e. Remove nut, washers and bolt attaching actuator bracket to aft end of cross beam and remove actuator bracket. Reinstall bolt, washers and nut to attach cross beam to aft support.

f. Cut lockwire and remove four nuts, washers and bolts attaching stop brace and bracket to plate and spacer assembly. Remove bracket.

g. Cut lockwire and remove four bolts attaching stop brace to crank assembly. Remove stop brace.

h. Remove crank shaft retainer nut from outboard end of crank shaft and remove keeper, key, crank assembly, bearing retainer and roller bearing from cross beam.

i. Remove crank shaft, with keeper, plate and spacer assembly, key, bearing retainer and roller bearings, as a unit from the inboard side of the cross beam.

j. Remove nuts, washers and bolts attaching bearing housings to the external stores support cross beam and remove bearing housings.

14-44. INSTALLATION - ADJUSTABLE LINK, ACTUATOR BRACKET AND CRANK ASSEMBLY.

a. Position bearing housings to external stores support cross beam and install attaching bolts, washers and nuts.

b. Assemble roller bearings, bearing retainer, short key, plate and spacer assembly (with flat side outboard) and keeper to the end of the crank shaft which has the short keyway. Secure loosely with shaft retainer nut.

c. Insert the items assembled in step b., above, into the external stores support cross beam in such a manner that the plate and spacer assembly is on the inboard side of the cross beam.

d. Assemble roller bearing, bearing retainer, crank assembly, long key, keeper and shaft retainer nut to outboard end of crank shaft.

e. Tighten both retainer nuts until there is no looseness but crank shaft rotates freely. Lock both nuts with tangs of keepers.

f. Align one end of stop brace with crank assembly so that stop brace is above cross beam. Install four bolts to attach stop brace to crank assembly and lock-wire.

g. Position bracket and other end of stop brace to plate and spacer assembly. Install four attaching bolts, washers and nuts and lock-wire.

h. Remove nut, washers and bolt attaching external stores support cross beam to aft support. Position actuator bracket to aft end of cross beam and install bolt, washers and nut previously removed.

i. Install teflon back-up bearings in threaded holes. Torque front and bottom rear bearings one turn. Torque top rear bearing one and one-half turns. Starting point for these torque values is 0.002 inch between the bearing arc and the teflon back-up bearing.

j. Position aft end of adjustable link to actuator bracket and install attaching bolt, washer and nut.

k. Position forward end of adjustable link to the yoke formed by the upper end of the crank and the plate and spacer assembly. Install attaching bolt and lock-wire.

14-45. PANEL ASSEMBLY - ARMAMENT CONTROL.

14-46. The armament control panel (see figure 14-4) is located in the lower left-hand corner of the instrument pedestal. The controls necessary for jettisoning the two pod assemblies, for turning on system power, for selecting the number of pairs of rounds, and the SAFE-ARMED switch are located on the panel. It also contains a counter to record the number of pairs of rounds fired during a mission, a SYSTEM POWER ON indicator light, an ARMED indicator light, a ZERO indicator light, a SAFE indicator light, a JETTISON POWER ON indicator light and a JETTISON COMPLETE indicator light.

14-47. REMOVAL - ARMAMENT CONTROL PANEL ASSEMBLY.

a. Make sure that the helicopter master battery switch is in the "OFF" position and that external power is disconnected.

b. Release quick-disconnect fasteners attaching armament control panel assembly to instrument pedestal and carefully raise panel assembly from pedestal.

c. Disconnect electrical connectors at back of panel and remove panel assembly. Cap or cover electrical connectors to prevent entrance of foreign material.

14-48. INSTALLATION - ARMAMENT CONTROL PANEL ASSEMBLY.

a. Uncap or uncover electrical connectors and connect to back of control panel assembly.

b. Position control panel assembly in instrument pedestal and engage quick disconnect fasteners.

14-49. PANEL ASSEMBLY - SIGHT LIGHT.

14-50. The sight light panel assembly is located in the lower left-hand corner of the instrument pedestal just forward of the armament control panel. The purpose of this panel is to control the power to the Mark 8 sight lamp. This action, as well as the intensity of illumination, is accomplished by means of a rheostat. The sight lamp has two filaments, either of which may be used for illumination. A switch on the sight light panel assembly affords the operator a choice of FIL 1 or FIL 2. The panel also is equipped with two standard panel lights.

14-51. REMOVAL - SIGHT LIGHT PANEL ASSEMBLY.

a. Make sure that the helicopter master battery switch is in the "OFF" position and that external power is disconnected.

b. Release quick-disconnect fasteners attaching armament control panel assembly to instrument pedestal and carefully raise panel assembly from pedestal.

c. Disconnect electrical connectors at back o panel and remove panel assembly. Cap or cover electrical connectors to prevent entrance of foreign material.

14-52. INSTALLATION - SIGHT LIGHT PANEL ASSEMBLY.

a. Uncap or uncover electrical connectors and connect to back of control panel assembly.

b. Position control panel assembly in instrument pedestal and engage quick-disconnect fasteners.

14-53. SIGHT ASSEMBLY - MARK 8.

14-54. The pilot sight (see figure 14-4) is used as an aid in maintaining alignment of the helicopter with the target during firing of a missile. The sight is mounted on a support assembly which is attached to the right-hand side of the instrument panel in front of the pilot's seat. The pilot sight consists of a sight body, a lamp and housing and a Mark 4 Mod O reflector assembly. A small control panel on the center console contains an FIL 1 - FIL 2 switch and an intensity control for illumination of the reticle.

14-55. REMOVAL - MARK 8 SIGHT ASSEMBLY.

a. Remove four nuts and bolts attaching pilot sight (10, figure 14-4) to support assembly (7), and remove pilot sight.

**Note**

The pilot sight is a delicate, optical instrument. Handle with care.

b. Remove five nuts, washers and screws attaching pilot sight support assembly (7) to right-hand side of instrument panel, and remove support assembly.

14-56. INSTALLATION - MARK 8 SIGHT ASSEMBLY.

a. Position pilot sight support assembly (7, figure 14-4) on instrument panel, and install attaching screws, washers and nuts.

b. Position pilot sight (10) against support assembly (7), and install attaching bolts and nuts.

14-57. ARMAMENT - JUNCTION BOX.

14-58. The junction box (see figure 14-4) connects to electrical connector at center of pylon in cabin and contains the circuits necessary for firing the rockets and for jettisoning the two pod assemblies. It also contains a RESET button which cycles the stepping switch to zero and a zero indicator light which illuminates when stepping switch is in zero position.

14-59. REMOVAL - ARMAMENT JUNCTION BOX.

a. Make sure that the helicopter master battery switch is in the "OFF" position and that external power is disconnected.

b. Disconnect electrical connectors from junction box and cap or cover to prevent entrance of foreign material.

c. Remove six bolts and washers attaching junction box to shelf assembly and remove junction box from helicopter.

14-60. INSTALLATION - ARMAMENT JUNCTION BOX.

a. Position junction box in helicopter and install six attaching washers and bolts.

b. Uncap or uncover electrical connectors and connect to junction box.

14-61. SMOKE GENERATOR SUB-SYSTEM XM52.

14-62. The smoke generator sub-system basically consists of the oil tank and hoses, pump and motor assembly, nozzle ring. A new designed bench seat and door panel is necessary to accept the smoke generator sub-system. The tank capacity is 50 gallons and provides approximately three minutes of smoke generator operation.

14-63. REMOVAL-SMOKE GENERATOR SUB-SYSTEM.

a. Remove clamps on pump inlet hose and remove hose.

b. Remove switch (U6374) by disconnecting connector on switch cord from connector in roof.

c. Remove pump and motor assembly.

(1) Remove floor clamps securing hoses and wiring harnesses and replace screws in cabin floor.

(2) Disconnect hoses and wiring harness and remove from cabin floor.

(3) Remove pump and motor attaching parts and remove pump and motor.

d. Remove quantity indicator and bracket and reinstall screws and washers.

e. Remove control box:

(1) Disconnect wiring harnesses.

(2) Remove attaching hardware.

(3) Remove control box.

f. Remove hose between nozzle ring and tailpipe fairing.

g. Remove nozzle ring attaching parts and nozzle ring.

h. Remove vent hose clamps from cabin floor, disconnect and remove vent hose.

i. Unhook tank tie down straps and remove oil tank.

j. Release fasteners and remove passenger seat.

k. Remove tank tie down straps.

l. Reinstall two-man seats and center seat. Do not secure forward legs of center seat.

m. Remove attaching bolts and remove door from cabin floor. Reinstall original door using existing hardware. Secure forward seat legs to floor fittings.

n. Remove attaching bolts and washers, and remove brackets from tailpipe fairing.

14-64. INSPECTION AND CLEANING. Aircraft shall be inspected for internal oil accumulation at the tailboom bulkheads. Any oil accumulation shall be removed. Tailboom of aircraft shall be washed down after each day's use of the smoke generator sub-system.

14-65. INSTALLATION - SMOKE GENERATOR SUB-SYSTEM.

a. Modify tailpipe fairing as follows: (See figure 14-5.)

(1) Locate vertical and horizontal centerlines of tailpipe opening. Mark centerlines of aft flange of fairing.

(2) Mark a line on each side of centerline marks on fairing flange, 1.25 inch from centerline mark.

(3) Drill eight No. 10 (0.193 inch diameter) holes in fairing flange at locations marked in step (2). Center holes on flat surface of flange.

(4) Mark existing interfering rivets for removal between holes and 0.375 inch beyond holes at bottom position.

(5) Mark interfering rivet above and below lower hole at right and left positions.

(6) Remove interfering rivets marked in steps (4) and (5).

(7) Install maximum of nine rivets (MS20426AD4-4) in holes from which interfering rivets were removed.

(8) Install two nut plates (NAS697A3) and two shims (205-961-100-3) at left and right positions shown, using four rivets (MS20426AD3-4).

(9) Install one nutplate (NAS696A3) at lower hole of left position and five nutplates (NAS697A3) at remaining locations using 12 rivets (MS20426AD3-4).

(10) Install doubler (205-961-100-5) as follows: (See figure 14-5.)

(a) On right side of tailpipe fairing, locate vertical skin joint below and aft of large tailpipe opening.

(b) Measure forward from aft edge of skin at joint, 4.00 inches. Mark a vertical line parallel to edge of skin.

(c) Measure up 1.10 inch from upper edge of bottom flange of fairing, along line marked in step (b). Mark an intersecting line.

(d) Cut a 1.33 inch diameter hole in fairing at intersection of lines.

(e) Position doubler (205-961-100-5) on inside of fairing, align with hole and lower edge of fairing and secure in position.

(f) Remove three interfering rivets from lower flange.

(g) Install two rivets (MS20426AD4-4) in two interference holes at edge of doubler. Drill six No. 30 (0.128 inch diameter) rivet holes as shown in figure 14-5, and install six rivets (MS20470AD4-4).

b. Modify bulkhead, F.S. 166.00 right side as shown in figure 14-5.

c. Replace aft center door in cabin floor as follows: (See figure 14-6.)

