

CHAPTER 9 FLIGHT CONTROLS

Section I — Scope

9-1. Scope. The purpose of this chapter is to provide all the essential information for maintenance personnel to accomplish organizational maintenance on the complete flight controls. This information includes a detailed description and chronological instructions as to methods and procedures. It also includes special

tools and equipment required for accomplishment of the maintenance phases as are applicable in accordance with the Maintenance Allocation Chart. Special tools required for performance of Organizational Maintenance will be found in TM 55-1520-211-20P.

Section II — Movable Flight Controls

9-2. Movable Flight Controls. The flight control system is a mechanical type, actuated by conventional helicopter controls which control the attitude and flight direction of the helicopter. The system includes the cyclic stick, used for fore and aft and lateral control; the collective pitch control for vertical control; the tail rotor pitch control pedals for directional control and a synchronized stabilizer linked to the fore and aft cyclic control system. Electrically operated force trims connected to the cyclic and directional controls induce artificial control feeling and stabilize the cyclic control stick and tail rotor pitch control pedals to prevent them from moving of their own accord.

9-3. The collective pitch system through push-pull tubes, bellcranks and power cylinder transmits movement of the collective pitch control lever to the pitch change mechanism of the main rotor hub. The helicopter can be made to ascend vertically or remain at a constant altitude by means of the collective pitch control system.

9-4. A system of linkage transmits control movement from the cyclic control stick in the cabin to the swashplate, then through the rotating control linkage, controlling the main rotor and direction of movement of the helicopter. The fore and aft, and lateral controls are independent units from the cyclic stick until they reach the intermixing bellcrank. From

this point on to the swashplate horns the cyclic controls are combined. A hydraulic power cylinder, incorporated in each linkage system, prevents rotor forces being transmitted to the controls. The right (pilot's) cyclic stick grip contains the cargo release switch, the trigger type three-position radio transmission switch, and force trim release switch. The force trim switch is located on the left top side of the stick grip. The copilot's cyclic pitch control stick is linked to the pilot's stick and has the same function except that the cargo release switch is not connected to the copilot's stick.

9-5. The tail rotor control system consists of a set of control pedals, pedal adjuster assembly, power cylinder, cable quadrant, cable pitch change mechanism and connecting linkage. Operation of the pedal provides power boosted pitch change of the tail rotor blades to control the torque and resultant directional control of the helicopter. The pedal position may be adjusted by depressing and turning a knob on the cabin floor. The force trim system is linked to the directional controls and is operated by a switch on the cyclic control stick.

9-6. A synchronized elevator is mounted near the aft end of the tail boom and is connected through push-pull tubes and bellcranks to the cyclic control system. Fore and aft movement of the cyclic control stick causes a change in the elevator angle, thereby aiding controllability.

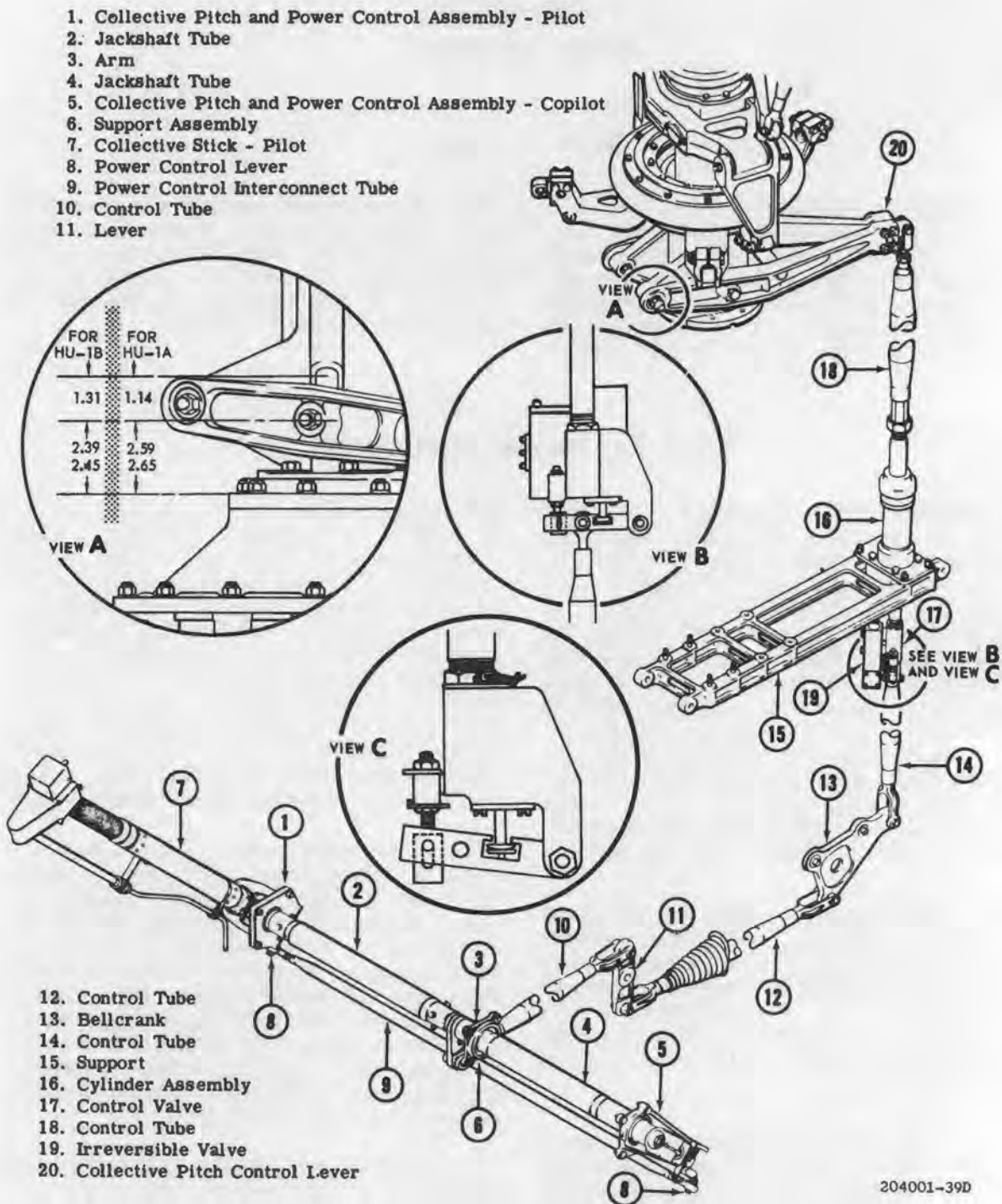
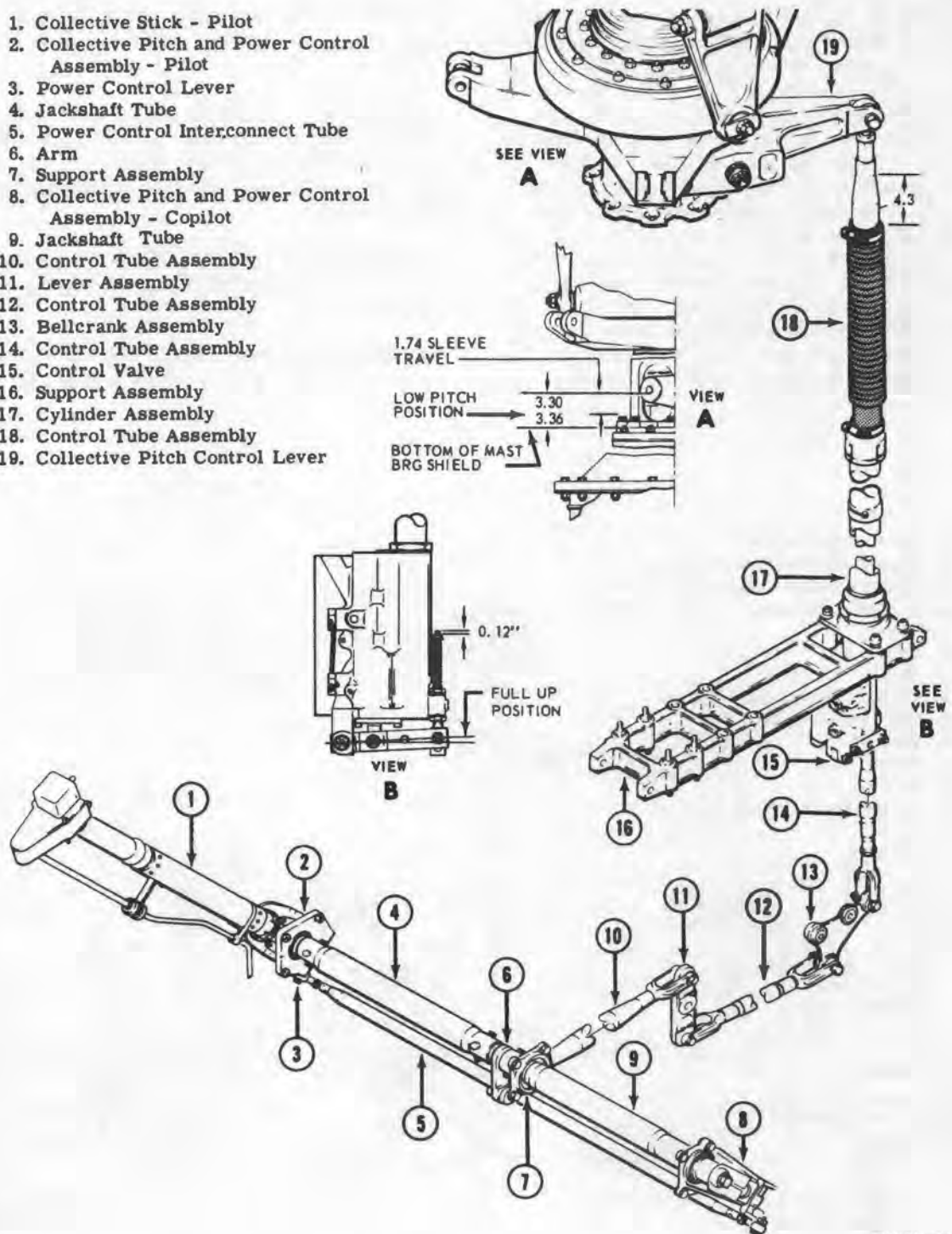


Figure 9-1. Collective pitch control system (UH-1A and UH-1B serial No. 60-3546 thru 64-14100)

1. Collective Stick - Pilot
2. Collective Pitch and Power Control Assembly - Pilot
3. Power Control Lever
4. Jackshaft Tube
5. Power Control Interconnect Tube
6. Arm
7. Support Assembly
8. Collective Pitch and Power Control Assembly - Copilot
9. Jackshaft Tube
10. Control Tube Assembly
11. Lever Assembly
12. Control Tube Assembly
13. Bellcrank Assembly
14. Control Tube Assembly
15. Control Valve
16. Support Assembly
17. Cylinder Assembly
18. Control Tube Assembly
19. Collective Pitch Control Lever



204001-64C

Figure 9-2. Collective pitch control system (UH-1B serial No. 64-14101 thru 65-12744 and 65-12772)

9-7. Collective Pitch and Power Control Assembly. The collective pitch and power control lever is located to the left of the pilot's position and controls vertical flight. The position of the lever determines the angle and resultant lift of the rotor blades. The blades are in low pitch when the lever is down. The blades are in high pitch when the lever is up. Operating friction may be induced into the lever by hand tightening the friction adjuster. A rotating grip type power control, providing manual control of power lever of fuel control unit, and a switch box assembly containing the starter, governor flight idle stop release, landing light and search light switches, is located on the upper end of the collective pitch lever. A spring loaded pitch lever down lock is located on the floor at the approximate center inboard of the

lever. The copilot's collective pitch control lever is connected to and in conjunction with the pilot's collective lever. The copilot's contains only the power control and governor switch.

9-8. Removal — Collective Pitch and Power Control Assembly. a. Remove access plates from floor and sides of cabin. Remove boots from pilot's and copilot's collective pitch and power control levers.

b. Disconnect electrical fittings of pilot's and copilot's collective pitch and power controls at bulkhead.

c. Disconnect power control tube (1, figure 9-3) from gear lever of collective assembly (2).

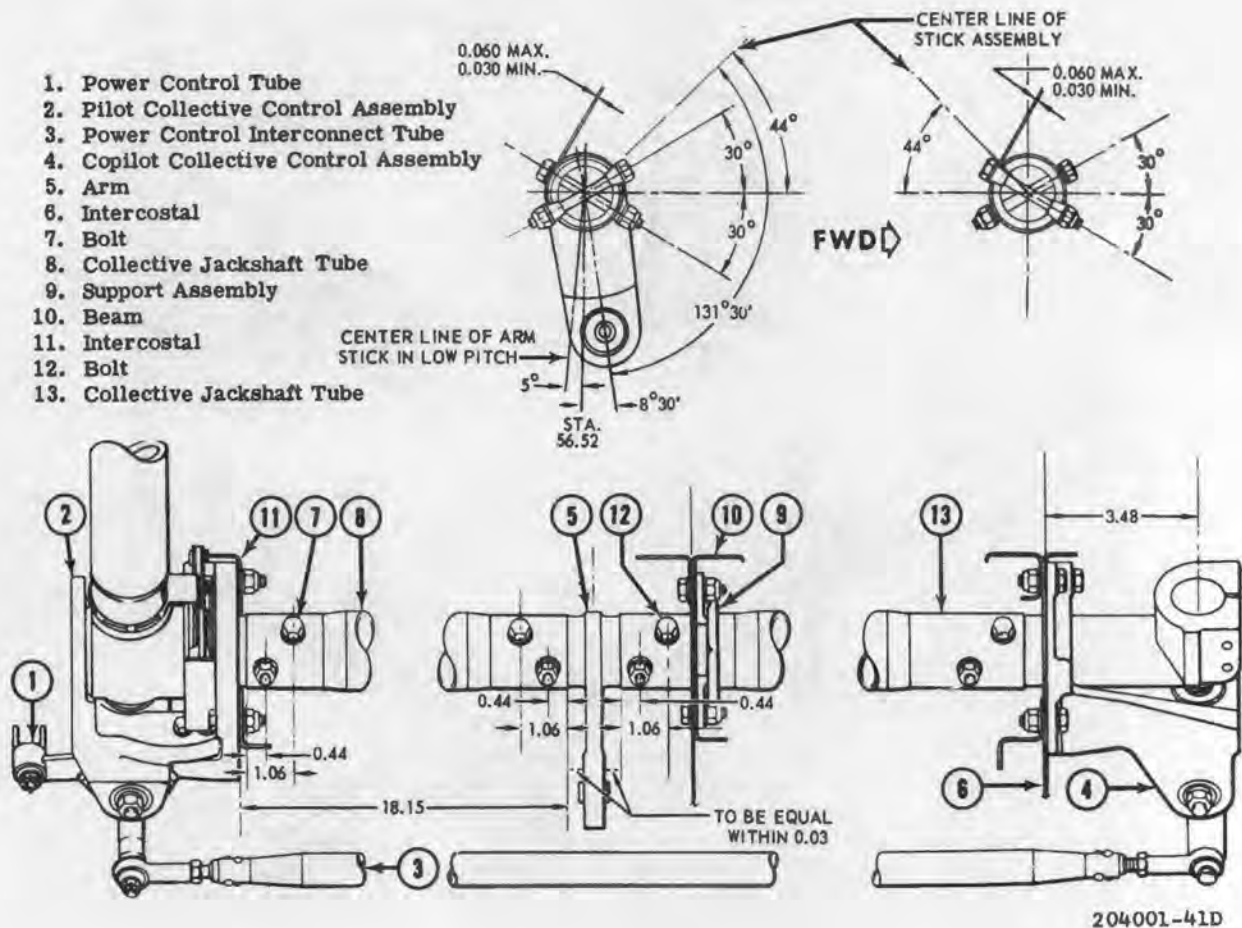


Figure 9-3. Collective pitch and power control assembly

d. Remove bolts from ends of power control interconnect tube (3), and remove tube through access opening in side of cabin.

e. Remove two bolts attaching copilot's lever to collective control assembly (4) and remove lever.

f. Disconnect pitch control push-pull tube from arm (5).

g. Remove four bolts attaching collective control assembly (4) to intercostal (6). Remove two bolts (7) and tapered bushings attaching copilot's jackshaft tube (8) and arm (5).

h. Remove bolts attaching support assembly (9) to beam (10).

i. Remove collective control assembly (4), jackshaft tube (8) and support (9) from structure, through access opening in left side of cabin.

j. Remove two screws and two bolts attaching collective control assembly (2) to intercostal (11).

k. Remove two bolts (12) and tapered bushings attaching collective control assembly (2) and jackshaft tube (13).

l. Remove collective control assembly (2) through access opening in cabin floor. Pilot's stick is a part of the control assembly (2) and is removed with control assembly.

m. Remove jackshaft tube (13) and arm (5) together, through access opening in left side of cabin.

9-9. Inspection — Collective Pitch and Power Control Assembly. a. Inspect control tubes for nicks and scratches. No limitations apply to length or direction of scratches. Scratches shall not exceed 0.010 inch in depth.

b. Inspect the bellcrank to control valve tube assembly (14, figure 9-1, 9-2 and 9-3A) bearing for 0.005 inch radial and 0.030 inch axial maximum allowable wear. Some of these tube assemblies may be equipped with alternate rod end bearings, 47-140-252-3. Tube assemblies so equipped have 0.012 inch radial and 0.012 inch axial maximum allowable wear limits.

c. Maximum allowable elongation to a bushing or clevis hole in the control system is 0.003 inch.

d. For replacement of control system bolts refer to paragraph 3-7.

e. Check pilot's collective stick for built in friction as follows:

(1) Apply pressure to helicopter hydraulic system using external hydraulic power.

(2) Back off friction control nut assembly far enough to assure that no friction is being applied by the nut assembly.

(3) Attach a calibrated pull scale to the center (plus or minus 1/2 inch) of the collective stick power control twist grip.

(4) Use the pull scale to pull the collective stick full travel up and then full travel down. Note the scale reading in both directions. Break-away force shall be from eight to ten pounds in each direction.

9-10. Repair or Replacement — Collective Pitch and Power Control Assembly. a. Remove all scratches in control tubes that do not exceed 0.010 inch in depth by polishing out with wet or dry sandpaper (item 508, table 1-1) or finer to obtain a smooth scratch free surface. Repair shall be blended out to extend over a minimum two inch area. Apply two coats of zinc chromate primer (item 119, table 1-1) to repaired area.

b. Replace control tubes with nicks or scratches in excess of 0.010 inch in depth.

c. Replace control tubes (14, figure 9-1, 9-2 and 9-3A) which do not meet inspection requirements of paragraph 9-9, step b.

d. If inspection requirements of paragraph 9-9, step e. are not met, repair or replace pilot's collective stick as follows:

(1) Should a greater force be required to move the collective stick up than is required to move it down, adjust the balance spring on the collective boost cylinder control head by bending the attaching tab up. If opposite condition exists, bend tab down. It may be necessary to replace spring if desired results are not obtainable.

(2) If correct reading of from eight to ten pounds cannot be obtained, refer to next higher maintenance level for replacement of shim.

9-11. Installation — Collective Pitch and Power Control Assembly. Check rigging, and rig if necessary, after removal and installation of any part of system.

a. Apply a coat of zinc chromate putty (item 200, table 1-1) to mounting face of pilot's (2, figure 9-8) and copilot's (4) collective control assemblies.

b. Lower collective assembly (2) through access opening in cabin floor. Insert elbow of collective assembly (2) through mounting hole in intercostal (11).

c. Insert jackshaft tube (13) and arm (5) through access opening in left side of cabin. Slide tube (13) over elbow of control assembly (2) with control arm down. Align holes and install tapered bushings and bolts (12) in jackshaft tube (13), attaching that tube to pilot's control assembly (2).

d. Insert jackshaft tube (8) and collective control (4) through access opening in left side of cabin. Insert tube (8) through mounting hole in intercostal (6).

e. Install support assembly (9) over tube (8) and slide tube over arm (5). Align holes and install tapered bushings and bolts (7).

f. Install mounting screws and bolts, and attach pilot's collective assembly (2) to intercostal (11). Install mounting bolts, and attach collective assembly (4) to intercostal (6), and attach support (9) to beam (10).

g. Mesh pinion and sector gears, and position control levers on the axis of the collective lever. Adjust and attach interconnect tube (3) to sector gear arms of pilot's (2) and copilot's (4) collective assemblies. Check controls for freedom of operation.

h. Install copilot's lever in collective control (4) and secure with two bolts.

i. Attach pitch control push-pull tube to arm (5).

j. Plug in electrical fittings, of pilot's (2) and copilot's (4) controls, at bulkhead.

k. Install boots around control levers. Replace and secure all access plates.

9-12. Collective Pitch Control Linkage. The collective pitch control assembly is connected to the control arms of the mast control assembly through a series of bellcranks, levers, fixed length and adjustable control rods. Incorporated in the system is a hydraulic power cylinder and control valves.

9-13. Removal — Collective Pitch Control Linkage (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). a. Disconnect control tubes (10 and 12, figure 9-1) from lever (11) and bellcrank (13). Remove bolt and lever (11).

Note

Tube (10) may be removed from the helicopter through the access opening in lower center nose section.

b. Disconnect control tube (14) from bellcrank (13) and remove bellcrank.

c. Disconnect control tube (14) from power cylinder (16). Disconnect control rod (18) from collective pitch control lever (20).

d. Disconnect and cover hydraulic lines from irreversible valve (19) of power cylinder (16).

e. Remove power cylinder (16) with irreversible valve (19) and control valve (17). (Refer to paragraph 6-23.)

9-14. Inspection — Collective Pitch Control Linkage (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). a. Inspect bearings for wear and roughness.

b. Inspect parts for wear, elongated bolt holes, cracks, nicks and surface damage.

c. Inspect power cylinder (Refer to paragraph 6-24.)

9-15. Repair or Replacement — Collective Pitch Control Linkage (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). Replace all parts that do not meet inspection requirements. (Refer to paragraph 9-14.)

9-16. Installation — Collective Pitch Control Linkage (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). a. Install lever (11, figure 9-1) in bracket with long end down. Attach control tube (10) to lever (11).

1. Collective Stick - Pilot
2. Collective Pitch and Power Control Assembly - Pilot
3. Power Control Lever
4. Jackshaft Tube
5. Power Control Interconnect Tube
6. Arm
7. Support Assembly
8. Collective Pitch and Power Control Assembly - Copilot
9. Jackshaft Tube
10. Control Tube Assembly
11. Lever Assembly
12. Control Tube Assembly
13. Bellcrank Assembly
14. Control Tube Assembly
15. Control Valve
16. Support Assembly
17. Cylinder Assembly
18. Control Tube Assembly
19. Collective Pitch Control Lever

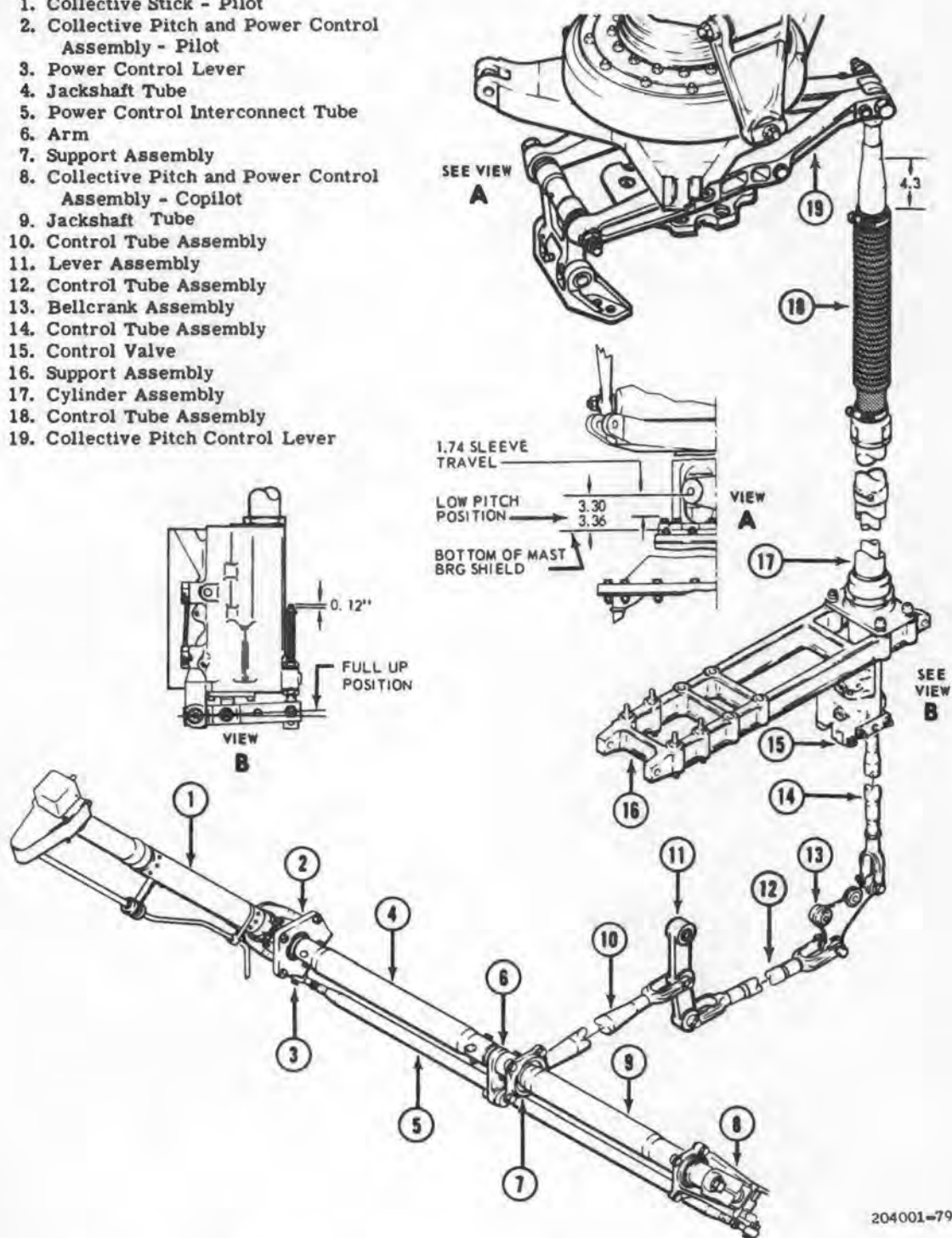


Figure 9-3A. Collective pitch control system (UH-1B serial No. 66-491 and subsequent)

204001-79

b. Install bellcrank (13) and attach control tubes (12) and (14). Place boots over forward end of control tube (12).

c. Adjust and install power cylinder (16) with irreversible valve (19) and control valve (17). (Refer to paragraph 6-26.)

d. Uncover hydraulic lines and connect to irreversible valve (19) of power cylinder (16).

e. Check rigging of collective pitch control system and rig if necessary. (Refer to paragraph 9-17.)

9-17. Adjustment — Collective Pitch Control Linkage (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). a. Install all fixed length tubes and links in collective control system. (See figure 9-1.)

b. Position collective control lever against the UP stop and secure with friction adjustment.

c. Adjust control tube (14, figure 9-1) to the cylinder attachment point with the cylinder bottomed in the UP direction and servo control valve in UP position. (See View C.) Shorten tube (14) three turns and install bolt, nut and cotter pin.

d. Place the collective control lever against the LOW stop. Position the collective lever to dimension illustrated in View A.

e. Exert sufficient downward pressure on collective cylinder assembly to hold valve lever at top of travel (View B.) Adjust clevis or rod end of control tube (18) to fit collective pitch lever (20); shorten cylinder by one full turn, and connect.

Note

When bottoming valves do not exert a force on the collective lever that will cause the controls to move below the valve as a result of structure and/or component deflection, or misrigging will occur.

f. Check for full free travel of collective pitch control system with boost pressure off.

g. Apply boost pressure and check for travel of collective sleeve. (View A.)

h. Check minimum pitch angle of rotor hub.

i. Inspect complete collective control system for security and safetying of parts.

9-18. Removal — Collective Pitch Control Linkage (UH-1B Serial No. 64-14101 and subsequent). a. Disconnect control tubes (10 and 12, figure 9-2 and 9-3A) from lever (11) and bellcrank (13). Remove bolt and lever (11).

Note

Tube (10) may be removed from the helicopter through the access opening in lower center nose section.

b. Disconnect control tube (14) from bellcrank (13) and remove bellcrank.

c. Disconnect control tube (14) from power cylinder (17). Disconnect control rod (18) from collective pitch control lever (19).

d. Disconnect and cover hydraulic lines from control valve (15) of power cylinder (17).

e. Remove power cylinder (17) with control valve (15). (Refer to paragraph 6-72.)

9-19. Inspection — Collective Pitch Control Linkage (UH-1B Serial No. 64-14101 and subsequent). (Refer to paragraph 9-14.)

9-20. Repair or Replacement — Collective Pitch Control Linkage (UH-1B Serial No. 64-14101 and subsequent). (Refer to paragraph 9-15.)

9-21. Installation — Collective Pitch Control Linkage (UH-1B Serial No. 64-14101 and subsequent).

a. Install lever (11 figure 9-2 and 9-3A) in bracket with long end down. Attach control tube (10) to lever (11).

b. Install bellcrank (13) and attach control tubes (12) and (14).

c. Adjust and install power cylinder (17) with control valve (15). (Refer to paragraph 6-75.)

d. Uncover hydraulic lines and connect to control valve (15) of power cylinder (17).

e. Check rigging of collective pitch control system and rig if necessary. (Refer to paragraph 9-22.)

9-22. Adjustment — Collective Pitch Control Linkage (UH-1B Serial No. 64-14101 and subsequent).

a. Install all fixed length tubes and links in collective control system. (See figure 9-2 and 9-3A.)

Note

For adequate clearance between bolt and cowling at attaching point of control tube (18) to collective lever (19) bolt head must be outboard.

b. On UH-1B helicopters Serial No. 64-14101 through 65-12744 and 65-12772 position collective control lever against the UP stop and secure with friction adjustment.

c. On UH-1B helicopters Serial No. 66-491 and subsequent position collective control lever against the LOW stop and secure with friction adjustment.

d. Adjust control tube (14) to the cylinder bottomed in the UP direction and servo control valve in UP position. (See View B, figure 9-2 and 9-3A.) Shorten tube (14) three turns and install bolt, nut and cotter pin.

e. Place the collective control lever against the LOW stop. Position the collective lever to dimension illustrated in View A.

f. Exert sufficient downward pressure on collective cylinder assembly to hold valve lever at top of travel (View B). Adjust clevis or rod end of control tube (18) to fit collective pitch lever (19); shorten cylinder by one full turn, and connect.

Note

When bottoming valves do not exert a force on the collective lever that will cause the controls to move below the valve as a result of structure and/or component deflection, or misrigging will occur.

g. Check cylinder boot location. (See figure 9-2 and 9-3A.)

h. Release adjustable friction with nut (1, figure 9-3B) and disconnect control tube (10, figure 9-2 and 9-3A) from collective jackshaft (9).

i. Tighten setscrews (2, figure 9-3B) in friction connector (3) until a spring scale applied at the center, plus or minus 0.050 inch, of and perpendicular to the throttle grip (4) indicates a breakaway force of 14 to 16 pounds up with collective stick positioned approximately one-third of full travel from bottom stop.

j. Apply boost pressure and check for travel of collective sleeve. (View A.)

k. Check minimum pitch angle of rotor hub.

l. Inspect complete collective control system for security and safetying of parts.

9-23. Cyclic Control Stick. The cyclic control stick is the means by which the pilot controls directional movement of the helicopter. When installed, the copilot's cyclic control stick is linked to the pilot's stick and has the same function.

9-24. Removal — Cyclic Control Stick. a. Disconnect fore and aft, and lateral control tubes.

b. Remove eight screws and remove boot.

c. Remove four bolts from support.

d. Disconnect wiring at bulkhead fitting and remove stick assembly from structure.

e. Remove opposite stick in the same manner.

9-25. Installation — Cyclic Control Stick. a. Position stick assembly in place. Install bolts through support. Install boot and plate and secure with eight screws.

b. Plug in electric fitting at bulkhead.

c. Attach fore and aft and lateral control tubes.

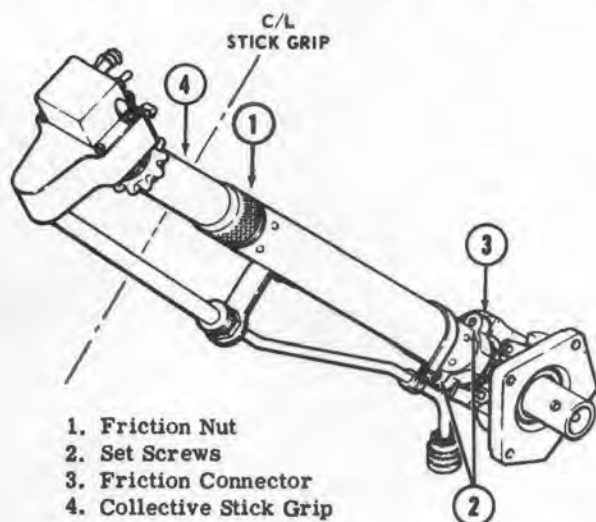
9-26. Cyclic Control Tube and Lever Assembly. The cyclic control tube and lever assembly interconnects the pilot and copilot control sticks for distribution of fore and aft control forces to the swashplate.

9-27. Removal — Cyclic Control Tube and Lever Assembly. a. Disconnect fore and aft control tubes (1 and 2, figure 9-6).

- b. Disconnect control tube (3).
- c. Disconnect fore and aft force gradient (4).
- d. On UH-1B, Serial No. 64-14101 and subsequent, helicopters remove counterweight balance assembly (5).
- e. Remove bolts from right and left housing assemblies (6 and 7).
- f. Remove bolts (8) and tapered bushings attaching arm (9) and tubes (10 and 11).
- g. Withdraw tubes (10 and 11) through access openings in right and left sides of cabin.

9-28. Inspection — Cyclic Control Tube and Lever Assembly. a. Inspect bearings for wear and roughness.

b. Inspect assembly for maximum allowable 0.200 inch lateral chuck. (See figure 9-6.)



204001-78

Figure 9-3B. Collective friction adjustment (UH-1B serial no. 64-14101 and subsequent)

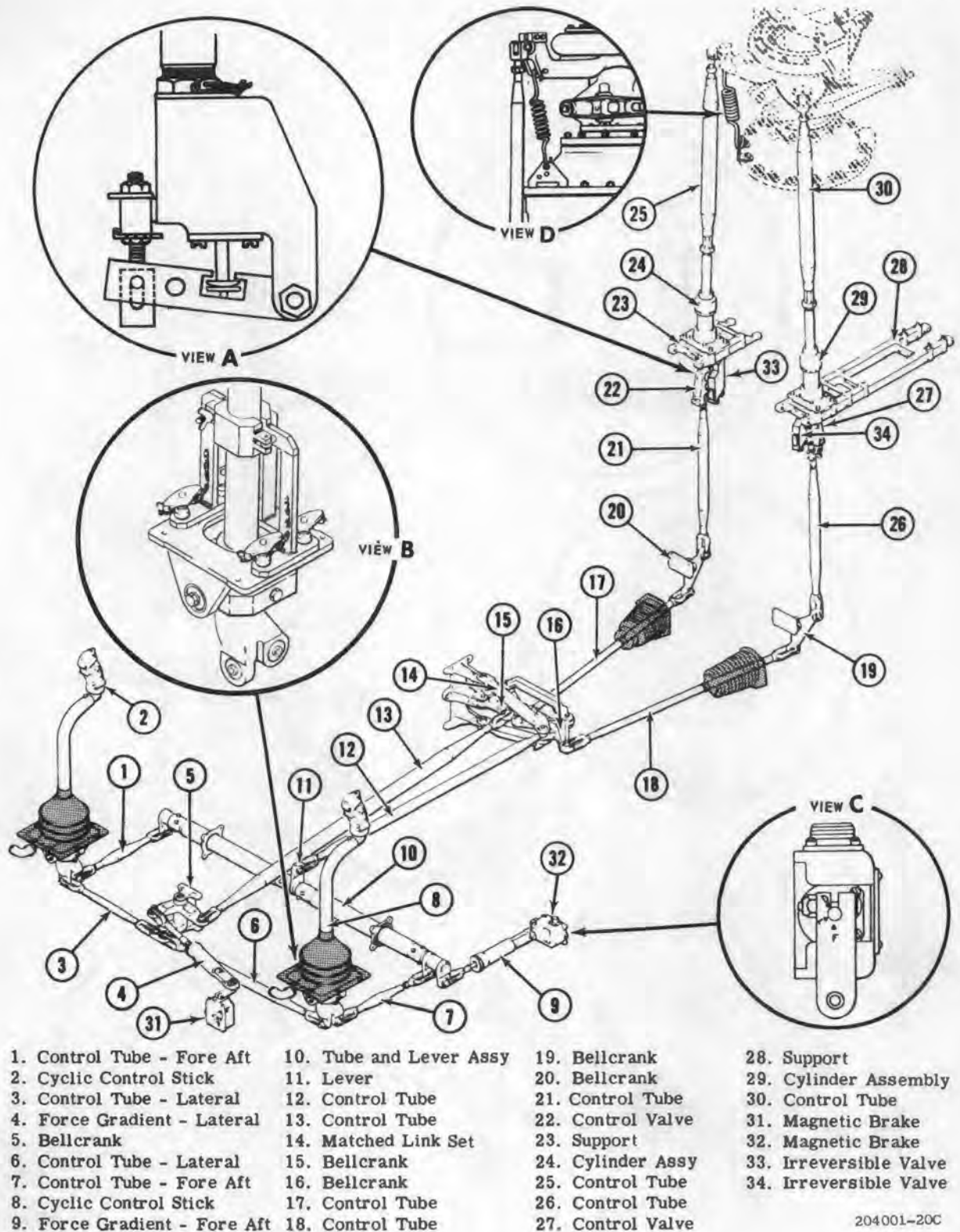


Figure 9-4. Cyclic control system (UH1A and UH1B serial no. 60-3546 thru 64-14100)

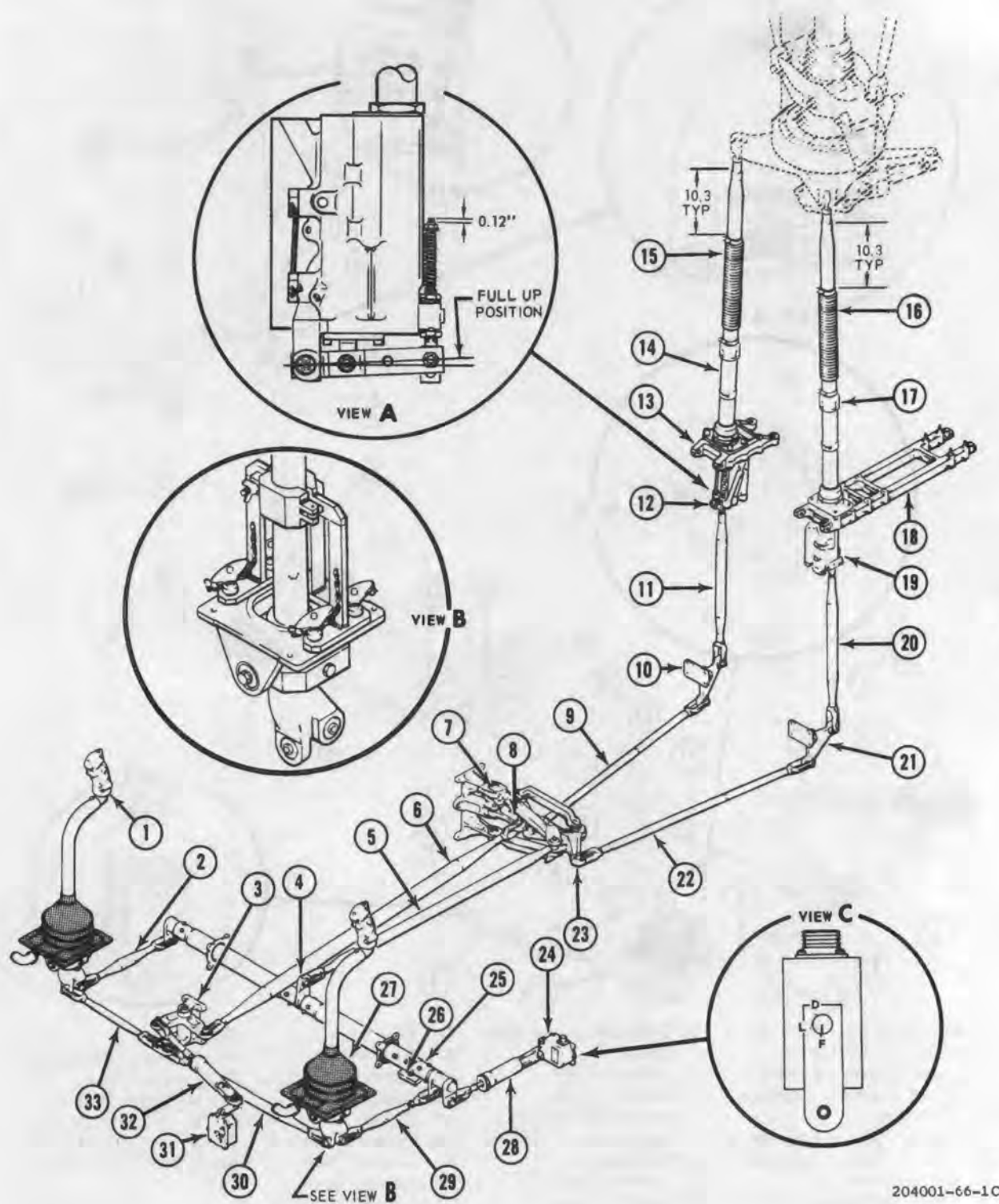


Figure 9-5. Cyclic control system (UH-1B serial no. 64-14101 and subsequent) (Sheet 1 of 2)

1. Cyclic Control Stick - Pilot
2. Control Tube - Fore and Aft
3. Bellcrank - Lateral
4. Tube and Lever Assembly
5. Control Tube - Fore and Aft
6. Control Tube Lateral
7. Matched Link Set
8. Bellcrank - Lateral
9. Control Tube - Lateral
10. Bellcrank - Lateral
11. Control Tube Lateral
12. Control Valve - Lateral
13. Support Assembly - Lateral
14. Cylinder Assembly - Lateral
15. Control Tube - Lateral
16. Control Tube - Fore and Aft
17. Cylinder Assembly - Fore and Aft
18. Support Assembly - Fore and Aft
19. Control Valve - Fore and Aft
20. Control Tube - Fore and Aft
21. Bellcrank - Fore and Aft
22. Control Tube - Fore and Aft
23. Bellcrank - Fore and Aft
24. Magnetic Brake - Fore and Aft
25. Tube and Lever Assembly
26. Counterweight Balance Weight
27. Cyclic Control Stick - Copilot
28. Force Gradient - Fore and Aft
29. Control Tube - Fore and Aft
30. Control Tube - Lateral
31. Magnetic Brake - Lateral
32. Force Gradient - Lateral
33. Control Tube - Lateral

204001-66-2

Figure 9-5. Cyclic control system (UH-1B serial No. 64-14101 and subsequent) (Sheet 2 of 2)

c. Inspect assembly for security of mounting, nicks, scratches and surface damage.

9-29. Repair or Replacement—Cyclic Control Tube and Lever Assembly. Replace all parts considered unsuitable for continued service.

Note

Any chuck or lost motion in the cyclic system caused by wear in the bearings should be investigated and bearings replaced when found to be damaged or when lost motion in the controls is objectionable.

9-30. Installation — Cyclic Control Tube and Lever Assembly. Parts of this assembly may be installed in any practical sequence.

a. Guide right and left tubes (10 and 11, figure 9-6) through access holes in sides of cabin. Slide housings (6 and 7) over tubes (10 and 11). Install tubes (10 and 11) over arm (9) with arm up.

b. Install tapered bushings and bolts (8) attaching tubes (10 and 11) to arm (9).

c. Install bolts through housing assemblies (6 and 7) and intercostals.

d. On UH-1B, Serial No. 64-14101 and subsequent, helicopters install counterweight balance assembly (5). Install one washer under

each bolt head, 16 washers on each bolt between counterweight and jackshaft tube, and one washer under each nut.

Note

Step d., above, is basic installation only. Final positioning of washers will be as required by rigging. Refer to paragraph 9-44.

e. Connect fore and aft force gradient (4).

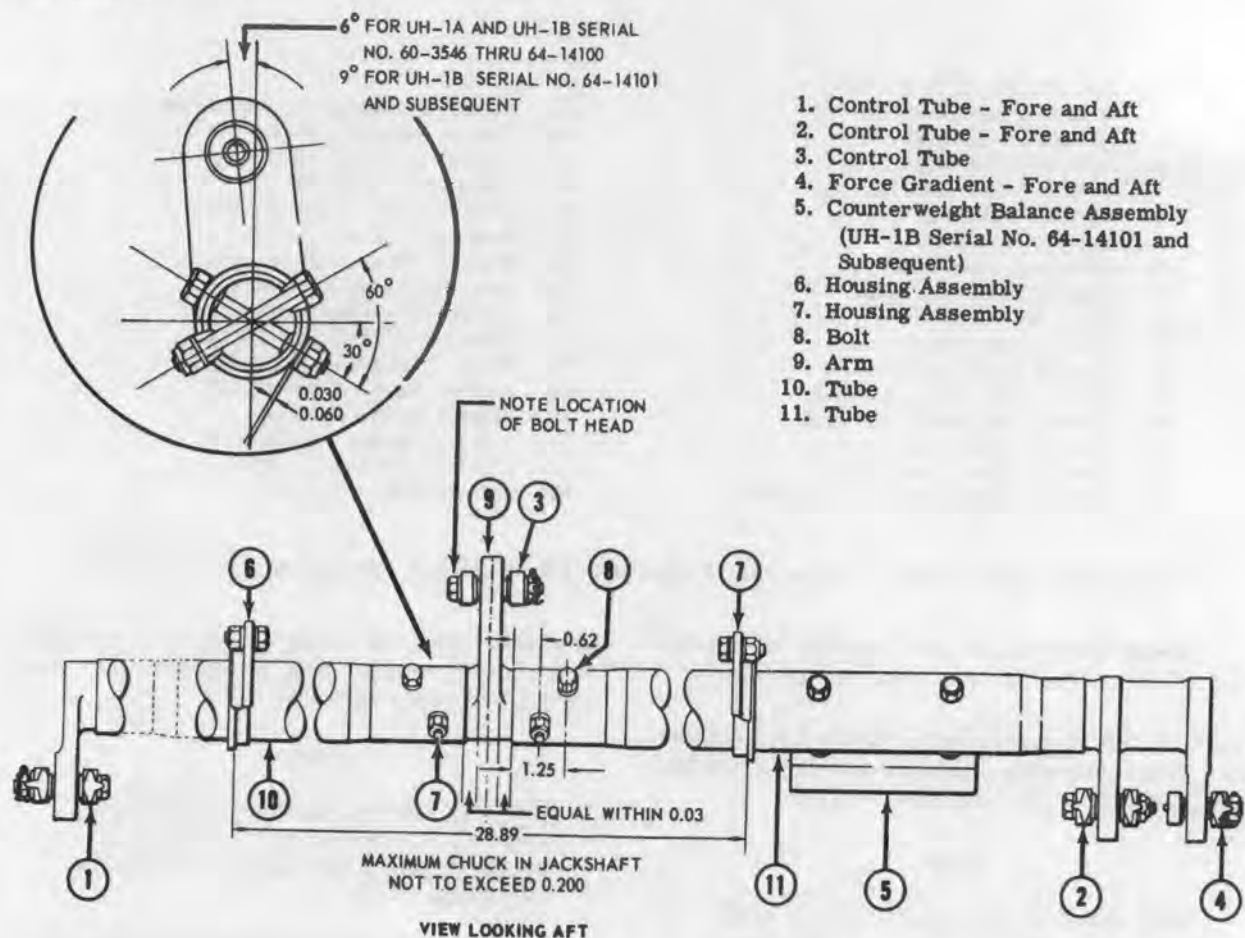
f. Connect control tube (3).

g. Connect fore and aft control tubes (1 and 2).

9-31. Force Gradient Assemblies. Electrically operated force trims connected to the cyclic and directional (tail rotor) controls induce artificial control feeling and stabilize the cyclic stick and tail rotor pitch control pedals to prevent them from moving of their own accord.

9-32. Adjustment — Force Gradient Assemblies. Check adjustment of force gradient assemblies as follows:

a. Adjust and preload lateral and fore and aft force gradient spring assembly (1, figure 9-7) by compressing the spring with 2.5 to 3.0 pounds of force and securing in this position with two jam nuts (6) on shaft of spring assembly.



204001-36G

Figure 9-6. Cyclic control tube and lever assembly

Note

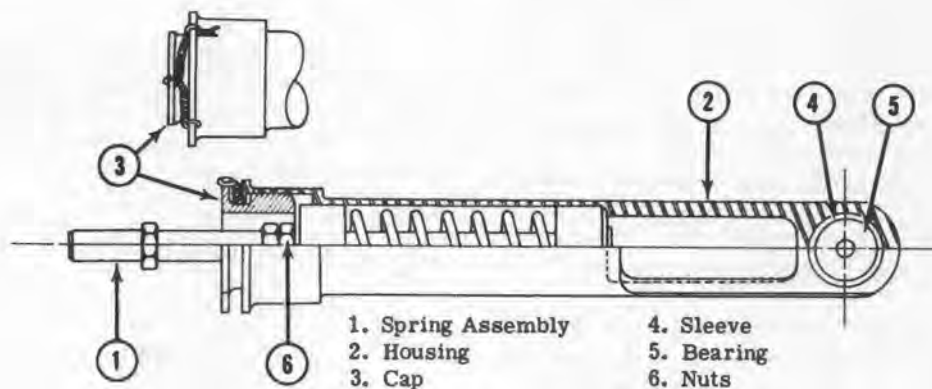
Preload on spring assembly in directional (tail rotor) force gradient assembly is 1.0 to 1.5 pounds.

b. Assemble spring assembly (1) into housing (2) and screw cap (3) in to eliminate any noticeable end-play. Secure cap (3) with safety wire as shown in figure 9-7 to prevent cap from turning in either direction.

c. If above conditions cannot be obtained replace entire assembly.

9-33. Cyclic Control Linkage (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). The cyclic control linkage consists of a series of control tubes, levers and bellcranks which transmit lateral and fore and aft control forces from the control stick(s) through hydraulic power cylinders to the main rotor.

9-34. Removal—Cyclic Control Linkage (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). Parts of the system may be removed in any practical sequence. Take precautions to prevent damage to parts by accidental movement of controls while linkage is disconnected.



204001-17B

Figure 9-7. Force gradient assembly

a. Disconnect all fore and aft and lateral control tubes from cyclic control sticks (2 and 8, figure 9-4), tube and lever assembly (10) and bellcrank (5).

b. Disconnect and remove lateral force gradient (4) from bellcrank (5) and magnetic brake (31).

c. Disconnect and remove fore and aft force gradient (9) from tube and lever assembly (10) and magnetic brake (32).

d. Remove bellcranks from support assemblies.

e. Disconnect and remove control tubes (21 and 26) from control valves (22 and 27).

f. Disconnect control tubes (25 and 30) from swashplate horns.

g. Disconnect and cover hydraulic lines from irreversible valves (33 and 34).

h. Remove power cylinders (24 and 29) with irreversible valves (33 and 34) and control valves (22 and 27). (Refer to paragraph 6-29.)

9-35. Inspection—Cyclic Control Linkage (UH-1A and UH-1B Serial No. 60-3546 through 64-14100).

a. Inspect control tubes for nicks and scratches. No limitation apply to length or direction of

scratches. Scratches shall not exceed 0.010 inch in depth.

b. Inspect the jackshaft to mixing lever tube assembly (12, figure 9-4) bearing for 0.005 inch radial and 0.030 inch axial maximum allowable wear.

c. Inspect the bellcrank to control valve tube assemblies (21 and 26) bearings for 0.005 inch radial and 0.030 inch axial maximum allowable wear.

Note

Some of the tube assemblies referred to in steps b. and c., above, may be equipped with alternate rod end bearing, 47-140-252-3 or -5. Tube assemblies so equipped have 0.012 inch radial and 0.012 inch axial maximum allowable wear limits.

d. Maximum allowable elongation to a bushing or clevis hole in the control system is 0.003 inch.

e. For replacement of control system bolts refer to paragraph 3-7.

f. Check balance spring (see View D, figure 9-4) for security, distortion and excessive length. Spring should be approximately 7.85 inches long, with a spring rate of 15.5 pounds, plus or minus 1.5 pounds, per inch.

9-36. Repair or Replacement—Cyclic Control Linkage (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). a. Remove all scratches in control tubes that do not exceed 0.010 inch in depth by polishing out with wet or dry sandpaper (item 508, table 1-1) or finer to obtain a smooth scratch free surface. Repair shall be blended out to extend over a minimum two inch area. Apply two coats of zinc chromate primer (item 119, table 1-1) to repaired area.

b. Replace control tubes with nicks or scratches in excess of 0.010 inch in depth.

c. Replace control tube assemblies (12, 21 and 26, figure 9-4) which do not meet inspection requirements. (Refer to paragraph 9-35.)

d. Replace bushing and clevis with unacceptable hole elongation.

e. Replace balance spring if inspection requirements are not met. (Refer to paragraph 9-35.)

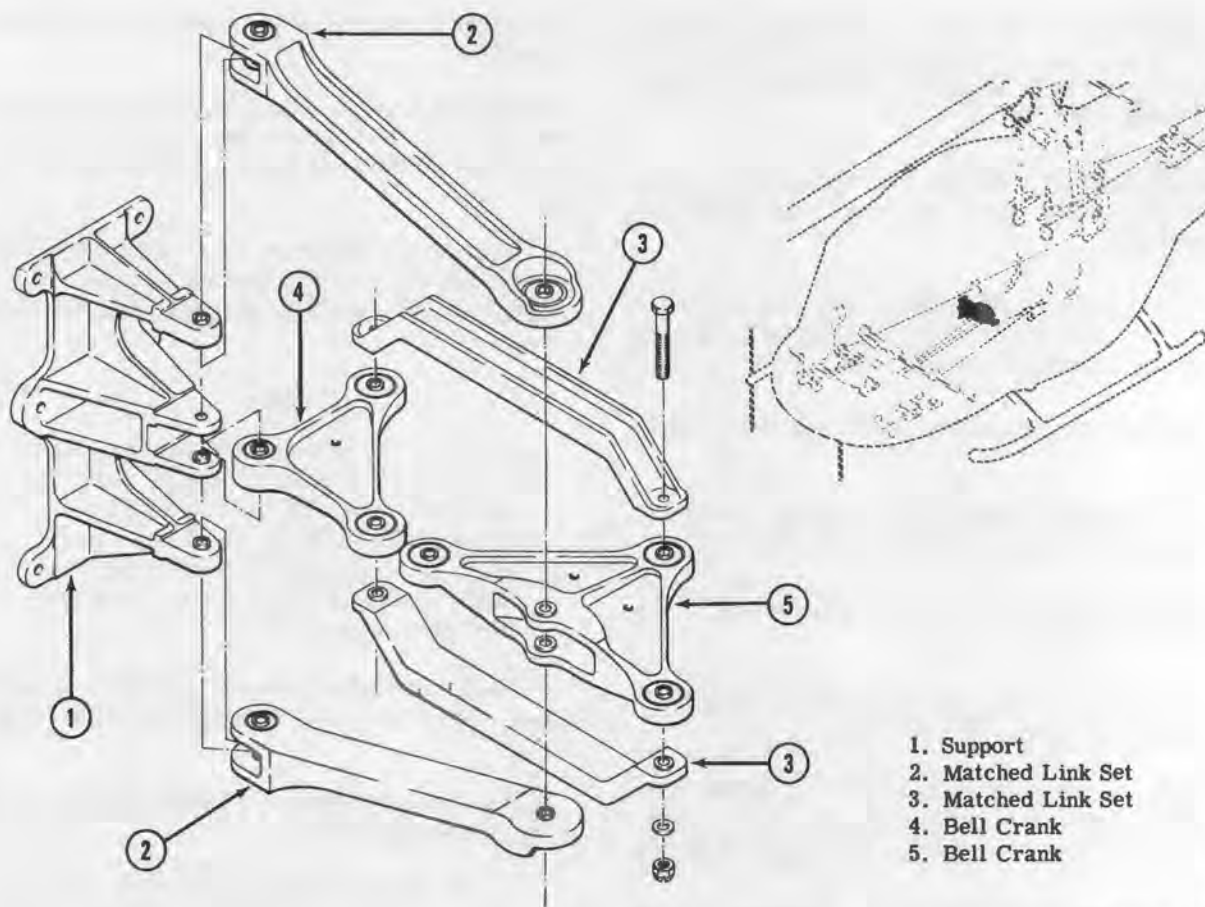
9-37. Installation—Cyclic Control Linkage (UH-1A and UH-1B Serial No. 60-3546 through 64-14100).

a. Install bellcranks (15 and 16, figure 9-4) on support. (Refer to figure 9-8 for installation of mixing bellcranks.)

b. Install and attach all fixed length control tubes.

Note

If adjustable control tubes are not correct length to be attached, leave one end free until controls are rigged.



1. Support
2. Matched Link Set
3. Matched Link Set
4. Bell Crank
5. Bell Crank

2040J1-12

Figure 9-8. Cyclic control bellcranks

c. Adjust and install power cylinders (24 and 29, figure 9-4) with irreversible valves (33 and 34) and control valves (22 and 27). (Refer to paragraph 6-32.)

9-38. Adjustment—Cyclic Control Linkage (UH-1A and UH-1B Serial No. 60-3546 through 64-14100).

a. Install all fixed length tubes in cyclic control system.

b. Place pilot's and copilot's cyclic sticks in either extreme right or left lateral position against stops. Secure in this position and adjust and connect lateral control tube (6, figure 9-4).

c. Place pilot's and copilot's cyclic sticks in extreme forward or extreme aft position against stops. Secure in this position and adjust and connect fore and aft control tube (7).

d. Place pilot's cyclic stick in extreme aft left corner position so that upper arm of bell-crank (20) is in its uppermost position. With cyclic stick in this position bottom out piston in UP position at top of cylinder (24) and set control valve (22) in UP position, (View A). Adjust control tube (21) to fit; shorten three full turns and install bolt, nut and cotter pin.

e. Place pilot's stick in extreme aft right corner position and adjust control tube (26) in same manner as control tube (21) was adjusted in step d.

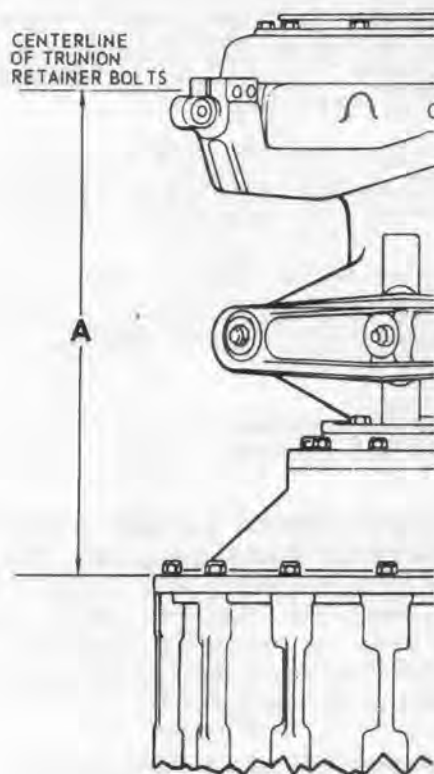
f. Install T101330 cyclic stick fixture on co-pilot's cyclic stick. (See View B.)

g. Position swashplate as illustrated in figure 9-9 and place cylinder valves in neutral. Maintain position and adjust control tubes (25 and 30, figure 9-4), to make proper fit with swashplate.

h. Position arm of fore and aft magnetic brake (32) as illustrated in View C, with scribe mark on shaft opposite "F" on arm. Position arm on lateral magnetic brake (31) with scribe mark on shaft opposite "L" on arm.

i. With cyclic stick in neutral, position arm on lateral magnetic brake (31) in center of travel. Adjust and install lateral force gradient (4).

j. Remove rigging fixture, T101330.



Measured with control valves at mid-travel

UH-1A

Left Horn		Right Horn
13.93 - 13.99	1° DOWN LEFT	14.15 - 14.21
13.88 - 13.94	1 1/2° DOWN LEFT	14.20 - 14.26
13.82 - 13.88	2° DOWN LEFT	14.26 - 14.32

UH-1B

(Serial No. 60-3546 thru 64-14100)

13.97 - 13.91	1° DOWN LEFT	14.19 - 14.13
13.92 - 13.86	1 1/2° DOWN LEFT	14.24 - 14.18
13.86 - 13.80	2° DOWN LEFT	14.30 - 14.24

Note

Adjust from 1° to 2° down left as required for satisfactory flight.

204001-33E

Figure 9-9. Adjusting swashplate (UH-1A and UH-1B serial No. 60-3546 thru 64-14100)

k. Place cyclic stick against forward stop, and arm on fore and aft magnetic brake (32) against its full aft stop. Adjust fore and aft force gradient (9) to fit. Extend force gradient rod end $3\frac{1}{2}$ turns and connect.

l. Check controls for full free travel before applying boost pressure. Check controls for full free travel with boost pressure applied.

m. Place bottom hook of balance spring in bracket so that spring does not go slack when swashplate arm is in lowest position. (See View D, figure 9-4.)

n. Inspect complete cyclic control system for security and safetying of parts.

9-39. Cyclic Control Linkage (UH-1B Serial No. 64-14101 and subsequent). The cyclic control linkage consists of a series of control tubes, levers and bellcranks which transmit lateral and fore and aft control forces from the control stick(s) through hydraulic power cylinders to the main rotor.

9-40. Removal—Cyclic Control Linkage (UH-1B Serial No. 64-14101 and subsequent). Parts of the system may be removed in any practical sequence. Take precautions to prevent damage to parts by accidental movement of controls while linkage is disconnected.

a. Disconnect all fore and aft and lateral control tubes from cyclic control sticks (1 and 27, figure 9-5), tube and lever assembly (25) and bellcrank (3).

b. Disconnect and remove lateral force gradient (32) from bellcrank (3), and magnetic brake (31).

c. Disconnect and remove fore and aft force gradient (28) from tube and lever assembly (25) and magnetic brake (24).

d. Remove bellcranks from support assemblies.

e. Disconnect and remove control tubes (11 and 20) from control valves (12 and 19).

f. Disconnect control tubes (15 and 16) from swashplate horns.

g. Disconnect and cover hydraulic lines from control valves (12 and 19).

h. Remove power cylinders (14 and 17) with control valves (12 and 19). (Refer to paragraph 6-78.)

9-41. Inspection—Cyclic Control Linkage (UH-1B Serial No. 64-14101 and subsequent). a. Inspect control tubes for nicks and scratches. No limitations apply to length or direction of scratches. Scratches shall not exceed 0.010 inch in depth.

b. Inspect the jackshaft to mixing lever tube assembly (5, figure 9-5) bearing for 0.005 inch radial and 0.030 axial maximum allowable wear.

c. Inspect the bellcrank to control valve tube assemblies (11 and 20) bearings for 0.005 inch radial and 0.030 inch axial maximum allowable wear.

Note

Some of the tube assemblies referred to in steps b. and c., above, may be equipped with alternate rod end bearing, 47-140-252-3 or -5. Tube assemblies so equipped have 0.012 inch radial and 0.012 inch axial maximum allowable wear limits.

d. Maximum allowable elongation to a bushing or clevis hole in the control system is 0.003 inch.

e. For replacement of control system bolts refer to paragraph 3-7.

9-42. Repair or Replacement—Cyclic Control Linkage (UH-1B Serial No. 64-14101 and subsequent).

a. Remove all scratches in control tubes that do not exceed 0.010 inch in depth by polishing out with wet or dry sandpaper (item 508, table 1-1) or finer to obtain a smooth scratch free surface. Repair shall be blended out to extend over a minimum two inch area. Apply two coats of zinc chromate primer (item 119, table 1-1) to repaired area.

b. Replace control tubes with nicks or scratches in excess of 0.010 inch in depth.

c. Replace control tube assemblies (5, 11 and 20, figure 9-5) which do not meet inspection requirements. (Refer to paragraph 9-41.)

d. Replace bushings and clevis with unacceptable hole elongation.

9-43. Installation—Cyclic Control Linkage (UH-1B Serial No. 64-14101 and subsequent). a. Install bellcranks (8 and 23, figure 9-5) on support. (Refer to figure 9-8 for installation of mixing bellcranks.)

b. Install and attach all fixed length control tubes.

Note

If adjustable control tubes are not correct length to be attached, leave one end free until controls are rigged.

c. Adjust and install power cylinders (14 and 17, figure 9-5) with control valves (12 and 19). (Refer to paragraph 6-81.)

9-44. Adjustment—Cyclic Control Linkage (UH-1B Serial No. 64-14101 and subsequent). a. Install all fixed length tubes in cyclic control system.

b. Place pilot's and copilot's cyclic sticks in either extreme right or left lateral position against stops. Secure in this position and adjust and connect lateral control tube (30, figure 9-5).

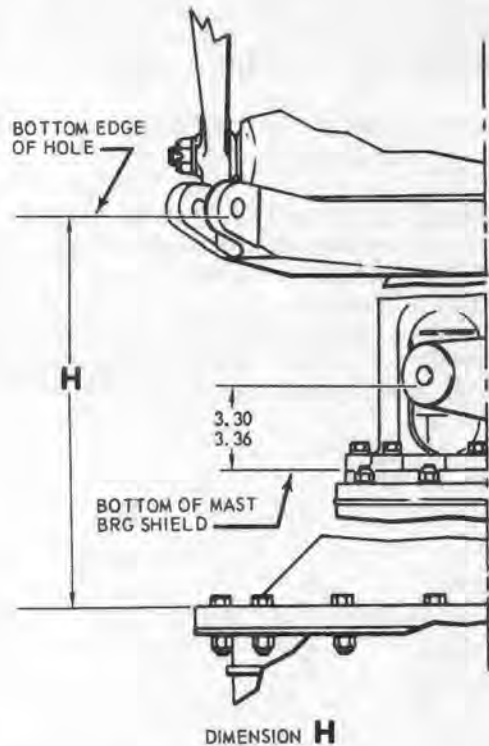
c. Place pilot's and copilot's cyclic sticks in extreme forward or extreme aft position against stops. Secure in this position and adjust and connect fore and aft control tube (29).

d. Place pilot's cyclic stick in extreme aft left corner position so that upper arm of bellcrank (10) is in its uppermost position. With cyclic stick in this position bottom out piston in UP position at top of cylinder (14) and set control valve (12) in UP position, (View A). Adjust control tube (11) to fit; shorten three full turns and install bolt, nut and cotter pin.

e. Place pilot's stick in extreme aft right corner position and adjust control tube (20) in same manner as control tube (11) was adjusted in step d.

f. Install T101330 cyclic stick fixture on copilot's cyclic stick. (See View B.)

g. Position swashplate as illustrated in figure 9-10 and place cylinder valves in neutral. Maintain position and adjust control tubes (15 and 16, figure 9-5) to make proper fit with swashplate.



Rigging dimension tolerances are plus or minus 0.06

Left Horn		Right Horn
11.75	1/2° Down Left	11.88
11.66	1° Down Left	11.96
11.60	1-1/2° Down Left	12.03

Adjust from 1/2° to 1-1/2° down left as required for satisfactory flight.

204001-68A

Figure 9-10. Adjusting swashplate (UH-1B serial No. 64-14101 and subsequent)

h. Position arm on fore and aft magnetic brake (24) as illustrated in View C, with scribe mark on shaft opposite "F" on arm. Position arm on lateral magnetic brake (31) with scribe mark on shaft opposite "L" on arm.

i. With cyclic stick in neutral, position arm on lateral magnetic brake (31) in center of travel. Adjust and install lateral force gradient (32).

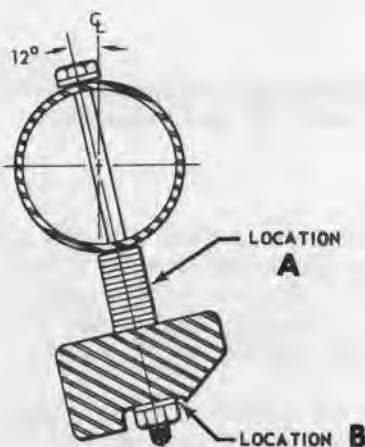
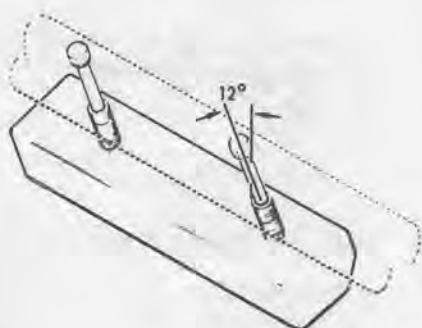
j. Remove rigging fixture, T101330.

k. Position boots on control tube (15 and 16) to dimension shown on figure 9-5.

l. Place cyclic stick against forward stop, and arm on fore and aft magnetic brake (24) against its full aft stop. Adjust fore and aft force gradient (28) to fit and connect.

m. Check controls for full free travel with boost pressure applied.

n. Adjust cyclic control system balance to eliminate all motion of cyclic stick with hydraulic boost on and hands off. Adjust by moving washers (one at a time) on jackshaft counterweight balance assembly from location A to location B. (See figure 9-11.) Relocate washers in even quantities on both bolts.



540001-11

Figure 9-11. Counterweight balance assembly (UH-1B serial no. 64-14101 and subsequent)

o. Inspect complete cyclic control system for security and safetying of parts.

9-45. Magnetic Brake. A magnetic brake, used in conjunction with a force gradient assembly, is mounted in each control element; the fore and aft cyclic, the lateral cyclic and the tail rotor pitch control. All three assemblies are identical except for the position of the arm on the brake. By positioning one of the letters "D", "L" or "F" relative to the brake shaft the brake may be used in either the D-irectional, L-ateral, or F-ore and aft control assembly.

9-46. Removal—Magnetic Brake. Disconnect electrical plug from brake body. Remove attachment bolt through force gradient and brake arm. Remove four bolts attaching brake body to structure.

9-47. Installation—Magnetic Brake. a. Mount brake arm on brake in appropriate position. Secure arm with retaining bolt. Position brake in place on structure and install mounting bolts.

b. Attach force gradient assembly to brake arm with bolt, nut, and washers. Install cotter pin in bolt. Attach and lockwire electrical plug to brake body.

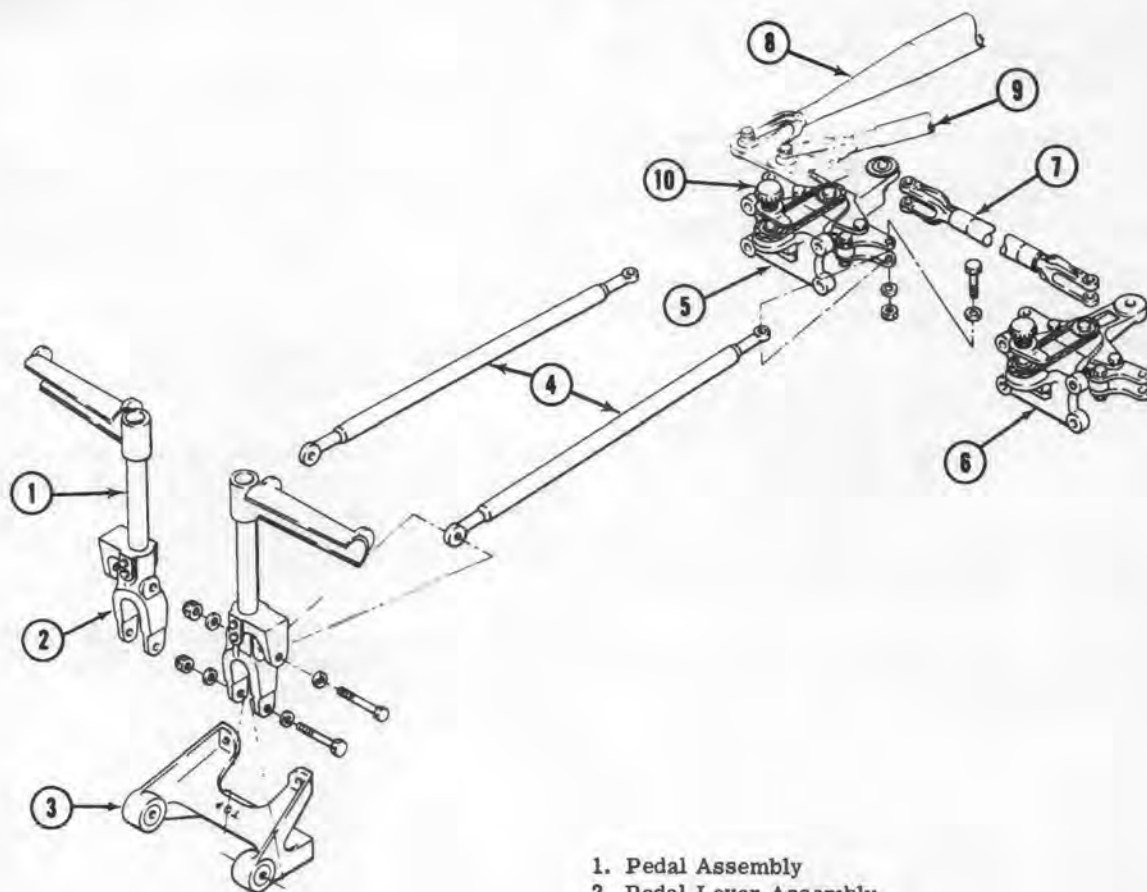
c. Check flight controls for unobstructed full travel.

9-48. Tail Rotor Control Pedal and Adjuster Assembly. Two sets of control pedals are mounted on a forward bulkhead located in the cabin floor, and are connected by control tubes to a pedal adjuster assembly. Pilot and copilot assemblies are connected by an adjustable tube assembly.

9-49. Removal—Tail Rotor Control Pedal and Adjuster Assembly. a. Disconnect two control tubes (4, figure 9-12) from pedal lever assembly (2), and pedal adjuster assembly (5).

b. Remove bolt, washers and nut securing each pedal lever assembly (2) to pedal support (3), and remove each pedal (1) and lever assembly (2) as a unit.

c. Remove four bolts, washers and nuts securing pedal support (3) to bulkhead and remove pedal support.



1. Pedal Assembly
2. Pedal Lever Assembly
3. Pedal Support
4. Control Tubes
5. Adjuster Assembly, Pilot
6. Adjuster Assembly, Copilot
7. Interconnect Control Tube
8. Control Tube
9. Force Gradient
10. Adjuster Knob

204001-34

Figure 9-12. Tail rotor control pedal and adjuster assembly

d. Disconnect interconnect control tube (7) from pedal adjuster assemblies (5 and 6).

e. Disconnect control tube (8) and force gradient tube (9) from pedal adjuster (5).

f. Remove four bolts, washers and nuts securing pilot's pedal adjuster (5) to bulkhead, and remove adjuster through access opening in cabin floor.

g. Repeat step f., for removal of copilot's pedal adjuster (6).

9-50. Inspection—Tail Rotor Control Pedal and Adjuster Assembly. a. Inspect bearings for wear and roughness.

b. Inspect all parts for wear, elongated bolt holes, cracks, nicks and other damage.

9-51. Repair or Replacement—Tail Rotor Control and Pedal Adjuster Assembly. Replace all parts which are considered unsuitable for continued service. (Refer to paragraph 9-50.)

9-52. Installation—Tail Rotor Control Pedal and Adjuster Assembly. a. Apply a coat of zinc chromate putty (item 200, table 1-1) to mounting face of pedal support (3, figure 9-12).

b. Position pedal support (3) in place on bulkhead with TOP up. Install four bolts with washers and nuts.

c. Apply a coat of zinc chromate putty (item 200, table 1-1) to mounting face of pedal adjuster support (5). (See figure 9-12, to identify pilot's and copilot's adjuster assemblies.)

d. Position adjuster assembly (5) in place on bulkhead. Install four bolts with washers and nuts.

e. Repeat steps c. and d., for installation of adjuster assembly (6).

f. Install interconnect control tube (7) to connect pedal adjuster assemblies (5 and 6).

g. Connect control tube (8) and force gradient tube (9) to pedal adjuster (5).

h. Install as assembled unit, left and right-hand pedals (1) and pedal lever (2) to pedal support (3). Attach each pedal lever (2) to the support (3) with one bolt, two washers and a nut.

i. Connect the control tubes (4) to pilot's pedal levers (2) and pilot's pedal adjuster (5).

9-53. Tail Rotor Control Quadrant. The tail rotor control quadrant is located in the upper forward section of the tail boom. The quadrant is utilized to interconnect the push-pull tubes and the tail rotor control cables.

9-54. Removal — Tail Rotor Control Quadrant.

a. Remove tailpipe cowling for access to head of bolt (5, figure 9-13).

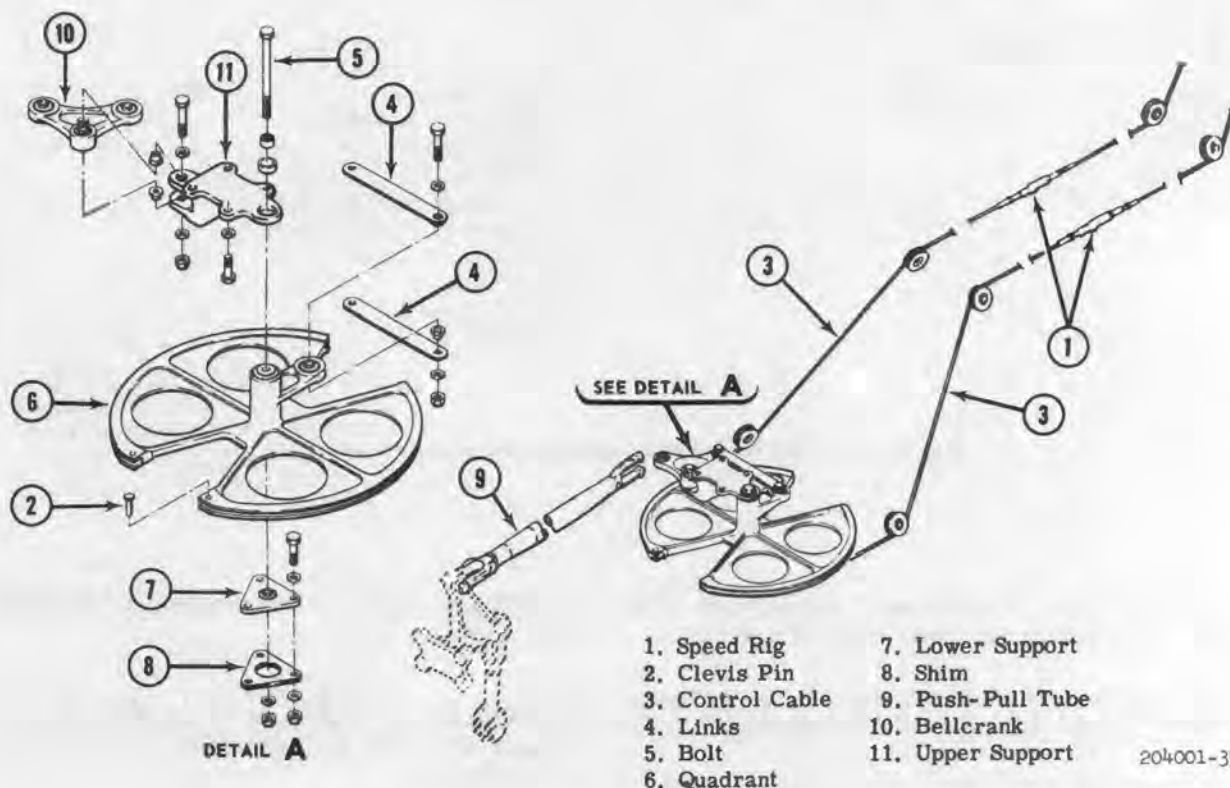


Figure 9-13. Tail rotor control quadrant

- b. Disconnect speed rigs (1).
- c. Remove clevis pins (2) and remove cable (3) from quadrant (6).
- d. Disconnect links (4) from quadrant.
- e. Remove bolt (5) and remove quadrant (6) and lower support (7) from structure.
- f. Disconnect push-pull tube (9) from bellcrank (10).
- g. Cut lockwire and remove four mounting bolts attaching upper support (11) to structure. Remove bellcrank assembly (10) and links (4) from structure. Disassemble support and bellcrank.

9-55. Inspection — Tail Rotor Control Quadrant.

- a. Inspect bearings for wear and roughness.
- b. Inspect all parts for wear, elongated bolt holes, cracks, nicks and other damage.

9-56. Repair or Replacement — Tail Rotor Control Quadrant. Replace all parts which are considered unsuitable for continued service. (Refer to paragraph 9-55.)

9-57. Installation — Tail Rotor Control Quadrant.

- a. Position upper support assembly (11, figure 9-13) on structure and secure with four bolts. Lockwire heads of bolts.
- b. Position wide section of bellcrank (10) in place in upper support (11) and install bolt.
- c. Position quadrant (6), lower support (7) and shim (8) to provide 0.000 to 0.010 inch clearance between support and quadrant. Install bolt (5) with washer, nut and cotter pin.
- d. Position links (4) and secure to bellcrank and quadrant.
- e. Attach push-pull tube (9).
- f. Position control cables (3) and secure to quadrant with clevis pins (2). Attach speed rigs (1).

9-58. Tail Rotor Pitch Control Mechanism.

Tail rotor blade pitch control is accomplished by means of a control quill assembly mounted in right side of 90 degree gear box, with a control rod extending through hollow output shaft on which rotor is mounted. The control quill has a sprocket, operated by a chain attached to control cables, with a worm thread engagement to control rod. Rotation of sprocket is transmitted through rod as linear motion to a crosshead which is linked to rotor blades. Chain and sprocket are enclosed by a metal housing

pan with a transparent hinged cover for inspection and access.

9-59. Removal — Tail Rotor Pitch Control Mechanism. a. Remove tail rotor, with control cross-head assembly.

b. Open hinged cover on control housing pan by removing lockwire and bolt near lower end of cover. Disconnect cables at quick disconnect.

c. Remove screw from housing pan bracket. Remove three nuts, with washers, from gear case studs to detach sprocket guard. Remove guard, chain and complete cover assembly.

d. Pull control quill with attached rod out of gear case port. Remove O-ring and cover case port. Detach rod from quill by turning sprocket to disengage threads.

9-60. Cleaning — Tail Rotor Pitch Control Mechanism.

Clean metal parts with dry cleaning solvent (item 302, table 1-1). Dry with filtered compressed air. Clean transparent housing cover with materials and methods used for cabin windows.

9-61. Inspection — Tail Rotor Pitch Control Mechanism.

- a. Inspect sprocket guard (2, figure 9-14), cover (1) and pan (4) for cracks or other damage.
- b. Inspect control rod (7) for faulty operation and visible damage such as cracks, bending and damaged threads or splines.

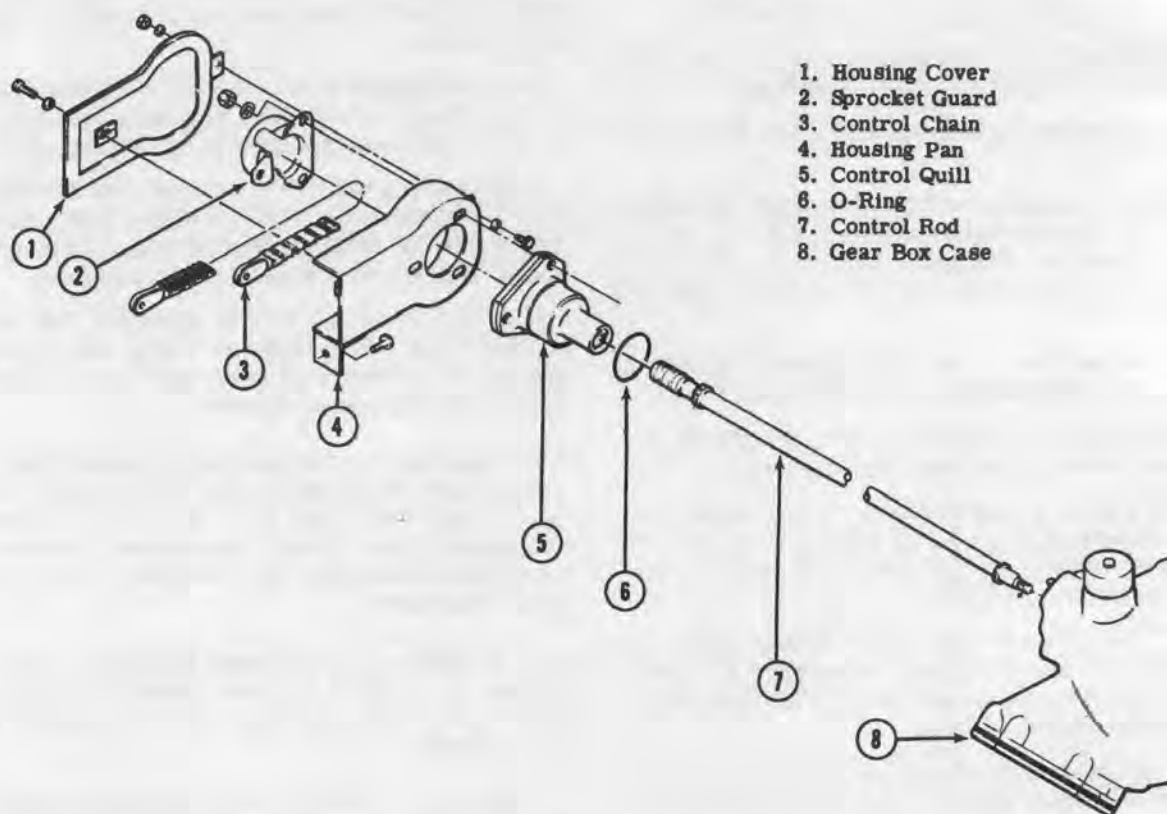
Note

Joint wear of control chain (3) may be checked by placing chain under tension and measuring length of any 32 pitches. Maximum allowable length is 6-3/16 inches. If chain has been removed from helicopter tension may be applied by suspending chain from one end and attaching 10 pound weight to opposite end.

c. Inspect control chain (3) for faulty operation and visible indications of excessive wear.

d. Inspect control quill housing for oil leakage past internal seals and cork plugs. Inspect control quill assembly for roughness or binding during operation.

e. Check gap between quill housing and retainer.



204010-39

Figure 9-14. Tail rotor pitch control mechanism

f. Determine the amount of looseness between the internal spline of the slider assembly and the tail rotor shaft spline and looseness in the tail rotor pitch change thread by means of the following procedure. (See figure 9-15.)

(1) Mount dial indicator on tail rotor gear box shaft with indicator against crosshead as illustrated.

(2) Position left tail rotor control pedal in the full forward position and actuate the crosshead radially as illustrated. Radial play in this position should not exceed 0.020 inch.

(3) Position the right tail rotor control pedal in the full forward position and repeat above procedure. Radial play in this position should not exceed 0.035 inch.

(4) Position pedals in the neutral position and check axial play as illustrated. Move crosshead axially without producing radial play. Axial play in this position should not exceed 0.018 inch. Excessive axial play indicates worn or loose pitch change rod bearings and/or worn pitch change rod thread.

Note

If any item is replaced as a result of this inspection, the tail rotor must be tracked.

9-62. Repair or Replacement — Tail rotor Pitch Control Mechanism. a. Replace sprocket guard (2, figure 9-14), cover (1) or pan (4) if cracked, damaged or otherwise unserviceable.

Spread ends and bend against hex face of retaining nut, parallel to outer face of sprocket.

e. Replace O-ring on control quill housing as required to prevent oil leakage, using ring conforming to (item 504, table 1-1) for use with synthetic lubricant in gear box.

f. Replace control quill assembly, when rough or binding in operation. Replace for oil leakage past internal seals or cork plugs, or as noted in step c. above.

Note

When replacing control quill assembly, it is important to pre-lubricate the assembly during installation. Lubricate the worm threads in the control quill assembly and on the control tube and the splines in the quill housing and on the control tube with lubricating oil, (item 2, table 1-1).

g. If gap between quill housing and retainer (refer to paragraph 9-61, step e.) is more than 0.025 inch but less than 0.040 inch, add one AN 960PD416L washer at each stud between quill housing and retainer to reduce gap. If gap is more than 0.040 inch but less than 0.055 inch add two AN960PD416L washers at each stud.

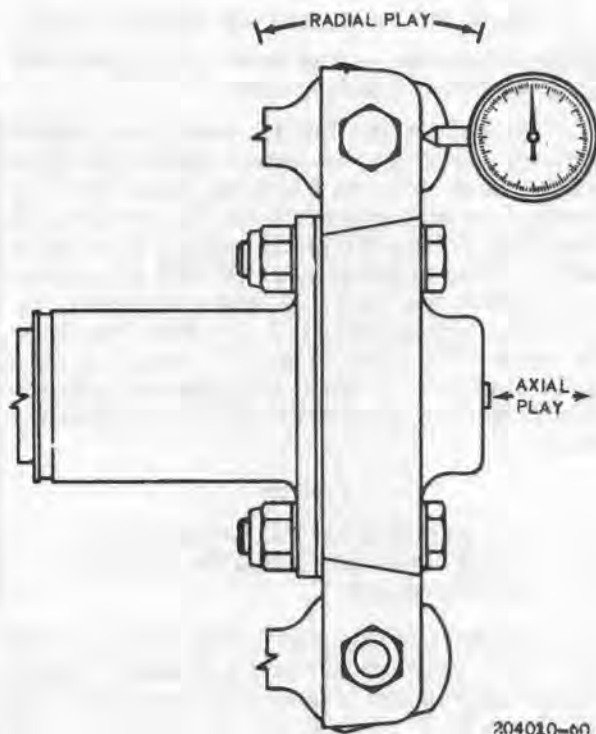


Figure 9-15. Checking tail rotor pitch control for looseness

b. Replace control rod (7) if inspection requirements are not met.

Caution

Do not apply lubricant of any kind to control chain (3, figure 9-14) as lubricant causes adherence of grit and other foreign matter.

c. Replace control chain when faulty operation occurs or when chain fails to meet inspection requirements. When chain is replaced, replace sprocket on control quill as outlined in step d.

d. To replace sprocket on control quill: Remove cotter pin and retaining nut, holding sprocket carefully in padded jaws of tool or vise. Remove and replace sprocket without separating other parts. Reinstall retaining nut on end of control nut. Tighten 100 to 300 inch-pounds and with cotter pin holes aligned, holding sprocket as in removal, install cotter pin.

9-63. Installation — Tail Rotor Pitch Control Mechanism. a. Insert control rod through inner end of control quill housing, engaging splines. Turn sprocket to engage control nut on threads of rod.

b. Uncover port on right side of 90 degree gear box. Insert control rod carefully through rotor shaft, and engage quill on gear box studs. Place cover pan on studs and attach temporarily with nuts and washers. Install screw through bracket on lower corner of pan into matching nut plate of vertical fin.

c. Install tail rotor. Install control chain, and sprocket guard, during rigging.

d. When rigging is complete, close transparent cover and secure with bolt through cover into bracket in pan. Lockwire bolt head to bolt at upper end of cover.

9-64. Tail Rotor Control Cables. The forward ends of the tail rotor control cables are attached to a quadrant. The cables run through a series of pulleys, grommets and fairleads to connect to the pitch control mechanism chain. Forward cables are connected to aft cables by means of speed rigs to facilitate removal and installation.

9-65. Removal — Tail Rotor Control Cables. a. Cut lockwire and disconnect cables at speed rigs. Disconnect cables from control chain.

b. Disconnect cables from control quadrant.

c. Remove clevis pins from pulley supports and remove pulleys, whenever necessary to remove cables.

d. Remove fairleads from brackets and remove cables.

9-66. Inspection — Tail Rotor Control Cables. a. Inspect cables for worn sections and broken strands.

b. Inspect pulleys for flat spots, and damaged, tight or worn bearings.

c. Inspect grommets for wear and signs of misalignment.

d. Inspect supports for security and condition. Inspect chain and sprocket for wear.

9-67. Repair or Replacement — Tail Rotor Control Cables. Replace all parts that do not meet inspection requirements. (Refer to paragraph 9-66.)

9-68. Installation — Tail Rotor Control Cables. a. Install forward ends of cable on quadrant with a spherical washer next to ball terminal. Secure with clevis pins and cotter pins.

b. Guide cables through pulley supports and grommet supports. Install grommets in supports.

c. Install aft sections of cable in support and temporarily secure aft ends with lockwire.

d. Install pulleys and clevis pins in support.

e. If supports have been disturbed, check alignment of cables through grommets and realign if necessary by altering shims under supports.

f. Attach ends of cables to pitch control chain.

g. Install pitch control chain on sprocket and adjust tension of cables. Refer to paragraph

9-69 for locating chain on sprocket and for tail rotor rigging.

h. Lockwire quick disconnects.

i. Check tail rotor controls for full travel.

9-69. Adjustment — Tail Rotor. Accomplish rigging with hydraulic boost off.

a. On UH-1A and UH-1B, Serial No. 60-3546 through 64-14100, helicopters adjust tail rotor pitch change links to 5.5 inches from bolt hole center to center when 204-010-733 crosshead is installed. If 204-011-711 crosshead is installed adjust links to 5.4 inches. On UH-1B helicopters, Serial No. 64-14101 and subsequent, adjust pitch change links to 5.4 inches. (See View C, (figure 9-18.) Install all fixed tubes and links in the tail rotor controls set pedals at approximately neutral adjustment by use of adjusting knob.

Caution

Use only 204-011-711 crosshead on UH-1B helicopters Serial No. 64-14101 and subsequent.

b. Depress both pilot's and copilot's left tail rotor control pedals and hold against stops. Adjust and install interconnect tube assembly (1, figure 9-18). Adjust tube assembly (11) to obtain condition shown in View B.

c. At control assembly on right side of 90 degree gear box, remove housing cover, sprocket guard, upper cable speed rig, and chain from the sprocket. Check that sprocket guard nuts and washers are reinstalled.

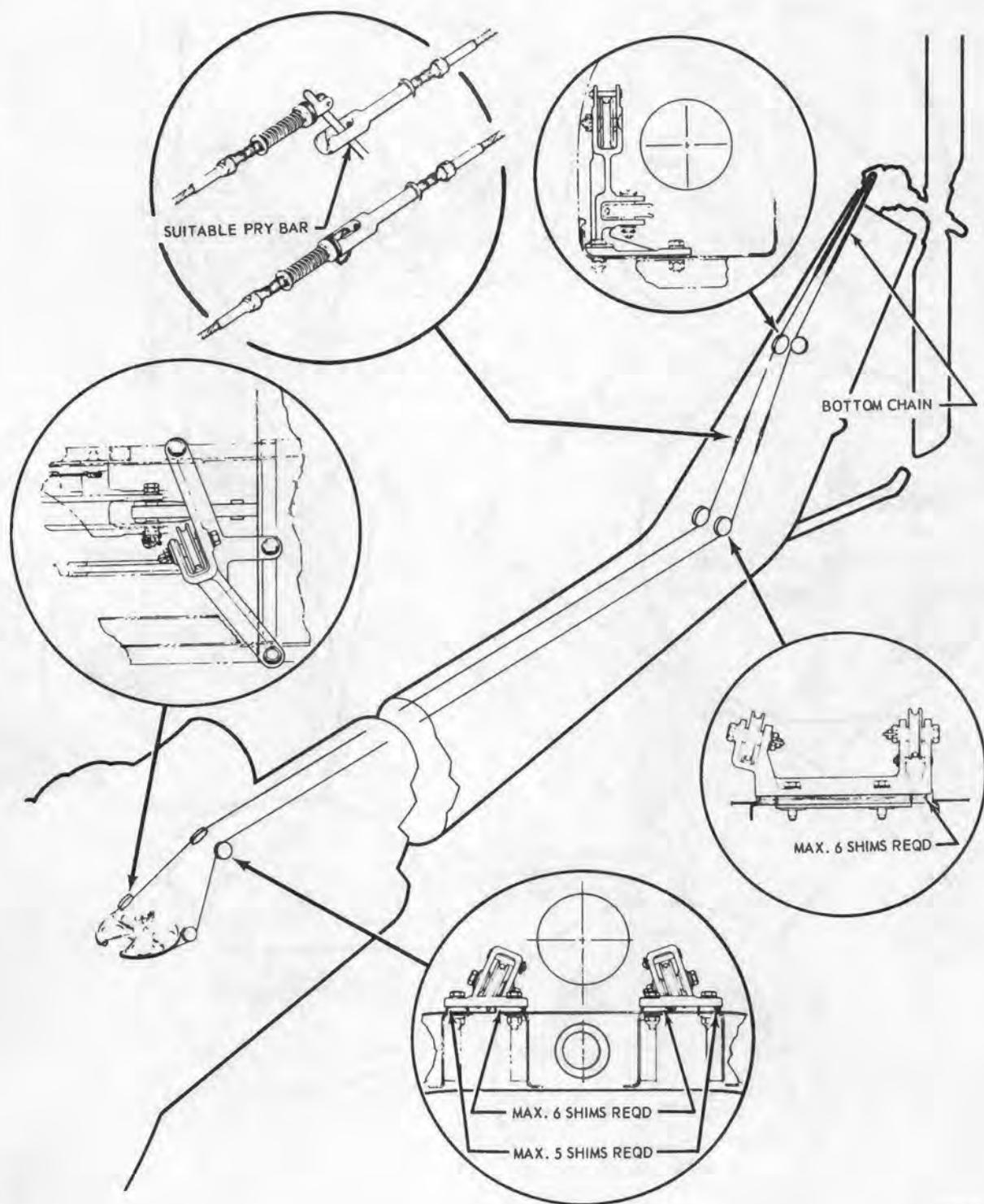
d. Place reference mark, with grease pencil, on surface of retainer adjacent to any tooth on sprocket. (See View A.)

e. Turn sprocket clockwise to bottom out quill and mark tooth opposite retainer reference mark.

f. With sprocket bottomed, and left pedal held against stop, apply sufficient tension to lower cable to take out servo pilot-valve motion. Install chain over sprocket and connect upper speed rig.

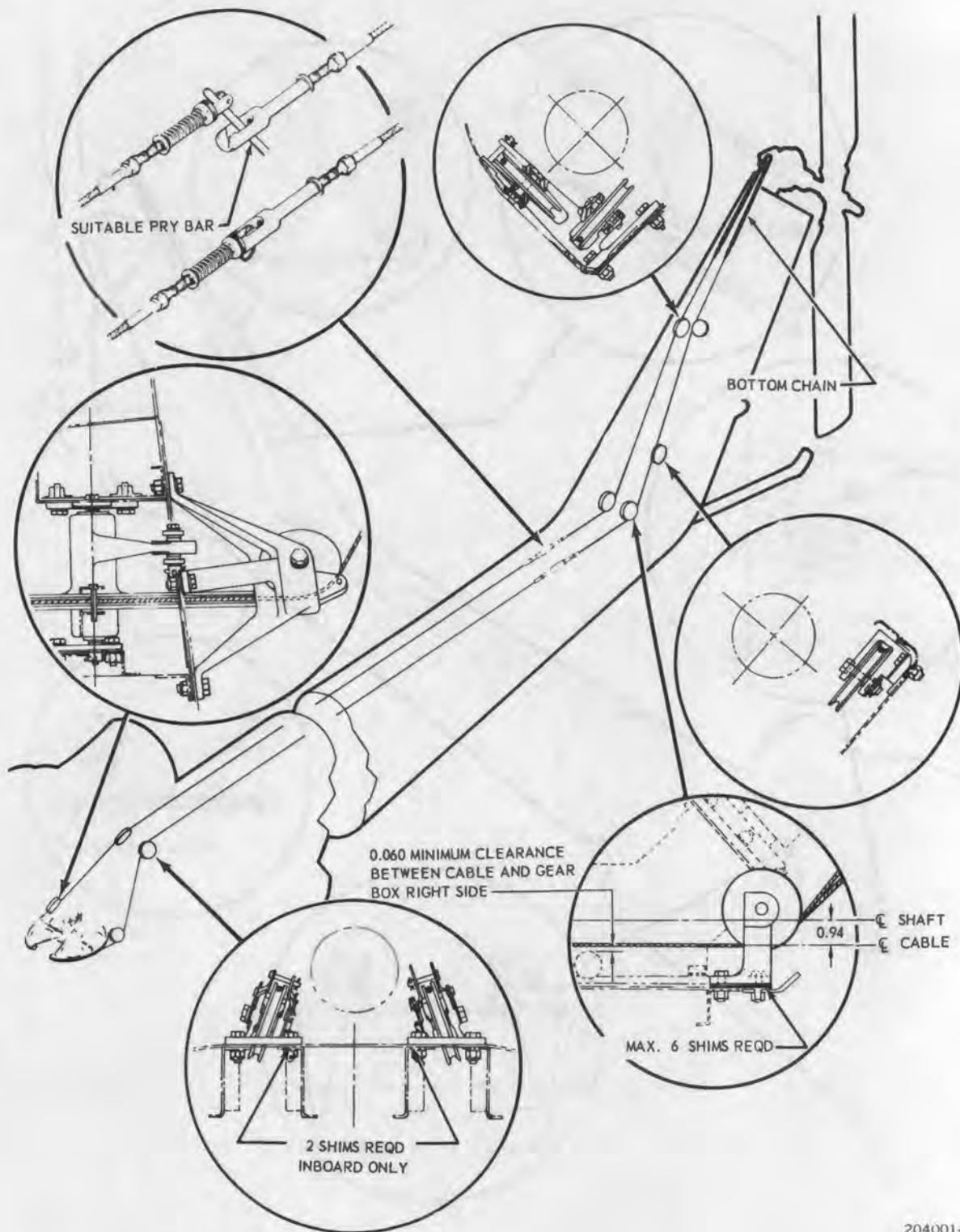
g. Adjust cable tension to 40 to 50 pounds, maintaining sprocket position established to conditions in step f. above.

h. Actuate pedals through full travel. With full left pedal, sprocket should be off bottom $2\frac{1}{2}$ to $3\frac{1}{2}$ teeth. Manually push forward on top chain to actuate the power cylinder valve. Sprocket should again bottom.



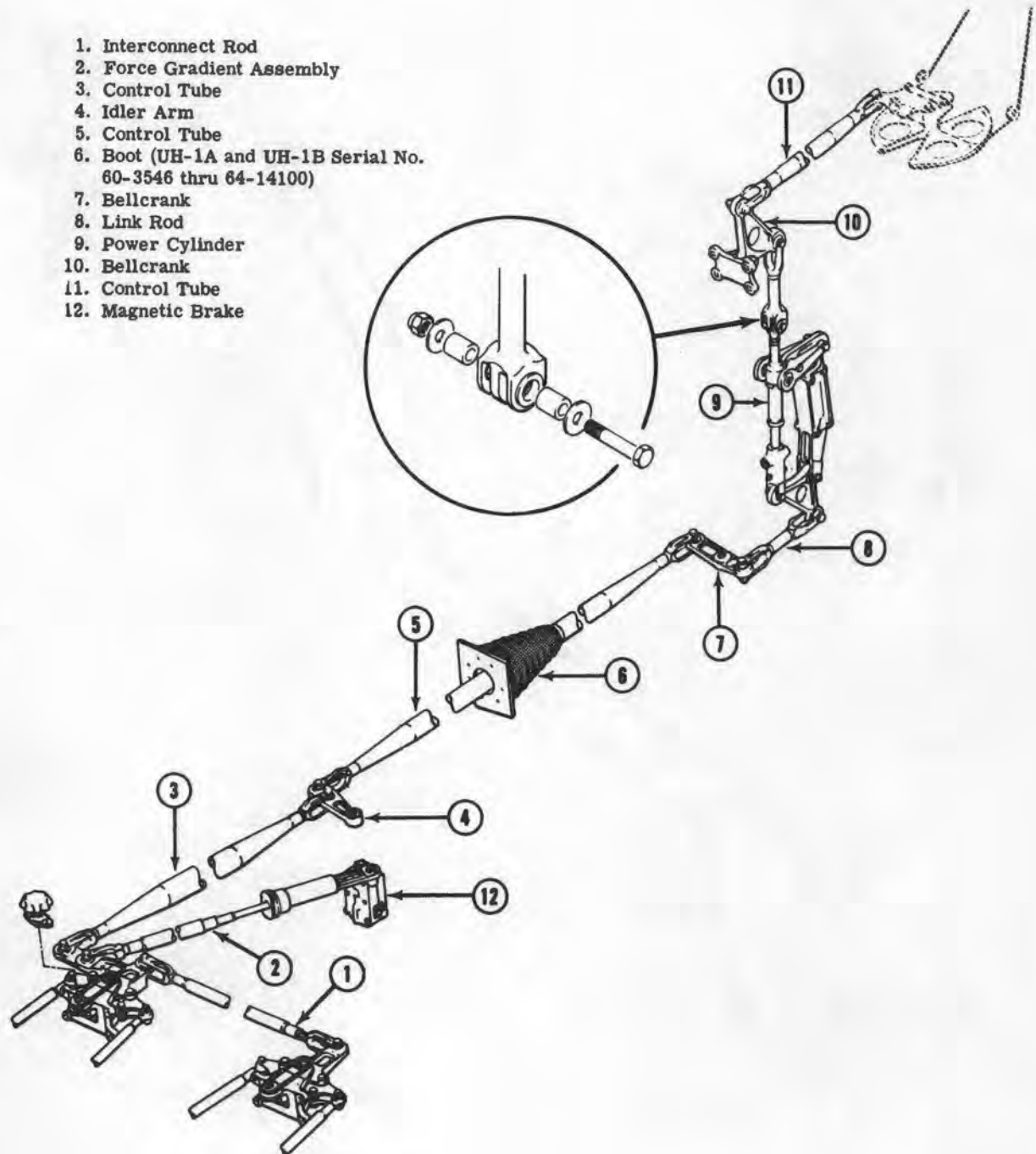
204001-24

Figure 9-16. Tail rotor control cables (UH-1A)



204001-27

Figure 9-17. Tail rotor control cables (UH-1B)



204001-65-1

Figure 9-18. Tail rotor controls adjustment (Sheet 1 of 2)

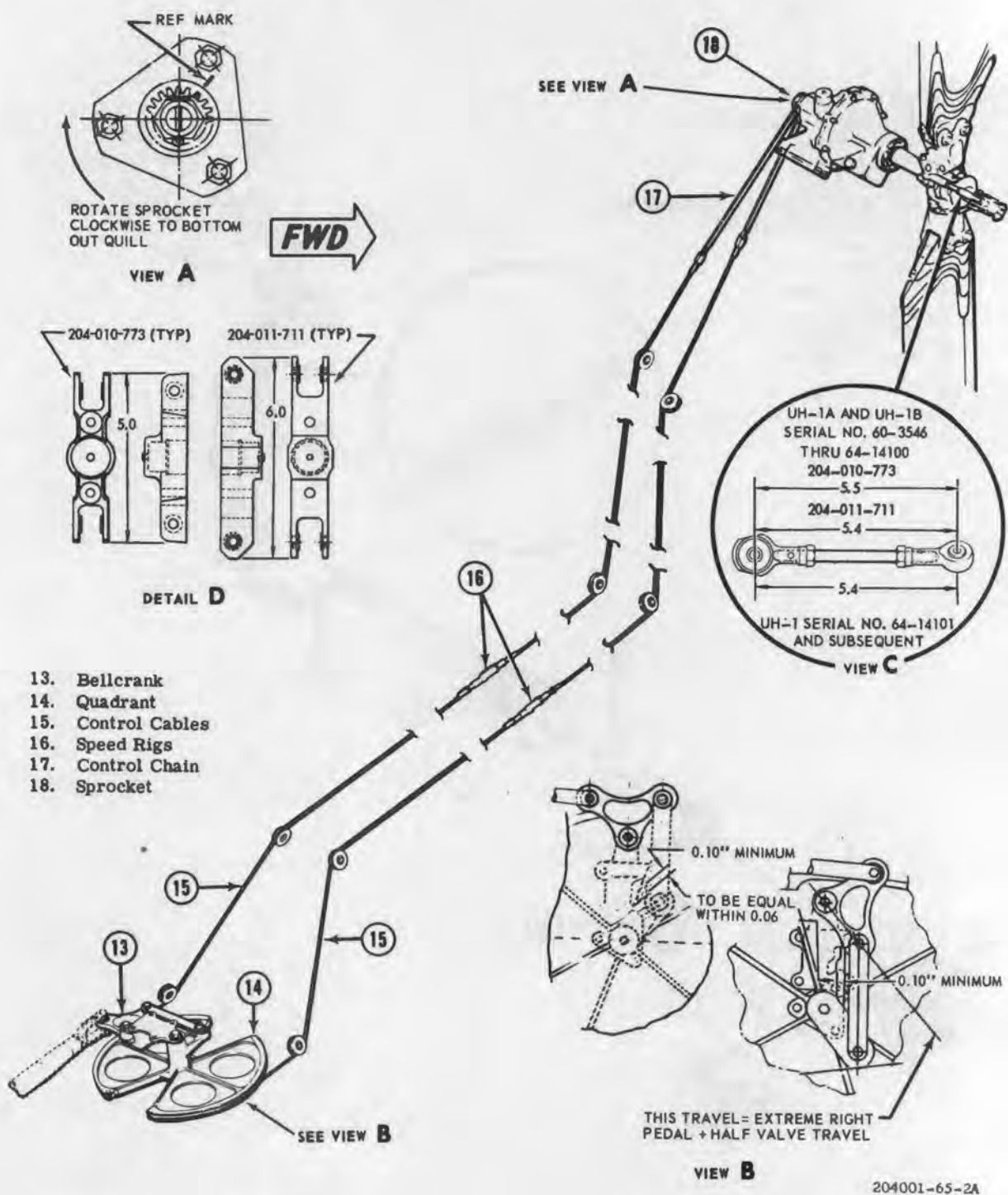


Figure 9-18. Tail rotor controls adjustment (Sheet 2 of 2)

i. Actuate control pedals and hold right pedal at full forward stop. Mark sprocket tooth opposite index mark and apply sufficient force to chain to rotate sprocket four to five teeth counterclockwise.

j. At this position check that splines of pitch change slider and tail rotor shaft are securely engaged. With the four to five tooth additional tooth settings obtained in step i., the splines should not disengage.

Note

If hydraulic power is available, check full left pedal sprocket position with "boost on". Position should be $\frac{1}{2}$ to $1\frac{1}{2}$ teeth from bottom by observing relation of sprocket tooth and index mark.

k. Position arm on magnetic brake with scribe mark on shaft opposite mark D on arm. Locate pedals and brake arm in their center of travel. Adjust and install directional force gradient assembly.

l. Check speed rigs for clearance at fairleads and safetywire turnbuckles.

m. Make final adjustment of pitch change link by tracking rotor blades.

9-70. Synchronized Elevator. A synchronized elevator is mounted near the aft end of the tail boom and is connected through push-pull tubes and bellcranks to the cyclic control system. Fore and aft movement of the cyclic control stick causes a change in the elevator angle, thereby aiding controllability.

9-71. Removal — Synchronized Elevator. (Refer to paragraph 4-218 or 4-223.)

9-72. Inspection — Synchronized Elevator. (Refer to paragraph 4-219 or 4-224.)

9-73. Repair or Replacement — Synchronized Elevator. (Refer to paragraph 4-221 or 4-225.)

9-74. Installation — Synchronized Elevator. (Refer to paragraph 4-221 or 4-226.)

9-75. Adjustment — Synchronized Elevator. The following steps cover rigging of synchronized

elevator controls on all model helicopters covered by this manual. (See figure 9-19, 9-20 and 9-21.)

a. Install fixed length control tubes (1, 7 and 9).

510 Note

Torque nut attaching upper end of link assembly (1, figure 9-21) to swashplate ring 690 to 990 inch-pounds.

b. Install T101330 cyclic stick fixture on copilot's cyclic stick. (See View B, figure 9-4 and 9-5.)

c. Locate control tube (5) at 21.42 inches for UH-1A and UH-1B, Serial No. 60-3546 through 64-14100, helicopters and at 21.50 inches for UH-1B Serial No. 64-14101 and subsequent, as shown in View A. With valve in both cyclic cylinders in the full UP position, adjust and connect control tube (3).

d. Disconnect control tube (5). Set chord line of elevator to pass through rivet P (View B). Adjust control tube (11) to minimum length that will reach bellcrank (10) when bellcrank is positioned so that tube (11) is in line with bellcrank pivot point. (View C.)

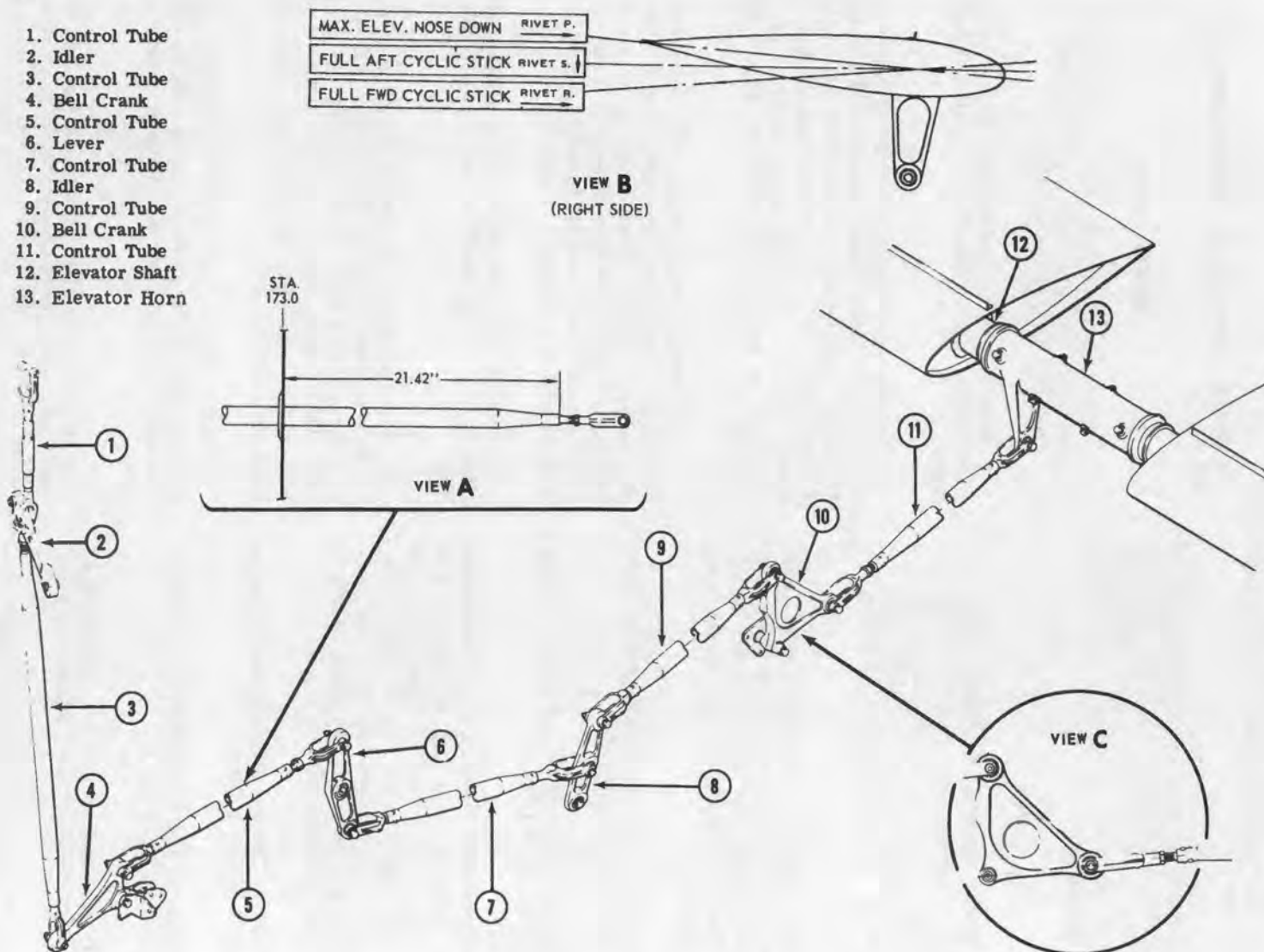
e. Remove T101330 cyclic stick fixture and place pilot's cyclic stick in full forward position.

f. With boost on, set chord line of elevator to pass through rivet R (View B). Aft arm of bellcrank (10) must be above horizontal position. With servo control valves centered in both cyclic cylinders, adjust control tube (5) to fit and connect tube.

g. Place pilot's cyclic stick in extreme aft position and check elevator chord line to pass through rivet S (View B), plus or minus $\frac{1}{8}$ inch.

h. On all helicopters except Serial No. 64-14101 and subsequent check system with boost off for freedom and full travel. On all helicopters check system with boost on. With full forward cyclic stick, elevator chord line should be aligned to rivet R. With neutral cyclic stick, elevator chord line should be a fraction of a degree below rivet P.

1. Control Tube
2. Idler
3. Control Tube
4. Bell Crank
5. Control Tube
6. Lever
7. Control Tube
8. Idler
9. Control Tube
10. Bell Crank
11. Control Tube
12. Elevator Shaft
13. Elevator Horn



204001-37

Figure 9-19. Synchronized elevator controls adjustment (UH-1A)

1. Control Tube
2. Bellcrank
3. Control Tube
4. Bellcrank
5. Control Tube
6. Lever
7. Control Tube
8. Idler
9. Control Tube
10. Bellcrank
11. Control Tube
12. Elevator Shaft
13. Elevator Horn

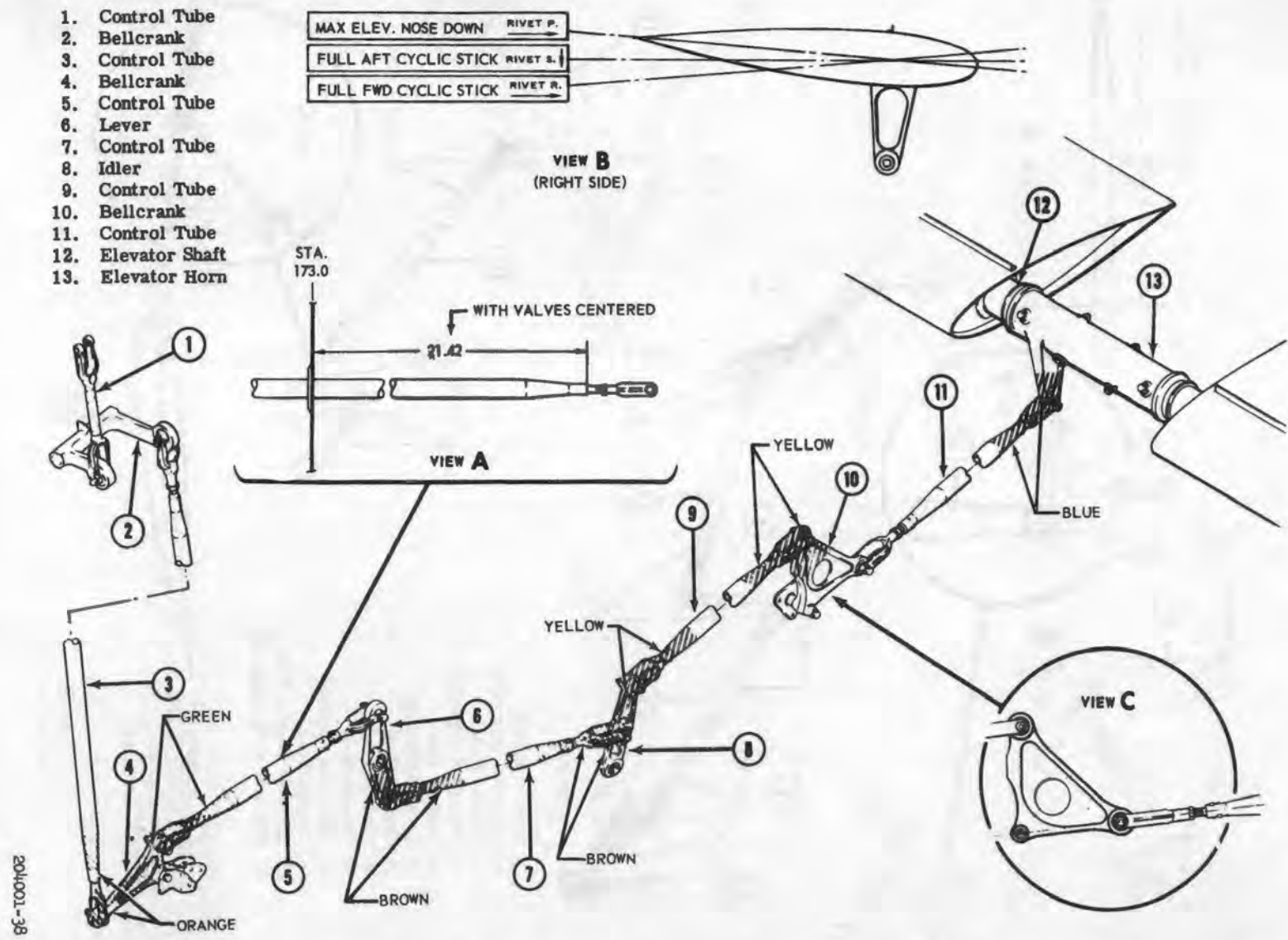
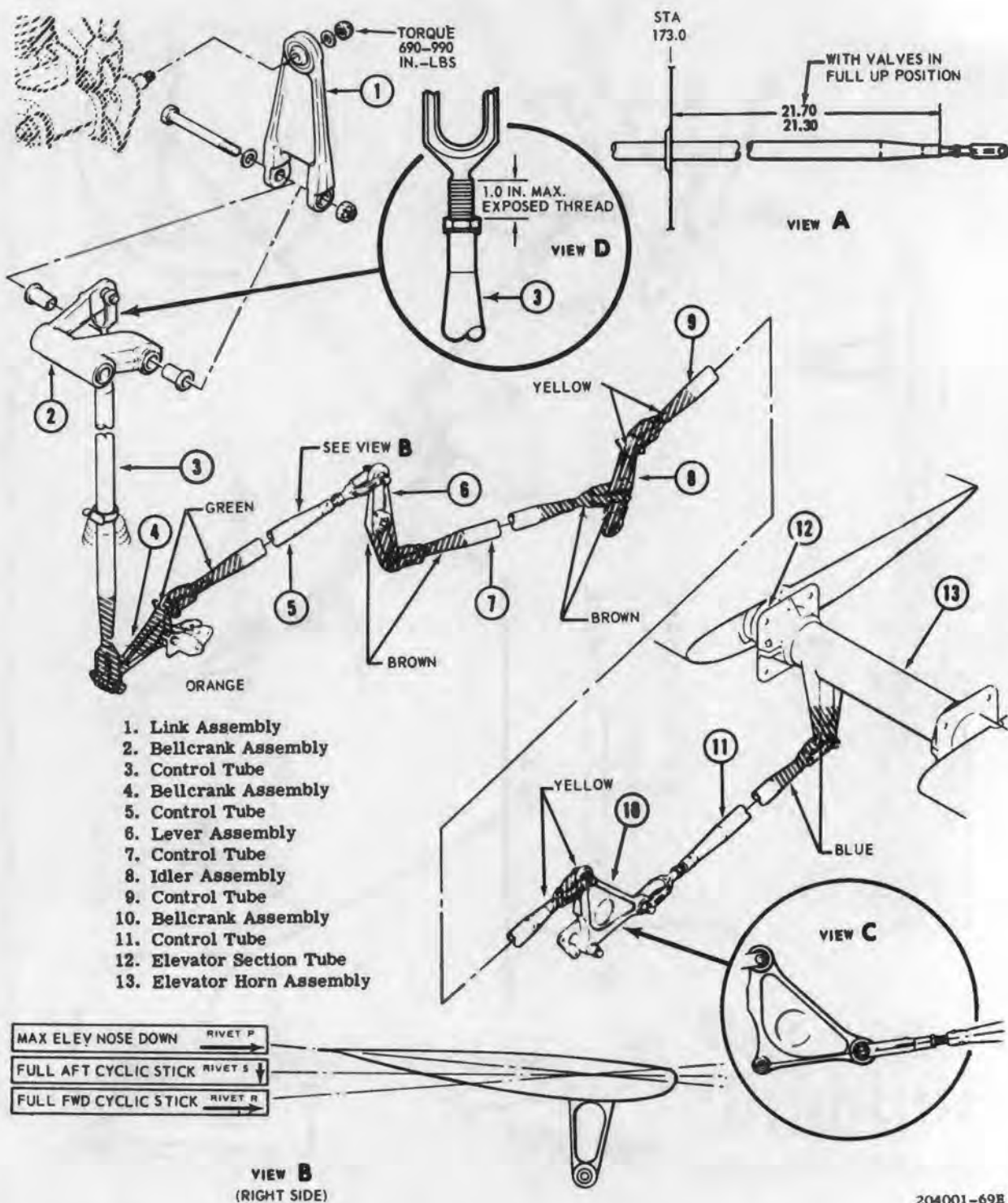


Figure 9-20. Synchronized elevator controls adjustment (UH-1B serial No. 60-3546 thru 64-14100)



204001-69B

Figure 9-21. Synchronized elevator controls adjustment (UH-1B serial no. 64-14101 and subsequent)

Section III — Fixed Flight Controls

(Not Applicable)

CHAPTER 10
INSTRUMENTS

Section I — Scope

10-1. Scope. The purpose of this chapter is to provide essential information for maintenance personnel to accomplish organizational maintenance on the instruments. All flight, navigation, engine and miscellaneous instruments are mounted in a panel attached to the top forward side of the pedestal.

Note

The illustrations, pertaining to the information found in the following sections, are contained in TM 55-1520-211-10.

10-2. Removal — Instruments. The removal procedure for all instruments is relatively the same, except that it is necessary to disconnect wiring for one type of instrument or disconnect a tube from another type of instrument. A single removal procedure may be used for any instrument.

a. Turn battery switch to "OFF" position.

b. Disconnect wires or tubes from back of instrument and tape or place cover on ends. Cover openings in instrument. Remove mounting screws from instrument and panel. Remove instrument from panel.

10-3. Cleaning — Instruments. Wipe dust and clean instrument cover glass with a soft, clean, lint-free cloth.

10-4. Minor Repair — Instruments. Inspect instruments for loose or cracked glasses and for legibility of range markings. Replace instrument if cover glass is loose or cracked and replace range markings, if needed.

10-5. Installation — Instruments. Position instrument in panel and install mounting screws. Remove tape or covers from tube, wire ends and openings in instrument. Attach or connect tubes, wires, receptacles, etc., to instrument.

10-6. Instrument Panel. The instrument panel is mounted on the top forward section of the pedestal and contains all instruments for the pilot and copilot.

10-7. Removal — Instrument Panel. a. Turn battery switch to "OFF" position.

b. Remove shroud from back side of panel.

c. Remove glare shield from forward side of panel.

d. Disconnect all electrical receptacles and hose from instruments. Cover all receptacles and hose with tape to prevent entrance of foreign particles. Cover openings in instruments.

e. Remove two braces from lower side of panel. Remove eight mounting screws and washers from top and bottom side of panel and lift panel from helicopter.

10-8. Installation — Instrument Panel. a. Position panel in place on pedestal and install mounting screws and washers.

b. Connect braces at bottom of panel on right and left side.

c. Connect electrical receptacles and hose to instruments.

d. Install glare shield and shroud.

Note

Instrument panel vibration may be eliminated or minimized by adjusting the tube and brace assemblies provided for this purpose. The two outboard tube assemblies are attached to the helicopter structure by means of a pin, washer and cotter pin. They are equipped with a clevis and check nut for adjustment. The two inboard brace assemblies are attached to the radio rack and may be adjusted by means of turnbuckles incorporated in the brace assemblies.

Section II — Flight Instruments

10-9. Altimeter. The altimeter furnishes a direct reading of height above sea level. The instrument is vented to the static air system.

10-10. Troubleshooting — Altimeter. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer indicates incorrectly	Leak in static line Static vent plugged Instrument defective	Correct leak Clean vent Replace instrument

10-11. Removal — Altimeter. (Perform steps in paragraph 10-2.)

10-12. Cleaning — Altimeter. (Perform steps in paragraph 10-3.)

10-13. Minor Repair — Altimeter. (Perform steps in paragraph 10-4.)

10-14. Installation — Altimeter. (Perform steps in paragraph 10-5.)

The single scale indicator provides an indication in knots by measuring the difference between the impact air pressure from the pitot tube and the static vent. The pitot tube is mounted on the left metal nose section of the cabin, or top right hand side of cabin roof. Static air pressure for instrument operation is derived from the two static vents located on the side cabin skins near the forward edges of the crew door.

10-15. Airspeed Indicator. The airspeed indicator is a standard pitot-static instrument.

10-16. Troubleshooting — Airspeed Indicator. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer fails to respond	Pressure line not connected properly Line clogged	Connect line properly Disconnect line and blow lines clear
Pointer indicates incorrectly	Leak in line Defective or leaking instrument	Repair or replace line Replace instrument

10-17. Removal — Airspeed Indicator. (Perform steps in paragraph 10-2.)

10-18. Cleaning — Airspeed Indicator. (Perform steps in paragraph 10-3.)

10-19. Minor Repair — Airspeed Indicator. (Perform steps in paragraph 10-4.)

10-20. Installation — Airspeed Indicator. (Perform steps in paragraph 10-5.)

10-21. Pitot Static System. (UH-1A and UH-1B Serial No. 60-3546 through 64-14100.) The pitot tube is mounted on the left metal

nose section of the cabin. Static air pressure for instrument operation is derived from the two static vents located on the side cabin skins near the forward edges of the crew doors.

10-22. Troubleshooting — Pitot Static System. (Perform steps in paragraphs 10-10 and 10-16.)

10-23. Removal — Pitot Tube. (UH-1A and UH-1B Serial No. 60-3546 through 64-14100.) Remove screws and lock-washers which attach sleeve to pitot head. Hold and slide sleeve forward until coupling in pitot pressure line is exposed. Disconnect pitot line and electrical cord from aft end of pitot tube.

10-24. Cleaning — Pitot Tube. (UH-1A and UH-1B Serial No. 60-3546 through 64-14100.) Clean pitot tube with a clean cloth dampened with dry cleaning solvent (item 302, table 1-1). Dry with filtered compressed air. Blow tube clear of any obstructions.

Note

Instrument **MUST** be disconnected from system when blowing lines.

10-25. Minor Repair — Pitot Tube. (UH-1A and UH-1B Serial No. 60-3546 through 64-14100.) Check pitot tube connections for tightness and tubing vents for obstruction. Drain moisture from pitot pressure and static pressure lines.

10-26. Installation — Pitot Tube. (UH-1A and UH-1B Serial No. 60-3546 through 64-14100.) Slide sleeve over pitot pressure line and electrical cordage into place on support tube. Connect wiring to pitot head, slide sleeve forward (over pitot head) and connect pressure line. Slide sleeve into place, align screw holes, and install washers and screws.

10-27. Pitot Static System. (UH-1B Serial No. 64-14101 and Subsequent.) These helicopters are equipped with pitot-static tube mounted just right of center line on the forward cabin roof.

10-28. Minor Repair — Pitot Static System. (UH-1B Serial No. 64-14101 and subsequent.) Check all tube and hose connections for tightness, security, and freedom from obstructions. Remove caps from pitot and static pressure drain lines and drain any accumulated moisture. Clean pitot static tube and support with a clean cloth dampened with dry cleaning solvent (item 302, table 1-1).

10-29. Removal — Pitot Static Tube. (UH-1B Serial No. 64-14101 and subsequent.) a. Disconnect

pitot and static hose assemblies at base of support and cap or recover openings to prevent entrance of foreign material.

b. Remove screws and lockwashers attaching pitot static tube to support and carefully disengage tube from support.

c. Disconnect and remove electrical plug from pitot static tube and cover plug with tape.

10-30. Installation — Pitot Static Tube. (UH-1B Serial No. 64-14101 and subsequent.) a. Remove tape from electrical plug and connect plug to heater unit in pitot static tube.

b. Coat aft end of pitot static tube with sealant, (item 205, table 1-1) and carefully insert into support, positioning and guiding electrical wires and hose assemblies as necessary. Wipe off excess sealant with a clean, dry cloth and install attaching lockwashers and screws.

c. Remove caps or covers from pitot and static hose assembly openings and connect hose assemblies at base of support.

10-31. Turn and Slip Indicator. The turn and slip indicator is controlled by an electrically-actuated gyro which is DC powered. This instrument has a needle (turn indicator) and a ball (slip indicator). Although the needle and ball are combined in one instrument and are normally read and interpreted together, each has its own specific function and operates independently of the other. The ball indicates when the aircraft is in directional balance either in turn or in straight and level flight. If the aircraft is yawing or slipping the ball will be off center. The needle indicates in which direction and at what rate the aircraft is turning.

10-32. Troubleshooting — Turn and Slip Indicator. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer remains at zero either constant or intermittent	Low voltage	Replace battery
	Defective instrument	Replace defective unit

10-33. Removal — Turn and Slip Indicator. (Perform steps in paragraph 10-2.)

10-34. Cleaning — Turn and Slip Indicator. (Perform steps in paragraph 10-3.)

10-35. Minor Repair — Turn and Slip Indicator. (Perform steps in paragraph 10-4.)

10-36. Installation — Turn and Slip Indicator. (Perform steps in paragraph 10-5.)

10-37. Attitude Indicator. On model UH-1A helicopters, the attitude indicator is mounted on the top right-hand side of the instrument panel. On model UH-1B helicopters, two attitude indicators are mounted on the instrument

panel, one each for the pilot and copilot, and the amplifier is located in the nose compartment. On model UH-1B, Serial No. 64-14191 and subsequent, the pilot's attitude indicator is a one piece unit containing both the indicator and the amplifier. This instrument indicates the flight attitude of the helicopter relative to the earth's surface.

10-38. Troubleshooting — Attitude Indicator. Perform steps as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Indicator does not operate and power flag does not lift	Failure of power supply	Replace power supply
Systems functions properly but power failure flag does not lift	Failure of indicator	Replace indicator
Indicator oscillates (hunts in roll and pitch)	Failure of indicator	Replace indicator
Power failure flag lifts but indicator moves in one axis only	Failure of indicator	Replace indicator

10-39. Removal — Attitude Indicator. (Perform steps in paragraph 10-2.)

10-40. Cleaning — Attitude Indicator. (Perform steps in paragraph 10-3.)

10-41. Minor Repair — Attitude Indicator. (Perform steps in paragraph 10-4.)

10-42. Installation — Attitude Indicator. (Perform steps in paragraph 10-5.)

Note

One and two-piece attitude indicators are interchangeable for all helicopters prior to Serial No. 64-14191. However,

when installing one piece attitude indicators in helicopters prior to Serial No. 64-14191, connectors of amplifier must be stowed when amplifier is removed. Connect remaining connector to receptacle on one piece attitude indicator.

10-43. Vertical Velocity Indicator. The vertical velocity indicator registers ascent and descent in feet. This instrument is actuated by the rate of atmospheric pressure change and is vented to the static air system.

10-44. Troubleshooting — Vertical Velocity Indicator. Perform steps as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer off zero	Mechanism shifted	Return pointer to zero by turning adjustment knob; tap face of instrument lightly while adjusting
Inaccurate readings	Loose connections in static line	Tighten connections
Excessive pointer oscillation	Instrument case leaks Leak in static line Defective instrument	Replace instrument Tighten connections, replace leaky lines Replace instrument

10-45. Removal — Vertical Velocity Indicator. (Perform steps in paragraph 10-2.)

10-46. Cleaning — Vertical Velocity Indicator. (Perform steps in paragraph 10-3.)

10-47. Minor Repair — Vertical Velocity Indicator. (Perform steps in paragraph 10-4.)

10-48. Installation — Vertical Velocity Indicator. (Perform steps in paragraph 10-5.)

Section III — Navigation Instruments

10-49. Course Indicator. The ID-453/ARN course indicator functions to furnish the pilot visual bearing from or to the station being received. A knob is provided on the instrument for selection or adjustment of the bearing indicator needle to set up a desired omni (VOR) course or to change to course 180 degrees on the indicator, thereby reversing the TO-FROM meter. Operating in conjunction with the course selector is the cross pointer meter. The pilot by means of the omni system can set up any bearing to or from a station when he knows his general geographical location and he can determine that location by obtaining a position fix on two omni stations. The cross pointer will deflect right or left depending upon the relative bearing of the helicopter to the station.

10-50. Removal — Course Indicator. (Perform steps in paragraph 10-2.)

10-51. Cleaning — Course Indicator. (Perform steps in paragraph 10-3.)

10-52. Minor Repair — Course Indicator. (Perform steps in paragraph 10-4.)

10-53. Installation — Course Indicator. (Perform steps in paragraph 10-5.)

10-54. Radio Compass. The radio compass is a synchro-driven instrument which indicates the angular position of the synchro located in the loop, and the bearing of the incoming signal relative to the helicopter heading. A knob marked VAR (variation) is located on the radio compass indicator and permits the operator to adjust the face of the radio compass indicator to correct for local magnetic variation or to add in the helicopter magnetic heading to obtain a true magnetic bearing for radio direction finding.

10-55. Removal — Radio Compass. (Perform steps in paragraph 10-2.)

10-56. Cleaning — Radio Compass. (Perform steps in paragraph 10-3.)

10-57. Minor Repair — Radio Compass. (Perform steps in paragraph 10-4.)

10-58. Installation — Radio Compass. (Perform steps in paragraph 10-5.)

10-59. Bearing-Heading Indicator. The C-6H and ID-250/ARN indicators are dual pointer, moving type instruments. The C-6H provides additional isolated heading output by means of an external servo amplifier. The ID-250/ARN indicator (RMI) is a repeater type instrument. The dial on each indicator displays heading from the J-2 compass system. Pointer No. 1 of each indicator displays ADF magnetic bearing from ARN-59 system. Pointer No. 2 of each indicator displays omni magnetic bearing from the AN/ARN-30 () system via the B-18A RMI converter.

10-60. Removal — Bearing-Heading Indicator. (Perform steps in paragraph 10-2.)

10-61. Cleaning — Bearing-Heading Indicator. (Perform steps in paragraph 10-3.)

10-62. Minor Repair — Bearing-Heading Indicator. (Perform steps in paragraph 10-4.)

10-63. Installation — Bearing-Heading Indicator. (Perform steps in paragraph 10-5.)

10-64. Gyro Magnetic Compass — Type V-7A. The gyro magnetic compass is an AC powered instrument. The compass may be used as a directional or it may be "slaved" to the remote transmitter control unit by a two position COMPASS SLAVING, IN-OUT, switch located at the lower center of the instrument panel. When the switch is in the "IN" position, the remote transmitter is in operation. The transmitter located in the lower center section

of the tail boom, picks up the lines of force from the earth's magnetic field and transmits these signals to the gyro, causing it to follow these signals. The gyro remains in constant synchronization with these signals. The switch in the out position disconnects the transmitter from the system, and the electrically actuated directional gyro then detects movement only about the vertical axis of the helicopter without reference to the earth's magnetic field.

10-65. Removal — Gyro Magnetic Compass — Type V-7A. (Perform steps in paragraph 10-2.)

10-66. Cleaning — Gyro Magnetic Compass — Type V-7A. (Perform steps in paragraph 10-3.)

10-67. Minor Repair — Gyro Magnetic Compass — Type V-7A. (Perform steps in paragraph 10-4.)

10-68. Installation — Gyro Magnetic Compass — Type V-7A. (Perform steps in paragraph 10-5.)

10-69. Standby Compass. The standby compass is a standard magnetic type and is to be used in conjunction with the compass correction card, located adjacent to the compass.

10-70. Troubleshooting — Standby Compass. Perform steps as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive card error	Improper compensation External magnetic interference Air in bowl	Compensate compass Refer to TM 55-405-3 Locate magnetic influence and eliminate if possible Replace instrument
Excessive card oscillation	Insufficient liquid in bowl	Replace instrument
Card element not level	Leaking float chamber Card magnets detached from card	Replace instrument Replace instrument
Card sluggish	Dirty jewels or pivots restricting rotation Weak magnetic card	Replace instrument Replace instrument

10-71. Removal — Standby Compass. (Perform steps in paragraph 10-2.)

10-72. Cleaning — Standby Compass. (Perform steps in paragraph 10-3.)

10-73. Minor Repair — Standby Compass. (Perform steps in paragraph 10-4.)

10-74. Installation — Standby Compass. (Perform steps in paragraph 10-5.)

Section IV — Engine and Miscellaneous Instruments

10-75. Dual Tachometer. The dual tachometer indicates both the engine and rotor rpm. The outer scale of the indicator is for power turbine rpm, and the smaller inner scale is for rotor rpm. Power for operation of the indicators is provided by two tachometer generators mounted on the engine and transmission. These systems are self generating; therefore,

a connection to the electrical system is not required. Normal operation of the helicopter is evident when the power turbine (engine) and rotor rpm indicator needles are in synchronization.

10-76. Troubleshooting — Dual Tachometer. Perform steps as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive scale error	Weak magneto in tachometer	Replace tachometer
Pointer moves backwards	Leads reversed at generator	Change leads in generator plug
Indication only one-half actual speed	Leads connected to wrong terminal indicator	Refer to wiring diagram and indicator
No reading on instrument either constant or intermittent	Break or short circuit in leads	Repair or replace leads
	Poor connections at indicator or generator plugs	Clean or tighten connections
	Break in unit circuit	Replace unit affected
Low reading on indicator either constant or intermittent	Indicator resistance out of adjustment	Replace indicator
High reading on indicator either constant or intermittent	Indicator resistance out of adjustment	Replace indicator

10-77. Removal — Dual Tachometer. (Perform steps in paragraph 10-2.)

10-78. Cleaning — Dual Tachometer. (Perform steps in paragraph 10-3.)

10-79. Minor Repair — Dual Tachometer. (Perform steps in paragraph 10-4.)

10-80. Installation — Dual Tachometer. (Perform steps in paragraph 10-5.)

10-81. Engine Oil Pressure Indicator. The engine oil pressure gage receives pressure indications from the pressure transmitter and provides readings in pounds per square inch (psi). The oil pressure indicator and transmitter are electrically operated by 28 volt AC.

10-82. Troubleshooting — Engine Oil Pressure Indicator. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Low reading on oil pressure indicator	Kinked tubing or air obstruction in tubing	Replace or change tubing
Inaccurate or sticking pressure indicator	Defective instrument	Replace instrument
Sluggish oil pressure reading or fluctuating oil pressure	Sludge or air in line	Bleed line

10-83. Removal — Engine Oil Pressure Indicator. (Perform steps in paragraph 10-2.)

10-84. Cleaning — Engine Oil Pressure Indicator. (Perform steps in paragraph 10-3.)

10-85. Minor Repair — Engine Oil Pressure Indicator. (Perform steps in paragraph 10-4.)

10-86. Installation — Engine Oil Pressure Indicator. (Perform steps in paragraph 10-5.)

10-87. Engine Oil Temperature Indicator. The engine oil temperature indicator is connected to an electrical resistance type thermocouple and indicator is powered by 28 volts DC and is connected to the essential bus.

10-88. Troubleshooting — Engine Oil Temperature Indicator. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Oil temperature reading off scale at low temperature end, or low reading either constant or intermittent	Open or short in indicator	Replace indicator
	Short circuit in leads from resistance bulb to indicator Short circuit in bulb	Make continuity check and repair or replace indicator Replace bulb
Oil temperature reading off scale at high temperature end, or high reading either constant or intermittent	Break in leads or resistance bulb	Repair or replace leads
	Open or short circuit in indicator	Replace indicator
No reading on indicator either constant or intermittent	Break in leads	Repair or replace leads
	Defective switch	Replace switch
	Defective indicator	Replace indicator

10-89. Removal — Engine Oil Temperature Indicator. (Perform steps in paragraph 10-2.)

10-90. Cleaning — Engine Oil Temperature Indicator. (Perform steps in paragraph 10-3.)

10-91. Minor Repair — Engine Oil Temperature Indicator. (Perform steps in paragraph 10-4.)

10-92. Installation — Engine Oil Temperature Indicator. (Perform steps in paragraph 10-5.)

10-93. Transmission Oil Pressure Indicator. The transmission oil pressure indicator receives pressure indications from the pressure transmitter and provides readings in pounds per square inch (psi). The oil pressure indicator and transmitter are electrically operated by 28 volts AC.

10-94. Troubleshooting — Transmission Oil Pressure Indicator. Perform steps as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Low reading on oil pressure indicator	Kinked tubing or air obstruction in tubing	Replace or change tubing
Inaccurate or sticking pressure indicator	Defective instrument	Replace instrument
Sluggish oil pressure reading or fluctuating oil pressure	Sludge or air in line	Bleed line

10-95. Removal — Transmission Oil Pressure Indicator. (Perform steps in paragraph 10-2.)

10-96. Cleaning — Transmission Oil Pressure Indicator. (Perform steps in paragraph 10-3.)

10-97. Minor Repair — Transmission Oil Pressure Indicator. (Perform steps in paragraph 10-4.)

10-98. Installation — Transmission Oil Pressure Indicator. (Perform steps in paragraph 10-5.)

10-99. Transmission Oil Temperature Indicator. The transmission oil temperature indicator is connected to an electrical resistance

type thermobulb which electrically transmits the oil temperature reading to the indicator unit. The unit operates from 28 volt DC electrical system and is connected to the essential bus.

10-100. Troubleshooting—Transmission Oil Temperature Indicator. Perform necessary checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Oil temperature reading off scale at low temperature end, or low reading, either constant or intermittent	Open or short circuit in indicator	Replace indicator
	Short circuit in leads or resistance bulb	Repair or replace lead
	Ground in lead from resistance bulb to indicator	Make continuity check
	Open or short circuit in indicator	Replace indicator
	Short circuit in bulb	Replace bulb
Oil temperature reading off scale at high reading either constant or intermittent	Break in leads or resistance bulbs	Repair or replace leads
	Open circuit in resistance bulb	Replace resistance bulb
	Open or short circuit in indicator	Replace indicator

10-101. Removal — Transmission Oil Temperature Indicator. (Perform steps in paragraph 10-2.)

10-102. Cleaning — Transmission Oil Temperature Indicator. (Perform steps in paragraph 10-3.)

10-103. Minor Repair — Transmission Oil Temperature Indicator. (Perform steps in paragraph 10-4.)

10-104. Installation — Transmission Oil Temperature Indicator. (Perform steps in paragraph 10-5.)

10-105. Gas Producer Tachometer Indicator. The gas producer tachometer registers the rpm of the gas producer turbine. The indicator is powered by a tachometer generator geared to the rotor shaft and does not depend on the helicopter's electrical system. The indicator readings are in percent rpm of gas producer turbine speed. The instrument when used in conjunction with the exhaust temperature gage, permits engine power to be accurately set without exceeding limitations.

10-106. Removal — Gas Producer Tachometer Indicator. (Perform steps in paragraph 10-2.)

10-107. Cleaning — Gas Producer Tachometer Indicator. (Perform steps in paragraph 10-3.)

10-108. Minor Repair — Gas Producer Tachometer Indicator. (Perform steps in paragraph 10-4.)

10-109. Installation — Gas Producer Tachometer Indicator. (Perform steps in paragraph 10-5.)

10-110. Exhaust Temperature Indicator. The exhaust temperature indicator receives temperature indications from the bayonet type thermocouples mounted in the forward section of the tailpipe. The gage temperature indications are in degrees centigrade and electrical power is not required as the system is self generating.

10-111. Troubleshooting — Exhaust Temperature Indicator. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
No reading on instrument	Loose connections	Check and tighten connections
	Open circuit in indicator	Replace indicator

10-112. Removal — Exhaust Temperature Indicator. (Perform steps in paragraph 10-2.)

10-113. Cleaning — Exhaust Temperature Indicator. (Perform steps in paragraph 10-3.)

10-114. Minor Repair — Exhaust Temperature Indicator. (Perform steps in paragraph 10-4.)

10-115. Installation — Exhaust Temperature Indicator. (Perform steps in paragraph 10-5.)

10-116. Torquemeter Indicator. The torquemeter indicator is connected to a single trans-

mitter which is part of the engine oil system. The torquemeter indicates torque pressure in psi readings of the torque imposed upon the engine output shaft. The torquemeter circuit is powered by 28 volt AC power and is protected by a circuit breaker located on the overhead console panel.

10-116A. Trouble Shooting — Torquemeter Indicator. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Low reading on indicator	Kinked or obstructed line	Replace or clean line
Inaccurate or sticking indicator	Defective indicator	Replace indicator
Sluggish or fluctuating pressure	Loose electrical connection	Check connections
No reading on indicator	Defective transmitter	Replace transmitter
	Open circuit between transmitter and indicator	Make continuity check and replace or repair leads

10-117. Removal — Torquemeter Indicator. (Perform steps in paragraph 10-2.)

10-118. Cleaning — Torquemeter Indicator. (Perform steps in paragraph 10-3.)

10-119. Minor Repair — Torquemeter Indicator. (Perform steps in paragraph 10-4.)

10-120. Installation — Torquemeter Indicator. (Perform steps in paragraph 10-5.)

10-121. AC Voltmeter. The AC voltmeter indicates the voltage output from the inverter (main or spare), however, the voltage indicated is the voltage between only two of the three 115 volt AC phases.

10-122. Removal — AC Voltmeter. (Perform steps in paragraph 10-2.)

10-123. Cleaning — AC Voltmeter. (Perform steps in paragraph 10-3.)

10-124. Minor Repair — AC Voltmeter. (Perform steps in paragraph 10-4.)

10-125. Installation — AC Voltmeter. (Perform steps in paragraph 10-5.)

10-126. DC Voltmeter. The DC voltmeter indicates the output of voltage from the main generator, standby generator, essential bus, non-essential bus, or battery. These sources are selected by the VM selector on the DC Power panel in the overhead console.

10-127. Troubleshooting — DC Voltmeter. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
No reading or erratic reading	Malfunctioning generator	Replace generator
	Open or short circuit in instrument	Replace instrument
	Dirty or worn mechanism in instrument	Replace instrument
10-128. Removal — DC Voltmeter. (Perform steps in paragraph 10-2.) 10-129. Cleaning — DC Voltmeter. (Perform steps in paragraph 10-3.) 10-130. Minor Repair — DC Voltmeter. (Perform steps in paragraph 10-4.) 10-131. Installation — DC Voltmeter. (Perform steps in paragraph 10-5.) 10-132. Loadmeter. Two DC loadmeters are mounted in the instrument panel, one each for the main and standby generator. These instruments measure and indicate, in percentage, the output or load of the generator. 10-133. Troubleshooting — Loadmeter. (Refer to paragraph 10-127.) 10-134. Removal — Loadmeter. (Perform steps in paragraph 10-2.) 10-135. Cleaning — Loadmeter. (Perform steps in paragraph 10-3.) 10-136. Minor Repair — Loadmeter. (Perform steps in paragraph 10-4.) 10-137. Installation — Loadmeter. (Perform steps in paragraph 10-5.) 10-138. Clock. The clock has an elapsed time mechanism incorporating a sweep second pointer. The number of revolutions being counted by		
	a minute totalizer hand indicating from 0 to 60 minutes and repeating, with on knob to control the start, stop and fly-back of both pointers by successive depressions. The control knob for the clock is located at the upper righthand corner of the clock face.	
	10-139. Removal — Clock. (Perform steps in paragraph 10-2.)	
	10-140. Cleaning — Clock. (Perform steps in paragraph 10-3.)	
	10-141. Minor Repair — Clock. (Perform steps in paragraph 10-4.)	
	10-142. Installation — Clock. (Perform steps in paragraph 10-5.)	
	10-143. Fuel Quantity Indicator. The transistorized fuel quantity indicator is an electrical receiver which continuously indicates the quantity of fuel in pounds and is powered by 115 volt AC. The indicator is connected to a capacitor type fuel quantity transmitter mounted in each fuel cell, which transmits the fuel quantity in pounds to the indicator. Note UH-1B helicopters Serial No. 64-14101 and subsequent are equipped with only one fuel quantity transmitter. On these helicopters the transmitter is located in the left-hand fuel cell.	
	10-144. Troubleshooting — Fuel Quantity Indicator. Perform checks as necessary to isolate trouble.	

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Indicator reads low	System out of adjustment Tank unit has low capacitance Compensator capacitance too high	Perform adjustment procedure Change tank unit Change tank unit

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Indicator reads high	System out of adjustment Tank unit has high capacitance Open lead on compensator circuit Compensator section of tank unit open	Perform adjustment procedure Change tank unit Check wiring Change tank unit
Indicator remains at one point on scale	No power Defective indicator Coaxial lead grounded 400 cycle lead grounded Prolonged existence of this condition will burn out fire hazard resistor in indicator	Check 115 volts, 400 cycle power supply. Replace indicator Check wiring Check wiring and/or replace indicator assembly
Indicator remains at zero or below	Open wiring	Check wiring
Indicator operation sluggish	Low insulation resistance of the circuit	Check wiring and tank unit

10-145. Removal — Fuel Quantity Indicator. (Perform steps in paragraph 10-2.)

10-147. Minor Repair — Fuel Quantity Indicator. (Perform steps in paragraph 10-4.)

10-146. Cleaning — Fuel Quantity Indicator. (Perform steps in paragraph 10-3.)

10-148. Installation — Fuel Quantity Indicator. (Perform steps in paragraph 10-5.)

CHAPTER 11 UTILITY SYSTEMS

Section I — Scope

11-1. Scope. The purpose of this chapter is to provide information for maintenance personnel to accomplish organizational maintenance on equipment not included on the basic helicopter, but is provided as loose equipment or as kits for installation when required for special purposes.

Note

Normally, first installation will have been accomplished by the manufac-

turer before delivery or by field maintenance personnel as a modification, for which detailed instructions are issued. Subsequent removal, parts replacement and reinstallation can be performed by instructions in this chapter, using attachment holes and fittings provided.

Section II — Heating and Ventilating

11-2. Heating and Ventilating. Heating of the UH-1A helicopter is accomplished by a combustion heater and defroster installation with either a 50,000 or 100,000 BTU combustion type burner. (See figure 11-1.) The UH-1B helicopter, Serial No. 60-3546 through 64-14191 utilizes a bleed air heater and defroster system which supplies heated air to the cabin area from the compression section of the helicopter's engine. The UH-1B helicopter Serial No. 60-3546 through 64-14191 may be equipped with an auxiliary heater and defroster installation. (See figure 11-2) which permits use of a combination of bleed air and combustion heat for heating, bleed air for defrosting, and combustion heat for heating, or combustion heat for defrosting only. The UH-1B helicopter, Serial No. 65-9416 and subsequent may be equipped with an auxiliary exhaust heater. (See figure 11-3) which uses heat circulated through a heat exchanger on the tail pipe and into the cabin area for heating and defrosting. The ventilating system on the UH-1A and UH-1B consists of four air scoops installed on the cabin roof to supply fresh air to the cabin area.

11-3. Combustion Heater and Defroster Installation (UH-1A). (See figure 11-1.) The UH-1A combustion heater and defroster installation consists of a combustion type burner, electrically powered blower, plenum chamber and ducting, registers and nozzles to the cabin area. Fuel for the combustion air is supplied from the engine fuel system. The atomized fuel, under pressure, is mixed with combustion air and is ignited by an electrical spark. Burning gases are contained in a combustion chamber, and the electrically powered blower forces air around the chamber, where it is heated and then forced forward into the cabin area. Exhaust gas from the combustion chamber is vented overboard.

11-4. Combustion Heater Igniter Plug (UH-1A). (See figure 11-1.) The combustion heater igniter plug (1) is located on the forward side of the combustion heater, just above the heater ignition assembly.

11-5. Removal — Combustion Heater Igniter Plug (UH-1A). a. Make sure battery switch is in "OFF" position.

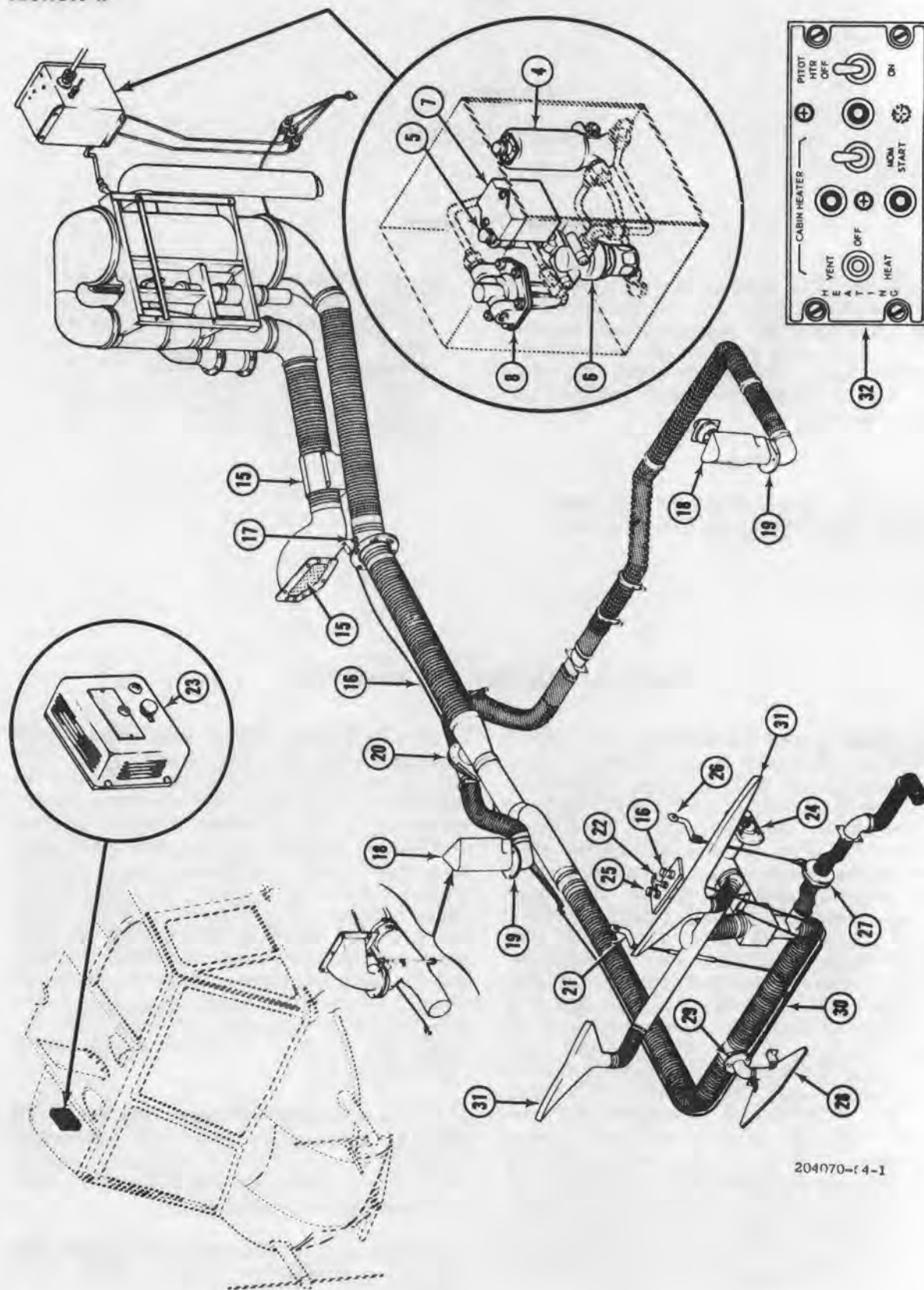
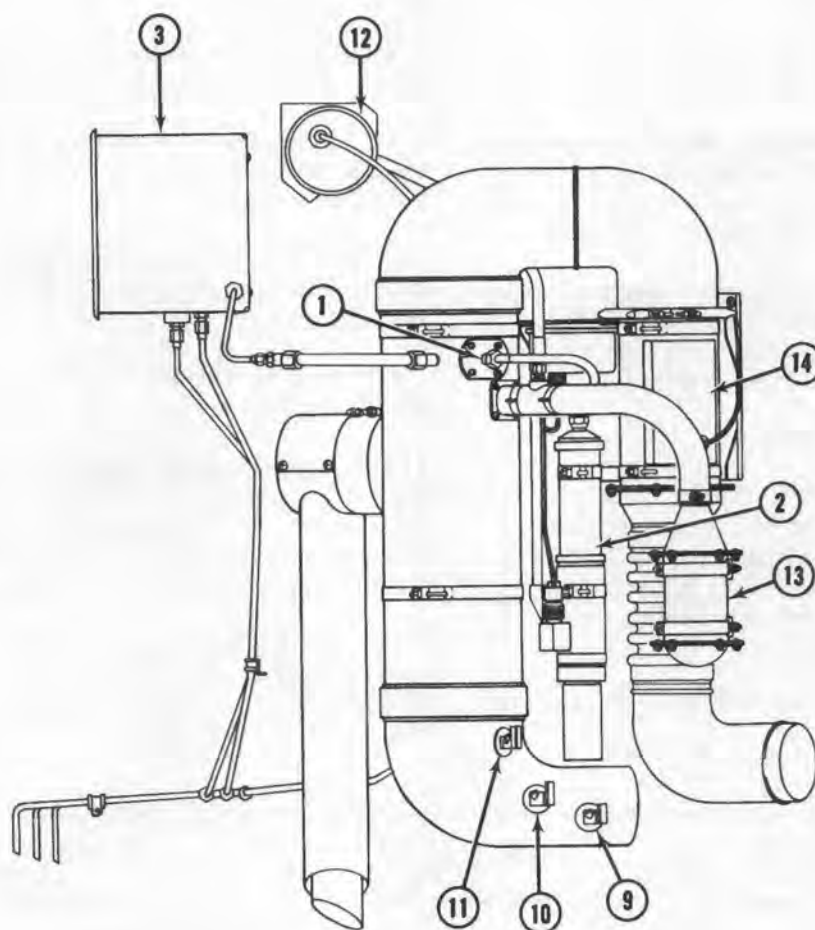


Figure 11-1. Heater and defroster installation — UH-1A (Sheet 1 of 2)

204070-1 4-1



- | | |
|-------------------------------|---|
| 1. Igniter Plug | 17. Cycling Switch 75°F |
| 2. Ignition Assembly | 18. Aft Cabin Registers and Air Valves |
| 3. Control Box | 19. Aft Cabin Control Valves |
| 4. Fuel Pump | 20. Aft Cabin Control Valve |
| 5. Solenoid Valve | 21. Aft Cabin Register Controls |
| 6. Fuel Filter | 22. Aft Cabin Heater Outlet Control |
| 7. Lockout Relay | 23. Thermostat |
| 8. Fuel Pressure Regulator | 24. Pilot and Copilot Heat Registers and Air Valves |
| 9. Cycling Switch 250°F | 25. Pilot and Copilot Heat Outlet Control |
| 10. Overheat Switch 350°F | 26. Foot Warmer Control |
| 11. Purge Switch 115°F | 27. Foot Warmer Control Valve |
| 12. Air Pressure Switch | 28. Lower Defroster Nozzles |
| 13. Air Blower | 29. Lower Defroster Control Valve |
| 14. Vent Blower | 30. Lower Defroster Control |
| 15. Air Screens | 31. Windshield Defroster Nozzles |
| 16. Recirculating Air Control | 32. Heating Control Panel |

204070-64-2

Figure 11-1. Heater and defroster installation — UH-1A (Sheet 2 of 2)

b. Remove igniter plug lead from heater ignition assembly, and cover wire end with insulating tape.

c. Unscrew igniter plug from igniter plug housing and remove igniter plug and gasket.

11-6. Cleaning — Combustion Heater Igniter Plug. Remove all grease and carbon deposits from igniter plug well and housing and spring connector that seats in the igniter plug well.

11-7. Inspection — Combustion Heater Igniter Plug. a. Inspect igniter plug for evidence of cracked or broken porcelain, arcing or carbon tracks inside the well of the igniter plug.

Note

Arcing or carbon tracks may be caused by shorting of the igniter plug, or by dirt on the spring connector that seats in the well of the igniter plug. Correct fault before reinstalling or replacing igniter plug.

b. Inspect gasket for evidence of improper seating.

11-8. Repair or Replacement — Combustion Heater Igniter Plug. a. If cracks are found in igniter plug, replace plug.

b. If gasket shows evidence of damage or improper seating, replacement is required.

11-9. Installation — Combustion Heater Igniter Plug. a. Screw gasket and igniter plug into igniter plug housing.

b. Remove insulating tape from wire end and connect igniter plug lead to heater ignition assembly.

c. Check operation of heater. (Refer to TM 55-1520-211-10.)

11-10. Combustion Heater Ignition Assembly. (See figure 11-1.) The heater igniter coil converts 28 volt DC current to high voltage oscillating current capable of producing a continuous spark at a gap in the combustion head.

11-11. Trouble Shooting — Combustion Heater Ignition Assembly. The indication of trouble, probable cause and corrective action for the ignition assembly is as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
No spark	No power at input terminal	Check power circuit, wires, switches and fuses and close circuit
	Faulty vibrator	Change to reserve contacts, or, if this has already been done, install new vibrator
	Faulty igniter plug	Install new igniter plug
	Faulty shielded lead	Repair or replace lead
	Worn ground electrode	Replace electrode

11-12. Removal — Combustion Heater Ignition Assembly. a. Make sure battery switch is in "OFF" position.

b. Remove igniter plug lead and electrical receptacle from ignition assembly. Cover wire ends with insulating tape.

c. Remove nuts and washers from attachment clamps and lift ignition assembly from heater.

11-13. Installation — Combustion Heater Ignition Assembly. a. Position ignition assembly in attachment clamps and install nuts and washers.

b. Remove insulating tape from wire ends and install electrical receptacle plug lead.

c. Check heater for operation.

11-14. Combustion Heater Fuel Control Box.

(See figure 11-1.) The fuel control box assembly (3) is located in the aft, right-hand side of the heater compartment. The function of this control box is to monitor the flow of filtered fuel from the engine fuel system to the heater combustion chamber.

11-15. Removal — Combustion Heater Fuel Control Box. a. Make sure battery switch is in "OFF" position.

b. Disconnect and cap all tube assemblies entering the control box.

c. Remove eight screws and washers attaching cover to control box and remove cover.

d. Remove screws, washers and nuts attaching wiring assembly to control box, and disconnect wiring assembly. Remove wiring assembly from control box, and cover wire ends with insulating tape.

e. Remove screw, washers and nut attaching electrical jumper to top of control box.

f. Remove four screws and washers attaching control box to structure, and remove control box assembly.

11-16. Installation — Combustion Heater Fuel Control Box. a. Position control box assembly against structure in the aft, right-hand side of the heater compartment and attach with four washers and screws.

b. Attach electrical jumper to top of control box with nut, washers and screw.

c. Remove insulating tape from wire ends and connect wiring assembly and attach to control box with nuts, washers and screws.

d. Position cover on control box and attach with eight washers and screws.

e. Uncap and connect all tube assemblies.

f. Check heater for operation. (Refer to TM 55-1520-211-10.)

11-17. Cabin Heater Control Box Fuel Pump. (See figure 11-1.) The heater control box fuel pump (4) supplies fuel to the heater from the engine fuel system. It also increases fuel pressure to the combustion heater.

11-18. Removal — Cabin Heater Control Box Fuel Pump. a. Make sure battery switch is in "OFF" position.

b. Remove eight screws and washers attaching cover to control box and remove cover

c. Disconnect electrical connections from solenoid valve and fuel pump, and cover wire ends with insulating tape.

d. Remove fuel lines and fittings from fuel pump and cap fuel line openings.

e. Remove three mounting screws and washers from the fuel pump, and remove the fuel pump from the control box.

11-19. Installation — Cabin Heater Control Box Fuel Pump. a. Position fuel pump in control box and attach with three washers and screws.

b. Uncap and install fuel lines and fittings.

c. Remove insulating tape from wire ends and connect electrical wiring to fuel pump and solenoid valve.

d. Position cover on control box and attach with eight washers and screws.

e. Check heater for operation. (Refer to TM 55-1520-211-10.)

11-20. Cabin Heater Control Box Solenoid Valve. (See figure 11-1.) This electrically-operated fuel shut-off solenoid valve (5) governs the flow of fuel to the heater combustion chamber.

11-21. Removal — Cabin Heater Control Box Solenoid Valve. a. Make sure battery switch is in "OFF" position.

b. Remove eight screws and washers attaching cover to control box, and remove cover.

c. Disconnect electrical wiring from solenoid valve, and cover wire ends with insulating tape.

d. Remove fuel lines from both ends of the solenoid valve, together with the lock-nut holding the solenoid union to the side of the control box. Cap fuel line openings.

e. Remove the solenoid valve from the control box, and remove the union and gasket from each end of the solenoid valve.

11-22. Installation — Cabin Heater Control Box Solenoid Valve. a. Install gasket and union on each end of the solenoid valve.

Note

The bulkhead union is to be located on the inlet end of the solenoid valve.

b. Position the solenoid valve in the control box with the bulkhead fitting extending out through the side of the control box. Install lock-nut on the portion of the bulkhead fitting which is outside the control box.

c. Uncap and install fuel lines to solenoid valve.

d. Remove insulating tape from wire ends and connect electrical wiring to solenoid valve.

e. Position cover on control box and attach with eight washers and screws.

f. Check heater for operation. (Refer to TM 55-1520-211-10.)

11-23. Cabin Heater Control Box Fuel Filter. (See figure 11-1.) Fuel is filtered through a ten micron screen fuel filter (6) which has a four gallon per hour capacity at 60 psi minimum.

11-24. Removal — Cabin Heater Control Fuel Filter. a. Make sure battery switch is in "OFF" position.

b. Remove eight screws and washers attaching cover to control box, and remove cover.

c. Disconnect fuel lines from filter and cap fuel line openings.

d. Remove screws, washers, spacers and nuts attaching fuel filter to control box, and remove filter from control box.

e. Remove elbows and gaskets from fuel filter ports.

11-25. Installation — Cabin Heater Control Box Fuel Filter. a. Install gaskets and elbows in fuel filter ports.

b. Position fuel filter in control box assembly, and attach with nuts, spacers, washers and screws.

c. Uncap and connect fuel lines to fuel filter.

d. Position cover on control box and attach with eight washers and screws.

e. Check heater for operation. (Refer to TM 55-1520-211-10.)

11-26. Cabin Heater Control Box Lock Out Relay. (See figure 11-1.) The heater lockout relay (7) shuts off the heater in case of overheating or when air pressure is too low to sustain combustion.

11-27. Removal — Cabin Heater Control Box Lock-out Relay. a. Make sure battery switch is in "OFF" position.

b. Remove eight screws and washers attaching cover to control box, and remove cover.

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

d. Remove mounting screws, washers and nuts from relay, and remove the relay from the control box.

11-28. Installation — Cabin Heater Control Box Lockout Relay. a. Position relay in the control box and install mounting nuts, washers and screws.

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

c. Position cover on control box and attach with eight washers and screws.

11-29. Cabin Heater Control Box Fuel Pressure Regulator. (See figure 11-1.) The fuel pressure regulator (8) has a minimum capacity of four gallons per hour. Inlet pressure is from 1 to 15 psi. Outlet pressure is one psi.

11-30. Removal — Cabin Heater Control Fuel Pressure Regulator. a. Make sure battery switch is on "OFF" position.

b. Remove eight screws and washers attaching cover to control box, and remove cover.

c. Remove fuel lines from the pressure regulator, together with the lock-nut holding the regulator to the side of the control box. Cap fuel line openings.

d. Remove the pressure regulator from the control box, and remove the union and gasket from each port of the regulator.

11-31. Installation — Cabin Heater Control Box Fuel Pressure Regulator. a. Install gasket and union in each port of the regulator.

Note

The bulkhead union is to be located on the inlet side of the pressure regulator.

b. Position the pressure regulator in the control box with the bulkhead fitting extending out through the side of the control box. Install lock-nut on the portion of the bulkhead fitting which is outside the control box.

c. Uncap and install fuel lines to the pressure regulator.

d. Position cover on control box and attach with eight washers and screws.

e. Check heater for operation. (Refer to TM 55-1520-211-10.)

11-32. Combustion Heater 250°F Cycling Switch. (See figure 11-1.) The combustion heater cycling switch is located in the upper inboard part of the lower plenum.

11-33. Removal — Combustion Heater 250°F Cycling Switch. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical plug from top of cycling switch, and cover plug with insulating tape.

c. Remove three screws and washers attaching cycling switch to plenum, and remove switch from plenum.

11-34. Installation — Combustion Heater 250°F Cycling Switch. Install cycling switch as follows:

Note

The cycling switch is set at 250°F, plus or minus 6°F, normally closed. This switch closes on falling temperature.

a. Position cycling switch in plenum and install three attaching washers and screws.

b. Remove insulating tape from electrical plug, and connect plug to top of cycling switch.

11-35. Combustion Heater 350°F Overheat Switch. (See figure 11-1.) The combustion heater switch is located in the heater plenum. The purpose of this switch is to prevent damage to the heater assembly from excessively high heat.

11-36. Removal — Combustion Heater 350°F Overheat Switch. a. Make sure the battery switch is in "OFF" position.

b. Disconnect electrical plug from top of overheat switch, and cover plug with insulating tape.

c. Remove three screws and washers attaching overheat switch to plenum, and remove switch from plenum.