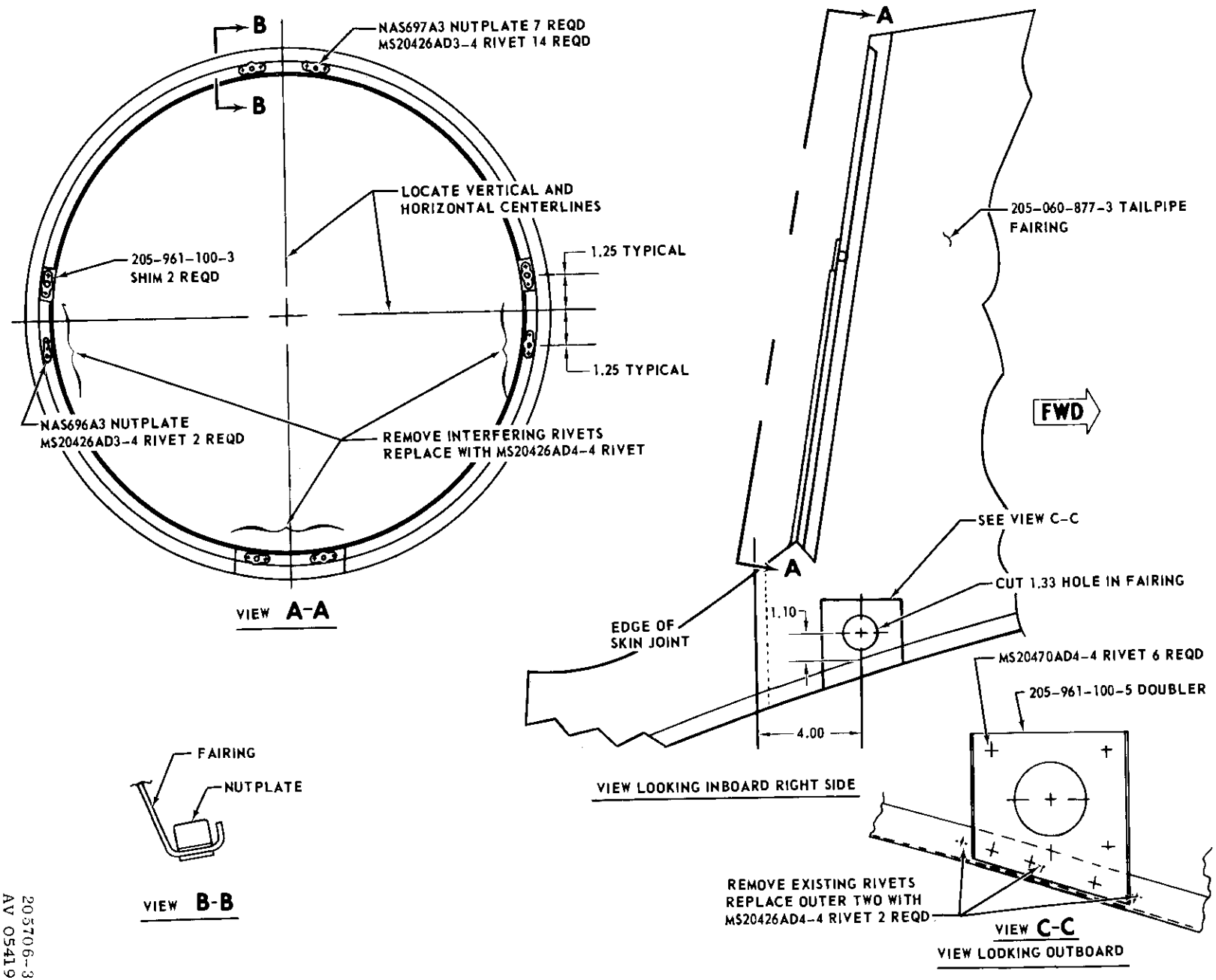



Figure 14-5. Tailpipe fairing modification

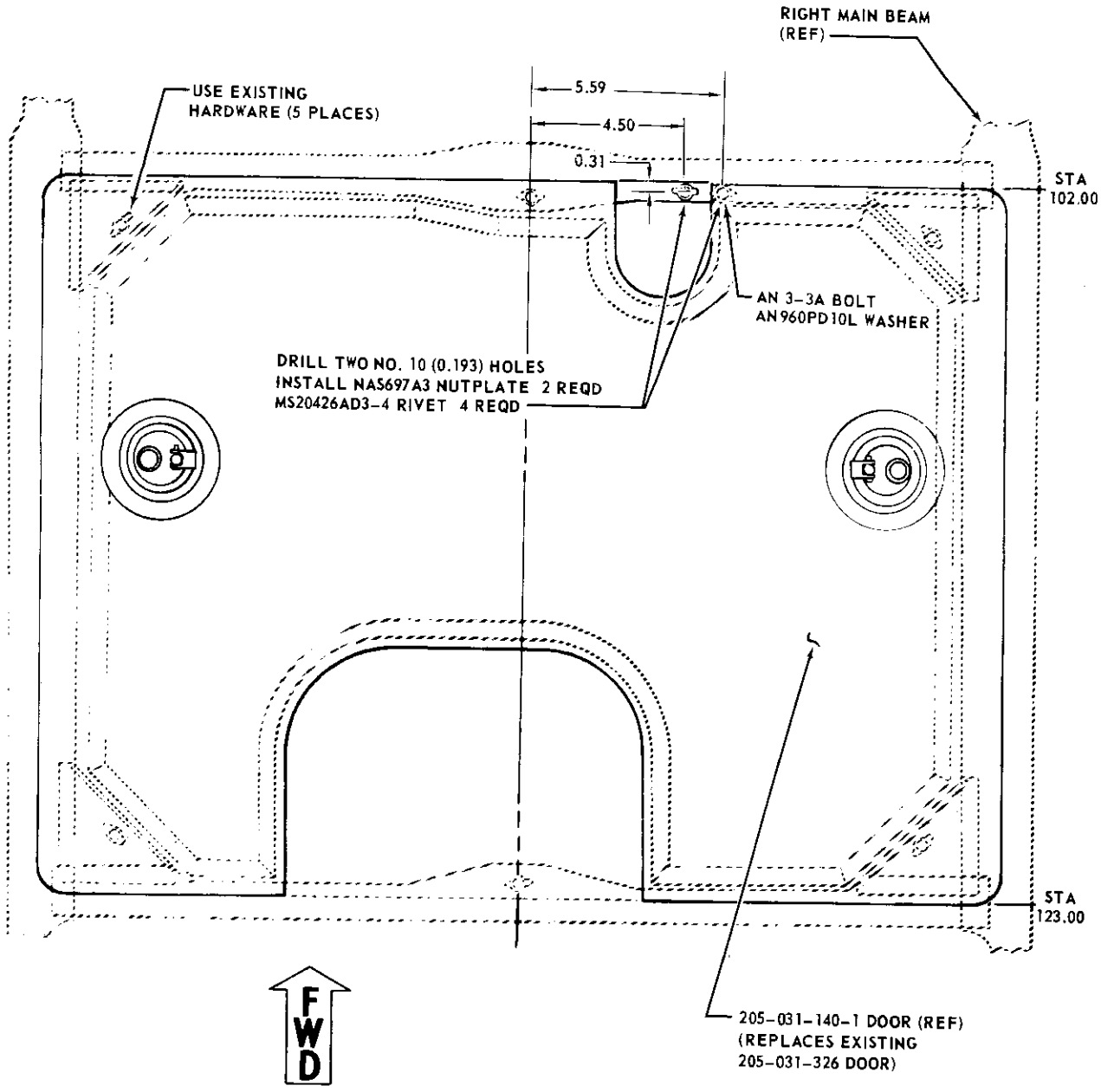



Figure 14-6. Cabin floor modification

(1) Release fasteners on legs of center passenger seat from floor fittings.

(2) Remove attaching bolts and remove aft center cabin floor door.

(3) Position new door in same location as removed door, with large cutout aft.

(4) Secure door to airframe, using hardware previously removed, and one additional bolt and washer.

d. Position tank on cabin floor, centered 1.62 inches to left of aircraft centerline, on forward side of bulkhead, FS 128.00 (see figure 14-7).

e. Install new passenger seat (see figure 14-8) as follows:

**Note**

If the two aft legs (205-070-710-1) (see figure 14-9) cannot be installed on tube assembly (205-070-055-1) because four rivet heads protrude near one end of the tube, rework tube as follows: Remove two rivets (MS20470B5) at fitting end. Clean up rivet holes with number 19 drill (0.166) diameter. Apply zinc chromate primer to bare surfaces. Slide legs over tube assembly and install two screws (AN525-832-22), two washers (AN960-8L) and two nuts (NAS679-A08). Torque nuts 7 to 15 inch-pounds.

(1) Release attaching fasteners and remove the left and right two-man seats across aft area of cabin. Leave upper seat back support tubes in place.

(2) Release attaching fasteners and remove center seat. Slide out lower center tube and reinstall for reuse.

(3) Install two legs on underside of seat at outboard forward corners, using six screws (MS27039-1-08).

(4) Install nut on each leg base and screw base into insert in leg.

(5) Install legs at the remaining positions on forward edge of seat, using six screws (MS27039-1-08).

(6) Position seat in aircraft. Insert tubes on aft edge of seat into existing brackets on stanchions at aft cabin bulkhead. Secure with existing pins and latches and adjust clamps on seat tubes as necessary.

**Note**

Do not secure seat legs to the floor fittings until steps e. (6) through (11) have been accomplished.

(7) Secure aft legs of seat to floor fittings.

(8) Secure forward inboard legs of seat to floor fittings.

(9) Adjust forward outboard leg bases to fit snugly to floor. Tighten jam nut.

(10) Position cushion on seat and tie cushion to tubes at aft edge of seat.

(11) Hook straps of seat backs to existing upper support tubes and adjust as necessary.

f. Install brackets on tailpipe fairing (see figure 14-10) as follows:

(1) Position brackets over nutplates.

(2) Secure each bracket to fairing using two bolts and washers.

g. Install oil tanks as follows.

(1) Remove center cover plate from bottom of tank. Remove shipping plug from cover plate.

(2) Install oil quantity transmitter (U6377) to cover plate, using gasket (U6350) and existing hardware. Position transmitter so that electrical connector will be toward right end of tank when installed in aircraft.

(3) Reinstall cover plate on bottom of tank, using existing hardware.

(4) Install union (AN815-20D) in one end of adapter tube (U6435).

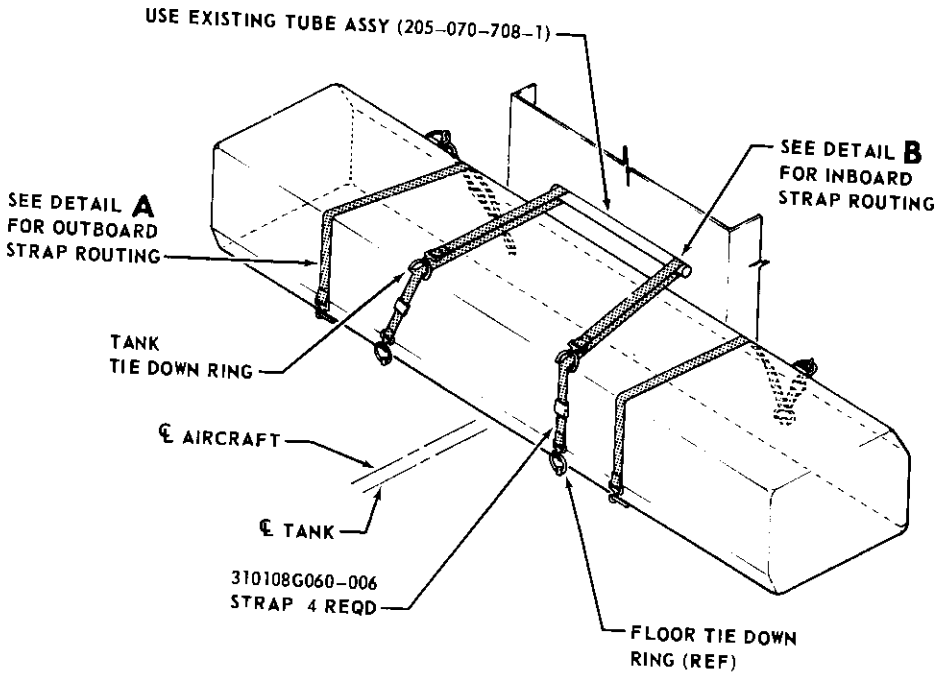
(5) Connect opposite end of adapter tube to fitting in bottom of tank.

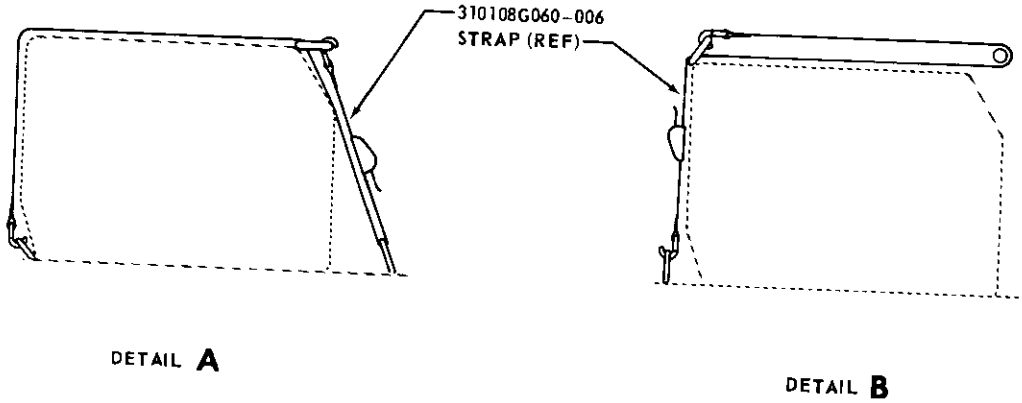
(6) Raise tank approximately six (6) inches above cabin floor and temporarily block in this position using any suitable material near ends of tank.

(7) Connect 90 degree end of hose (U6356) to union previously installed in adapter tube.

(8) Connect existing stowed electrical connector on wiring harness to connector of quantity transmitter previously installed in bottom of tank.

(9) Route hose forward and up through opening in floor, so that hose extends up through forward cutout in new door.




DETAIL A

DETAIL B

205706-47
AV 054201

Figure 14-7. Oil tank installation

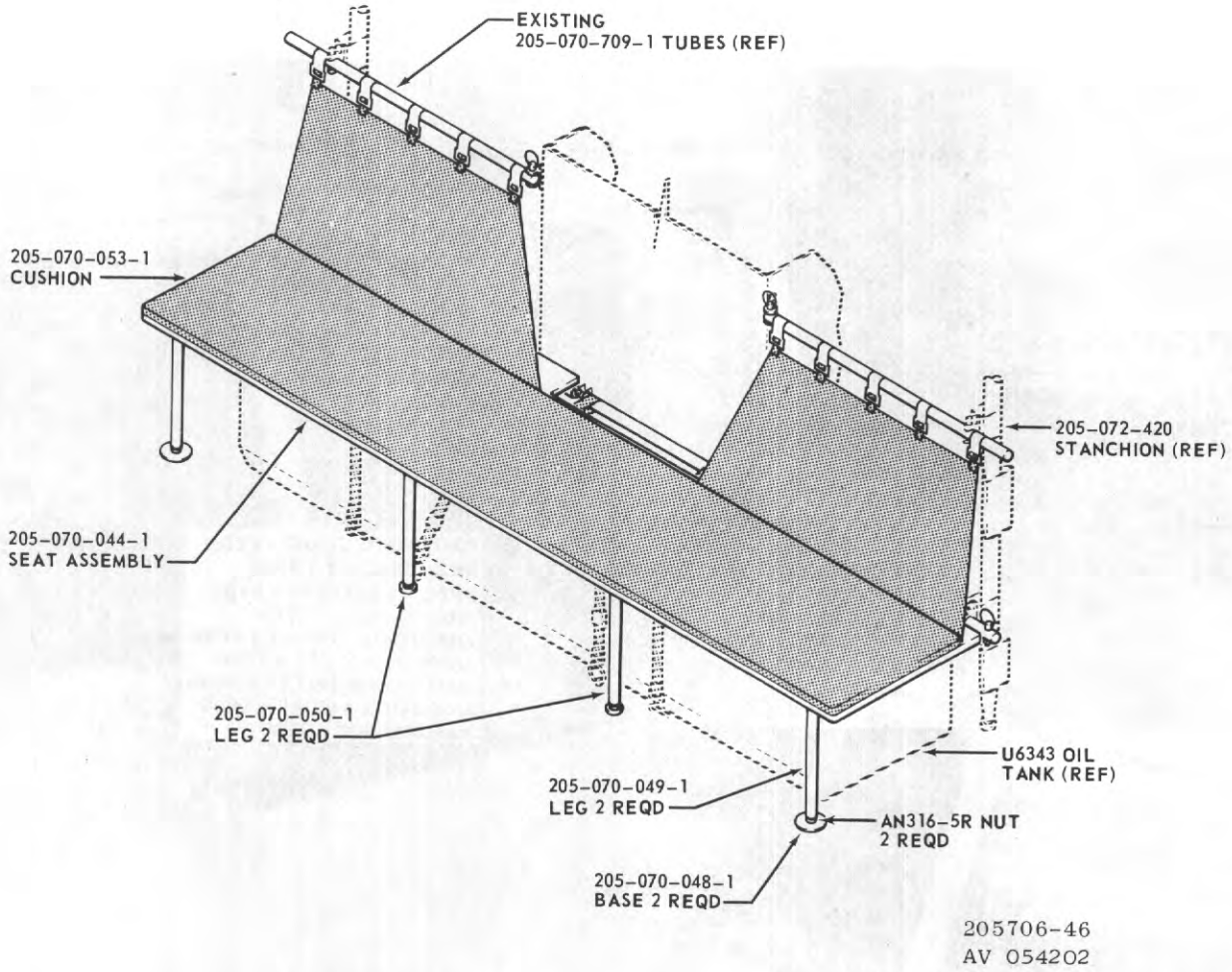



**Figure 14-8. Seat installation**

(10) Remove blocking material and allow tank to rest on cabin floor.