11-37. Installation — Combustion Heater 350°F Overheat Switch. Install overheat switch as follows:

Note

The overheat switch is set at 350°F, plus or minus 6°F, normally closed. This switch closes on falling temperature.

a. Position overheat switch in plenum and install three attaching washers and screws.

b. Remove insulating tape from electrical plug, and connect plug to top of overheat switch.

11-38. Combustion Heater 115°F Purge Switch. (See figure 11-1.) The combustion heater purge switch (11) is located in the heater plenum. The purpose of this switch is

to keep both the combustion air blower and the heater vent blower in operation for a sufficient period of time after shutdown of the heater assembly to prevent damage to the combustion heater.

11-39. Removal — Combustion Heater 115°F Purge Switch. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical plug from top of purge switch, and cover plug with insulating tape.

c. Remove three screws and washers attaching purge switch to plenum, and remove switch from plenum.

11-40. Installation — Combustion Heater 115°F Purge Switch. Install purge switch as follows:

Note

The purge switch is set at 115°F, plus or minus 6°F, normally open. This switch closes on rising temperature.

a. Position purge switch in plenum and install three attaching washers and screws.

b. Remove insulating tape from electrical plug, and connect plug to top of purge switch.

11-41. Combustion Heater Air Pressure Switch. (See figure 11-1.) The heater air pressure switch (12) is mounted in the upper aft corner of the heater compartment. It is operated by the air pressure in the heater system.

11-42. Removal — Combustion Heater Air Pressure Switch. a. Make sure battery switch is in "OFF" position.

b. Disconnect flexible hose and electrical plug from air pressure switch. Cap hose opening and cover plug with insulating tape.

c. Remove mounting screws, spacers, washers, and nuts and lift air pressure switch from mounting bracket.

11-43. Installation — Combustion Heater Air Pressure Switch. a. Position air pressure switch on mounting bracket and install nuts, washers, spacers and screws.

b. Uncap flexible hose opening and remove insulating tape from electrical plug. Connect hose and plug to air pressure switch.

11-44. Combustion Heater Air Blower. (See figure 11-1.) The combustion heater air blower (13) is mounted on the forward bulkhead of the heater compartment, and supports combustion by forcing outside air into the combustion chamber.

11-45. Removal — Combustion Heater Air Blower. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical plug from air blower and cover plug with insulating tape.

c. Remove screws, washers and nuts attaching air blower to adapter.

d. Loosen clamps on support assemblies and remove air blower and adapter gasket.

e. Remove screws, washers and nuts attaching screen assembly to air blower and remove screen assembly from blower.

11-46. Inspection — Combustion Heater Air Blower. Inspect adapter gasket for damage and serviceability.

11-47. Repair or Replacement — Combustion Heater Air Blower. Replace adapter gasket if damaged or unserviceable.

11-48. Installation — Combustion Heater Air Blower. a. Position screen assembly on air blower and attach with nuts, washers and screws.

b. Place adapter gasket on air blower and position blower in support assembly clamps. Tighten clamps.

c. Install nuts, washers and screws which attach the air blower to the adapter.

d. Remove insulating tape from electrical plug and connect plug to air blower.

11-49. Combustion Heater Vent Blower. (See figure 11-1.) The combustion heater vent blower (14) is located in the forward section of the heater assembly just below the top crossover duct. This blower circulates air across the heated portion of the heater assembly and forces it into the cabin passenger area.

11-50. Removal — Combustion Heater Vent Blower. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical plug from vent blower and cover plug with insulating tape.

c. Remove clamp and V-band from cross over duct, and remove duct and gasket.

d. Remove screws, washers and nuts attaching vent blower to fresh air hose adapter and remove blower and adapter gasket.

11-51. Inspection — Combustion Heater Vent Blower. Inspect blower to adapter, and blower to cross over duct gaskets for damage and serviceability.

11-52. Repair or Replacement — Combustion Heater Vent Blower. Replace gaskets if damaged or unserviceable.

11-53. Installation — Combustion Heater Vent Blower. a. Position adapter gasket on fresh air hose adapter, and vent blower in heater and on adapter. Align holes and install mounting nuts, washers and screws.

b. Position cross over duct gasket and cross over duct. Install attaching clamp and V band.

c. Remove insulating tape from electrical plug and connect plug to vent blower.

11-54. Fresh and Recirculating Air Screens. (See figure 11-1.) These air screens (15) are located in the forward portion of the air intake duct, and remove foreign material from air being taken into the combustion heater.

11-55. Removal — Fresh and Recirculating Air Screens. Remove attaching screws and washers, and remove screens.

11-56. Installation — Fresh and Recirculating Air Screens. Position screens, and attach with washers and screws.

11-57. Recirculating Air Control. (See figure 11-1.) The recirculating air control head (16) is mounted on the heater controls panel located between, and in front of, the pilot's and copilot's seats.

11-58. Removal — Recirculating Air Control. a. Disconnect swivel from control valve and remove swivel from end of cable.

b. Remove screws, washers, nuts, clamps, brackets and grommets which attach cable assembly.

c. Back off nut which attaches control assembly head, and remove control assembly from the helicopter.

11-59. Installation — Recirculating Air Control. a. Position control assembly and tighten nut attaching control assembly head.

b. Route and position cable, progressively installing grommets, brackets, clamps, nuts, washers and screws.

c. Install control cable swivel to end of control cable and connect swivel to control valve.

11-60. Heated Air 75°F Cycling Switch. (See figure 11-1.) UH-1A helicopters Serial No. 59-1607 and subsequent are equipped with a heated air cycling switch (17) located in the heated air duct elbow adjacent to the fresh air intake.

11-61. Removal — Heated Air 75°F Cycling Switch. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical plug from top of switch, and cover plug with insulating tape.

c. Remove three screws and washers attaching switch to elbow, and remove switch from elbow.

11-62. Installation — Heated Air 75°F Cycling Switch. a. Position switch in elbow and install three attaching washers and screws.

b. Remove insulating tape from electrical plug, and connect plug to top of switch.

11-63. Aft Cabin Register. (See figure 11-1.) The aft cabin registers (18), used on UH-1A helicopters Serial Nos. 58-2078 through 58-3047, are located just aft of the pilot's and copilot's seats and distribute heated air to the aft cabin area.

11-64. Removal — Aft Cabin Registers. a. Remove three screws and washers attaching register, and remove register.

b. Remove screws, studs, washers and nuts attaching frame and diffuser to register. Remove frame and diffuser.

c. Remove screen assembly from register duct.

11-65. Installation — Aft Cabin Registers. a. Position screen assembly on register duct.

b. Position frame and diffuser on screen assembly. Align holes and install nuts, washers, studs and screws.

c. Position register and install three attaching washers and screws.

11-66. Aft Cabin Air Valves. (See figure 11-1.) The aft cabin air valves (18), used on UH-1A helicopters Serial No. 59-1607 and subsequent, are located just aft of the pilot's and copilot's seats and distribute heated air to the aft cabin area.

11-67. Removal — Aft Cabin Air Valves. Remove screws and washers attaching air valves, and remove valves.

11-68. Installation — Air Valves. Position air valves, and install attaching washers and screws.

11-69. Aft Cabin Heat Control Valve. (See figure 11-1.) UH-1A helicopters Serial Nos. 58-2078 through 58-2083 have a manually operated heat control valve (19) located beneath each of the aft cabin registers.

11-70. Removal — Aft Cabin Heat Control Valve. a. Remove aft cabin registers. (Refer to paragraph 11-64.)

b. Disconnect control cable swivel from control valve lever.

c. Remove control valve and gaskets.

11-71. Inspection — Aft Cabin Heat Control Valve. Inspect gaskets for damage and serviceability.

11-72. Repair or Replacement — Aft Cabin Heat Control Valve. Replace gaskets if damaged or unserviceable.

11-73. Installation — Aft Cabin Heat Control Valve. a. Position gaskets and control valve and align mounting holes.

b. Install aft cabin registers. (Refer to paragraph 11-65.)

c. Connect control cable swivel to control lever of valve.

11-74. Aft Cabin Heat Control Valve. (See figure 11-1.) UH-1A helicopters Serial No. 58-2084 and subsequent have a single manually operated heat control valve (20), located at the T duct, which distributes heated air to the aft cabin registers or air valves.

11-75. Removal — Aft Cabin Heat Control Valve. a. Disconnect control cable swivel from control lever of valve.

b. Remove screws, washers, nuts and clamps attaching T duct to aft register (or air valve) ducts.

c. Remove five screws and washers attaching T duct to control valve, and remove T duct.

d. Remove control valve and gaskets.

11-76. Inspection — Aft Cabin Heat Control Valve. Inspect gaskets for damage and serviceability.

11-77. Repair and Replacement — Aft Cabin Heat Control Valve. Replace gasket if damaged or unserviceable.

11-78. Installation — Aft Cabin Heat Control Valve. a. Position gaskets and control valve and align mounting holes.

b. Position T duct on control valve and install five attaching washers and screws.

c. Attach T duct to aft register (or air valve) ducts with clamps, nuts, washers and screws.

d. Connect control cable swivel to control lever of valve.

11-79. Aft Cabin Register Controls. (See figure 11-1.) UH-1A helicopters Serial Nos. 58-2078 through 58-2083 are equipped with two manually operated, cable type, aft cabin register controls (21). Control knobs are located between, and beside, the pilot's and copilot's seats.

11-80. Removal — Aft Cabin Register Controls. a. Disconnect swivel from control valve and remove swivel from end of cable.

b. Remove screws, washers, nuts, clamps, brackets and grommets which attach cable assembly.

c. Back off nut which attaches control assembly head, and remove control assembly from the helicopter.

11-81. Installation — Aft Cabin Register Controls. a. Position control head and tighten mounting nut.

b. Route and position cable assembly, progressively installing grommets, brackets, clamps, nuts, washers and screws.

c. Attach swivel to end of cable and connect swivel to control valve.

11-82. Aft Cabin Heater Outlet Control. (See figure 11-1.) UH-1A helicopters Serial No. 58-2084 and subsequent are equipped with a single manually operated, cable type, heat outlet valve control (22). The control knob is located between the pilot's and copilot's seats, to the left of the main windshield defroster nozzle duct.

11-83. Removal — Aft Cabin Heater Outlet Control. a. Disconnect swivel from control valve and remove swivel from end of cable assembly.

b. Remove screws, washers, nuts, clamps, brackets and grommets which attach cable assembly.

c. Back off nut which attaches control assembly head, and remove control assembly from the helicopter.

11-84. Installation — Aft Cabin Heater Outlet Control. a. Position control head and tighten mounting nut.

b. Route and position cable, progressively installing grommets, brackets, clamps, nuts, washers and screws.

c. Attach swivel to end of cable and connect swivel to control valve.

11-85. Cabin Thermostat. (See figure 11-1.) An electrical thermostat (23) with a control range of 30°F to 90°F, is located near the top of the right-hand door pillar post between the crew and passenger areas of the cabin.

11-86. Removal — Cabin Thermostat. a. Make sure battery switch is in the "OFF" position.

b. Disconnect electrical plug from thermostat and cover plug with insulating tape.

c. Remove attaching screws and washers and remove thermostat.

11-87. Installation — Cabin Thermostat. a. Position thermostat and attach with washers and screws.

b. Remove insulating tape from electrical plug and connect plug to thermostat.

11-88. Pilot and Copilot Heat Registers. (See figure 11-1.) The pilot and copilot heat registers, (24) used on UH-1A helicopters Serial Nos. 58-2078 through 58-3047, are located between the pilot and copilot in the forward part of the cabin.

11-89. Removal — Pilot and Copilot Heat Registers. Remove two screws, washers and nuts attaching register to duct and remove register.

11-90. Installation — Pilot and Copilot Heat Registers. Position register in duct and install two nuts, washers and screws.

11-91. Pilot and Copilot Heat Air Valves (See figure 11-1.) The pilot and copilot air valves (24) used on UH-1A helicopters Serial No. 59-1607 and subsequent, are located between the pilot and copilot in the forward part of the cabin.

11-92. Removal — Pilot and Copilot Heat Air Valves. Remove screws and washers attaching air valves, and remove valves.

11-93. Installation — Pilot and Copilot Heat Air Valves. Position air valves, and install attaching washers and screws.

11-94. Pilot and Copilot Heat Outlet Control (See figure 11-1.) The pilot and copilot heat outlet control (25) is mounted on the heater controls panel located between, and in front of, the pilot's and copilot's seats.

11-95. Removal — Pilot and Copilot Heat Outlet Control. a. Disconnect swivel from flapper arm lever and remove swivel from end of cable.

b. Remove screw, washer, spacer, nut and clamp attaching cable assembly.

c. Back off nut which attaches control assembly head, and remove control assembly.

11-96. Installation — Pilot and Copilot Heat Outlet Control. a. Position control head and tighten mounting nut.

b. Route cable and install attaching clamp, nut, spacer, washer and screw.

c. Attach swivel to end of cable and connect swivel to flapper arm lever.

11-97. Copilot Foot Warmer Control. (See figure 11-1.) The copilot foot warmer control (26) is mounted just to the left of the control panel assembly.

11-98. Removal — Copilot Foot Warmer Control. a. Remove cotter pins, washers and pins connecting control rod to handle and to control valve, and remove rod.

b. Remove screw, washer, spacer and nut attaching handle, and remove handle.

11-99. Installation — Copilot Foot Warmer Control. a. Position control handle and attach with nut, spacer, washer and screw.

b. Position control rod and attach to control valve and handle with pins, washers and cotter pins.

11-100. Copilot Foot Warmer Control Valve (See figure 11-1.) The copilot foot warmer control valve (27) is located directly below the control handle and regulates the flow of warmed air to the foot warmer outlet.

11-101. Removal — Copilot Foot Warmer Control Valve. a. Disconnect control rod from valve.

b. Remove three screws, washers and nuts attaching control valve to duct flanges, and remove valve from between ducts.

11-102. Installation — Copilot Foot Warmer Control Valve. a. Position control valve between ducts and install three nuts, washers and screws.

b. Connect control rod to valve.

11-103. Right-Hand Lower Defroster Nozzle. (See figure 11-1.) The lower defroster nozzle (28) is located in front of the pilot's position, and directs warmed air against the lower, right-hand, window.

11-104. Removal — Right Hand Lower Defroster Nozzle. a. On UH-1A helicopters Serial Nos. 58-2078 through 58-3047 remove screws, washers and nuts attaching nozzle angles to structure.

b. Remove screw, washer, nut and clamp attaching nozzle to elbow, and remove nozzle.

11-105. Installation — Right-Hand Lower Defroster Nozzle. a. Position nozzle on elbow and install attaching clamp, nut, washer and screw.

b. On UH-1A helicopters Serial Nos. 58-2078 through 58-3047 install nuts, washers and screws attaching nozzle angles to structure.

11-106. Right-Hand Lower Defroster Control Valve. (See figure 11-1.) The control valve (29) for the right-hand lower defroster is located between the nozzle elbow and the T duct which carries warmed air to the nozzle.

11-107. Removal — Lower Defroster Control Valve. a. Remove defroster nozzle, (Refer to paragraph 11-104).

b. Disconnect control cable from control lever of valve.

c. Remove screws, washers and nuts attaching elbow, control valve and T duct.

d. Remove elbow, gaskets and control valve from T duct.

11-108. Inspection — Right-Hand Lower Defroster Control. Inspect gaskets for damage and serviceability.

11-109. Repair or Replacement Right Hand Lower Defroster Control. Replace gaskets if unserviceable.

11-110. Installation — Right-Hand Lower Defroster Control Valve. a. Position control valve, gaskets and elbow on T duct, align holes and install nuts, washers and screws.

b. Connect control cable to control lever of valve.

c. Install defroster nozzle, (Refer to paragraph 11-105).

11-111. Right-Hand Lower Defroster Control. The right-hand lower defroster control (30) is mounted to the right of the copilot foot warmer control, where it is readily accessible to the pilot.

11-112. Removal — Right-Hand Lower Defroster Control (UH-1A). a. Disconnect cable from control lever of valve and from control handle.

b. Remove screws, washers, brackets, clamps, nuts and grommets attaching control cable, and remove cable.

c. Remove screw, washer, spacer and nut attaching control handle, and remove handle.

11-113. Installation — Right-Hand Lower Defroster Control (UH-1A). a. Position control handle and install nut, spacer, washer and screw.

b. Connect control cable to handle.

c. Route control cable, and progressively install attaching grommets, clamps, brackets, nuts, washers and screws.

d. Connect control cable to control lever of valve.

11-114. Windshield Defroster Nozzles (UH-1A). (See figure 11-1.) The windshield defroster nozzles (31) are located just below, and aft of, the pilot's and copilot's windshields.

11-115. Removal — Windshield Defroster Nozzle (UH-1A). Remove bolts, washers and nuts attaching nozzle to duct, and remove nozzle.

11-116. Installation — Windshield Defroster Nozzle (UH-1A). Position nozzle on duct, and install attaching nuts, washers and bolts.

11-117. Heating Control Panel (UH-1A). (See figure 11-1.) The heating control panel (32) is located on the lower (forward), left-hand side of the overhead console panel and contains electrical switches necessary for the operation of the heater and defroster installation.

11-118. Removal — Heating Control Panel (UH-1A). a. Make sure battery switch is in "OFF" position.

b. Remove screws and washers attaching control panel to overhead console panel, and carefully disengage control panel from console.

c. Disconnect all electrical wiring from control panel and cover wire ends with insulating tape. Remove control panel.

11-119. Installation — Heating Control Panel (UH-1A). a. Remove insulating tape from wire ends and connect electrical wiring to control panel.

b. Position control panel in overhead console panel and install attaching washers and screws.

11-120. Bleed Air Heater and Defroster Installation (UH-1B Serial No. 60-3546 through 64-14191). (See figure 11-2.) The UH-1B bleed air heater and defroster installation is supplied heated air from the compressor section of the helicopter's engine. Heated air is conducted to the cabin heat, and windshield defroster outlets by means of various ducts and hoses. Controls, valves and switches are provided for the most efficient utilization of the system. The bleed air heater is used only as required. Its thermal output is regulated by controlling the amount of bleed air drawn from the engine. As bleed air is also utilized to drive other systems in addition to the bleed air heater, control of the amount of bleed air for the heater must be exercised under certain conditions. When used in conjunction with the Lycoming T53-L-5 engine, the bleed air heater shall not be used on take-off and, when used, shall be limited to one-half maximum above 85% nI. When used in conjunction with the Lycoming T53-L-9, T53-L-9A or T53-L-11 engine, the bleed air heater shall not be used above 90% nI, nor shall bleed air heater positions 2, 3 or 4 be used above 85% nI or when ambient temperature exceeds 50°F.

11-121. Bleed Air Selector Valve (UH-1B Serial No. 60-3546 through 64-14191). (See figure 11-2.) UH-1B helicopters Serial No. 60-3546 through 64-14191 are equipped with a five-position, electrically operated butterfly valve (1). This valve is located just aft of the forward engine firewall, and to the left of the engine. It is operated by a switch in the overhead console heater control panel.

11-122. Removal — Bleed Air Selector Valve (UH-1B Serial No. 60-3546 through 64-14191). a. Make sure battery switch is in "OFF" position.

b. Open engine cowl on left-hand side of engine compartment.

c. Disconnect electrical connection to valve solenoid and cover wire end with insulating tape.

d. Remove bolts and washers attaching valve bracket to aft side of engine firewall.

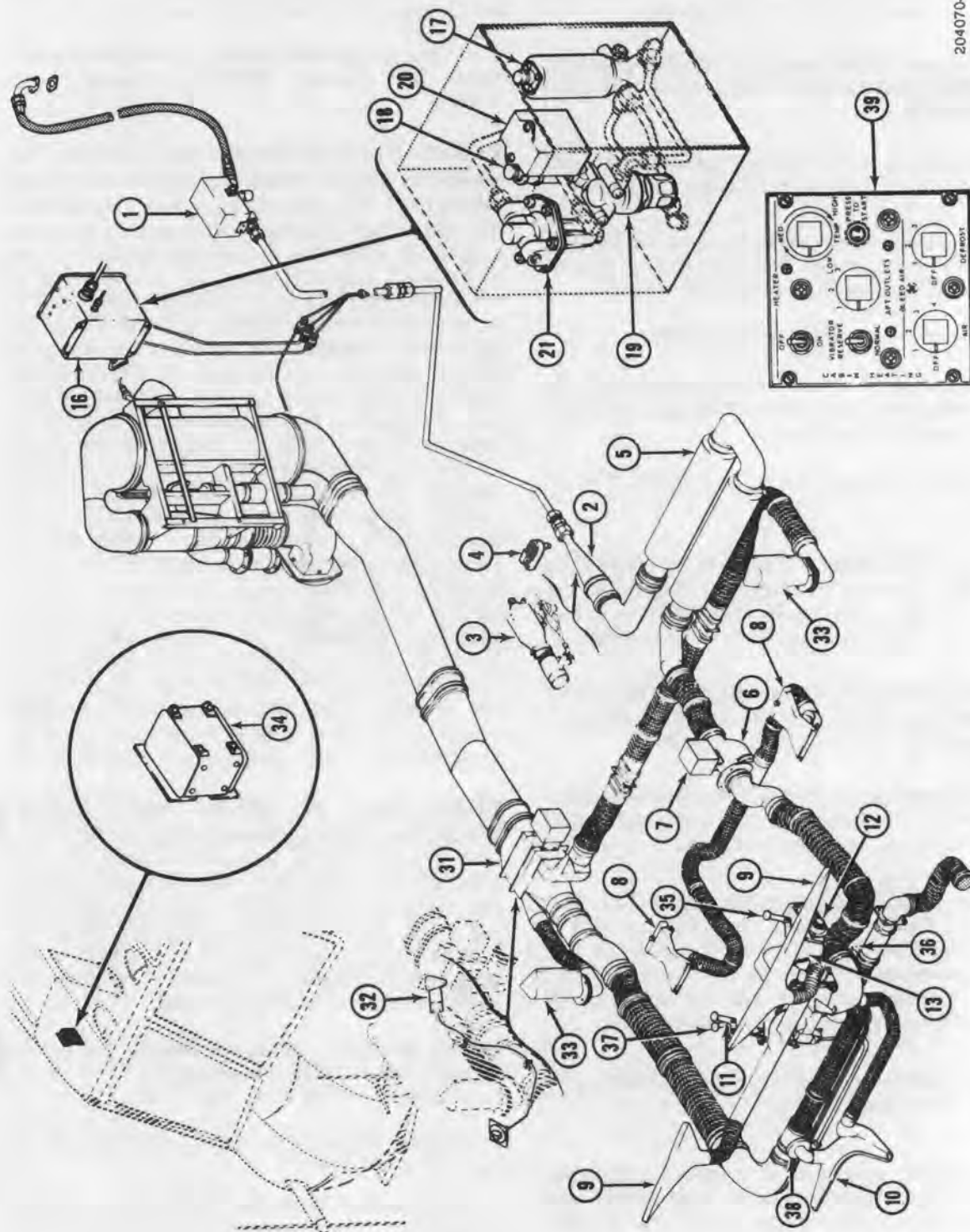
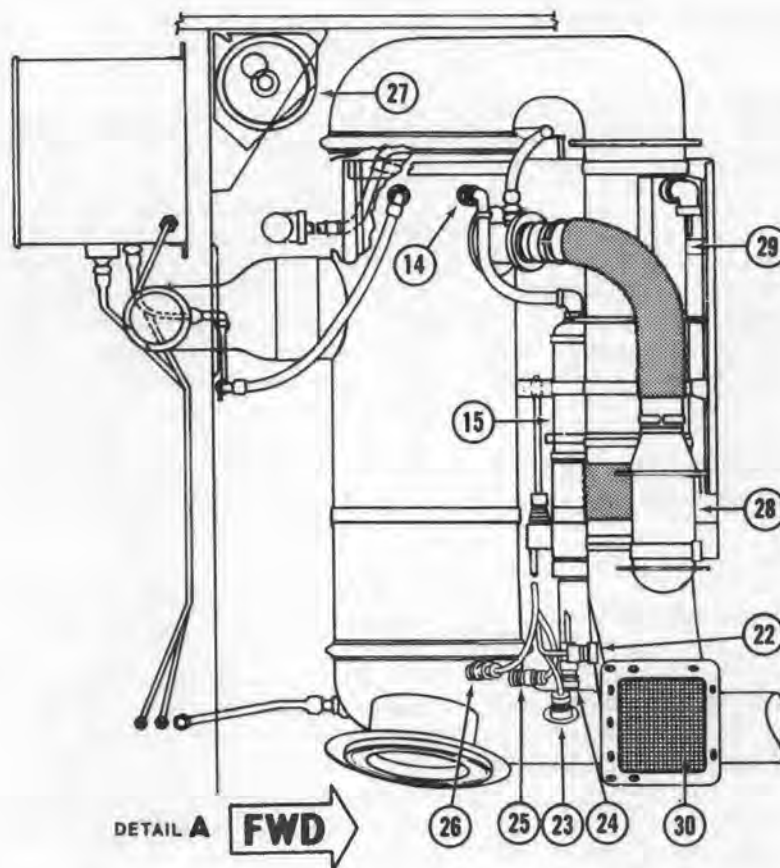


Figure 11-2. Typical heater and defroster installation UH-1B, serial no. 60-3546 thru 64-14191 (Sheet 1 of 2)



- | | |
|---|---|
| 1. Selector Valve | 21. Cabin Heater Control Box Fuel Pressure Regulator |
| 2. Venturi Assembly | 22. Fresh Air Sensing Element |
| 3. Hot Air Mixing Valve | 23. Hot Air Sensing Element |
| 4. Temperature Sensitive Element | 24. Combustion Heater Cycling Switch |
| 5. Noise Suppressors | 25. Combustion Heater Overheat Switch |
| 6. Bleed Air Four Way Control Valve | 26. Combustion Heater Purge Switch |
| 7. Four Way Control Valve Solenoid | 27. Combustion Heater Air Pressure Switch |
| 8. Cabin Floor Registers | 28. Combustion Heater Air Blower |
| 9. Windshield Defroster Nozzles | 29. Combustion Heater Vent Blower |
| 10. Right-hand Lower Defroster Nozzle | 30. Fresh Air Intake Screen |
| 11. Heating and Bleed Air Separator Valve Control | 31. Combustion Heat Selector Valve |
| 12. Pilot and Copilot Heat Air Valves | 32. Combustion Heat Selector Valve Control Dial and Cable |
| 13. Heating and Bleed Air Separator Valve | 33. Aft Cabin Air Valves |
| 14. Combustion Igniter Plug | 34. Combustion Heat Control Relay |
| 15. Combustion Heater Ignition Assembly | 35. Copilot Foot Warmer Control |
| 16. Combustion Heater Fuel Control Box | 36. Copilot Foot Warmer Control Valve |
| 17. Cabin Heater Control Box Fuel Pump | 37. Right-hand Lower Defroster Control |
| 18. Cabin Heater Control Box Solenoid Valve | 38. Right-hand Lower Defroster Control Valve |
| 19. Cabin Heater Control Box Fuel Filter | 39. Heating Control Panel |
| 20. Cabin Heater Control Box Lockout Relay | |

204070-65-2

Figure 11-2. Typical heater and defroster installation UH-1B, serial no. 60-3546 thru 64-14191 (Sheet 2 of 2)

Note

Bolt heads are on forward side of engine firewall.

e. Remove clamps attaching valve to tee and bulkhead fitting, and remove valve from bleed air line, together with the O-ring at each end of the valve.

11-123. Installation — Bleed Air Selector Valve.

a. Position O-ring on each end of selector valve, and position valve between tee and bulkhead fitting. Loosely install clamps attaching valve to tee and fitting. Connect valve to tee and bleed air line.

b. Install washers and bolts attaching valve bracket to aft side of engine firewall.

Note

Bolt heads are on forward side of engine firewall.

c. Tighten clamps attaching valve to tee and bulkhead fitting. Remove insulating tape from wire end and connect electrical wiring to valve solenoid.

d. Close engine cowl on left-hand side of engine compartment.

11-124. Bleed Air Venturi Assembly. (See figure 11-2.) On UH-1B helicopters, Serial Nos. 60-3546 through 60-3169, bleed air from the selector valve is conducted into the system by means of a venturi assembly (2) located under the aft cabin floor just forward of the aft cabin bulkhead.

11-125. Removal — Bleed Air Venturi Assembly.

a. Remove access plate from aft cabin floor.

b. Back off venturi assembly nut to disconnect venturi from bleed air inlet line.

c. Remove screw, washer, nut and clamp attaching venturi to outlet coupling and bracket, and remove venturi assembly.

11-126. Installation — Bleed Air Venturi Assembly.

a. Position venturi assembly between bleed air inlet line and outlet coupling, and attach to coupling by installing clamp, nut, washer and screw.

b. Connect venturi assembly to bleed air inlet line.

c. Install access plate in aft cabin floor.

11-127. Hot Air Mixing Valve. (See figure 11-2.) UH-1B helicopters, Serial No. 61-686 and subsequent, are equipped with a hot air mixing valve (3) located under the aft cabin floor just forward of the aft cabin bulkhead. This valve controls the temperature of cabin heating and defrosting air by mixing bleed air from the engine compressor section with outside air. The bleed air acts as the power source to operate the valve and control the intake of outside air. The outside air inlet butterfly valve is fully closed at, or below, a mixed air temperature of 180°F, plus or minus 5°F, and is fully open at, or above, a mixed air temperature of 220°F, plus or minus 5°F.

11-128. Removal — Hot Air Mixing Valve. a. Remove access plate from aft cabin floor.

b. Remove screws, washers, nuts and clamps attaching mixing valve assembly to support bracket and output duct assembly.

c. Back off nut and washer attaching mixing valve assembly to support bracket and output duct assembly.

c. Back off nut and washer attaching mixing valve assembly to bleed air inlet line, and remove valve assembly.

d. Remove screws and washers attaching screen assembly to valve, and remove screen assembly from valve.

11-129. Installation — Hot Air Mixing Valve. a. Position screen assembly on mixing valve and install attaching washers and screws.

b. Position valve assembly between bleed air inlet line and output duct assembly and attach to bleed air inlet line with washer and nut.

c. Attach valve assembly to output duct assembly with clamps, nut, washers and screws.

d. Install access plate in aft cabin floor.

11-130. Temperature Sensitive Element (See figure 11-2.) UH-1B helicopters, Serial Nos. 60-3546 through 61-803, are equipped with a temperature sensitive element (4) located on

the back of the aft cabin bulkhead in the engine compartment.

11-131. Removal — Temperature. Sensitive Element. a. Make sure battery switch is on "OFF" position.

b. Open engine cowl on left side of engine compartment.

c. Disconnect electrical connection on element and cover wire ends with insulating tape.

d. Remove screws and washers attaching element to support, and remove element.

11-132. Installation — Temperature. Sensitive Element. a. Position element on support and install washers and screws.

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

c. Close engine cowl.

11-133. Noise Suppressors. (See figure 11-2.) Two in-line, straight-through noise suppressors (5) are located between the venturi assembly, or selector valve, and the under seat outlet valve.

11-134. Removal — Noise Suppressors. Remove screws, washers, spacers, nuts, clamps and brackets attaching noise suppressors to flexible ducts, and remove noise suppressors.

11-135. Installation — Noise Suppressors. Position noise suppressors on flexible ducts, and install attaching brackets, clamps, nuts, spacers, washers and screws.

11-136. Bleed Air Four Way Control Valve. (See figure 11-2.) The solenoid operated, four way control valve (6) is located between the floor registers, and directs heated air to either the defroster nozzles or the cabin floor registers. It is operated by a switch in the overhead console heater control panel.

11-137. Removal — Bleed Air Four Way Control Valve. a. Make sure battery switch is in "OFF" position.

b. Remove access panel in bottom outside skin.

c. Disconnect electrical plug from solenoid, and cover plug with insulating tape.

d. Remove screws, washers, nuts and clamps attaching control valve, and remove valve from helicopter.

11-138. Installation — Bleed Air Four Way Control Valve. a. Position control valve in helicopter and install attaching clamps, nuts, washers and screws.

b. Remove insulating tape from electrical plug, and connect plug to solenoid.

c. Install access panel in bottom outside skin.

11-139. Four Way Control Valve Solenoid. (See figure 11-2.) The four way control valve solenoid (7) is mounted on top of the valve.

11-140. Removal — Four Way Control Valve Solenoid. a. Remove four way control valve. (Refer to paragraph 11-137.)

b. Remove bolts and washers which attach solenoid to mount on top of valve housing, and remove solenoid from valve.

11-141. Installation — Four Way Control Valve Solenoid. Install control valve solenoid as follows:

Note

Energized solenoid must be in starting, or neutral, position prior to attaching shaft to adapter. In neutral position the flats of the solenoid shaft are at right angles to center line of the solenoid, and should be at right angles to the adjoining flapper in the top duct.

a. Position solenoid on valve housing mount with shaft entering into flapper shaft adapter.

b. Align mounting holes of solenoid and install washers and bolts.

c. Install four way control valve. (Refer to paragraph 11-138.)

11-142. Cabin Floor Registers. (See figure 11-2.) The cabin floor registers (8) are located beneath the pilot's and copilot's seats and distribute heated air to the forward and aft sections of the cabin.

11-143. Removal — Cabin Floor Registers. Remove attaching screws, washers and nuts, and remove registers.

11-144. Installation — Cabin Floor Registers. Position registers and install attaching nuts, washers and screws.

11-145. Windshield Defroster Nozzles. (See Figure 11-2.) (Refer to paragraph 11-114.)

11-146. Removal — Windshield Defroster Nozzle. (Refer to paragraph 11-115.)

11-147. Installation — Windshield Defroster Nozzle. (Refer to paragraph 11-116.)

11-148. Right-Hand Lower Defroster Nozzle. (See figure 11-2.) The lower defroster nozzle (10) is located in front of the pilot's position, and directs heated air against the lower, right-hand window.

11-149. Removal — Right-Hand Lower Defroster Nozzle. Remove screws, washers, spacers, nuts, clamps and brackets attaching nozzle to ducts and removed nozzle.

11-150. Installation — Right-Hand Lower Defroster Nozzle. Position nozzle on ducts and install attaching brackets, clamps, nuts, spacers, washers and screws.

11-151. Heating and Bleed Air Separator Valve Control. (See figure 11-2.) The handle of the heating and bleed air separator valve control (11) is located on the right-hand side of the instrument pedestal, and must be in the aft detent to be able to operate on bleed air.

11-152. Removal — Heating and Bleed Air Separator Valve Control. a. Remove pins and washer from each end of control rod, and remove rod.

b. Remove cotter pin, nut, washers and bolt attaching control handle, and remove handle.

11-153. Installation — Heating and Bleed Air Separator Valve Control. a. Position control handle and attach with bolt, washers, nut and cotter pin.

b. Position control rod and attach each end with washer and pins.

11-154. Pilot and Copilot Heat Air Valves. (See figure 11-2.) The pilot and copilot air

valves (12) are located in the forward part of the cabin.

11-155. Removal — Pilot and Copilot Heat Air Valves. (Refer to paragraph 11-92.)

11-156. Installation — Pilot and Copilot Heat Air Valves. (Refer to paragraph 11-93.)

11-157. Heating and Bleed Air Separator Valve. (See figure 11-2.) The heating and bleed air separator valve (13) is located in the lower forward portion of the instrument pedestal, and controls heated air for both the pilot's and copilot's upper windshield, as well as the pilot's lower panel defroster outlet. Separator valves on UH-1B helicopters Serial Nos. 60-3546 through 61-803 have two micro switches on the right-hand side of the valve. On UH-1B helicopters Serial No. 62-1872 through 64-14191, these switches are located on the right-hand side of the instrument pedestal. The upper micro-switch must be actuated to turn on the five position selector valve located near the engine. If the bleed air is on and this micro switch is de-energized the five position valve will rotate to the off position. The lower of these two micro switches is used with the auxiliary combustion heat system and actuates the door post outlet control valve. The function of the separator control valve is to prevent the mixing of high pressure bleed air with low pressure combustion air.

11-158. Removal — Heating and Bleed Air Separator Valve. a. Make sure battery switch is in "OFF" position.

b. Remove instrument pedestal access doors.

c. Disconnect wiring from micro switches and cover wire ends with insulating tape.

d. Remove micro switches as follows:

1. On UH-1B helicopters Serial Nos. 60-3546 through 61-803 back off the check nuts attaching the micro switches to the support assembly and remove the switches.

2. On UH-1B helicopters Serial No. 62-1872 through 64-14191 remove the screws, washers and nuts attaching the micro switches to the brackets and remove the switches.

e. Remove cotter pin, washer and pin attaching lower end of control rod to separator valve.

f. Remove four screws, washers and nuts attaching air valves and duct combination to separator valve and support bracket. Remove valves and duct combination and gasket.

g. Remove three screws, washers and nuts attaching forward part of separator valve to instrument pedestal.

h. Remove screws, washers, spacers, nuts and clamps attaching ducts and hoses to separator valve and remove valve.

11-159. Inspection — Heating and Bleed Air Separator Valve. Inspect gasket for damage and serviceability.

11-160. Repair or Replacement — Heating and Bleed Air Separator Valve. Replace gasket if damaged or unserviceable.

11-161. Installation — Heating and Bleed Air Separator Valve. a. Position separator valve and attach ducts and hoses with clamps, nuts, spacers, washers and screws.

b. Attach forward part of separator valve to instrument panel with three nuts, washers and screws.

c. Position gasket and air valves and duct combination on aft part of separator valve and support bracket and install four attaching nuts, washers and screws.

d. Attach lower end of control rod to separator valve with pin, washer and cotter pin.

e. Install micro switches as follows:

Note

Adjust the bleed air micro switch (upper switch) to indicate when the flappers are fully closed. This will give a maximum over travel of 0.03 inch. Adjust the aft outlet micro switch (lower switch) to indicate when the flappers are fully open. This will give a maximum over travel of 0.12 inch.

1. On UH-1B helicopters Serial Nos. 60-3546 through 61-803 position the micro switches in the support assembly and tighten attaching check nuts.

2. On UH-1B helicopters Serial No. 62-1872 through 64-14191 position the micro switches

on the brackets and install the attaching nuts, washers and screws.

f. Remove insulating tape from wire ends and connect wiring to micro switches.

g. Install instrument pedestal access doors.

11-162. Auxiliary Heater and Defroster Installation—UH-1A. (See figure 11-1.) The UH-1A auxiliary heater and defrosters installation differs from the standard UH-1A combustion heater and defroster installation in that the BTU output of the heater has been increased from 50,000 BTU to 1000,000 BTU. For organizational maintenance purposes the instructions contained in paragraphs 11-3 through 11-116 may be considered as applicable to the UH-1A auxiliary heater and defroster installation.

11-163. Auxiliary Heater and Defroster Installation — UH-1B Serial No. 60-3546 through 64-14191. (See figure 11-2) UH-1B helicopters may be equipped with an auxiliary heater and defroster installation. (See Figure 11-2), which permits use of a combination of bleed air heat and combustion heat for heating; bleed air heat for defrosting and combustion heat for heating, or combustion heat for defrosting only. This installation consists of a combustion type burner, electrically powered blower, plenum chamber and ducting, registers and nozzles to the cabin area. Fuel for the combustion air is supplied from the engine fuel system. The atomized fuel, under pressure, is mixed with combustion air and is ignited by an electrical spark. Burning gases are contained in a combustion chamber, and the electrically powered blower forces air around the chamber, where it is heated and then forced forward into the cabin area. Exhaust gas from the combustion chamber is vented overboard.

11-164. Combustion Heater Igniter Plug. (See 14, figure 11-2.) (Refer to paragraph 11-4.)

11-165. Removal — Combustion Heater Igniter Plug. (Refer to paragraph 11-5.)

11-166. Cleaning — Combustion Heater Igniter Plug. (Refer to paragraph 11-6.)

11-167. Inspection — Combustion Heater Igniter Plug. (Refer to paragraph 11-7.)

11-168. Repair or Replacement — Combustion Heater Igniter Plug. (Refer to paragraph 11-8.)

11-169. Installation — Combustion Heater Igniter Plug. (Refer to paragraph 11-9.) Procedure is the same.

11-170. Combustion Heater Ignition Assembly. (See 15, figure 11-2.) (Refer to paragraph 11-10.)

11-171. Trouble Shooting — Combustion Heater Ignition Assembly. (Refer to paragraph 11-11.)

11-172. Removal — Combustion Heater Ignition Assembly. (Refer to paragraph 11-12.)

11-173. Installation — Combustion Heater Ignition Assembly. (Refer to paragraph 11-13.)

11-174. Combustion Heater Fuel Control Box. (See 16, figure 11-2.) Refer to paragraph 11-14.)

11-175. Removal — Combustion Heater Fuel Control Box. (Refer to paragraph 11-15.) Procedure is the same.

11-176. Installation — Combustion Heater Fuel Control Box. (Refer to paragraph 11-16.)

11-177. Cabin Heater Control Box Fuel Pump. (See 17, figure 11-2.) (Refer to paragraph 11-17.)

11-178. Removal — Cabin Heater Control Box Fuel Pump. (Refer to paragraph 11-18.)

11-179. Installation — Cabin Heater Control Box Fuel Pump. (Refer to paragraph 11-19.)

11-180. Cabin Heater Control Box Solenoid Valve. (See 18, figure 11-2.) (Refer to paragraph 11-20.)

11-181. Removal — Cabin Heater Control Box Solenoid Valve. (Refer to paragraph 11-21.) Procedure is the same.

11-182. Installation — Cabin Heater Control Box Solenoid Valve. (Refer to paragraph 11-22.) Procedure is the same.

11-183. Cabin Heater Control Box Fuel Filter. (See 19, figure 11-2.) (Refer to paragraph 11-23.)

11-184. Removal — Cabin Heater Control Box Fuel Filter. (Refer to paragraph 11-24.) Procedure is the same.

11-185. Installation — Cabin Heater Control Box Fuel Filter. (Refer to paragraph 11-25.) Procedure is the same.

11-186. Cabin Heater Control Box Lockout Relay. (See 20, figure 11-2.) (Refer to paragraph 11-26.)

11-187. Removal — Cabin Heater Control Box Lockout Relay. (Refer to paragraph 11-27.) Procedure is the same.

11-188. Installation — Cabin Heater Control Box Lockout Relay. (Refer to paragraph 11-28.) Procedure is the same.

11-189. Cabin Heater Control Box Fuel Pressure Regulator. (See 21, figure 11-2.) (Refer to paragraph 11-29.)

11-190. Removal — Cabin Heater Control Box Fuel Pressure Regulator. (Refer to paragraph 11-30.) Procedure is the same.

11-191. Installation — Cabin Heater Control Box Fuel Pressure Regulator. (Refer to paragraph 11-31.) Procedure is the same.

11-192. Fresh Air Sensing Element. (See figure 11-2.) UH-1B helicopters Serial Nos. 60-3546 through 61-803 are equipped with a fresh air sensing element (22) located in the aft side of the combustion heater fresh air intake elbow.

11-193. Removal — Fresh Air Sensing Element. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical wiring from sensing element and cover wire ends with insulating tape.

c. Remove four attaching screws and washers and remove sensing element.

11-194. Installation — Fresh Air Sensing Element. a. Position sensing element in the aft side of the fresh air intake elbow and install four attaching washers and screws.

b. Remove insulating tape from wire ends and connect electrical wiring to sensing element.

11-195. Hot Air Sensing Element. (See figure 11-2.) UH-1B helicopters Serial Nos. 60-3546 through 61-803 are equipped with a hot air sensing element (23) located in the outboard side of the lower hot air plenum between the spot heater opening and the fresh air intake.

11-196. Removal — Hot Air Sensing Element. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical wiring from sensing element and cover wire ends with insulating tape.

c. Remove four attaching screws and washers and remove sensing element.

11-197. Installation — Hot Air Sensing Element. a. Position sensing element in the outboard side of the lower hot air plenum between the spot heater opening and the fresh air intake and install four attaching washers and screws.

b. Remove insulating tape from wire ends and connect electrical wiring to sensing element.

11-198. Combustion Heater 250°F Cycling Switch. (See figure 11-2.) The combustion heater cycling switch (24) is located in the upper inboard part of the lower plenum behind the fresh and hot air sensing elements.

11-199. Removal — Combustion Heater 250° Cycling Switch. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical wiring from switch and cover wire ends with insulating tape.

c. Unthread cycling switch from plenum and remove switch.

11-200. Installation — Combustion Heater 250° Cycling Switch. Install combustion heater cycling switch as follows:

Note

The cycling switch is set at 250°F, plus or minus 6°F, normally closed. This switch closes on falling temperature.

a. Thread the cycling switch into the upper inboard part of the lower plenum behind the fresh and hot air sensing elements.

b. Remove insulating tape from wire ends and connect electrical wiring to cycling switch.

11-201. Combustion Heater 350°F Overheat Switch. (See figure 11-2.) The combustion heater overheat switch (25) is located in the heater plenum. The purpose of this switch is to prevent damage to the heater assembly from excessively high heat.

11-202. Removal — Combustion Heater 350° Overheat Switch. a. Make sure the battery switch is in "OFF" position.

b. Disconnect electrical wiring from switch and cover wire ends with insulating tape.

c. Unthread overheat switch from plenum and remove switch.

11-203. Installation — Combustion Heater 350° Overheat Switch. Install overheat switch as follows:

Note

The overheat switch is set at 350°F, plus or minus 6°F, normally closed. This switch opens on rising temperature.

a. Thread the overheat switch into the heater plenum.

b. Remove insulating tape from wire ends and connect electrical wiring to overheat switch.

11-204. Combustion Heater 115°F Purge Switch. (See figure 11-2.) The combustion heater purge switch (26) is located in the heater plenum. The purpose of this switch is to keep both the combustion air blower and the heater vent blower in operation for a sufficient period of time after shutdown of the heater assembly to prevent damage to the combustion heater.

11-205. Removal — Combustion Heater 115° Purge Switch. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical wiring from switch and cover wire ends with insulating tape.

c. Unthread purge switch from plenum and remove switch.

11-206. Installation — Combustion Heater 115° Purge Switch. Install purge switch as follows:

Note

The purge switch is set at 115°F, plus or minus 6°F, normally open. This switch closes on rising temperature.

a. Thread the purge switch into the heater plenum.

b. Remove insulating tape from wire ends and connect electrical wiring to purge switch.

11-207. Combustion Heater Air Pressure Switch. (See 27, figure 11-2.) Refer to paragraph 11-41.)

11-208. Removal — Combustion Heater Air Pressure Switch. (Refer to paragraph 11-42.)

11-209. Installation — Air Pressure Switch. (Refer to paragraph 11-43.)

11-210. Combustion Heater Air Blower. (See 28, Figure 11-2.) (Refer to paragraph 11-44.)

11-211. Removal — Combustion Heater Air Blower. (Refer to paragraph 11-45.)

11-212. Installation — Combustion Heater Air Blower. (Refer to paragraph 11-48.)

11-213. Combustion Heater Vent Blower. (See 29 Figure 11-2.) Refer to paragraph 11-49.)

11-214. Removal — Combustion Heater Vent Blower. (Refer to paragraph 11-50.)

11-215. Inspection — Combustion Heater Vent Blower. (Refer to paragraph 11-51.)

11-216. Repair or Replacement — Combustion Heater Vent Blower. (Refer to paragraph 11-52.)

11-217. Installation — Combustion Heater Vent Blower. (Refer to paragraph 11-53.)

11-218. Fresh Air Intake Screen. (See figure 11-2.) The fresh air intake screen (30) is located on the lower end of the combustion heater air intake duct and removes foreign material from air being taken into the heater.

11-219. Removal — Fresh Air Intake Screen. Remove attaching screws and washers and remove screen.

11-220. Installation — Fresh Air Intake Screen. Position screen on lower end of combustion heater air intake duct and install attaching washers and screws.

11-221. Combustion Heat Selector Valve. (See figure 11-2.) The solenoid operated combustion heat selector valve (31) is located at approximately mid-point of the cabin passenger-cargo area on the right-hand side of the helicopter. The purpose of this valve is to distribute heated air from the combustion heater to various cabin areas as required. On UH-1B helicopters Serial No. 62-1872 through 64-14191, this valve is equipped with a thermostat in addition to the electrical solenoid.

11-222. Removal — Combustion Heat Selector Valve. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical wiring from selector valve and cover wire ends with insulating tape.

c. Remove screws, washers, nuts and clamps attaching valve housing to forward hot air ducts.

d. Remove two screws and washers attaching selector valve to structure.

e. Remove flame resistant glass cloth attaching aft portion of valve housing to main combustion heater hot air duct, and remove selector valve.

f. Remove screws and washers attaching solenoid to mount, and remove solenoid.

g. On UH-1B helicopters Serial No. 62-1872 through 64-14191, remove screws and washers attaching thermostat to selector valve housing, and remove thermostat.

11-223. Installation — Combustion Heat Selector Valve. a. On UH-1B helicopters Serial No. 62-1872 through 64-14191, position thermostat in selector valve housing and install attaching washers and screws.

b. Position solenoid on mount and install attaching washers and screws.

c. Position selector valve on structure with aft portion of valve housing mated to main combustion heater hot air duct, and install washers and screws attaching valve to structure.

d. Connect aft portion of selector valve housing to hot air duct as follows:

1. Apply Selectron adhesive to soft ends.

2. Apply three complete wraps of two inch wide Scotch brand flame resistant glass cloth.

Note

Do not stretch last wrap.

e. Attach forward hot air ducts to selector valve housing with clamps, nuts, washers and screws.

f. Remove insulating tape from wire ends and connect electrical wiring to selector valve.

11-224. Combustion Heat Selector Valve Control Dial and Cable. (See figure 11-2.) UH-1B helicopters Serial No. 62-1872 through 64-14191, are equipped with a selecting dial and flexible control cable (32) for proper operation of the combustion heat selector valve.

11-225. Removal — Combustion Heat Selector Valve Control Dial and Cable. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical wiring from solenoid and cover wire ends with insulating tape.

c. Remove screws, washers, spacer, nuts, clips, clamps and grommet attaching flexible cable.

d. Remove screws, washers and nuts attaching selecting dial, and remove selecting dial and flexible cable.

11-226. Installation — Combustion Heat Selector Valve Control Dial and Cable. a. Position selecting dial and install attaching nuts, washers and screws.

b. Position and route flexible cable, progressively installing attaching grommet, clamps, clips, nuts, spacer, washers and screws.

c. Remove insulating tape from wire ends and connect electrical wiring to solenoid.

11-227. Aft Cabin Air Valves. (See 33, figure 11-2.) (Refer to paragraph 11-66.)

11-228. Removal — Aft Cabin Air Valves. Refer to paragraph 11-67.)

11-229. Installation — Aft Cabin Air Valves. (Refer to paragraph 11-68.)

11-230. Combustion Heat Control Relay. (See figure 11-2.) UH-1B helicopters Serial No. 60-3546 through 64-14191 are equipped with a combustion heat control relay (34) located near the top of the right-hand door pillar post between the pilot and copilot and passenger-cargo areas of the cabin.

11-231. Removal — Combustion Heat Control Relay. a. Make sure battery switch is in "OFF" position.

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

c. Remove attaching screws, washers and nuts and remove relay.

11-232. Installation — Combustion Heat Control Relay. a. Position relay on right-hand door pillar post and install attaching nuts, washers and screws.

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

11-233. Copilot Foot Warmer Control. (See 35, figure 11-2.) Refer to paragraph 11-97.)

11-234. Removal — Copilot Foot Warmer Control. (Refer to paragraph 11-98.)

11-235. Installation — Copilot Foot Warmer Control. (Refer to paragraph 11-99.)

11-236. Copilot Foot Warmer Control Valve. (See 36, Figure 11-2.) (Refer to paragraph 11-100.)

11-237. Removal — Copilot Foot Warmer Control Valve. (Refer to paragraph 11-101.)

11-238. Installation — Copilot Foot Warmer Control Valve. (Refer to paragraph 11-102.)

11-239. Right-Hand Lower Defroster Control. (See 37, Figure 11-2.) The right-hand lower defroster control handle (37) is located on the right-hand side of the instrument pedestal.

11-240. Removal — Right-Hand Lower Defroster Control. a. Remove cotter pins and washers at each end of control cable.

b. Remove screw, washer, nut, clamp and grommet attaching control cable, and remove cable.

c. Remove cotter pin, nut, washers and bolt attaching control handle, and remove handle.

11-241. Installation — Right-Hand Lower Defroster Control. a. Position control handle and attach with bolt, washers, nut and cotter pin.

b. Attach upper end of control cable with washer and cotter pin.

c. Route and position control cable, progressively installing grommet, clamp, nut, washer and screw.

d. Attach lower end of cable to control valve with washer and cotter pin.

11-242. Right-Hand Lower Defroster Control Valve. (See 38, figure 11-2.) (Refer to paragraph 11-106.)

11-243. Removal — Right-Hand Lower Defroster Control Valve. a. Remove defroster nozzle (Refer to paragraph 11-176.)

b. Disconnect control cable from control lever of valve.

c. Remove screws, washers and nuts attaching elbow, control valve and T duct.

d. Remove elbow, gaskets and control valve from T duct.

11-244. Inspection — Right-Hand Lower Defroster Control. Inspect gaskets for wear, damage and serviceability.

11-245. Repair or Replacement — Right-Hand Lower Defroster Control. Replace gasket if worn, damaged or unserviceable.

11-246. Installation — Right-Hand Lower Defroster Control Valve. a. Position control valve,

gaskets and elbow on T duct, align holes and install nuts, washers and screws.

b. Connect control cable to control lever of valve.

c. Install defroster nozzle. (Refer to paragraph 11-114.)

11-247. Heating Control Panel. (See 39, figure 11-2.) (Refer to paragraph 11-117.)

11-248. Removal — Heating Control Panel. Refer to paragraph 11-118.)

11-249. Installation — Heating Control Panel. (Refer to paragraph 11-119.)

11-250. Auxiliary Exhaust Heater UH-1B 65-9416 and Subsequent. (See figure 11-3.) The auxiliary exhaust heater system consists of a heat exchanger on the exhaust tailpipe, a blower for circulating the air through the heat exchanger, a mixing valve to maintain the desired temperature, a selector valve assembly which controls the flow of air to aft cabin outlet ducts, a selector dial to actuate the remote sensor which controls the mixing valve, and a control lever assembly. A screen covers the inlet duct of the blower.

11-251. Heater Exchanger. (See figure 11-3.) The heat exchanger (8) is mounted on the tailpipe of the engine and serves to heat the air as it is circulated through the distribution system by the blower.

11-252. Removal — Heat Exchanger. a. Remove clamps holding ducts to inlet and outlet parts on heat exchanger.

b. Through small access door at lower left on tailpipe fairing, disconnect antenna and collision light wiring at deck connectors. Open section of drive shaft access door which overlaps tailpipe fairing. Release fasteners and remove fairing.

c. Disconnect drain hole couplings.

d. Remove V-band clamp for mating flanges of engine exhaust diffuser tailpipe. Lift off tailpipe.

e. Cut lockwire, remove eight bolts and remove cover plate from inner housing flange.

1. Windshield Defroster Nozzle
2. Remote Control Cable
3. Selector Dial
4. Pilot and Copilot Hot Air Valves
5. Remote Sensor
6. Thermal Switch
7. Mixing Valve
8. Exhaust Jacket Heat Exchanger
9. Exhaust Heat Exchange Blower
10. Intake Screen
11. Selector Assembly
12. Selector Valve Assembly
13. Control Lever Assembly
14. Lower Defroster Nozzle

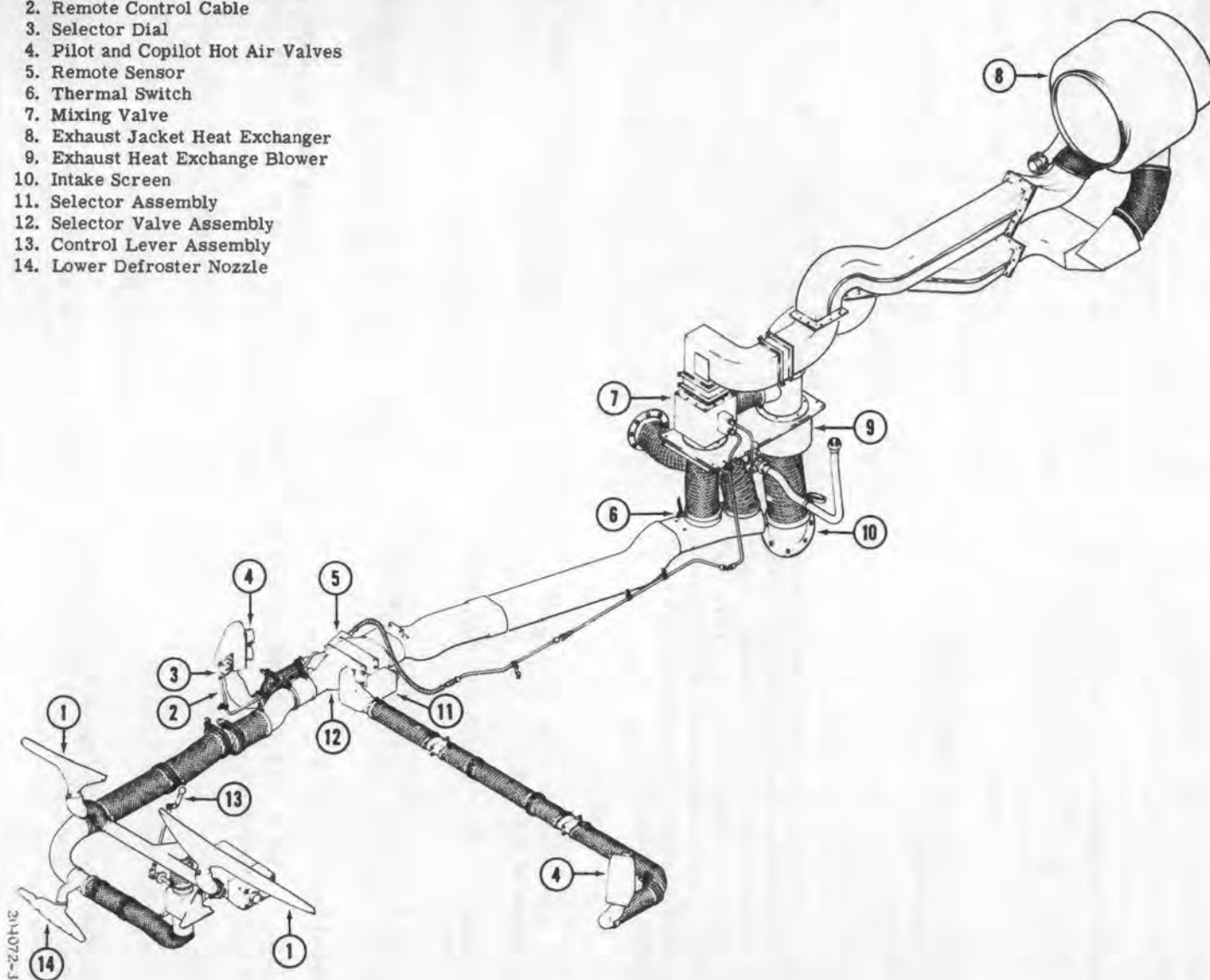


Figure 11-3. Auxiliary exhaust heater

f. Protect exhaust diffuser opening with fabric cover normally used on tailpipe.

11-253. Installation — Heat Exchanger. a. Remove protective cover from engine exhaust diffuser.

b. Position cover plate over center opening of diffuser. Secure with eight bolts through cover into captive nuts of housing flange.

Note

Apply anti-seize compound suitable for high temperatures to bolts before installation.

c. Lockwire bolts.

d. Position tailpipe on outer flange of diffuser with drain fitting down and locating dowels engaged. Secure with V-band clamps around flanged joint. Seat clamp by tapping with soft mallet from center toward ends while tightening nuts on clamp bolts to a torque of 40 to 50 inch pounds. Lockwire nuts.

Note

Make sure inside of pipe is aligned with exhaust diffuser.

e. Connect drain hose from tail pipe to coupling on fuselage.

f. Install ducts and clamps to inlet and outlet ports of heat exchanger.

g. Install tailpipe fairing.

h. Connect antenna and anti collision light wiring at deck connectors.

i. Close drive shaft access doors.

j. Place protective cover on tailpipe.

11-254. Blower. (See figure 11-3.) A bleed air driven ventilation blower (9) is connected to ducts leading into the inlet port of the exhaust heat exchanger.

11-255. Removal — Blower. a. Disconnect bleed line from tee fitting on inlet port.

b. Disconnect tube from remote sensor from tee fitting.

c. Remove clamps from inlet and outlet ports of blower assembly and remove ducts.

d. Remove screws, washers, and nuts securing blower assembly to mounting bracket and lift blower from mounting bracket.

11-256. Installation — Blower. a. Position blower on bracket and secure to mounting with screws, washers and nuts.

b. Connect bleed air inlet line and remote sensor tube to tee fitting.

c. Install ducts on inlet and outlet ports of blower. Install clamps and secure with screws, washers and nuts.

11-257. Mixing Valve Assembly. (See figure 11-3.) The mixing valve (7) controls the flow of air from the heat exchanger to maintain the desired temperature. Increase or decrease of bleed air pressure dictated by the remote sensor uses bleed air pressure through the actuator to drive the butterfly to the correct position to admit or restrict entrance of air into the distribution system.

11-258. Removal — Mixing Valve Assembly. a. Remove clamps and disconnect ducts from valve assembly.

b. Disconnect two tubes from valve assembly.

c. Remove screws, washers and nuts securing valve to mount. Lift valve from mount.

11-259. Installation — Mixing Valve Assembly. a. Position valve on mount and secure with screws, washers and nuts.

b. Install ducts and clamps on valve assembly.

c. Connect tube fittings to valve.

11-260. Remote Sensor. (See figure 11-3.) The remote sensor (5) senses the temperature air in the distribution duct and controls the mixing valve by increasing or decreasing bleed air pressure against the butterfly to maintain the selected temperature.

11-261. Removal — Remote Sensor. a. Disconnect hose and cable from remote sensor.

b. Remove screws and washers securing sensor to valve and lift sensor from valve.

11-262. Installation — Remote Sensor. a. Position sensor on valve and secure with screws and washers.

b. Connect hose and cable to remote sensor.

11-263. Selector Valve Assembly. (See figure 11-3.) The selector valve assembly (12) controls the flow of air to the aft cabin.

11-264. Removal — Selector Valve Assembly. a. Remove clamps and ducts from valve assembly.

b. Remove electrical cable.

c. Remove remote sensor (Refer to paragraph 11-261).

d. Remove screws, and washers securing selector valve assembly to mount and lift valve assembly from mount.

11-265. Installation—Selector Valve Assembly. a. Position selector valve assembly and secure with screws and washers.

b. Install ducts and secure with clamps.

c. Replace remote sensor assembly. (Refer to paragraph 11-262).

11-266. Ducts, Nozzles, Registers, Gaskets and Miscellaneous Valves. (See figure 11-3.) Maintain heater miscellaneous components in accordance with paragraph 11-267 through 11-270.

11-267. Removal — Ducts, Nozzles, Registers, Gaskets and Miscellaneous Valves. Remove attaching hardware and/or clamps and remove component.

11-268. Inspection — Ducts, Nozzles, Registers, Gaskets and Miscellaneous Valves. a. Inspect ducts for cracks, fraying and wear.

b. Inspect nozzles, registers and valves for damage and serviceability.

c. Inspect gaskets for damage.

11-269. Repair or Replacement — Ducts, Nozzles, Registers, Gaskets and Miscellaneous Valves. a. Replace ducts if cracked, frayed, or worn.

b. Replace damaged or unserviceable nozzles, registers, gaskets and valves.

11-270. Installation — Ducts, Nozzles, Registers, Gaskets and Miscellaneous Valves. Install components and secure with hardware and/or clamps.

11-271. Air Scoop Assemblies. Four air scoop assemblies, installed in the cabin roof section, supply fresh air to the cabin area. A flow direction fitting, containing a valve, controls the quantity of air at each scoop. These valves are operated by turning a collar on the end of the fitting. The air scoop assemblies are of sheet metal construction and house the flow direction fitting and valve as well as gathering fresh air for release into the cabin area.

11-272. Trouble Shooting—Air Scoop Assemblies. The following is a list of indications of trouble, probable causes and corrective action.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
No fresh air	Fitting inoperative Air scoop plugged	Replace fitting Clean air scoop

11-273. Removal — Air Scoop Assemblies. a. Pull drain tube from air scoop pan assembly nipple inside the cabin roof section.

b. Remove screws and washers attaching scoop assembly to top of cabin roof section, and remove scoop assembly.

c. Use any sharp, non-metallic tool to separate the pan assembly and fitting from the top cabin skin.

d. Remove attaching screws, and separate fitting from pan assembly.

Note

The fitting may be removed from the pan assembly, from inside the cabin area, as a unit without removing the pan and air scoop.

11-274. Installation — Air Scoop Assemblies. a. Position fitting in pan assembly and install attaching screws.

b. Place one quarter-inch bead of zinc chromate putty on mating section of cabin roof skin and position pan and fitting assembly.

c. Position scoop assembly on pan and fitting assembly and install attaching washers and screws.

d. Slide drain tube firmly onto air scoop pan assembly nipple inside the cabin roof section.

11-275. Drain Tubes. Rubber drain tubes, extending from the air scoop pan assemblies

through the outer skin of the cabin roof, eliminate excessive moisture.

11-276. Removal—Drain Tubes. a. Remove grommet, screws, nuts, clamps and brackets attaching drain tube to roof bulkheads.

b. Slide tube from pan assembly nipple and pull drain tube inboard from skin.

11-277. Installation — Drain Tubes. a. Slide drain tube firmly onto air scoop pan assembly nipple inside the cabin roof section.

b. Position and route drain tube along roof bulkheads and through skin, progressively installing attaching brackets, clamps, nuts, screws, and grommet.

c. Seal void areas between drain tube and grommet with cement.

Note

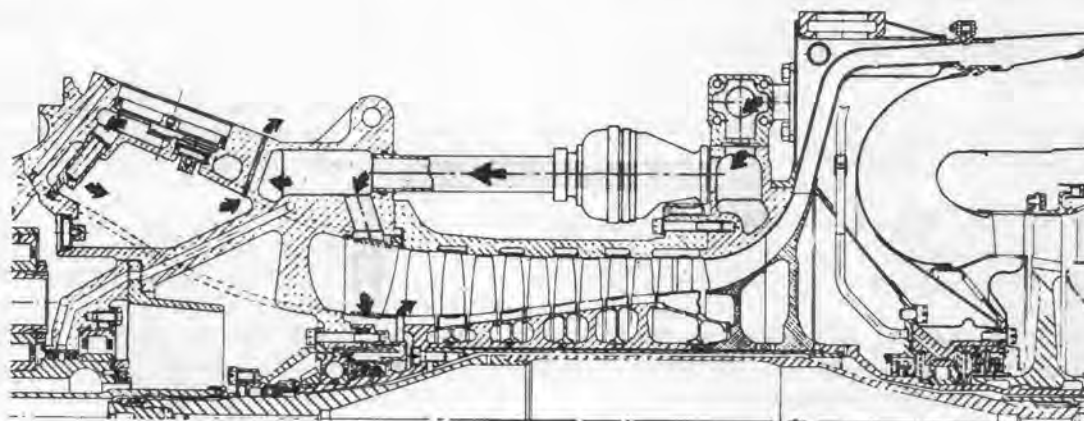
Avoid slack in drain tube to prevent water trap.

Section III — Anti-Icing System

11-278. Engine Anti-Icing. Engine anti-icing system uses air heated by compression to prevent ice formation in air inlet passages during engine operation. On T53-L-1A, -5, and -9 engines, anti-icing air is internally bled through drilled passages into the hollow housing around the centrifugal compressor. On T53-L-9A and -11 engines the air source is at aft face of diffuser vanes; from a gallery in the diffuser housing, air flows through an external manifold, hose and adapter into top of the centrifugal compressor housing. (See figure 11-4.) On all engines, the anti-icing air is conducted through an externally mounted solenoid-operated valve and tube to the inlet housing. Internal passages direct air through all inlet housing struts (except the lower strut which is warmed by internal flow of scavenge oil), through hollow inlet guide vanes, and to mounting pad of fuel control temperature sensing element. (On T53-L-1A, an external hose serves this pad.) Small holes through inlet housing, behind mounting pad, provide air exit from each strut.

Anti-icing air valve (air flow regulator on UH-1A) is fail-safe loaded to OPEN position whenever solenoid is not electrically energized, for continuous air flow in event of electrical failure. Valve closes when electrical power is applied to circuit. When ice detector probe in intake air stream senses ice forming on its upstream side, ENGINE ICING caution panel will be lighted until probe is rid of ice or other clogging. On UH-1A, air flow regulator valve will also be allowed to open by automatic de-energizing of solenoid. On UH-1B to provide continuous anti-icing in case of electrical failure, the inline valve is fail-safe loaded open. Under normal conditions it is operated by a toggle switch in the cabin.

11-279. Air Flow Regulator — UH-1A. (See figure 11-5). Anti-icing air flow regulator on T53-L-1A engine consists of a regulator assembly, tube, and elbow mounted above engine compressor section and connecting centrifugal compressor housing to inlet housing.



205061-3

Figure 11-4. Anti-icing air flow on T53-L-9A/11 engines

11-280. Removal — Air Flow Regulator — UH-1A. (See figure 11-5). a. Disconnect air hose from temperature sensing element pad and anti-icing elbow. Remove fittings and packings.

b. Remove lockwire, four bolts, and washers to detach anti-icing elbow from inlet housing.

c. Disconnect electrical harness connector from regulator.

d. Remove two bolts and washers to detach regulator flange from centrifugal compressor housing port. Separate regulator, tube, elbow, and gaskets.

e. Cover open ports on centrifugal compressor and inlet housings. Protect regulator connector and ports as required.

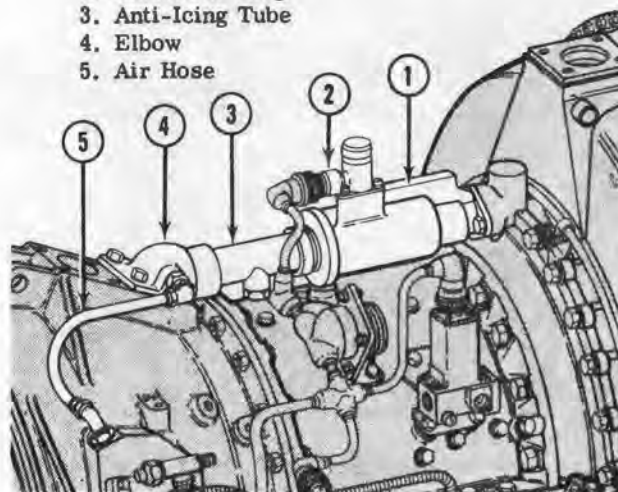
11-281. Installation — Air Flow Regulator UH-1A. (See figure 11-5.) a. Uncover mounting pads on centrifugal compressor housing and inlet housing.

b. Position regulator with gasket on port of centrifugal compressor housing, and secure with two bolts and washers. Lockwire bolt heads together.

c. Assemble anti-icing tube, with packing on each end, and elbow with regulator. Secure elbow, with gasket, on inlet housing pad with four bolts and washers. Lockwire bolts in pairs.

d. Install union, with packing, in port at left side of anti-icing elbow.

1. Air Flow Regulator
2. Connector Plug
3. Anti-Icing Tube
4. Elbow
5. Air Hose



204060-125

Figure 11-5. Anti-icing air flow regulator on T53-L-1A engine

e. Install elbow, with packing and nut, in port at top of temperature sensing element pad on left side of inlet housing.

f. Connect air hose between fittings on elbow and pad.

g. Connect electrical harness lead to connector on air flow regulator.

11-282. Ice Detector — UH-1A. (See figure 11-6). Ice detector on T53-L-1A engine is mounted on inlet housing at upper right side.

11-283. Removal — Ice Detector — UH-1A. (See figure 11-6). a. Disconnect electrical harness lead from connector on detector unit.

b. Remove lockwire and two screws to detach strap from detector support plate. Remove strap.

c. Remove lockwire and two bolts securing jumper and intermediate support plate to lower support plate. Remove two flat washers, four shock washers, and two spacers.

d. Remove lockwire and two bolts which pass through detector case, with four flat washers and two shock washers. Remove detector. Protect sensory holes in probe with suitable covering. Remove two bushings and shock pad from bottom of detector.

e. Remove lockwire and two bolts to detach lower support plate from inlet housing.

f. Cover openings in inlet housing, and connector plug of detector.

11-284. Installation—Ice Detector — UH-1A. (See figure 11-6). a. Install lower support plate on inlet housing, secured by two bolts with heads lockwired.

b. Place a spacer and a shock washer on each end of lower support plate. Place intermediate support plate over shock washers. Place a shock washer and a flat washer on intermediate plate. Install two bolts through assembly into lower plate.

c. Position shock pad over probe on bottom of detector. Insert two mounting bushings into detector mounting holes from bottom.

d. Position detector on inlet housing mounting pad. Secure with two bolts, with a shock washer between two flat washers under each bolt head.

e. Position strap over detector, and secure to intermediate support plate with two screws.

f. Remove bolt from right side of intermediate support plate, install jumper connector under head, and reinstall bolt.

g. Lockwire all bolts and screws.

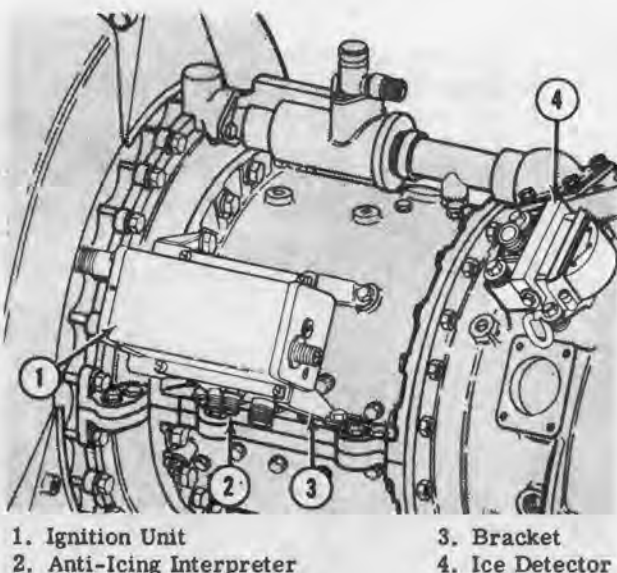
h. Connect electrical harness lead to detector.

11-285. Anti-Icing Interpreter—UH-1A. (See figure 11-6). Interpreter unit of anti-icing system is mounted under ignition exciter unit, on brackets at right side of compressor housing.

11-286. Removal Anti-Icing Interpreter — UH-1A. (See figure 11-6). a. Disconnect electrical harness leads from two connectors of ignition unit and three connectors of interpreter unit.

b. Remove four screws and nuts through corners of ignition unit. Remove ignition unit. Lift off interpreter and bracket assembly, leaving front and rear ignition unit support brackets on compressor housing.

c. Remove four bolts and nuts to detach interpreter from bracket plate.



204060-126

Figure 11-6. Anti-icing assemblies and ignition unit on T53-L-1A engine

- d. Cover connectors.

11-287. Installation — Anti-Icing Interpreter-UH-1A. (See figure 11-6). a. Check condition of interpreter shock mounts. Attach bracket plate, with mounting flange joggle away from unit, with four bolts inserted through plate and shock mounts and secured by nuts.

b. Position interpreter assembly and ignition unit on two support brackets at right side of compressor housing. Secure with four screws and nuts.

c. Connect electrical harness leads to three connectors on interpreter and two connectors on ignition unit.

11-288. Anti-Icing Air Valve—UH-1B. (See figure 11-7). Electrically actuated valve is mounted with a tube above engine compressor section, connecting centrifugal housing to inlet housing.

11-289. Removal — Anti-Icing Air Valve — UH-1B. (See figure 11-7 and 11-8). a. Disconnect electrical harness plug from valve connector.

b. Remove two bolts with washers to detach rear flange of valve from impeller housing.

c. Spread retaining ring to disengage from groove at forward end of tube. Slide ring toward rear.

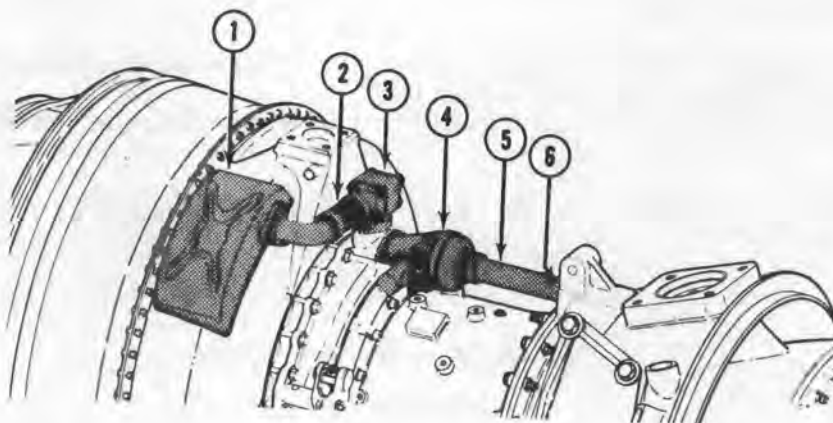
d. Push tube forward into inlet housing until free of valve.

e. Remove valve and gasket. Remove tube.

f. Remove packings from valve and from inlet housing port. Cover open port.

11-290. Installation — Anti-Icing Air Valve UH-1B. (See figure 11-7 and 11-8.) a. Insert a packing into inlet housing port, and another packing into forward port of valve.

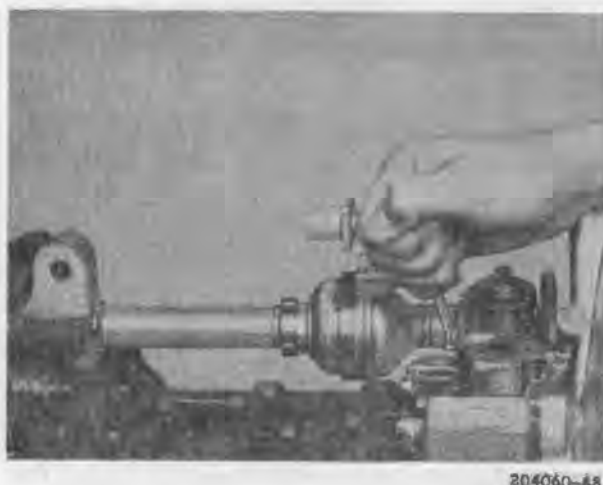
b. Place retaining ring loosely on tube. Insert large end of tube into inlet housing port. Push tube forward, with a twisting motion, far enough into housing to allow installation of valve.



- | | |
|------------------------|-----------------------|
| 1. Bleed Air Chamber | 4. Anti-Icing Valve |
| 2. Connecting Manifold | 5. Tube |
| 3. Bleed Air Adapter | 6. Inlet Housing Port |

205061-4

Figure 11-7. Anti-icing components on UH-1B T53-L-9A/11 engine



204060-48

**Figure 11-8. Removing anti-icing air valve
UH-1B T53-L-5/9 engine**

c. Attach rear flange of valve, with gasket, to mounting pad on impeller housing with two bolts and washers.

d. Slide tube rearward, with twisting motion, into port of valve. Install retaining ring in groove at forward end of tube, firmly against inlet housing. Tighten and lockwire bolts at rear flange of valve.

e. Connect and lockwire electrical harness lead to valve solenoid connector.

11-291. Ice Detector — UH-1B. (See figure 11-9). Ice detector unit on UH-1B is mounted on air intake bellmouth, just behind forward engine firewall.

11-292. Removal — Ice Detector — UH-1B. a. Open engine cowling doors.

b. Disconnect electrical leads from ice detector.

c. Remove four mounting bolts. Tilt detector to right, and spring longest brackets to left. Withdraw detector with gasket from hole at top of bellmouth.

11-293. Installation — Ice Detector — UH-1B. a. Place gasket over probe of detector unit. Insert probe through hole near top of intake bellmouth, behind firewall.

b. Work detector into place by springing brackets slightly.

c. Secure unit in brackets with four bolts and washers.

d. Connect electrical leads and ground jumper.

e. Close engine cowling.

11-294. Anti-Icing Interpreter—UH-1B. The interpreter unit of the anti-icing system is located in the lower radio compartment. Refer to wiring diagrams for wiring information.

11-295. Removal — Anti-Icing Interpreter UH-1B. a. Remove four screws, washers and nuts securing interpreter to shelf.

b. Disconnect two wires from terminals.

c. Lift interpreter from helicopter.

11-296. Installation — Anti-Icing Interpreter UH-1B. a. Position interpreter on shelf.

b. Secure with four screws, washers and nuts.

Section IV — Oxygen System

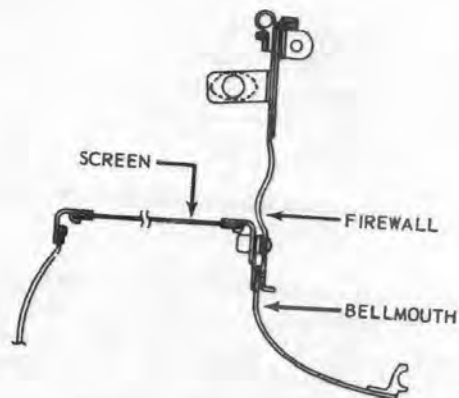
(Not Applicable)

Section V — Fire Detector System

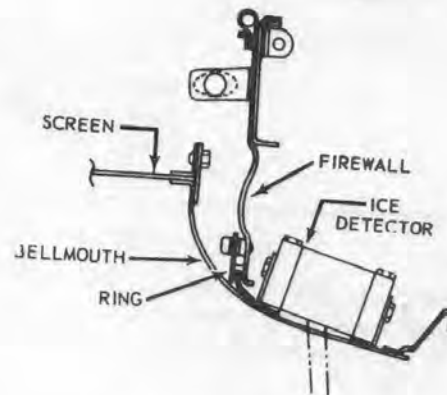
11-297. Fire Detector Installation. The engine fire detection installation consists of a heat sensitive detector wire routed on the inside of each engine cowl. These wires are mounted in spring retention clips, and are at-

tached to an indicator light and a test switch located on the instrument panel.

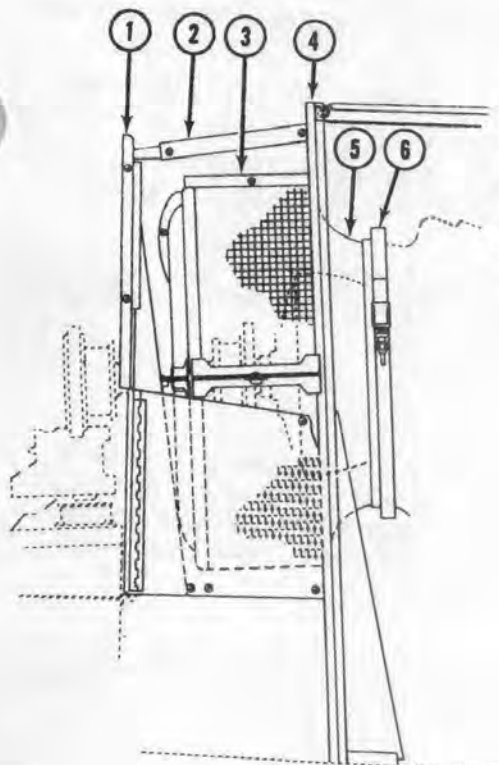
11-298. Trouble Shooting—Fire Detector. The following is a list of indication of trouble, probable causes and corrective action.



CROSS SECTION UH-1A
TOP CENTER OF FIREWALL

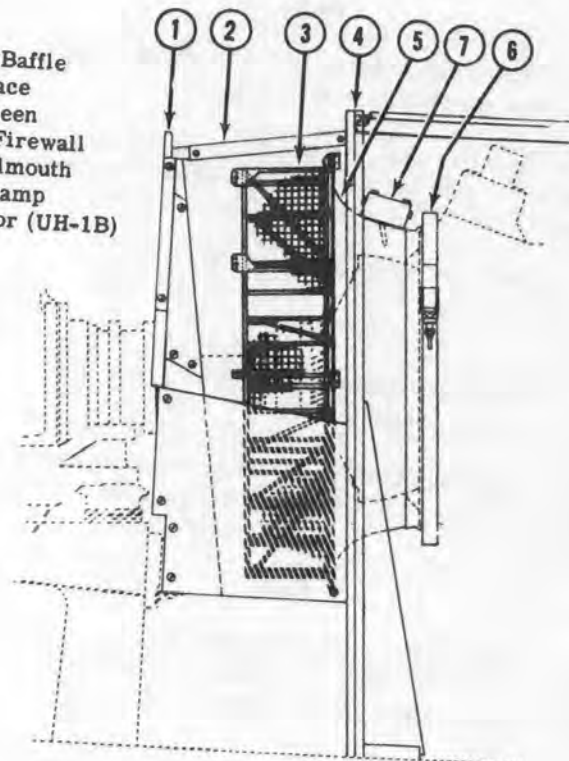


CROSS SECTION UH-1B
TOP CENTER OF FIREWALL



UH-1A

1. Induction Baffle
2. Baffle Brace
3. Intake Screen
4. Forward Firewall
5. Intake Bellmouth
6. V-Band Clamp
7. Ice Detector (UH-1B)



UH-1B

204200-26A

Figure 11-9. Engine air induction areas UH-1A and UH-1B

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Indicator light inoperative	Burnt out bulb Detective test switch Loose electrical connections Broken or disconnected detector wire	Replace bulb Replace switch Tighten connections Replace or connect detector wire

11-299. Testing — Fire Detector. a. Disconnect electrical plug located in work deck directly under power plant on left-hand side of helicopter at Station 184.41.

b. Short receptacle pins "C" and "F" together with a jumper wire. With pins "C" and "F" shorted together, depress the "Push-to-Test" switch. Fire warning light should come on.

Note

This test assures that the test and control circuit is operable.

c. Remove the jumper wire from pins "C" and "F" and use it to short either receptacle pin "C" or "F" to ground.

d. Fire warning light should come on.

Note

This test assures that the alarm circuit is operable.

e. Use an ohmmeter to check conductivity between pins "C" and "F" at plug side of harness.

Note

Maximum resistance should not exceed 20 ohms. If higher value registers, check all connectors for tightness.

f. Use an ohmmeter to check either pin "C" or "F" to ground at plug side of harness.

Note

Value register should always be a minimum of 200,000 ohms at an am-

bient temperature of 72°F. As the ambient temperature rises the resistance value of pin "C" or "F" to ground will decrease. At 100°F this resistance should be a minimum of 100,000 ohms.

g. If the above values are not obtained, it will be necessary to check each cable for resistance from center pin of cable to ground. At 72°F the minimum value of each cable is one megohm. Resistance below this value will indicate a faulty cable which should be replaced.

h. Re-connect main firewall cannon plug.

i. Depress "Push-to-Test" switch to assure that system is fully and properly assembled.

j. Install a Jet-Cal Tester unit to area of cable that assures a good fit for the temperature probe.

Note

Make sure that temperature probe is contacting nothing but the cable. It is easy to "heat-sink" the probe if contact is made with helicopter structure.

k. When alarm light comes on, check indicator on Jet-Cal Tester unit. Value should be 429°F, plus or minus 111°F.

Note

The Jet-Cal Tester unit is only a check system under heated condition. The temperature that warning light comes on is not a good indication of system operation temperature.

1. Remove test equipment and safety wire all electrical connectors and cannon plugs.

11-300. Removal — Fire Detector. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical wiring from detector wire receptacles and cover wire ends with insulating tape.

c. Remove bolts, washers and nuts attaching detector wire receptacles to engine cowl.

d. Apply pressure on each side of detector wire retaining clips and remove detector wire from cowl.

e. Remove safety wire from retaining nuts on each end of detector wire receptacles. Remove top nut on each receptacle and remove detector wire ends.

11-301. Inspection — Fire Detector. a. Inspect wires for damage and wear.

b. Inspect wire retention clips for cracks and serviceability.

11-302. Repair or Replacement — Fire Detector. a. Replace wires if damaged or worn.

b. Replace clips if broken, cracked or unserviceable.

11-303. Installation — Fire Detector. a. Insert detector wire ends into receptacles and tighten retaining nuts. Safety wire top and bottom retaining nuts together on each receptacle.

b. Position detector wire receptacles on engine cowl and install attaching units, washers and bolts.

c. Position and route detector wire through spring retention clips.

d. Remove insulating tape from wire ends and connect electrical wiring to detector wire receptacles.

Section VI — Fire Extinguisher System

(Not Applicable)

Section VII — Defroster System

(Not Applicable)

Section VIII — Windshield Wiper System

11-304. Windshield Wiper. Model UH-1A helicopters have an electrically operated windshield wiper installed at the upper right-hand corner of the pilot's windshield. Model UH-1B helicopters are equipped with a windshield wiper for both the pilot and copilot. Circuit breakers in the overhead console panel protect these installations in case of malfunction. A four position, rotary selector switch on the miscellaneous panel of the overhead console

permits operation of the wipers at low, medium or high speed. Model UH-1B helicopters are equipped with a selector switch for operation of the pilot and copilot windshield wipers separately or simultaneously.

11-305. Trouble Shooting — Windshield Wiper. Following is a list of indications of troubles, probable causes and corrective action:

<u>INDICATION OF TROUBLE</u>	<u>PROBABLE CAUSE</u>	<u>CORRECTIVE ACTION</u>
Does not clean windshield	Damaged or deteriorated wiper blade	Replace wiper blade

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Inoperative	Circuit breaker Damaged switch Broken electrical wire or loose connections Motor and converter	Replace circuit breaker Replace switch Inspect and replace wire if necessary Tighten connections Replace motor and converter assembly

11-306. Replacement — Wiper Blade. a. Remove nut attaching blade to wiper arm and remove blade.

b. Position wiper blade on arm and install attaching nut.

c. Use special wrench, XW20509, and adjust pressure of blade on windshield to $6\frac{3}{4}$ pounds, measured at the intersection of the wiper blade and wiper arm.

11-307. Motor and Converter Assembly. The motor and converter assembly is an electrically operated unit which causes the converter output drive shaft to rotate in alternate directions at various speeds as called for by the operating switch. This moves the wiper arm and blade through an arc of 64 degrees.

11-308. Removal — Motor and Converter Assembly. Remove motor and converter as follows:

Note

Make sure battery switch is in "OFF" position.

a. Remove nut and washer attaching wiper arm and blade to serrated end of converter output drive shaft and remove arm and blade.

b. Disconnect electrical receptacle from motor and converter assembly, and cover receptacle with insulating tape.

c. Remove two screws which attach head guard assembly to windshield wiper support bracket, and remove head guard assembly.

d. Remove four bolts, washers and nuts which attach motor and converter assembly to

support bracket, and remove motor and converter assembly.

11-309. Installation — Motor and Converter Assembly. a. Position motor and converter assembly in support bracket, with converter output drive shaft projecting through mounting hole in cabin structure, and install four attaching nuts, washers and bolts.

b. Position head guard assembly over motor and converter assembly and support bracket and install two attaching screws.

c. Remove insulating tape from electrical receptacle and connect receptacle to motor and converter assembly.

d. Prior to installation of arm assembly, straighten the arm in a vise and insert a 3/32 pin between the mounting head and the arm to temporarily hold the mounting head straight with the arm while the assembly is being installed on the serrated end of the converter output drive shaft.

e. Position the arm assembly on the converter drive output shaft in such a manner that the wiper blade is parallel to, and approximately 3.5 inches below, the upper, inboard edge of the pilot's windshield.

f. Remove 3/32 temporary pin, and install attaching washer and nut.

g. Use special wrench, XW20509, and adjust pressure of blade on windshield to $6\frac{3}{4}$ pounds, measured at the intersection of the wiper blade and wiper arm.

h. Check sweep of wiper on windshield by small increment movements of the blade on the windshield.

Section IX — Auxiliary Power Unit

(Not Applicable)

Section X — Auxiliary Fuel Systems

11-310. Auxiliary Fuel Systems. Auxiliary fuel systems are available for use on UH-1A and UH-1B helicopters to provide additional fuel for extended distance and ferry missions. A 165 gallon capacity non-sealing fuel bladder, enclosed in a metal container, may be installed in the passenger-cargo compartment of UH-1A and UH-1B helicopters. A 350 gallon capacity, metal enclosed fuel tank is also available for installation in the passenger-cargo compartment of UH-1B helicopters only (Refer to paragraph 11-322.) A 165 gallon capacity, metal

enclosed fuel tank may be installed in the passenger-cargo compartment of UH-1A and UH-1B Helicopters (Refer to paragraph 11-312.) Internal 50.0 or 60.0 gallon capacity, self sealing auxiliary fuel tanks may be installed in either the forward or aft portion of the passenger-cargo compartment of UH-1A and UH-1B helicopters (Refer to paragraph 11-332).

11-311. Trouble Shooting — Auxiliary Fuel System. A list of troubles, probable cause and corrective action follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Shifting or movement of tank	Improper installation	Inspect and tighten all attachment points and connections
Fuel odor	Loose fuel line connection	Inspect and tighten all fuel line connections
Fuel quantity indicator does not show fuel use	Inoperative check valve in main transfer line	Replace check valve
Fuel quantity indicator does not show increase when transferring fuel	Inoperative transfer pump Loose electrical connections	Replace transfer pump Inspect and tighten electrical connections

11-312. Fuel Tank — 165.0 U. S. Gallon Auxiliary. (See figure 11-10.) A 165.0 U.S. gallon capacity auxiliary fuel tank may be installed in the passenger-cargo compartment of UH-1A and UH-1B helicopters for extended distance and ferry missions. The tank consists of a non-sealing bladder enclosed in a metal cylinder which is clamped in four cradle supports. The tank sump is equipped with an electrically operated fuel transfer pump, a fuel-low switch for caution panel circuit, fittings and flexible hoses for quick connections to the permanently installed piping which is a part of the main fuel system. Couplings on piping and tank hoses are smaller on UH-1A helicopters, Serial No. 58-2078 through 58-3047, than those provided on UH-1A, serial No. 59-1607 and subsequent, and on all UH-1B helicopters. Wiring for the transfer pump and fuel level transmitter circuits is also permanently installed and is stowed when not in use. A check valve is incorporated in the

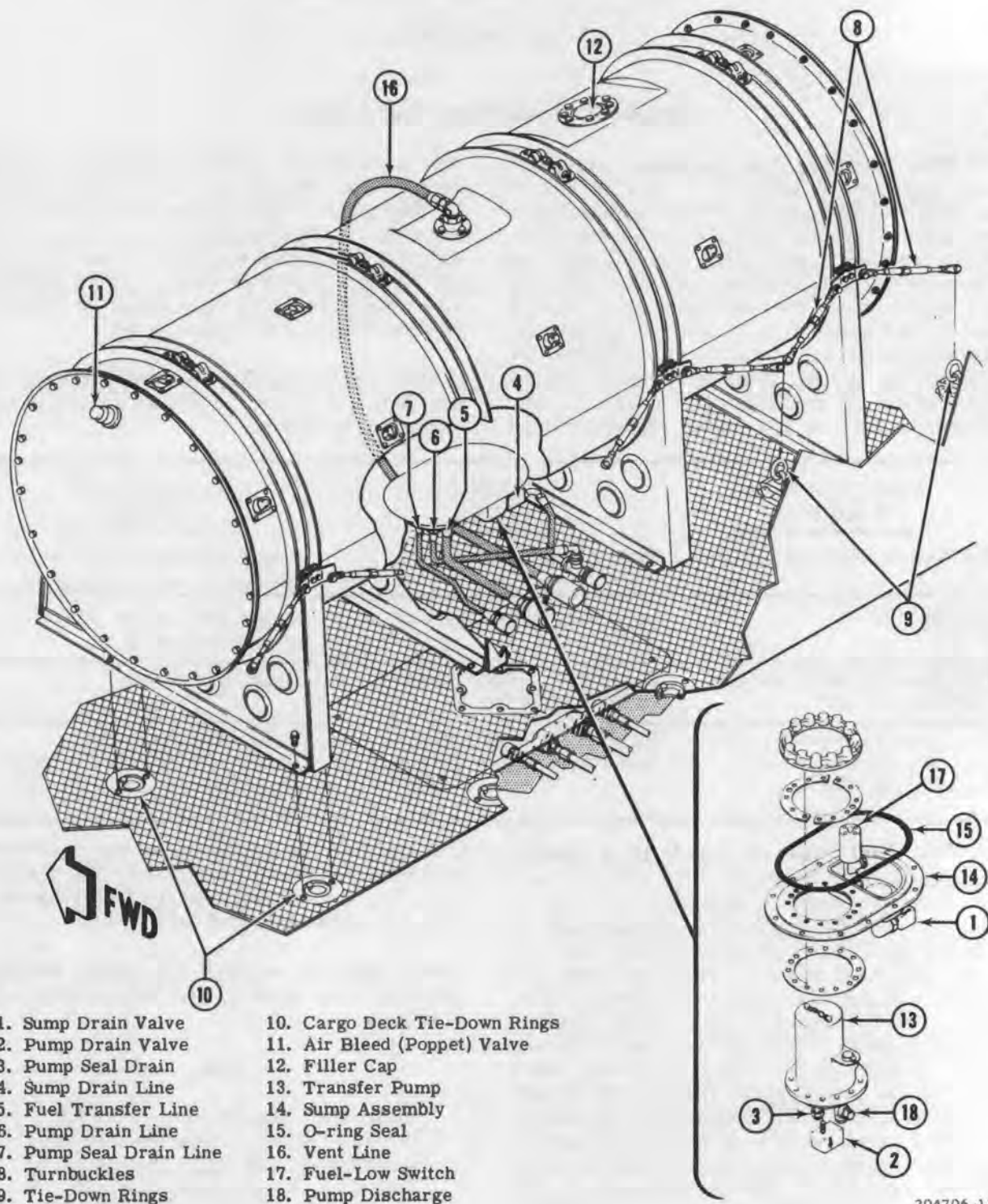
fuel transfer line to the main fuel system to prevent reverse flow of fuel. The auxiliary transfer pump circuit relay is controlled by float switches in the main fuel cell.

11-313. Removal — 165.0 U.S. Gallon Auxiliary Fuel Tank. (See figure 11-10.) Remove fuel tank as follows:

Note

Make sure that the battery switch is in "OFF" position, that the helicopter is grounded, and that external power source has been disconnected prior to breaking any fuel line connection.

a. Drain fuel from the auxiliary tank by pumping into the main fuel system and then draining through the defueling valve located on the lower left-hand side of the fuselage.



204706-13

Figure 11-10. 165.0 U.S. gallon auxiliary fuel tank

b. Open drain valves (1, 2, and 3) under pump and sump assembly to discharge trapped fuel through drain line.

c. Disconnect tank hoses (4, 5, 6, and 7) at quick disconnect fittings on bulkhead below deck, and cap all hose openings.

d. Disconnect pump and fuel-low switch circuit wires, which comes from below deck, at the terminal block and grounding screw, located on the outboard side of the left center tank support. Cover wire ends with insulating tape and stow at beam under the deck.

e. Cut safety wire and loosen eight turnbuckles (8). Detach turnbuckle forks from tie-down rings (9) by removing bolts, washers and nuts.

f. Remove bolts and washers attaching tank supports to deck, and remove tank and support assembly from the helicopter.

g. Install access door, or removable floor, in deck. Install two screws in open holes of each cargo deck tie-down ring (10) in the two aft rows.

11-314. Inspection — 165.0 U.S. Gallon Auxiliary Fuel Tank. (See figure 11-10). a. Visually inspect tank for indications of handling damage and serviceability.

b. Depress poppet valves (11) several times to assure proper operation.

c. Inspect hoses (4, 5, 6 and 7) for cleanliness, damage and wear.

11-315. Repair or Replacement — 165.0 U.S. Gallon Auxiliary Fuel Tank. a. Replace tank if unserviceable.

b. Replace poppet valve if malfunctioning or inoperable.

c. Replace damaged or unserviceable hoses.

11-316. Installation — 165.0 U.S. Gallon Auxiliary Fuel Tank. (See figure 11-10). a. Remove all cargo and/or equipment from the cargo tie-down area of the cabin.

b. Remove access door, or removable floor, in cargo deck, giving access to main fuel system quick disconnect hoses.

c. Remove two attachment screws from each cargo tie-down fitting in the two aft rows of fittings in the cabin floor. (See figure 11-11.) These rows of fittings are parallel to the aft cabin bulkhead.

d. Position the auxiliary tank and support assembly across the cabin, with the tank filler cap (12), at right of center on the forward side. Check operation of auxiliary fuel low light prior to filling tank.

e. Secure supports to the cargo deck by installing washers and bolts in open holes in the tie-down fittings (10). Use thin aluminum washers under bolt heads.

f. Remove caps from all hose openings, and connect hoses (4, 5, 6 and 7) from tank to main fuel system hoses at bulkhead below deck.

g. Remove electrical wires from stowage at beam under the deck, and remove insulating tape from wire ends. Connect electrical wiring to terminal block and grounding screw on outboard side of left center tank support.

h. Attach eight turnbuckles (8), between brackets on tank supports, to tie-down rings (9 and 10) located in the cargo deck and on the cabin bulkhead, using bolt, thin aluminum washer and self-locking nut at each attachment point. Tighten turnbuckles evenly and safety wire.

i. Fuel the auxiliary tank. (Refer to paragraph 1-74.)

11-317. Transfer Pump and Sump — 165.0 U.S. Gallon Auxiliary Tank. (See figure 11-10). The electrically operated transfer pump (13) is similar to the boost pump in the main fuel system, except that discharge is external. The transfer pump (13) and sump (14) are located in the bottom of the auxiliary fuel tank approximately on center line.

11-318. Removal — 165.0 U.S. Gallon Auxiliary Tank Transfer Pump and Sump. (See figure 11-10.) Remove pump and sump as follows:

Note

Make sure that the battery switch is in "OFF" position, that the helicopter is grounded, and that external power source has been disconnected prior to breaking any fuel line connection.

a. Accomplish steps a. through d., paragraph 11-313.

b. Remove transfer pump (13) as follows:

(1) Disconnect pump drain hose (6) from tee in sump drain hose (4).

(2) Remove 12 bolts and washers attaching transfer pump (13) and gasket to sump assembly (14) and pump mounting flange.

(3) Remove pump (13) and gasket from sump assembly (14), and cap or cover openings in sump and drain lines.

c. Remove sump assembly (14) as follows:

(1) Remove 12 bolts and washers and the wiring support bracket.

(2) Remove sump assembly (14) and O-ring seal (15) from the fuel tank.

(3) Remove O-ring seal (15) from the sump assembly and cover opening in fuel tank.

11-319. Inspection — Transfer Pump and Sump. (See figure 11-10.) Inspect O-ring seal (15) for damage or deterioration. Inspect transfer pump gasket for damage and deterioration.

11-320. Repair or Replacement Transfer Pump and Sump. (See figure 11-10.) a. Replace O-ring seal (15) if damaged or deteriorated.

b. Replace transfer pump gasket if damaged or unserviceable.

11-321. Installation — 165.0 U.S. Gallon Auxiliary Tank Transfer Pump and Sump. (See figure 11-10.) a. Uncover opening in fuel tank, and place O-ring seal (15) in groove of sump assembly (14).

b. Position sump assembly (14) in fuel tank opening. Install twelve washers and bolts, with wiring support bracket in place of washer on forward bolt at left-hand side. Tighten bolts evenly 45 to 50 inch-pounds.

c. Place gasket on transfer pump (13) and position pump and gasket in sump assembly port with pump discharge aft.

d. Install twelve washers and bolts attaching transfer pump (13) to sump assembly (14) and pump mounting flange.

e. Connect pump drain hose (6) to tee in sump drain hose (4).

f. Accomplish steps f. and g., paragraph 11-316.

11-322. Auxiliary Fuel Tank — 350.0 U. S. Gallons. (See figure 11-12 and 11-13.) An auxiliary fuel tank with a capacity of 350.0 U.S. gallons may be installed in the passenger-cargo compartment of UH-1B helicopters, only, for extended distance and ferry missions. The tank consists of a non-sealing bladder enclosed in a metal container which is secured to the floor section at the tie-down fittings. The tank sump is equipped with an electrically operated fuel transfer pump and fittings and flexible hoses for quick connection to the permanently installed piping which is a part of the main fuel system. Wiring for the transfer pump and the fuel level transmitter circuits is also permanently installed and is stowed when not in use. A check valve is incorporated in the fuel transfer line to the main fuel system to prevent reverse flow of fuel. The auxiliary transfer pump circuit relay is controlled by float switches in the main fuel cell.

11-323. Removal — 350.0 U.S. Gallon Auxiliary Fuel Tank. (See figure 11-12.) Remove fuel tank as follows:

Note

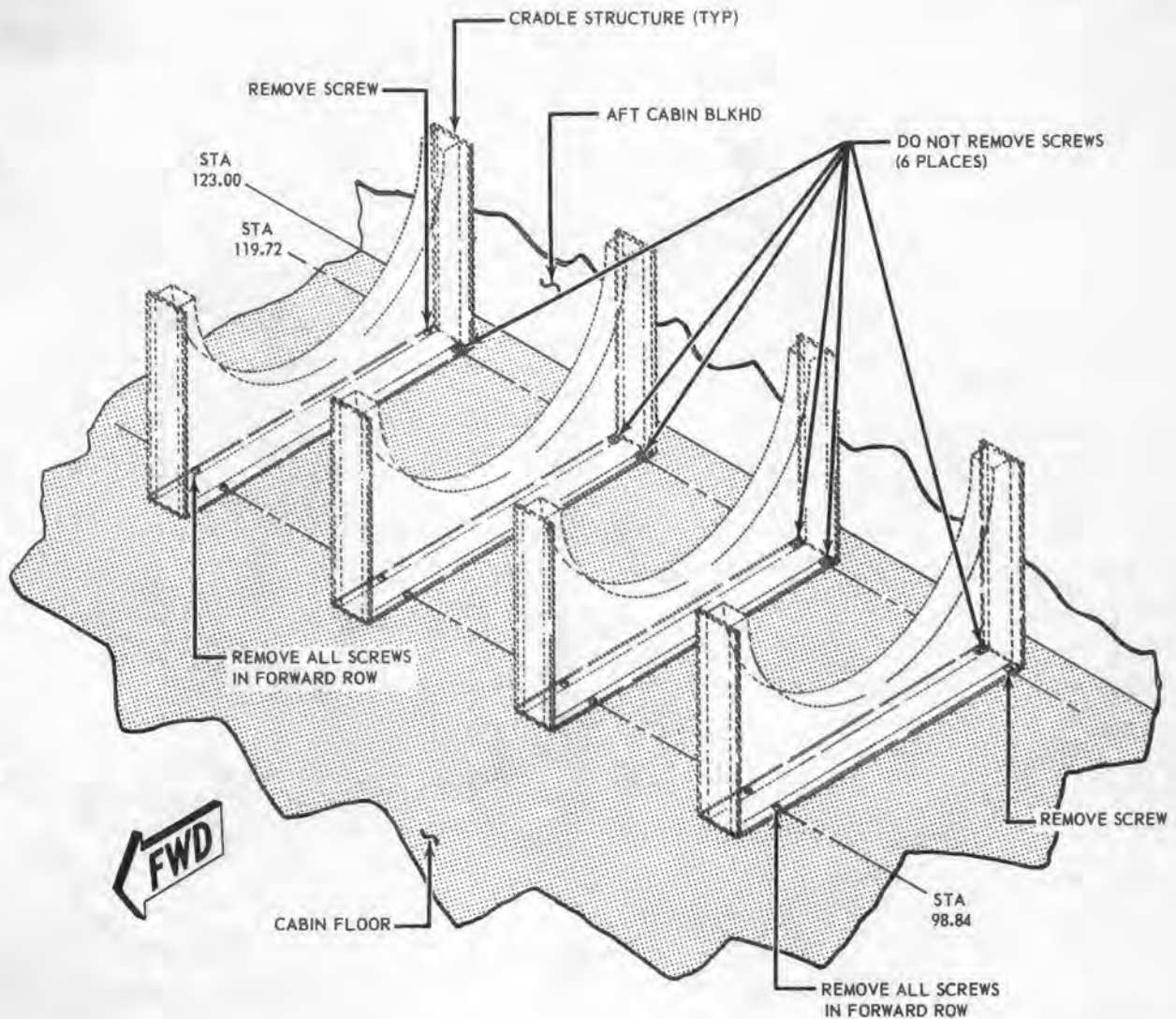
Make sure that the battery switch is in "OFF" position, that the helicopter is grounded, and that external power source has been disconnected prior to breaking any fuel connections.

a. Attach a suitable hose to the drain coupling on the right-hand bottom side of the auxiliary fuel tank and open drain valve (1) to drain fuel from the tank.

b. Remove access door in bottom of fuselage, forward of cargo sling clearance hole, and open pump drain valve (2) sump drain valve (3) and pump seal drain (4) to drain trapped fuel.

c. Disconnect auxiliary fuel tank lines (5 through 8) from permanently installed lines and cap all line openings.

d. Disconnect pump switch circuit electrical wiring. Cover wire ends with insulating tape and stow under deck.



204700-30

Figure 11-11. Tie-down fitting screw removal

e. Remove bolts, washers and nuts attaching tie rod assemblies (9) to tank.

f. Remove bolts and washers attaching tank assembly to cabin floor and remove tank assembly from the helicopter.

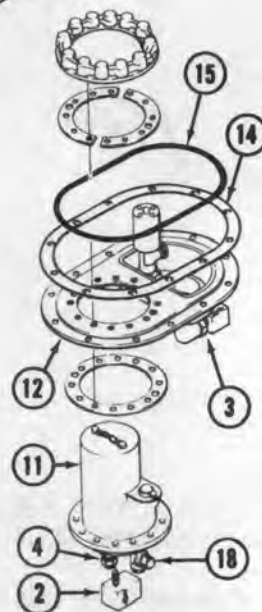
g. Remove bolts and washers attaching tie-rod assemblies (9) to aft cabin bulkhead, and remove tie-rod assemblies.

h. Remove screws attaching special access door to aft cabin bulkhead, and remove door.

Using same screws, replace removed door with standard configuration access door.

i. Install standard configuration center floor assembly in aft center section of the cabin floor, and install original size screws in the cargo tie-down fittings. Install access door in bottom of fuselage.

11-324. Inspection — 350.0 U.S. Gallon Auxiliary Fuel Tank. (See figure 11-12.) a. Visually inspect tank for indications of handling damage.



VIEW A

204706-14

Figure 11-12. 350.0 U.S. gallon auxiliary fuel tank

- b. Depress poppet valves (13) several times to assure proper operation.
- c. Inspect hoses (5, 6, 7 and 8) for cleanliness and general condition.

11-325. Repair or Replacement—350.0 U.S. Gallon Auxiliary Fuel Tank. a. Replace tank if damaged or unserviceable.

b. Replace poppet valve if malfunctioning or inoperable.

c. Replace hoses if frayed, damaged or unserviceable.

11-326. Installation — 350.0 U.S. Gallon Auxiliary Fuel Tank. (See figure 11-12.) a. Remove all cargo and/or equipment from the cargo tie-down area of the cabin.

b. Remove standard configuration access door in the lower section of the aft cabin bulkhead, and install special access door, using original hardware.

c. Remove two aft screws from each cargo tie-down fitting in the aft row of fittings parallel to the aft cabin bulkhead. Remove two forward screws from each cargo tie-down fitting in the forward row of fittings.

d. Remove the standard configuration center floor assembly from the aft center section of the cabin floor.

e. Position the auxiliary fuel tank assembly in the cabin parallel to the aft cabin bulkhead and with filler cap (10) forward.

f. Align the fuel tank base with the open holes by the cargo tie-down fittings, and install attaching washers and bolts.

g. Position tie-rod assemblies (9) in fuel tank fittings and against aft cabin bulkhead and install attaching nuts, washers and bolts.

h. Remove access door in bottom of fuselage, forward of cargo sling clearance hole. Remove caps from all line openings and connect auxiliary fuel tank lines (5, 6, 7 and 8) to permanently installed lines.

Note

Check pump drain valve (2), sump drain valve (3) and pump seal drain (4) to make sure they are closed.

i. Remove electrical wiring from stowage and remove insulating tape from wire ends. Connect electrical wiring to pump switch circuit.

j. Fuel the auxiliary tank. (Refer to paragraph 1-74.)

11-327. 350.0 U. S. Gallon Auxiliary Fuel Tank Transfer Pump and Sump. (See figure 11-12.) The electrically operated transfer pump (11) is similar to the boost pump in the main fuel system, except that discharge is external. The transfer pump (11) and sump assembly (12) are located in the bottom of the auxiliary fuel tank approximately on center line.

11-328. Removal — 350.0 U.S. Gallon Auxiliary Transfer Pump and Sump. (See figure 11-12.) Remove transfer pump and sump as follows:

Note

Make sure that the battery switch is in "OFF" position, that the helicopter is grounded, and that external power source has been disconnected prior to breaking any fuel line connection.

a. Accomplish steps a. through d., paragraph 11-323.

b. Remove transfer pump (11) as follows:

(1) Disconnect pump drain hose (7) from tee in sump drain hose (5).

(2) Cut safety wire and remove 12 bolts and washers attaching transfer pump (11) to sump assembly (12) and pump mounting flange.

(3) Remove pump (11) and gasket from sump assembly (12) and cap or cover openings in sump and drain lines.

c. Remove sump assembly (12) as follows:

(1) Remove 12 bolts and washers and the wiring support bracket.

(2) Remove sump assembly (12), asbestos gasket (14) and O-ring seal (15) from the fuel tank.

(3) Remove asbestos gasket (14) and O-ring seal (15) from the sump assembly and cover opening in fuel tank.

11-329. Inspection — 350.0 U.S. Gallon Auxiliary Tank Transfer Pump and Sump. (See figure 11-12.) Inspect asbestos gasket (14) O-ring seal (15) and transfer pump gasket for damage and deterioration.

11-330. Repair or Replacement — Transfer Pump and Sump. Replace asbestos gasket, O-ring seal or transfer pump gasket if damaged or deteriorated.

11-331. Installation — 350.0 U.S. Gallon Auxiliary Tank Transfer Pump and Sump. (See figure 11-12.) a. Uncover opening in fuel tank and place O-ring seal (15) in groove of sump assembly (12) and asbestos gasket (14) on face of sump.

b. Position sump and gaskets in fuel tank opening. Install 12 washers and bolts, with wiring support bracket in place of washer on forward bolt at left-hand side. Tighten bolts evenly 45 to 50 inch-pounds.

c. Place gasket on transfer pump (11) and position pump and gasket in sump port with pump discharge aft.

d. Install 12 washers and bolts attaching transfer pump (11) to sump assembly (12) and pump mounting flange. Safety wire bolts.

e. Connect pump drain hose (7) to tee in sump drain hose (5).

f. Accomplish steps h. through j., paragraph 11-326.

11-332. Internal Auxiliary Fuel Tank — 50.0 or 60.0 U. S. Gallon. (See figures 11-14 and 11-15.) A 60.0 U.S. gallon capacity auxiliary fuel system may be installed in the passenger-cargo compartment of UH-1A and UH-1B helicopters for extended distance and ferry missions. A comparable 50.0 U.S. Gallon capacity system may be installed in all UH-1B helicopters. The tank consists of a self-sealing, self-supporting bladder and may be installed just aft of the pilot and copilot seats or at the rear of the passenger-cargo compartment just forward of the aft cabin bulkhead. The tank sump is equipped with an electrically operated fuel transfer pump, a fuel-low switch for caution panel circuit and fittings and flexible hoses for quick connection to the permanently installed piping which is a part of the main fuel system. Couplings on piping and tank hoses are smaller

on UH-1A helicopters, Serial No. 58-2078 through 58-3047, than those provided on UH-1A, Serial No. 59-1607 and subsequent, and on all UH-1B helicopters. Wiring for the transfer pump and fuel level transmitter circuits is also permanently installed and is stowed when not in use. A check valve is incorporated in the fuel transfer line to the main fuel system to prevent reverse flow of fuel. The auxiliary transfer pump circuit relay is controlled by float switches in the main fuel cell.

11-333. Removal — Forward 50.0 or 60.0 U.S. Gallon Auxiliary Fuel Tank. (See figure 11-4.) a. Make sure that helicopter battery switch is in the "OFF" position, that all external power is disconnected and that the helicopter is grounded.

b. Remove access doors and panels necessary to gain access to fuel and vent disconnects.

c. Disconnect fuel vent hose (3), fuel system hose (4) and pump drain hose (5). Cap or cover hose openings to prevent entrance of foreign material. Remove clamps attaching hose bundle to cabin floor tie-down rings.

d. Loosen and release hold-down straps (6) from tie-down rings on cabin floor.

e. Remove bolts attaching tank to cabin floor and slightly tip tank to facilitate access to electrical wiring on tank sump (7). Disconnect electrical wiring from pump and cover wire ends with tape. Stow wiring under clamp provided for this purpose on left-hand side of access cavity.

f. Remove tank from helicopter and prepare for storage. (Refer to paragraph 16-26.)

g. Install access doors and panels.

11-334. Installation — Forward 50.0 or 60.0 U.S. Gallon Auxiliary Fuel Tank. (See figure 11-14.) Install 50.0 and 60.0 gallon auxiliary fuel tank as follows:

Note

If fuel tank has been installed in aft location the tank pump must be removed from the sump assembly (7), rotated 120 degrees counterclockwise and reinstalled. Check for leaks after re-installation.

Note

Couplings on piping and tank hoses may be smaller on UH-1A helicopters, Serial No. 58-2078 through 58-3047, than those provided on UH-1A, Serial No. 59-1607 and subsequent, and on all UH-1B helicopters.

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

b. Remove access doors and panels necessary to gain access to fuel and vent connections.

c. Position the fuel tank on the cabin floor, just aft of the pilot and copilot seats, with the filler fuel cap on the right-hand side of the helicopter.

d. Remove electrical wiring from under clamp on left-hand side of access cavity and remove tape from wire ends. Tip fuel tanks slightly to facilitate access to tank sump (7) and connect electrical wiring to pump.

Note

Make sure electrical wiring is protected from possible chafing and abrasion.

e. Align fuel tank mounting holes with holes in cabin floor and install bolts attaching fuel tanks to cabin floor.

f. Uncap or uncover openings in pump drain hose (5), fuel system hose (4) and fuel vent hose (3) and connect to mating lines. Bundle hoses and clamp in two places to tie-down rings on cabin floor.

g. Position hold-down straps (6) over fuel tank and attach to tie-down rings on cabin floor. Tighten and secure hold-down straps.

h. Perform operational check. (Refer to TM 55-1520-211-10.)

i. Install access doors and panels.

11-335. Removal — Aft 50.0 or 60.0 U.S. Gallon Auxiliary Fuel Tank. (See figure 11-15.) a. Make sure that helicopter battery is in the "OFF" position, that all external power is disconnected and that the helicopter is grounded.

REMOVE, INSULATE, AND STOW WIRE NO. Q30B20 FROM TERMINAL A2 AND WIRE NO. Q33A20 FROM TERMINAL A3

CONNECT STOWED WIRES NO. Q50A18 TO TERMINAL A2 AND WIRE NO. Q51A18 TO TERMINAL A3

204-075-904-1 CABLE ASSY
(STOWED WIRES) (REF)

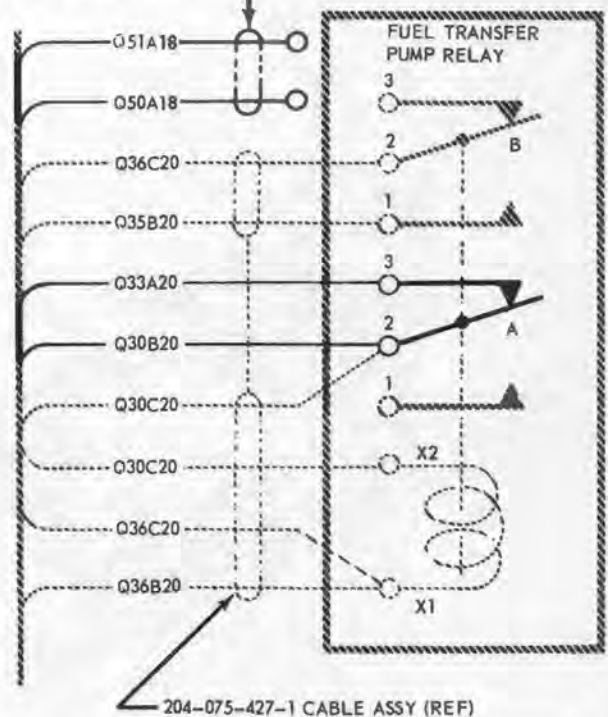


Figure 11-13. Fuel transfer pump relay wiring

b. Remove access doors and panels necessary to gain access to fuel and vent disconnects.

c. Disconnect fuel vent hose (3), fuel system hose (4) and pump drain hose (5). Cap or cover hose openings to prevent entrance of foreign material.

d. Loosen and release hold-down straps (6) from litter rack support rings on aft cabin bulkhead and from tie-down rings in cabin floor on both sides of fuel tank. Remove hold-down straps.

e. Slightly tip tank to facilitate access to electrical wiring on tank sump. Disconnect electrical wiring from pump and cover wire ends

1. Fuel Tank
2. Sump Drain Hose
3. Fuel Vent Hose
4. Fuel System Hose
5. Pump Drain Hose
6. Hold Down Straps
7. Sump Assembly
8. Filler Cap

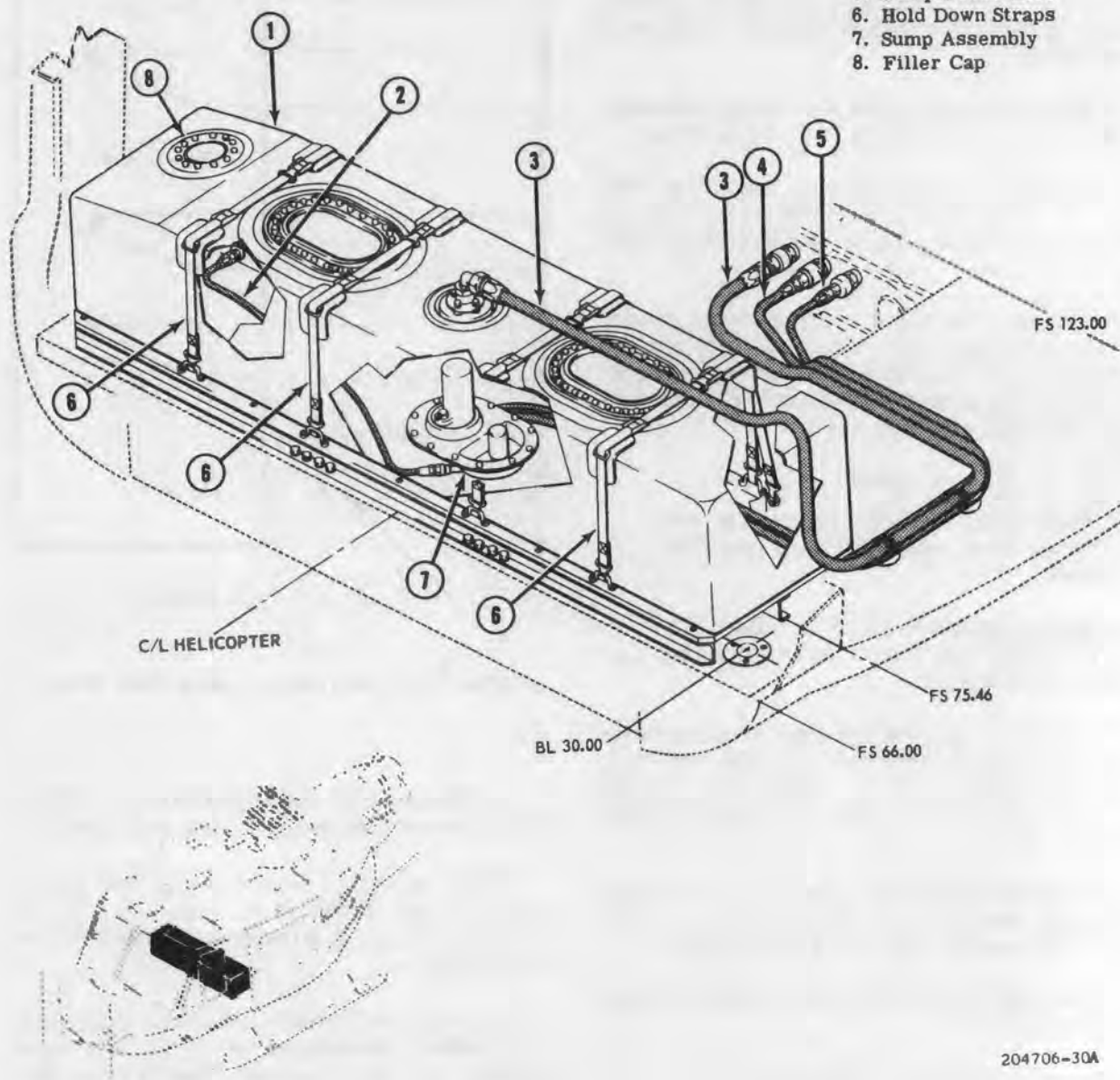


Figure 11-14. Typical forward 50 and 60 U.S. gallon auxiliary fuel tank

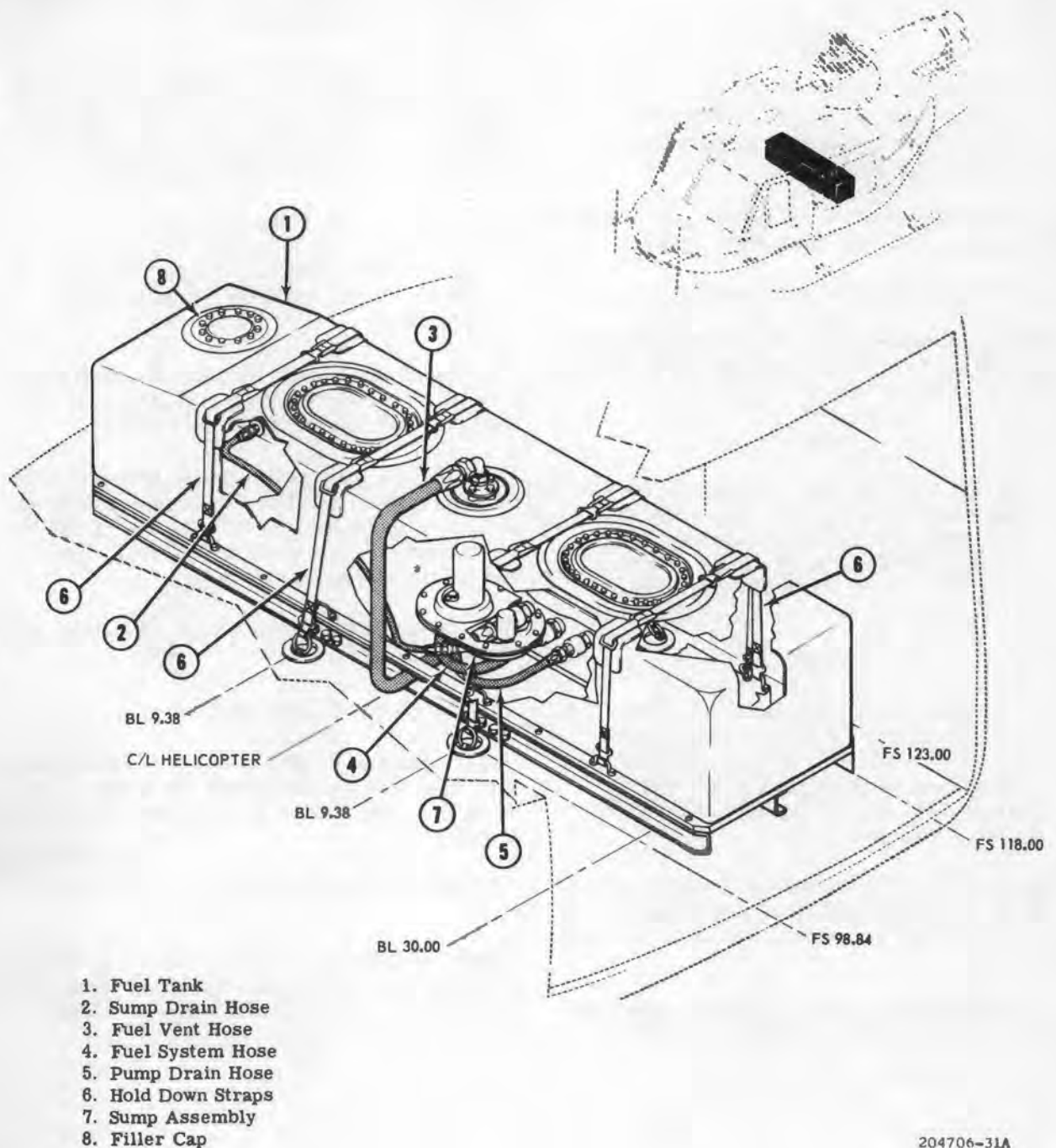


Figure 11-15. Typical aft 50 and 60 U.S. gallon auxiliary fuel tank

with tape. Stow wiring under clamp provided for this purpose on left-hand side of access cavity.

Note

Do not cut wiring to shorten length and facilitate stowage. Full length is required when fuel tank is installed in forward position.

f. Remove tank from helicopter and prepare for storage. (Refer to paragraph 16-26.)

g. Install access doors and panels.

11-336. Installation — Aft 50.0 or 60.0 U.S. Gallon Auxiliary Fuel Tank. (See figure 11-15.) Install fuel tank as follows:

Note

If fuel tank has been installed in forward location the tank pump must be removed from the sump assembly (7), rotated 120 degrees clockwise and reinstalled. Check for leaks after reinstallation.

Note

Couplings on piping and tank hoses may be smaller on UH-1A helicopters, Serial No. 58-2078 through 58-3047, than those provided on UH-1A, Serial No. 59-1607 and subsequent, and on all UH-1B helicopters.

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

b. Remove access doors and panels necessary to gain access to fuel and vent connections.

c. Position the fuel tank on the cabin floor, approximately three inches forward of the aft cabin bulkhead, with filler cap on the right-hand side of the helicopter.

d. Remove electrical wiring from under clamp on left-hand side of access cavity and remove tape from wire ends. Tip fuel tank slightly to facilitate access to tank sump (7) and connect electrical wiring to pump.

Note

Make sure electrical wiring is protected from possible chafing and abrasion.

e. Uncap or uncover openings in pump drain hose (5) fuel system hose (4) and fuel vent hose (3) and connect to mating lines.

f. Position hold-down straps (6) over fuel tank and attach to litter rack support rings on aft cabin bulkhead and to tie-down rings in cabin floor on both sides of fuel tank. Tighten and secure hold-down straps.

g. Perform operational check. (Refer to TM 55-1520-211-10.)

h. Install access doors and panels.

11-337. Removal — 50.0 or 60.0 U.S. Gallon Auxiliary Fuel Tank Transfer Pump and Sump. a. Remove fuel tank. Refer to paragraph 11-333 or 11-335.)

b. Accomplish paragraph 11-318, steps b. and c.

11-338. Installation — 50.0 or 60.0 U.S. Gallon Auxiliary Fuel Tank Transfer Pump and Sump. Accomplish paragraph 11-321, steps a. through e.

CHAPTER 12 ELECTRICAL SYSTEMS

Section I — Scope

12-1. Scope. The purpose of this chapter is to provide organizational maintenance instructions for the electrical system.

12-2. General. The Models UH-1A and UH-1B helicopters are equipped with a 28 volt direct current electrical system. The primary sources of power are the transmission driven and engine driven generators and a 24 volt battery.

12-3. A secondary source of power, used in operating equipment requiring alternating current, is supplied by two 115 volt, 400 cycle, three phase inverters. Both inverters receive power for their operation from the main generator (transmission driven), standby generator (engine driven) and battery. All circuits

in the helicopter are single wire with a common ground return. The negative terminals of both generators and battery are grounded to the helicopter structure. Generator and battery power is fed to the circuit breakers on the overhead console and circuit breaker panel on the right-hand side of the pedestal. Switches used in controlling the various electrical units of the helicopter are mounted on the overhead console and the pedestal. Circuit breakers used to protect the various circuits against overloads are located on the AC and DC circuit breaker panel.

12-4. External power may be supplied to the helicopter by means of a receptacle accessible through a hinged door located below the aft electrical compartment door.

Section II — Direct Current

12-5. Description. Direct current for the helicopter's electrical system is supplied by the transmission driven generator and a 24 volt battery. A receptacle is provided for connection to an external power supply. A voltage regulator and a reverse current relay are used in the generator system to regulate the voltage

and prevent the battery from discharging through the generator when the generator output voltage is lower than that of the battery.

12-6. Trouble Shooting. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
No generator output	No residual magnetism in field	Flash field by momentarily applying positive battery voltage to generator terminal A
	Open circuit in voltage regulator	Check continuity between terminals A and B of regulator; if circuit is open, replace regulator
	Open generator field circuit	Check continuity of wiring and of generator field winding; repair wiring or replace generator

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
	Generator armature burned out or shaft sheared	Replace generator
	Brushes excessively worn	Visually check brushes and replace them as required
	Faulty connections voltage regulator	Tighten connections
	Generator armature or field windings short circuited	Replace generator
	Generator brushes binding in holders	Remove, clean and reset brushes
	Commutator is dirty, rough or pitted	Visually check commutator. If dirty, clean; if rough or pitted, replace generator
Generator output polarity is reversed	Reversed generator field residual magnetism	Stop engine. Flash field by momentarily applying positive battery voltage to generator terminal A
Generator produces voltage, but loadmeter reads zero	Generator switch OFF	Place generator switch ON
	Defective reverse current relay	Check for higher voltage on generator terminal than on BAT terminal of relay. Replace defective relay
	Defective loadmeter circuit or loadmeter	Check for continuity of wiring between loadmeter and the loadmeter shunt. Replace wiring or replace defective loadmeter
Generator voltage too high	Voltage regulator not adjusted properly	Check generator output with accurate voltmeter; adjust voltage regulator rheostat
	Defective rheostat in voltage regulator	Check rheostat for smooth adjustment between 26 and 30 volts; replace defective regulator
	Faulty negative connection to regulator	Tighten connection
	Defective voltmeter	Check generator output with an external voltmeter; replace defective voltmeter
	Faulty wiring between generator and voltmeter	Check continuity of wire. Repair wiring

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
	Contact springs of voltage regulator base do not make good contact with regulator prongs	Clean spring and prongs
Generator voltage too low	Voltage regulator not adjusted properly	Check generator output with voltmeter. Adjust rheostat for proper voltage
	Faulty connections in generator field circuit	Tighten connections
	Contact springs of voltage regulator base do not make good contact with regulator plugs	Clean springs and prongs
	Defective voltmeter	Check generator output with external voltmeter; replace defective voltmeter
Movement of regulator rheostat does not alter voltage within normal range	Defective rheostat	Check for smooth control of voltage between 26 and 30 volts; replace defective rheostat
	Carbon pile out of adjustment or defective	Replace regulator
	Faulty wiring between generator and regulator	Repair wiring
	Contact springs of voltage regulator base do not make good contact with regulator prongs	Clean spring and prongs
Loadmeter or voltmeter fluctuates rapidly under steady load conditions	Voltage regulator unstable	Replace faulty regulator
Voltage varies excessively with changes in engine speed or electrical load	Carbon pile out of adjustment or defective	Replace defective regulator
Battery will not hold charge	Charging rate too low	Adjust voltage regulator
	Level of electrolyte too low	Send to battery shop. (Refer to paragraph 1-97.)
	Impurities in electrolyte	Replace battery

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive loss of electrolyte	Charging rate too high	Adjust voltage regulator
	If loss is in individual cell(s) only, cell(s) is faulty	Send battery to shop for cell replacement
	Cracked cell cases	Check cell case for leaks; replace battery
Battery terminals corroded	Excessive charging or discharging rate	Reduce charging rate or load
Battery polarity reversed	Battery connections reversed	Check wiring to battery plug. Reverse wiring if necessary

12-7. Generator Field Control Relay. This relay is located in the aft electrical compartment of the helicopter. It provides control of the main generator by opening and closing the generator shunt field. It is tripped by the generator overvoltage applied through the overvoltage relay and may be reset electrically or manually.

12-8. Removal — Generator Field Control Relay. a. Turn battery switch to OFF.

b. Disconnect electrical connector to relay. Remove mounting nuts, washers, and screws and lift relay from helicopter.

12-9. Installation — Generator Field Control Relay. a. Position relay in aft electrical compartment and install mounting screws, washers, and nuts.

b. Connect electrical connector to relay.

12-10. Battery Relay. The battery relay is mounted on a shelf in the aft electrical compartment. This unit is an electrically operated switch between the battery and the main bus bar. It is controlled by a switch which opens or closes the circuit to the actuating coil of the relay.

12-11. Removal — Battery Relay. a. Disconnect battery.

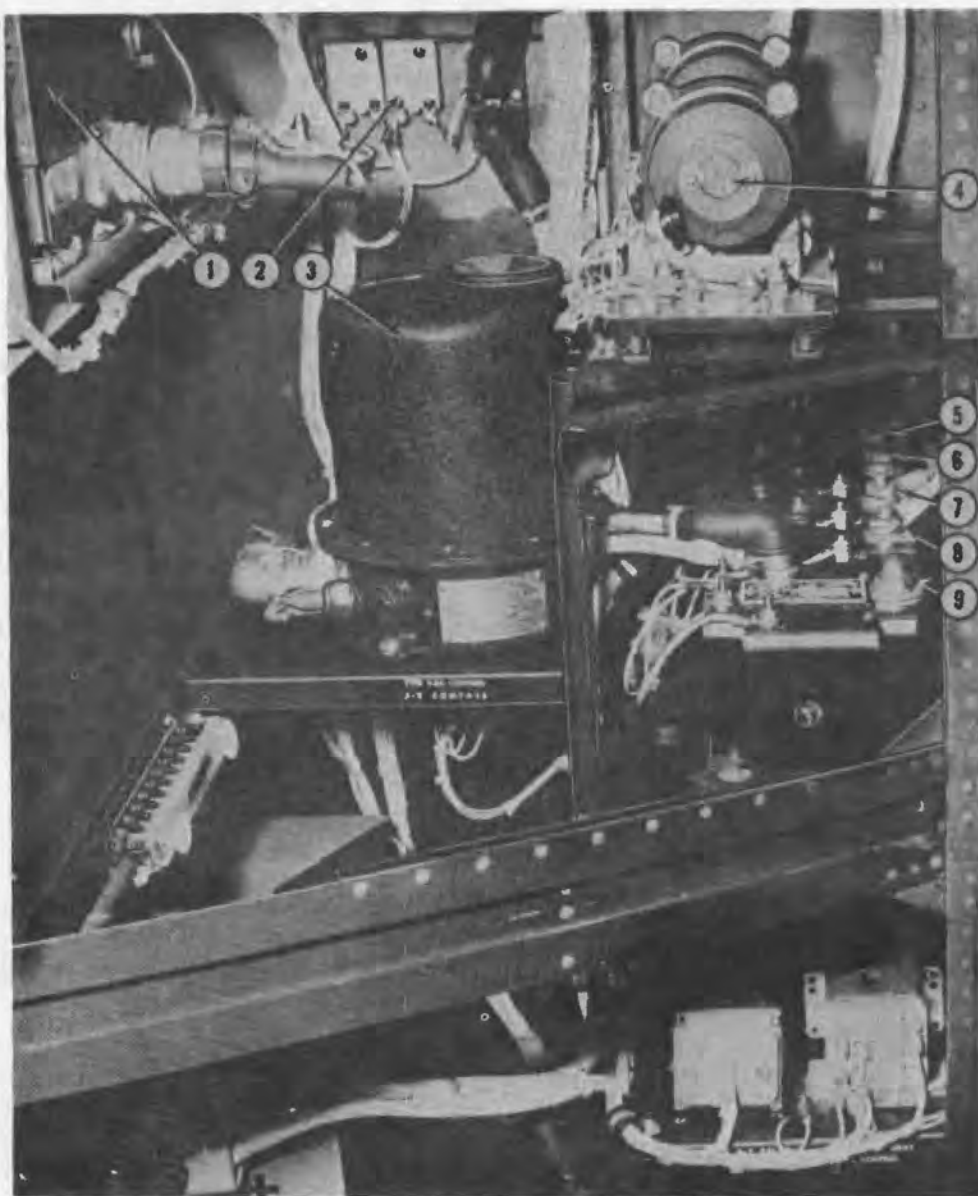
b. Remove bus bar from top of relays. Remove electrical wires from battery relay and tape wire ends. Remove nuts, washers, and screws and lift relay from support.

12-12. Installation — Battery Relay. a. Position relay on support and install screws, washers, and nuts. Remove tape from electrical connections and install wires on relay.

b. Place bus bar on terminals and install nuts. Connect battery leads to battery.

12-13. Voltage Regulator. Two voltage regulators are located in the forward electrical compartment (one for the main generator and one for the standby generator) on the left hand side of the helicopter. The voltage regulator adjusts the charging of the generator by increasing or decreasing resistance in the shunt of the field coil winding. The voltage regulator of the standby generator is set at a lower voltage than that of main generator.

12-14. Removal — Voltage Regulator. a. Turn battery switch to "OFF" position.



1. Gyrosyn Compass Amplifier
2. Circuit Breakers
3. Gyrosyn Compass Control
4. Voltage Regulator
5. Starter Relay
6. External Power Relay
7. Non-Essential Bus Relay
8. Battery Relay
9. Reverse Current Relay (Main Generator)

204475-4

Figure 12-1. Electrical compartment (Typical)

b. Unlock snap-clamps and remove voltage regulator from mounting base.

12-15. Installation — Voltage Regulator. Position voltage regulator on mounting base and lock snap-clamps.

12-16. Adjustment — Voltage Regulator. Adjust voltage regulator by turning adjustment screw on base of regulator clockwise to increase voltage and counter-clockwise to decrease voltage. Adjust main generator voltage regulator to the following values dependent upon the average ambient temperature conditions.

90°F (and above)	27 volts
32°F to 90°F	27.5 volts
32°F and lower	28.5 volts

Note

Always adjust the standby generator voltage regulator 1.0 volt below the main generator voltage regulator.

12-17. Reverse Current Relay. The reverse current relay is mounted in the aft electrical compartment. This unit prevents the generator from being connected to the line until operating voltage is attained, protects the generator against overload, prevents reverse current flow and holds generator connected to line unless voltage drops to a point where continued operation would be detrimental to the electrical equipment.

12-18. Removal — Reverse Current Relay. a. Disconnect battery.

b. Remove bus bar from top of relays. Remove electrical wires from reverse current relay and tape wire ends. Remove mounting nuts, washers, and bolts and lift relay from support.

12-19. Installation — Reverse Current Relay. a. Position relay on support and install mounting bolts, washers, and nuts. Remove tape from electrical connections and install wires on relay.

b. Place bus bar on terminals and install nuts. Connect battery leads to battery.

12-20. Bus Control Relay. The bus control relay is actuated from the indicator terminal of the main generator reverse current relay. It also controls the nonessential bus relay; turns on non-essential bus when external power or main generator is on; prevents the starter generator from being on when generator is on and operates main generator failure caution lights. This unit is located in the aft electrical compartment.

12-21. Removal — Bus Control Relay. a. Turn battery switch to "OFF" position.

b. Disconnect electrical wires from relay and tape wire ends. Remove mounting nuts, washers, and screws and lift relay from helicopter.

12-22. Installation — Bus Control Relay. Position relay in place and install mounting screws, washers and nuts. Remove tape from wires and connect wires to proper terminals.

12-23. Overvoltage Relay. The over voltage relay is located in the aft electrical compartment. This unit actuates the trip coil on the field relay when 32 volts is reached and breaks the field of the generator which takes the generator off the line.

12-24. Removal — Over Voltage Relay. a. Disconnect battery.

b. Disconnect electrical wires from relay and tape ends of wires. Remove mounting nuts, washers and screws from relay and lift relay from helicopter.

12-25. Installation — Over Voltage Relay. Position relay on shelf and install mounting screws, washers, and nuts. Remove tape from wires and connect wires to proper terminals. Connect battery.

12-26. Non-Essential Bus Relay. The non-essential bus relay is mounted on a shelf in the aft electrical compartment. This unit is an electrically operated switch between the main bus bar and the non-essential bus. It is controlled by a switch which opens or closes the circuit to the actuating coil of the relay.

12-27. Removal — Non-Essential Bus Relay. a. Disconnect battery.

b. Remove bus bar from top of relays. Remove electrical wires from non-essential bus

relay and tape wire ends. Remove mounting nuts, washers, and bolts and lift relay from support.

12-28. Installation — Non-Essential Bus Relay.

a. Position relay on support and install mounting bolts, washers, and nuts. Remove tape from electrical connections and install wires on relay.

b. Place bus bar on terminals and install nuts. Connect battery leads to battery.

12-29. Starter Relay. The starter relay is located in the aft electrical compartment. This unit supplies direct current to the starter when the starter switch is depressed.

12-30. Removal — Starter Relay. a. Disconnect battery.

b. Remove bus bar from top of relays. Remove electrical wires from starter relay and

tape wire ends. Remove mounting nuts, washers, and bolts and lift relay from support.

12-31. Installation — Starter Relay. a. Position relay on support and install mounting bolts, washers, and nuts. Remove tape from electrical connections and install wires on relay.

b. Place bus bar on terminals and install nuts. Connect battery leads to battery.

12-32. Interior Lights. Interior light circuits include the instrument lights, instrument secondary lights located on the glare shield, console and pedestal panel lights, dome lights, and cockpit lights.

12-33. Troubleshooting — Interior Lights. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Switch fails to operate lights	Defective switch rheostat	Replace switch rheostat
Circuit breaker breaking circuit	Short in switch or wires	Replace necessary parts
One light dim or intermittent	Poor ground	Remove light and clean ground
One light out	Burned out bulb Corroded lamp socket Broken wire	Replace bulb Clean terminals Replace wire

12-34. Removal — Interior Lights. a. Disengage appropriate circuit breaker.

b. Remove mounting hardware, lift out light assembly and disconnect light wire.

12-35. Installation — Interior Lights. a. Connect light wire and install light assembly with mounting hardware.

b. Engage appropriate circuit breaker and check light for proper operation.

12-36. Landing Light and Search Light. The landing light is mounted on the underside of

the cabin forward of the aft cross tube. The search light is also mounted on the underside of the cabin forward of the front cross tube. Each light is retractable and is controlled by a switch on the pilot's collective stick. The circuit is protected by a circuit breaker on the overhead console panel.

12-37. Troubleshooting — Landing or Search Light. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Light inoperative	Defective switch	Replace switch
Circuit breaker breaking circuit	Short in switch or wires	Replace necessary parts
One light dim constantly or intermittently	Poor ground	Remove light and ground
One light out	Burned out bulb or corroded lamp socket	Replace bulb. Clean terminals or replace light
	Broken wires	Repair wires

12-38. Removal — Landing or Search Light. a. Turn battery switch to "OFF" position.

b. Remove four mounting screws from lower side of helicopter. Remove and disconnect wires from terminals. Cover wires with tape.

12-39. Installation — Landing or Search Light. Remove tape from wire ends. Attach wires to proper terminals on light and install wire clamp. Position light through hole and install mounting screws. Check light for operation.

12-40. Anti-Collision Light. The anti-collision light is mounted on top of the fuselage aft of the cabin area. Rotation of the light creates a flashing action that is visible for a considerable distance. This light is controlled by a switch on the exterior light panel on the overhead console.

12-41. Removal — Anti-Collision Light. a. Turn battery switch to "OFF" position. Remove mounting screws holding light to top of fuselage.

b. Pull light out as far as wiring will permit and disconnect electrical connector.

12-42. Installation — Anti-Collision Light. Connect electrical connector. Position light in place and install mounting screws.

12-43. Navigation Lights. The navigation lights circuit consists of circuit breaker, two selector switches, flasher, two red lights on left side and two green lights on right side (one each above and below the cabin door), three white lights (one each above the cabin door and one on bottom right side of cabin), and one amber light in the vertical fin of the

aft section assembly. On UH-1B Serial No. 64-14101 and subsequent two amber lights are mounted just below the vertical fin in the aft section assembly. On UH-1B Serial No. 65-9416 and subsequent the white lights are protected by a separate circuit breaker.

12-44. Trouble Shooting — Navigation Lights. (Perform steps in paragraph 12-37.)

12-45. Removal — Navigation Lights. a. Make sure battery switch and light switch are in "OFF" position.

b. Remove cover mounting screw and remove cover. Remove two screws mounting light assembly to bracket, pull assembly from ship and disconnect electrical connector. Remove light assembly from helicopter and cover wire with tape.

12-46. Installation — Navigation Lights. a. Remove tape from wire and connect light assembly.

b. Position light assembly and install two mounting screws. Place cover in position and install mounting screws.

12-47. Navigation Lights Flasher. The navigation lights flasher is mounted in the aft electrical compartment. On helicopters through UH-1B Serial No. 64-14191 this unit will cause the white and colored navigation lights to flash alternately. On UH-1B Serial No. 65-9416 and subsequent it will cause only the colored navigation lights to flash.

12-48. Removal — Flasher — Navigation Lights. a. Make sure battery switch is in "OFF" position.

b. Disconnect electrical connector. Remove mounting nuts, washers, and bolts and lift flasher from helicopter.

12-49. Installation — Navigation Lights Flasher. Position flasher on shelf and install mounting bolts, washers and nuts. Connect electrical connector.

12-50. Rheostat. The rheostats are mounted on the overhead console. The rheostats are a means of turning on, and dimming instrument lights.

12-51. Removal — Rheostat. a. Make sure battery switch is in "OFF" position. Disengage fasteners and swing right-hand side of overhead console down.

b. Remove rheostat pointer knob. Remove nut and washer and disconnect wires from terminals of rheostat and lift rheostat from panel. Tape ends of wires.

12-52. Installation — Rheostat. a. Position rheostat in panel and install washer and nut. Install pointer knob.

b. Remove tape from wires and install on proper posts of rheostat. Carefully raise panel into position, noting that wires stow without binding or interference and engage panel fasteners.

12-53. Control Panels. The control panels on the overhead console consist of the following: Dome lights and pitot heater, exterior lights, cabin heater instrument lights, AC power, DC power, and miscellaneous panels. The panels on the pedestal consist of hydraulic control and force trim, caution, and engine control panels.

12-54. Removal — Control Panels. Remove control panels as follows:

Note

The removal procedure for all panels are relatively the same. A single removal procedure may be used for any panel.

a. Turn battery switch to "OFF" position.

b. Release snap fasteners holding panel to pedestal or overhead console. Carefully lift panel away from mounting position. Disconnect electrical receptacle and lift panel from mounting position.

12-55. Installation — Control Panels. Connect electrical receptacle to under side of panel. Position panel in place being careful not to damage wiring. Connect fasteners.

12-56. DC Circuit Breakers. The DC circuit breakers are mounted on the overhead console. DC circuits can be opened and closed by operating these trip-free, push-pull type circuit breakers.

12-57. Removal — DC Circuit Breakers. Make sure battery switch is in "OFF" position. Open circuit breaker panel. Disconnect leads from circuit breakers and tape ends of leads. Remove mounting screws and lift circuit breaker from panel.

12-58. Installation — DC Circuit Breakers. Position circuit breaker in panel and install mounting screws. Remove tape from leads and connect leads to circuit breaker terminals. Close circuit breaker panel.

12-59. Thermocouple Lead Spool Resistor. The thermocouple lead spool resistor is located in the aft electrical compartment. Two sections of chromel and alumel leads are used to connect the thermocouple to the indicator. The thermocouple lead spool resistor is a part of the tailpipe temperature indicator circuit.

12-60. Removal — Thermocouple Lead Spool Resistor. Disconnect leads from resistor. Remove mounting nuts, washers and screws and lift resistor from compartment.

12-61. Installation — Thermocouple Lead Spool Resistor. Position resistor in compartment and install mounting screws, washers, and nuts. Connect leads from thermocouple and indicator circuits.

12-62. Adjustment — Thermocouple Lead Spool Resistor. a. Disconnect thermocouple leads at indicator and measure resistance of circuit. It shall be 8.0 ± 0.05 ohms.

b. If necessary, cut thermocouple lead spool resistor to attain this value.

12-63. Hydraulic Pressure Warning Switch (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). The hydraulic pressure warning switch on these helicopters is mounted on the bulkhead on the right-hand side of the transmission. When system pressure gets low, the pressure switch turns on the warning light on the instrument panel.

12-64. Removal — Hydraulic Pressure Warning Switch (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). a. Make sure battery switch is in "OFF" position.

b. Remove right-hand transmission cowling. Slide a small drain pan under pressure switch and disconnect hydraulic line. Cap all openings.

c. Disconnect electrical receptacle. Remove mounting nuts, washers, and bolts and lift switch from bracket.

12-65. Installation — Hydraulic Pressure Warning Switch (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). a. Position pressure switch in bracket and install mounting bolts, washers and nuts. Remove caps from all openings. Connect electrical receptacle and hydraulic line.

b. Fill and bleed hydraulic system. Install cowling.

12-65A. Hydraulic Pressure Warning Switch (UH-1B Serial No. 64-14101 and subsequent). A pressure warning switch is located in each of the two hydraulic system module assemblies which are mounted on the bulkhead on the right-hand side of the transmission. When pressure in either system decreases, the pressure switch activates a warning light on the instrument panel.

12-65B. Removal — Hydraulic Pressure Warning Switch (UH-1B Serial No. 64-14101 and subsequent). a. Make sure battery switch is in "OFF" position.

b. Remove right-hand transmission cowling. Slide a small drain pan under pressure switch and disconnect hydraulic line. Cap all openings.

c. Disconnect electrical receptacle. Back off check nut and remove switch from module assembly. Cap opening in module.

12-65C. Installation — Hydraulic Pressure Warning Switch (UH-1B Serial No. 64-14101 and subsequent). a. Remove cap from module opening. Install pressure switch, with check nut, into module assembly. Tighten check nut with 40 to 50 inch-pounds torque.

b. Remove caps from all openings. Connect electrical receptacle and hydraulic line.

c. Fill and bleed hydraulic system. Install cowling.

12-66. Hydraulic Bypass Solenoid Valve (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). The hydraulic bypass solenoid valve on these helicopters is mounted on the bulkhead on the right-hand side of the transmission. This valve is controlled by a switch on the hydraulic control panel.

12-67. Removal — Hydraulic Bypass Solenoid Valve (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). a. Remove right-hand transmission cowling.

b. Slide a small drain pan under solenoid valve and disconnect hydraulic lines from valve. Cap all openings.

c. Disconnect electrical receptacle. Remove mounting nuts, washers and bolts and lift valve from mounting bracket.

12-68. Installation — Hydraulic Bypass Solenoid Valve (UH-1A and UH-1B Serial No. 60-3546 through 64-14100). a. Position valve on mounting bracket and install mounting bolts, washers and nuts.

b. Remove caps from all openings. Connect hydraulic lines and electrical receptacle.

c. Fill and bleed hydraulic system. Install cowling.

12-68A. Hydraulic Bypass Solenoid Valve (UH-1B Serial No. 64-14101 and subsequent). A bypass solenoid valve is located in the top of each of the two hydraulic system module assemblies which are mounted on the bulkhead on the right-hand side of the transmission. This valve is controlled by a switch on the hydraulic control panel.

12-68B. Removal — Hydraulic Bypass Solenoid Valve (UH-1B Serial No. 64-14101 and subsequent). a. Remove right-hand transmission cowling.

b. Slide a small drain pan under solenoid valve and disconnect hydraulic lines from valve. Cap all openings.

c. Disconnect electrical receptacle. Remove screws attaching valve to module and remove valve from module. Cap opening in module.

12-68C. Installation — Hydraulic Bypass Solenoid Valve (UH-1B Serial No. 64-14101 and subsequent). a. Remove cap from module opening. Position valve in module and install attaching screws. Tighten screws with 35 to 40 inch-pounds torque.

b. Remove caps from all openings. Connect hydraulic lines and electrical receptacle.

c. Fill and bleed hydraulic system. Install cowl.

12-69. External Power Receptacle. The external power receptacle is mounted on a bracket

just below the aft electrical compartment access door. The receptacle is covered by an access door. This receptacle is the contact point for external power plug-in.

Note

External power is not required for starting the helicopter.

12-70. Trouble Shooting — External Power Receptacle. Perform check as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Lack of power when external power plug is inserted	Reverse polarity in plug	Rework plug to correct polarity
	Relay points corroded or pitted Power supply from external source too low	Replace points or relay Increase output of external power

12-71. Removal — External Power Receptacle. a. Disconnect battery.

b. Remove nuts and washers from terminal post and free wires from receptacle. Tape ends of wires. Remove mounting screws and washers and lift receptacle from bracket.

12-72. Installation — External Power Receptacle. Position external power receptacle in bracket

and install mounting washers and screws. Remove tape from wires and secure wires to terminal post. Connect battery.

12-73. External Power Door Limit Switch. The external power door limit switch is mounted on the external power receptacle bracket. This switch is actuated when the door is closed. If the door is left unlatched the EXTERNAL POWER segment of Caution panel on pedestal will illuminate.

12-74. Removal — Limit Switch — External Power Door. a. Disconnect battery.

b. Disconnect electrical wires from switch and tape ends of wires. Loosen jam nut on threaded portion of switch inside of electrical compartment. Remove mounting nut from switch through external power receptacle door and lift switch from helicopter.

12-75. Installation — Limit Switch — External Power Door. a. Install jam nut approximately halfway on threaded portion of switch.

b. Place switch in position with threads extending through mounting bracket and install jam nut through external power receptacle door.

c. Connect battery.

12-76. Adjustment — Limit Switch — External Power Door. Adjust switch by loosening jam nut and adjusting screw so switch will actuate when door is closed.

12-77. External Power Relay. The external power relay is located in the aft electrical compartment. This relay connects an external source of power, through the external power receptacle, to the electrical system of the helicopter.

12-78. Removal — External Power Relay. a. Disconnect battery.

b. Remove bus bar from top of relays. Remove electrical wires from external power relay and tape wire ends. Remove mounting nuts, washers, and bolts and lift relay from support.

12-79. Installation — External Power Relay. a. Position relay on support and install mounting bolts, washers, nuts. Remove tape from electrical connections and install wires on relay.

b. Place bus bar on terminals and install nuts. Connect battery leads to battery.

12-80. RPM Limit Warning System. The rpm limit warning system includes a detector unit in right side of nose compartment, a circuit breaker on overhead console, a warning light on instrument panel, audio oscillator device, low rpm switch on engine control panel, and electrical wiring and connectors. Power is supplied by the 28 volt DC essential bus.

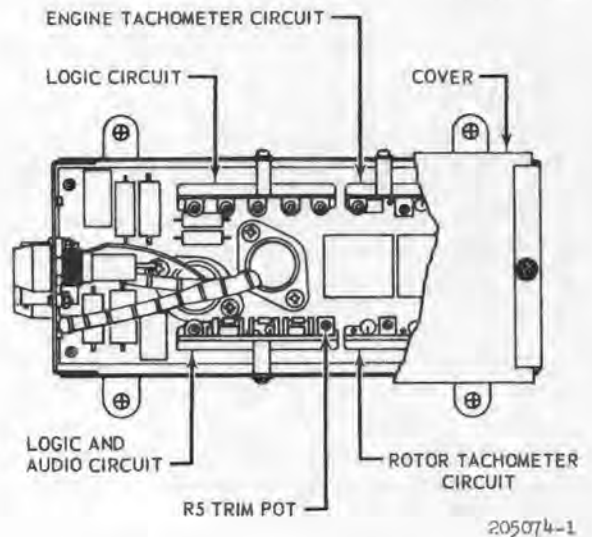


Figure 12-2. RPM limit detector

12-81. Operation Check. The rpm limit detector, operating on DC power, senses and interprets rotor and engine rpm through connection to tachometer circuits. If the rotor rpm exceeds normal limit, warning light will illuminate. When either rotor or engine rpm reaches low limit, an audio signal is produced in pilot's and copilot's headsets, and warning light is illuminated. For starting and ground operation, audio tone can be turned off by audio switch. The rpm warning system detector is adjusted before installation. Readjustment may be required whenever a tachometer generator is replaced, due to tolerances on tachometer components. Replacement of an engine tachometer generator will not require a check of rotor high rpm setting.

12-82. Testing. The testing and alignment of the system is accomplished during ground run-up.

Note

To increase the rpm at which the warning light will illuminate, turn either R1, R2, or R3 clockwise. One half turn of the potentiometer shaft will cause a change of 5 rotor rpm or 100 engine rpm. (Do not adjust R4 and R5. These are bench check adjustments and are to be performed only by higher level maintenance facility.)

a. Perform check and alignment of low engine and low rotor rpm as follows:

(1) Using the dual tachometer indicator as a reference and with LOW RPM switch in AUDIO position, run engine at 6300 rpm, approximately and ascertain that the red RPM LIMIT warning light on the instrument panel is not illuminated and the audio warning signal (series of audio bursts) should be heard in the pilot's and copilot's headsets.

(2) Decrease engine speed, very slowly, to 6000 plus or minus 100 (295 plus or minus 5 rotor rpm). The warning light should illuminate and an audio warning signal (series of audio bursts) should be heard in the pilot's and copilot's headsets.

Note

A time lapse of one to two seconds is required before the warning occurs after the limit is exceeded. The rpm may have to be varied above and below the warning limit to determine the exact value.

(3) Position the LOW RPM switch to OFF position. Run engine at slightly less than 5900 rpm (290 rotor rpm). The RPM LIMIT warning light should be illuminated, but the audio signal should not be heard in the pilot's and copilot's headsets.

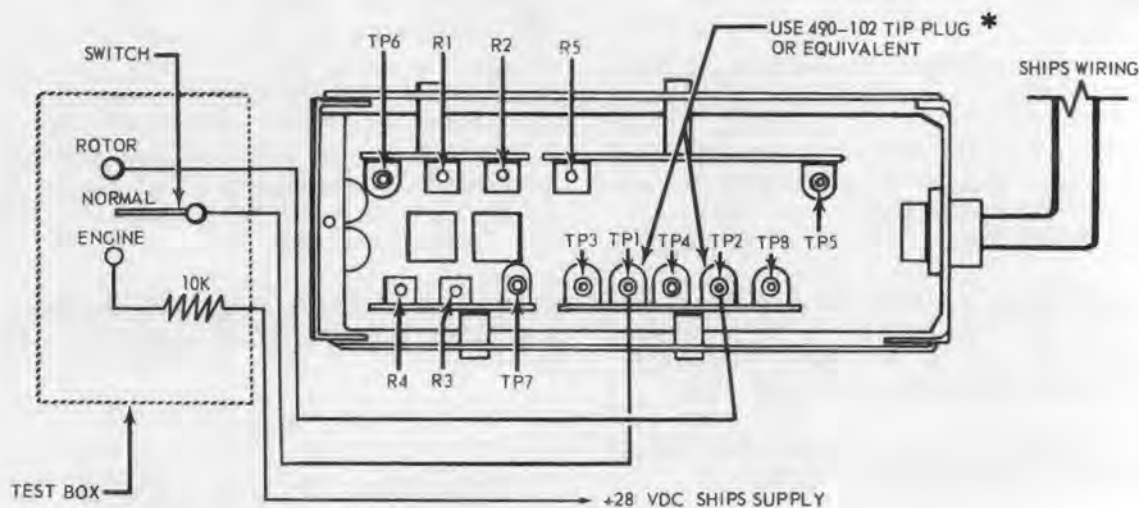
(4) Increase engine rpm slowly and verify that warning light extinguishes within limits of 6000 plus or minus 100 rpm (295 plus or minus 5 rotor rpm).

(5) If the rpm warning system does not meet the requirements as outlined in paragraph (1) through (4) above, the system must be aligned in accordance with the following procedures:

Note

Steps (a) through (c) shall be performed with engine OFF.

(a) Disengage the RPM WARN SYSTEM breaker.



* PROCURED FROM: Herman H. Smith, Inc.

205074-9

Figure 12-3. Alignment of RPM limit warning system

(b) Remove the cover from the detector and connect test box leads to TP1 and TP2 as shown in figure 12-3.

(c) Reset the RPM WARN SYSTEM circuit breaker and position the LOW RPM switch to AUDIO. The audio warning signal should be heard in pilot's and copilot's headsets.

(d) Start the engine and increase rpm to approximately 6300 rpm (310 rotor rpm).

(e) Position the ENGINE — NORMAL — ROTOR switch on the test box (figure 12-3) to ENGINE position.

(f) Decrease engine to 6000 rpm (295 rotor rpm). If warning light illuminates, turn R3 slowly counterclockwise until warning light is off, then very slowly turn R3 clockwise until it illuminates.

(g) If the warning light does not illuminate at 6000 engine rpm (295 rotor rpm) turn R3 very slowly clockwise until light illuminates.

(h) To test for proper alignment, vary the engine rpm slowly above and below 6000 rpm (295 rotor rpm) and observe warning light. Verify that the warning light illuminates when engine reaches 6000 plus or minus 100 rpm.

(i) If light fails to illuminate, repeat steps (d), (e), (f), (g), and (h) above.

(6) The low rotor rpm warning shall be aligned as follows:

(a) Place the ENGINE — NORMAL — ROTOR switch in ROTOR position.

(b) Run engine at 6000 rpm (295 rotor rpm). If warning light is illuminated turn R1 slowly counterclockwise until light goes off, then very slowly clockwise until light illuminates.

(c) If light is not illuminated at 6000 rpm (295 rotor rpm), turn R1 very slowly, clockwise, only until light illuminates.

(d) To test proper alignment, vary engine rpm above and below 6000 rpm (295 rotor rpm) and observe warning light. Verify that light comes on at 6000 rpm plus or minus

100 (25 plus or minus 5 rotor rpm). If light does not come on, repeat steps (b) and (c).

b. The high rotor rpm warning shall be tested for proper alignment as follows:

(1) Position the LOW RPM switch to AUDIO position.

(2) Set governor switch in EMERGENCY, and with the rotor in flat pitch, slowly increase the engine rpm until the warning light illuminates. The light should illuminate at a rotor speed of 335 plus or minus 5 rpm (engine speed 6800 plus or minus 100). No audio signal should be heard in the pilot's and copilot's headsets.

(3) The rpm limit warning signal should meet the requirements in paragraph (b) above. If not, the system shall be aligned as follows:

Note

The high engine potentiometer R4 is factory set and shall be adjusted ONLY by higher level maintenance facility.

(a) Pull circuit breaker, remove cover from the detector and connect test box leads to TP1 and TP2 as shown in figure 12-3.

Note

Locally fabricate test box in accordance with instructions shown in figure 12-4.

(b) Reset the RPM WARN system circuit breaker and position the low rpm switch to AUDIO position.

(c) Position the ENGINE — NORMAL — ROTOR switch on the test box (figure 12-3) to ROTOR position. Set the governor switch to EMERGENCY position and with rotor in flat pitch, slowly increase throttle to engine speed of 6800 plus or minus 100 rpm (335 plus or minus 5 rotor rpm). If the warning light illuminates, turn R2 slowly clockwise until the light goes off. Then turn, very slowly, counterclockwise until light illuminates again. If the light goes off during tests, turn R2, very slowly, counterclockwise until light illuminates.

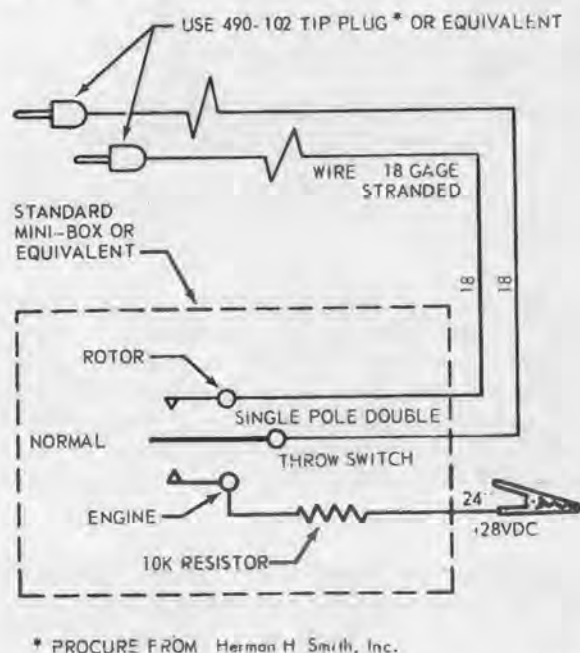


Figure 12-4. Wiring diagram of RPM limit warning system test box

Section III — Battery

12-83. Battery. The battery is mounted in the lower section of the aft electrical compartment on the left-hand side of the helicopter. Two overflow or vent tubes extend from the battery to the underside of the fuselage. The battery is connected to the helicopter's electrical system through a relay, which is controlled by the battery switch on the DC power panel. The Model UH-1A helicopters are equipped with a 24 volt, 22 ampere hour battery and Model UH-1B helicopters are equipped with a 24 volt, 34 ampere hour battery. Model UH-1A, Serial No. 59-1607 through 58-1716 and 60-3530 through 60-3545 have provisions for a 24 volt, 34 ampere hour battery. Model UH-1A helicopters, Serial No. 58-2078 through 58-3047, also will accommodate either battery after installation of battery shelf assembly, Part No. 204-030-965-1.

Caution

If forward battery attaching bracket is removed or replaced, check that in-board screw and nut are installed correctly. The correct installation is screw with head on underside of panel. The screw should be 100 degrees countersunk.

(d) To test for proper alignment, vary the engine rpm to determine that warning light is illuminated and audio warning does not sound at 335 plus or minus rotor rpm (6800 plus or minus 100 engine rpm). If warning light does not illuminate, repeat steps in paragraph b. (3).

c. With engine off, pull RPM WARN SYSTEM circuit breakers and remove test box leads. Reinstall the cover on the detector unit. Engage circuit breaker.

d. Repeat rpm tests paragraph a. and b.

12-84. Removal — Battery. a. Turn battery switch to "OFF" position.

b. Remove battery terminal by turning knob counterclockwise and tape ends of terminals.

c. Cut safety wire, release clamps and loosen nuts. Loosen clamps on vent tubes and slide tubes off of battery case.

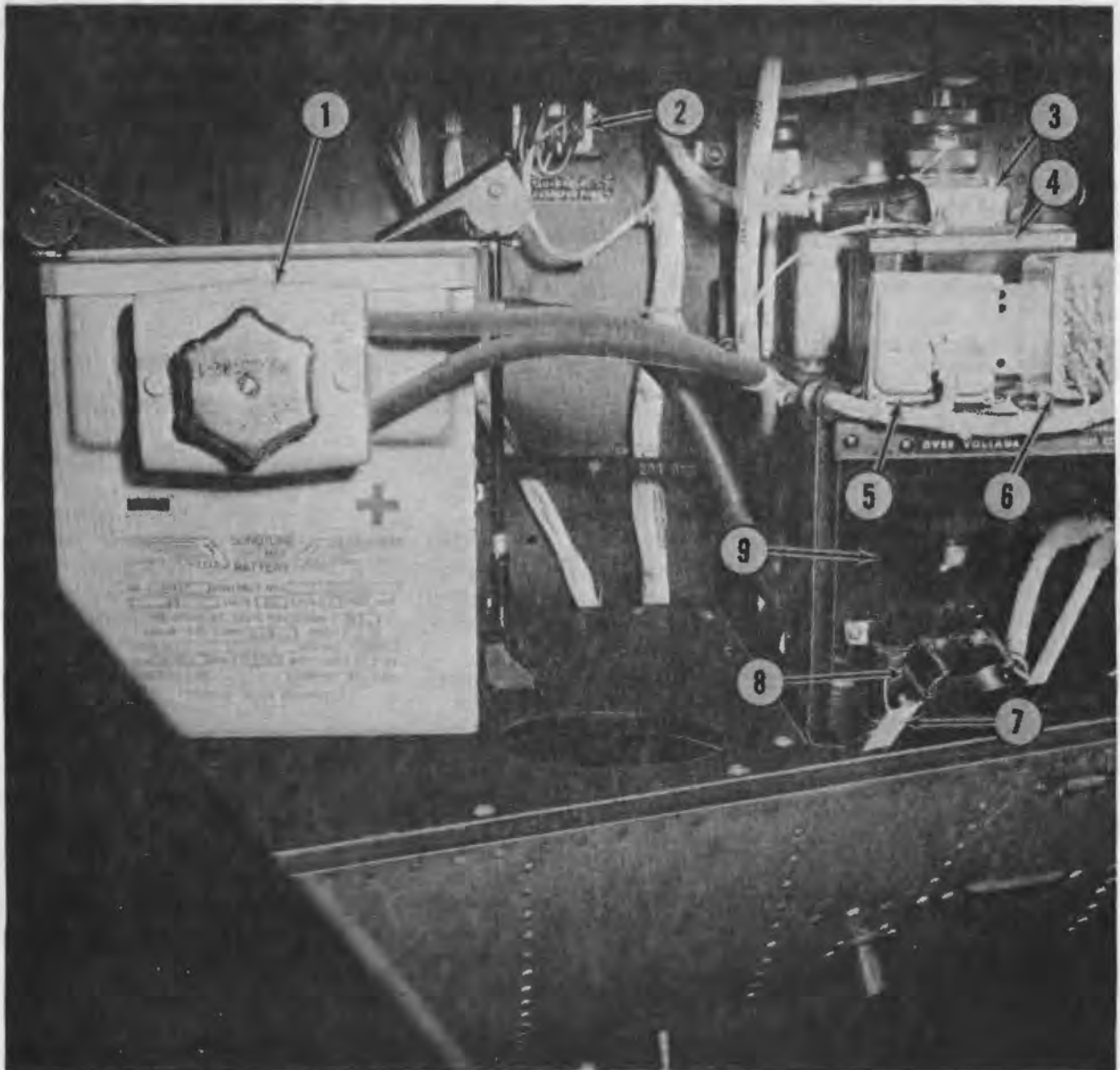
d. Remove tie down rods from case and lift battery from helicopter.