(11) Secure oil tank to floor, as shown in figure 14-7, using four straps.

(12) Install one coupling (U6363) in 45 degree end of hose (U6356). (See figure 14-11.)

(13) Secure hose to cabin floor, using bracket (AN743-12), spacer (NAS43DD3-16), screw (AN520-10R16), washer (AN960PD10L), clamp (MS21919DG24), screw (AN520-10R8), washer (AN960PD10L), and nut (NAS679A3).

(14) Connect one end of vent hose (U6367) to top fitting toward left end of tank.

(15) Route hose aft and outboard around left side of pylon island along cabin floor, to existing connector in bulkhead, FS 166.00. Connect elbow to connector in bulkhead.

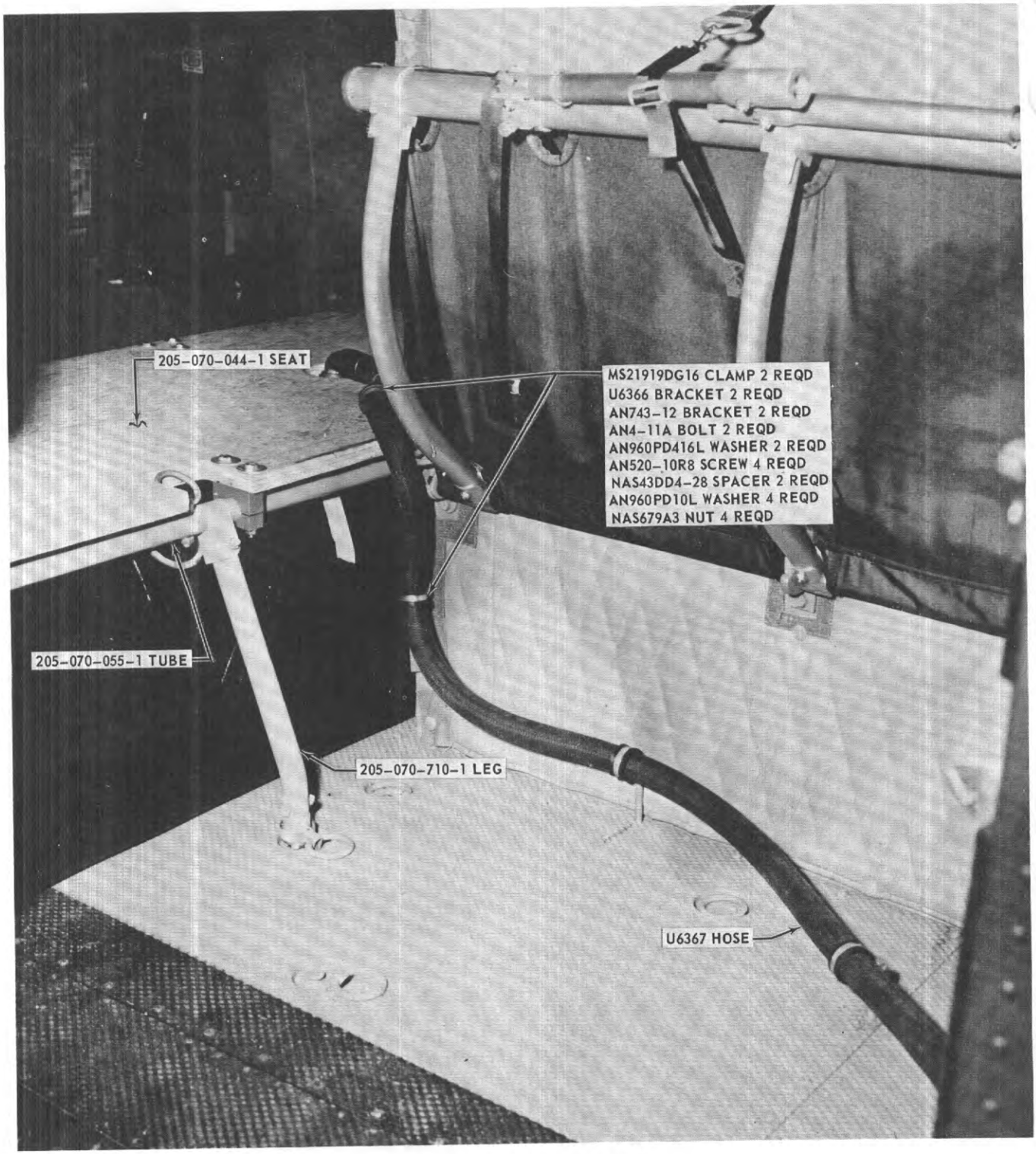
(16) Secure vent hose as follows: (See figure 14-9).

(a) Locate row of holes in outboard side of vertical angle at left forward corner of pylon island at FS 128.00.

(b) Secure hose at fourth hole up from floor, using bracket (U6366), washer (AN960PD416L), bolt (AN4-11A), bracket (AN743-12), clamp (MS21919DG-16), two screws (AN520-10R8), two washers (AN960-PD10L), and two nuts (NAS679A3).

(c) Secure hose at second hole up from floor, using bracket (U6366), washer (AN960PD416L), bolt (AN4-11A), bracket (AN743-12), clamp (MS21919DG-16), two screws (AN520-10R8), two washers (AN960-PD10L), and two nuts (NAS679A3).

(d) Locate inboard row of screws securing cabin floor between FS 128.00 and FS 166.00.




VIEW LOOKING INBOARD LEFT SIDE

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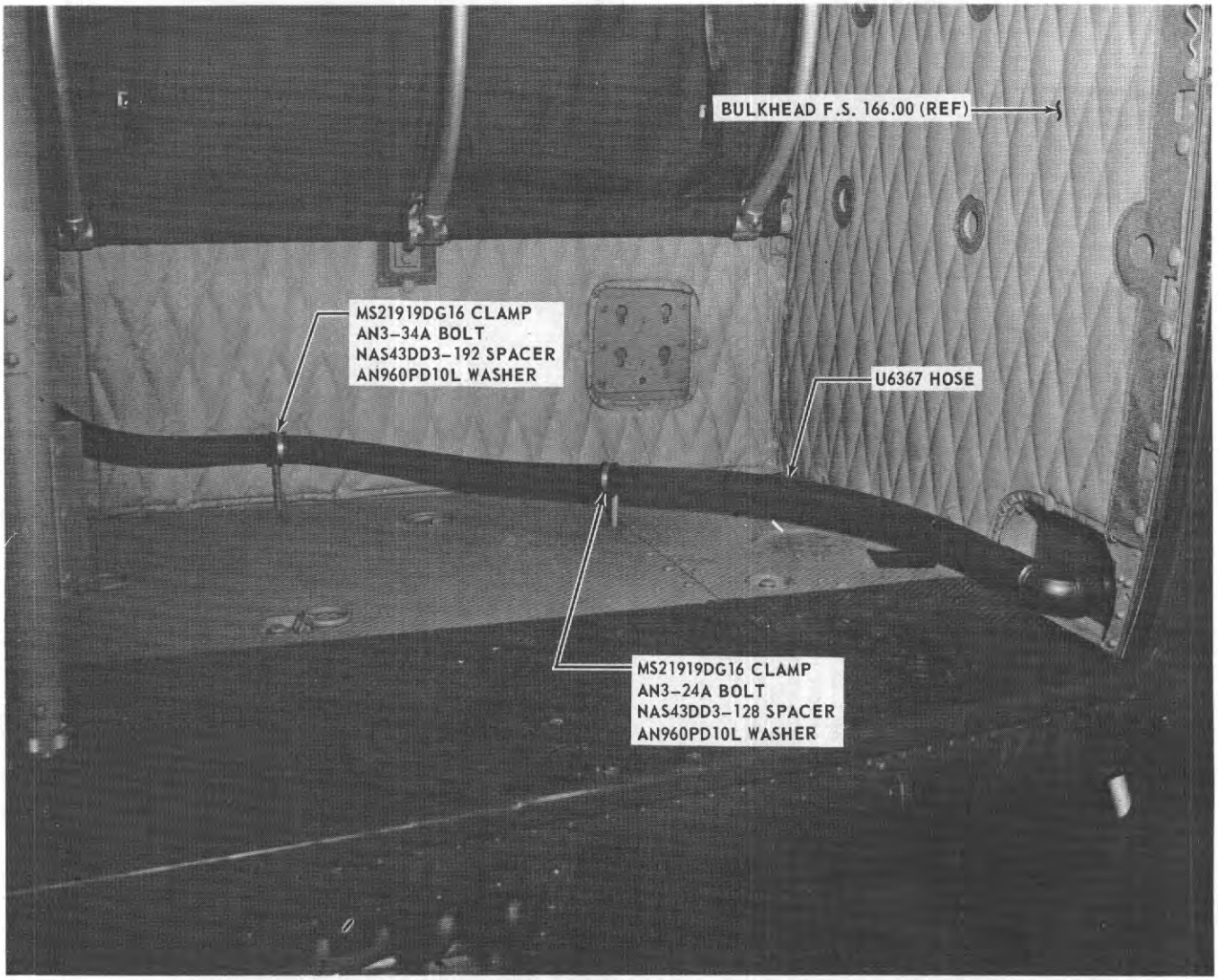
AV 054203-1

Figure 14-9. Vent hose installation (Sheet 1 of 2)




VIEW LOOKING INBOARD LEFT SIDE

205706-45
AV 054203-2

**Figure 14-9. Vent hose installation (Sheet 2 of 2)**

(e) Remove screw approximately 12 inches aft of forward corner of island.

(f) Secure hose at forward screw hole, using clamp (MS21919DG16), bolt (AN3-34A), washer (AN-960PD10L), and spacer (NAS43DD3-192).

(g) Remove screw and secure hose at aft screw hole (as shown) using clamp (MS21919DG16), bolt (AN3-24A), washer (AN960PD10L), and spacer (NAS43DD3-128).

h. Install nozzle ring (U6370) (see figure 14-10) as follows:

(1) Position nozzle ring on brackets with inlet fitting at bottom and slightly to left of aircraft center line. Align bosses on nozzle ring with holes in brackets.

(2) Secure nozzle ring to brackets, using four bolts (AN106408) and four washers (MS15795-808). Lock-wire bolts to nozzle ring, using lockwire (MS-20995C32).

i. Install hoses (U6360) and (U6394) (see figure 14-10) as follows:

(1) Loosen fasteners and remove lower right tailpipe fairing.

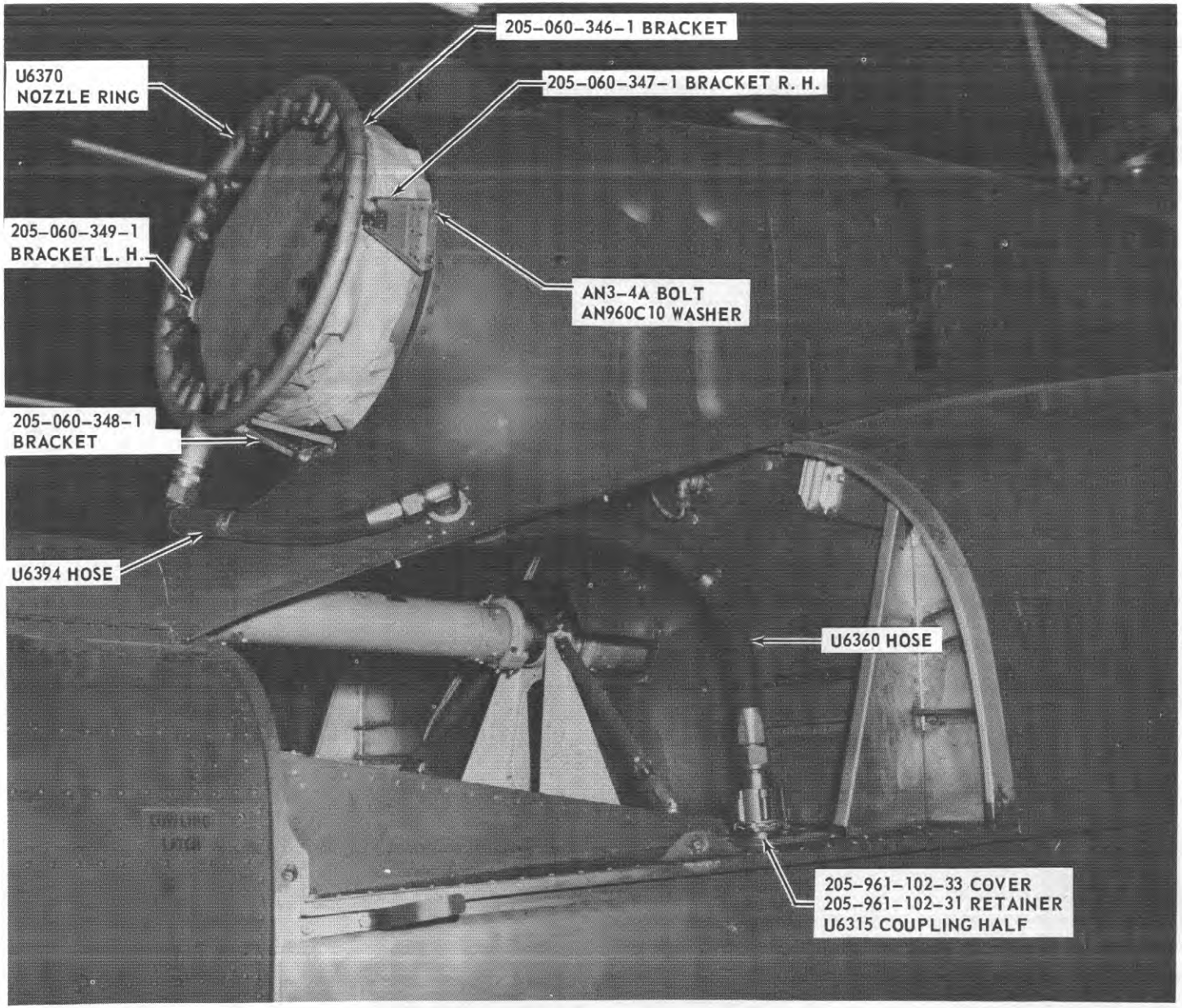
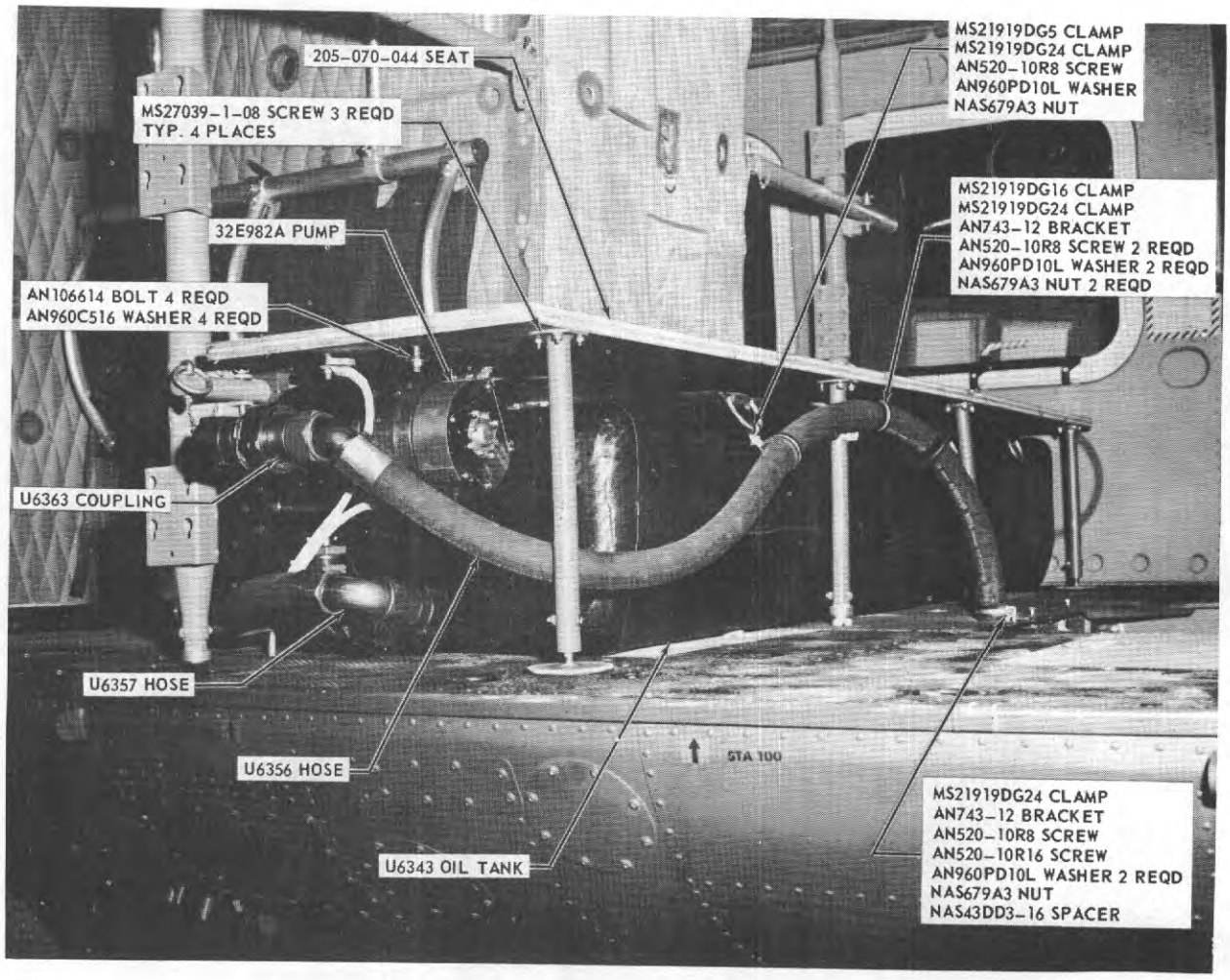