12-85. Cleaning — Battery. a. Clean battery with a dry stiff fiber brush or wash with water.

Caution

Do not use a wire brush. Make sure the vent plugs are closed before attempting to clean. Make sure the cell tops are dry before returning the battery to use.

b. The compartment in which the battery is installed must be clean, dry and free of all traces of alkaline. The compartment should be painted with an alkali resisting paint.



- | | |
|--|-------------------------------------|
| 1. Battery | 6. Bus Control Relay |
| 2. Relay - Transfer Pump | 7. External Power Receptacle |
| 3. Generator Field Relay | 8. Limit Switch External Power Door |
| 4. Reverse Current Relay (Standby Generator) | 9. Battery Sump Jar |
| 5. Overvoltage Relay | |

Figure 12-5. Battery compartment (Typical)

12-86. Installation — Battery. a. Place battery in battery rack, position tie down assembly on rods and engage clamps. Install safety wire.

b. Slide vent tubes onto battery case. Remove tape from battery terminal and connect to battery.

12-87. Battery Sump Jar. All model UH-1A, and UH-1B helicopters Serial No. 60-3546 through 64-14100, are equipped with a battery sump jar mounted on the wall in the aft electrical compartment. On UH-1B helicopters Serial No. 64-14101 through 64-14191 the battery sump jar is replaced with a vent tube assembly.

12-88. Removal — Battery Sump Jar. Remove clamp holding jar to wall and unscrew jar from mount.

12-89. Cleaning — Battery Sump Jar. a. Remove pad from jar and rinse jar with water.

b. Wash pad in boric acid or vinegar.

12-90. Installation — Battery Sump Jar. Position in mount and screw into position. Install clamp around jar.

Section IV — Generator

12-91. Main Generator. A 300 ampere main generator is installed on the left-hand side of the transmission, and is driven by a drive assembly in the transmission. The generator circuit is controlled by a reverse current cut-out and a voltage regulator. The generator output is connected to the electrical system by placing the generator switch on the overhead console to the "ON" position.

12-92. Removal — Generator — Main. a. Open cowling on left-hand side of transmission.

b. Disconnect electrical wires from generator and tape wires.

c. Remove mounting nuts and washers. Turn generator counterclockwise and pull generator outboard until shaft is free of drive assembly.

12-93. Installation — Generator — Main. a. Apply light coat of grease on drive shaft. Carefully position generator on studs, with splines of shaft engaged with splines on driving unit.

b. Install washers and nuts and tighten nuts.

c. Remove tape from wires. Connect electrical wires to generator and install cowling.

12-94. Rotor Tachometer Generator. The rotor tachometer generator is mounted on the transmission and is connected to the dual tachometer indicator on the instrument panel.

12-95. Trouble Shooting — Rotor Tachometer Generator. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive scale error	Weak magnetos in tachometer	Replace tachometer generator
Pointer moves backward	Leads reversed at generator	Change leads at generator
Indicates only one half actual speed	Leads connected to wrong terminal on indicator	Refer to wiring diagram and install wires in indicator plug correctly
No reading on indicator either constant or intermittent	Break or short circuit in leads	Repair or replace leads
	Bad generator or bad indicator	Replace faulty unit

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Low reading on indicator either constant or inter- mittent	Poor connections at indicator or generator plugs	Clean or tighten connections
	Poor connections at indicator or generator	Clean and tighten con- nections
High reading on indicator either constant or inter- mittent	Indicator resistance out of adjustment	Replace indicator

12-96. Removal — Rotor Tachometer Generator. Remove cowling from right-hand side of transmission. Disconnect electrical receptacle, remove mounting nuts and washers and lift tachometer generator from helicopter.

12-97. Installation — Rotor Tachometer Generator. Position generator on mounting studs and install mounting washers and nuts. Connect electrical receptacle and install cowling.

12-98. Power Turbine Tachometer Generator. The engine tachometer generator is mounted on the governor and tachometer drive gear box on the left upper side of the engine and is connected to the dual tachometer indicator on the instrument panel.

12-99. Trouble Shooting — Power Turbine Tachometer Generator. (Refer to paragraph 12-95.)

12-100. Removal — Power Turbine Tachometer Generator. Remove cowling from left-hand side of engine. Disconnect electrical receptacle, re-

move mounting nuts and washers and lift tachometer from engine.

12-101. Installation — Power Turbine Generator. Position generator and gasket on studs and install washers and nuts. Connect electrical receptacle and install cowling.

12-102. Gas Producer Tachometer Generator. The gas producer tachometer generator, located on the right-hand side of the engine accessory gear box, registers the rpm of the gas producer turbine. This instrument is used in conjunction with the gas producer tachometer indicator on the instrument panel.

12-103. Trouble Shooting — Gas Producer Tachometer Generator. (Refer to paragraph 12-95.)

12-104. Removal — Gas Producer Tachometer Generator. (Perform steps in paragraph 12-100.)

12-105. Installation — Gas Producer Tachometer Generator. (Perform step in paragraph 12-101.)

Section V — Auxiliary Power

(Not Applicable)

Section VI — Alternating Current

12-106. AC Circuit Breakers. The AC circuit breakers are mounted on the right hand forward side of the pedestal. AC circuits can be opened and closed by operating these trip-free, push-pull type circuit breakers.

12-107. Removal — AC Circuit Breakers. a. Make sure battery switch is in "OFF" position. Remove mounting screws and washers of panel installation. Carefully lift panel away from mounting position.

b. Disconnect leads from circuit breakers and tape ends of leads. Remove mounting screws and lift circuit breaker from panel.

12-108. Installation — AC Circuit Breakers. a. Position circuit breaker in panel and install mounting screws. Remove tape from leads and connect to circuit breaker terminals.

b. Position panel in place being careful not to damage wiring. Install mounting washers and screws.

12-109. Transformer. The transformer is mounted in the forward electrical compartment and reduces 115 volts AC to 28 volts AC for engine, transmission, and torque meter instruments, and their transmitters.

12-110. Removal — Transformer. Disconnect electrical wires from transformer and tape ends of wires. Remove nuts, washers, and screws and lift transformer from helicopter.

12-111. Installation — Transformer. Position transformer and install screws, washers, and nuts. Remove tape from wire ends and install wires on terminals.

12-112. Torque Pressure Transmitter. The torque pressure transmitter is mounted on a bracket on top of the engine and is connected to the torque meter on the instrument panel.

12-113. Removal — Torque Pressure Transmitter. a. Remove cowling from engine.

b. Disconnect electrical receptacle from transmitter. Disconnect oil line and cover openings.

c. Cut lockwire, remove screws and washers from mounting bracket and lift transmitter from bracket.

12-114. Installation — Torque Pressure Transmitter. a. Position transmitter on mounting bracket and install washers and screws and lockwire.

b. Remove covers from openings and connect hose to transmitter. Connect electrical receptacle.

c. Install cowling.

12-115. Transmission Oil Pressure Transmitter. The transmission oil pressure transmitter is located on the right-hand side of the transmission. This unit is connected to the transmission oil pressure indicator on the instrument panel.

12-116. Removal — Transmission Oil Pressure Transmitter. a. Disconnect electrical receptacle from unit.

b. Cut lockwire and unscrew transmitter from manifold.

12-117. Installation — Transmission Oil Pressure Transmitter. a. Screw transmitter into manifold.

b. Connect electrical receptacle to transmitter. Install lockwire.

12-118. Engine Oil Pressure Transmitter. The engine oil pressure transmitter is mounted on a bracket on top of the engine and is connected to the engine oil pressure indicator on the instrument panel.

12-119. Removal — Engine Oil Pressure Transmitter. a. Remove cowling from engine. Turn battery switch to "OFF" position.

b. Disconnect electrical receptacle and oil line and cap or cover openings. Cut lockwire and remove mounting bolts and lift pressure transmitter from mounting bracket.

12-120. Installation — Engine Oil Pressure Transmitter. a. Position transmitter in mounting and install mounting washers and bolts.

b. Remove caps or covers on all openings. Connect electrical receptacle and oil line. Install lockwire. Install cowling.

Section VII — Inverter Systems

12-121. Inverters. The inverter is a motor generator set used to convert direct current to alternating current. It consists essentially, of a DC motor and an AC generator enclosed in a common housing. The DC armature and the rotor of the AC generator are mounted on a common shaft. When DC current is supplied to the DC armature, AC power is made available from armature windings through sliprings and brushes. Output voltage under varying load conditions is controlled by a carbon pile regula-

tor and its associated circuit. A governor, mounted on the DC end of the armature shaft, regulates the motor field current to provide automatic speed and assure constant frequency. The inverters are located in the forward electrical compartment on the left-hand side of the helicopter.

12-122. Trouble Shooting — Inverters. Perform checks as necessary to isolate trouble.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Main or spare inverter fails to operate	Open circuit breaker	Reset circuit breaker
	Faulty wiring or connections in switch or power circuits	Check continuity of wiring
	Defective inverter power relay	Replace relay
	Defective inverter	Replace inverter
	Defective circuit breaker	Replace circuit breaker
Spare inverter runs but no voltage to instruments	Defective inverter changeover relay	Replace relay
		Check continuity of wiring; repair wiring
Improper inverter output voltage or frequency	Faulty inverter	Check inverter output voltage and frequency with voltmeter and frequency meter; replace faulty inverter
	Low input voltage	Check for proper input voltage to inverter; correct low input voltage condition

12-123. Removal — Inverters. a. Turn battery switch to "OFF" position. Remove hold-down screws and washers from inverter terminal box cover and remove cover.

b. Remove nuts and washers to disconnect terminals from posts. Cover ends of terminals with tape.

c. Remove inverter mounting bolts and lift inverter from helicopter.

12-124. Installation — Inverters. a. Position inverter on the deck floor and install inverter mounting bolts.

b. Remove tape and connect terminals to correct terminal posts. Install washers and nuts.

c. Position terminal box cover and install holddown washers and screws.

Section VIII — Wiring Diagrams

12-125. Wiring Diagrams. The following is a list of diagrams included in this section.

12-6 Symbols Chart

12-7 Wiring Identification Code

12-8 Electrical Schematic — UH-1A (58-2078 thru 58-2093, 58-3017 thru 58-3047, 59-1607 thru 59-1657, 59-1672 thru 59-1716, 60-3530 thru 60-3545.)

12-9 sht 1 thru sht 5 Electrical & Communication Wiring Diagram — UH-1A (58-2078 thru 58-2093, 58-3017 thru 58-3047, 59-1607 thru 59-1657, 59-1672 thru 59-1716, 60-3530 thru 3545)

12-10 Electrical Schematic — UH-1A (59-1658 thru 59-1671)

12-11 sht 1 sht 4 Electrical & Communication Wiring Diagram — UH-1A (59-1658 thru 59-1671)

12-12 Electrical Schematic — UH-1B (60-3546 thru 60-3619, 61-686 thru 61-740)

12-13 sht 1 thru sht 5 Electrical & Communication Wiring Diagram — UH-1B (60-3546 thru 60-3619 and 61-686 thru 61-740)

12-14 Electrical Schematic — UH-1B (61-741 thru 61-803)

12-15 sht 1 thru sht 3 Electrical & Communication Wiring Diagram (61-741 thru 61-803)

12-16 Electrical Schematic — UH-1B (62-1872 thru 62-2105, 62-4566 thru 62-4605, 62-12515 thru 62-12555)

12-17 sht 1 thru sht 4 Electrical & Communication Wiring Diagram (62-1872 thru 62-2105, 62-4566 thru 62-4605 and 62-12515 thru 62-12555)

12-18 Electrical Schematic (63-8500 thru 63-8738, 63-12903 thru 63-12952)

12-19 sht 1 thru sht 5 Electrical & Communication Wiring Diagram (63-8500 thru 63-8738 and 63-12903 thru 63-12952)

12-20 Electrical Schematic — UH-1B (64-13902 thru 64-14191)

12-21 sht 1 thru sht 5 Electrical & Communication Wiring Diagram (64-13902 thru 64-14191)

12-22 Electrical Schematic — UH-1B (65-9416 thru 65-9564, 65-12738 thru 65-12744 and 65-12722)

12-23 sht 1
thru sht 4

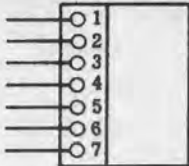
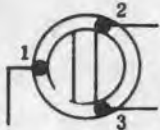
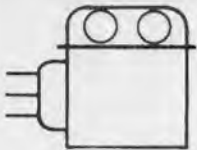
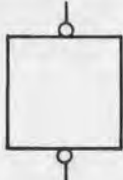
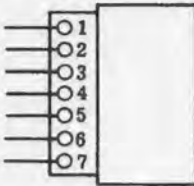
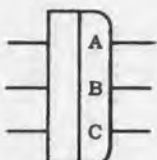
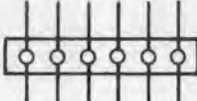
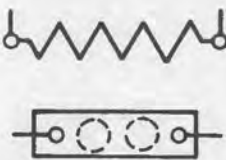
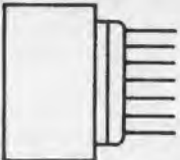
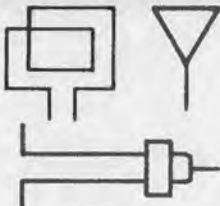
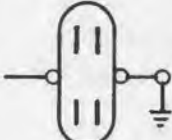
Electrical & Communication
Wiring Diagram (65-9416 thru
65-9564, 65-12738 thru 65-12744
and 65-12722)

12-24

Electrical Schematic — UH-1B
(66-491 and subsequent)

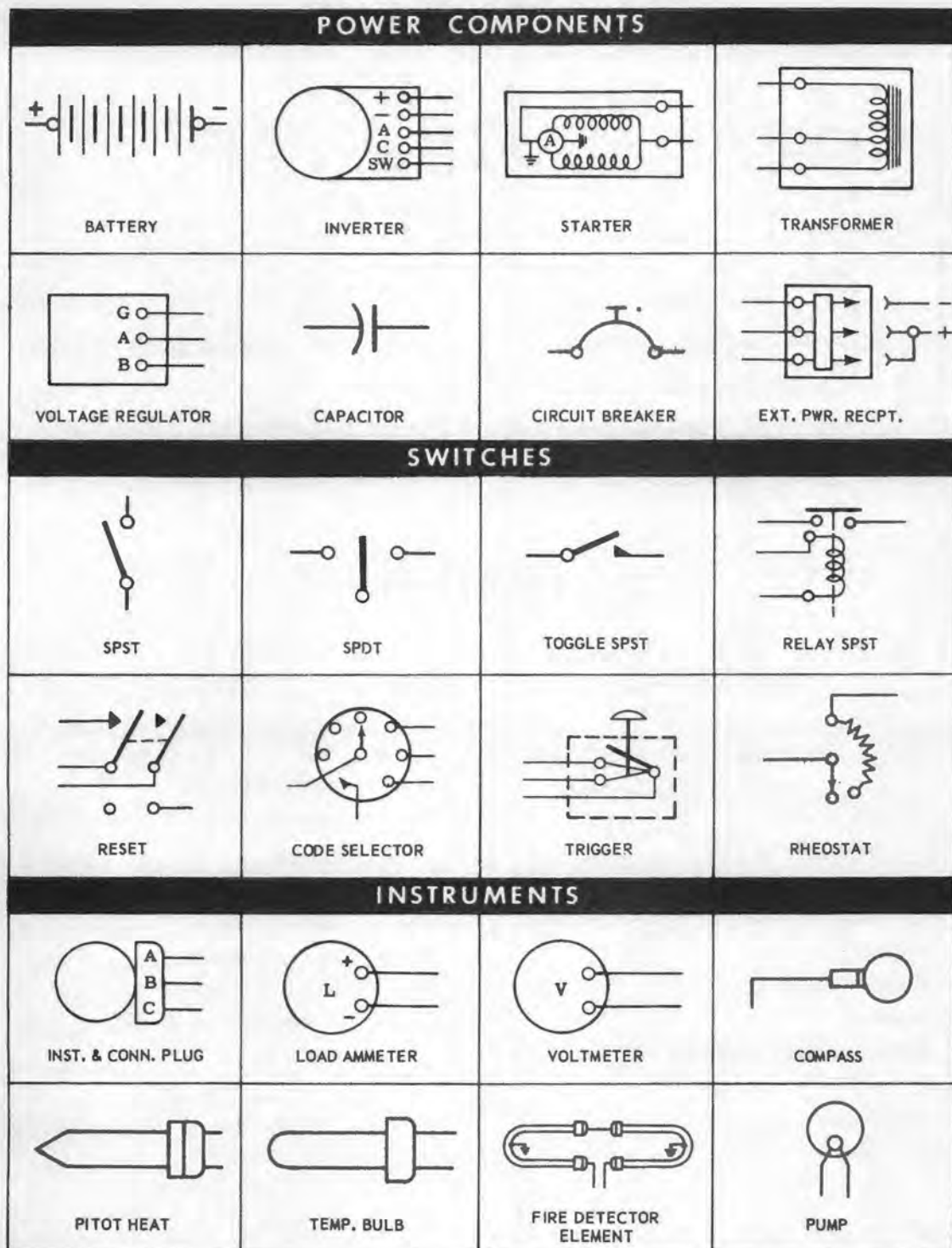
12-25 sht 1
thru sht 5

Electrical & Communication
Wiring Diagram (66-491 and
subsequent)

LIGHTS			
			
LANDING	MARKER BEACON	ANTI-COLLISION	DOME
			
FUSELAGE	COCKPIT	WARNING	SEARCH LIGHT
CONNECTORS			
			
PLUG & RECPT.	QUICK DISCONNECT	TERMINAL CONNECT	TERMINAL BLOCK
MISCELLANEOUS			
			
RESISTORS	RECEIVER TRANSMITTER CONTROLS	ANTENNAS	SOLENOID VALVE
			
THERMOCOUPLE HARNESS	HEATED BLANKET RECEPTACLE	COAXIAL CABLE	SHIELDED WIRES IN CABLE

204075-8-1

Figure 12-6. Symbols chart (Sheet 1 of 2)

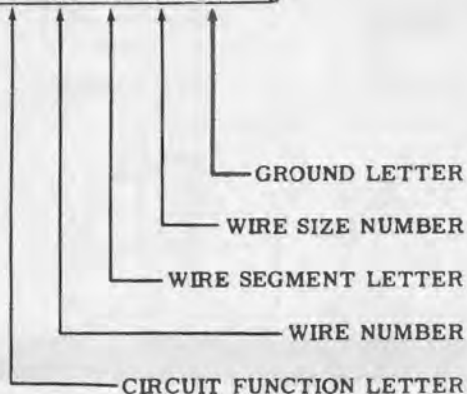


204075-t-2

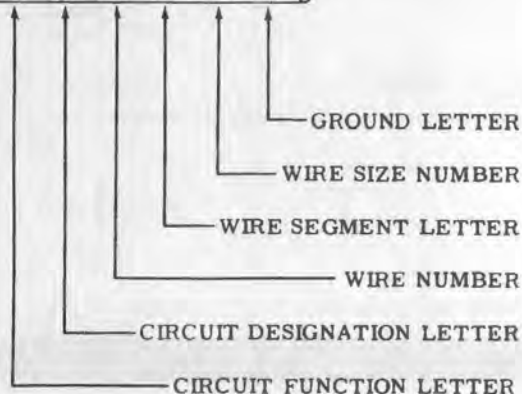
Figure 12-6. Symbols chart (Sheet 2 of 2)

WIRING IDENTIFICATION CODE

L 18 A 20 N



R N 85 F 20 N



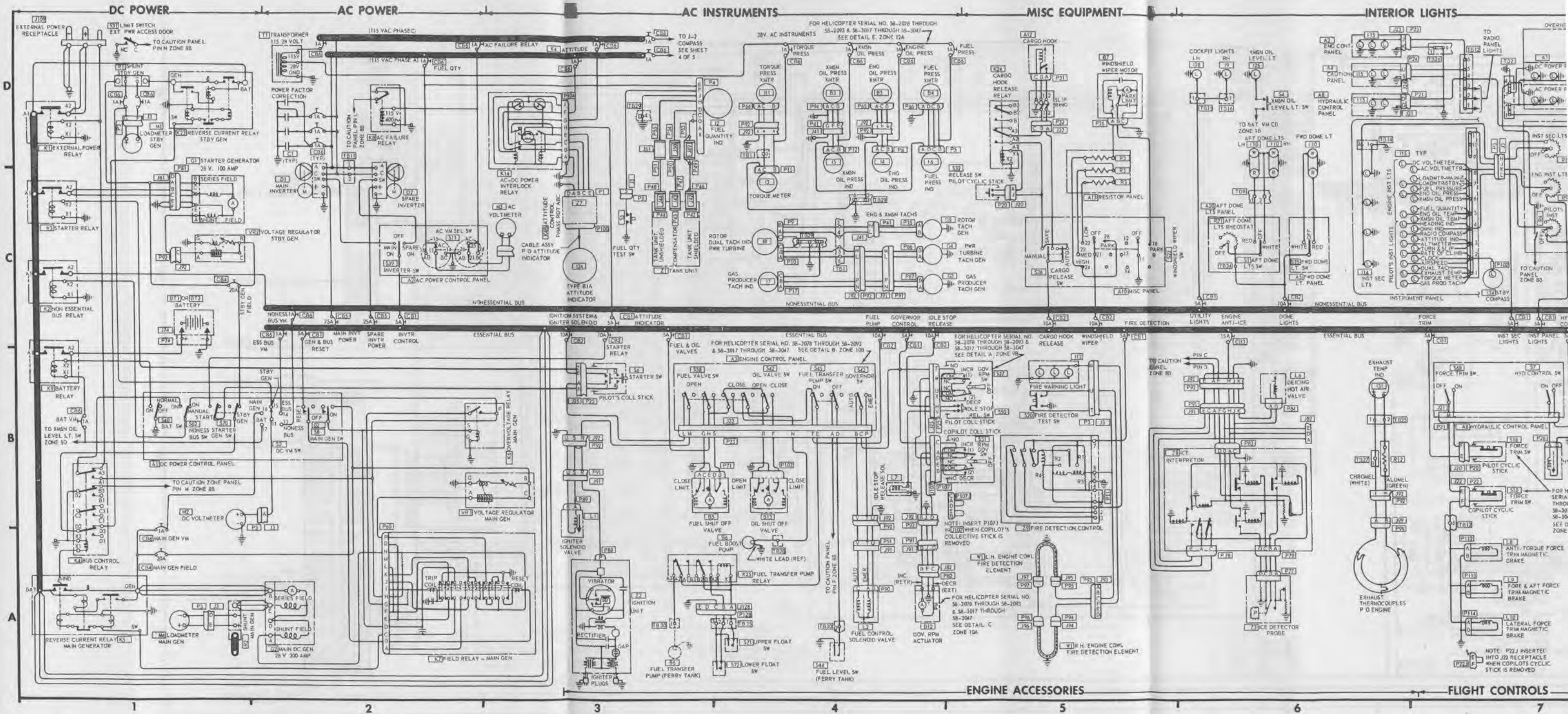
CIRCUIT FUNCTIONS

CODE	NOMENCLATURE
A	ARMAMENT
C	CONTROL SURFACES
D	INSTRUMENTS (OTHER THAN FLIGHT OR ENGINE)
E	ENGINE INSTRUMENTS
F	FLIGHT INSTRUMENTS
H	HEATING, VENTILATING AND DE-ICING
J	IGNITION
K	ENGINE CONTROL
L	LIGHTING
M	MISCELLANEOUS ELECTRIC
N	GROUND
P	DC POWER
Q	FUEL AND OIL

CODE	NOMENCLATURE
R	RADIO (NAVIGATION AND COMMUNICATION)
RC	COMMAND
RF	VHF LIAISON
RL	LIAISON
RM	MARKER BEACON
RN	NAVIGATION
RU	UHF COMMAND
RV	VHF COMMAND
RZ	INTERPHONE AND HEADPHONE
S	RADAR
SX	RECOGNITION (IFF)
V	DC POWER AND DC CONTROL CABLES FOR AC SYSTEM
W	WARNING AND EMERGENCY
X	AC POWER

204 175-34B

Figure 12-7. Wiring identification code



1

2

3

4

5

6

7

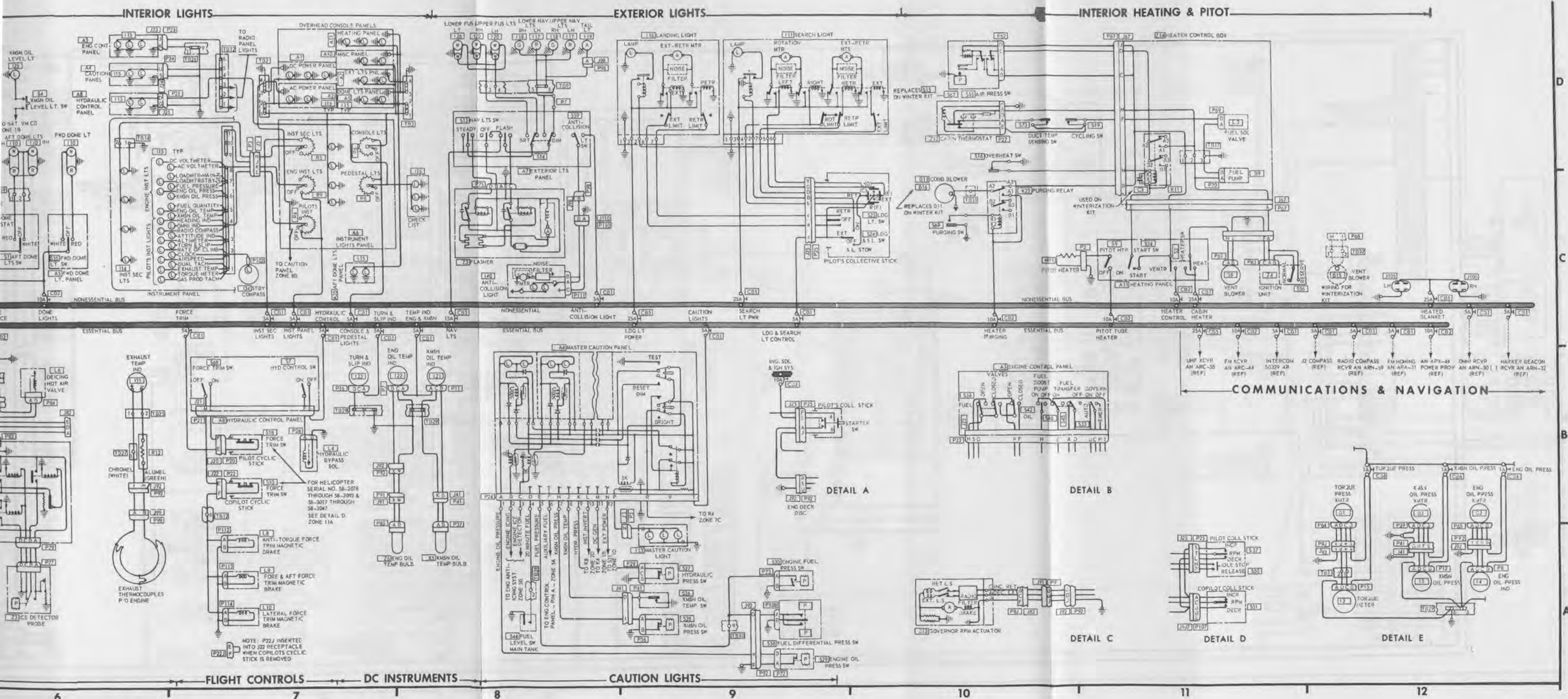
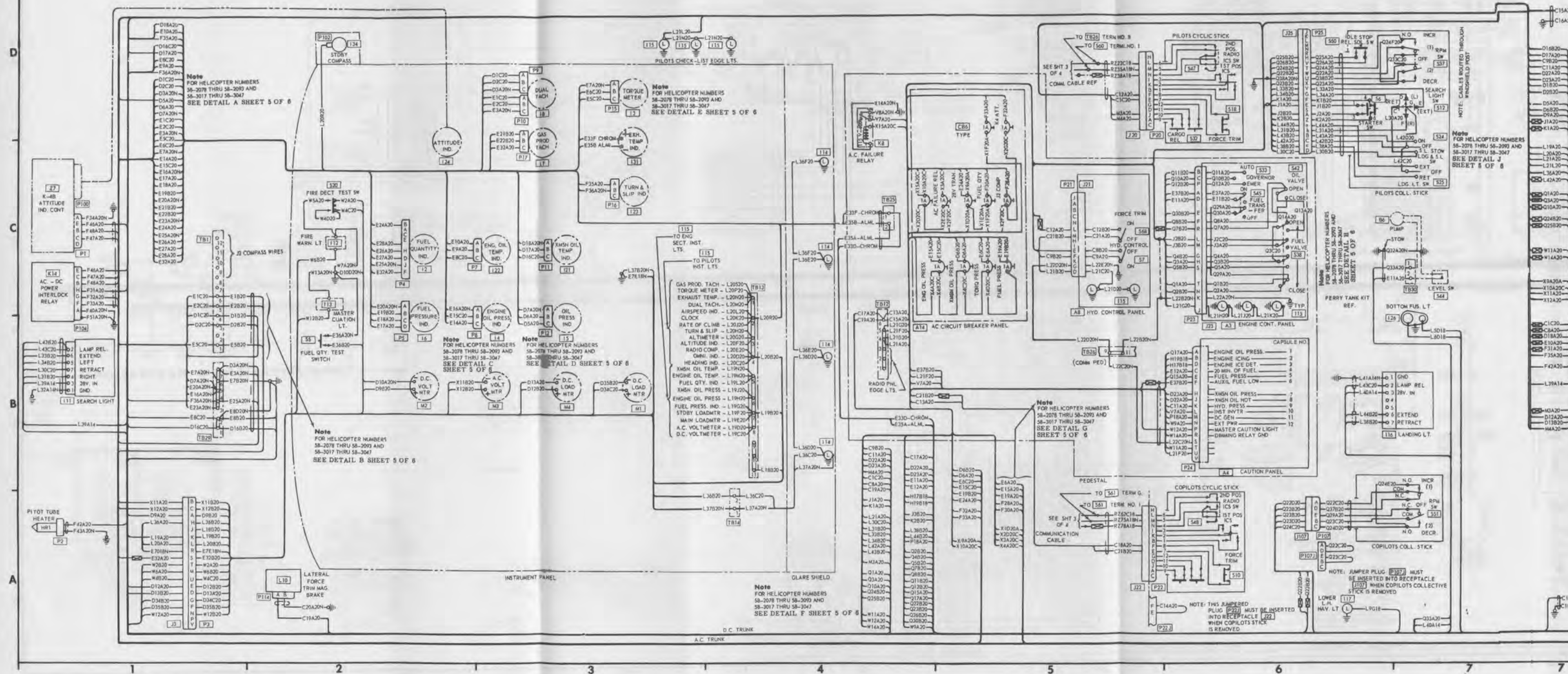


Figure 12-8. Electrical schematic — UH-1A (58-2078 thru 58-2093, 58-3017 thru 58-3047, 59-1607 thru 59-1657, 59-1672 thru 59-1716, 60-3530 thru 60-3545)



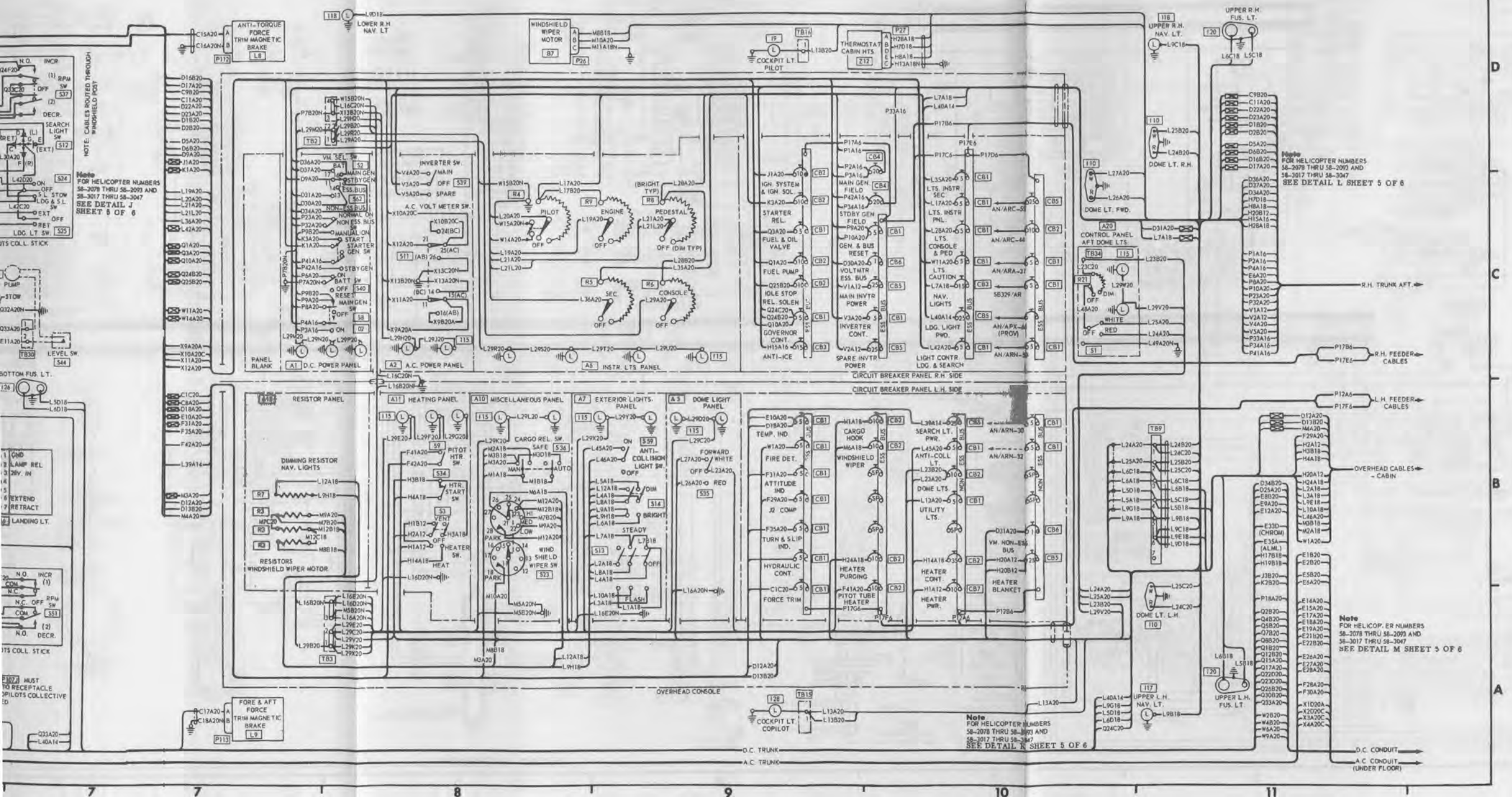
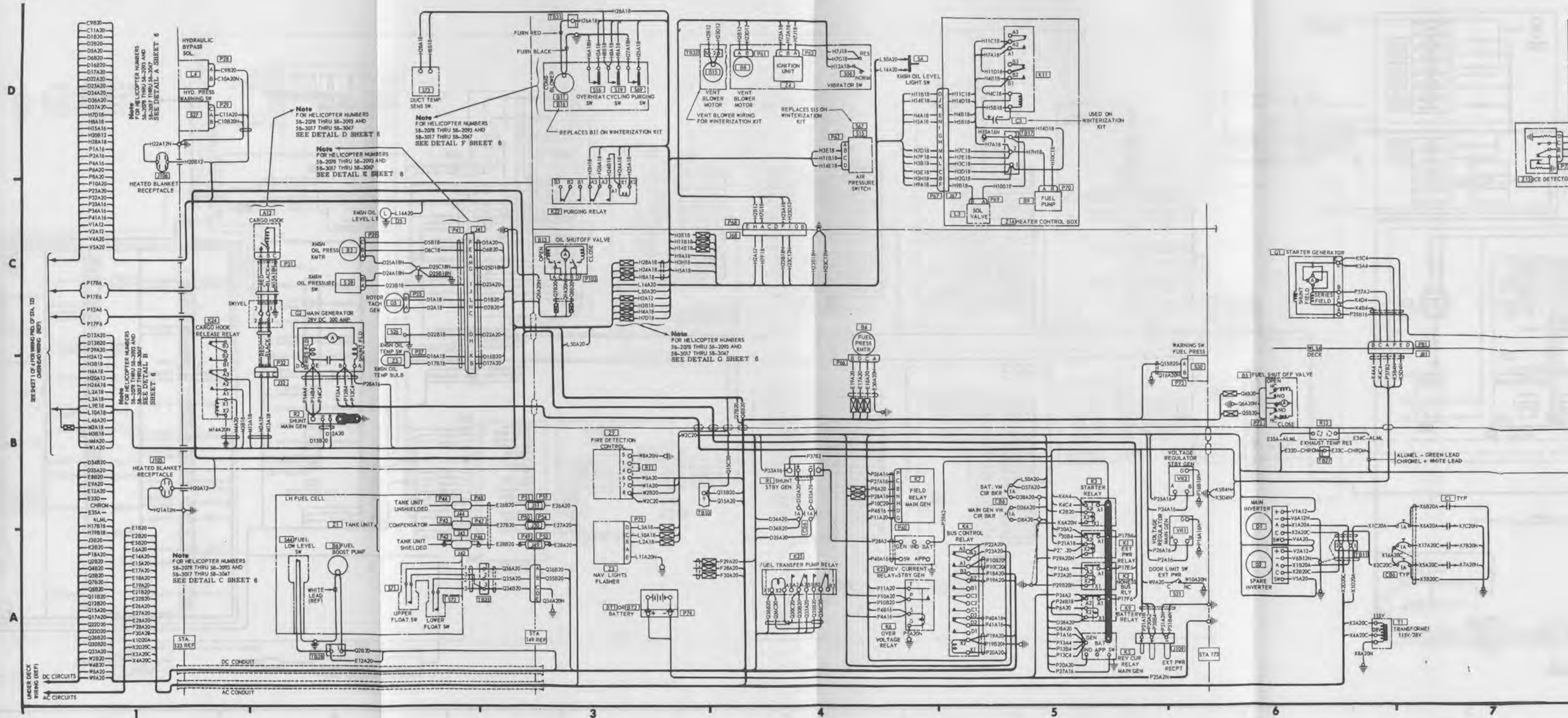


Figure 12-9. Electrical and communication wiring diagram — UH-1A (58-2078 thru 58-2093, 58-3017 thru 58-3047, 59-1607, thru 59-1657, 59-1672 thru 59-1716, 60-3530 thru 60-3545) (Sheet 1 of 5)



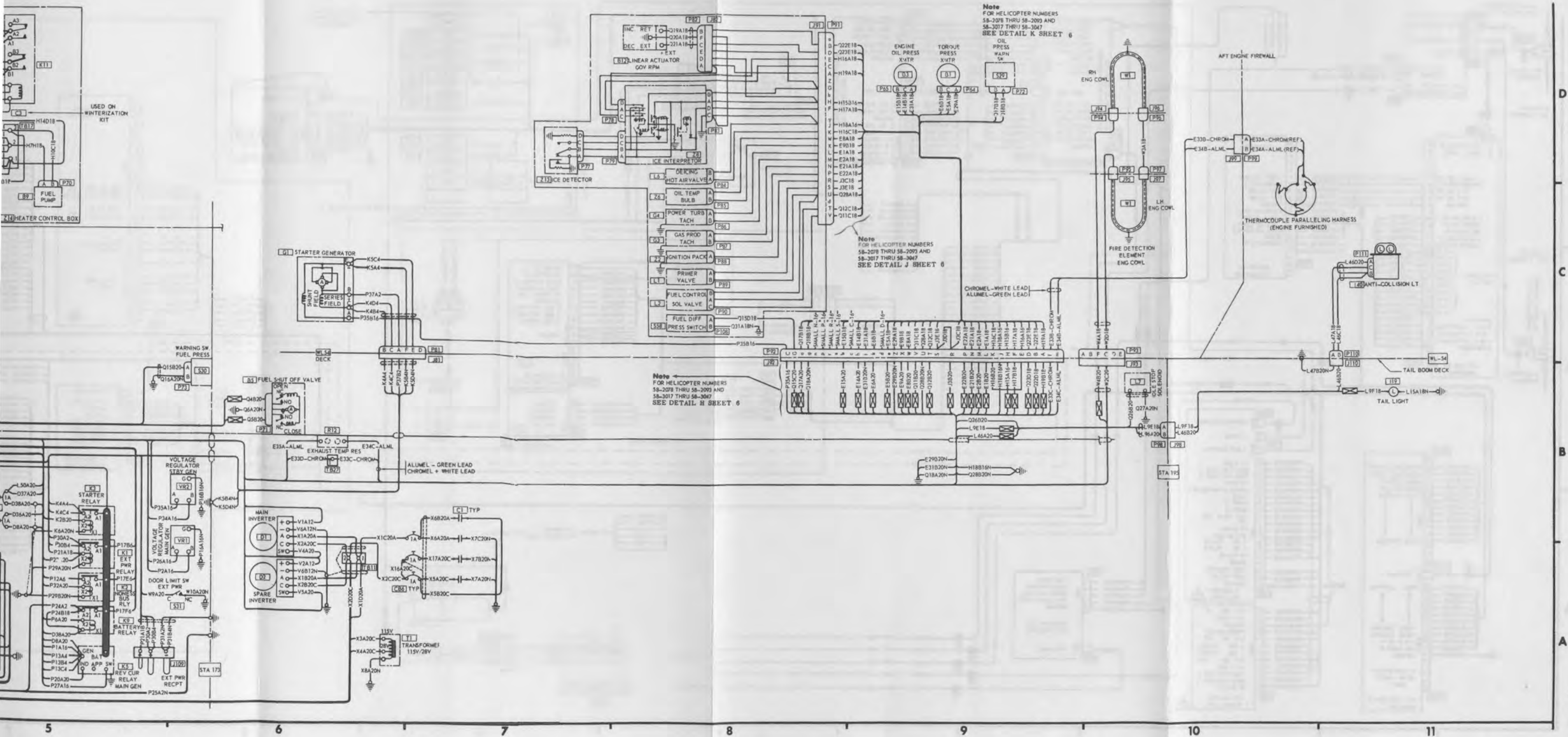
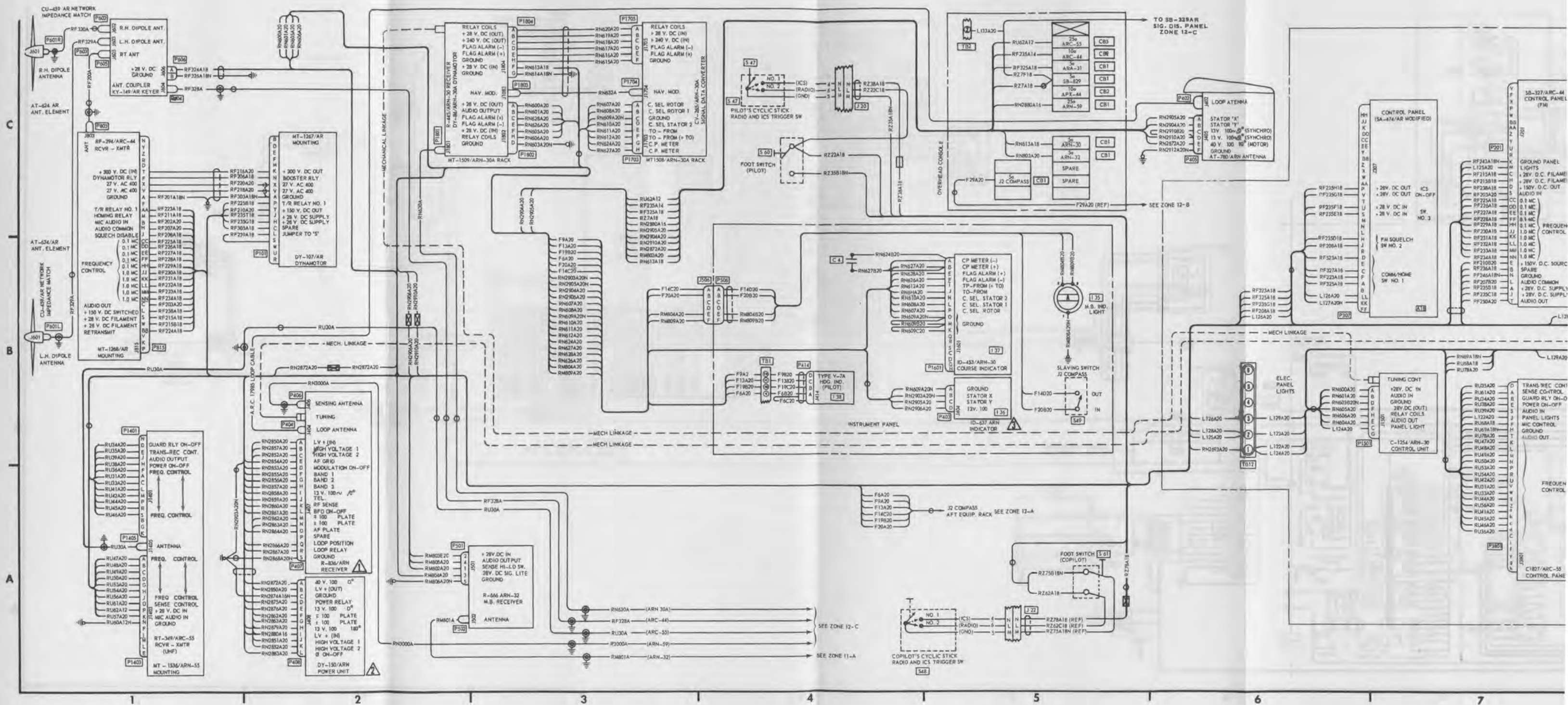
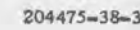
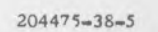


Figure 12-9. Electrical and communication wiring diagram — UH-1A (58-2078 thru 58-2093, 58-3017 thru 58-3047, 59-1607, thru 59-1657, 59-1672 thru 59-1716, 60-3530 thru 60-3545) (Sheet 2 of 5)

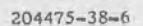




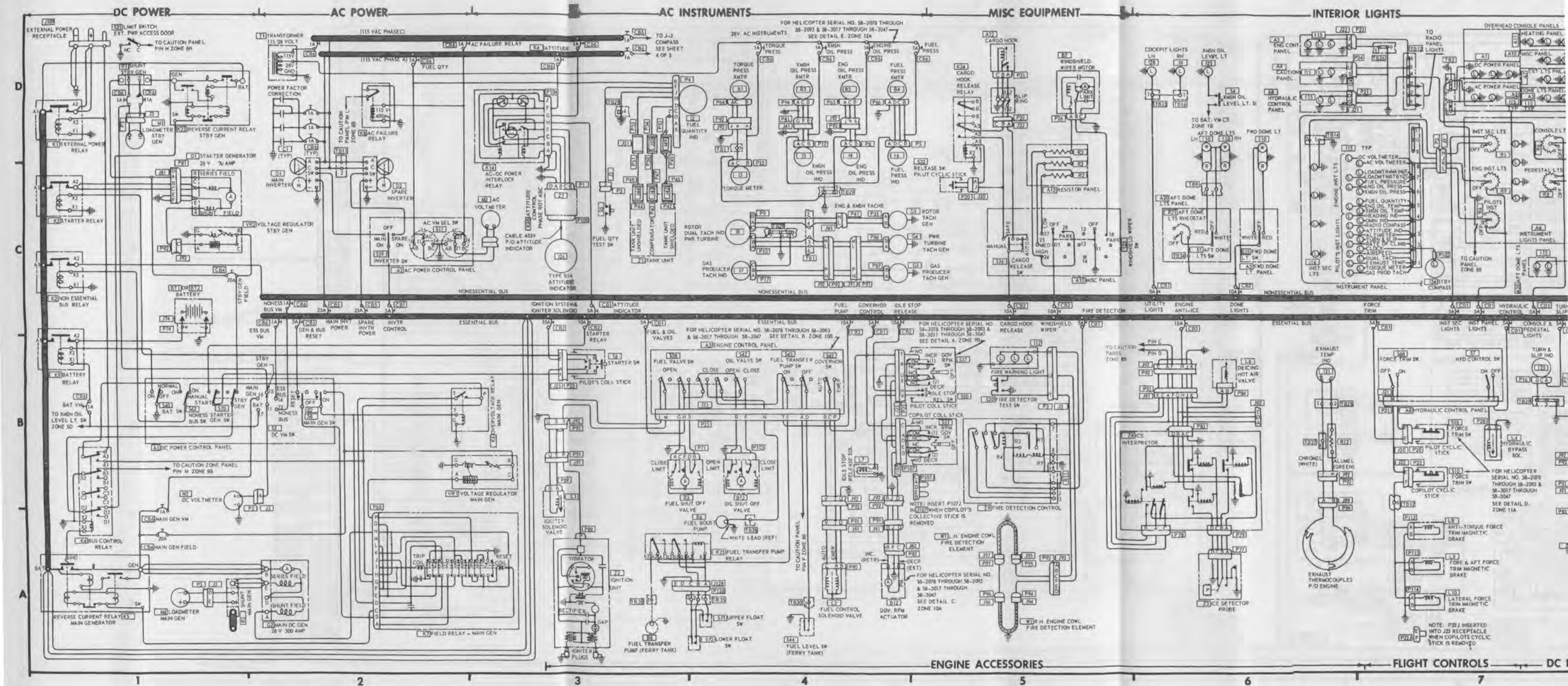
12-28



12-29



12-30



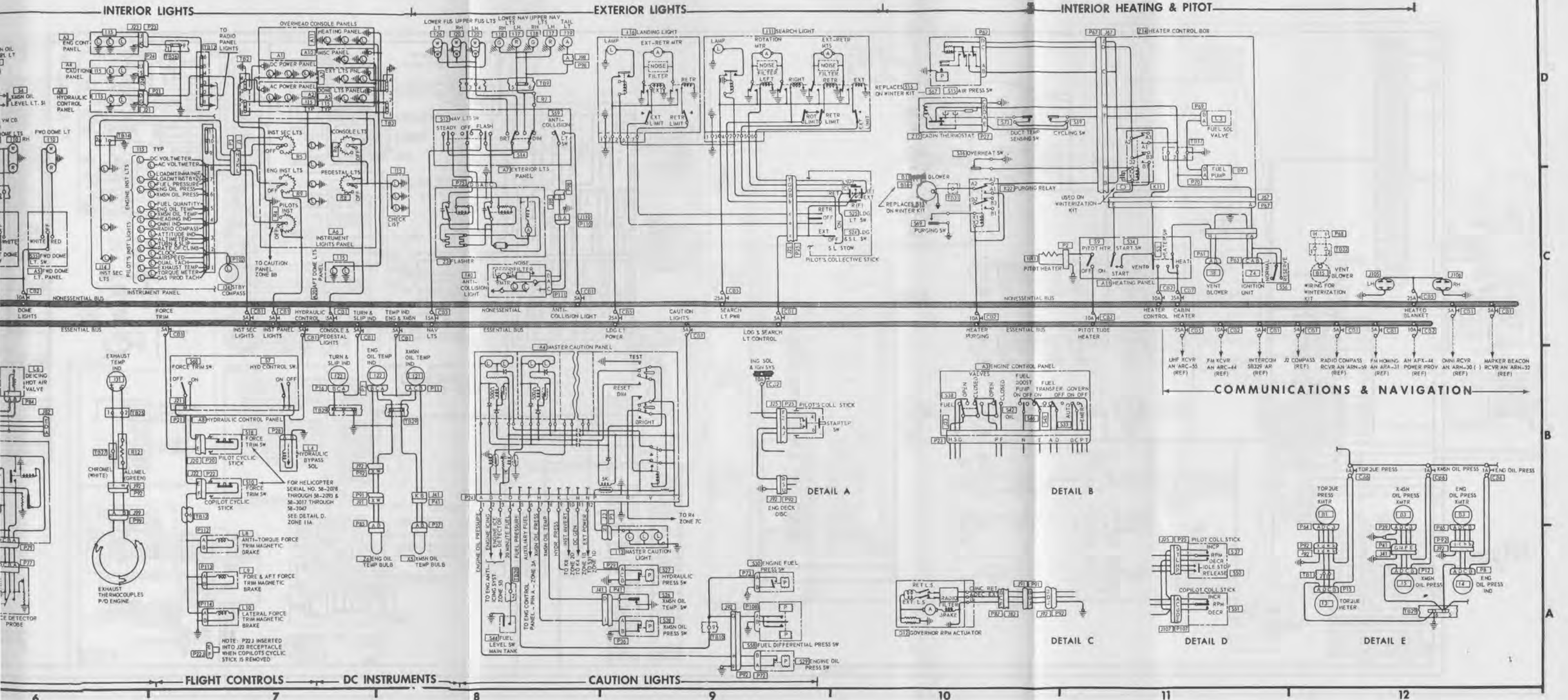
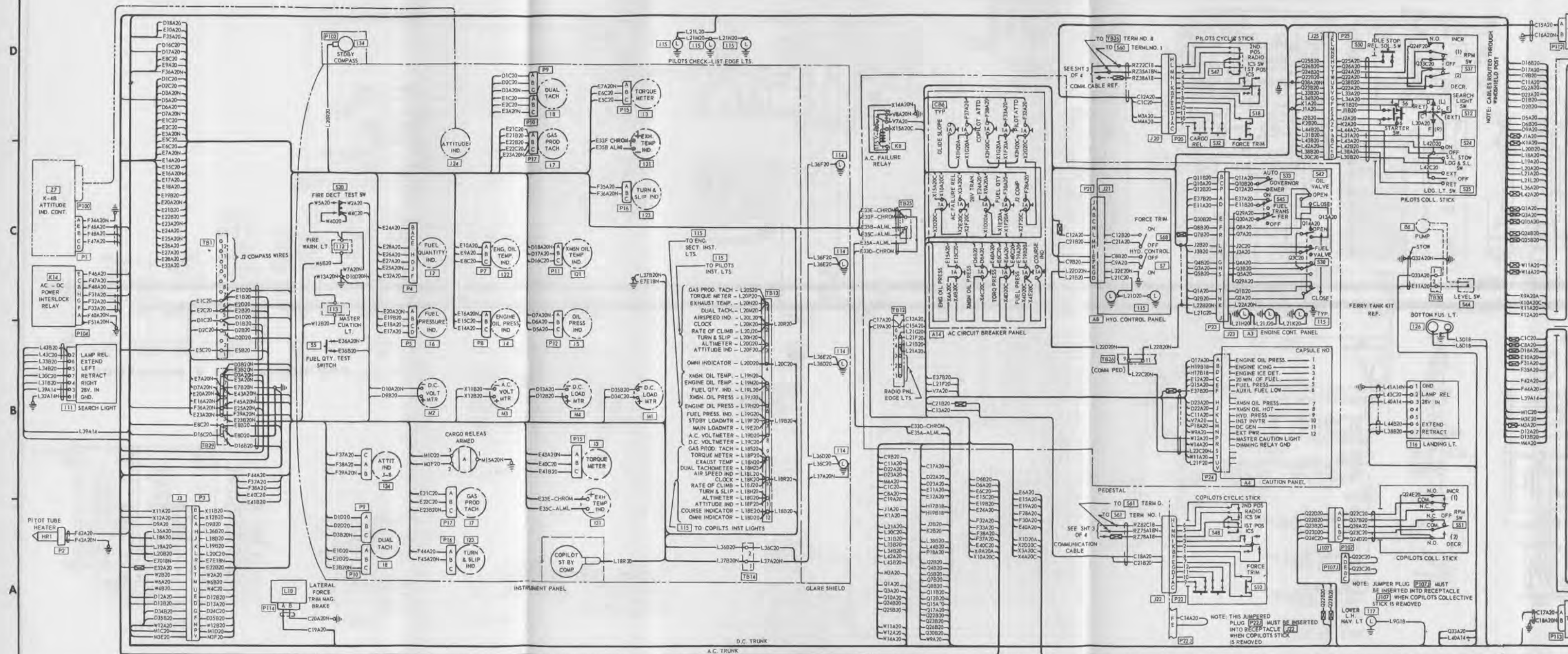
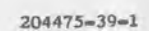
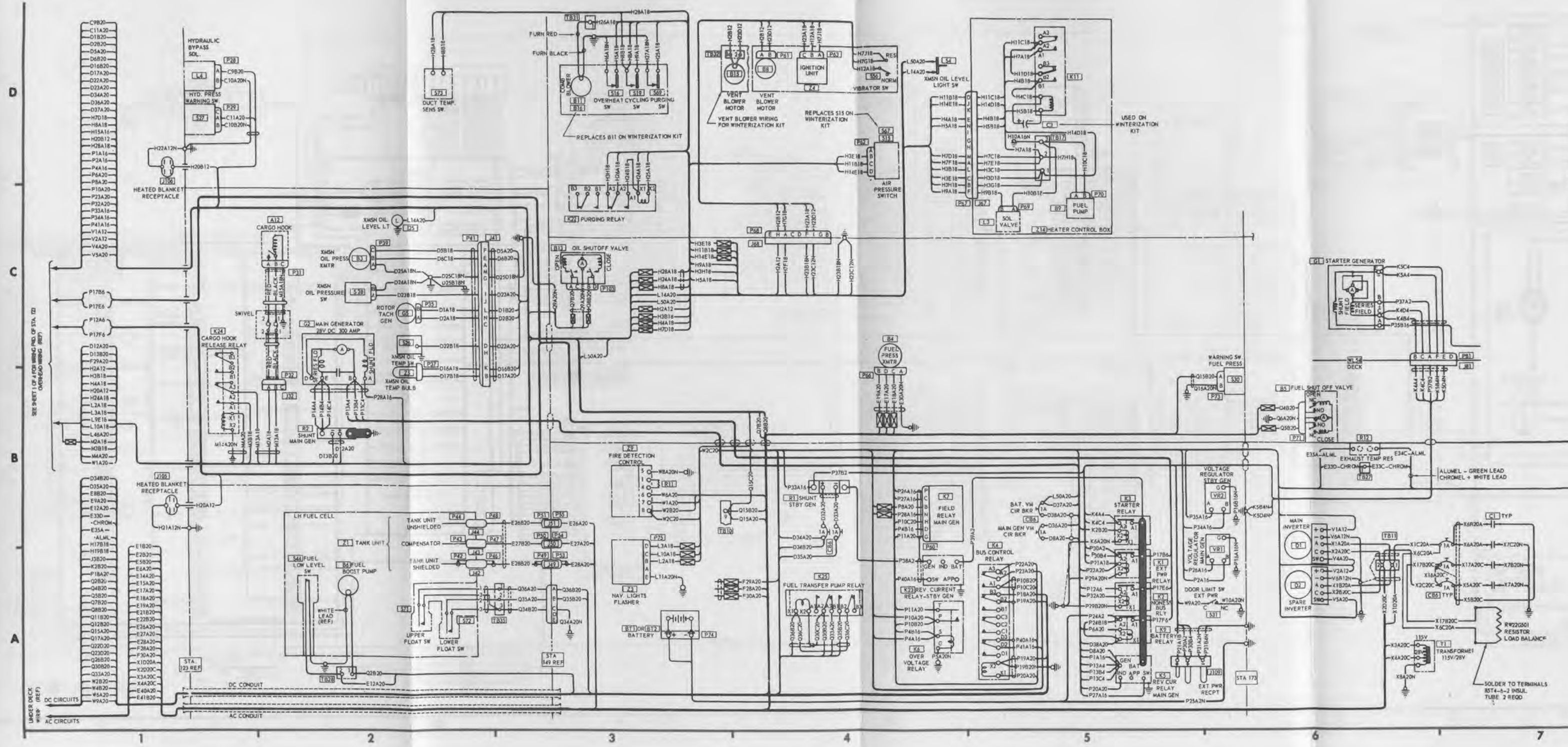


Figure 12-10. Electrical schematic — UH-1A (59-1658 thru 59-1671)





12-32



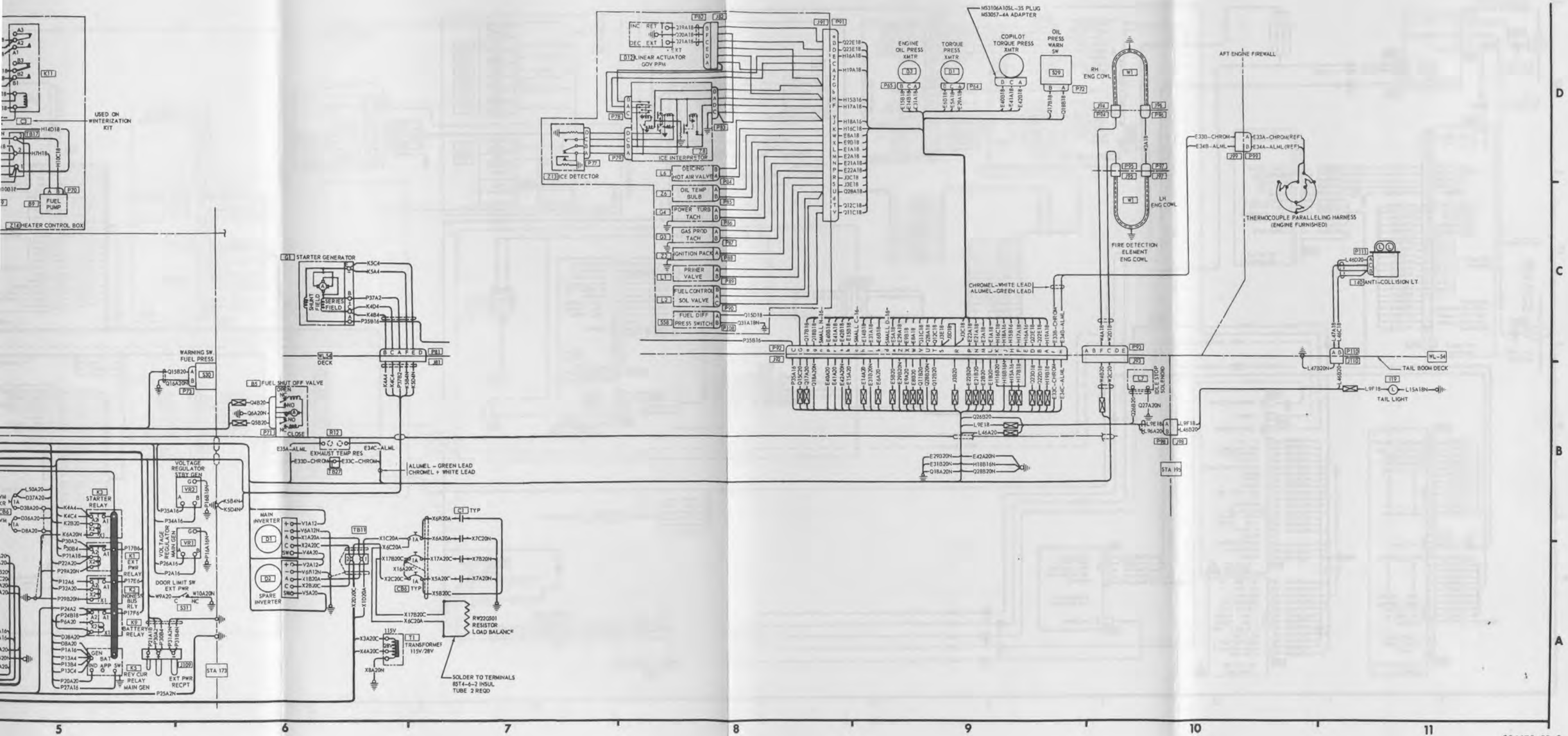
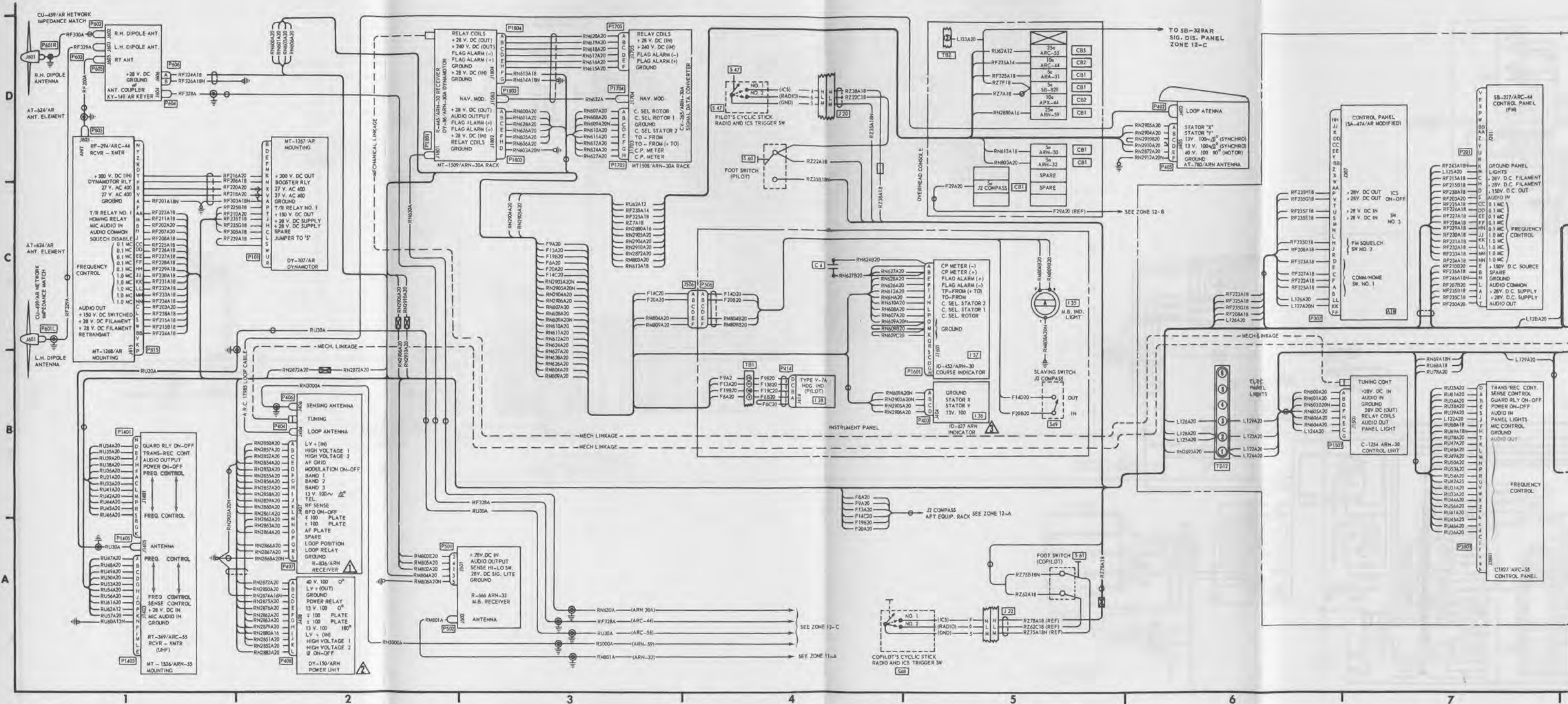


Figure 12-11. Electrical and communication wiring diagram — UH-1A (59-1658 thru 59-1671)
(Sheet 2 of 4)



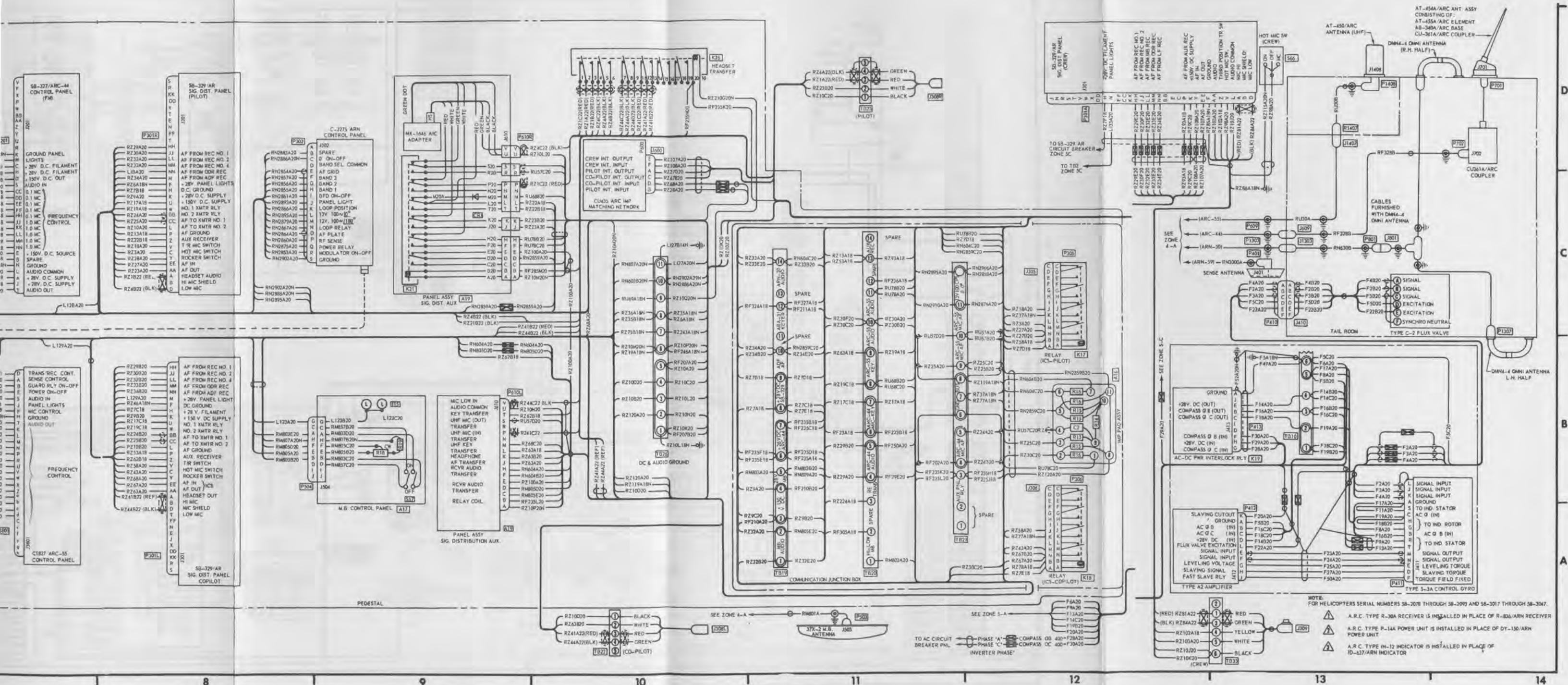
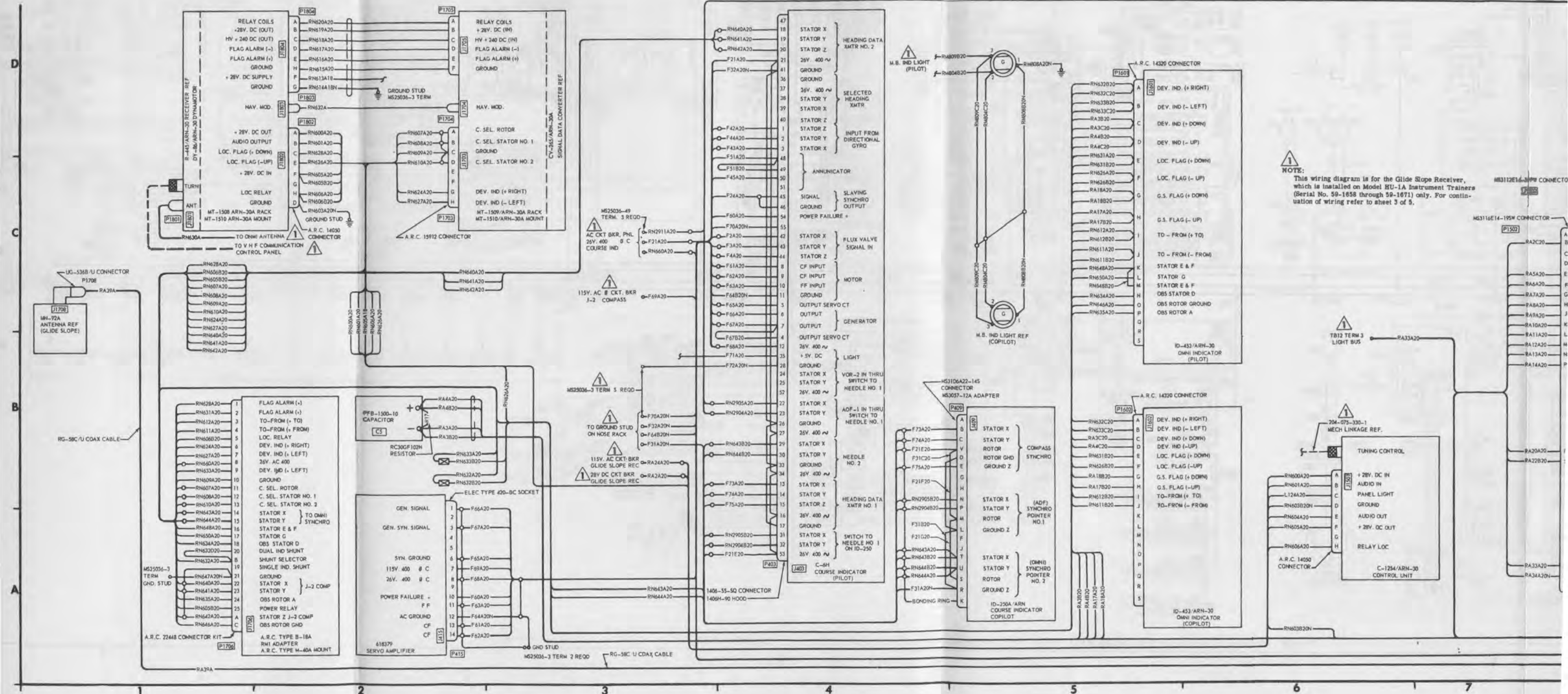


Figure 12-11. Electrical and communication wiring diagram — UH-1A (59-1658 thru 59-1671)
(Sheet 3 of 4)



NOTE:
This wiring diagram is for the Glide Slope Receiver, which is installed on Model HU-1A Instrument Trainers (Serial No. 59-1658 through 59-1671) only. For continuation of wiring refer to sheet 3 of 5.