Figure 14-10. Nozzle ring and bracket installation

205706-44
AV 054204

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AV 054205

**Figure 14-11. Oil pump and motor installation**

(2) Install elbow (AN833-16D) in hole in right side of upper tailpipe fairing using washer (AN960-2116), and nut (AN924-16D). Do not tighten nut at this time.

(3) Connect 90 degree end of hose (U6394) to nozzle ring.

(4) Connect opposite end of hose (U6394) to elbow in fairing. Position hose to prevent chafing on skin, and tighten nut on elbow.

(5) Install coupling half (U6387) on straight end of hose (U6360).

(6) Connect 90 degree end of hose (U6360) to elbow in tailpipe fairing.

(7) Connect coupling half on hose to coupling half in service deck.

(8) Reinstall tailpipe lower fairing.

j. Install control box (see figure 14-12) as follows:

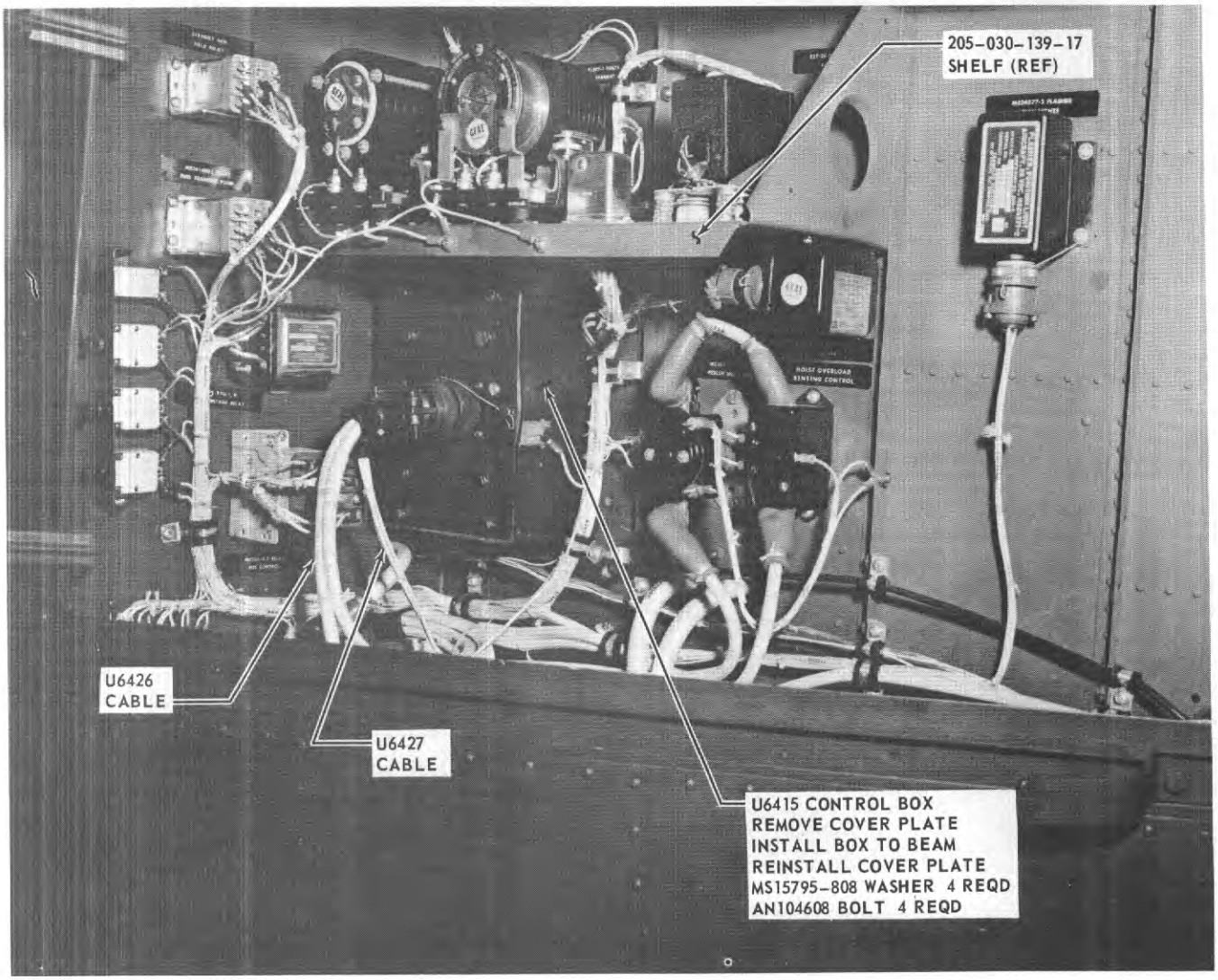
(1) Open left aft electrical compartment doors.

(2) Remove attaching bolts and remove front cover of control box (U6415).

(3) Position control box shell in forward inboard corner of electrical compartment, against left main beam web and near bulkhead, FS 211.00, under shelf.

(4) Secure control box to beam at existing nutplates, using four bolts (AN104608) and four washers (MS15795-808).

(5) Reinstall control box front cover, using bolts and washers previously removed. Lock-wire bolts.




LEFT AFT ELECTRICAL COMPARTMENT
VIEW LOOKING INBOARD

205706-43
AV 054206

Figure 14-12. Control box installation

(6) Locate large connector on existing wiring harness (U6426). Install connector on control box.

(7) Locate small connector on existing wiring harness (U6427). Install connector on control box.

(8) Lock-wire connectors using safety-wire (MS20995C32).

k. Install quantity indicator and bracket assembly (U6373) as follows:

(1) Remove sixth and seventh screws outboard from center post, along top edge of right windshield.

(2) Position indicator and bracket and align with existing holes. Holes in bracket may be elongated, as necessary, to accommodate screw spacing.

(3) Secure bracket, using two screws (AN525-D10R10) and existing washers and nuts previously removed.

l. Install pump and motor assembly (34E982A) as follows (see figure 14-11):

(1) Assemble the following parts into each port of pump. Do not completely tighten nuts on unions.

(a) Install union (AN832-20D), with nut (AN-6289-20D) and packing (MS28778-20), in pump port.

(b) Install elbow (AN939-20D) with packing (MS28778-20) on union.

(c) Install coupling half (U6365) with packing (MS28778-20) in elbow.

(2) Install pump and motor under right end of seat, using four bolts (AN106614) and four washers (AN960C516). Do not tighten aft outboard bolt at this time.

(3) Position elbows as shown in figure 14-11 and tighten all pump fittings.

m. Install hose (U6357) (see figure 14-13) and wiring harness (U6443) as follows:

(1) Install connector on wiring harness (U6443) to connector in right side of bulkhead, FS 166.00.

(2) Route wires inboard and forward under two man seat, to pump motor.

(3) Connect wire number P111B4 to terminal on pump motor.

(4) Remove aft outboard pump mounting bolt and secure wire number P112B4 to pump base with pump mounting bolt.

(5) Install union (AN815-20D) in one end of hose (U6357).

(6) Install elbow (AN939-20D) with packing (MS28778-20) on union.

(7) Install coupling half (U6363) with packing (MS28778-20) in elbow.

(8) Install coupling half (U6363) in opposite end of hose.

(9) Connect end of hose with elbow installed to bottom (outlet) port of pump.

(10) Route hose inboard and aft to coupling in bulkhead, FS 166.00. Connect hose to coupling.

(11) Remove one screw from cabin floor aft of pump. Secure hose and wiring harness at screw hose (as shown).

(12) Remove one screw from near inboard end of row of screws approximately 10 inches forward of bulkhead, FS 166.00. Secure hose and wiring harness at screw hole (as shown).

(13) Secure hose and wiring harness approximately midway between aft connector and aft floor attach point (as shown).

(14) Secure hose and wiring harness approximately midway between the two floor attach points (as shown).

n. Install switch (U6374) as follows:

(1) Locate small electrical connector in cabin roof outboard and aft of right overhead console.

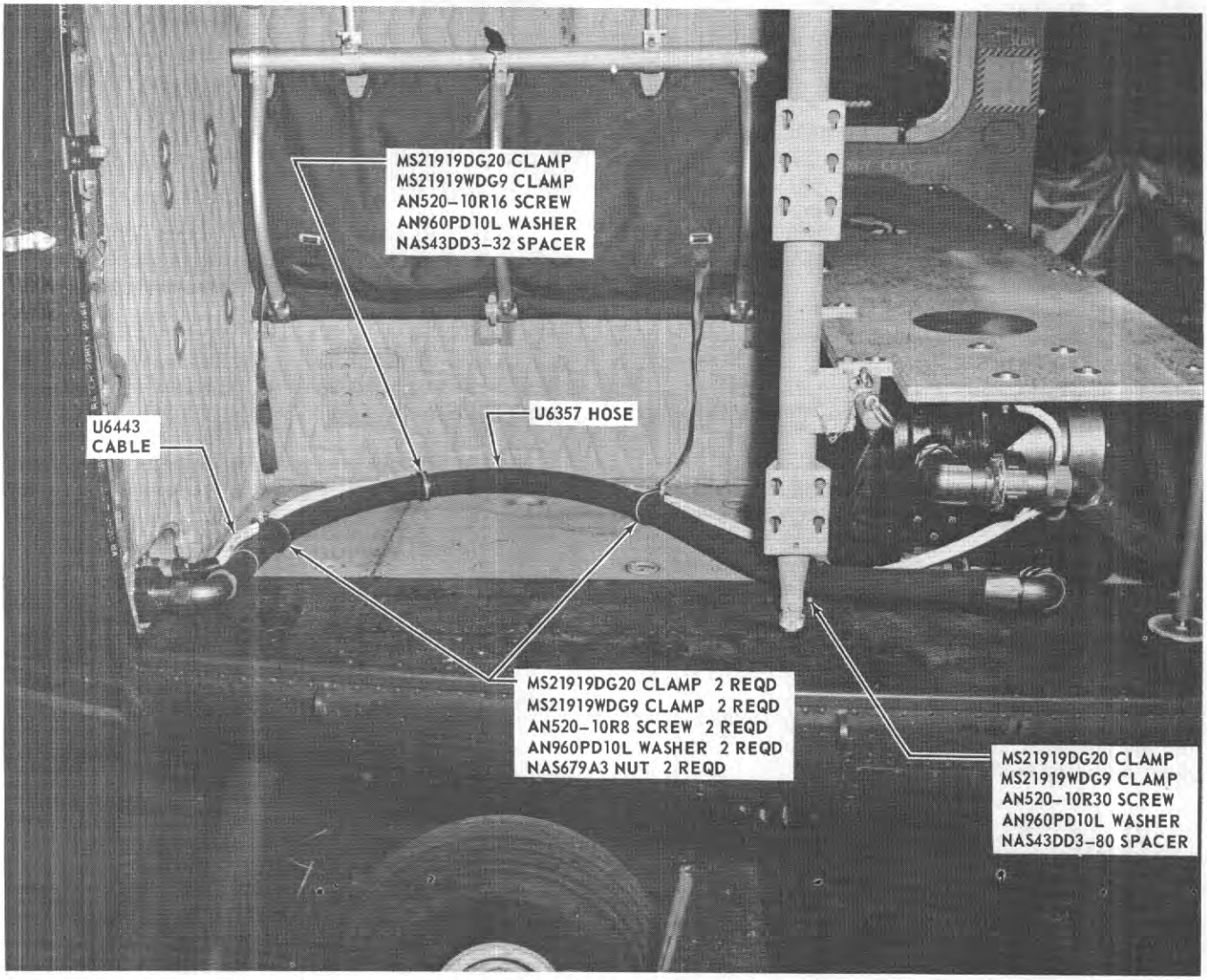
(2) Install connector on switch cord, on connector in roof.