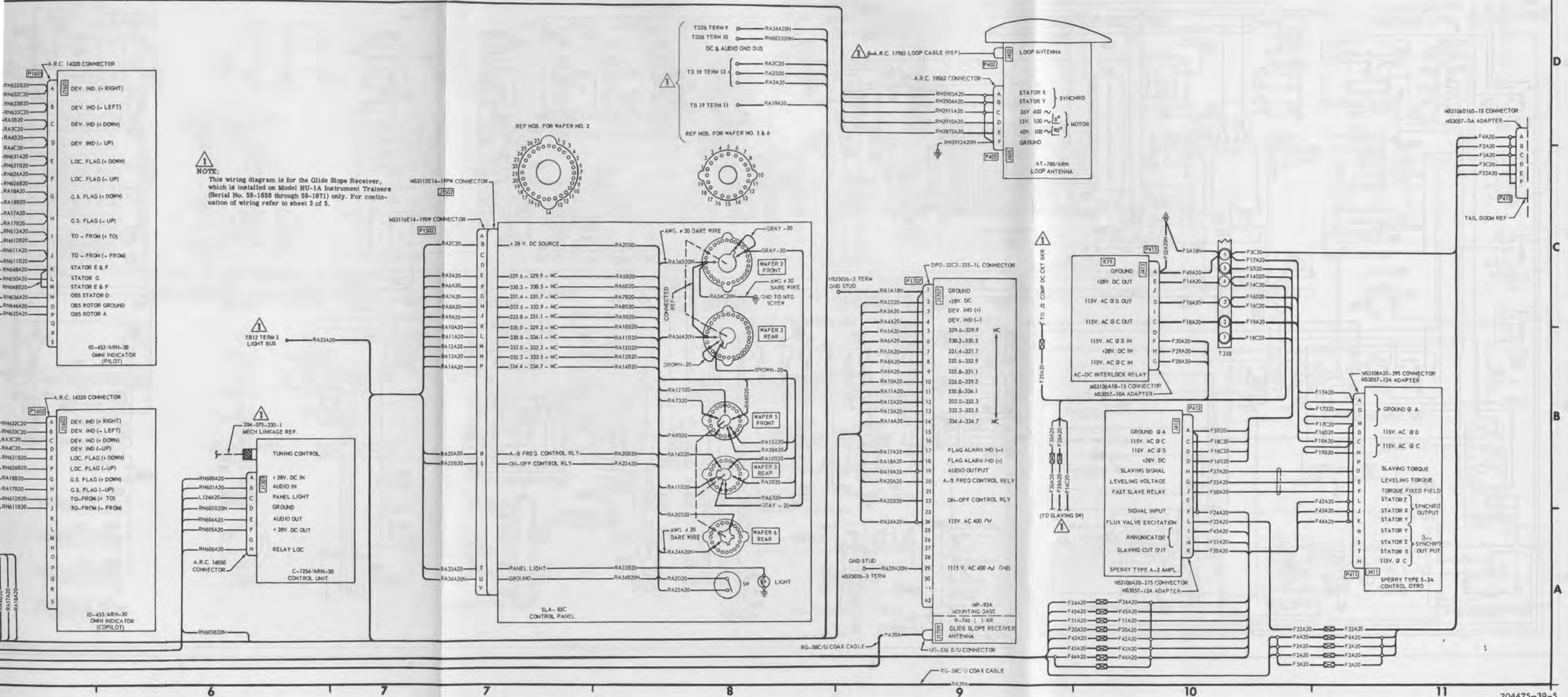
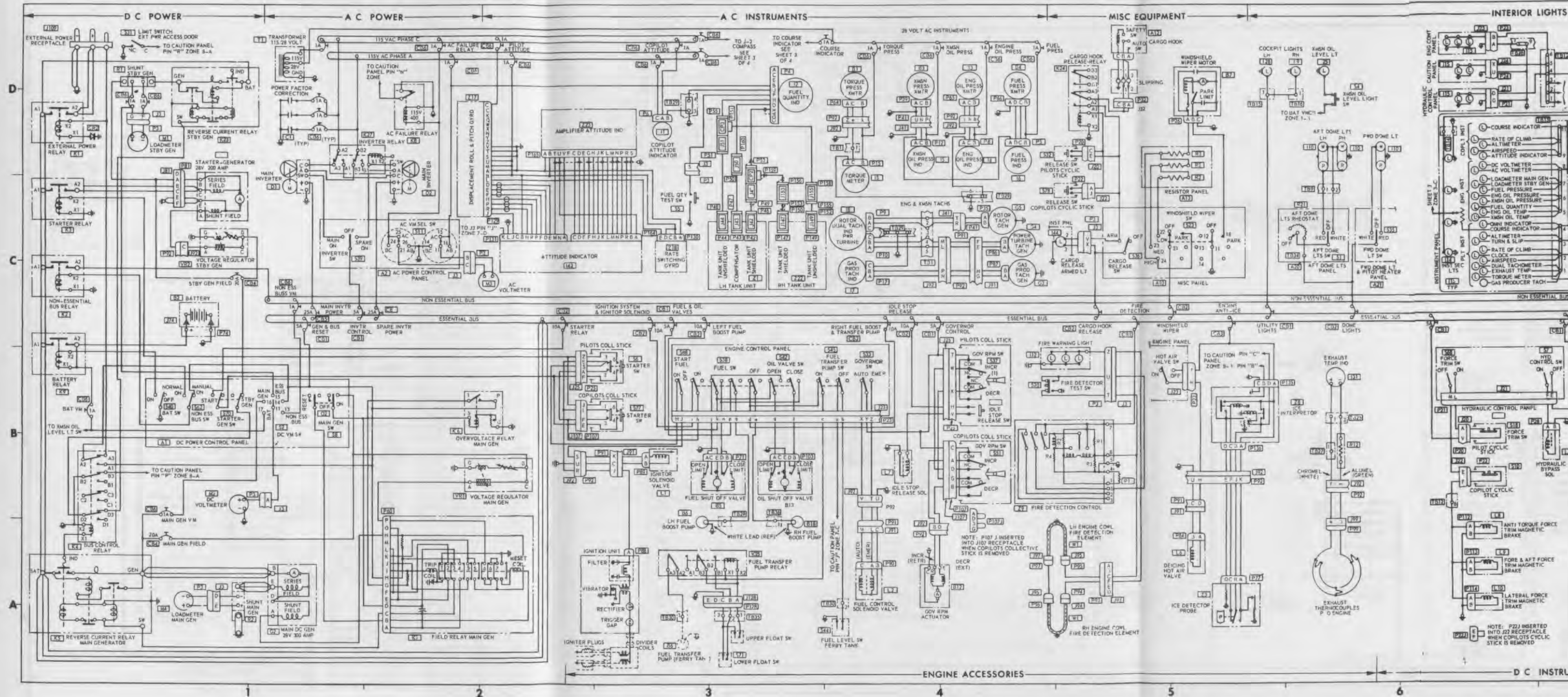


Figure 12-11. Electrical and communication wiring diagram — UH-1A (59-1658 thru 59-1671)
(Sheet 4 of 4)



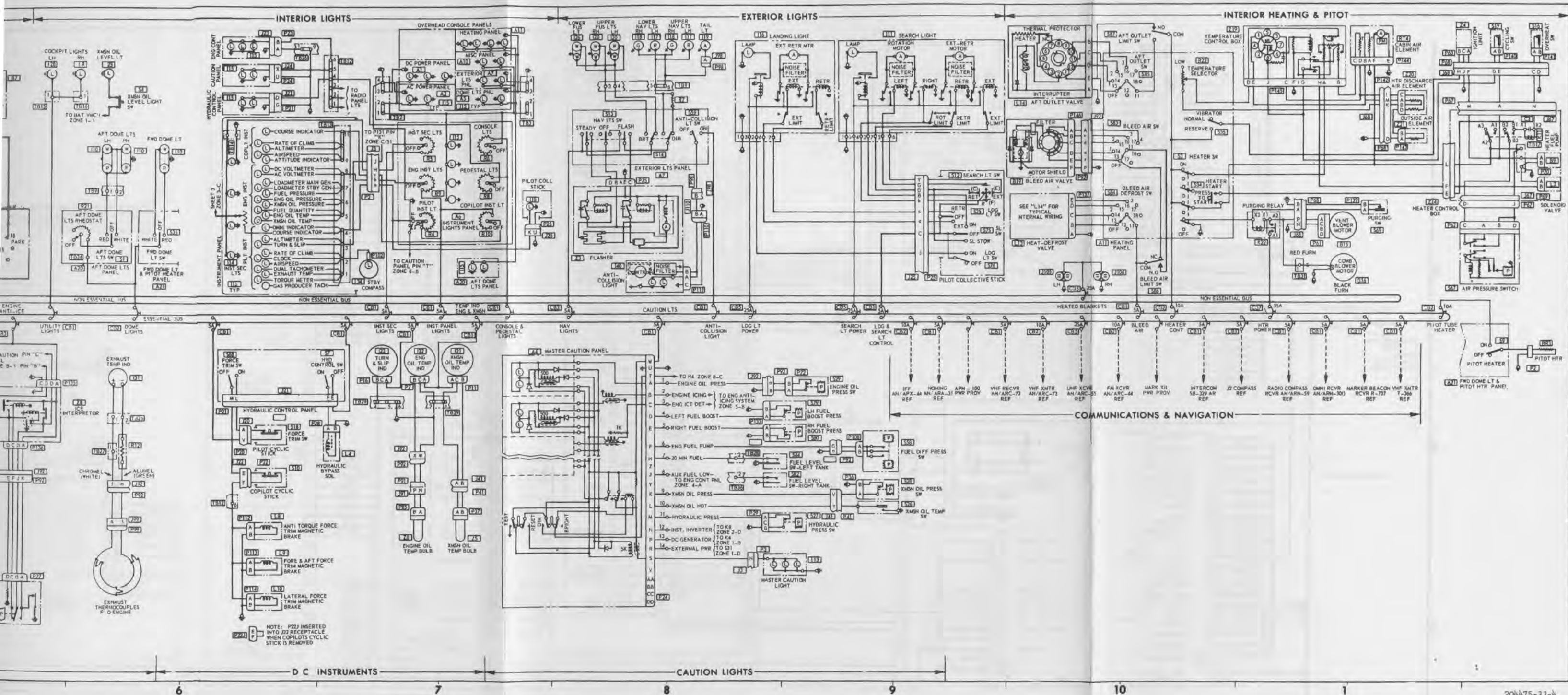
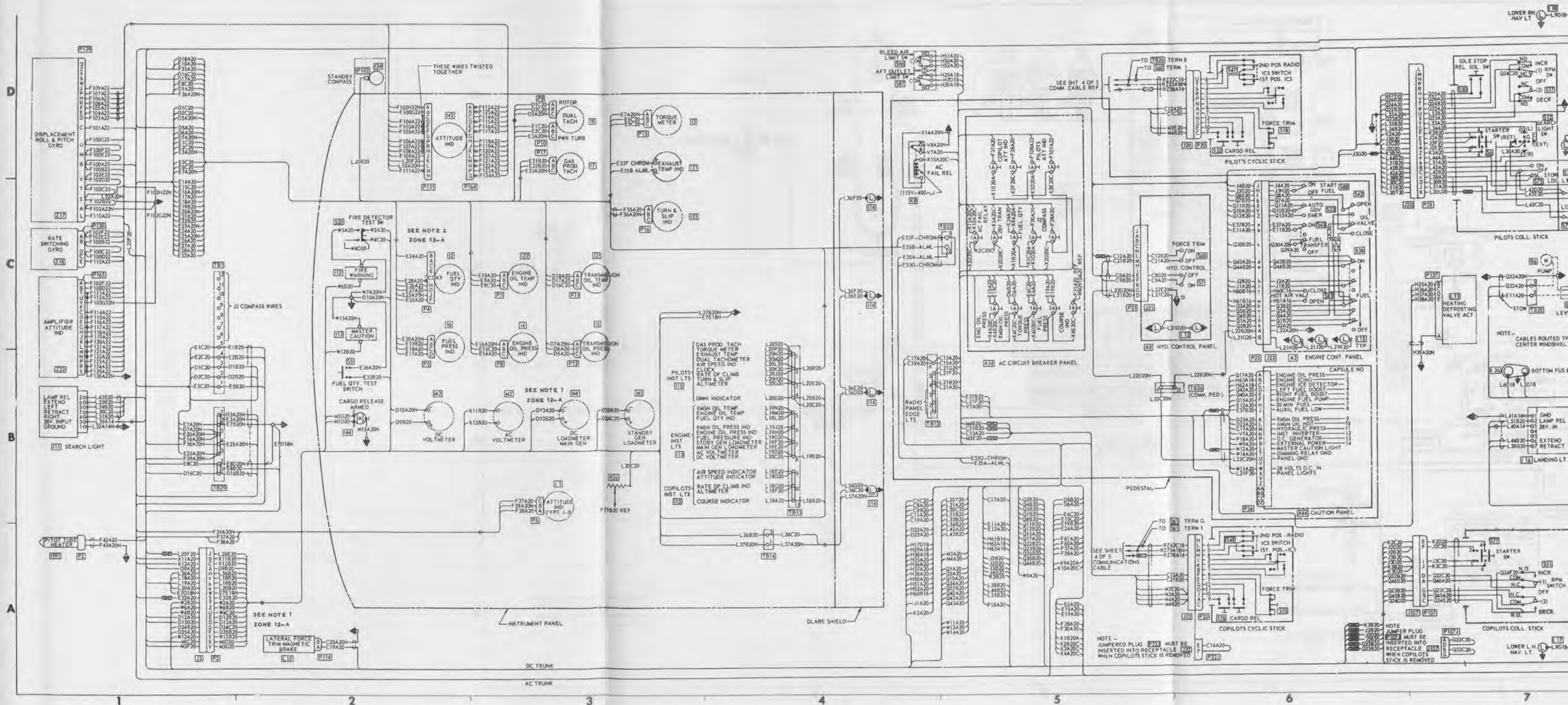


Figure 12-12. Electrical schematic — UH-1B (60-3546 thru 60-3619, 61-686 thru 61-740)



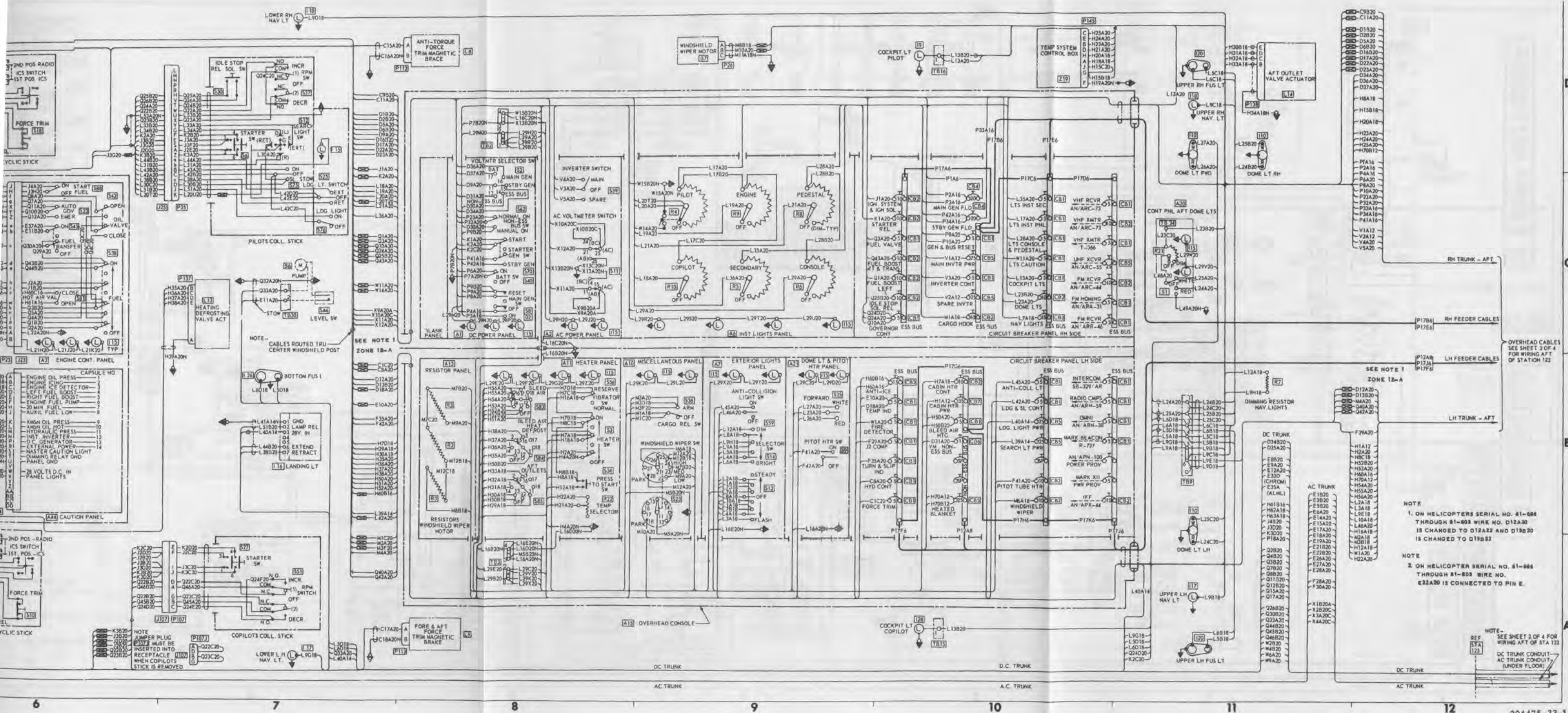
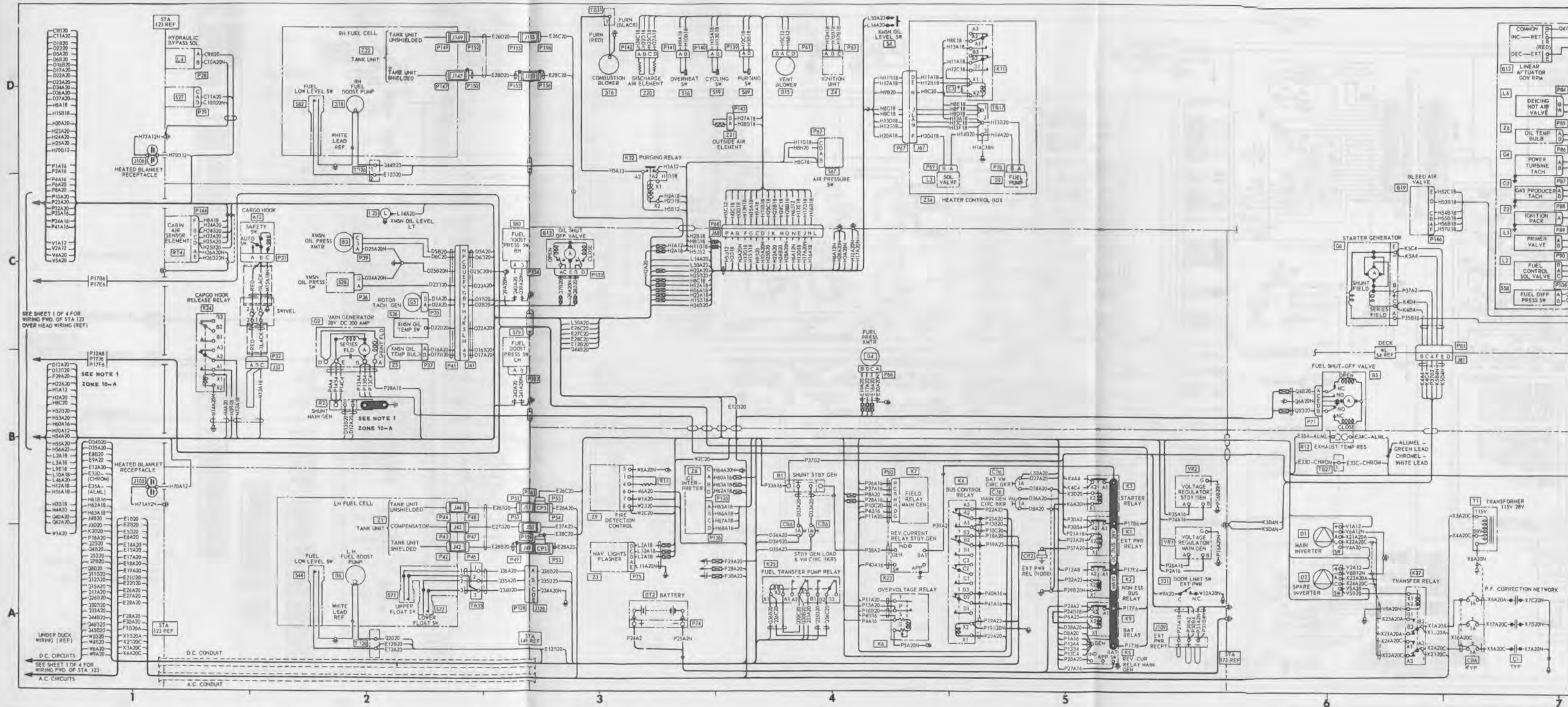
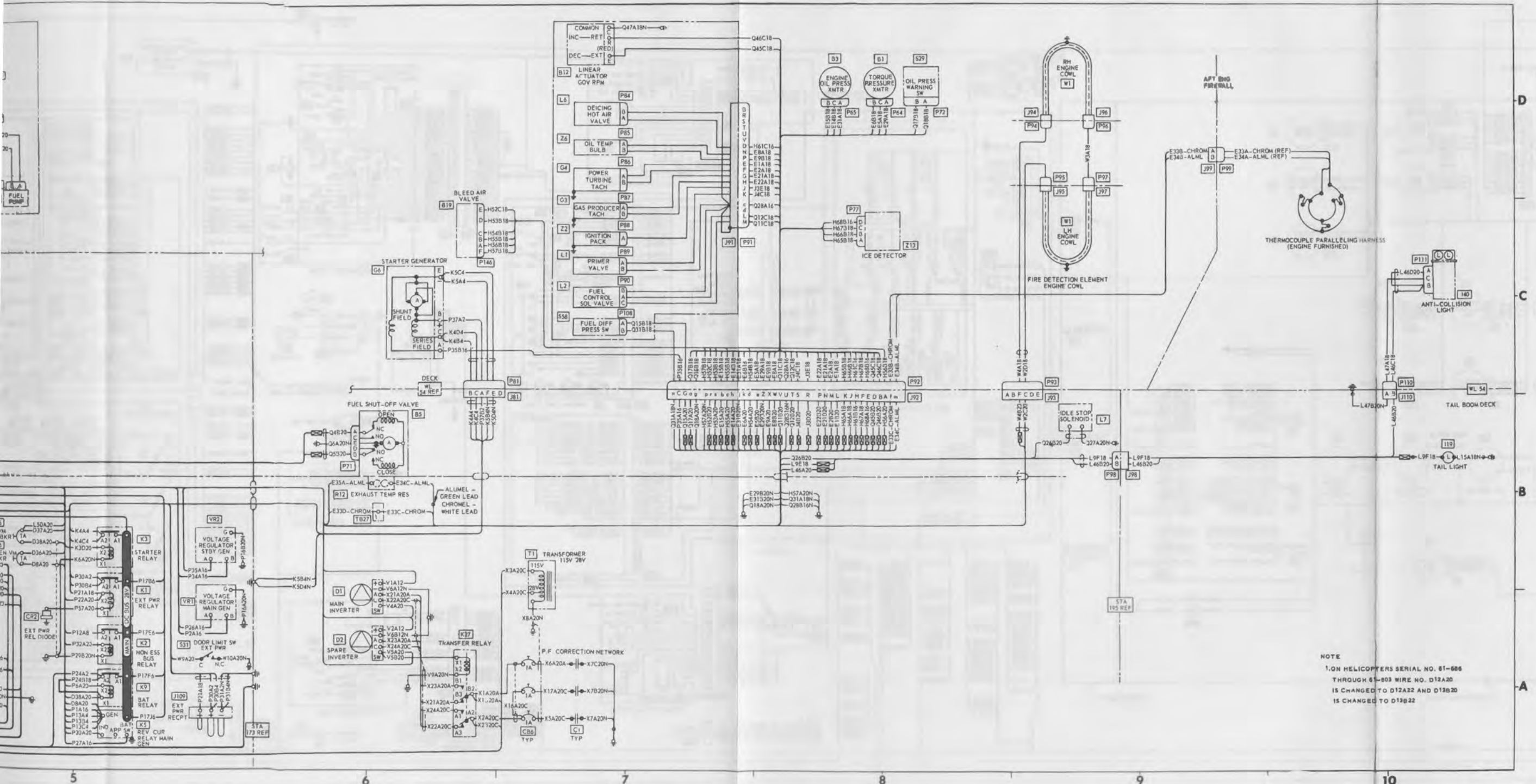
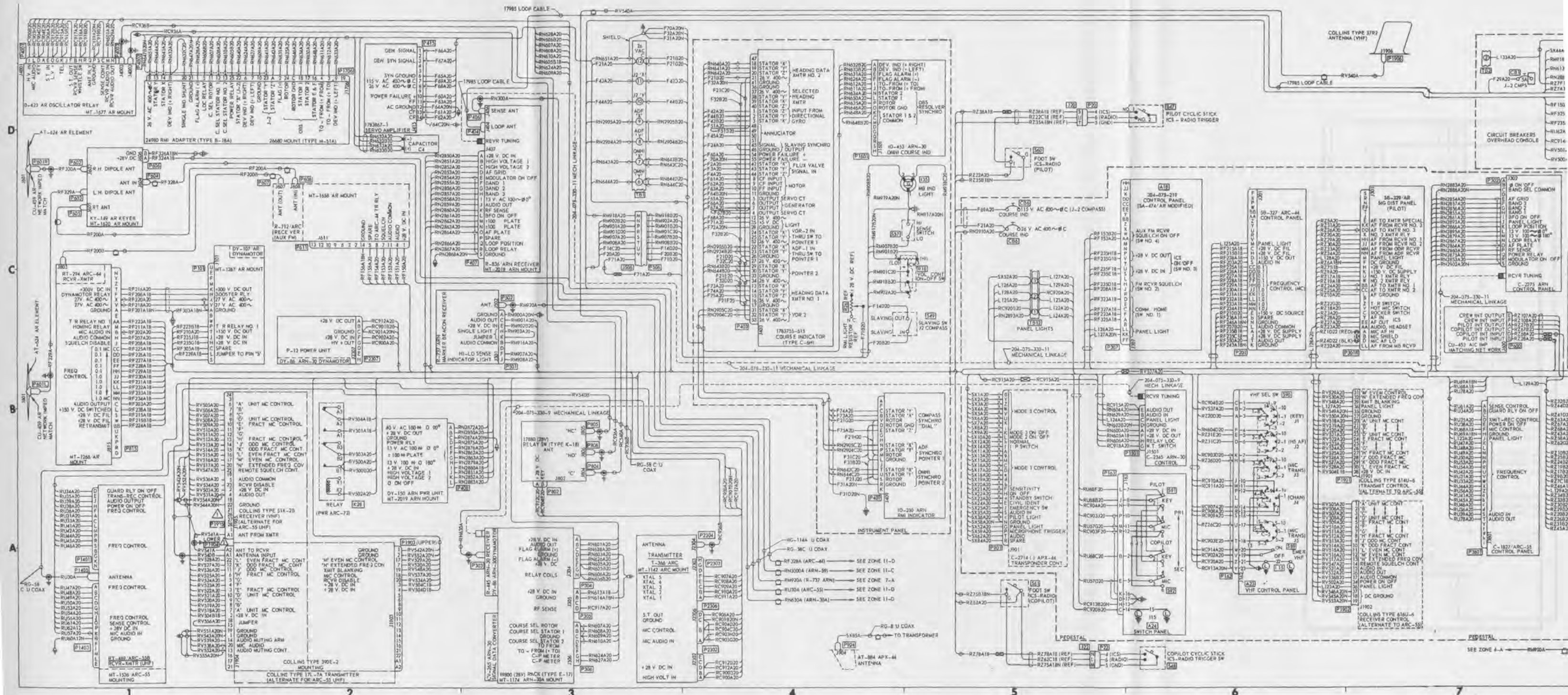


Figure 12-13. Electrical and communication wiring diagram — UH-1B (60-3546 thru 60-3619 and 61-686 thru 61-740) (Sheet 1 of 5)







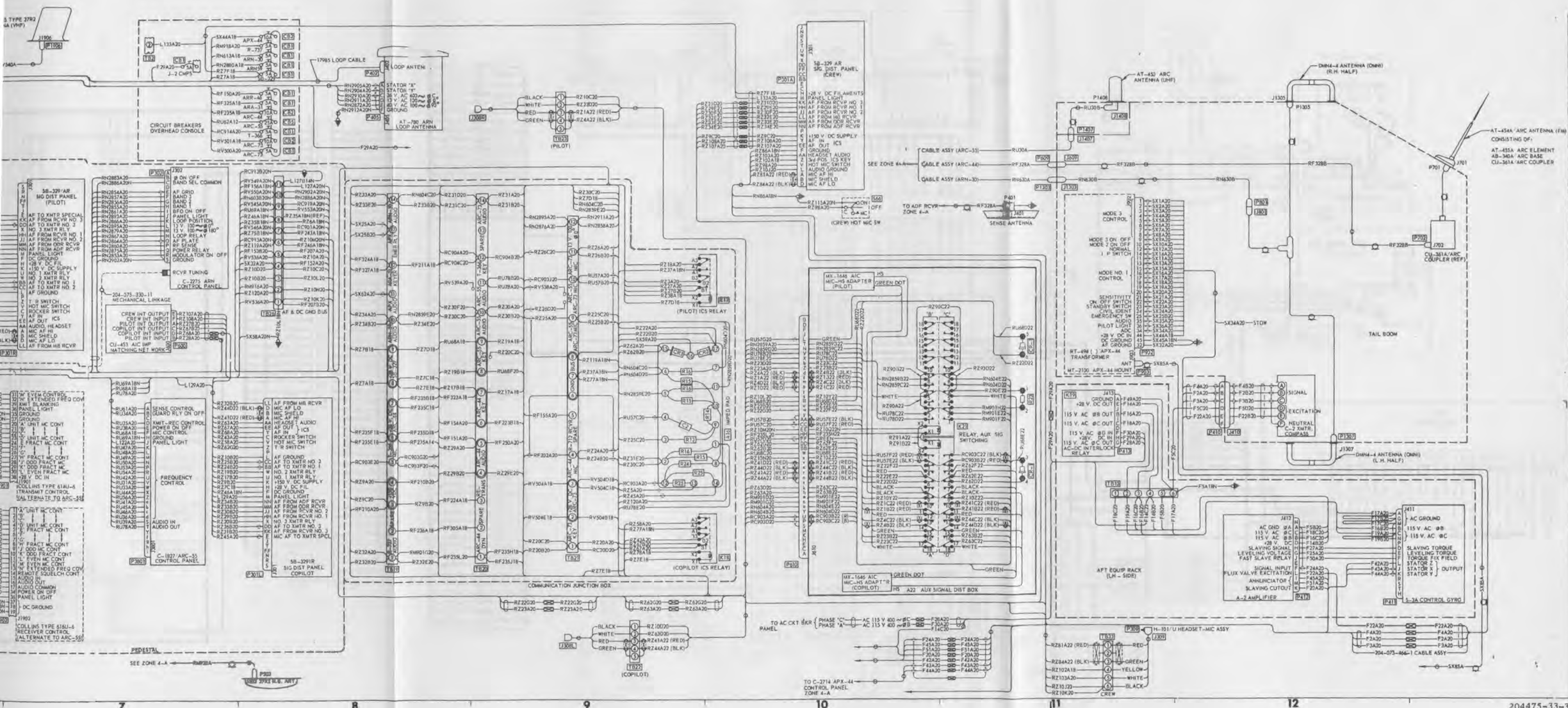


Figure 12-13. Electrical and communication wiring diagram — UH-1B (60-3546 thru 60-3619 and 61-686 thru 61-740) (Sheet 3 of 5)

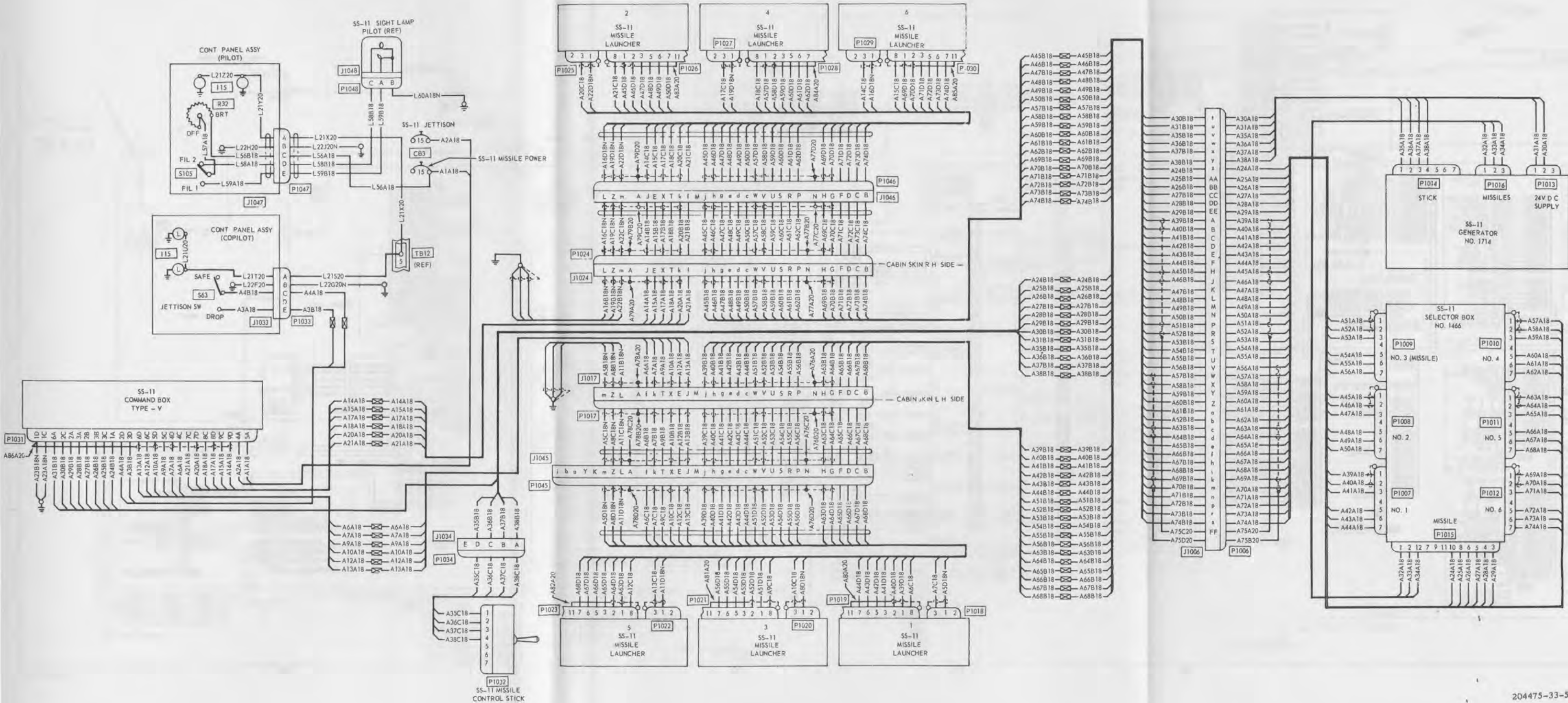
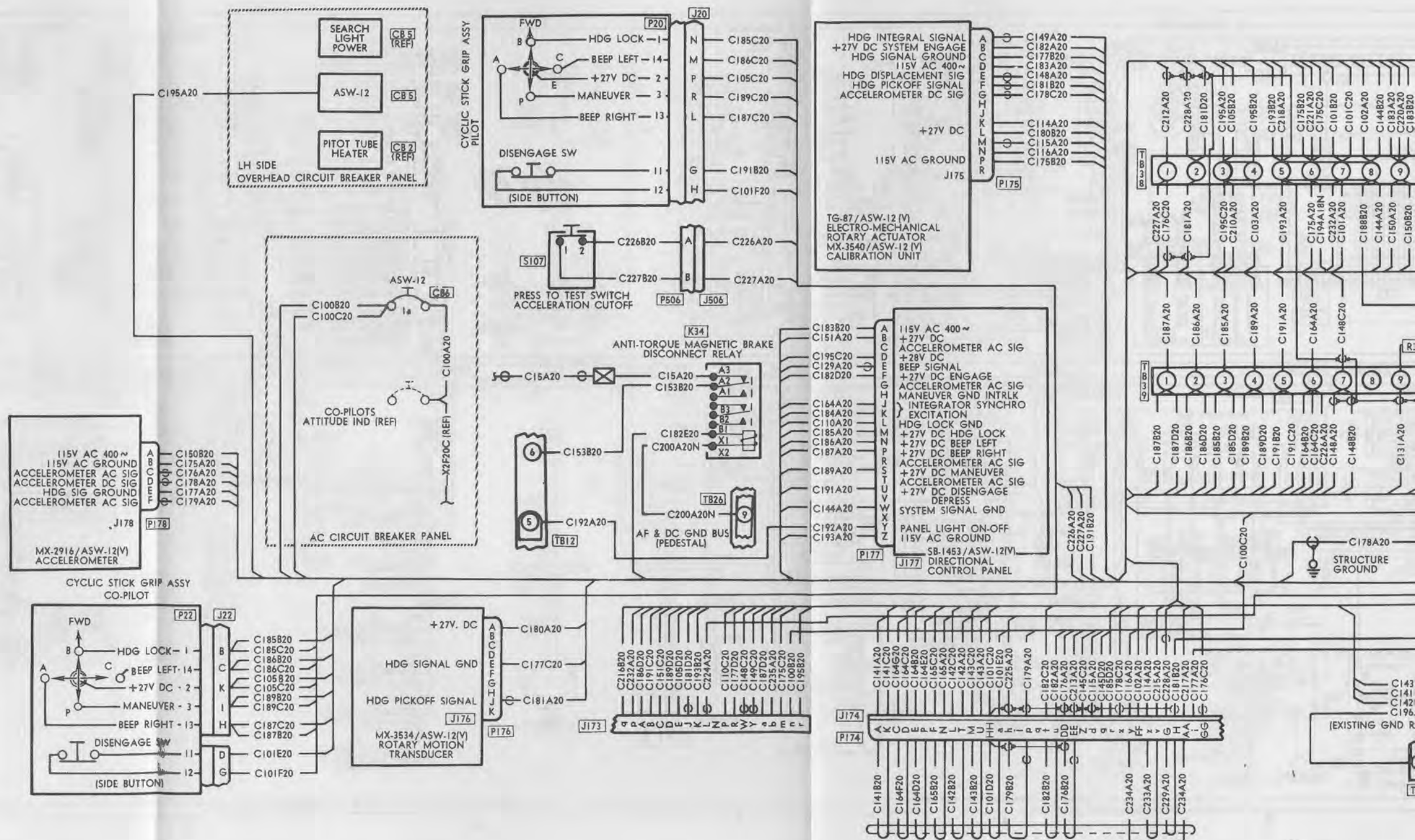


Figure 12-13. Electrical and communication wiring diagram — UH-1B (60-3546 thru 60-3619 and 61-686 thru 61-740) (Sheet 4 of 5)



Figure

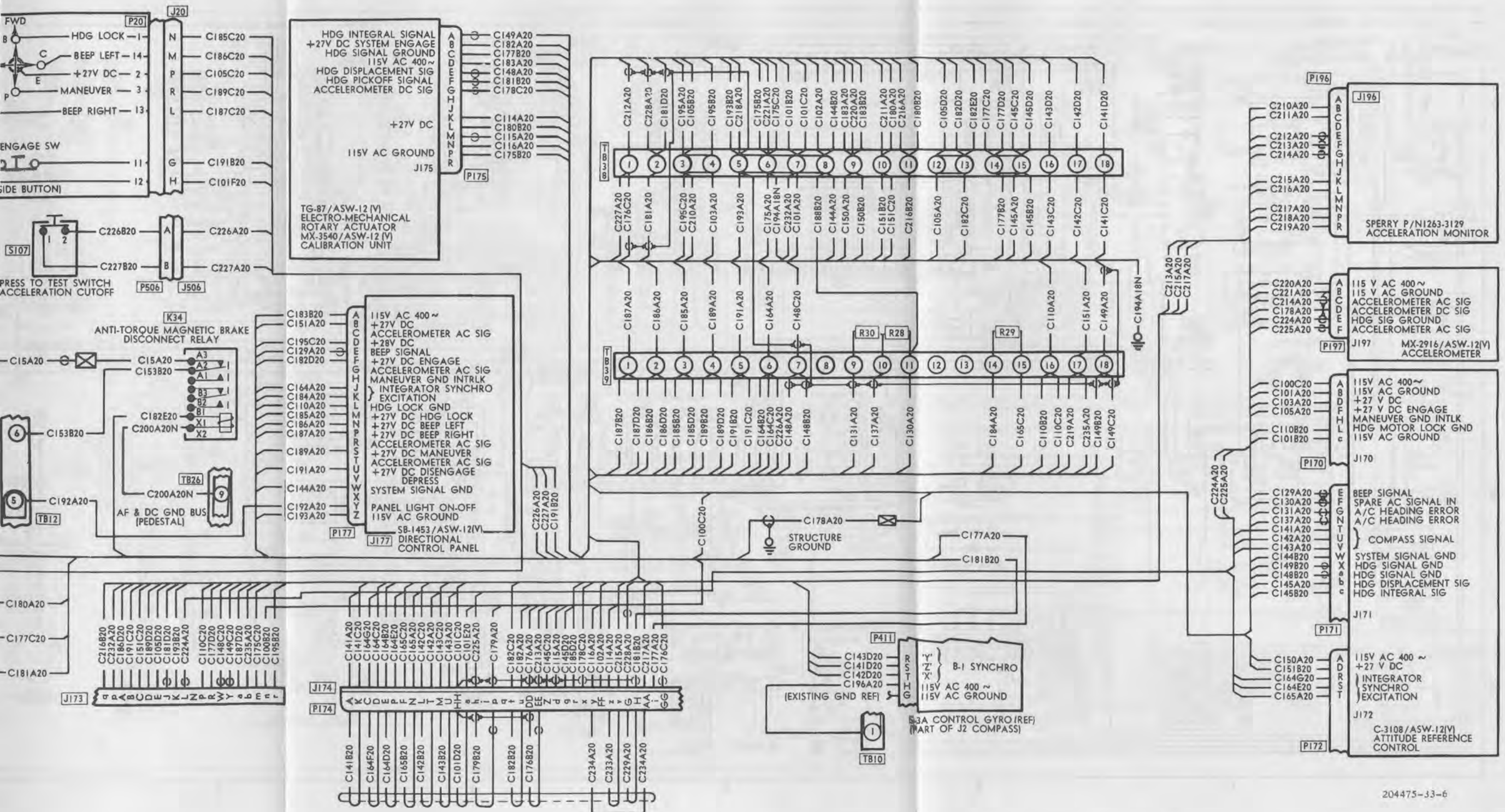
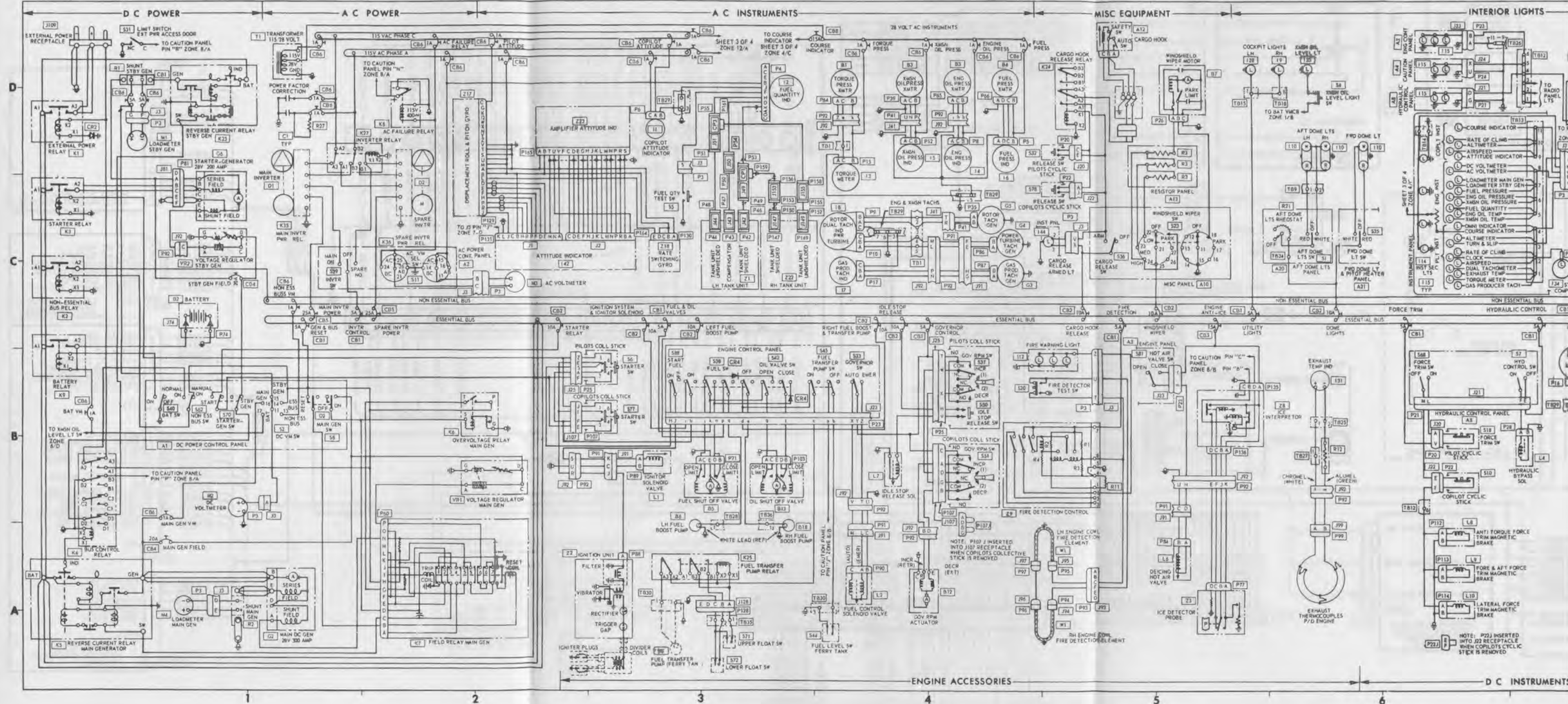


Figure 12-13. Electrical and communication wiring diagram — UH-1B (60-3546 thru 60-3619 and 61-686 thru 61-740) (Sheet 5 of 5)



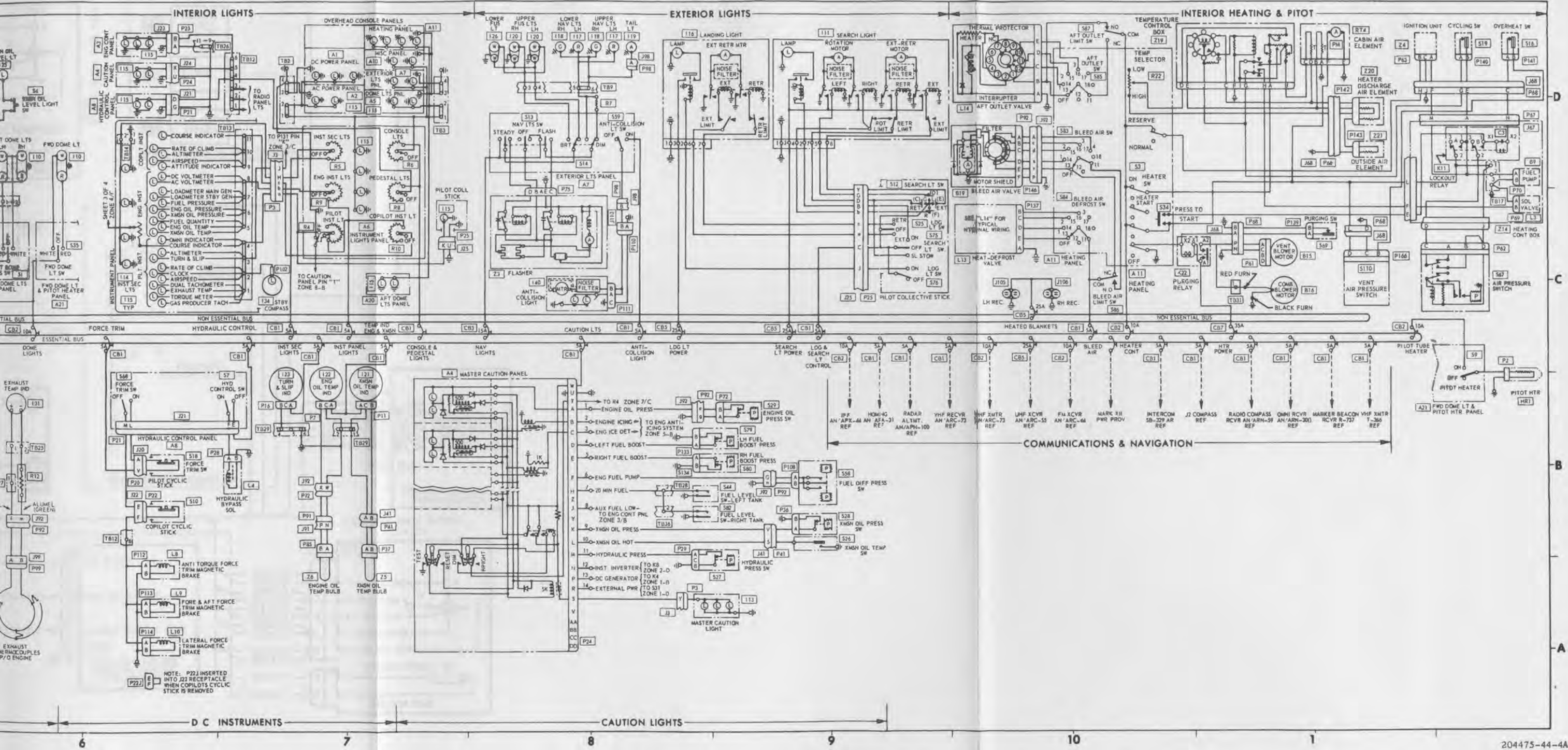
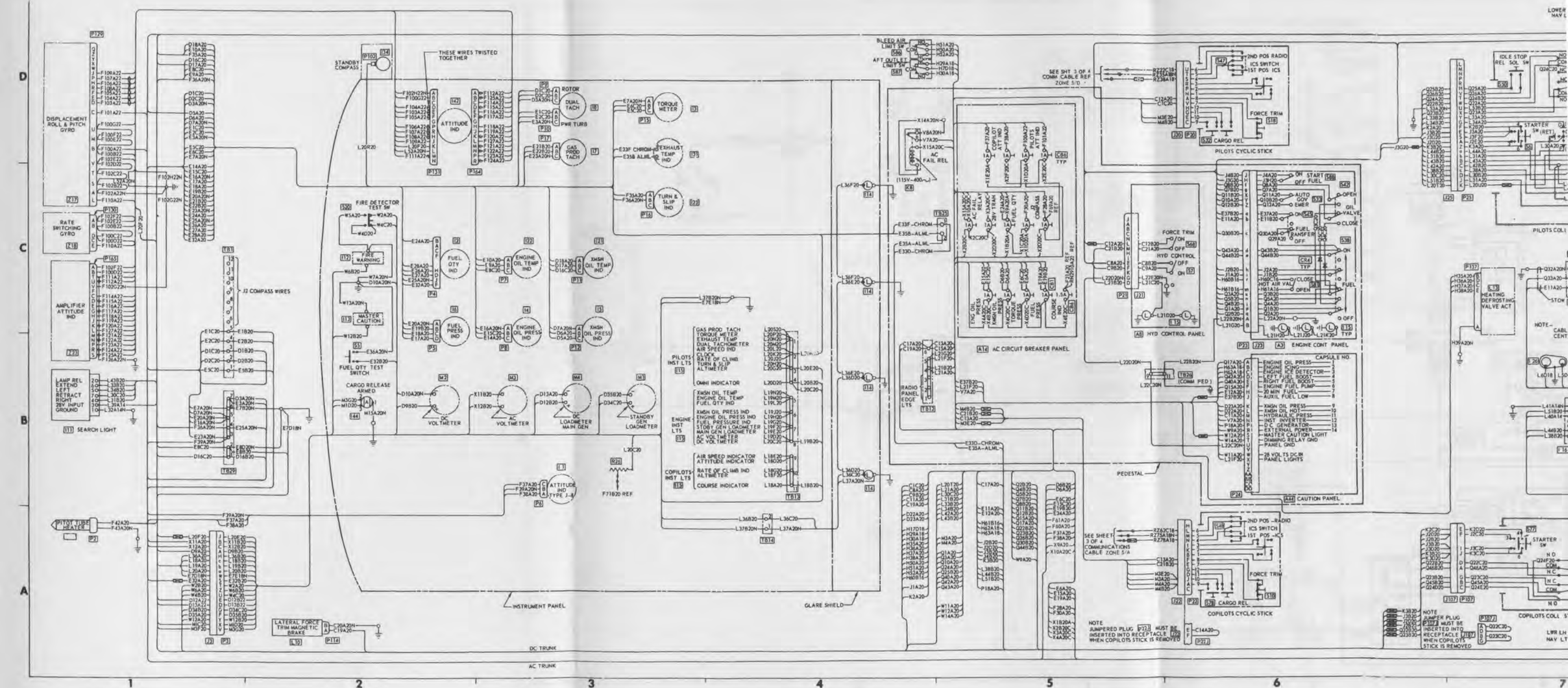


Figure 12-14. Electrical schematic — UH-1B (61-741 thru 61-803)



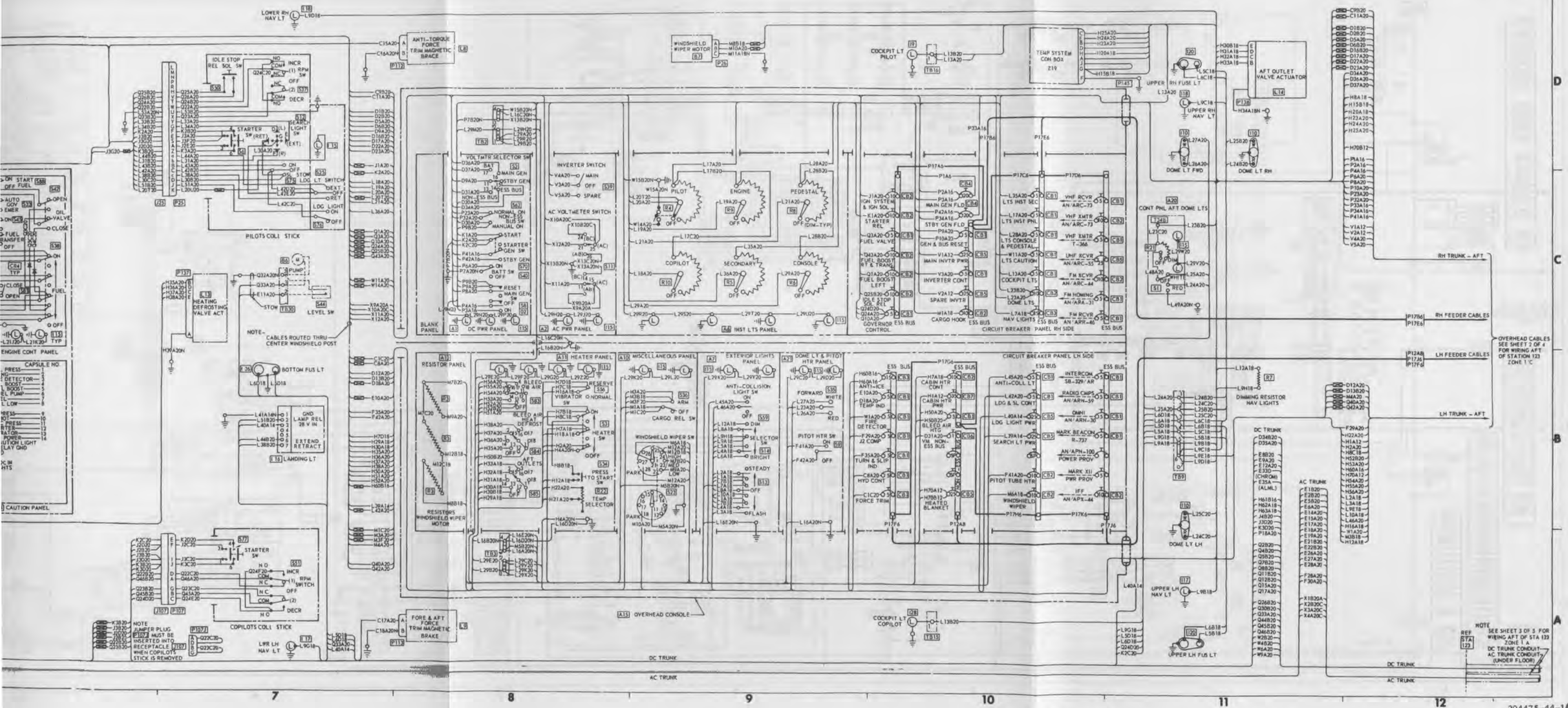
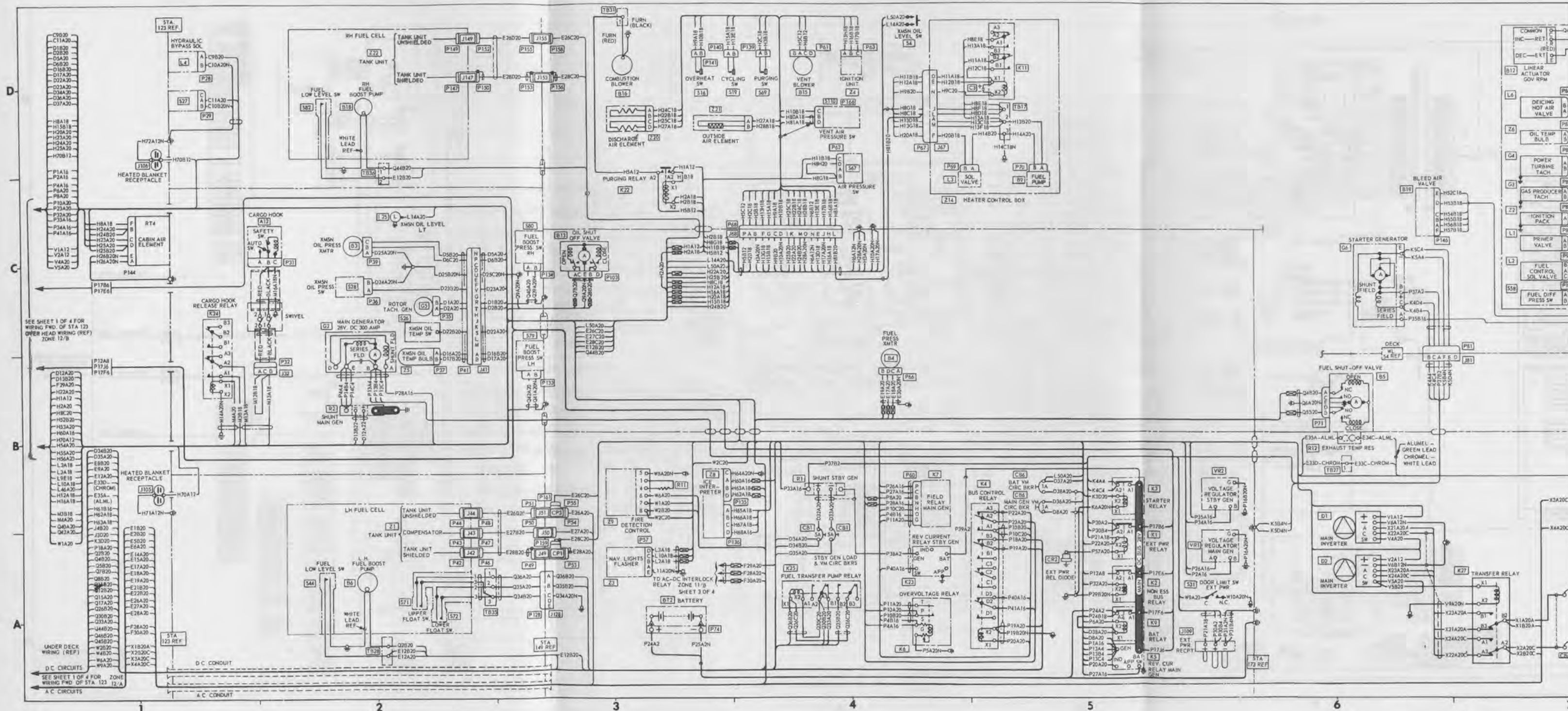


Figure 12-15. Electrical and communication wiring diagram (61-741 thru 61-803) (Sheet 1 of 3)



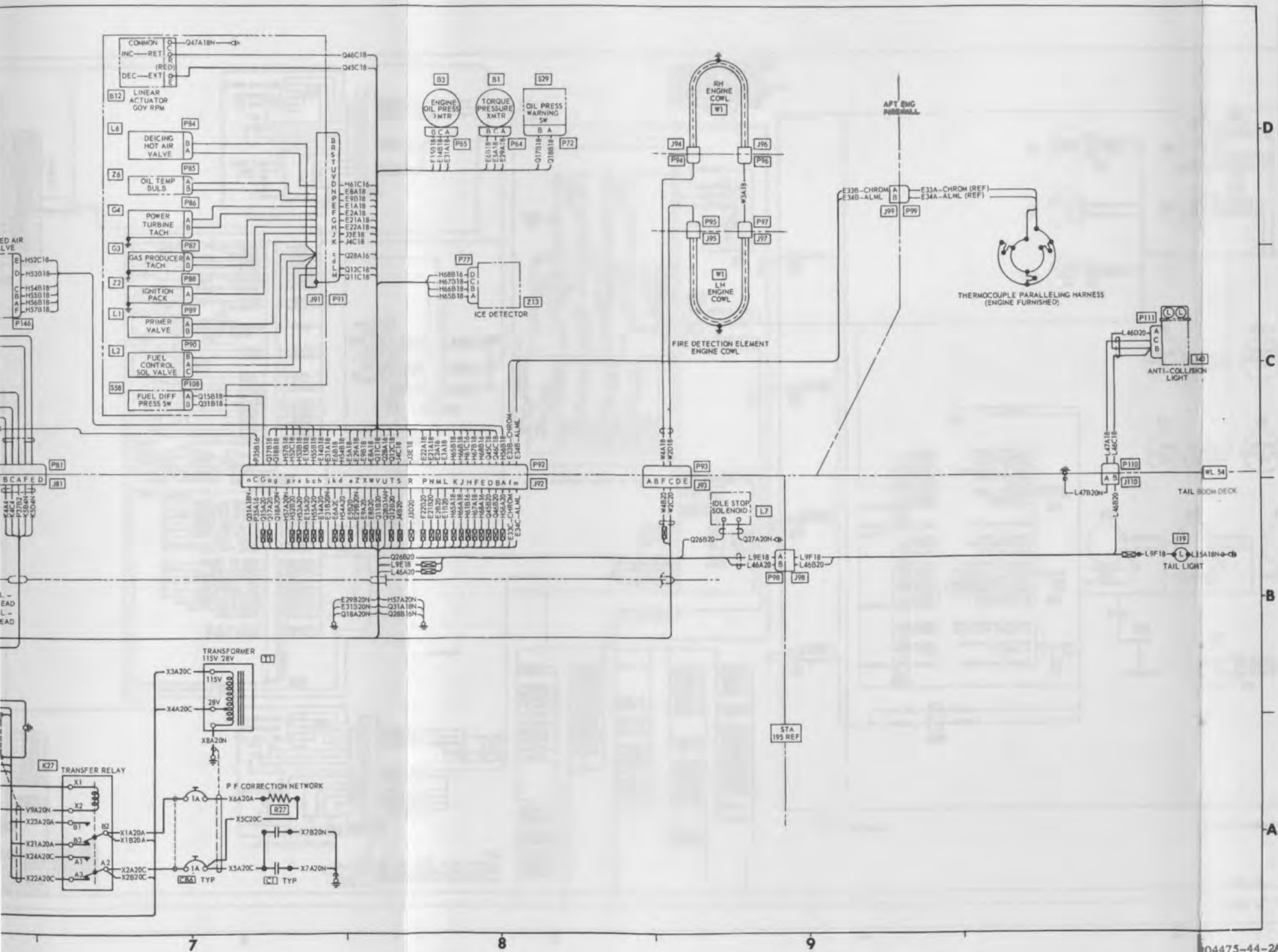
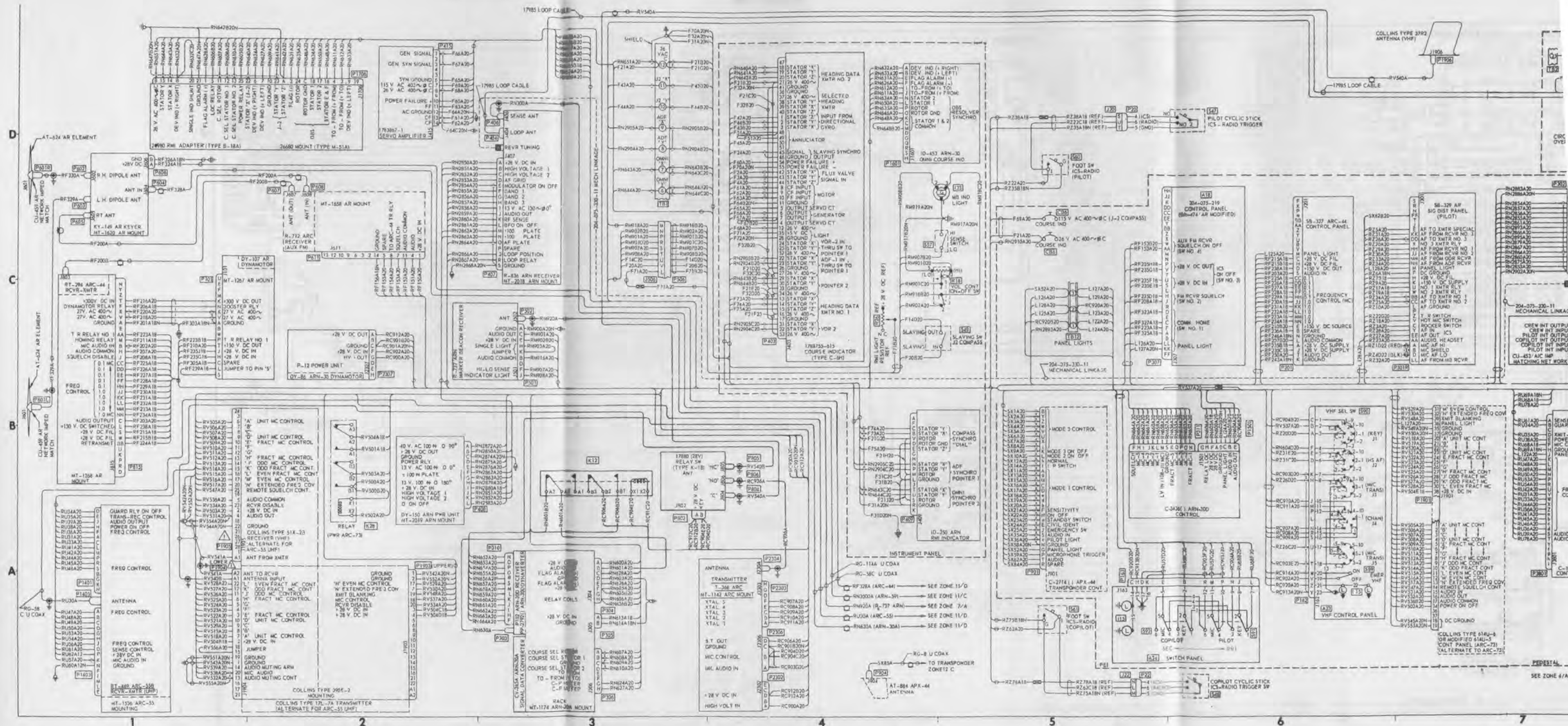
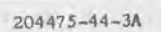
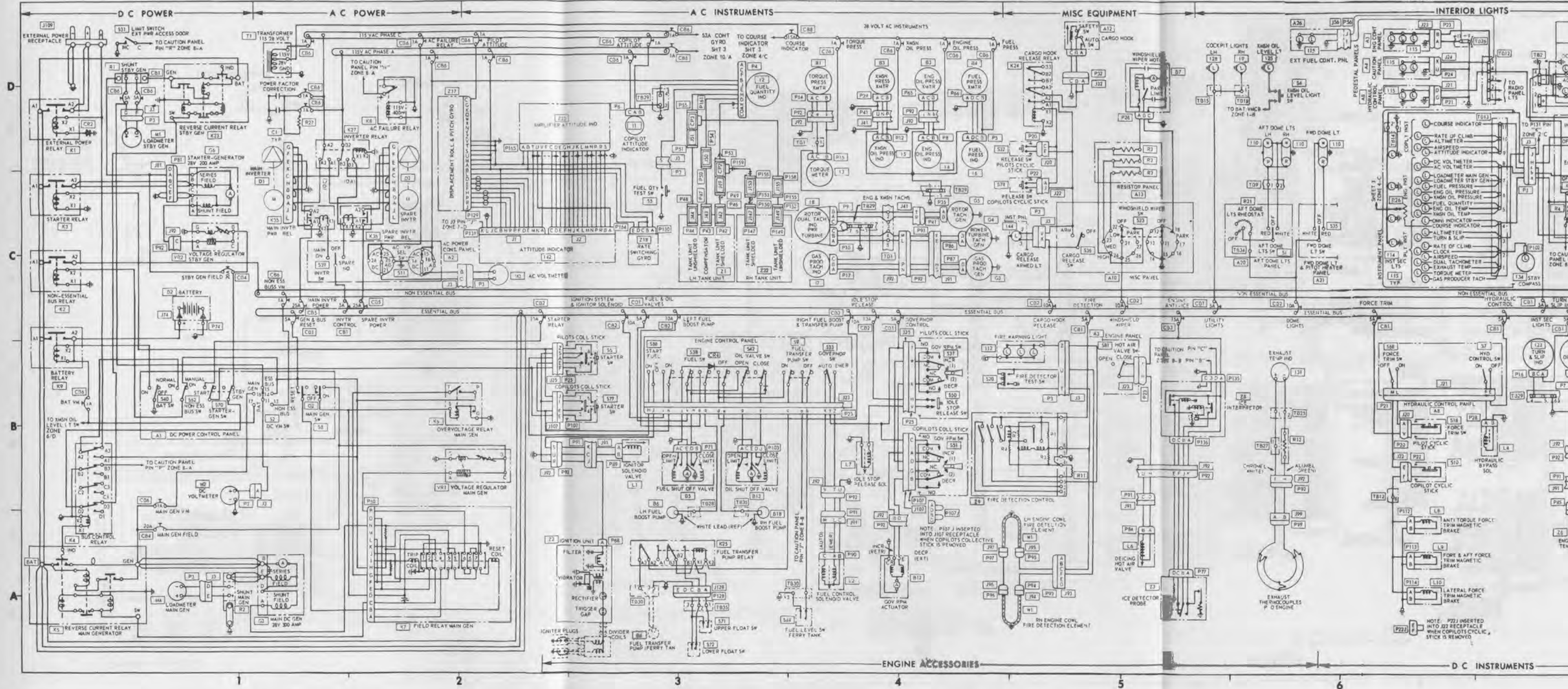


Figure 12-15. Electrical and communication wiring diagram (61-741 thru 61-803) (Sheet 2 of 3)





12-45



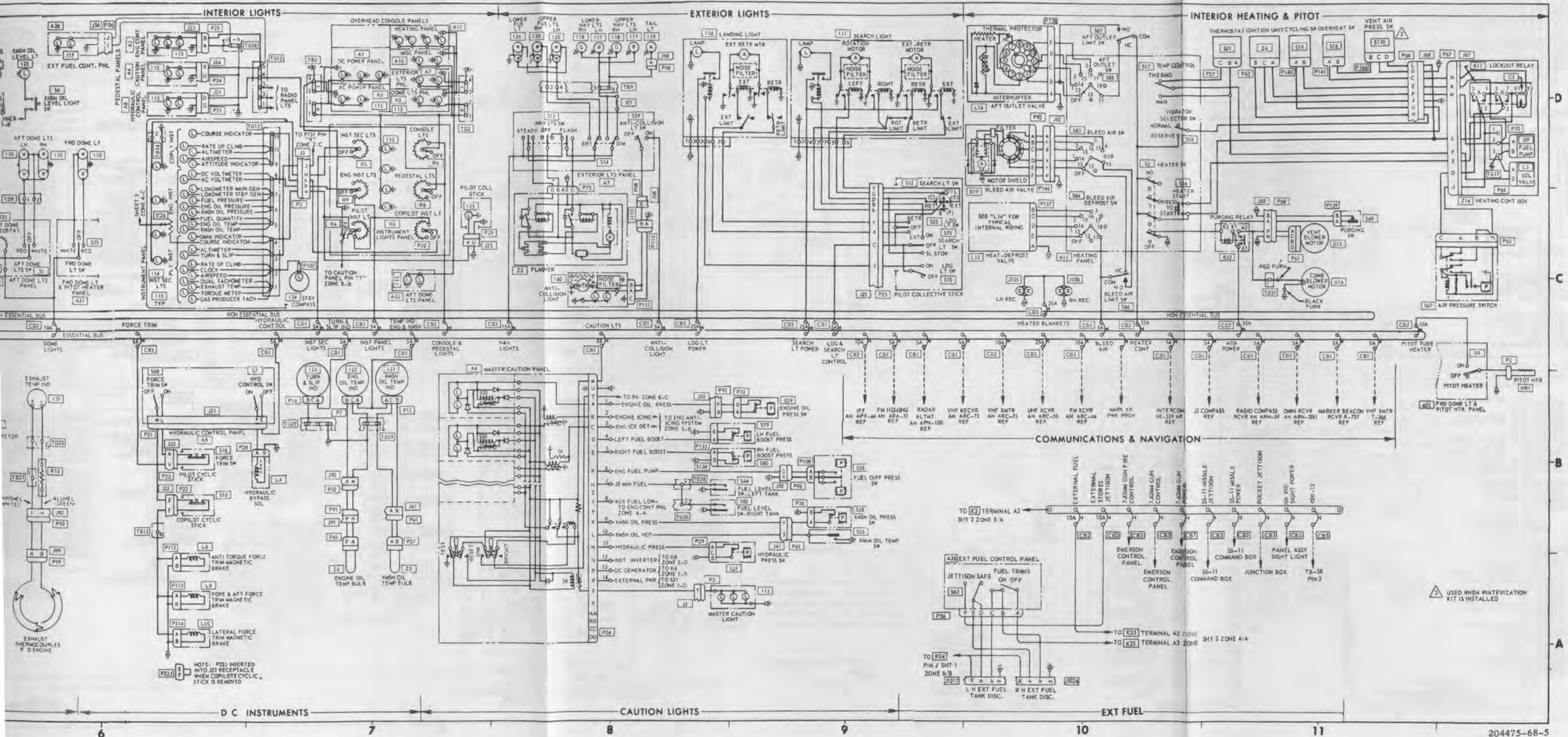
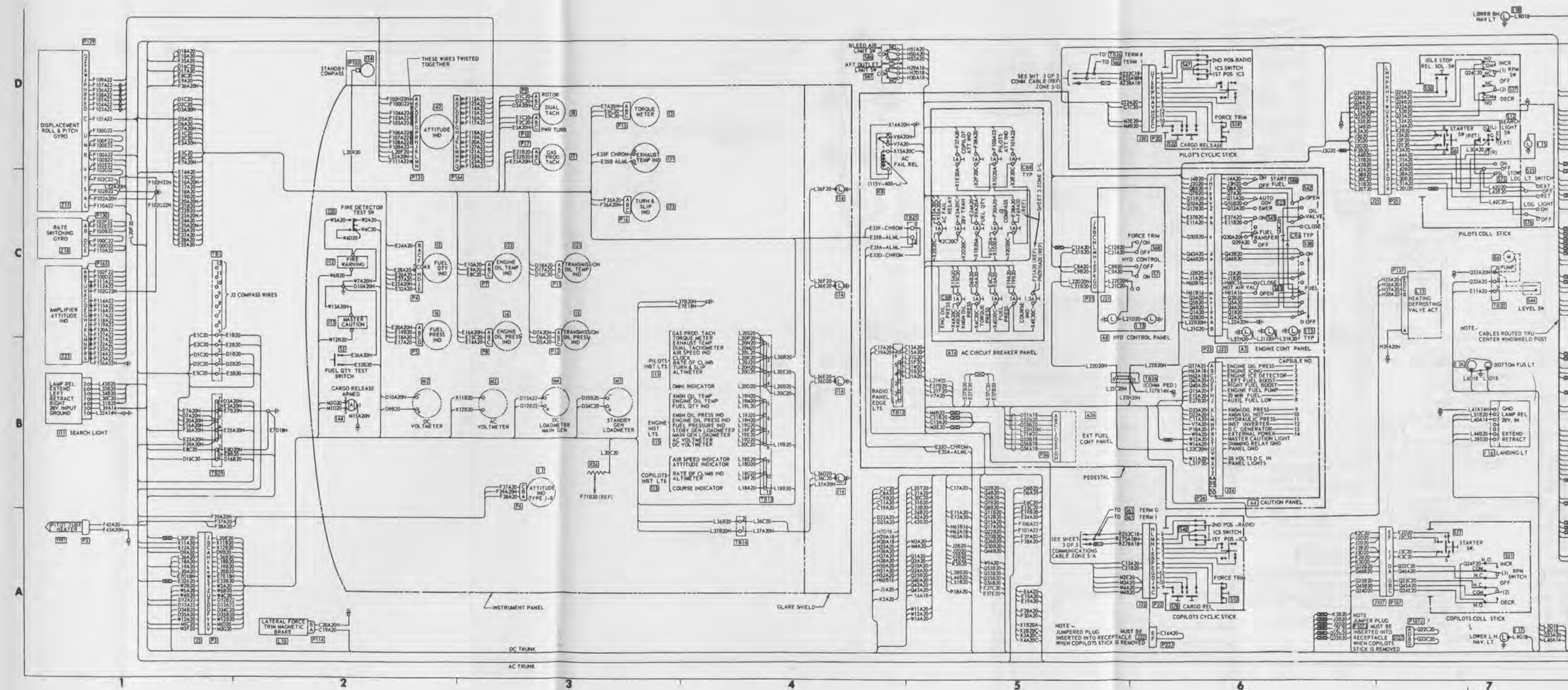
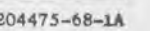
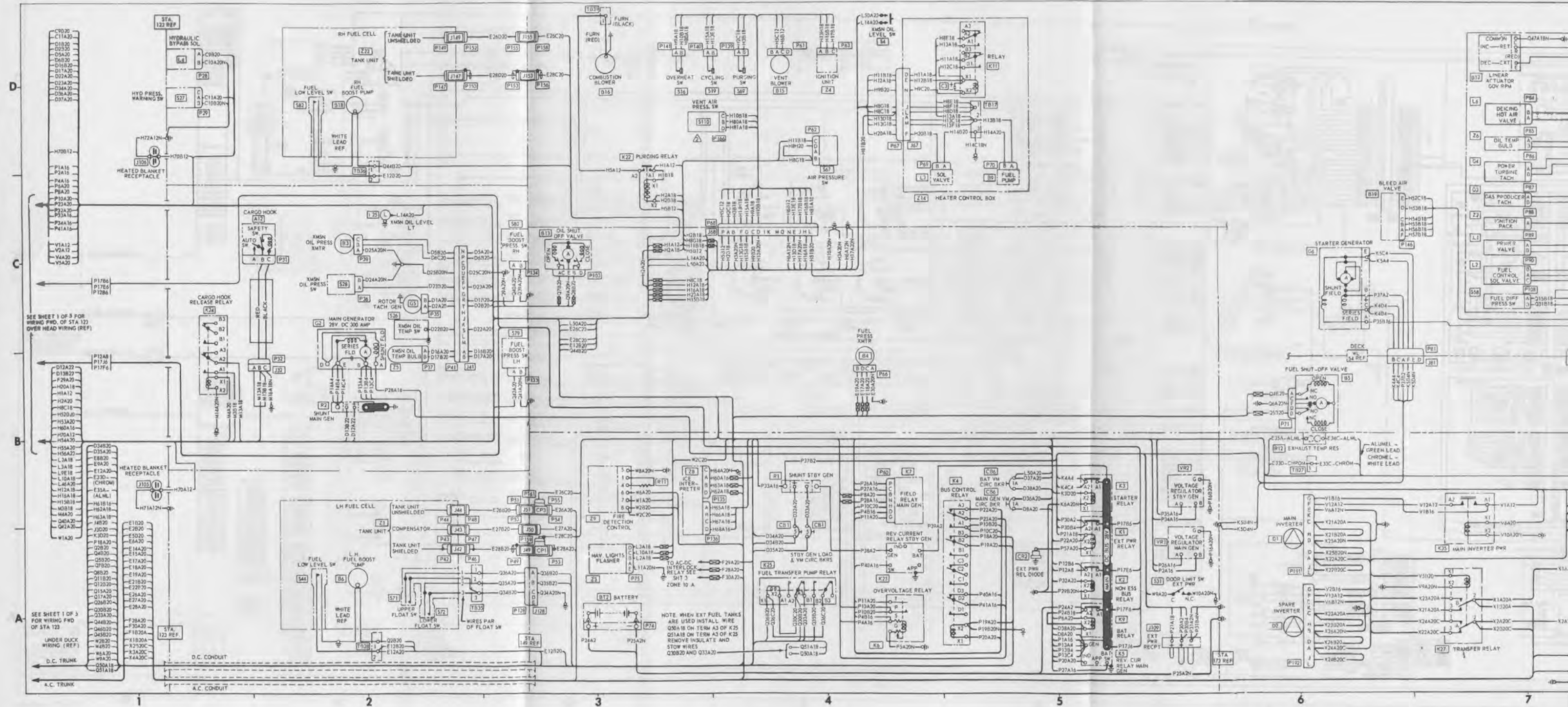


Figure 12-16. Electrical schematic — UH-1B (62-1872 thru 62-2105, 62-4566 thru 62-4605, 62-12515 thru 62-12555)





12-47



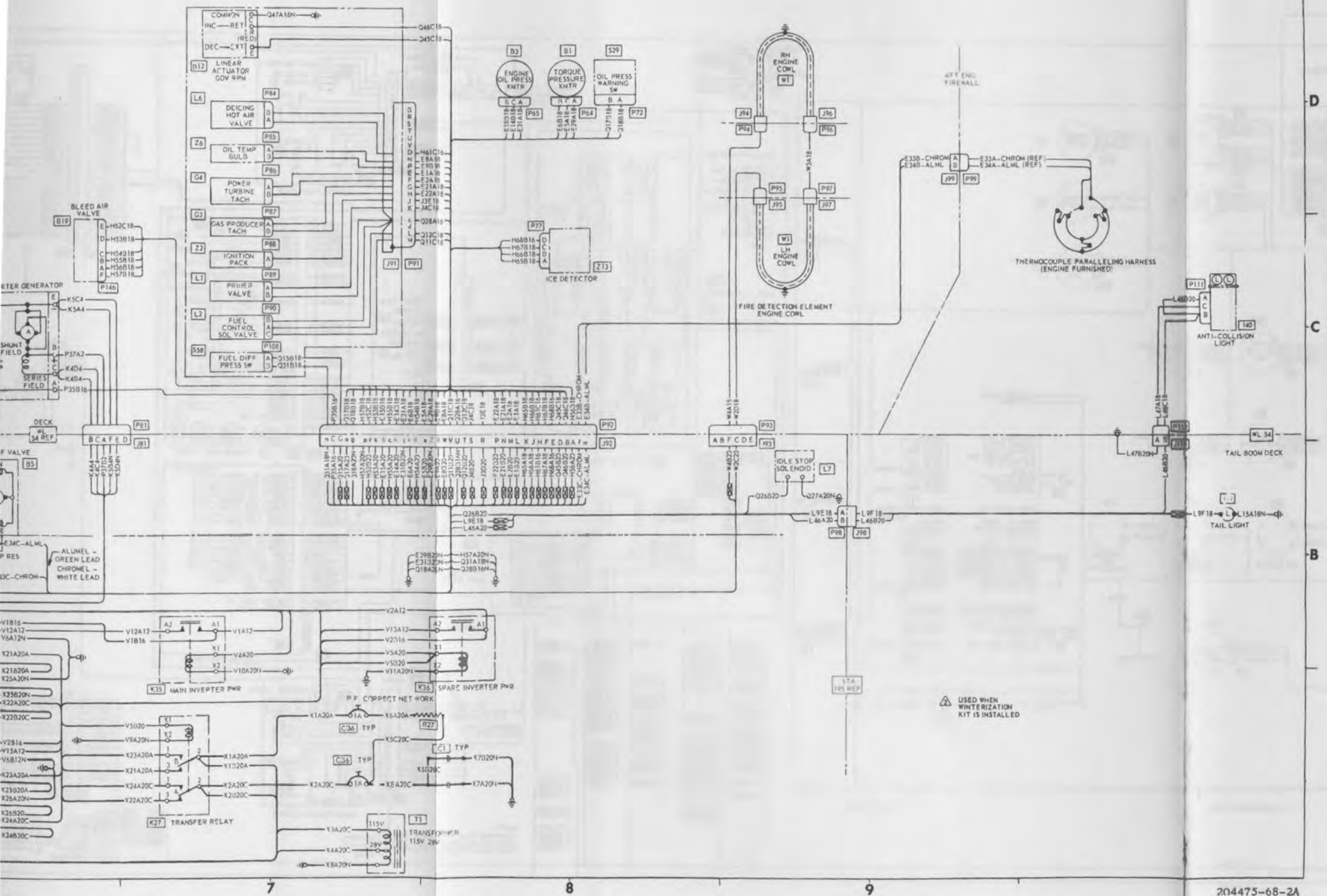
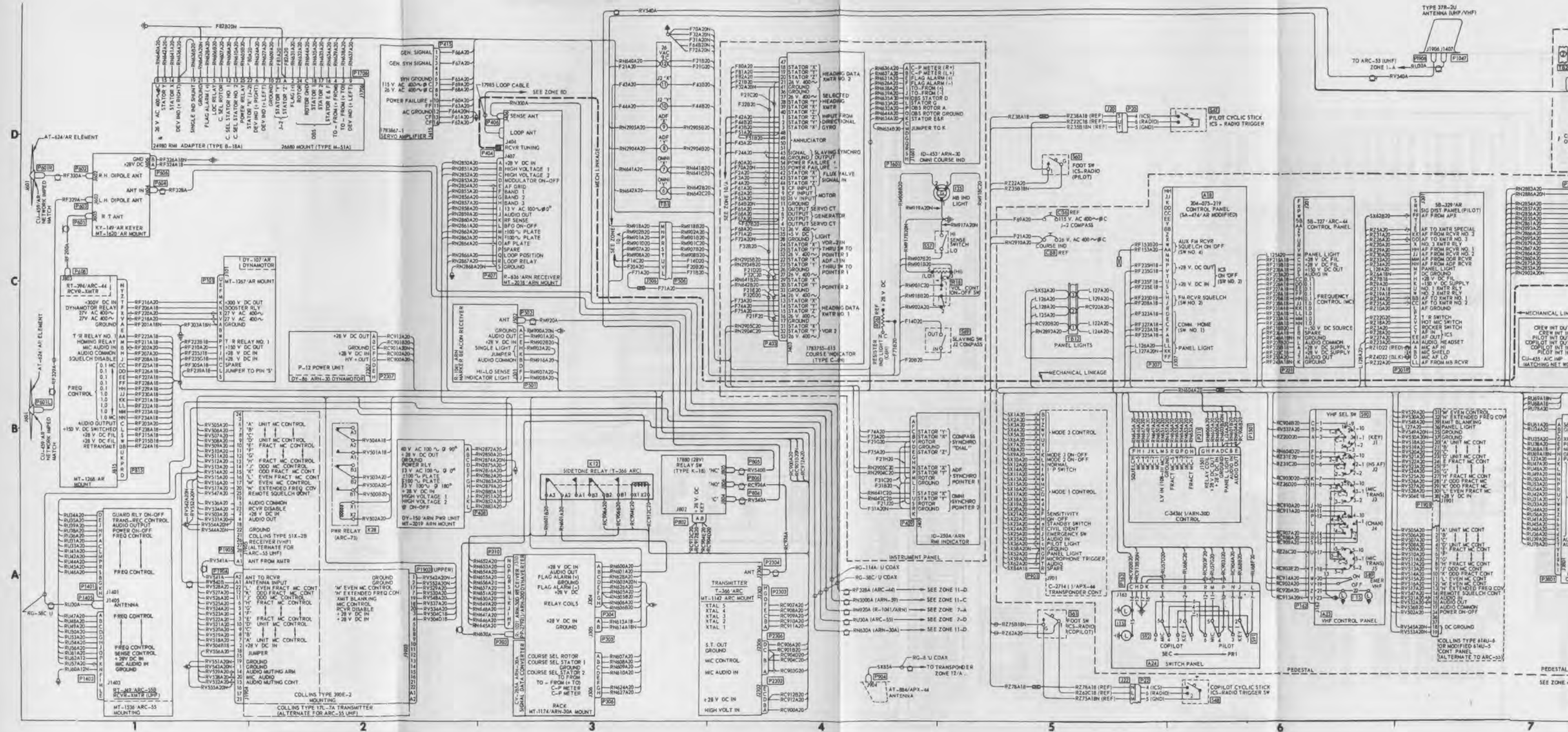
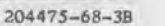


Figure 12-17. Electrical and communication wiring diagram (62-1872 thru 62-2115, 62-4566 thru 62-4605 and 62-12515 thru 62-12555) (Sheet 2 of 4)





12-49

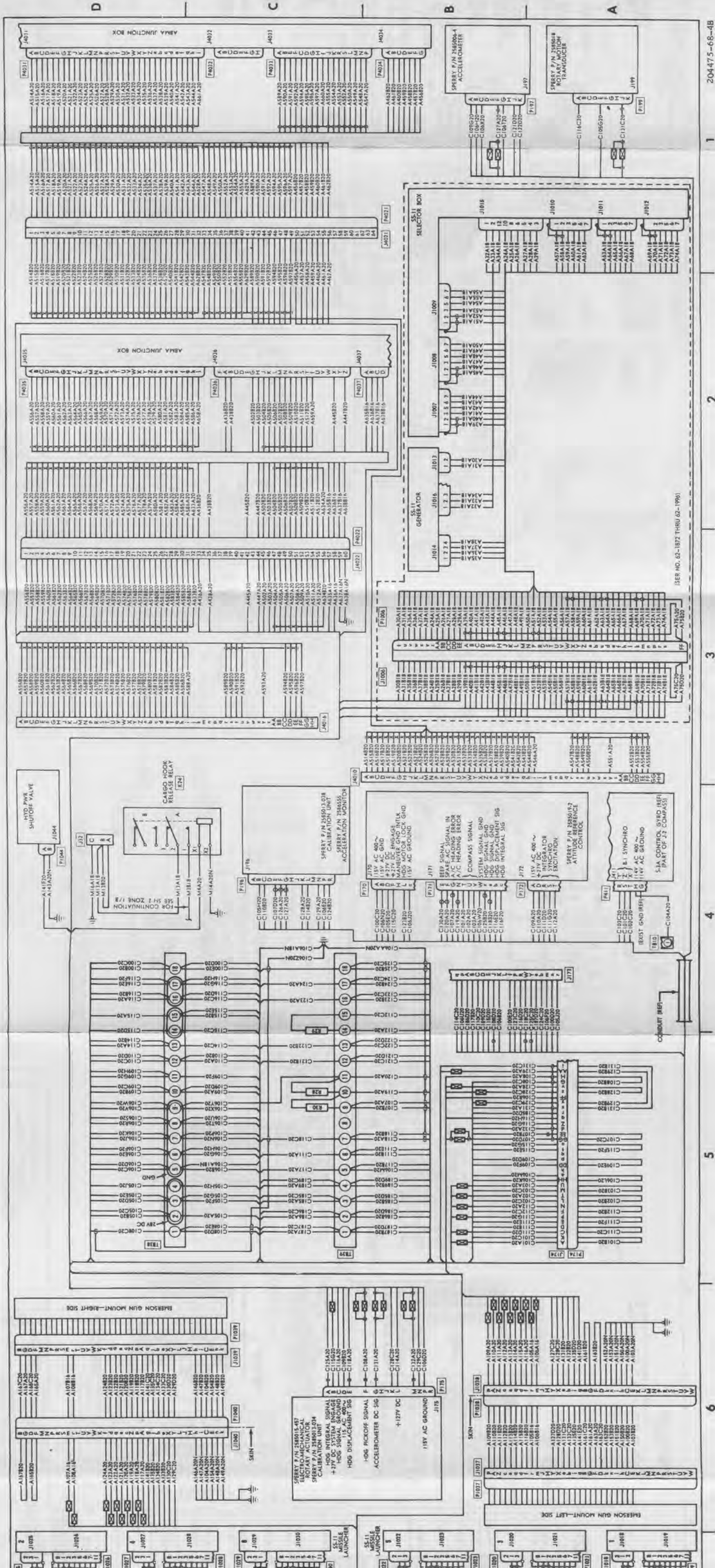
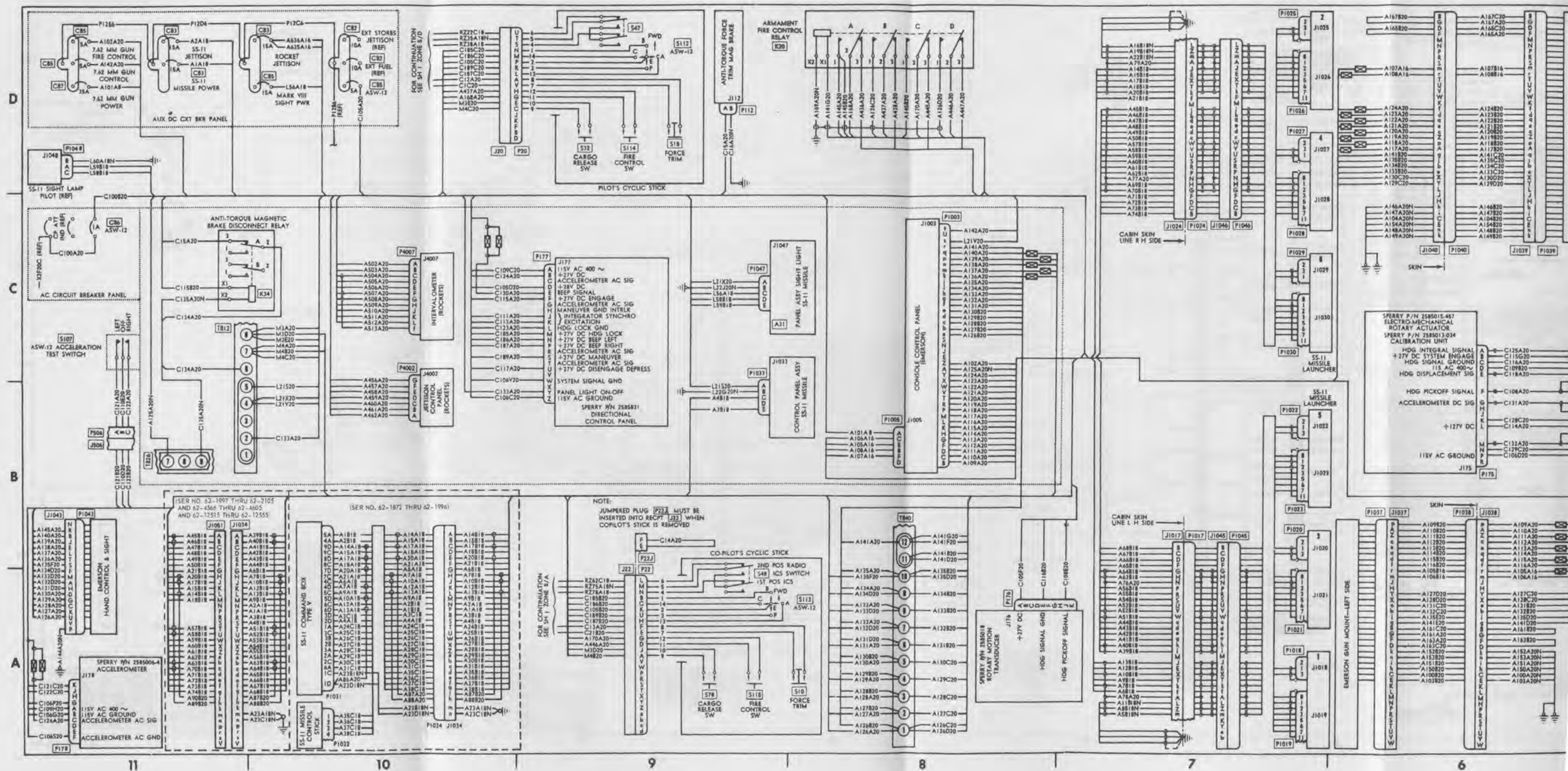
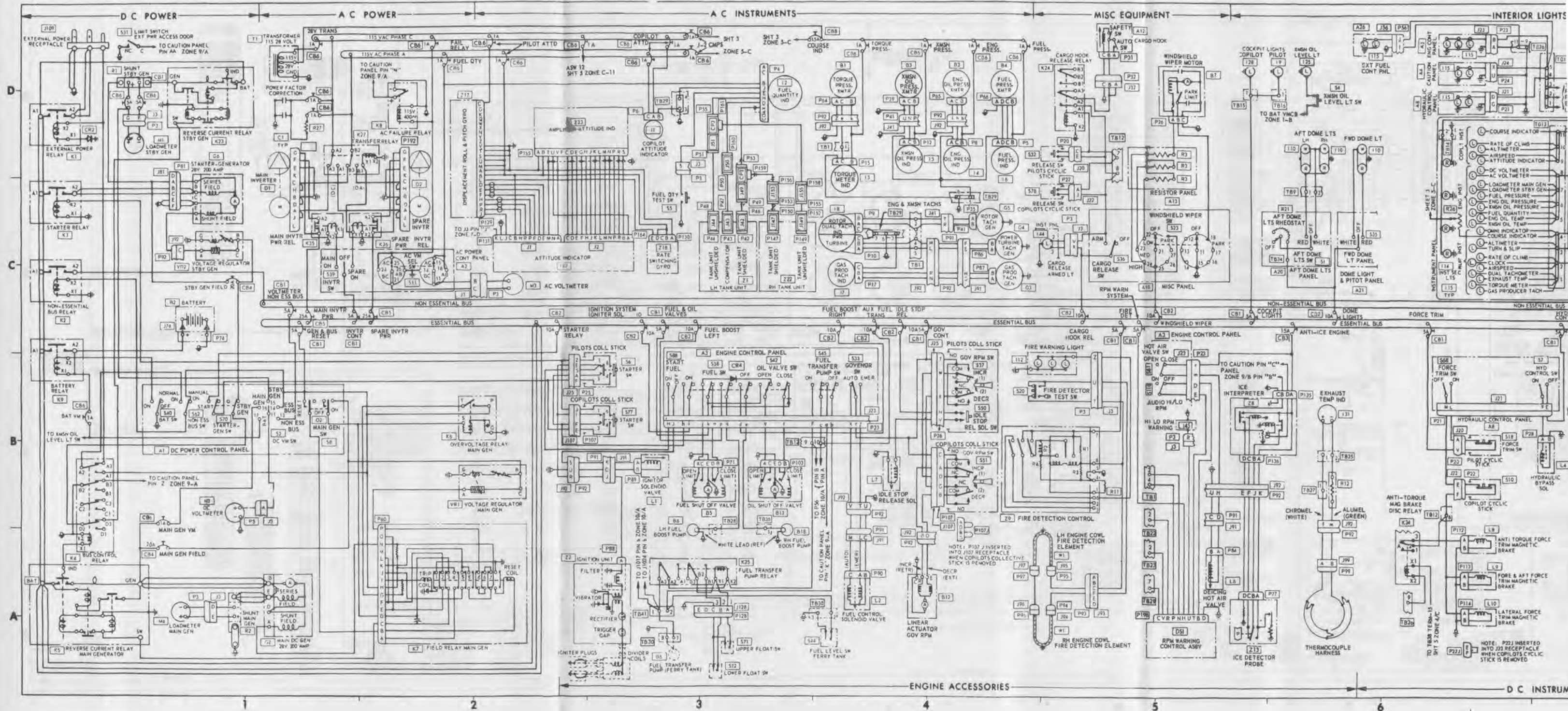