(3) Stow switch in spring clip located in cabin roof approximately two inches aft of overhead console.

o. Complete pump inlet hose installation as follows (figure 14-11):

(1) Route hose (U6356) which extends up from center of floor forward of oil tank, outboard to the right along forward edge of tank, to pump. Connect coupling (U6363) on hose, to coupling (U6365) on upper (inlet) pump port.

(2) Secure hose to forward inboard seat leg and DEE ring in tank (as shown).




VIEW LOOKING INBOARD RIGHT SIDE

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Figure 14-13. Hose and wiring assemblies

# CHAPTER 15

# EXTERNAL STORES - NONARMAMENT

## SECTION I SCOPE

### 15-1. PURPOSE.

15-2. The purpose of this Chapter is to provide all the essential information for maintenance personnel to accomplish organizational maintenance on the external stores that are carried by the UH-1D/H helicopter.

## SECTION II MAINTENANCE INSTRUCTIONS

### 15-3. MAINTENANCE.

15-4. FUEL SYSTEM - 60.0 U. S. GALLON EXTERNAL AUXILIARY.

15-5. Two 60.0 U.S. gallon capacity external auxiliary fuel tanks (19, figure 15-1) may be installed on UH-1D/H helicopters. Each of these tanks is attached to a pylon assembly (20), from which they may be simultaneously released by either manual (21) or electrical (22) means. When the tanks are jettisoned all hoses and electrical cables are automatically disconnected. Hoses have poppet type disconnects that immediately seal them off. Mechanical jettisoning of the fuel tanks is accomplished by activating the mechanical jettison lever mounted on the righthand side of the instrument pedestal. Electrical jettisoning is accomplished by placing the "JETTISON-SAFE" switch on the instrument pedestal control panel (23) in the "JETTISON" position. Fuel in the tanks is forced into the main fuel system by means of an air pressurization system which is protected by a pressure regulator. Air for this system is provided by a pump on each pylon assembly (20) and the system is interconnected so that if one pump fails the other will still supply the required pressure. The pylon assemblies (20) are attached to pylon supports (24), which, in turn, are attached to external stores support assemblies (25). The external stores support assemblies are attached to aft "hard-points" on the helicopter structure.

15-6. FUEL TANK - 60.0 U. S. GALLON EXTERNAL AUXILIARY.

15-7. The fuel tank (see figure 15-1) is of welded aluminum construction and is equipped with two suspension lugs for attachment to the pylon assembly. The filler cap is located in the forward end of the tank and will accommodate fuel nozzles up to 2.0 inches in diameter.

15-8. REMOVAL - FUEL TANK.

**Note**

The external auxiliary fuel tank may be removed by either activating the mechanical release lever or by placing the "JETTISON-SAFE" switch in the "JETTISON" position.

**Caution**

Adequate precautions must be taken for suitable support for the fuel tank at time of release.

15-9. INSTALLATION - FUEL TANK.

**Note**

With battery switch "ON" place the "JETTISON-SAFE" switch on the instrument pedestal control panel in the "SAFE" position.

a. Remove lock-pins from the pylon fuel (1, figure 15-2) and air (2) couplings. Rotate wing nuts under each coupling mounting flange to raise body of coupling to highest position. This will avoid contact between the tank and coupling during positioning of the tank and arming of the pylon.

b. Loosen the four sway brace jam nuts and raise the sway braces (3 and 4) approximately 3/4 inch to avoid contact with the tank during arming.

**Note**

The following step requires a minimum of two personnel.

c. Carefully raise the fuel tank so that the suspension lugs properly engage with the pylon hooks. Make sure that the pylon mounted electrical coupling (5) mates securely with the receptacle on the fuel tank, and arm the pylon.

d. Lower the fuel (1) and air (2) couplings by turning wing nuts. Make sure the pilot on each coupling poppet barrel properly engages the tank opening. Adjust the position of each coupling body so that the lower portion of the body aligns with the red groove around the poppet barrel. Install lock pins in coupling flange.

e. Lower the forward sway braces (3) to stabilize the tank on the pylon. Push down firmly on the forward end of the tank during this operation to eliminate any play at the forward hook. Play may result from the load applied by the three spring loaded couplings (1, 2 and 5) at the rear of the tank. Position tank fore and aft as well as laterally during this operation. This will assure that the fuel (1) and air (2) couplings are approximately perpendicular to their respective seats on the tank and will evenly distribute sealing pressure. Lower aft sway braces (4) to contact tank surface. All braces shall be finger tight only.

**Note**

If the helicopter is to be flown with empty tanks the jam nuts should be made secure to prevent movement of the sway braces (3 and 4). If tanks are to be fueled do not secure jam nuts until tanks are full. Then readjust sway braces finger tight and secure jam nuts.

f. Check operation of the "AUX FUEL LOW" warning light on the pilot's caution panel. With the system on and the tanks empty the warning light should be on. During fueling of the auxiliary system the warning light should go out.

**Note**

Before completing fueling of the main fuel system it is desirable to close the auxiliary fuel tank filler caps, pressurize the tanks and transfer a small amount of fuel from the auxiliary system to the main system. While transferring fuel check both the fuel (1) and air (2) coupling seats for leaks. After switching off transfer pumps the auxiliary tanks may be topped off and the main fuel tanks filled.

15-10. PYLON ASSEMBLY - EXTERNAL AUXILIARY FUEL SYSTEM.

15-11. The pylon assemblies are attached to the pylon supports on both sides of the helicopter, and contain the pylon hooks to which the fuel tanks are attached. An air pump (6, figure 15-2) is mounted on the forward end of each pylon, and an air pressure regulator (7) is located at the approximate center on the outboard side. Fuel, air and electrical lines and cabling are also a part of each pylon assembly.

1. Lower Cable Assembly
2. Grommet
3. Cable Assembly
4. Pulley Brackets
5. Upper Guard Tube
6. Lower Guard Tube
7. Barrel
8. Lateral Release Cable Pulleys
9. Bellcrank
10. Lateral Release Cable Assemblies
11. Cable Guard
12. Longitudinal Release Cable Assembly
13. Emergency Release Lever Assembly
14. Grommet
15. Longitudinal Release Cable Pulleys
16. Fairlead
17. Grommets
18. Support Assembly
19. Auxiliary Fuel Tank
20. Pylon Assembly
21. Manual Release Mechanism
22. Electrical Release Controls
23. Control Panel
24. Pylon Support
25. External Stores Support Assembly

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**Figure 15-1. 60 gallon external fuel tank (Sheet 1 of 2)**

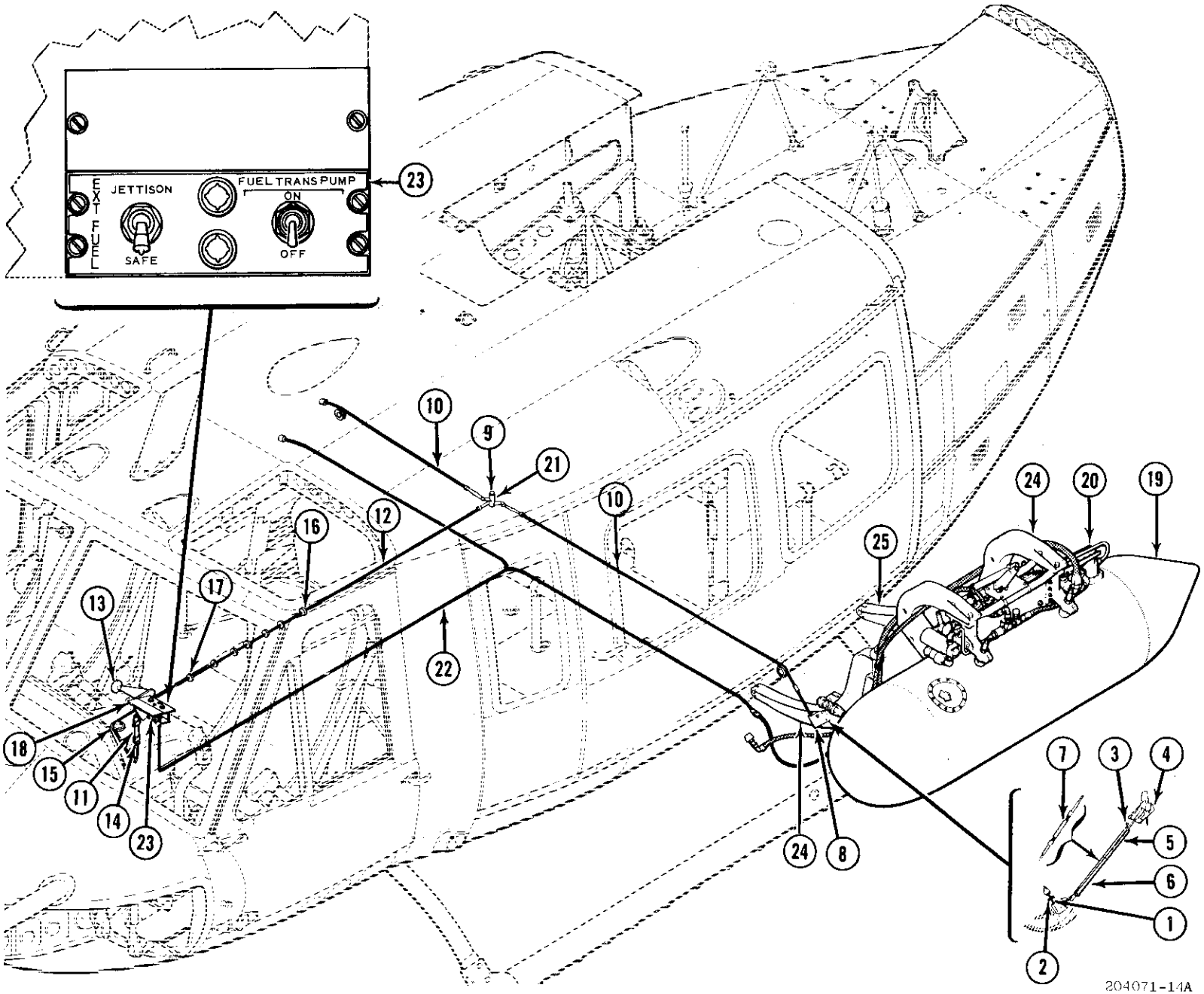



Figure 15-1. 60 gallon external fuel tank (Sheet 2 of 2)

15-12. REMOVAL - PYLON ASSEMBLY.

a. Remove fuel tank. (Refer to paragraph 15-8.)

b. Disconnect fuel (8, figure 15-2) and air (9) couplings and electrical connector (10) just inside helicopter fuselage skin. Disconnect lower manual release cable (11) at same location. Cap or cover fuel and air couplings and electrical connector to prevent entrance of foreign material. Install access panel to fuselage skin on left-hand side of helicopter and to cabin floor on right-hand side of helicopter.

c. Remove cotter pin and pin attaching cable guard tube (12) to support assembly (13) on top of external stores support assembly. Carefully disengage cable guard tube (12) from support assembly (13), and withdraw manual release cables from lower guard tubes. Remove cotter pin, washer and flat head pin (14) attaching upper end of manual release cable to pylon assembly.

d. Support pylon assembly and remove nuts, washers and bolts attaching pylon assembly to pulley support tubes (15) and pylon support (24, figure 15-1). Remove pylon assembly. Remove pulley support tubes (15, figure 15-2) with support, cable guard tube (12) and manual release cables still attached.

15-13. INSTALLATION - PYLON ASSEMBLY.

a. Position the pulley support tubes (15, figure 15-2) with support, cable guard tube (12) and manual release cables attached and pylon assembly to the pylon support (24, figure 15-1) and install attaching bolts, washers and nuts.

**Note**

Air pump (6, figure 15-2) on pylon shall be forward.

b. Attach upper end of manual release cable to pylon assembly with flat head pin, washer and cotter pin (14) With hand tension on cable, adjust pulley support bracket to obtain proper cable alignment. This adjustment will place the forward edge of the support bracket between 3.6 and 4.6 inches aft of the aft edge of the pylon support forward arm.

c. Align manual release cable over pulley in support assembly (13) on top of external stores support assembly. Align holes in cable guard tube (12) with holes in support assembly (13) and install attaching pin and cotter pin. Thread lower manual release cable (11) through lower guard tubes.

d. Remove access panels from fuselage skin on left-hand side of helicopter and from cabin floor on right-hand side of helicopter. Connect lower manual release cable to existing release cable.

**Note**

Cable tension may be varied by adjustment of the turnbuckle located between the upper and lower manual release cables.

e. Uncap or uncover fuel (8) and air (9) couplings and electrical connector (10). Connect fuel and air couplings and electrical connector to existing internal lines and electrical receptacle.

**Caution**

Fuel couplings are colored RED and air couplings are colored GREEN. Be sure to connect red coupling to red coupling and green to green.

f. Before installing fuel tank, arm the pylon and operate both the manual and electrical release mechanisms to assure smooth, efficient operation.

15-14. SUPPORT - EXTERNAL AUXILIARY FUEL SYSTEM PYLON.

15-15. The pylon support (see figure 15-3) is a heavy duty aluminum alloy casting. It is attached to the external stores support assembly (25, figure 15-1) and supports the pylon and fuel tank.

15-16. REMOVAL - PYLON SUPPORT. Adequately support the pylon support and remove nuts, washers and bolts attaching the pylon support to the external stores support assembly.

15-17. INSTALLATION - PYLON SUPPORT. Position the pylon support against the external stores support assembly and align bolt holes. Install attaching bolts, washers and nuts with a washer under each bolt head and under each nut.

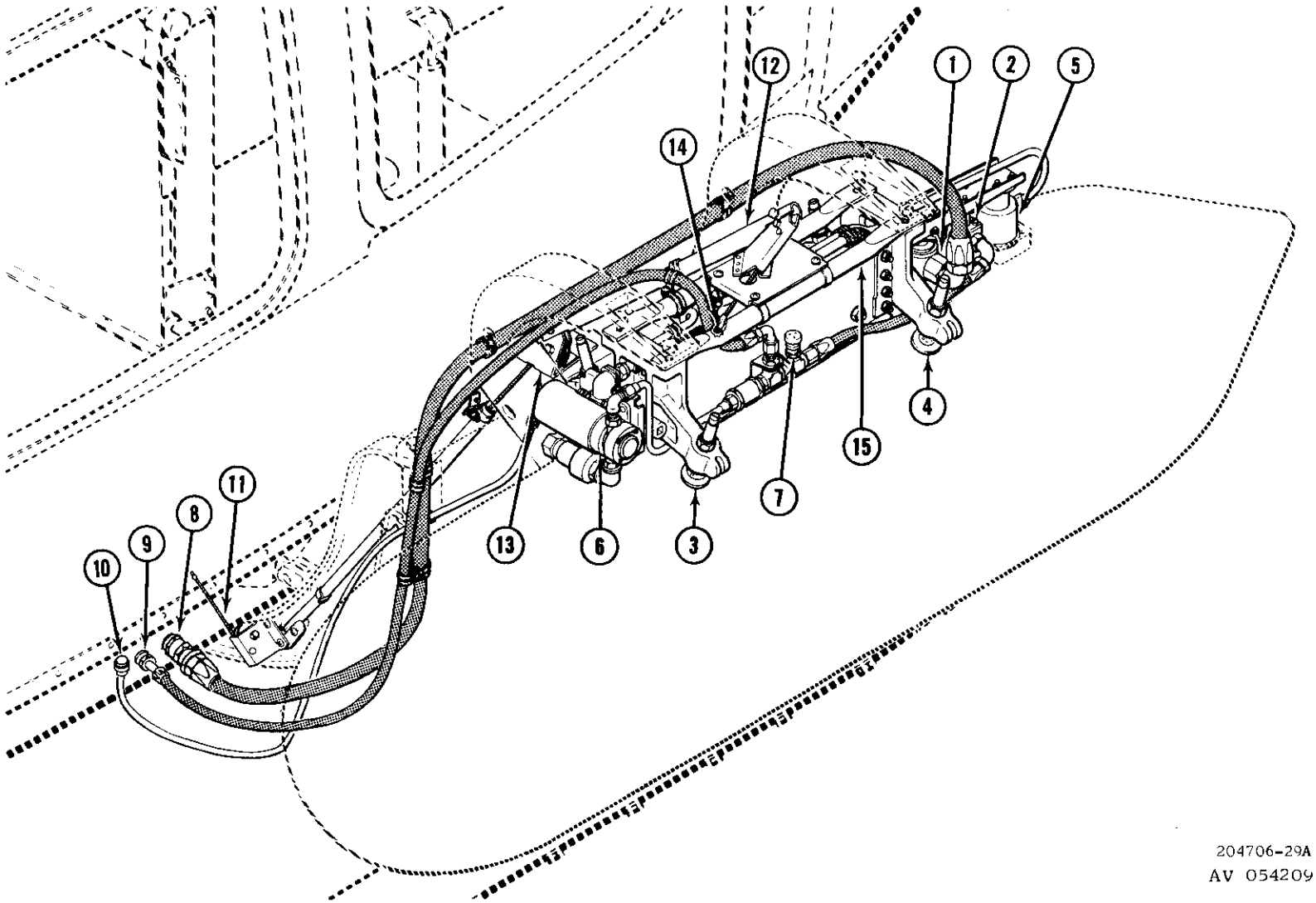
15-18. PANEL - EXTERNAL AUXILIARY FUEL SYSTEM CONTROL.

15-19. The control panel (23, figure 15-1) is located in the lower right-hand corner of the instrument pedestal where it is readily available to the pilot. This panel contains the "JETTISON-SAFE" switch, the "FUEL PUMP TRANSFER" switch and two instrument lights.

15-20. REMOVAL - CONTROL PANEL.

a. Disconnect four quick-disconnects and raise panel from instrument pedestal.

b. Disconnect electrical connector from receptacle on back of control panel and cover connector and receptacle with tape to prevent entrance of foreign material.

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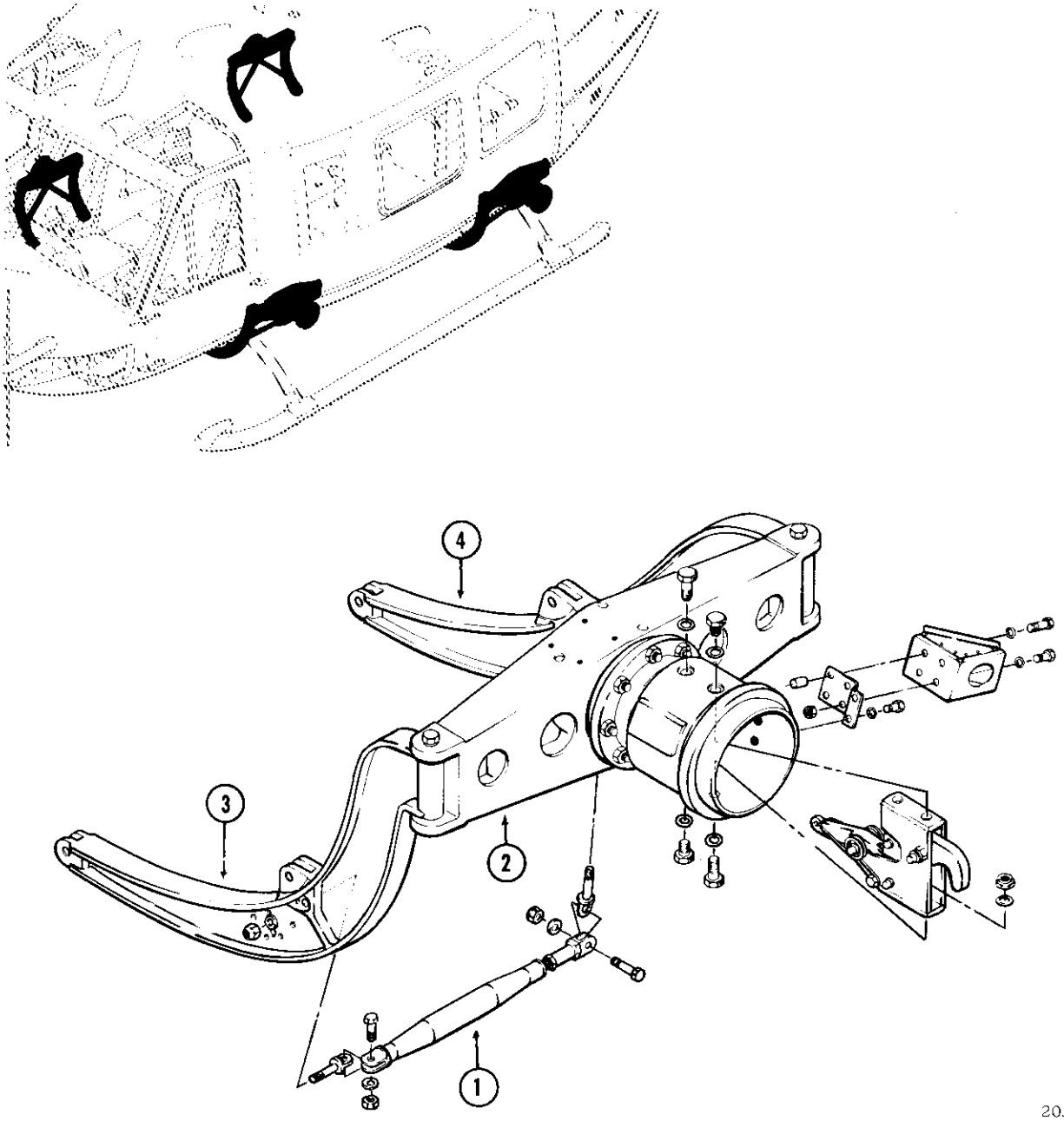
1. Pylon Fuel Coupling
2. Pylon Air Coupling
3. Forward Sway Brace
4. Aft Sway Brace
5. Pylon Electrical Coupling
6. Air Pump
7. Air Pressure Regulator
8. Fuselage Fuel Coupling
9. Fuselage Air Coupling
10. Fuselage Electrical Connector
11. Lower Manual Release Cable
12. Cable Guard Tube
13. Support Assembly
14. Pin, Washer and Cotter Pin
15. Pulley Support Tubes

Figure 15-2. External components - 60 gallon external fuel tank

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1. Sway Brace Assemblies
2. Support Assembly Cross Beam
3. Support Assembly Forward Beam
4. Support Assembly Aft Beam

Figure 15-3. External stores support assembly

c. Remove blank panel above control panel and install second blank panel to completely cover opening in instrument pedestal.

15-21. INSTALLATION - CONTROL PANEL.

a. Remove existing blank panel from lower right-hand corner of instrument pedestal.

b. Remove tape from electrical connector and receptacle on back of control panel and connect receptacle and connector.

c. Position control panel in instrument pedestal and connect four quick-disconnect fasteners. Position and install blank panel just above control panel.

15-22. EXTERNAL STORES SUPPORT ASSEMBLIES.

15-23. The external stores supports (see figure 15-3) consist of beams and sway braces to which various adapters are available for equipment or armament configurations.

15-24. REMOVAL - EXTERNAL STORES SUPPORT ASSEMBLIES.

a. Remove nuts, washers, and bolts attaching sway braces to support beams and cross beams. Remove sway braces.

b. Remove nuts, washers, and bolts attaching cross beam to forward and aft supports and remove adapters.

c. Remove nuts, washers, and clevis bolts attaching forward and aft support assemblies to fuselage and remove support beams.

15-25. INSPECTION - EXTERNAL STORES HARD POINTS.

a. Inspect for cracks and corrosion.

b. Inspect for loose, missing or improperly installed hardware.

c. Inspect bushings for proper inside diameter.

15-26. INSTALLATION - EXTERNAL STORES SUPPORT ASSEMBLIES.

a. Position each support beam assembly on helicopter and secure to structure with clevis bolts, washers, and nuts. Install cotter pins.

b. Position cross beam between outer ends of forward and aft beam assemblies and install attaching bolts, washers, and nuts.

c. Position sway brace assemblies on external stores support assembly and install attaching bolts, washers, and nuts.

# CHAPTER 16

# STORAGE OF AIRCRAFT

## SECTION I INTRODUCTION AND SCOPE

### 16-1. INTRODUCTION.

16-2. This Chapter contains comprehensive procedures for preparing aircraft and components for storage. Methods and equipment necessary for proper preservation are included in Section II. Depreservation and activation procedures are outlined in Section III. Section IV provides methods for destruction of the entire helicopter, as well as individual items of equipment, should the need arise.

16-3. SCOPE.

16-4. GENERAL INFORMATION.

16-5. MAINTENANCE PERSONNEL INSTRUCTIONS. When a selection of the categories shown in paragraph 16-6 is made by maintenance personnel, it is desirable to take into account ground operation, motoring of engines, and other required maintenance in storage for which men and materials may be needed. Care of the aircraft during unusual weather conditions must also be taken into consideration.

16-6. CATEGORIES OF STORAGE. The three categories of storage are listed and defined as follows:

a. Flyable Storage: There is no time limit to Flyable Storage. The helicopter shall be preserved and maintained with all components and systems in an operable condition. On each third day of storage, the engine shall be either run-up or motored with the starter. If engine is only motored on the third day, it shall be run-up on the seventh day.

b. Short Term Storage: A helicopter that will not be flown for a period of one to 45 days shall be placed in Short Term Storage. Helicopters normally falling in this category are those undergoing minor repair or modification, awaiting assignment or disposition, being held in operational reserve, or any other condition which would require grounding of the helicopter for a period not to exceed 45 days.

c. Intermediate Storage: A helicopter that will be inactive for a period of 46 to 180 days shall be preserved and maintained in Intermediate Storage. Normally, this includes those helicopters undergoing major repair or modification, those declared surplus and awaiting final disposition, or any other circumstance that would warrant storage for a period of 46 to 180 days.

## SECTION II PRESERVATION PROCEDURES

16-7. PROCEDURES.

16-8. PARKING AND MOORING.

16-9. PARKING AND MOORING PROCEDURE. For parking and mooring procedures, refer to paragraph 1-55 and 1-56.

16-10. INSPECTION OF STORED HELICOPTERS.

16-11. INSPECTION PROCEDURE.

**Note**

The local maintenance officer shall be responsible for establishing a program for periodic inspection of stored helicopters in addition to the following:

a. Ensure proper preservation and ventilation of helicopters and take immediate action to correct all unsatisfactory conditions.

b. Ensure drainage holes are free of obstructions.

c. When canvas covers are used for protection, they shall be so arranged as to prevent the accumulation of water on surface of the cover.

d. During hot weather, spot checks shall be made of stored helicopters to determine maximum temperature. This shall be accomplished by hanging a standard thermometer in interior of the helicopter and recording readings during the hottest part of the day. If temperature exceeds 160°F (71°C), action shall be taken to properly ventilate the helicopter.

Note

Forced ventilation shall be employed, if other methods are not adequate, to prevent sweating and possible mildew.

e. If average local humidity exceeds 40 percent, all stored helicopters shall be inspected carefully at 14 day intervals and treated for corrosion if necessary. If humidity is less than 40 percent, the above shall be accomplished every 30 days. While inspecting for corrosion, special attention shall be given to areas where moisture deposits will not evaporate rapidly. Normally, corrosion will not be as prevalent on painted surfaces as on unpainted ones; however, under certain conditions, corrosion may attack the metal through the paint, indicated by blisters or scaly appearance on the paint.

f. Inspect ground wires, mooring devices, and rotor tie-down straps every 30 days, and immediately after helicopter has been subjected to high velocity winds (exceeding 40 mph). Pulled rods, deteriorated ground wires, mooring ropes, and tie-down straps shall be replaced.

16-12. INSPECTION AND SERVICING - SHORT TERM STORAGE.

a. Perform a daily inspection in accordance with TM 55-1520-210-20PMD, except oil servicing of engine, transmission, and tail rotor gear boxes.

b. Drain following reservoirs and fill with corrosion preventive oil (item 9, table 1-2).

(1) Engine oil tank.

(2) Transmission sump.

(3) Intermediate (42 degree) gear box.

(4) Tail rotor (90 degree) gear box.

16-13. INSPECTION AND SERVICING - INTERMEDIATE STORAGE.

a. In preparing helicopter for intermediate storage, perform a daily inspection in accordance with TM 55-1520-210-20PMD, except for oil service of engine, transmission, and gear boxes.

b. Drain and fill following reservoirs with corrosion preventive oil (item 9, table 1-2).

(1) Engine oil tank.

(2) Transmission sump.

(3) Intermediate (42 degree) gear box.