Figure 12-17. Electrical and communication wiring diagram (62-1872 thru 62-4605 and 62-12515 thru 62-12555) (Sheet 4 of 4)





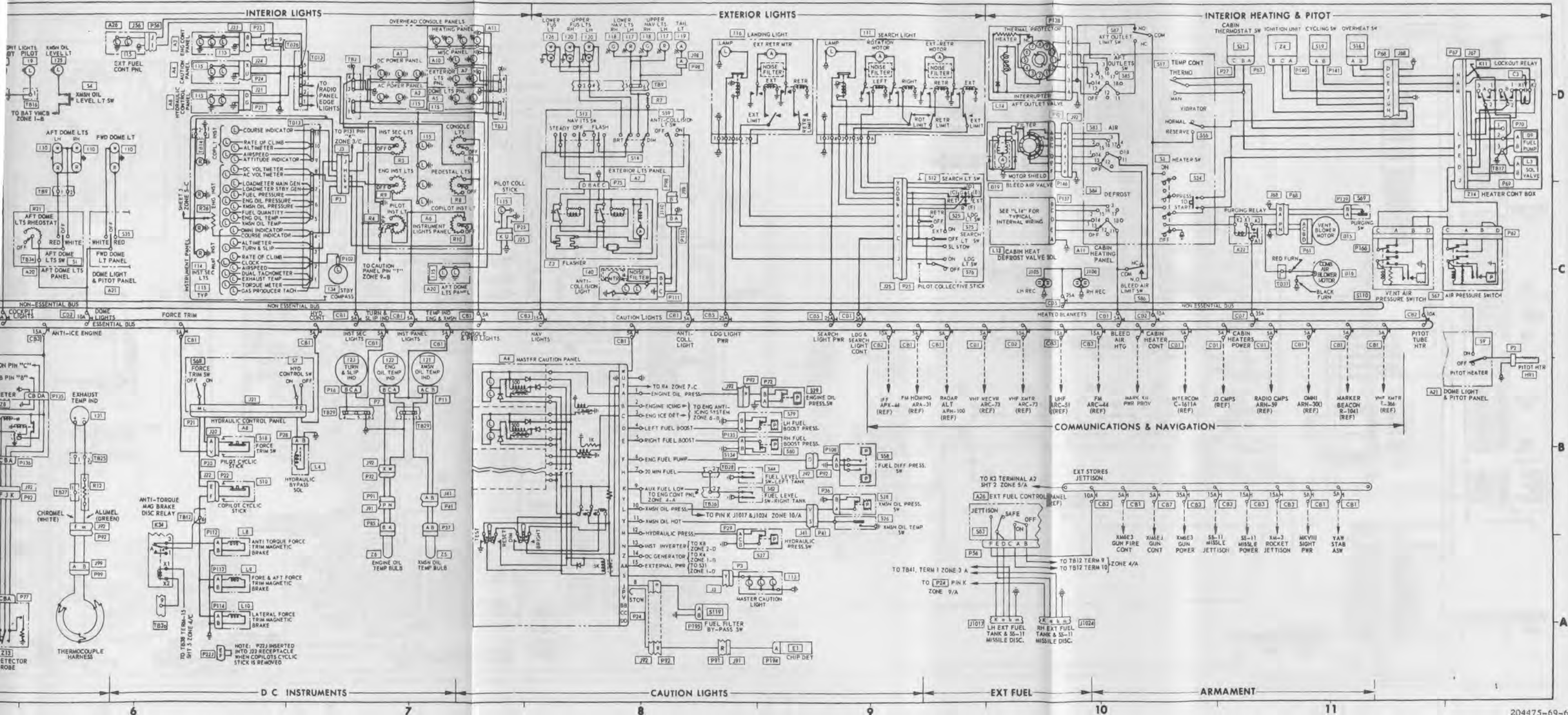
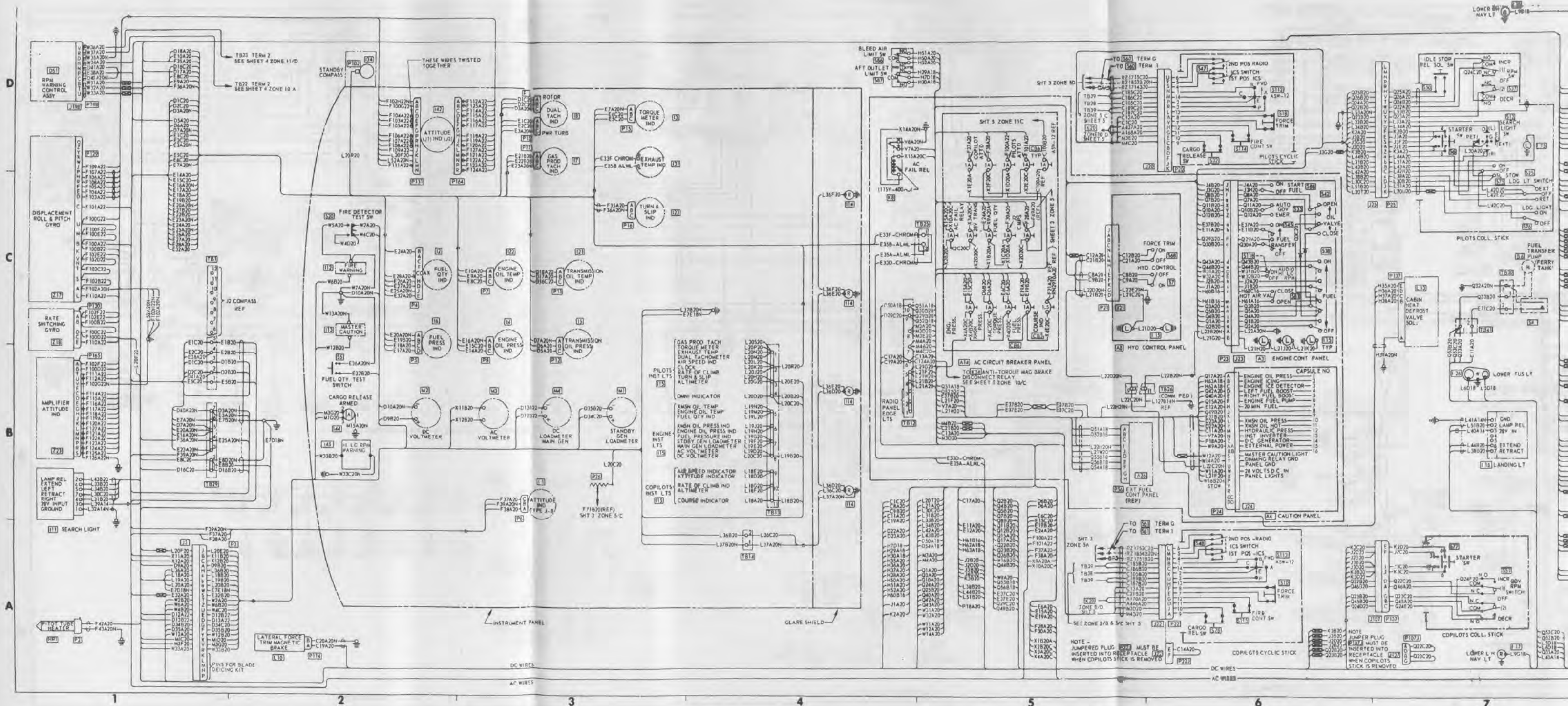


Figure 12-18. Electrical schematic (63-8500 thru 63-8738, 63-12903 thru 63-12952)



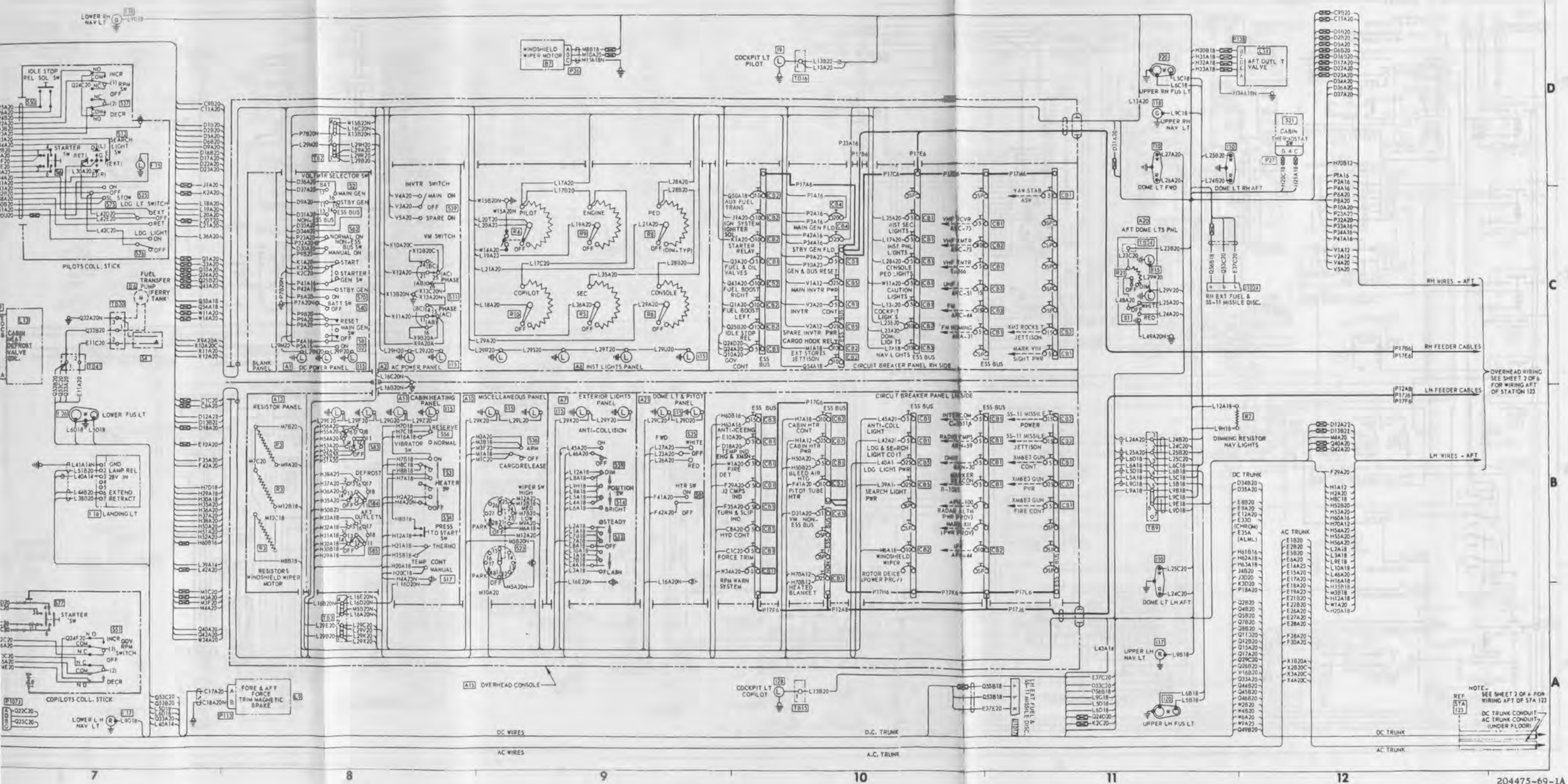
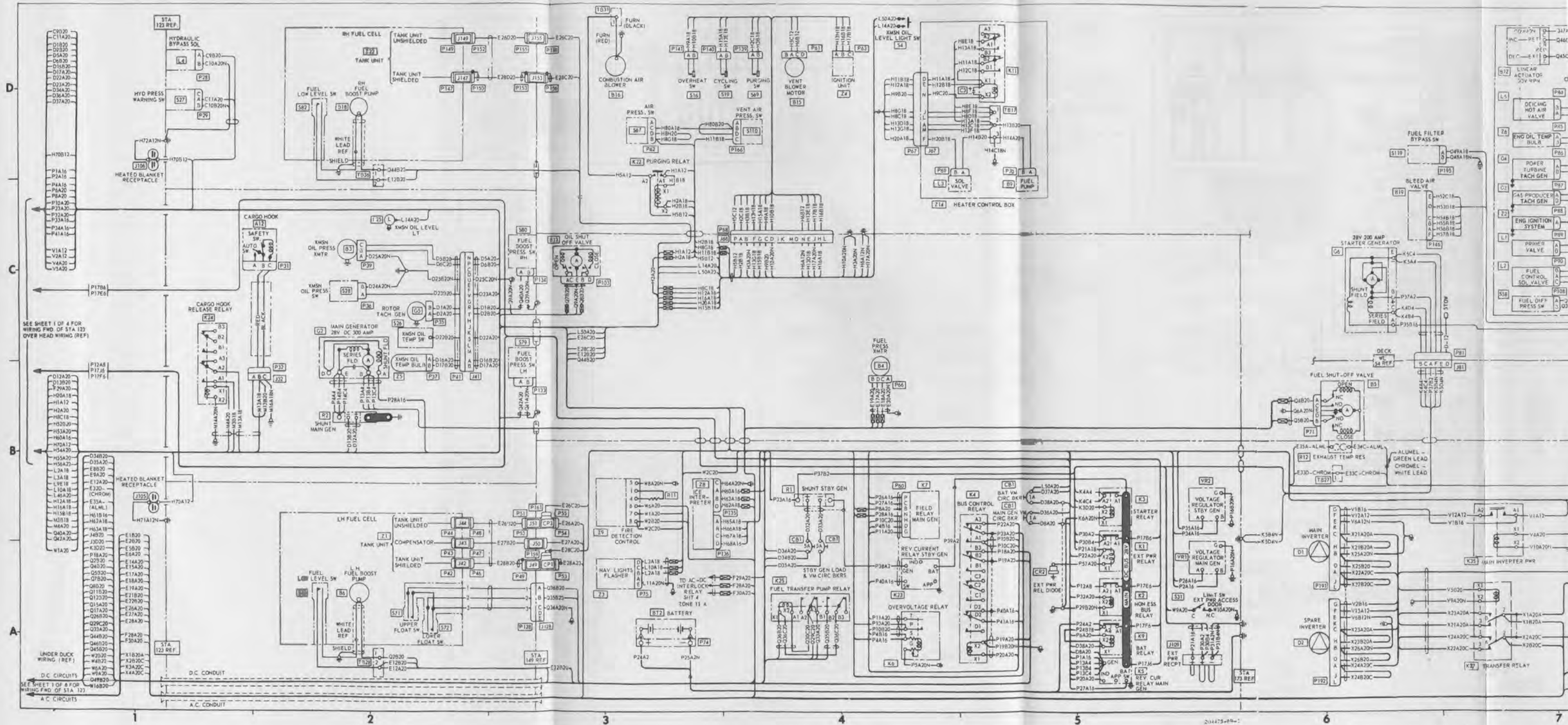


Figure 12-19. Electrical and communication wiring diagram (63-8500 thru 63-8738 and 63-12903 thru 63-12952) (Sheet 1 of 5)



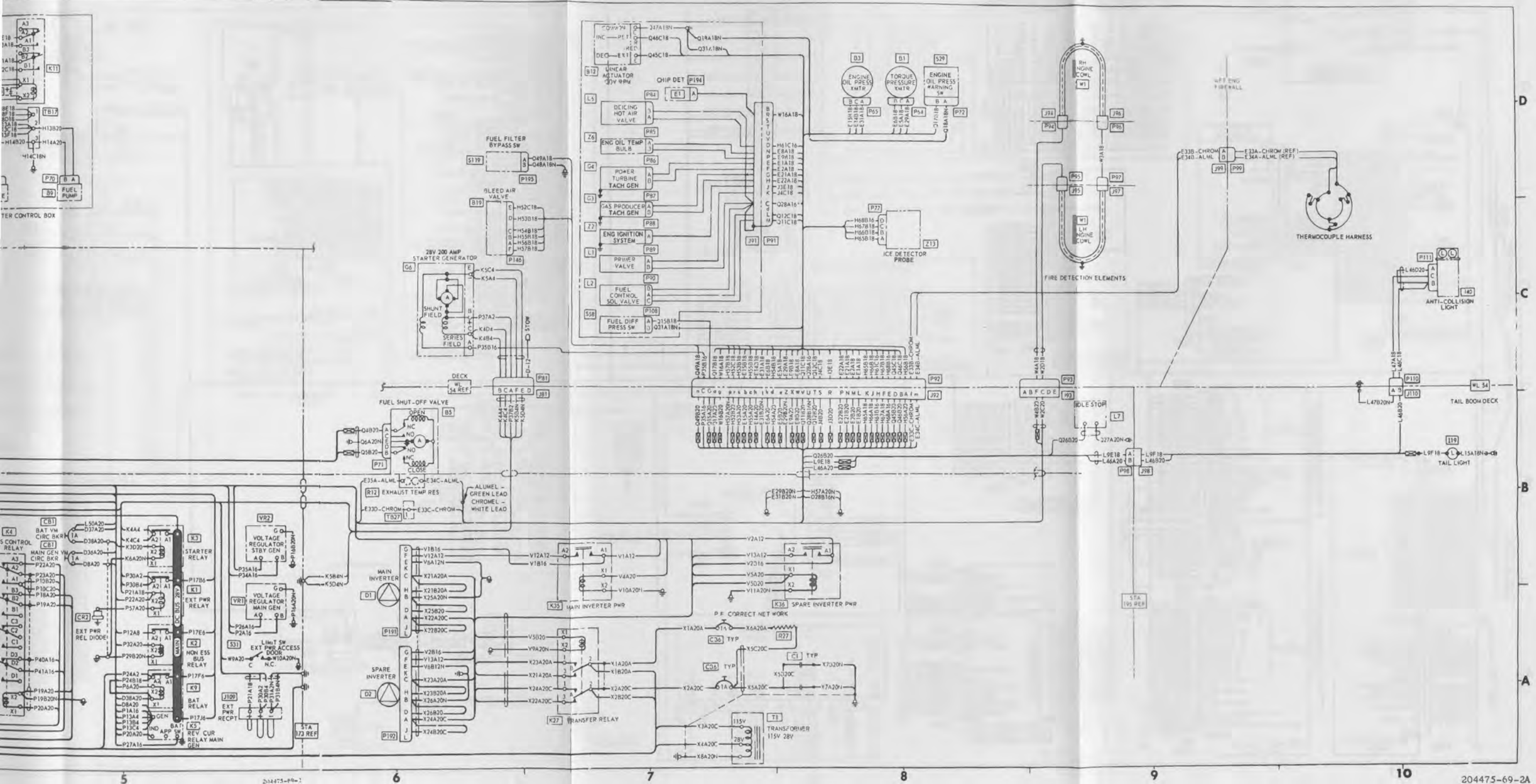
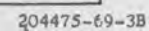


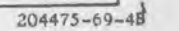
Figure 12-19. Electrical and communication wiring diagram (63-8500 thru 63-8738 and 63-12903 thru 63-12952) (Sheet 2 of 5)



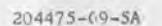
TM 55-1520-211-20



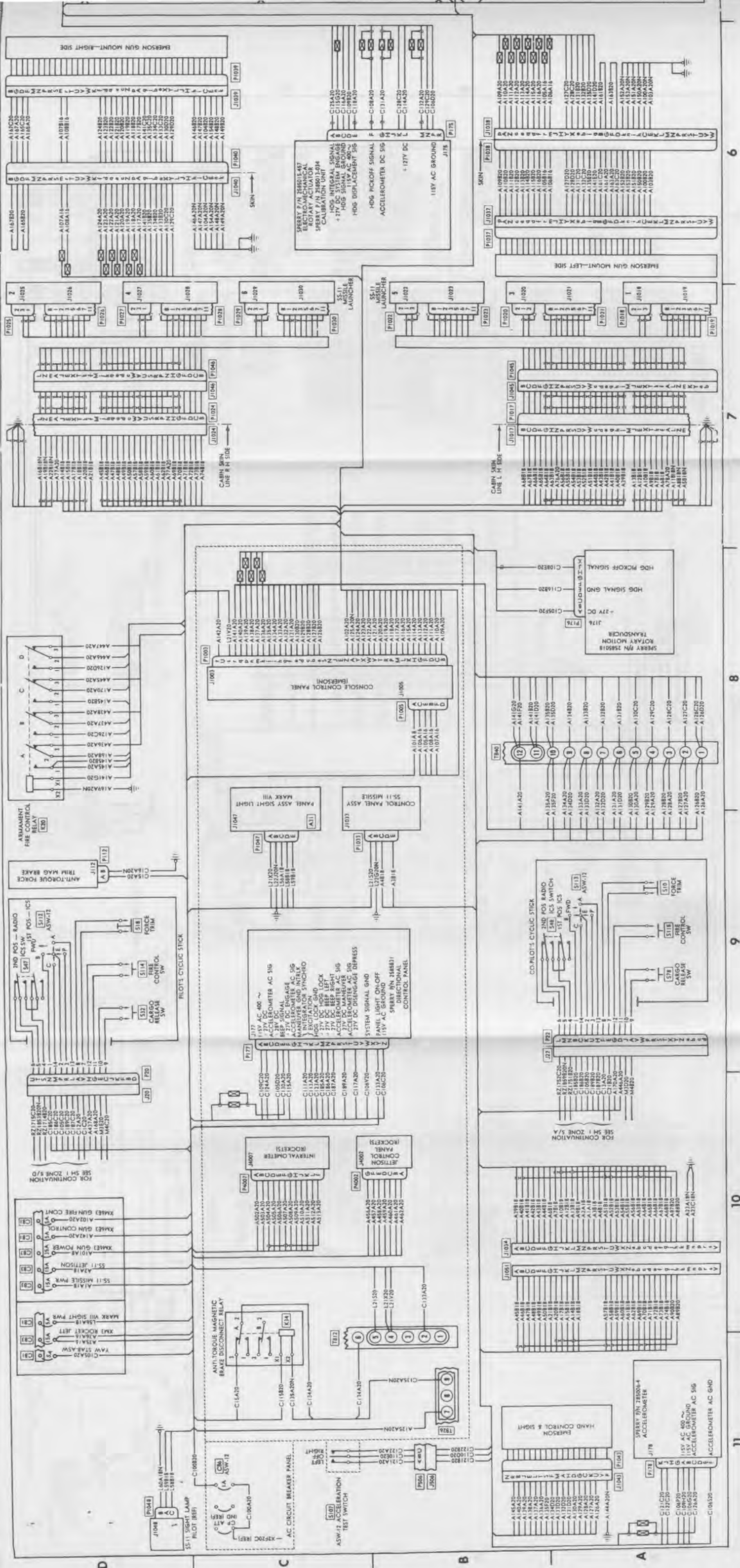
12-54

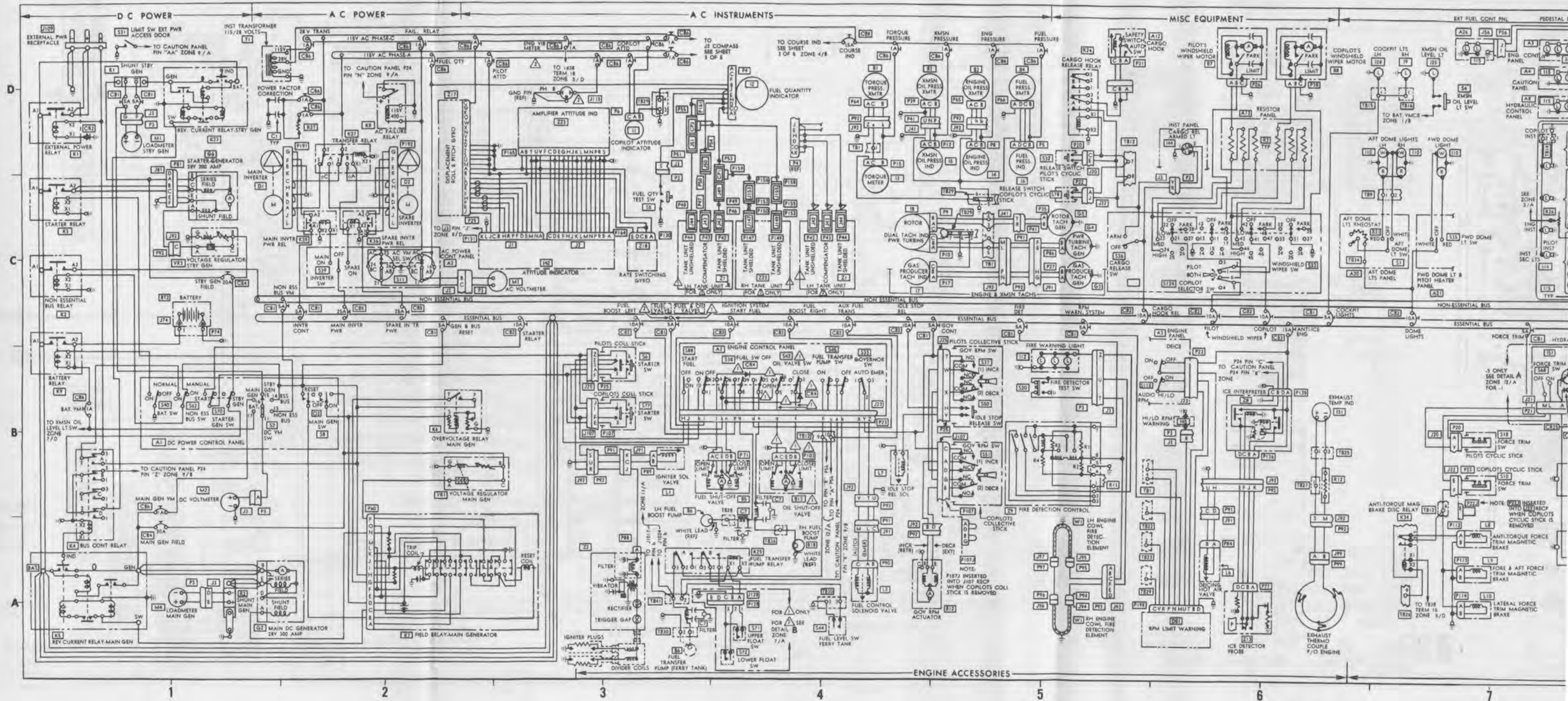


12-55



12-56





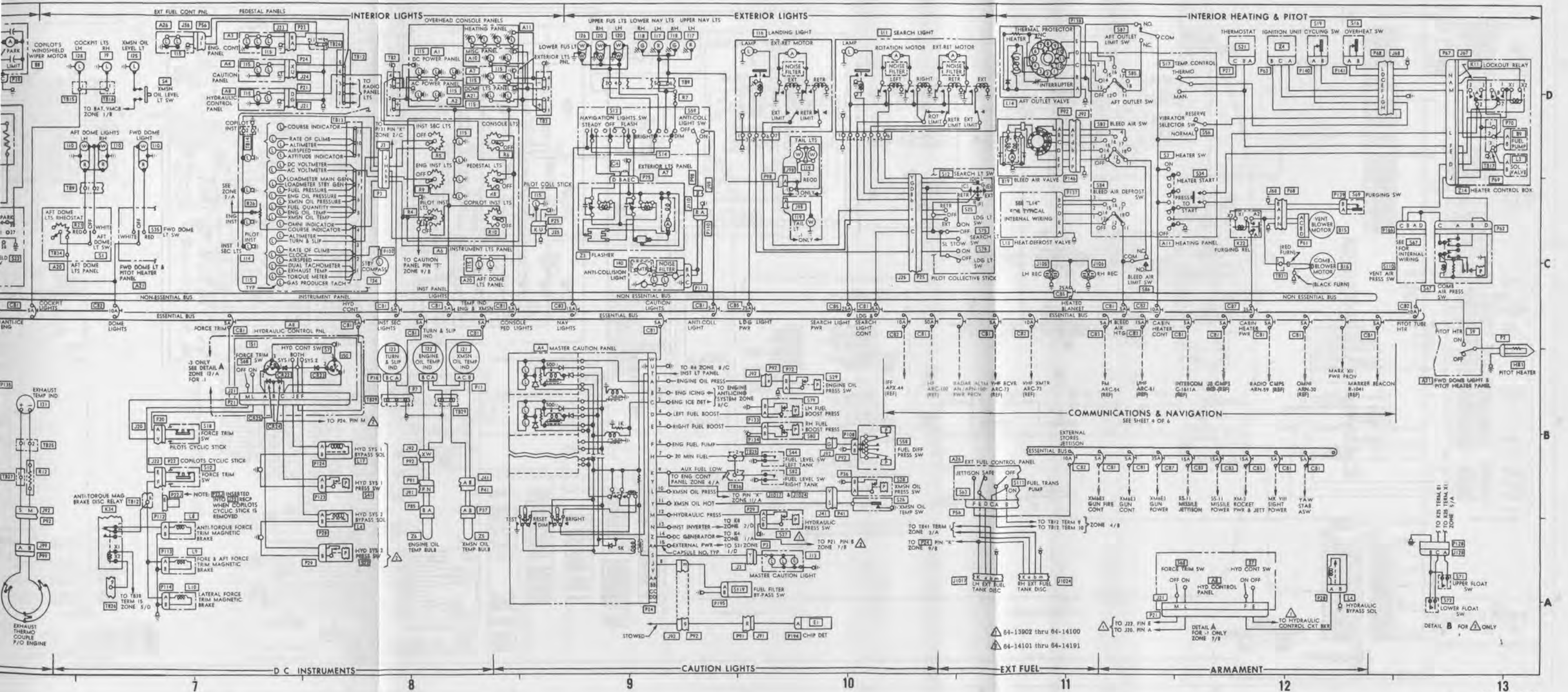
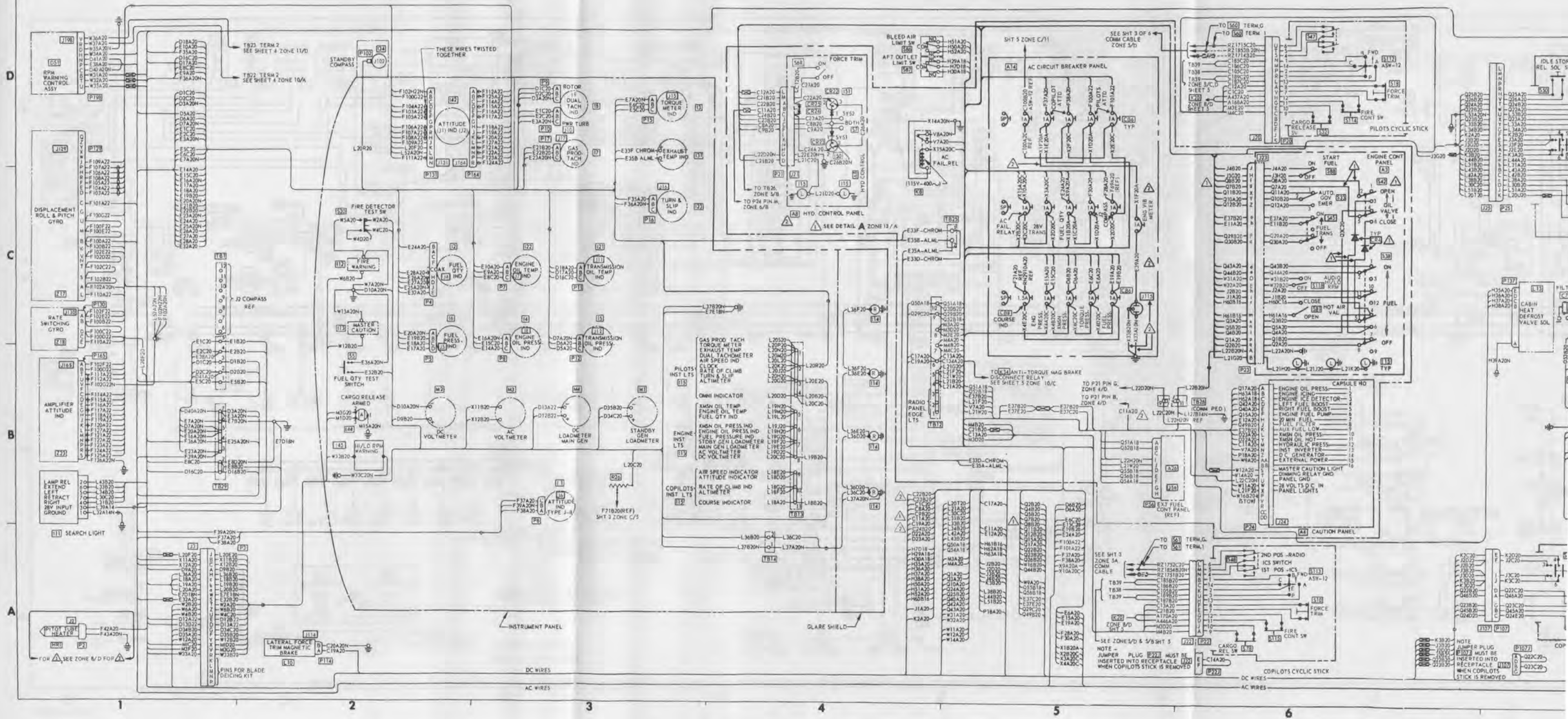
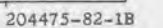
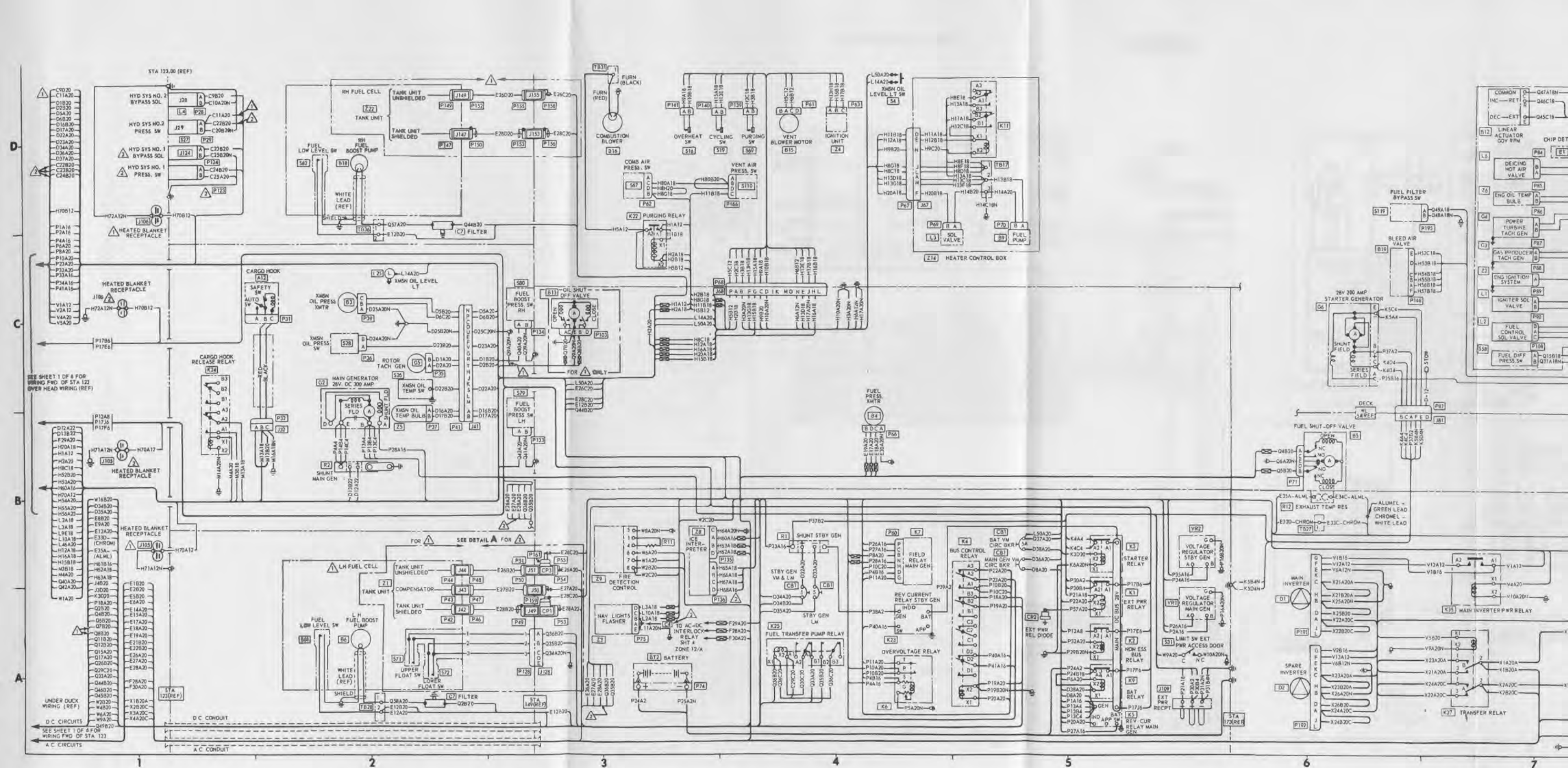


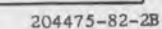
Figure 12-20. Electrical schematic — UH-1B (64-13902 thru 64-14191)





12-58





12-59

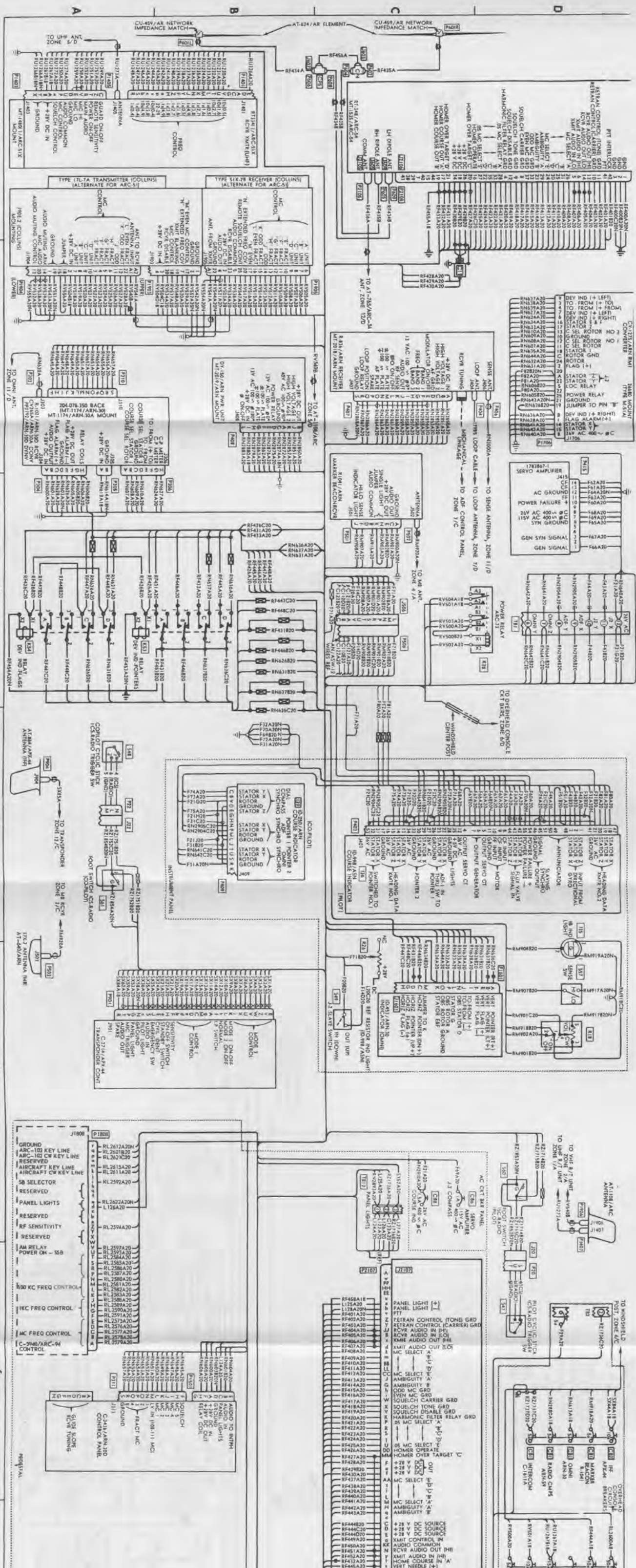


Figure 12-21. Electrical and communication wiring diagram (64-13)

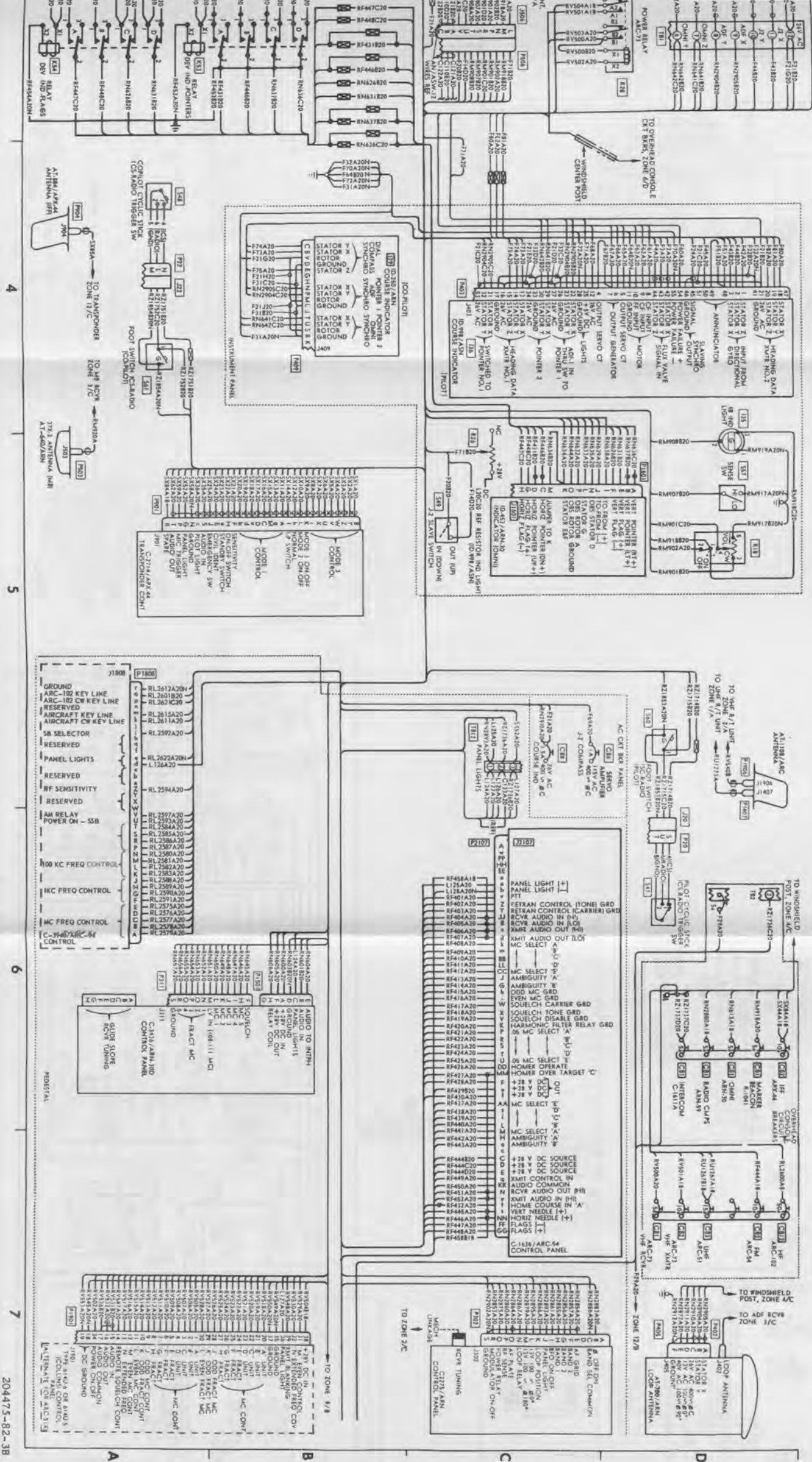


Figure 12-21. Electrical and communication wiring diagram (64-13902 thru 64-14191) (Sheet 3 of 5)

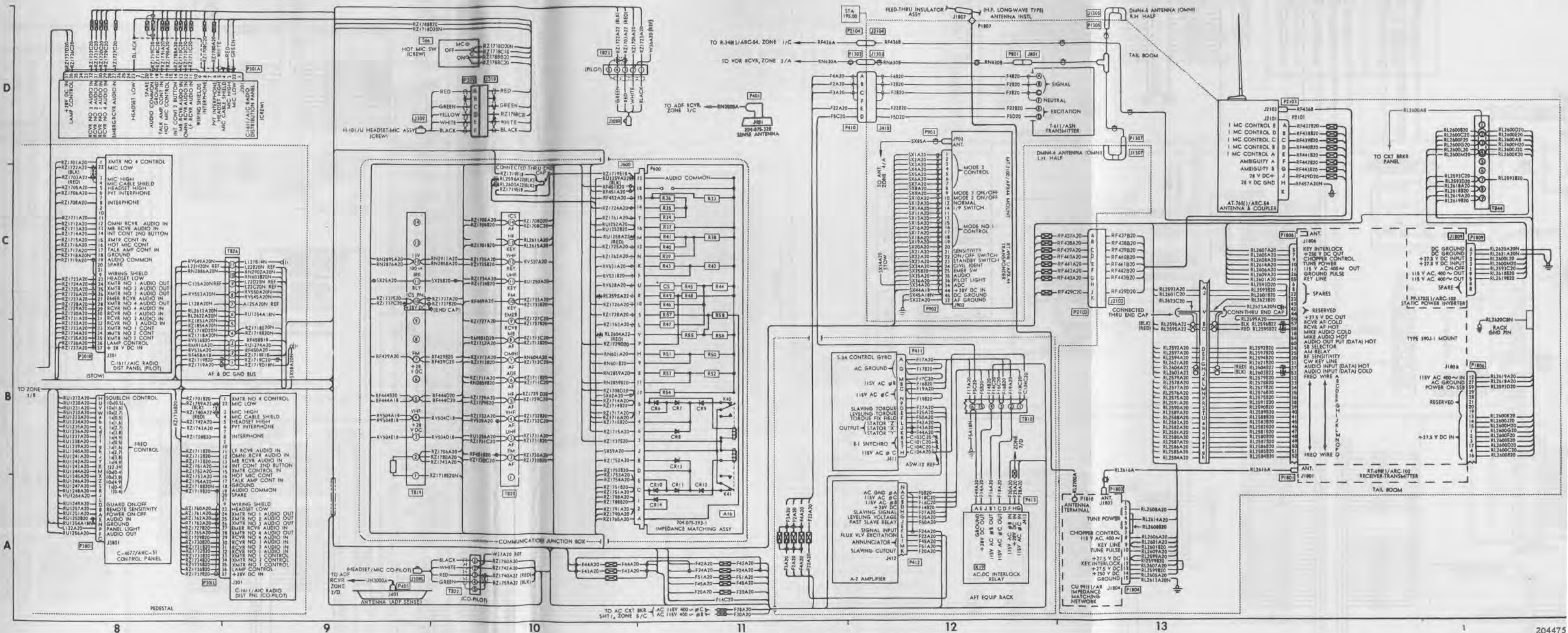


Figure 12-21. Electrical and communication wiring diagram (64-13902 thru 64-14191) (Shee

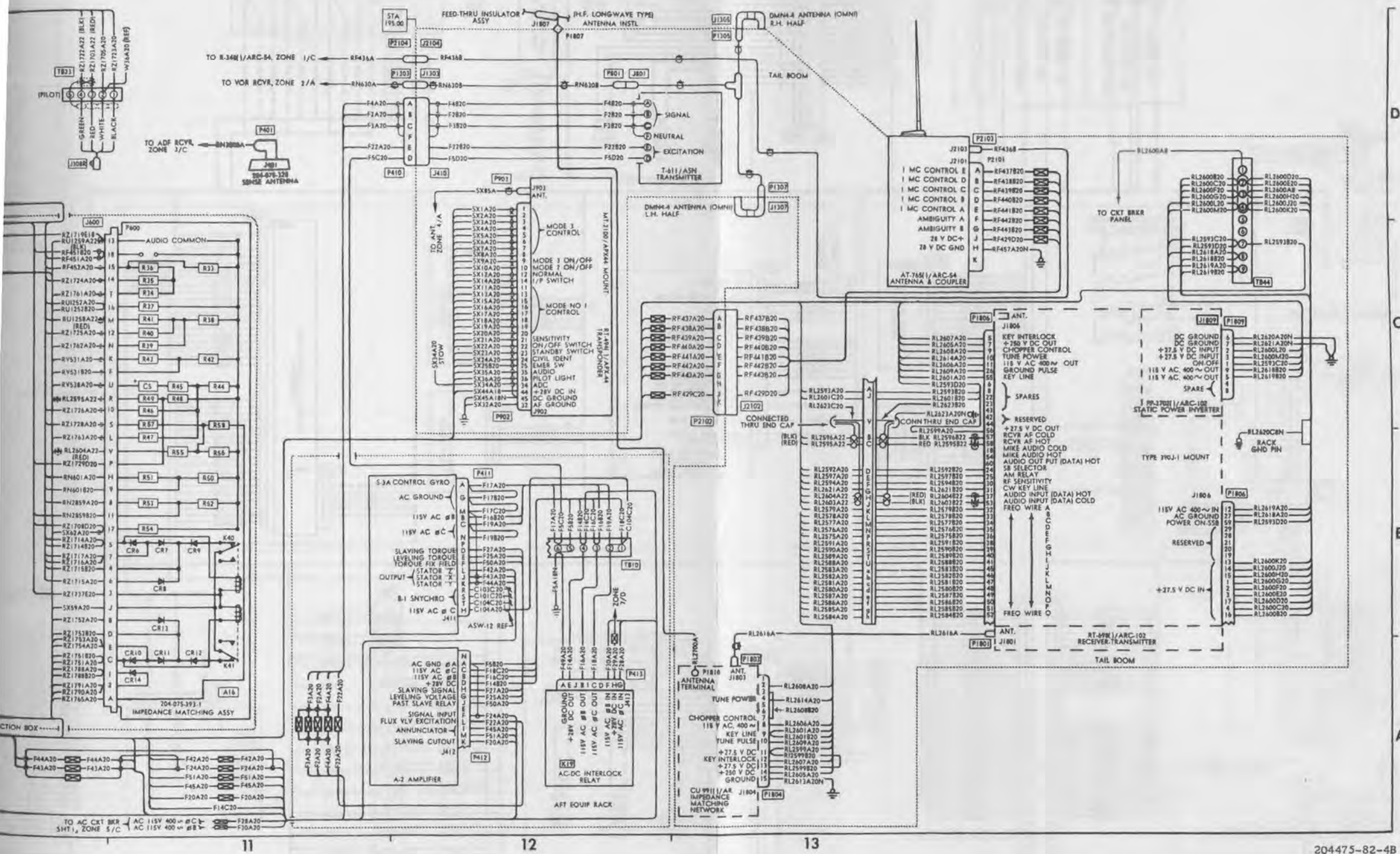


Figure 12-21. Electrical and communication wiring diagram (64-13902 thru 64-14191) (Sheet 4 of 5)

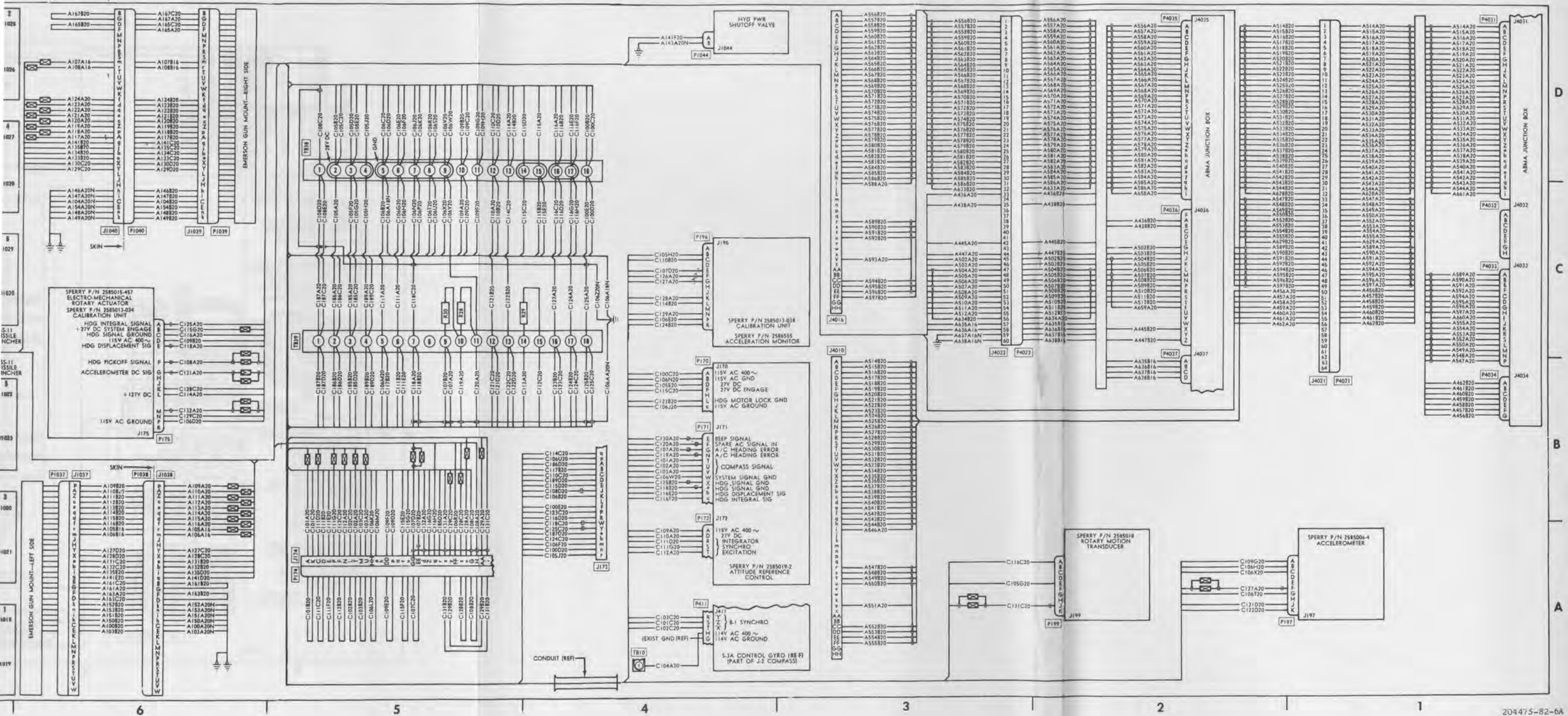
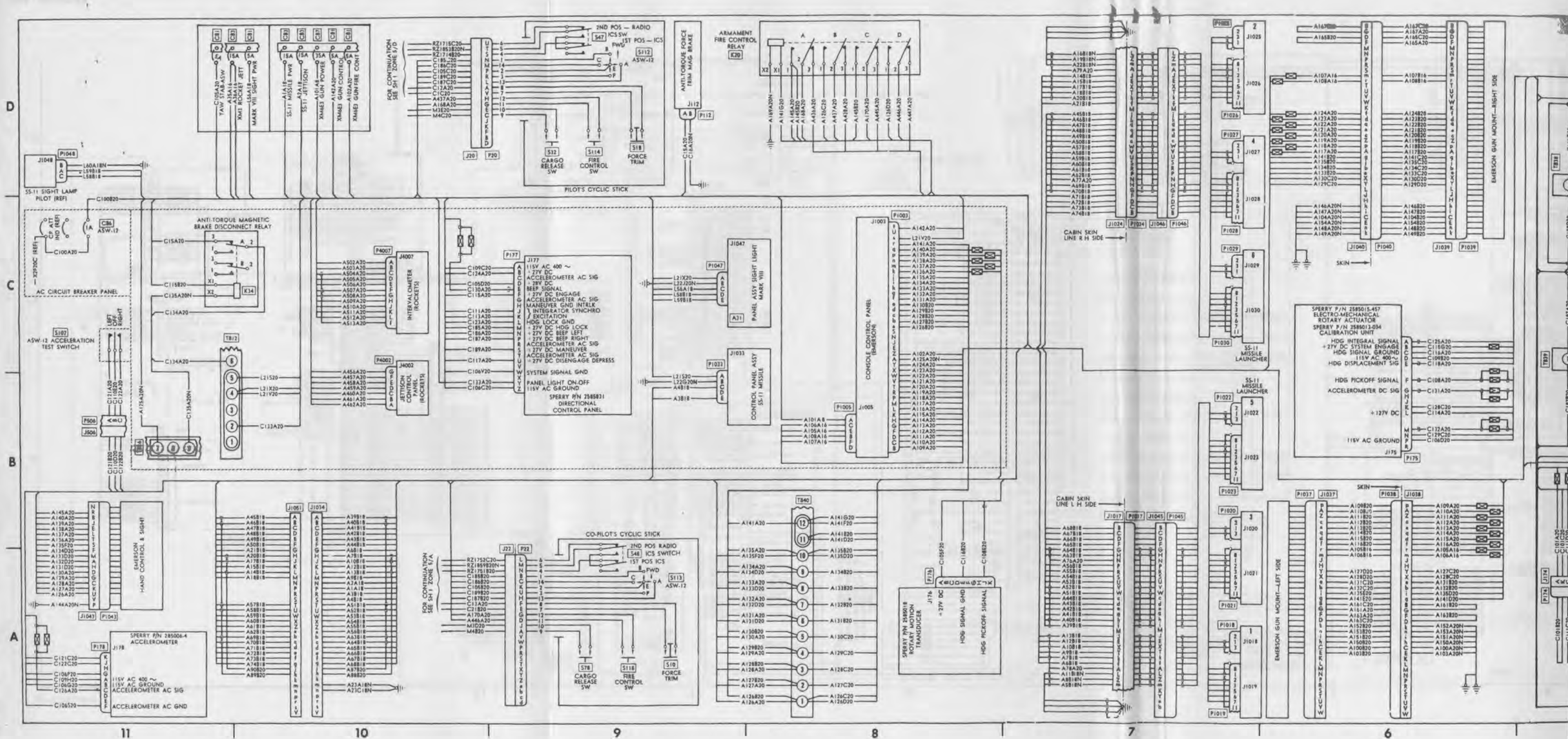
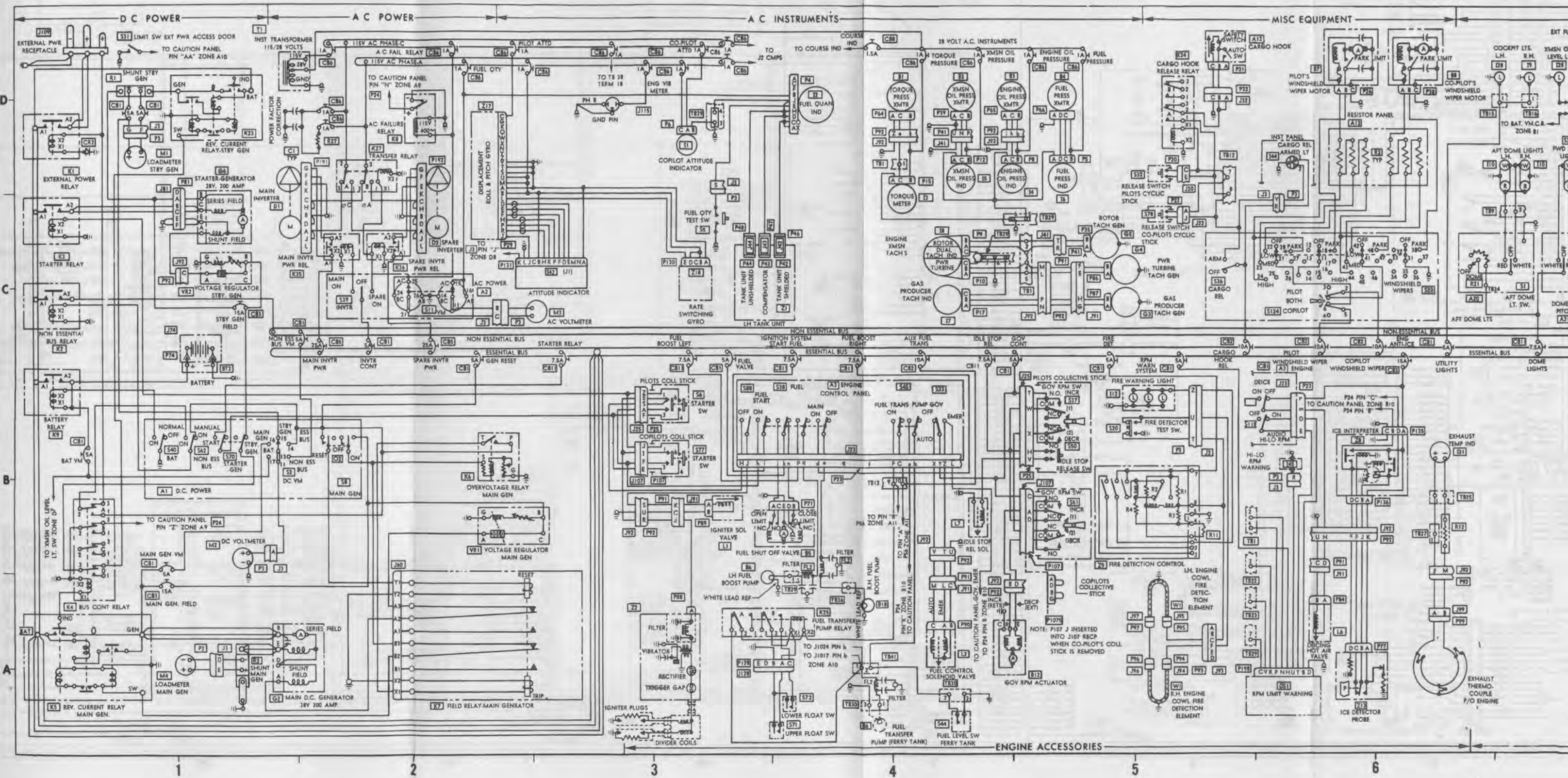


Figure 12-21. Electrical and communication wiring diagram (64-13902 thru 64-14191) (Sheet 5 of 5)





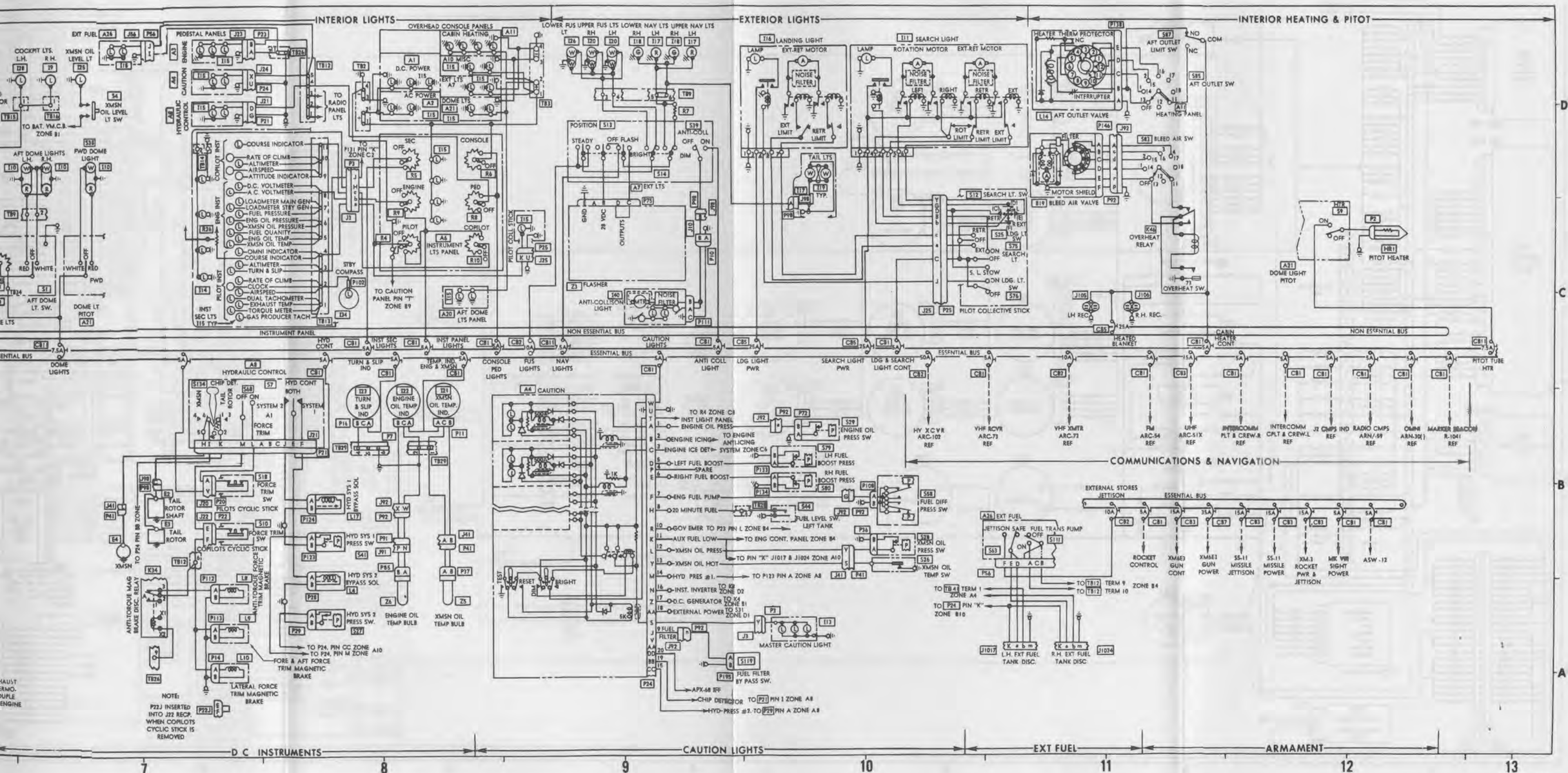
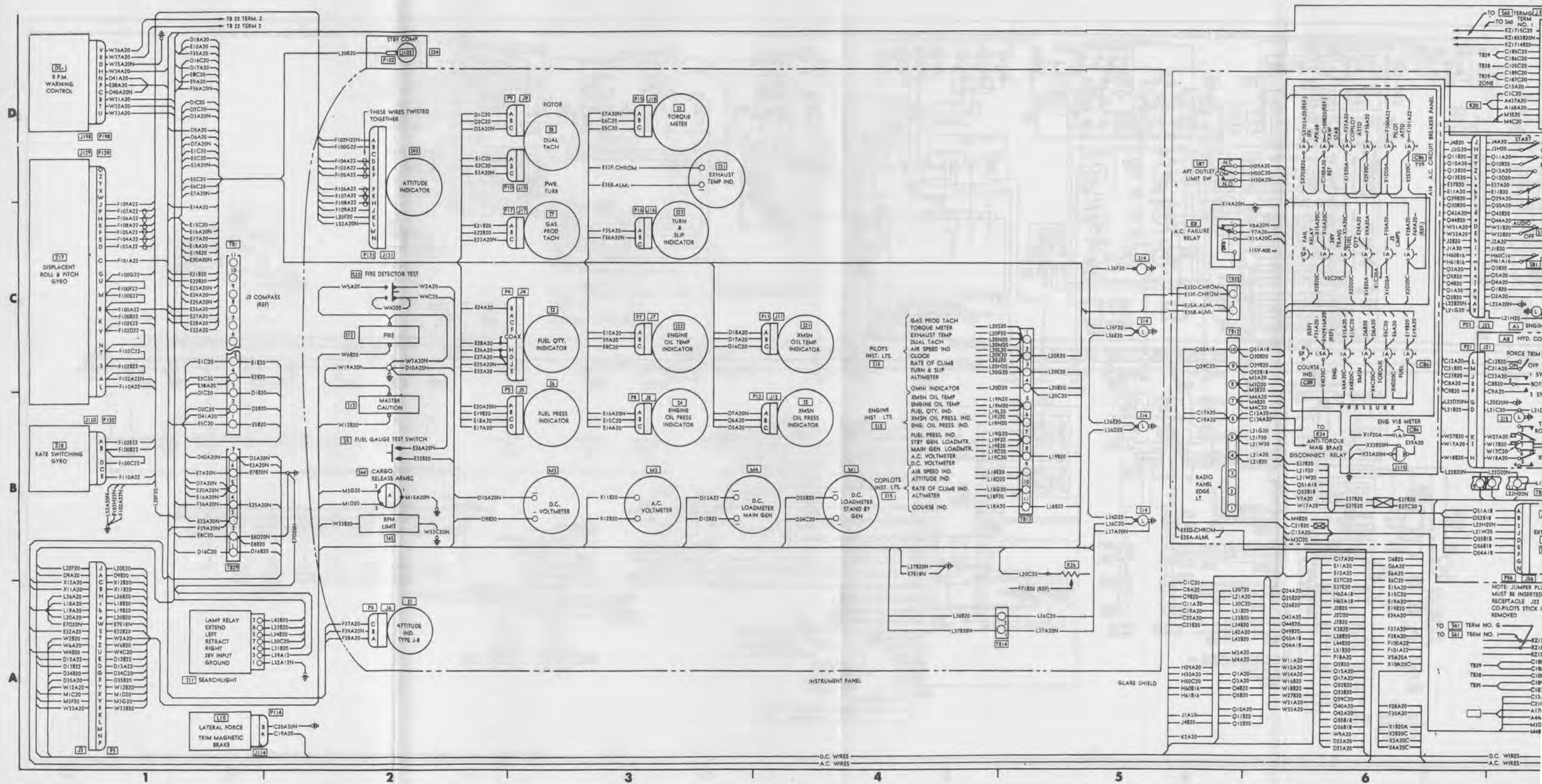
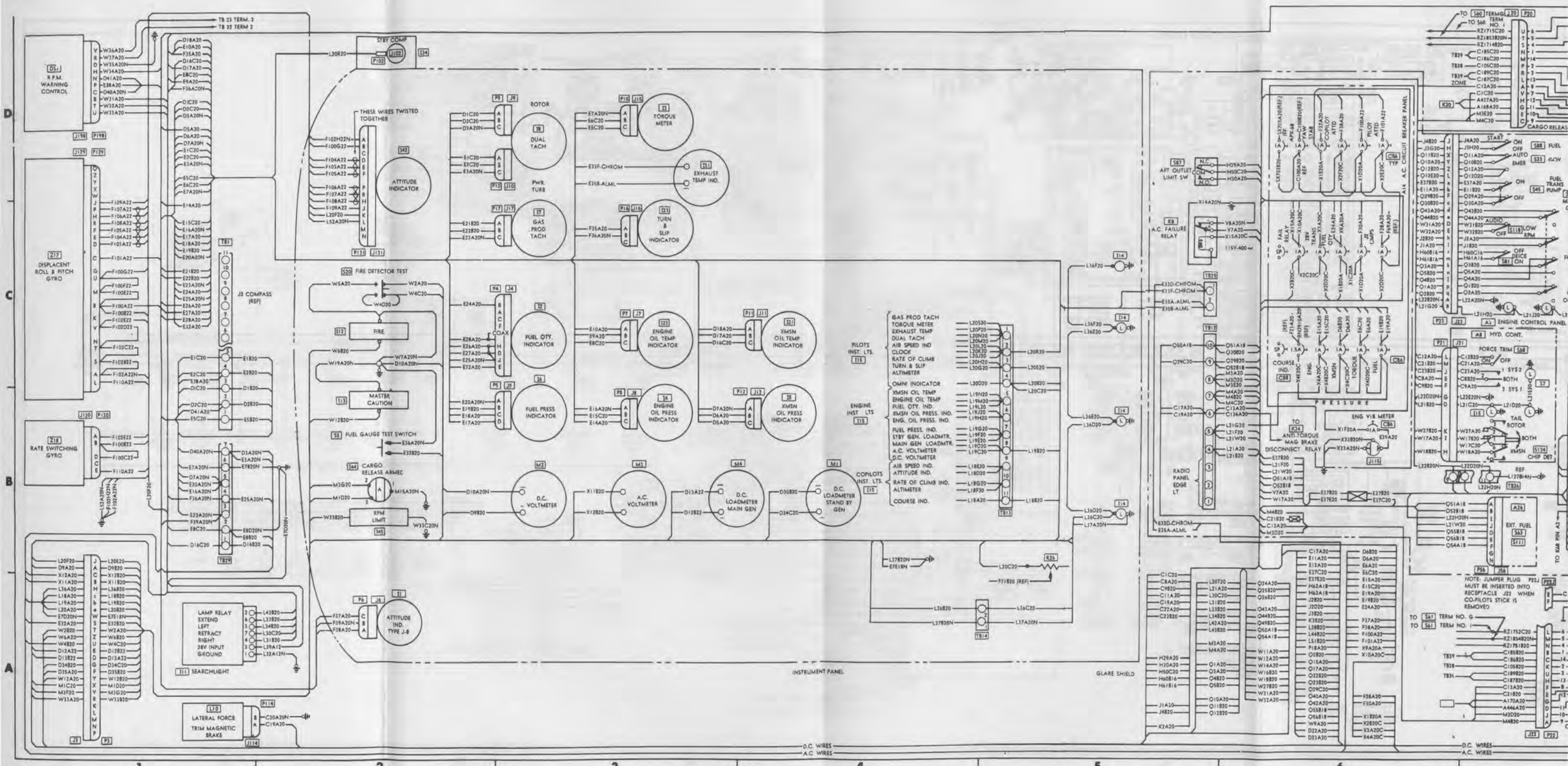


Figure 12-22. Electrical schematic (65-9416 thru 65-9546, 65-12738 thru 65-12744 and 65-12722)





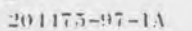
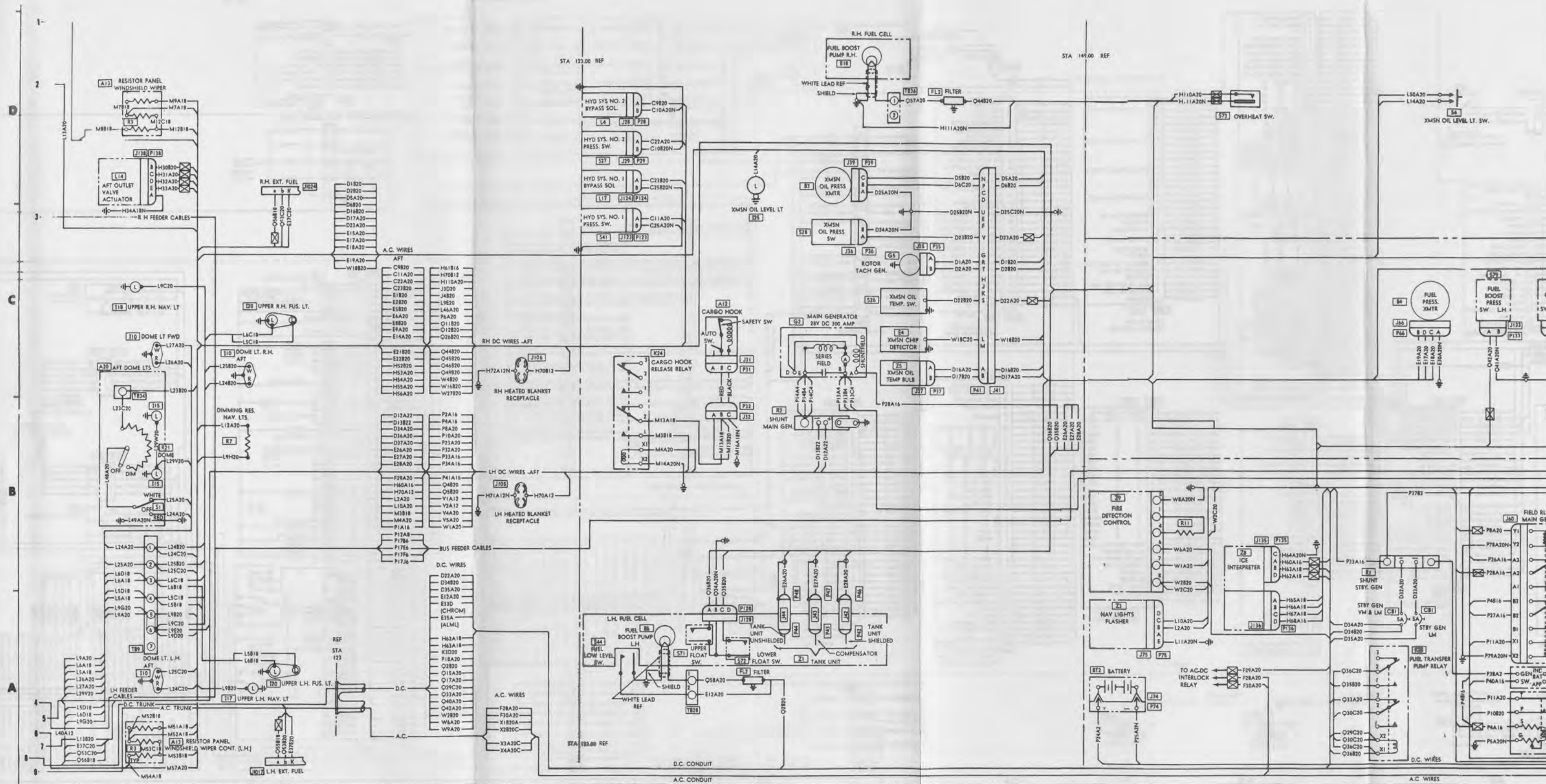
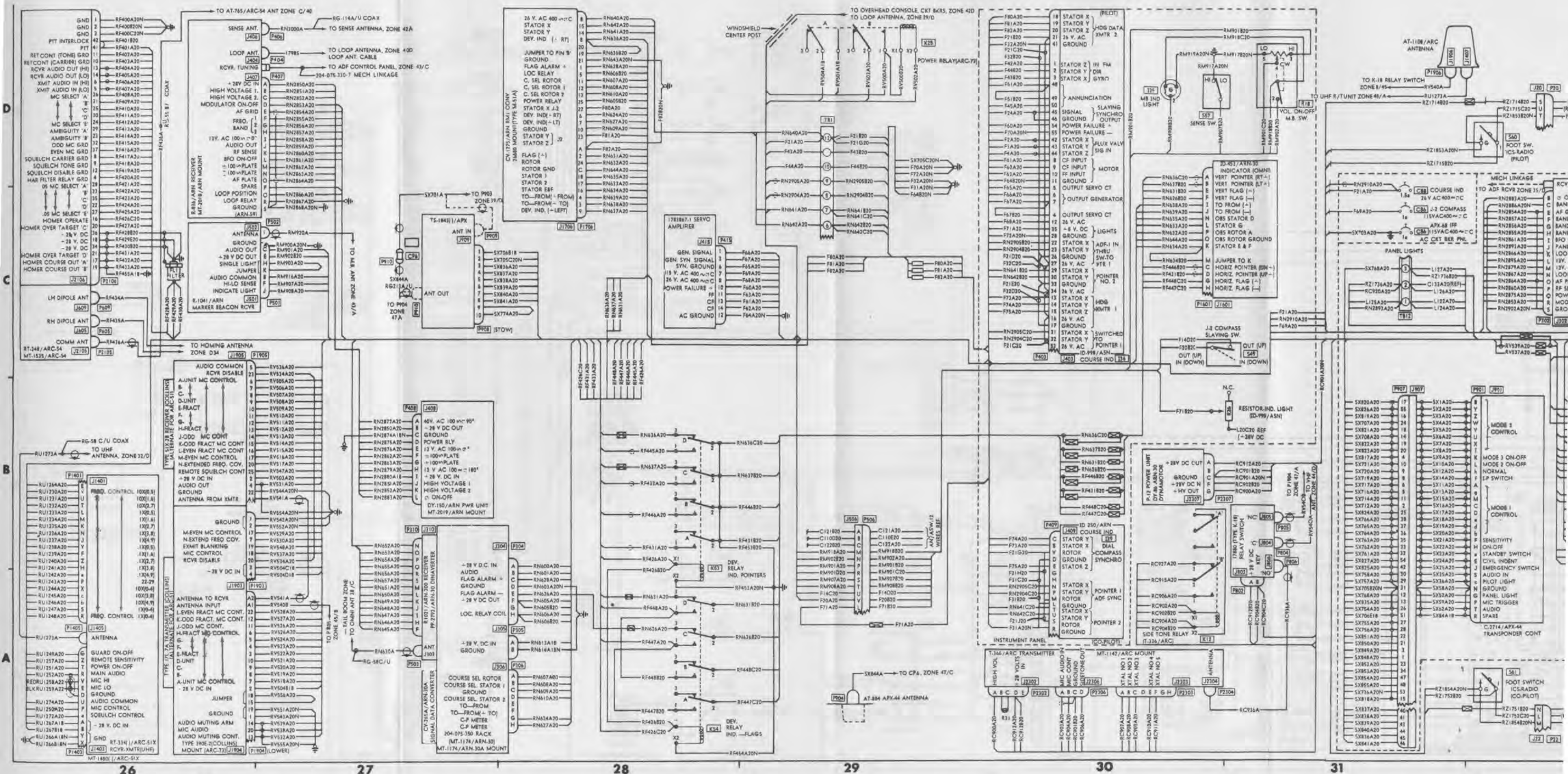


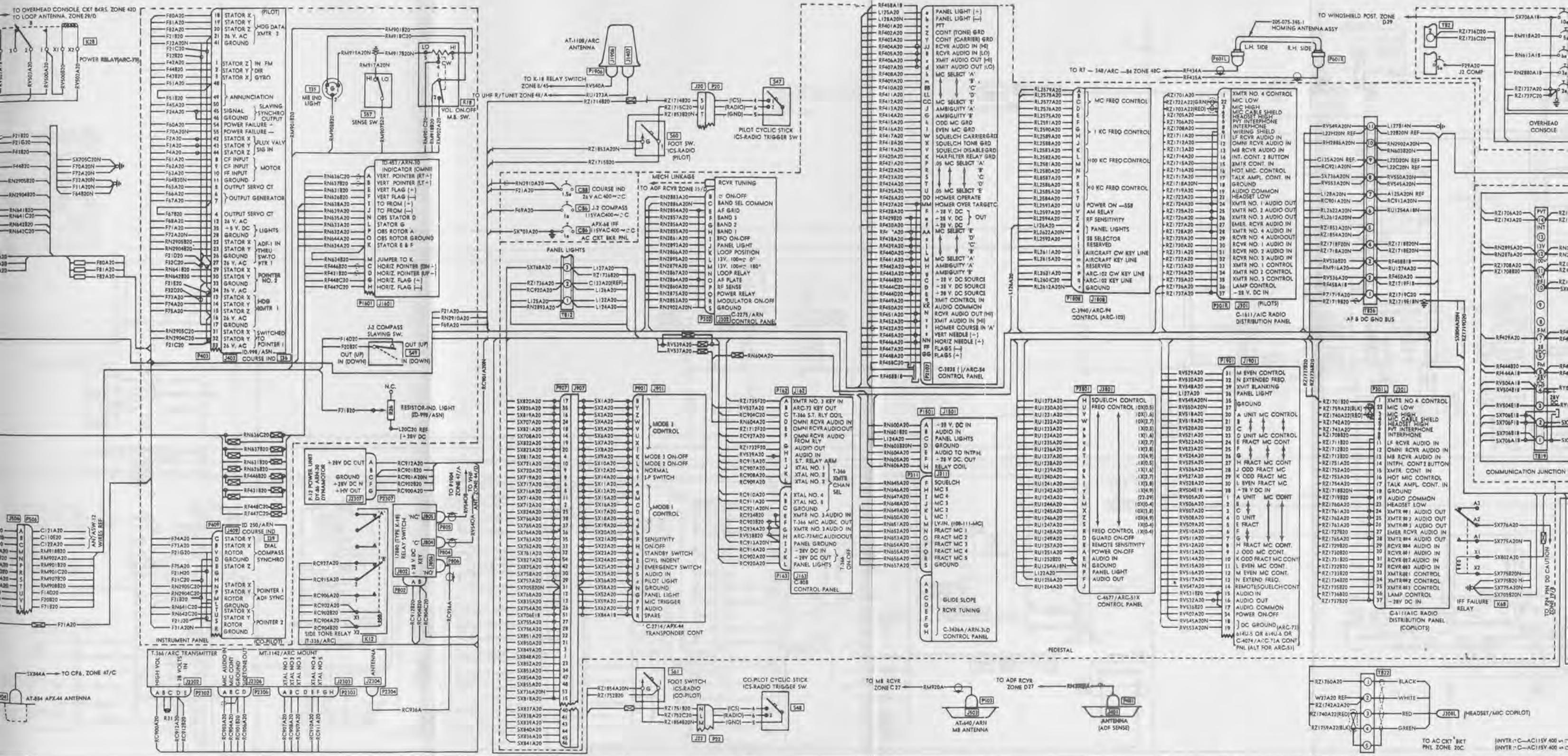
Figure 12-23. Electrical and communication wiring diagram (65-9416 thru 65-9564; 65-12738 thru 65-12744 and 65-12722) (Sheet 1 of 5)