(4) Tail rotor (90 degree) gear box.

Note

Helicopters and components shall be processed for storage in accordance with applicable methods described, or included by reference, in this section. Methods include cleaning, drying, preservative application, and use of wrappings or coverings when required. Preservation should be accomplished in an uninterrupted series of operations. When periods of interruption are necessary, temporary protection shall be provided for partially processed items, as required to avoid contamination. For component assemblies removed from helicopter, preservation and packaging instructions may generally be found in that section which carries instructions for removing the component. Further information on preservation methods may be found in TM 38-230, Preservation, Packaging and Packing of Military Supplies and Equipment.

16-14. ENGINE PRESERVATION - GENERAL. All preservation procedures require that the accumulation of dirt be removed from the engine using dry cleaning solvent (item 302, table 1-2). Under normal conditions, it will not be necessary to clean the entire external surface of the engine. If necessary, perspiration residues may be removed from close tolerance bare metal surfaces by wiping with a clean cloth dampened in fingerprint remover (item 313, table 1-2), before cleaning with solvent.

Caution

To prevent oil contamination, never mix synthetic-base oils with mineral-base oils. Synthetic-base lubricating oil (item 2, table 1-2), is required for engines. Only a synthetic-base corrosion preventive oil can be used to spray the compressor for corrosion prevention.

16-15. HELICOPTER PREPARATION - FLYABLE STORAGE.

16-16. Prepare helicopter for flyable storage, according to paragraphs 16-17 through 16-19. Perform a daily inspection in accordance with TM 55-1520-210-20PMD.

16-17. AIRFRAME PREPARATION - FLYABLE STORAGE.

a. Install cover on airspeed (pitot) tube.

b. Park and moor helicopter with main and tail rotor tiedowns installed. (Refer to paragraphs 1-55 and 1-56.)

c. Inflate ground handling wheel tires to normal pressure. Remove handling wheel assemblies and stow in cabin cargo area.

d. Close all doors and windows.

16-18. ENGINE PREPARATION - FLYABLE STORAGE.

a. Preserve an operable engine as follows:

(1) Perform a regular preflight inspection of engine.

(2) Run engine at idle and check all instruments for normal engine operation.

(3) Operate engine for 10 minutes at approximately 75 percent rated speed or at highest power possible without gaining flight altitude. Make certain that engine temperature stabilizes.

(4) Shut down engine.

(5) Perform a regular postflight inspection of engine.

(6) Install engine inlet and exhaust covers.

**Note**

When covers are not available, seal openings with greaseproof barrier material (item 505, table 1-2), and secure with tape (item 400, table 1-2).

b. Preserve an inoperable engine that can be motored as follows:

(1) Check oil level; service, if necessary.

(2) Disconnect cable connector from ignition exciter to prevent accidental firing of engine.

(3) Motor the engine to initiate oil flow.

**Caution**

Do not exceed starter limitations.

(4) Connect cable connector to ignition exciter.

(5) Install engine inlet and exhaust covers.

**Note**

When covers are not available, seal openings with greaseproof barrier material (item 505, table 1-2), and secure with tape (item 400, table 1-2).

(6) Seal the gap between bleed band and compressor housing by encircling the engine with a narrow strip of barrier material (item 505, table 1-2), and secure with tape (item 400, table 1-2).

c. Preserve an inoperable engine that cannot be motored as follows:

(1) Check oil level; service, if necessary.

(2) Install engine inlet and exhaust covers.

**Note**

When covers are not available, seal openings with greaseproof barrier material (item 505, table 1-2), and secure with tape (item 400, table 1-2).

(3) Seal the gap between bleed band and compressor housing by encircling the engine with a narrow strip of barrier material (item 505, table 1-2), and secure with tape (item 400, table 1-2).

16-19. FUEL SYSTEM PREPARATION - FLYABLE STORAGE. Service fuel system to normal capacity after each engine preservation run.

16-20. HELICOPTER PREPARATION - SHORT TERM STORAGE.

16-21. When a helicopter will not be operated for a period of one to 45 days it shall be preserved and maintained according to paragraphs 16-22 through 16-31.

16-22. AIRFRAME PREPARATION - SHORT TERM STORAGE.

a. Clean the following areas and treat for corrosion in accordance with TM 55-405-3:

(1) Crew and cargo compartment.

(2) Radio compartment.

(3) Electrical compartments.

(4) Tail boom, interior and exterior.

b. Install tie-downs on main and tail rotors.

c. Close and secure all cowling, inspection panels, and covers.

16-23. ENGINE PREPARATION - SHORT TERM STORAGE. Preservation of an installed engine for short term storage is the same as for intermediate storage. (Refer to paragraph 16-35.)

16-24. FUEL SYSTEM PREPARATION - SHORT TERM STORAGE.

a. Defuel and drain fuel system, including strainer and tank sumps.

b. Purge fumes from fuel cells by slowly discharging carbon dioxide bottles into filler opening.

**Warning**

In the interest of safety of personnel and equipment, the following precautions must be observed while preparing aircraft fuel tanks for storage:

The aircraft and all equipment used in performing the operation must be properly grounded. This includes, defueling equipment, work stands, purging equipment and any powered or pneumatic devices. Work stands shall be equipped with a personnel static discharge plate of copper or zinc plate, which shall be affixed in such a position that personnel can contact the plate before coming in contact with the aircraft. High static electrical charges are created by the contact and separation of unlike substances, or by any sort of motion of persons or material and are a constant source of danger when generated in the presence of fuels or flammable vapors.

When using a fire extinguisher bottle as a source of $CO_2$ for purging fuel tanks, regardless of the size of the bottle used, the fiber horn shall be removed, not only because it is too large for insertion into the tank filler neck, but to avoid generating static electrical charges which can build up by gas moving rapidly through the horn. The nozzle as well as the bottle itself must be grounded to the aircraft. The $CO_2$ must be discharged into the fuel tanks slowly, at a rate of one pound per minute. $CO_2$ must be released slowly because the rapid passage of a gas through a hose can generate static electricity. In addition to this, a very rapid rate of discharge allows rapid expansion of the $CO_2$ gas when it flows into the fuel cell. The expanding gas can lower the temperature to the point that it will cause damage to the cell.

Fuel tanks should not be drained near the end of the working day and then allowed to stand "empty" over night. Such action could make a perfect set of conditions for producing explosive vapors. The fact is that the system is not completely empty. Residue fuel drains down the sides of the tank and forms puddles. During the night fuel from these puddles evaporates into the air in the tank and if the critical fuel-air ratio develops an explosion could be set off by a spark. The remedy is to avoid such a lapse of time between draining and purging.

The size of the $CO_2$ bottle to be used can be varied to meet existing conditions. The 15 pound size is handy to use. The total amount recommended is based on the quantity usually needed to purge a tank or tanks of the size under discussion. However, more may be needed to obtain a safe reading on the combustible gas indicator.

It is permissible to use nitrogen or other inert gas in place of the $CO_2$ gas called out in any of the purging procedures. The same precautionary measures stated above will be observed.

c. Fog interior of fuel cells with light engine oil (item 5, table 1-2), through filler opening, vents, and other openings available without extensive disassembly.

**Caution**

Do not relax precautions against fire and explosion, since purging of fumes does not eliminate these hazards.

16-25. POWER TRAIN PREPARATION - SHORT TERM STORAGE.

a. Clean drive shaft and treat for any evident corrosion.

b. Apply corrosion preventive compound (item 309, table 1-2) to unplated steel surfaces not in contact with bearings.

c. Cover breather holes in transmission and gear boxes with greaseproof barrier material (item 505, table 1-2), secured with tape (item 400, table 1-2).

16-26. HYDRAULIC SYSTEM PREPARATION - SHORT TERM STORAGE.

a. Fill hydraulic reservoir with fluid (item 4, table 1-2).

b. Wipe exposed portions of hydraulic boost cylinder actuator pistons with lint-free cloth moistened with hydraulic fluid.

16-27. ROTORS AND CONTROLS PREPARATION - SHORT TERM STORAGE.

a. Lubricate rotors and controls according to Lubrication Order. (Refer to Chapter 2.)

b. Apply fingerprint remover (item 313, table 1-2), to all unpainted metal surfaces. Remove any film residue of fingerprint remover with solvent (item 302, table 1-2).

c. Wipe all parts dry with clean, lint-free cloth, and apply corrosion-preventive compound (item 309, table 1-2) on all unpainted metal surfaces not in contact with bearings.

d. Clean surfaces of rotor blades with mild soap and water solution. Wipe blade completely dry with clean, lint-free cloth.

e. Apply a light, even coat of wax (item 504, table 1-2) to entire painted area of rotor blades.

f. Apply a light coat of corrosion preventive compound (item 309, table 1-2), to tail rotor cables, sprocket, and chain. Cycle controls through full range for complete coverage.

16-28. BATTERY PREPARATION - SHORT TERM STORAGE.

a. Disconnect battery and allow to remain in helicopter.

b. Wrap battery quick-disconnect with barrier material (item 506, table 1-2), secured with tape (item 400, table 1-2).

16-29. INSTRUMENTS PREPARATION - SHORT TERM STORAGE.

a. Install cover on airspeed (pitot) tube.

b. Cut a piece of barrier material (item 506, table 1-2), to fit over each static vent of airspeed system. Secure material in place with tape (item 400, table 1-2).

16-30. AVIONIC EQUIPMENT PREPARATION - SHORT TERM STORAGE.

a. Remove, attach condition tags, and return all head-sets and microphones to supply.

b. Leave all other unclassified avionic equipment installed in helicopter.

16-31. LANDING GEAR PREPARATION - SHORT TERM STORAGE.

a. Place blocks or shoring under skid tubes to provide free air passage.

b. Remove and clean ground handling wheel assemblies. Inflate tires to normal pressure. Stow wheel assemblies in cabin cargo area.

c. Clean cross tubes and skid tubes, and treat for corrosion in accordance with TM 55-405-3.

16-32. HELICOPTER PREPARATION - INTERMEDIATE STORAGE.

16-33. Prepare helicopter for intermediate storage, from 46 to 180 days, according to paragraphs 16-34 through 16-44.

Note

A renewal of preservation shall be accomplished at each 45 day interval. (Refer to paragraph 16-54.)

16-34. AIRFRAME PREPARATION - INTERMEDIATE STORAGE.

Note

Apply the following procedures in addition to those for short term storage. (Refer to paragraph 16-22.)

a. Install standard covers, or suitable waterproof covering, over any openings which could allow water or other foreign matter to contact equipment or structural parts.

b. Clean external surfaces of transparent plastic windows. (Refer to TM 55-405-4.)

c. Allow windows to dry thoroughly. Apply an 0.008 inch minimum dry film of plastic coating compound (item 314, table 1-2).

**Note**

This white pigmented coating must extend at least two inches onto metal surface around window, if possible. No further covering of plastic windows is necessary.

16-35. ENGINE PREPARATION - INTERMEDIATE STORAGE.

a. Preserve engine that can be motored as follows:

(1) Check oil level; service, if necessary.

**Warning**

Prolonged contact with lubricating oil (item 2 or 3, table 1-2) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Saturated clothing should be removed immediately. Areas in which lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

**Caution**

Lubricating oil (item 2 or 3, table 1-2) may soften paint upon contact. If lubricating oil is spilled on painted surfaces, these surfaces should be thoroughly washed.

(2) Disconnect cable connector from ignition exciter to prevent accidental firing of engine.

(3) Remove fuel inlet strainer, pump discharge strainer, and servo supply filter from fuel regulator. Clean with dry-cleaning solvent, (item 302, table 1-2) and reinstall.

(4) Remove two bolts and washers to loosen anti-icing air valve from impeller housing.

(5) Install a blocker plate between impeller housing and anti-icing air valve.

(6) Disconnect the main fuel hose from main fuel manifold (flow divider on T53-L-13) and the starting fuel hose from inlet side of starting fuel solenoid valve. Install temporary lines on end of hoses to allow drainage into suitable container.

(7) Connect hose from a source of lubricating oil, (item 5, table 1-2), Grade 1010, to fuel control inlet fitting.

(8) Remove temperature sensing element with housing from engine inlet housing. Wrap element in barrier material, (item 505, table 1-2), and secure it to engine to prevent any physical damage. Cover opening in inlet housing.

(9) Disconnect airbleed hose from diffuser housing. Apply dry filtered air, using 40 psi on T53-L-9/9A or 15 psi on T53-L-11/13, through airbleed hose to tighten bleed band.

(10) Check that engine has cooled enough to prevent auto-ignition.

(11) Set throttle arm to idle position.

(12) Motor engine, with starter, to pump lubricating oil into fuel system.

**Caution**

Do not exceed starter limitations.

(13) Using a suitable spray gun with filtered air at a pressure of 90 psi, spray 1/2 pint of lubricating oil (item 2 or 3, table 1-2), or corrosion inhibiter (item 306, table 1-2), into inlet during engine motoring. Hold spray gun approximately 18 inches from inlet housing and move it constantly to cover entire area. Continue until all the oil is used.

(14) Open and close throttle to ensure flushing of the fuel control.

(15) Continue motoring until oil is observed draining into container.

(16) With engine stopped, spray power turbine rotor with sufficient amount of lubricating oil or corrosion inhibiter, to cover blades.

(17) Disconnect air pressure from airbleed hose and connect hose to diffuser housing.

(18) Disconnect lubricating oil hose from fuel control and connect fuel inlet line.

(19) Remove temporary lines from fuel hoses and connect main fuel hose to main fuel

manifold, or flow divider. Connect starting fuel hose to starting fuel solenoid valve.

(20) Remove blocker plate at anti-icing air valve and connect valve to impeller housing with two bolts and washers. Lock-wire bolts.

(21) Connect valve connector to ignition exciter.

(22) Place four eight-unit bags of desiccant, (item 310, table 1-2) in air inlet opening and four bags in exhaust diffuser or tailpipe opening.

(23) Install engine inlet and exhaust covers.

**Note**

When covers are not available, seal openings with greaseproof barrier material (item 505, table 1-2) and secure with tape (item 400, table 1-2).

(24) Seal the gap between bleed band and compressor housing by encircling the engine with a narrow strip of barrier material, (item 505, table 1-2) and secure with tape, (item 400, table 1-2).

(25) Visually check entire engine. Plug all holes, cap all ports, and check that external parts are complete and secure. Bare metal, including internal and external threads, should be covered with a film of lubricating oil (item 2 or 3, table 1-2), or corrosion inhibiter.

(26) Record date of preservation, and maintenance during preservation, on engine history.

b. Preserve engine that cannot be motored as follows:

**Note**

An engine removed from an aircraft, because of an inflight malfunction, and scheduled for overhaul, shall have the words INFLIGHT SHUTDOWN typed or printed in red on the applicable engine historical record.

(1) Disconnect cable connector and disconnect fuel inlet and outlet hoses from fuel control. Remove drain plug from fuel control. Drain all fuel from fuel control and hoses.

(2) Remove fuel inlet strainer, pump discharge strainer, and servo supply filter from fuel control. Clean with dry-cleaning solvent, (item 302, table 1-2) and reinstall.

(3) Remove overspeed governor and drain fuel.

(4) Connect cable and fuel hoses. Replace drain plug.

(5) Lock-wire throttle arm into closed position.

(6) Pour lubricating oil, (item 5, table 1-2) Grade 1010, into openings made accessible by removal of overspeed governor, until fuel regulator is filled.

(7) Pour lubricating oil into overspeed governor while rotating the drive shaft by hand.

(8) Reinstall overspeed governor.

(9) Spray 1/2 pint lubricating oil (item 2 or 3, table 1-2), or corrosion inhibiter, (item 9 or 306, table 1-2) into inlet housing and exhaust diffuser openings. Constantly move spray gun to cover all internal surfaces.

(10) Place four eight-unit bags of desiccant, (item 310, table 1-2) in air inlet openings and four bags in exhaust diffuser or tailpipe opening.

(11) Install engine inlet and exhaust covers.

**Note**

When covers are not available, seal openings with greaseproof barrier material (item 506, table 1-2) and secure with tape, (item 400, table 1-2).

(12) Seal the gap between bleed band and compressor housing by encircling the engine with a narrow strip of barrier material, (item 505, table 1-2) and secure with tape, (item 400, table 1-2).

(13) Visually check entire engine. Plug all holes, cap all ports, and check that external parts are complete and secure. Bare metal, including internal and external threads, should be covered with a film of lubricating oil (item 2 or 3, table 1-2), or corrosion inhibiter.

(14) Record date of preservation, and maintenance during preservation, on engine historical form.

16-36. FUEL SYSTEM PREPARATION - INTERMEDIATE STORAGE. Apply same procedures as for short term storage. (Refer to paragraph 16-24.) Any auxiliary fuel tanks will be removed, preserved, tagged, and returned to stock in accordance with TM 55-405-3.

16-37. POWER TRAIN PREPARATION - INTERMEDIATE STORAGE.

a. If engine is operable, preserve power train for intermediate storage by same procedures as for short term storage. (Refer to paragraph 16-25.)

**Note**

If engine cannot be rotated, preserve power train for intermediate storage according to steps b. through h. below.

b. Remove main rotor. (Refer to paragraph 8-22.)

c. Remove mast assembly.

d. Spray inside of transmission, through top opening, with approximately one gallon of corrosion-preventive oil, (item 9, table 1-2). While spraying, manually rotate internal gears and bearings with input drive quill.

e. Reinstall mast assembly. Apply fingerprint remover (item 313, table 1-2) to all unpainted surfaces of mast assembly. Wipe mast dry with clean lint-free cloth. Apply corrosion-preventive compound (item 309, table 1-2) to all unpainted surfaces.

f. Reinstall main rotor.

g. Reinstall main drive shaft.

h. Be sure intermediate and tail rotor gear boxes have been filled with corrosion-preventive compound.

16-38. HYDRAULIC SYSTEM PREPARATION - INTERMEDIATE STORAGE. Apply same procedures as for short term storage. (Refer to paragraph 16-26.)

16-39. ROTORS AND CONTROLS PREPARATION - INTERMEDIATE STORAGE. Apply same procedures as for short term storage. (Refer to paragraph 16-27.)

16-40. BATTERY PREPARATION - INTERMEDIATE STORAGE.

a. Remove battery and maintain in accordance with applicable TM 11 series manual.

b. Wrap battery quick-disconnect with barrier material (item 506, table 1-2) secured with tape (item 400, table 1-2).

16-41. INSTRUMENTS PREPARATION - INTERMEDIATE STORAGE. Apply same procedures as for short term storage. (Refer to paragraph 16-29.) Also remove clock, apply condition tag, and turn in to supply.

16-42. AVIONIC EQUIPMENT PREPARATION - INTERMEDIATE STORAGE. Apply same procedures as for short term storage. (Refer to paragraph 16-30.)

16-43. UTILITY EQUIPMENT PREPARATION - INTERMEDIATE STORAGE.

a. Remove fire extinguishers, apply condition tag, and return to local supply.

b. Remove, apply condition tag, and return to supply such items as first-aid kits and other equipment subject to mildew and deterioration.

16-44. LANDING GEAR PREPARATION - INTERMEDIATE STORAGE. Apply same procedures as for short term storage. (Refer to paragraph 16-31.)

16-45. PRESERVATION OF FUEL REGULATOR REMOVED FROM ENGINE.

16-46. FUEL REGULATOR PRESERVATION PROCEDURE.

**Note**

A fuel control removed from an engine for longer than 48 hours must be preserved. Refer to paragraph 5-346for instructions. If fuel control is serviceable, accomplish steps a. through g. of paragraph 5-346, and enclose fuel control in a plastic envelope. If fuel control is not serviceable, accomplish the following steps:

a. Turn fuel control over several times, allowing oil to penetrate all sections.

b. Reinstall pump discharge strainer and servo supply filter.

c. Enclose fuel control in plastic envelope.

**Note**

If fuel control is defective to the extent it requires Direct Support maintenance, accomplish steps h. through l. of paragraph 5-346 and forward to Direct Support maintenance.

16-47. ENGINE PRESERVATION - PERMANENT STORAGE.

16-48. Preservation of an engine for permanent storage requires that the engine be installed in a metal shipping container. Preservation of such an engine is the same as for intermediate storage. (Refer to paragraph 16-35.)

16-49. ACCIDENT ENGINES - PRESERVATION.

16-50. ACCIDENT ENGINES PRESERVATION PROCEDURE.

**Note**

Engines removed from an aircraft, which has been involved in an accident in which engine failure or malfunction is known or suspected to have been a factor, should not be treated for corrosion protection. No attempt should be made to operate, motor, or disassemble an accident engine. All accident engines must be transported to an overhaul depot or designated investigation area within ten days after the accident.

a. Without disconnecting lines or fittings make every effort to prevent the remaining fuel and oil in the engine from leaking out.

b. To prevent the accumulation of moisture, place four eight-unit bags of desiccant, (item 310, table 1-2) in the inlet housing and four bags in exhaust diffuser.

c. Plug all ports and cap all fittings and lines. Seal all openings with covers or barrier material, (item 505, table 1-2) and secure with tape, (item 400, table 1-2).

16-51. ENGINES DAMAGED, CANNIBALIZED OR FAILED - PRESERVATION.

16-52. DAMAGED, CANNIBALIZED OR FAILED ENGINE PRESERVATION PROCEDURE. Inoperable engines that are idle because they require parts, maintenance, or overhaul shall be preserved as required (depending on storage time) and stored in a shipping container or in a clean, dry area, adequately protected from dirt and physical damage.

16-53. PRESERVATION RENEWAL.

16-54. PRESERVATION RENEWAL PROCEDURE.

**Note**

Preservation may be repeated as often as necessary, but when conditions warrant it, a permanent preservation should be considered for a flyable or an extended storage engine. Renew preservation as follows:

a. Remove inlet and exhaust covers or barrier material and remove desiccant bags.

b. Inspect openings for foreign material and corrosion. Wipe clean with dry-cleaning solvent, (item 302, table 1-2).

c. Repeat preservation procedure for flyable or intermediate storage. (Refer to paragraph 16-15 or 16-32.)

## SECTION III

## DEPRESERVATION AND ACTIVATION PROCEDURES

### 16-55. ACTIVATION AND DEPRESERVATION.

16-56. Activation of the helicopter and depreservation of component parts will be accomplished in accordance with the following described methods for cleaning, flushing and removing preservation materials.

16-57. HELICOPTER ACTIVATION - AFTER FLYABLE STORAGE.

16-58. A helicopter in flyable storage requires no depreservation, and can be returned to active flight status by accomplishing a complete Daily Inspection. (Refer to TM 55-1520-210-20PMD.)

16-59. HELICOPTER ACTIVATION - AFTER SHORT TERM OR INTERMEDIATE STORAGE.

16-60. A helicopter being removed from short term or intermediate storage requires depreservation in accordance with paragraphs 16-55 through 16-71, in addition to a complete Daily Inspection.

16-61. AIRFRAME - DEPRESERVATION. Clean airframe in accordance with instructions in TM 55-405-4. Remove all protective covers, coatings, and barrier material.

16-62. FUEL CELLS - DEPRESERVATION. Flush fuel cells with dry cleaning solvent (item

302, table 1-2). Thoroughly dry insides of cells with filtered compressed air.

**Caution**

Do not exceed three psig during drying operation, as excessive pressure can rupture fuel cell.

16-63. POWER TRAIN - DEPRESERVATION.

a. Drain preservative compound from transmission intermediate gear box, and tail rotor gear box. Flush and fill each unit with oil (item 2, table 1-2).

b. Check and clean transmission oil filters.

c. Clean drive shafts as necessary with cleaning solvent (item 302, table 1-2).

16-64. ROTORS AND CONTROLS - DEPRESERVATION.

a. Clean main and tail rotor assemblies with dry cleaning solvent (item 302, table 1-2). Wipe dry with lint-free cloth.

b. Lubricate in accordance with Lubrication Order, Chapter 2.

c. Check stabilizer bar dampers to be full of hydraulic oil (item 4, table 1-2). If fluid level is much below top of window on damper, check timing after refilling and replace damper if unsatisfactory. (Refer to paragraph 8-51.)

16-65. BATTERY - DEPRESERVATION. Remove protective material from battery connector. Install and connect battery.

16-66. LANDING GEAR - DEPRESERVATION. Remove blocks from under skid gear. Inflate ground handling wheel tires to normal pressure.

16-67. ENGINE ACTIVATION - AFTER STORAGE.

16-68. The following procedures apply to installed engines immediately, or after installation, in aircraft; the particular procedure chosen depends on the length of time that the engine has been inactive. Examine the preservation record tags and the historical records of the engine to determine period of inactivity.

16-69. ENGINE IN AIRCRAFT - ACTIVATION - AFTER FLYABLE STORAGE. Remove covers of barrier material from inlet and exhaust housings and remove any tape residue with dry cleaning solvent (item 302, table 1-2). Engine is ready for ground test.

16-70. ENGINE IN AIRCRAFT - ACTIVATION - AFTER SHORT TERM OR INTERMEDIATE STORAGE.

a. Remove bleed band, inlet, and exhaust covers or barrier material, and remove desiccant bags.

b. Inspect openings for foreign material and corrosion. Wipe clean with dry cleaning solvent (item 302, table 1-2).

c. Remove chip detector from accessory drive gearbox and drain plugs from fuel control. Allow oil to drain. Clean and replace chip detector and plugs.

d. Disconnect cable connector from ignition exciter to prevent accidental firing of engine.

e. Remove lockwire from throttle arm of fuel control and set to idle position.

f. Disconnect main fuel hose from main fuel manifold or flow divider and drain into a container of at least a two-gallon capacity.

g. Check oil level; service if necessary.

h. Operate aircraft boost pump to prime fuel system and motor engine with starter.

**Caution**

Do not exceed starter limitations.

i. Move throttle arm to maximum until a solid stream of fuel with no air bubbles is observed flowing into container. At least one gallon of fuel must flow into container.

**Note**

Engine lubrication system is fully primed when oil pressure gage shows a steady positive indication.

j. Connect main fuel hose to main fuel manifold or flow divider and inspect engine for leakage.

k. Unwrap and install temperature sensing element on inlet housing.

l. Connect cable connector to ignition exciter. Lock-wire connector.

m. Start engine and operate for five minutes at approximately 75 percent rated speed or at highest power possible without gaining flight altitude.

n. Shut down engine.

o. Remove oil filter. Check for excessive contamination and replace.

p. Remove chip detector. Check for excessive contamination, clean, and reinstall.

q. Remove fuel inlet strainer, pump discharge strainer, and servo supply filter from fuel control, check for contamination, clean and replace.

r. If no contamination is evident, the engine is ready for ground test.

s. If oil system accumulation is slight, drain the oil and refill system with new oil.

t. Repeat steps m. through p. Evidence of continued contamination in oil system requires a thorough investigation.

**Note**

If there is less than ten hours operating time on engine since new, or since last overhaul, repeat steps m. through p. until no contamination is evident, or analysis of the contamination determines that engine must be replaced.

16-71. ENGINE - ACTIVATION - NEW, OVERHAULED, OR PERMANENT STORAGE. A new, overhauled, or permanent storage engine is preserved in a shipping container. It will be removed from the container and installed on an airframe, with proper fuel and oil supplied. Activate engine in same manner as outlined for an intermediate storage engine. (Refer to paragraph 16-70.)

## SECTION IV

## DEMOLITION

**16-72. DEMOLITION.**

16-73. EXPLANATION OF NECESSITY.

16-74. When it is evident that an enemy may possibly come into possession of the helicopter, every effort should be made to evacuate the aircraft to a defendable location. If the helicopter is not in operational readiness, destruction of the aircraft shall be accomplished by one of the following procedures, the most logical of which should be determined by evaluating the existing circumstances.

16-75. DESTRUCTION BY EXPLOSIVES. Place a charge of dynamite, or comparable explosive, in the engine compartment. Attach a suitable time delay fuse so personnel may attain a safe distance after igniting. Ignite fuse, evacuate to a safe distance, and lie flat on the terrain with face down.

16-76. DESTRUCTION BY MECHANICAL MEANS. The helicopter may be destroyed mechanically in several different ways. The most logical manner of destruction is to smash all instruments, transmission case, engine compressor housing, gear boxes and rotor blades, using an entrenching tool or other suitable devices. Another means of destroying the helicopter mechanically is to run engine at flight idle rpm and lock collective control stick in down position. Open oil drain valves on transmission, engine, and gear box reservoirs so as to allow oil to drain. Leave engine running and evacuate personnel to a safe distance. A mechanical seizure of all rotating parts will subsequently occur thus damaging the helicopter to such an extent that further operation would be impossible.

16-77. DESTRUCTION BY FIRE. The simplest method of destroying the helicopter by fire is to open the fuel drain valve and allow fuel to saturate the terrain beneath the helicopter. Pour a vein of fuel from the saturated spot to a point ten to twelve feet from the helicopter. Ignite the vein of fuel and evacuate the area. The flame will subsequently travel the distance of the vein and ignite the saturated point.