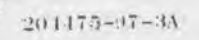




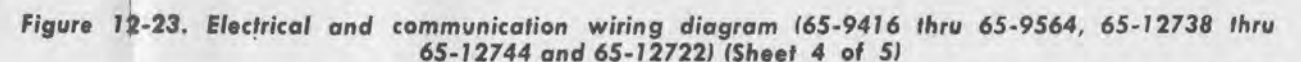
12-65







12-66



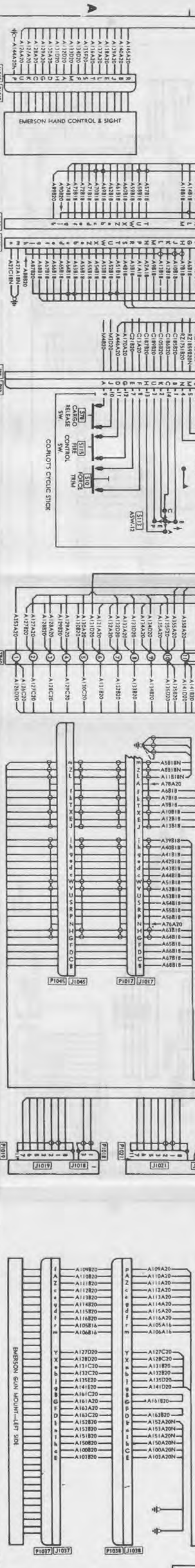
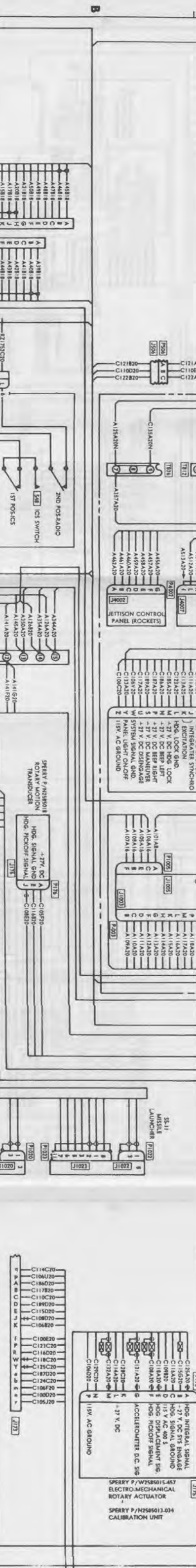
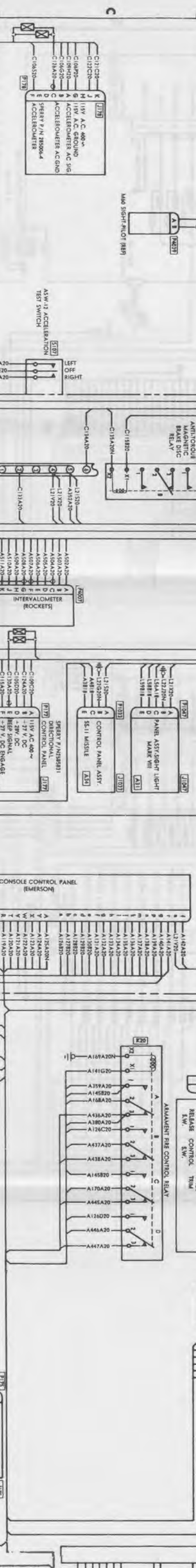
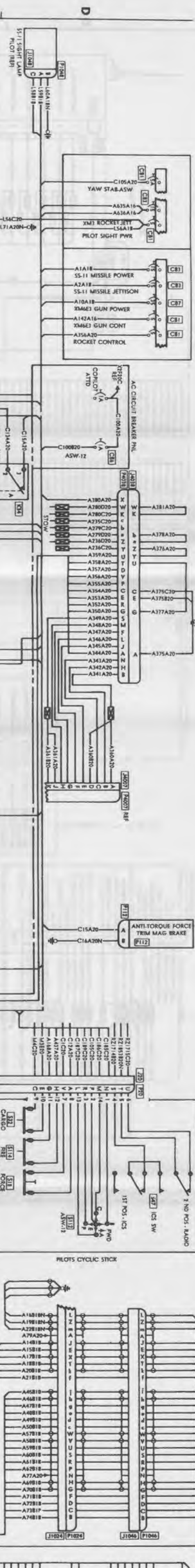
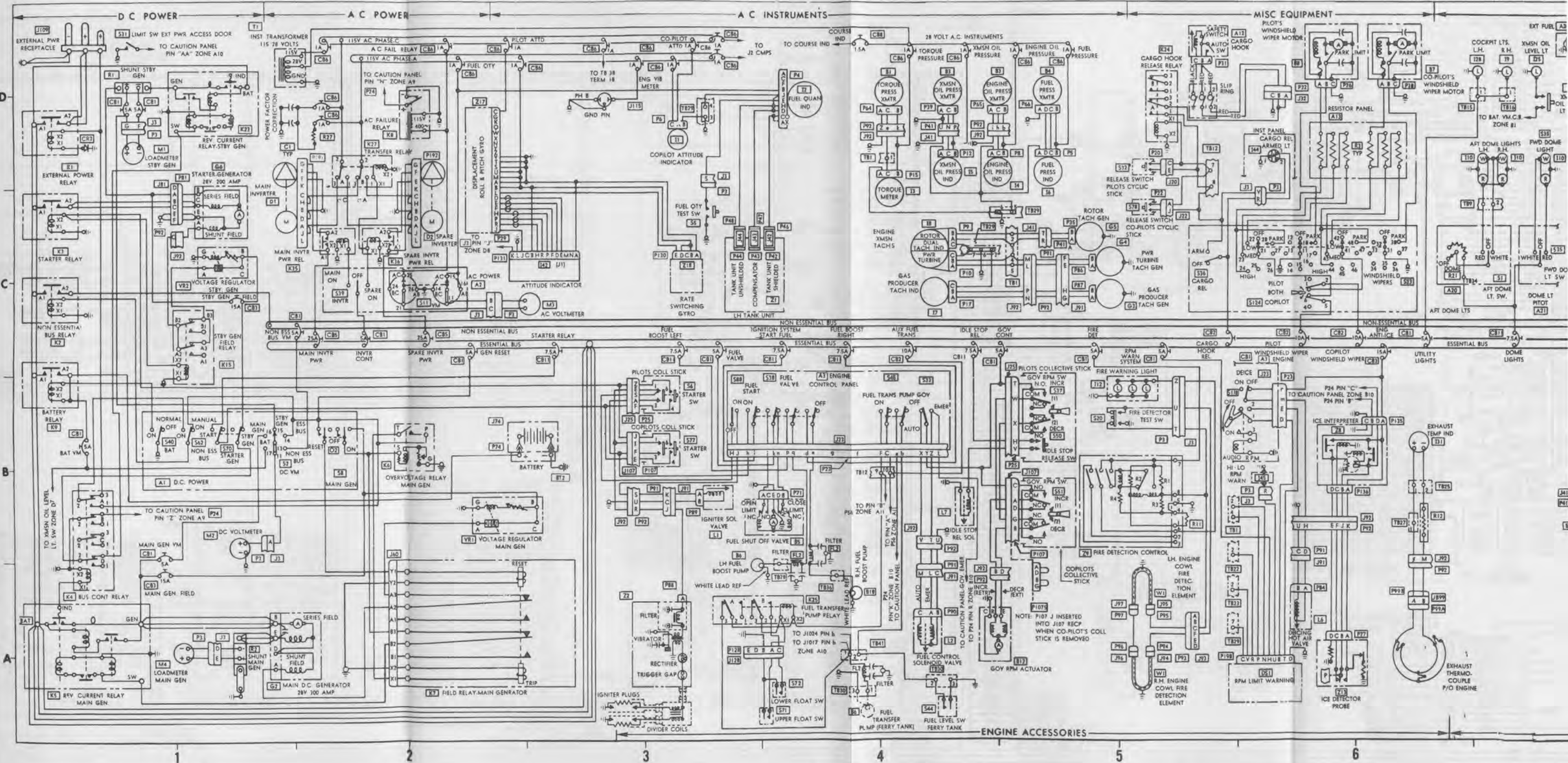




Figure 12-23. Electrical & communication wiring diagram (65-9416 thru 65-9564, 65-12738 thru 65-12744 and 65-12722) (Sheet 5 of 5)



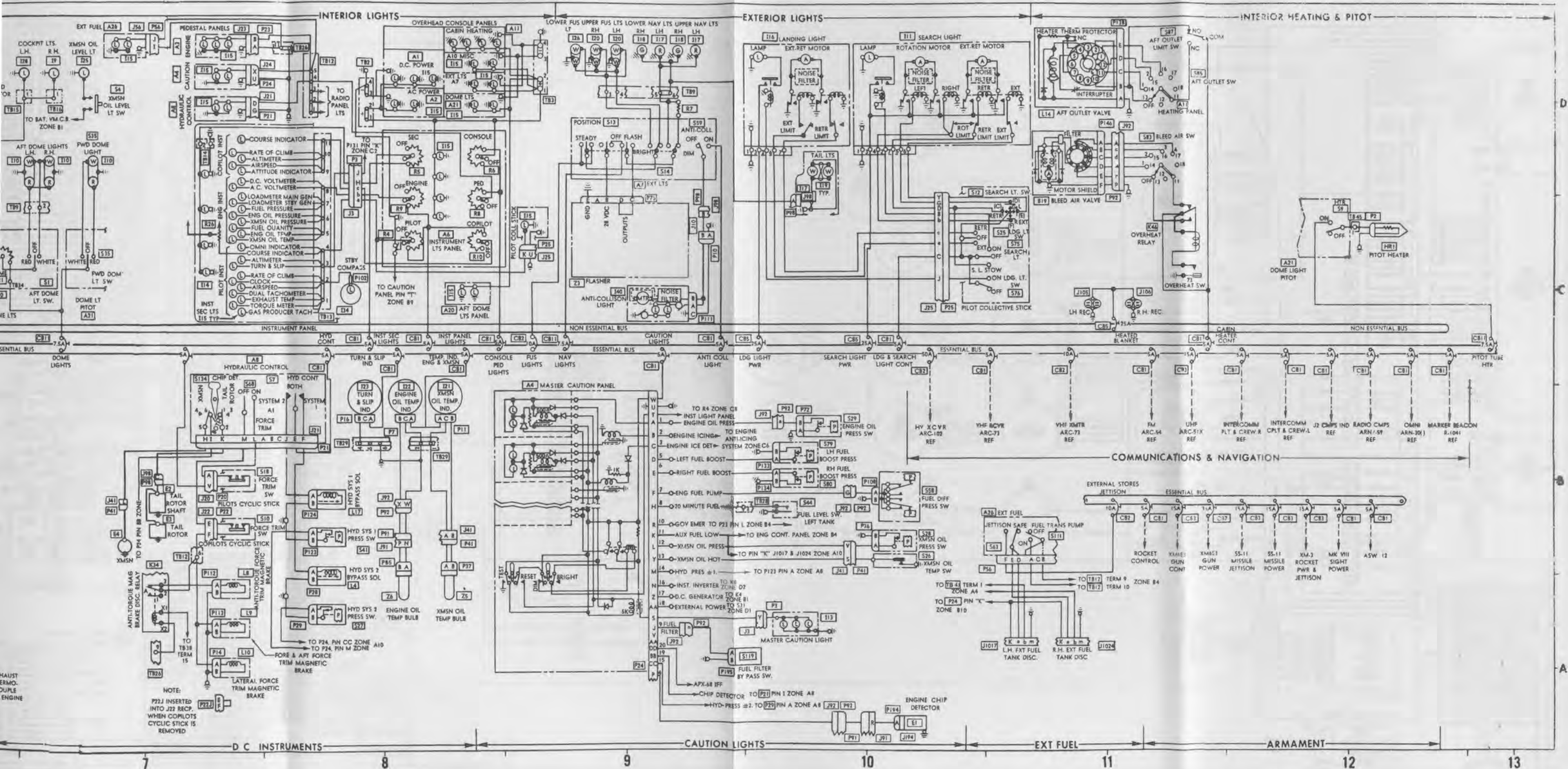
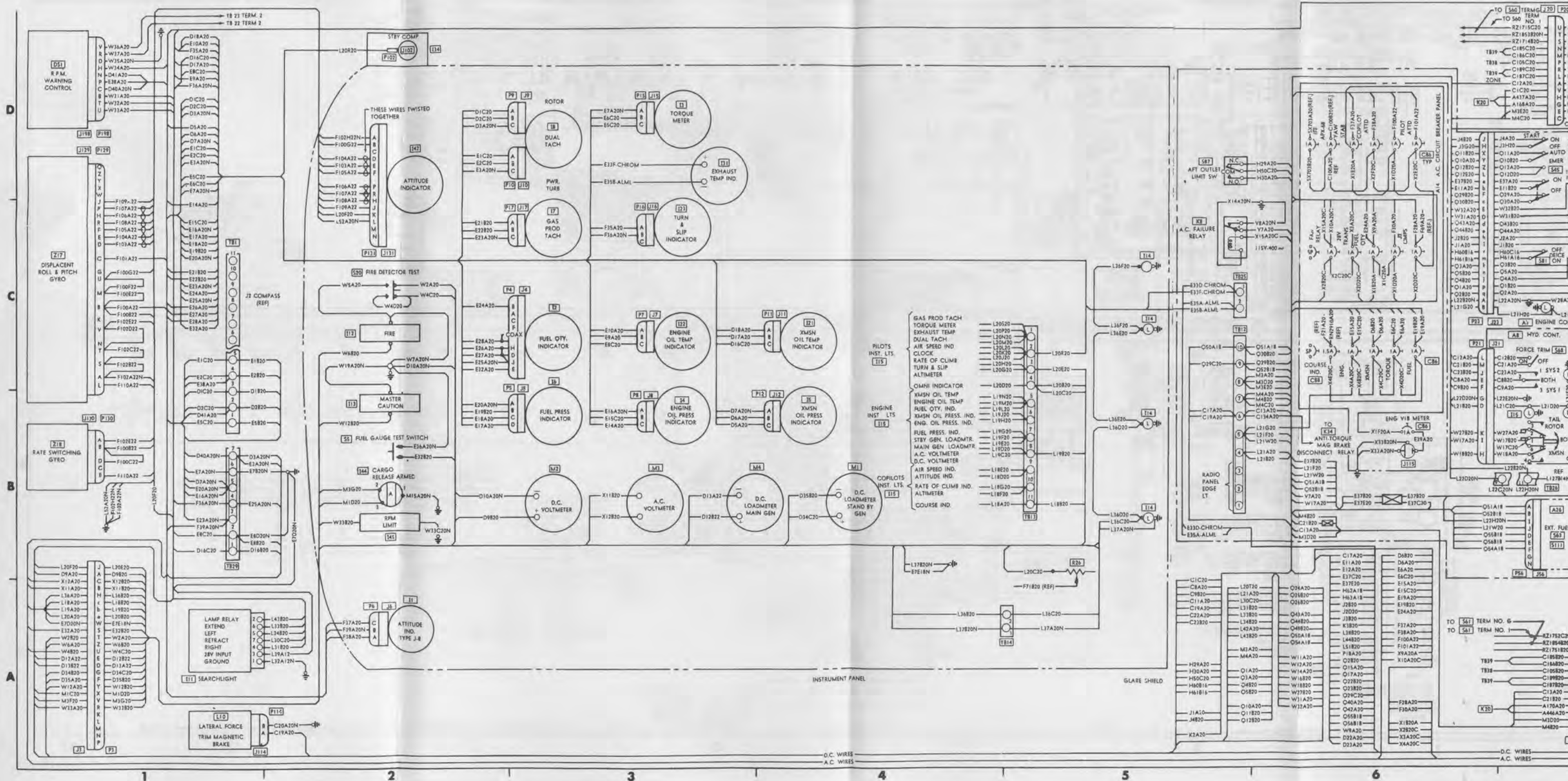


Figure 12-24. Electrical schematic (66-491 and subsequent)



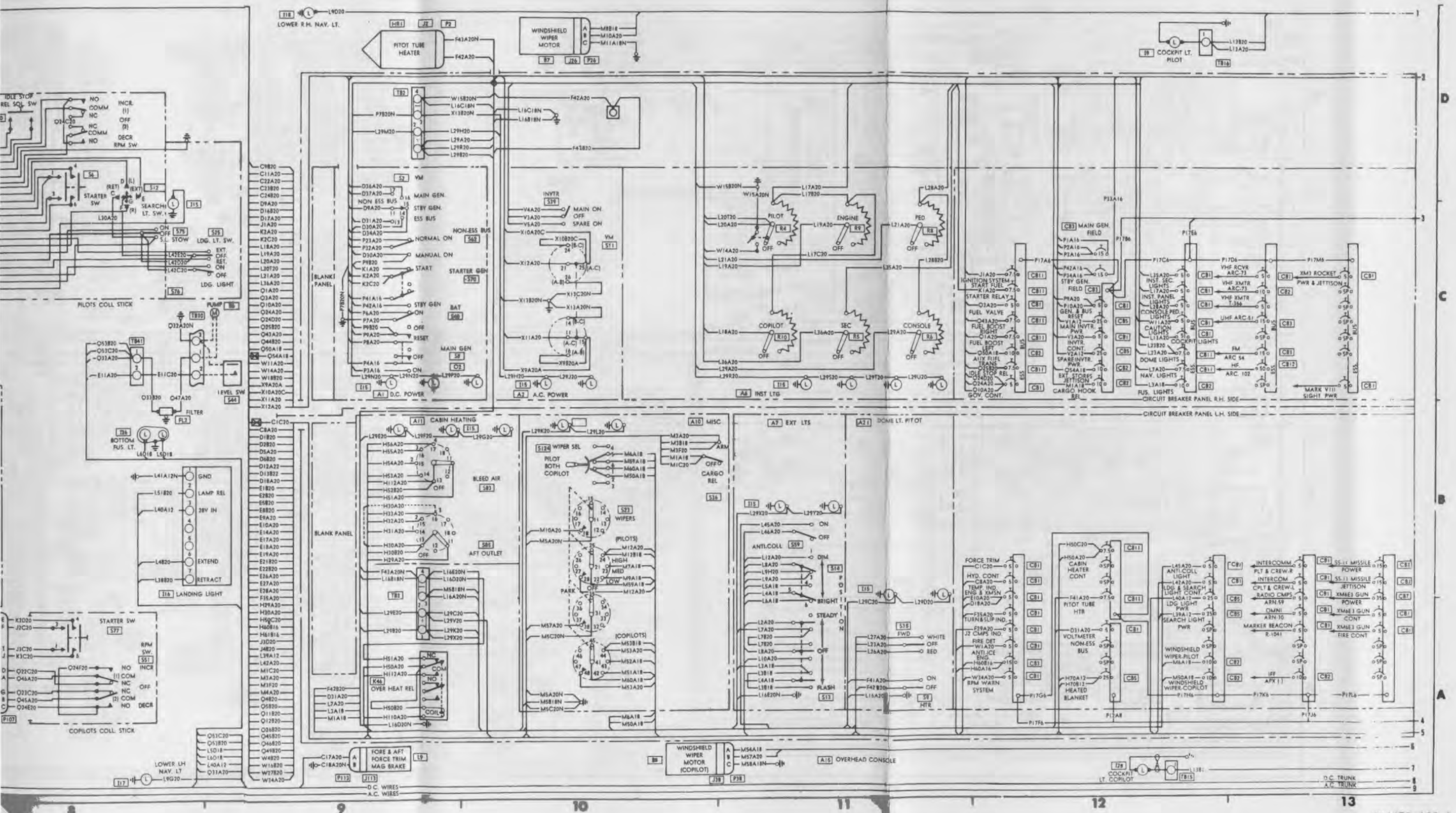
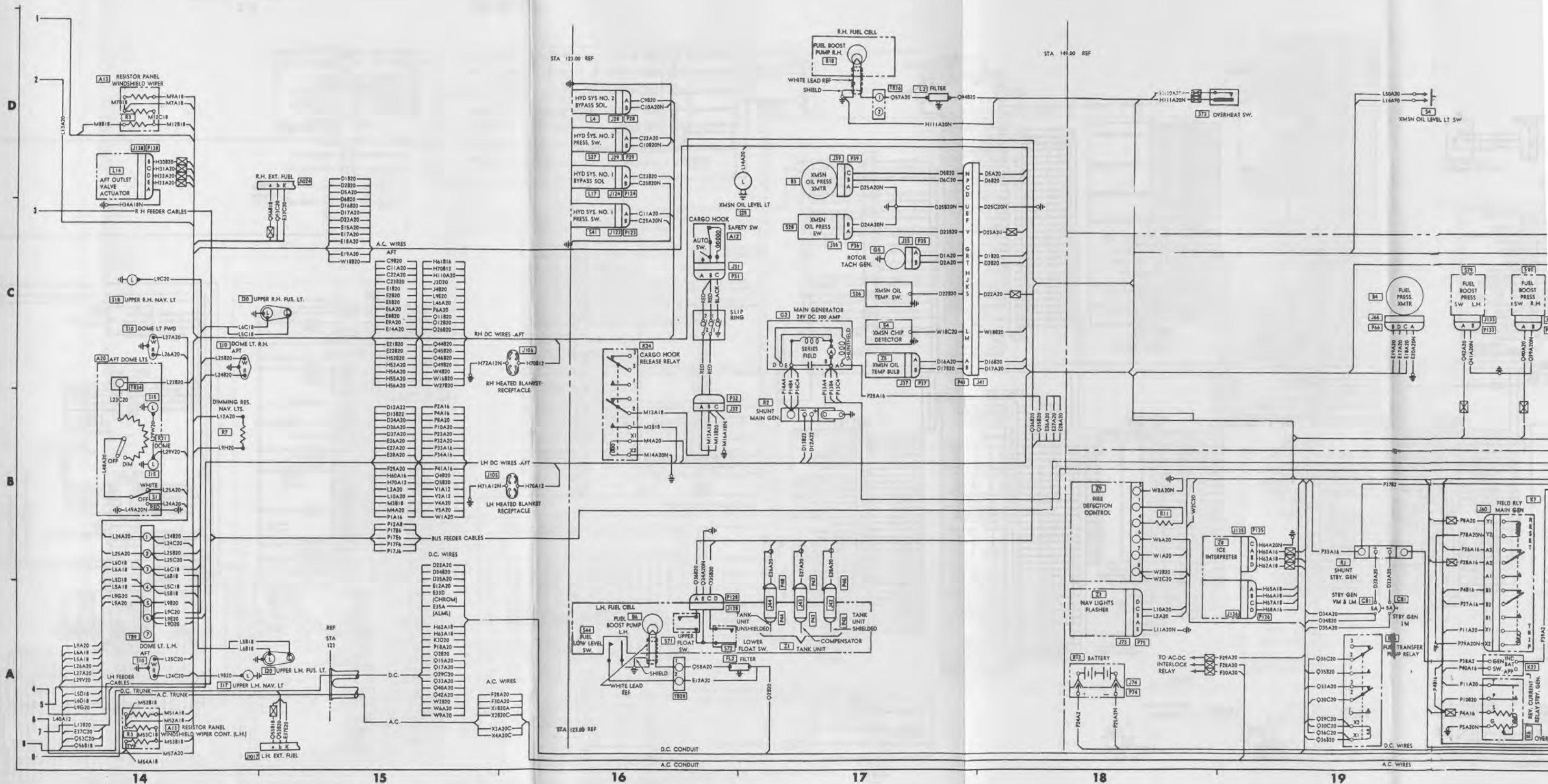
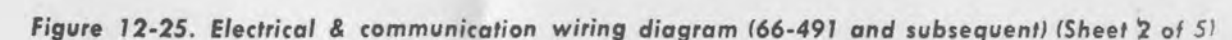
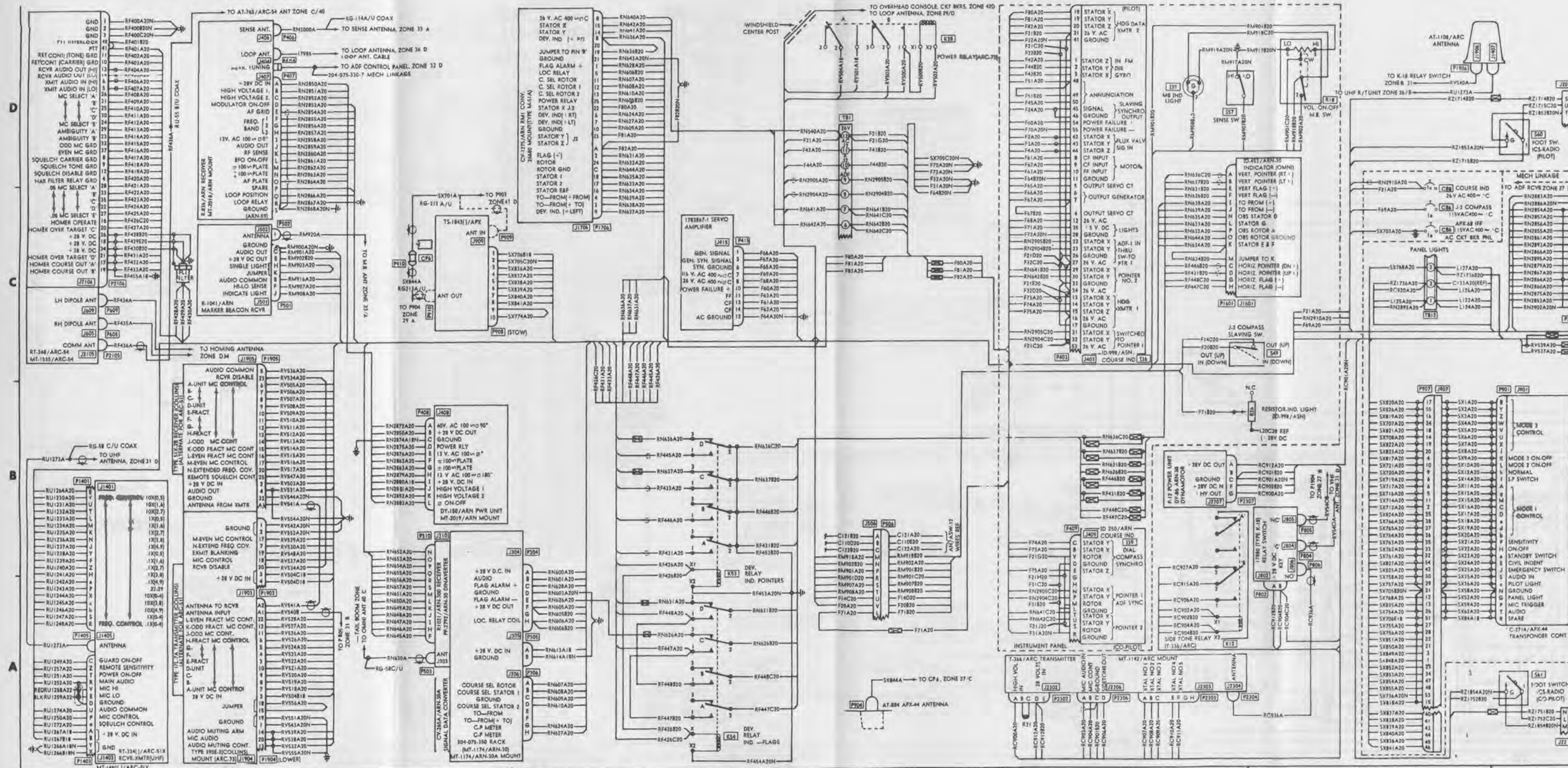


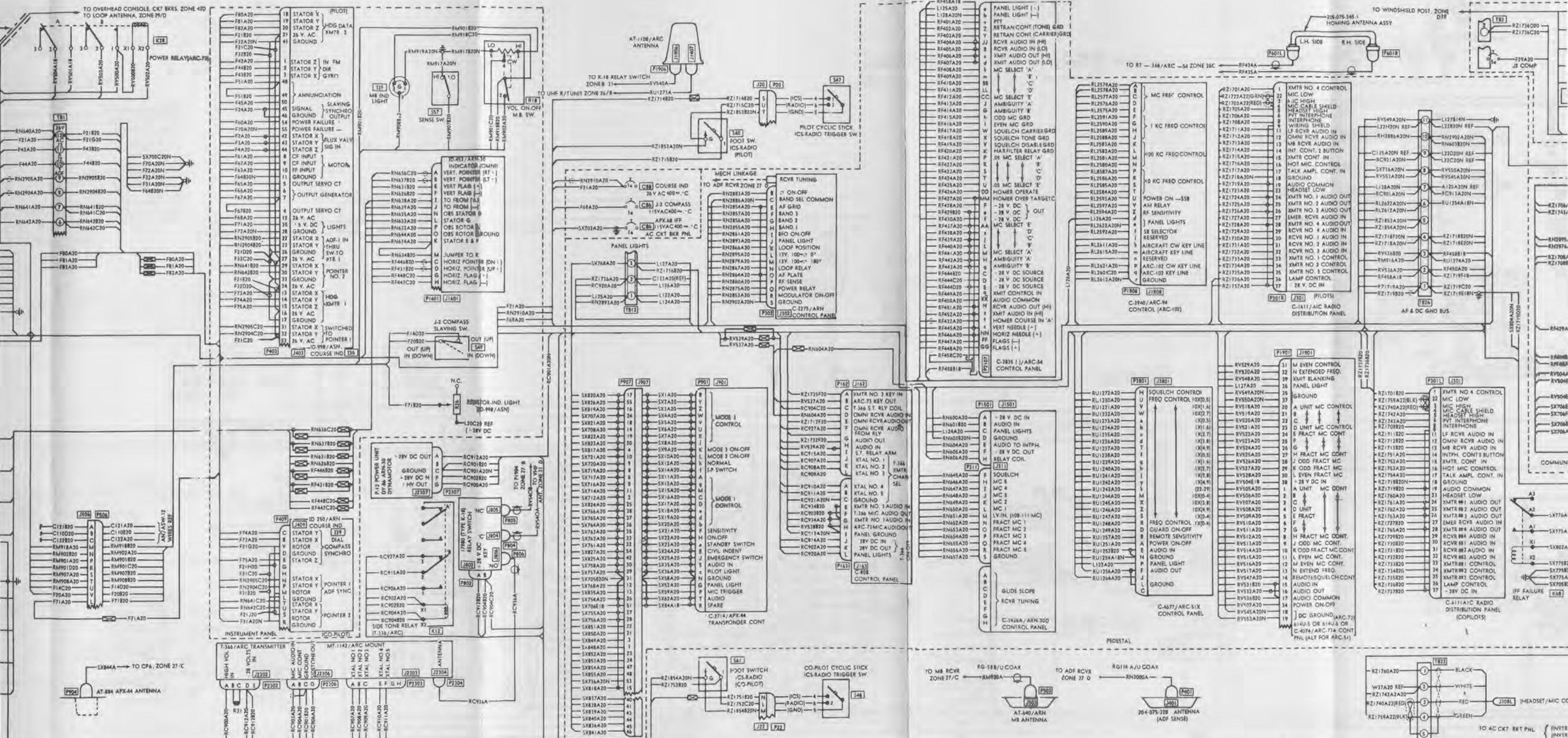
Figure 12-25. Electrical & communication wiring diagram (66-491 and subsequent) (Sheet 1 of 5)
12-70











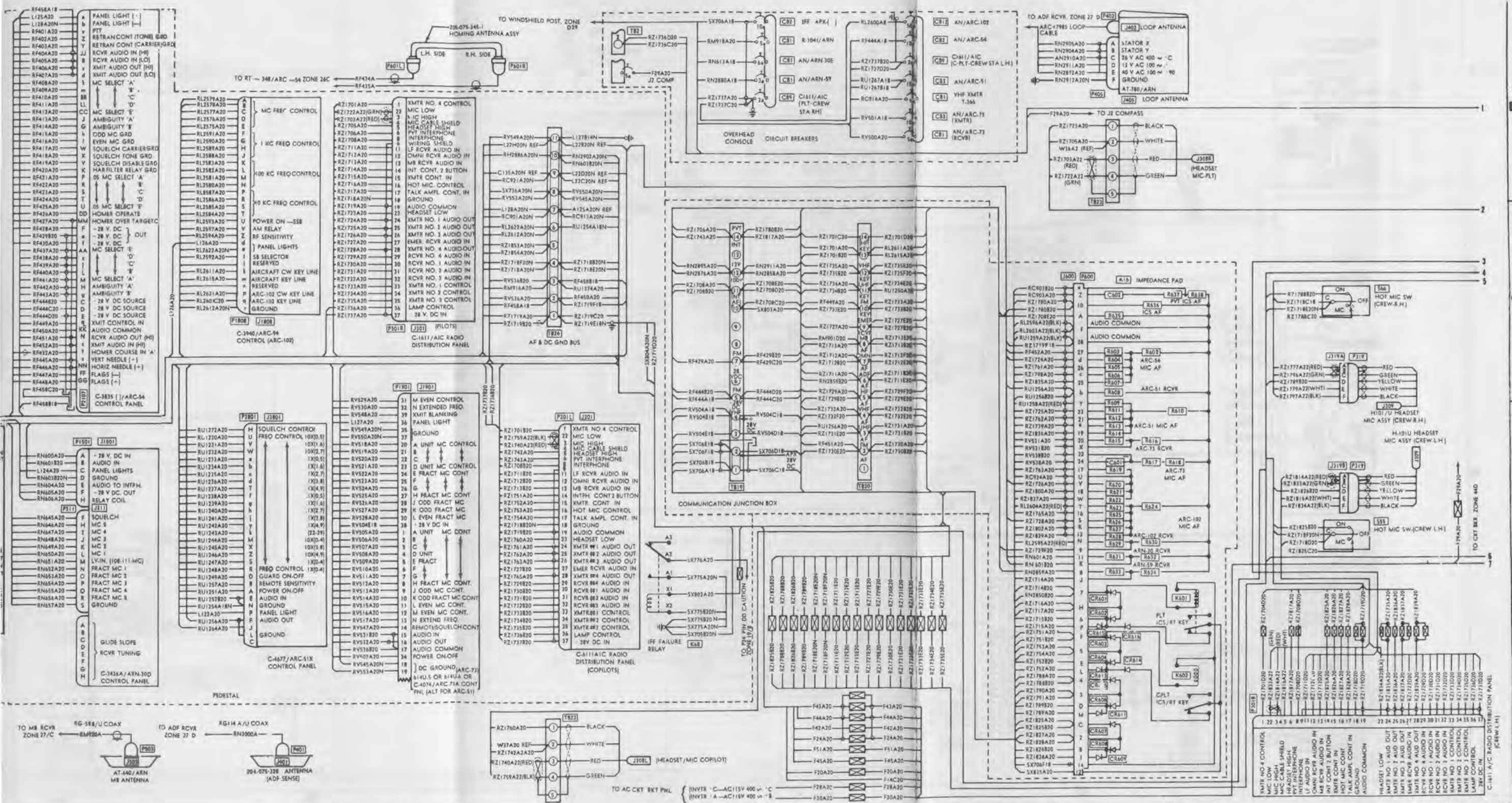


Figure 12-25. Electrical & communication wiring diagram (66-491 and subsequent) (Sheet 3 of 5)

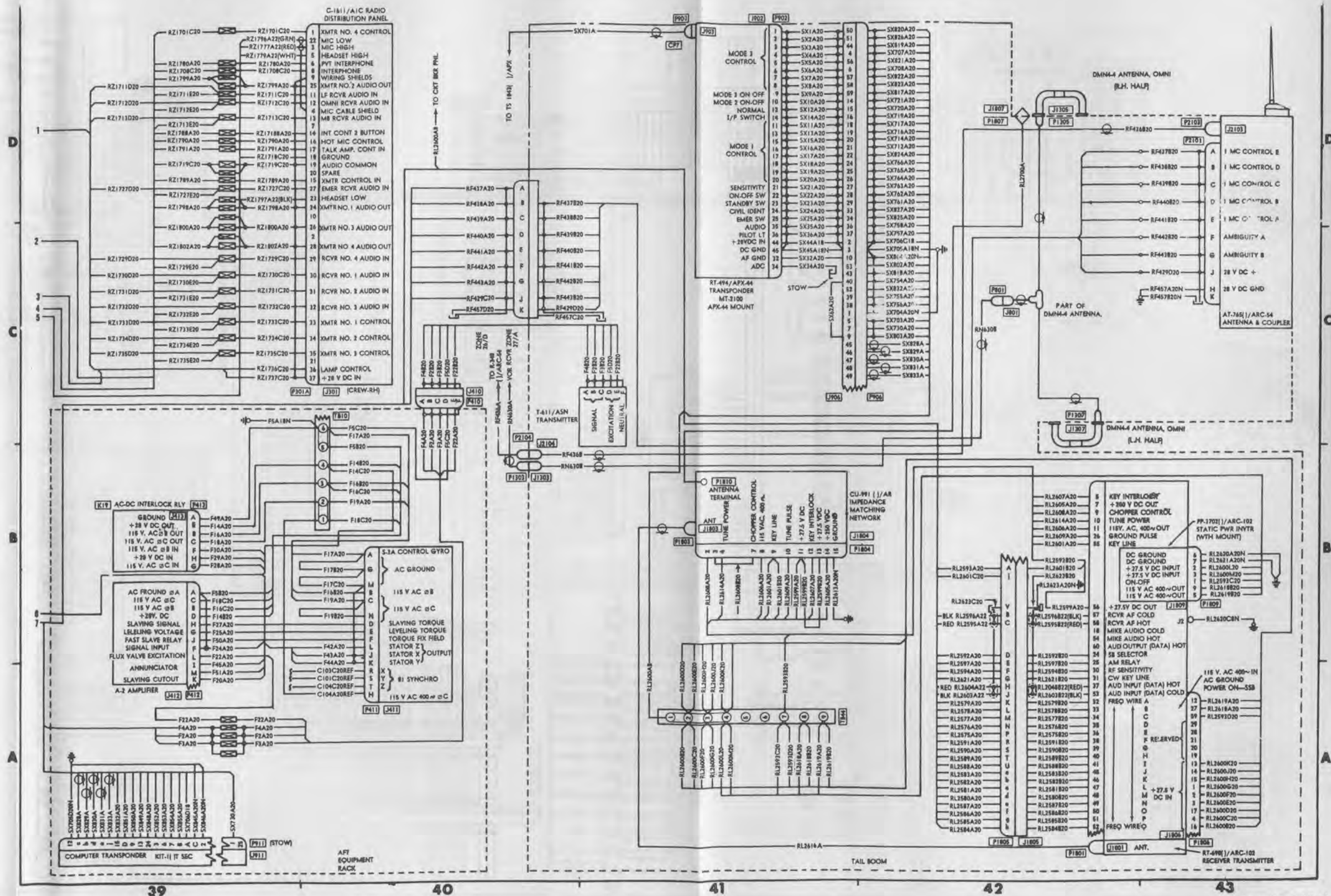


Figure 12-25. Electrical & communication wiring diagram (66-491 and subsequent) (Sheet 4 of 5)

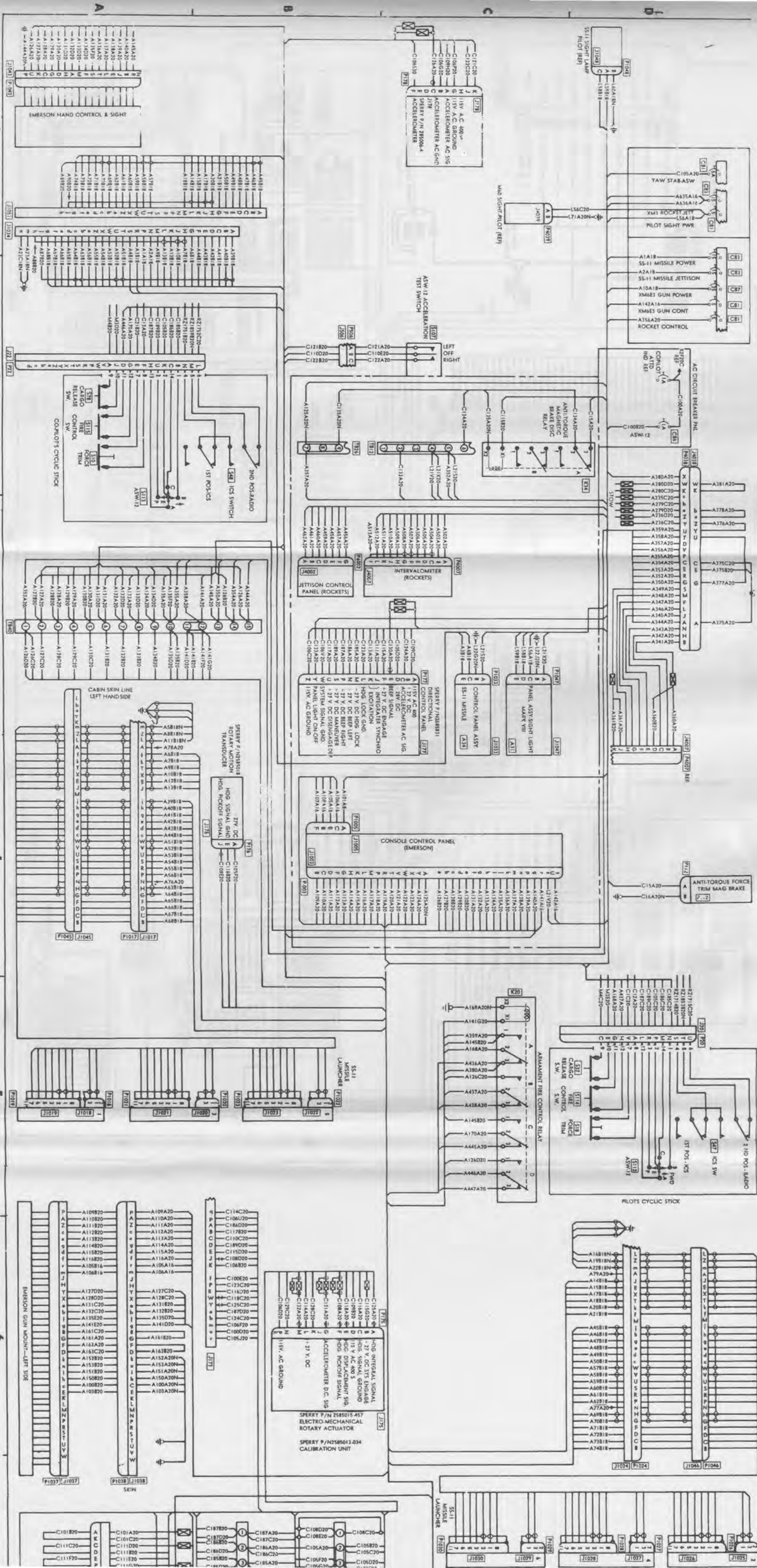




Figure 12-25. Electrical & communication wiring diagram (66-491 and subsequent) (Sheet 5 of 5)
12-74

CHAPTER 13

AVIONICS AND PHOTOGRAPHIC

Section I — Scope

13-1. Scope. The purpose of this chapter is to provide all the essential information for maintenance personnel to accomplish organizational maintenance on the complete signal

electronics equipment configuration and photographic equipment (when applicable) as prescribed for organizational maintenance activities in the Maintenance Allocation Chart.

Section II — Avionics

13-2. Avionics. Refer to applicable avionics manual for preventive maintenance of avionics equipment.

Section III — Photographic

(Not Applicable)

CHAPTER 14

ARMAMENT

Section I — Scope

14-1. Scope. This chapter contains maintenance instructions for the armament system and its provisions. Organizational maintenance

of the armament subsystems will be performed by Aircraft Armament Repair men, MOS427.

Section II — Armament Control System

(Not Applicable)

Section III — Gunnery Equipment

14-2. Machine Gun Installation — M6 7.62 MM M60C. (See figure 14-1.) The Quad 7.62 MM, M60C, machine gun installation is designed for use on the Model UH-1B helicopter. It consists, basically of four M6 7.62 MM machine guns, two machine gun mounts equipped with turret adapters (5) which are attached to each of the external stores support assemblies (10). 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.

14-3. Machine Gun — M6 7.62 MM M60C. (See figure 14-1.) The M6 7.62 MM machine gun 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. TM 9-1005-243-12.

14-4. Removal — M6 7.62 MM M60C Machine Gun. (See figure 4-1.) 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 (11) counterclockwise and open the gun cover (12).

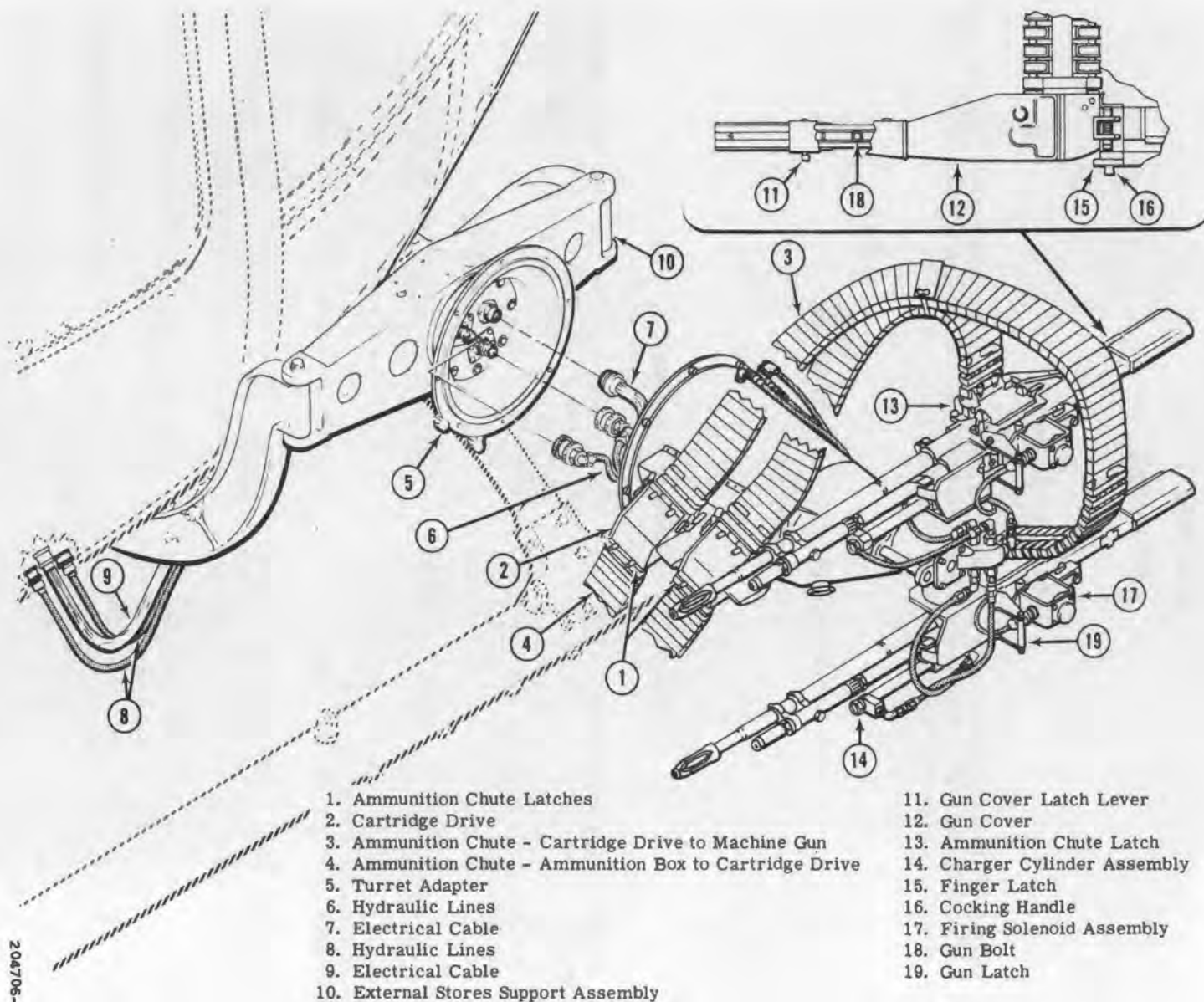


Figure 14-1. 7.62 MM M60C machine gun and adapter

204705-41A

(2) Depress spring loaded ammunition chute latches (13) 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 (12) and make sure that cover latch lever (11) 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 (14) piston. This action unlocks a detent inside the charger cylinder assembly, which relieves hydraulic pressure and permits disengagement of spring loaded finger latch (15) attaching charger cylinder assembly (14) to machine gun cocking handle (16) bolt. Disengage finger latch (15) and rotate latch and charger cylinder assembly piston to clear cocking handle bolt.

e. Press up on underside of firing solenoid assembly (17) to trip sear. This action permits the gun bolt (18), cocking handle (16) and charger cylinder assembly (14) piston to move forward to "battery" position and remain in that position.

f. Disconnect electrical connector from mating receptacle on firing solenoid assembly (17).

g. Depress spring loaded safety latches on gun latch (19) 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 for the M6 7.62 MM, M60C, machine guns.

14-5. Installation — M6 7.62 MM, M60C Machine Gun. (See figure 14-1.) 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 (19) and unlock gun latch. Position and engage machine gun in gun latch pawls. Close and lock spring loaded safety latches.

c. Connect electrical connector to mating receptacle on firing solenoid assembly (17).

d. Position spring loaded finger latch (15) aft of cocking handle (16) bolt. Engage finger latch with bolt.

e. Refer to paragraph 14-11 and TB 55-1520-208-10/3 for loading and arming machine gun.

Note

Installation of all four machine guns is the same.

14-6. Mount and Adapter — M6 7.62 MM, M60C Machine Gun. (See figure 14-1.) The two gun mount assemblies 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, 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.

14-7. Removal — M6 7.62 MM, M60C Machine Gun Mount and Adapter. (See figure 14-1.) a. Remove 7.62 MM M60C machine guns. (Refer to paragraph 14-4.)

b. Depress spring loaded ammunition chute latches (13) at top and bottom of cartridge drives (2) and release ammunition chutes from cartridge drives. Remove cartridge drive to machine gun ammunition chutes (3) and place on helicopter aft cabin floor or other suitable location. Fold ammunition box to cartridge drive ammunition chutes (4) back onto aft cabin floor.

c. Remove eight nuts, washers and bolts attaching gun mount to turret adapter (5). Carefully swing gun mount open.

Note

Use care not to damage hydraulic lines and electrical cables.

d. Disconnect two hydraulic lines at quick disconnects on turret adapter (5) and immediately cap or cover male and female connectors to prevent entrance of foreign material. Disconnect electrical cable from receptacle on turret adapter (5) and cap or cover electrical connector and receptacle to prevent entrance of foreign material.

Caution

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

e. Position one man on each side of the gun mount and carefully raise the mount from the hinge pins on the turret adapter (5). Move and locate gun mount to location where it will not be damaged.

f. Disconnect hydraulic lines (8) at helicopter fuselage quick disconnects. Cap or cover lines and connectors to prevent entrance of foreign material.

g. Back off check nuts connecting hydraulic lines (8) to turret adapter (5) quick disconnects. Disconnect hydraulic lines from quick disconnects. Remove, and cap or cover hydraulic lines and connectors to prevent entrance of foreign material.

h. Disconnect electrical cable (9) from receptacle at helicopter fuselage skin. Cap or cover connector and receptacle to prevent entrance of foreign material.

i. Remove eight nuts, washers and bolts attaching turret adapter (5) to external stores support assembly (10) and remove turret adapter.

Note

Turret adapter (5) may be inspected by Fluorescent Penetrant method, Specification MIL-I-6866. Before proceeding with such inspection complete the following steps j. and k.

j. Back off check nut attaching electrical receptacle to adapter plate and remove receptacle and attached cable (9).

k. 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 disconnect from turret adapter.

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

14-8. Installation — M6 7.62 MM, M60C Machine Gun Mount and Adapter. (See figure 14-1.) Install machine gun as follows:

Note

If turret adapter (5) has been completely disassembled, complete steps a. and b.

a. Position hydraulic quick disconnect in turret adapter (5) and install check nuts. Position hydraulic mounting flange over each check nut and install four attaching bolts, washers and nuts.

b. Thread electrical cable (9) through turret adapter (5) and position electrical receptacle. Install attaching check nut.

c. Position turret adapter (5) to external stores support assembly (10) and install eight attaching bolts, washers and nuts.

d. Uncap or uncover turret adapter electrical cable (9) connector and receptacle at helicopter fuselage skin. Connect electrical cable to receptacle.

e. Uncap or uncover hydraulic lines (8), turret adapter (5) quick disconnects and helicopter fuselage quick disconnects. Connect hydraulic lines (8) 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 (5) hinge pins.

g. Uncap or uncover electrical cable connector and turret adapter (5) receptacle and connect electrical cable (7) to receptacle.

h. Uncap or uncover hydraulic lines and turret adapter (5) quick disconnects and connect hydraulic lines (6) 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 (5).

j. Position loose end of ammunition box to cartridge drive ammunition chutes (3) to bottom of cartridge drives (2). Depress spring loaded ammunition chute latches (1) and connect ammunition chutes (4) to cartridge drives (2).

k. Position cartridge drive to machine gun ammunition chutes (3) to top of cartridge drives (2). Depress spring loaded ammunition chute latches (1) and connect ammunition chutes (3) to cartridge drives (2).

l. Install M6 7.62 MM M60C machine guns. (Refer to paragraph 14-5.)

Note

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

14-9. Ammunition Feed Group. (See figure 14-2.) The ammunition feed group for the M6 7.62 MM, M60C machine gun, 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.

14-10. Removal — Ammunition Feed Group. (See figure 14-1 and 14-2.) Remove ammunition chutes, boxes and trays as follows:

a. Accomplish paragraph 14-4 steps a. and b.

b. Depress the spring loaded ammunition chute latches (1, figure 14-1) which connect the chutes (3, figure 14-1) to the top of the cartridge drives (2, figure 14-1) 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 (1, figure 14-1) which connect the chutes (4, figure 14-1) to the bottom of the cartridge drives (3, figure 14-1) and the ammunition boxes. Withdraw chutes through opening in the cargo floor and fuselage.

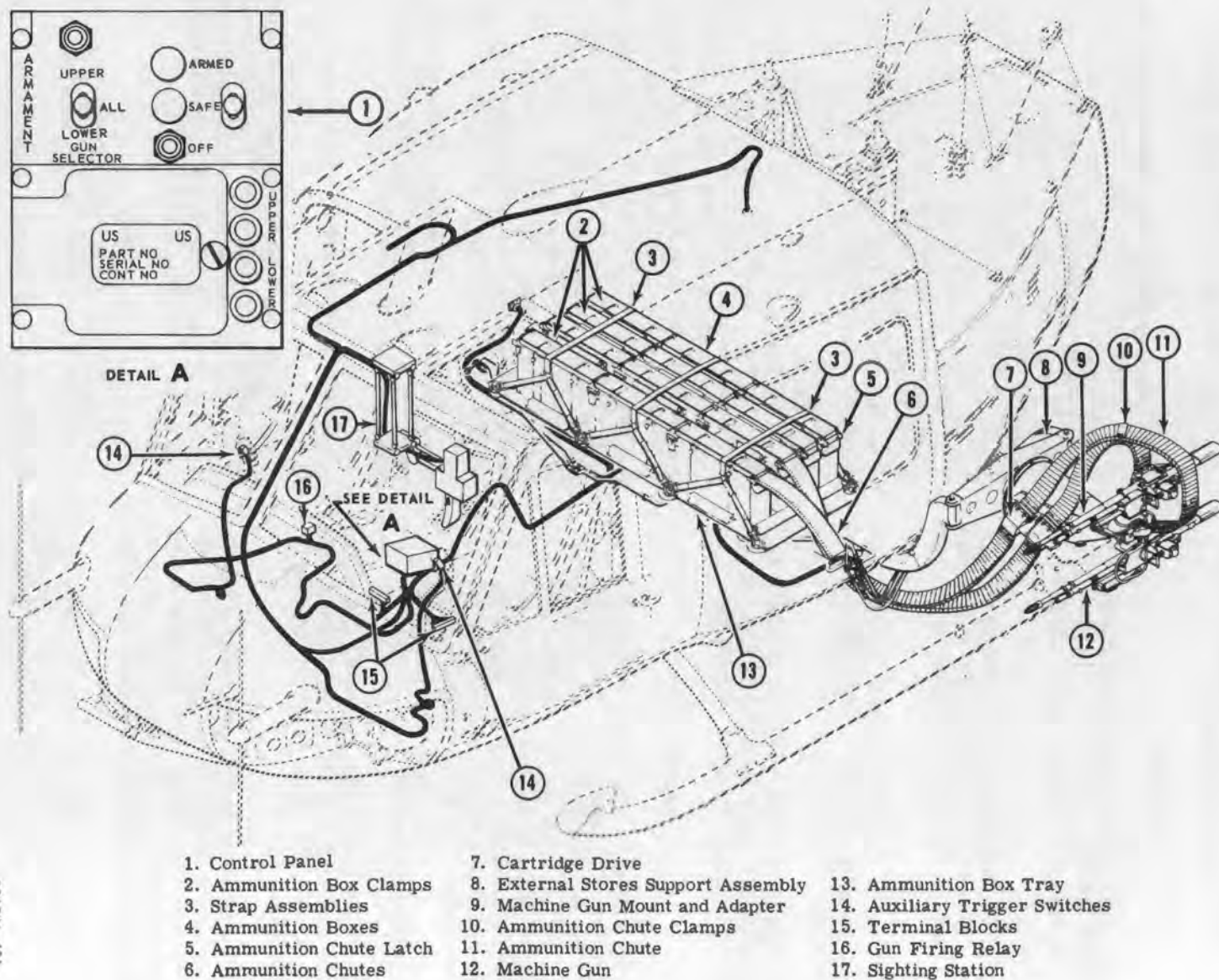


Figure 14-2. Ammunition feed group

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 (13, figure 14-2). Remove strap assemblies (3, figure 14-2) and ammunition box clamps (2, figure 14-2).

Note

Refer to TM 9-1005-243-12 for care, handling and preservation of ammunition.

e. Remove ammunition boxes from helicopter.

f. Remove 16 screws attaching ammunition box tray (13, figure 14-2) to cargo area floor and remove tray from helicopter.

14-11. Installation — Ammunition Feed Group. (See figure 14-2.) Install ammunition tray and boxes as follows:

a. Position ammunition box tray (13) 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 (2) 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 (4) on the ammunition box tray (13).

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

(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 placed properly in all boxes.

(6) Install covers on all ammunition boxes.

c. Position ammunition box clamps (2). Hook three hold-down strap assemblies to footman's loops along aft side of ammunition box tray (13) and position snugly over ammunition boxes. Position other ends of strap assemblies footman's loops forward of ammunition box tray (13). Tighten and secure hold-down strap assemblies (3).

d. Position one end of ammunition chutes (11) to top of cartridge drives (7). Depress ammunition chute latches (1, figure 14-1) 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 (4, figure 14-1) to bottom of cartridge drives (5, figure 14-2). Depress ammunition chute latches (1, figure 14-1) 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. (See 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.

14-12. Control Panel. (See figure 14-2.) The M6 7.62 MM, M60C Machine Gun Installation control panel 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.

14-13. Removal — Armament Control Panel Assembly. (See figure 14-2.) 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.

14-14. Installation — Armament Control Panel Assembly. (See figure 14-1.) a. Uncap or uncover electrical connectors and connect to control panel assembly.

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

14-15. Sighting Station. The sighting station for the M6 7.62 MM M60C machine gun installation 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.

14-16. 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 materials.

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.

14-17. Installation — Sighting Station. Install sighting station as follows:

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.

14-18. Gun Firing Relay. (See figure 14-3.) The gun firing relay for the M6 7.62 MM M60C Machine Gun Installation is mounted on a bracket beneath cabin floor under the pilot's seat. Two terminal blocks are provided for electrical wiring interconnection.

14-19. Removal — Gun Firing Relay. (See figure 14-3.) 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 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.

14-20. Installation — Gun Firing Relay. (See figure 14-3.) a. Position gun firing relay on bulkhead under cabin floor 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.

Section IV — Bombing Equipment

(Not Applicable)

Section V — Rocket Equipment

14-21. Rocket Installation—2.75 Inch, XM3, Fixed. (See figures 14-3 and 14-4.) Complete electrical provisions for installing the XM2, 2.75 rocket installation are included in UH-1B helicopter. 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. (See 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 degrees 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, figure 14-4) cross-beam. The external stores support assembly is attached to the "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).

14-22. Rocket — 2.75 Inch. (See figure 14-4.) The 2-75 inch folding-fin aircraft rocket

(FFAR) used with the 2.75 XM3 fixed rocket installation 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.

14-23. Removal — 2.75 Inch Rockets. a. Set the helicopter master battery switch to the "OFF" position.

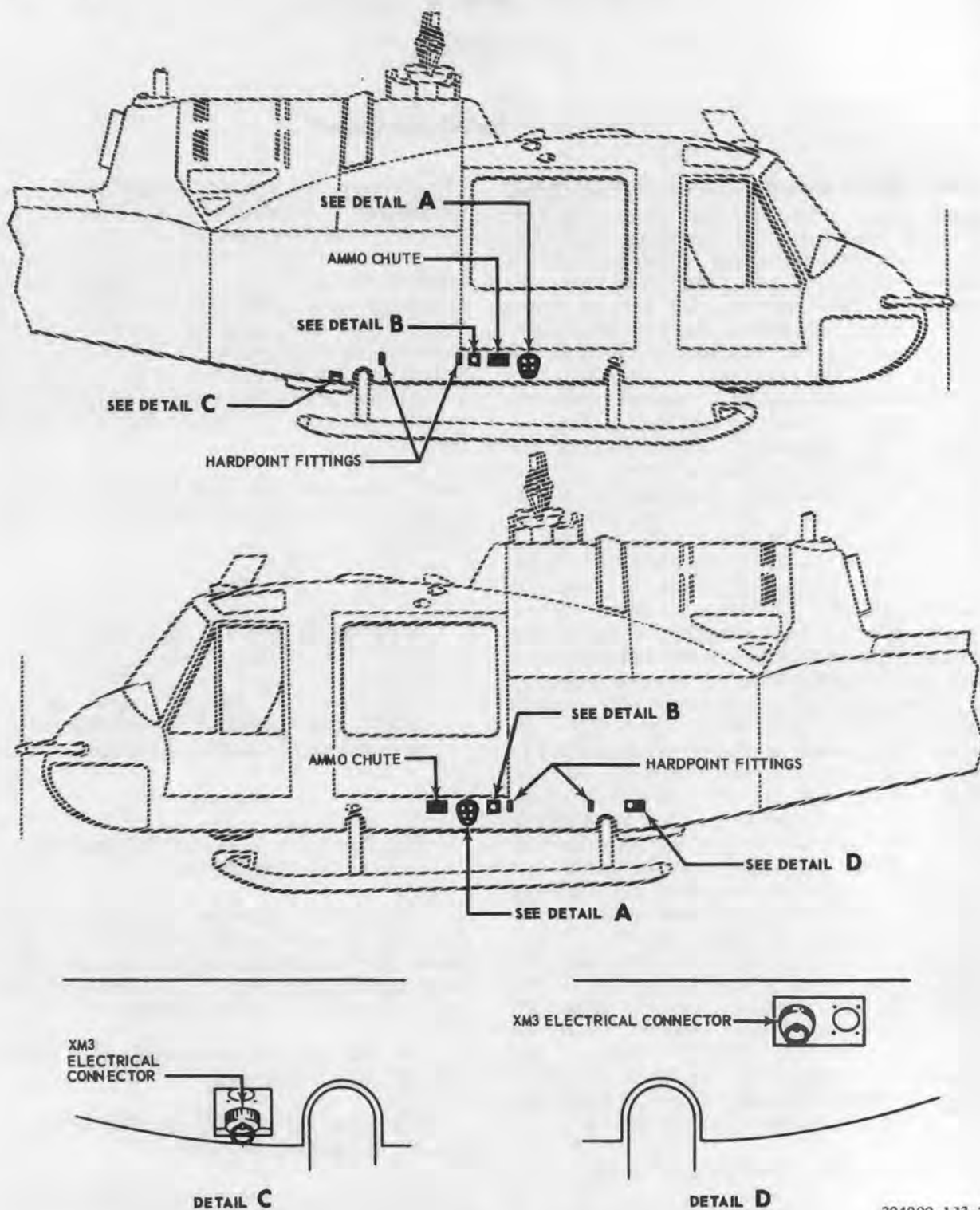
Note

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

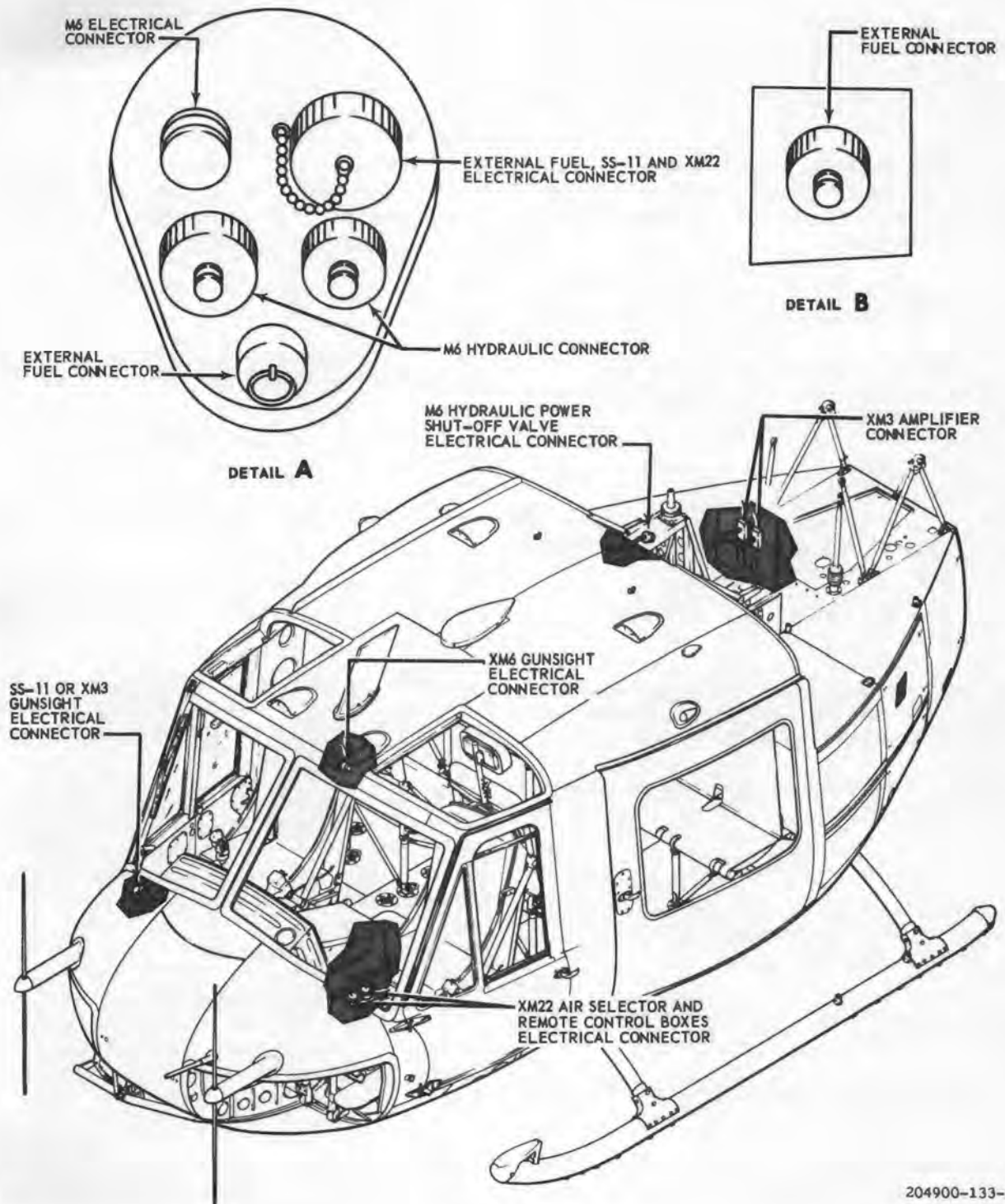
The following safety precautions are to be observed at all times:

- (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



204900-133-2

Figure 14-3. Armament and fuel kit external connections (Sheet 1 of 2)



204900-133-1

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

radio and radar transmitters, as there is the possibility of squibs actuating prematurely.

(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 installation.

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

c. Disconnect the main battery plug from the battery.

d. Electrically ground the helicopter to an earth ground.

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

f. 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.

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

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

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

14-24. Installation — 2.75 Inch Rockets. a. Observe all safety precautions outlined in paragraph 14-23.

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 into the launcher latch retaining groove on the rocket.

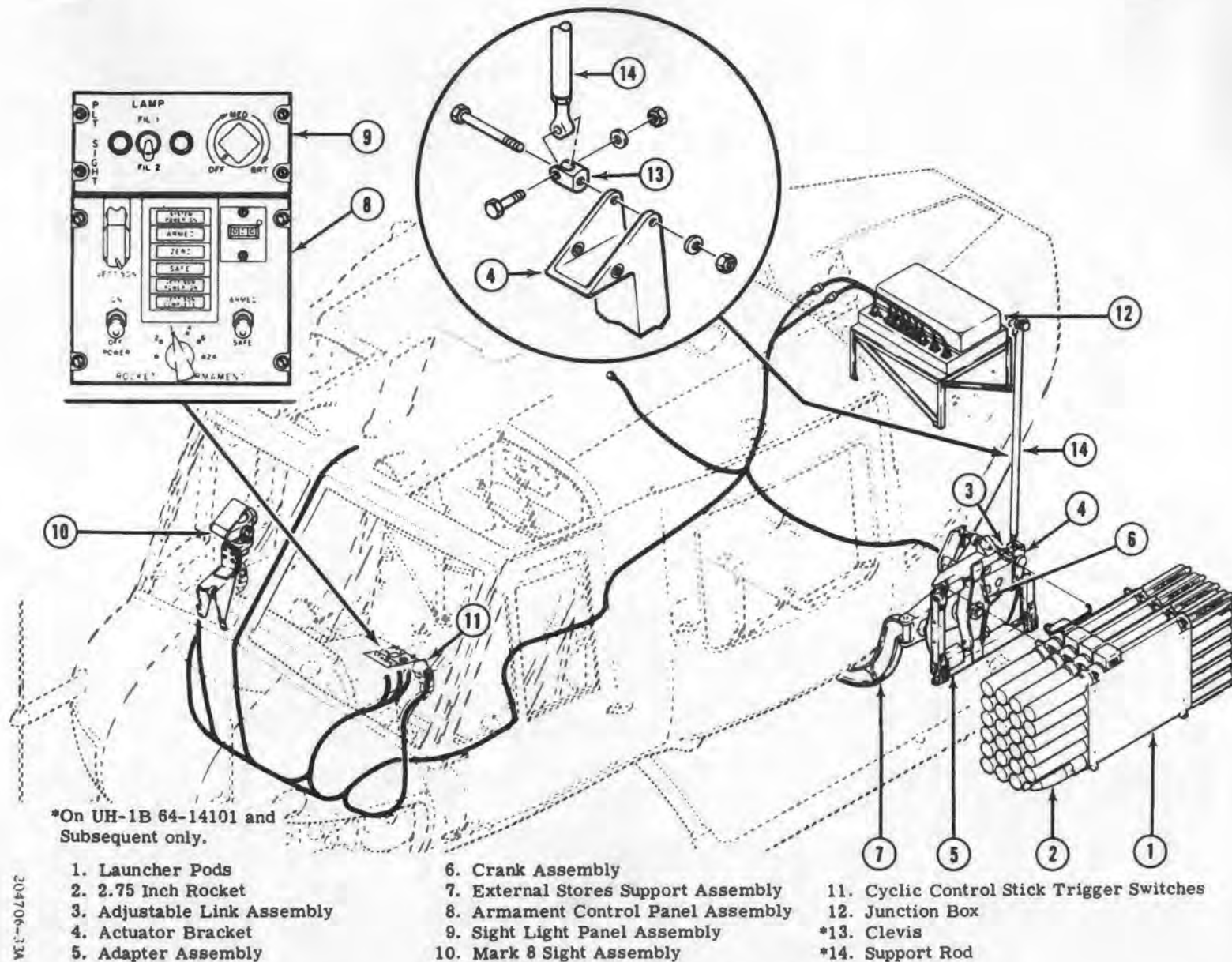


Figure 14-4. 2.75 inch, XM3, fixed rocket installation

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.

m. When all tubes have been loaded, remove and retain shorting caps from the explosive bolt squibs and attach the four connectors to the squibs, being careful to observe the connector markings for the top and bottom bolt.

14-25. Launcher and Adapter. (See figure 14-4.) A launcher and adapter for the 2.75 XM3 fixed rocket 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.

14-26. Removal — Launcher and Adapter. a. Remove all unfired rockets. (Refer to paragraph 14-23.)

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.

14-27. Cleaning — Launcher and Adapter. The 2.75 XM3 Fixed Rocket Installation 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.

14-28. Installation — Launcher and Adapter.

a. Position adapter assembly to crank assembly and install attaching explosive bolts. Safety 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.

14-29. Adjustable Link Actuator Bracket and Crank Assembly. (See figure 14-4.) Each launcher for the 2.75 XM3 Fixed Rocket Installation has an adjustable link 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.

14-30. Removal — Adjustable Link, Actuator Bracket and Crank Assembly. (See figure 14-4.)

a. Remove launcher and adapter. (Refer to paragraph 14-26.)

b. (On UH-1B 64-14101 and subsequent.) Remove lockwire and unscrew bolt with washer

and pad from tripod fitting. Remove bolt washer and nut that attaches support tube (14) to clevis (13) and lift support tube from clevis.

c. Cut safety wire 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.

d. Remove nut, washer and bolt attaching aft end of the adjustable link to the actuator bracket. Remove adjustable link. On UH-1B 64-14101 and subsequent remove clevis (13).

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

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

g. Cut safety wire and remove four nuts, washers and bolts attaching stop brace and bracket to plate and spacer assembly. Remove bracket.

h. Cut safety wire and remove four bolts attaching stop brace to crank assembly. Remove stop brace.

i. 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.

j. 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.

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

14-31. Installation — Adjustable Link, Actuator Bracket and Crank Assembly. (See figure 14-4.)

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 crossbeam. Install four bolts to attach stop brace to crank assembly and safety wire.

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

h. Remove nut, washers and bolt attaching external stores support crossbeam to aft support. Position actuator bracket to aft end of crossbeam 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 attaching clevis (13). Install attaching bolt, washer and nut.

k. (On UH-1B 64-14101 and subsequent.) Attach rod end of the support tube (14) to clevis (13) with previously removed hardware. Adjust support tube (14) as necessary so hole in opposite end of tube aligns with hole in tripod fitting. Place washer and pad under bolt head and insert bolt through support tube and screw into fitting. Lockwire bolt when tight.

l. Position forward end of adjustable link to the yoke formed by the upper end of the crank and the plate and spacer assembly. Insert attaching bolt and safetywire.

14-32. Panel Assembly — Armament Control. (See figure 14-4.) The armament control

panel for the 2.75 XM3 Fixed Rocket Installation 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 in a ripple 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.

14-33. Removal — Armament Control Panel Assembly. (See figure 14-4.) 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.

14-34. 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.

14-35. Panel Assembly — Sight Light. (See figure 14-4.) The sight light panel assembly for the 2.75 XM3 Fixed Rocket Installation 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.

14-36. 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 of panel and remove panel assembly. Cap or cover electrical connectors to prevent entrance of foreign materials.

14-37. 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.

14-38. Sight Assembly — Mark 8. (See figure 14-4.) The pilot sight for the 2.75 XM3 Fixed Rocket Installation 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 a FIL-1 — FIL 2 switch and an intensity control for illumination of the reticle.

14-39. Removal — Mark 8 Sight Assembly. (See figure 14-4.) a. Remove four nuts and bolts attaching pilot sight (10) to support assembly 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.

14-40. Installation — Mark 8 Sight Assembly. (See figure 14-4.) a. Position pilot sight support assembly on instrument panel, and install attaching screws, washers and nuts.

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

14-1. Armament Junction Box. (See figure 14-4.) The junction box for the 2.75 XM3 Fixed Rocket installation connects to electrical connector at center of pylon in cabin and contains the circuitry 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.

14-42. 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.

14-43. 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.

Section VI — Missiles

14-44. SS-11 Missile Installation. (See figure 14-5.) The SS-11 anti-tank missile system installation is designed for use on Model UH-1B helicopters, Serial Nos. 61-720 through 61-735 and converts those helicopters from passenger, cargo carrying vehicles to attack and assault weapons. The system contains six SS-11 missiles (1), launchers (2), and pylons (3), attached to boom assemblies which protrude from the helicopter fuselage. Each boom assembly is equipped with three missiles, launchers and pylons. The inboard end of each boom assembly is contained in a mechanical jettison device (5), which is attached to an external stores support assembly (6). A gunner sight assembly (7) is provided for maintenance of visual contact with the missile during flight. The gunner control stick assembly (8) is mounted on the forward side of the gunner sight pedestal. The pilot sight assembly (9) acts as a visual aid to maintain proper alignment of the helicopter with the target. A command box (10), located at the lower, left-hand forward corner of the center console, contains the controls necessary for operation of the SS-11 missile system. Switches on the command box enable the gunner to jettison individual missiles and launchers; simultaneously jettison all missiles and launchers, or jettison the junction box and missile guidance wires after a missile has been fired. Manual emergency jettison controls (11) enable the pilot to mechanically jettison both boom assemblies simultaneously. The pilot also

has available an electrical, total jettison control which is located on the center console panel. This control jettisons all launchers simultaneously, but leaves the boom assemblies attached to the helicopter. The selector box (12) and signal generator (13), located in the helicopter baggage compartment, act in conjunction with the gunner control stick and the command box.

14-45. SS-11 Missile. (See figure 14-5.) The SS-11 missile is a self-propelled, autorotating remote-controlled missile for use against surface targets. The missile consists of a streamlined body fitted with four equally spaced fins. These fins are set at an angle of one degree to the center line in order to provide autorotation about the roll axis. The missile is propelled by a two-stage solid-propellant rocket motor, comprising a booster and a sustainer stage. The missile is guided by remote control. Command signals, produced by a control stick, are transmitted by a signal generator for control of the pitch and yaw relays in the missile. The command signals are fed to the missile through two guidance wires, which unwind from bobbins in the missile during flight. The pitch and yaw relays in the missile actuate jettavators in the jet stream of the sustainer motor to provide guidance control during flight.

14-46. Removal — SS-11 Missile. (See figure 14-5.) Remove missiles as follows:

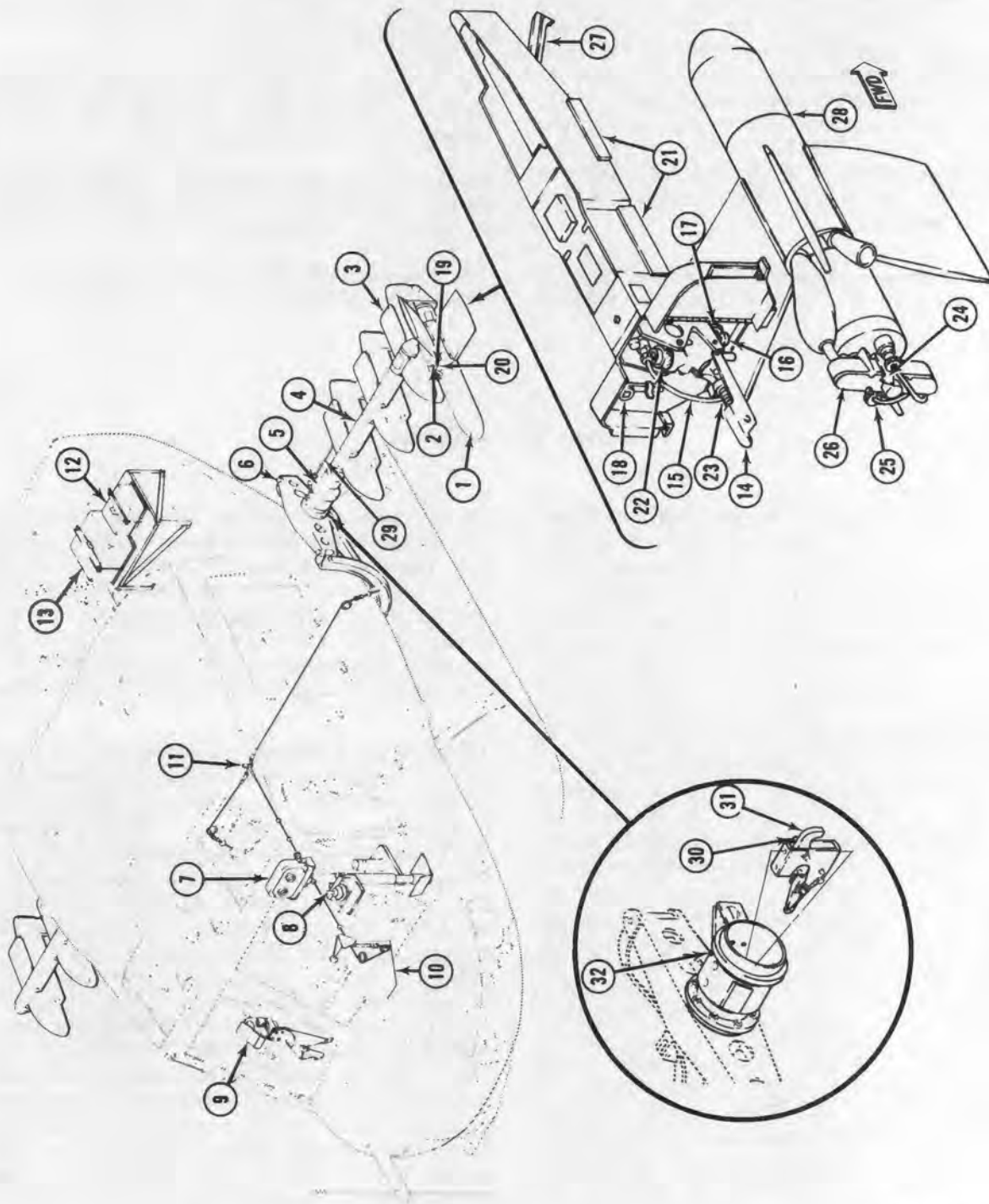


Figure 14-5. SS-11 missile installation (Sheet 1 of 2)

204071-13-1

- | | |
|--|---|
| 1. SS-11 Missile | 17. Quick Disconnect Connector |
| 2. Launcher | 18. Locking Wrench |
| 3. Pylon | 19. Locking Lever Shaft |
| 4. Boom Assembly | 20. Missile Release Explosive Cartridge |
| 5. Mechanical Jettison Device | 21. Guide Rails |
| 6. External Stores Support Assembly | 22. Junction Box Jettison Explosive Cartridge |
| 7. Gunner Sight Assembly | 23. Ejection Plunger |
| 8. Control Stick Assembly | 24. Junction Box Hooks |
| 9. Pilot Sight Assembly | 25. Seven Pin Connector |
| 10. Command Box | 26. Junction Box |
| 11. Manual Emergency Jettison Controls | 27. Locking Lever |
| 12. Selector Box | 28. Missile Body Hole |
| 13. Signal Generator | 29. Quick Disconnect Connector |
| 14. Junction Box Jettison Spring Compression Lever | 30. Hook Adjustment Cam |
| 15. Missile Cable | 31. Locking Hook |
| 16. Knurled Locking Nut | 32. Adjustment Hole |

204071-13-2

Figure 14-5. SS-11 missile installation (Sheet 2 of 2)**Note**

After a flight is completed, the unfired missiles must be removed from the launchers and returned to their original containers. Remove the outboard missiles first and work to the inboard. Two personnel are required to remove the missiles.

Warning

The following precautions should be observed to guard against danger in case of accidental firing.

- (1) Personnel not engaged in removal of the missiles should remain at least 100 meters (approximately 328 feet) to the rear of the missile launchers, and clear of the missile flight path.
- (2) Make sure that the helicopter master battery switch is in the "OFF" position and that external power is disconnected.
- (3) Set the missile-selection dial on the command box in the "OFF" position and make sure that the "FIRE" switch is not pressed down.
- (4) Set the key switch and the 24V switch on the command box in the "OFF" position.
- (5) Check the launchers for damage to the guide rails and for any foreign material on the guide rails that would obstruct freedom of movement of the missile on the guide rails.
- (6) Set the signal generator missile-selector switch to the SS-11 position, and set the missile-selection dial to the "OFF" position.
 - a. Open pylon access cover and disconnect the launcher jettison explosive bolt cable assembly and connect it to the shorting plug. Close access cover.
 - b. Open access covers on the rear of the launcher and raise the junction-box-jettison-spring-compression lever (14), to the vertical position.
 - c. Disconnect the missile cable (15) from the launcher. Loosen the knurled locking nut (16), which secures the quick-disconnect connector (17), and open the clamp.
- (7) Remove the locking wrench (18), from the rear access cover of the launcher. Fit the locking wrench on the locking lever shaft (19). Pull the wrench upward and hold in position.

Note

Two personnel are required to perform the following operations.

Pull out the spring-loaded locking pin and remove the explosive cartridge (20). Slowly and carefully release pressure on the locking wrench (18), and permit the locking lever shaft (19), to return to normal position.

e. Remove locking wrench (18), and store in the rear access cover.

f. Using extreme care slide the missile forward off the launcher guide rails (21), and place it below the launcher. Disconnect the missile cable (15) from the junction box.

Warning

The SS-11 missile weighs 62.83 pounds. DO NOT strike the warhead against the detonator and DO NOT subject the warhead detonator to any jars or sharp blows.

g. Stow the missile cable (15), by connecting it to the launcher. Secure the cable by closing the clamp and tightening the knurled nut (16).

h. Pull out the spring-loaded locking pin and remove the junction-box-jettison explosive cartridge (22).

i. Close and secure the rear access covers.

14-47. Test Procedure — SS-11 Missile. a. Place the missile battery on the connector of the battery tester with the rounded side of the battery facing forward. The voltmeter on the battery tester should indicate between 12 and 15 volts.

b. Press the toggle switch on the battery tester in either direction and hold it down. The voltmeter indication should not vary more than 1.5 volts from the initial indication, and must indicate at least 12 volts.

c. Remove battery from battery tester.

d. Repeat steps (a) through (c) for each battery.

e. With battery installed in missile body check the missile battery circuit by removing the plastic plug, located on the left-hand side of the missile body and placing a screwdriver across the contact points. If the circuit is complete, current will flow through and the jettavators will click once. If there is no click, recheck the batteries as outlined above. Install

the batteries (Refer to paragraph 14-48). Recheck the missile battery circuit, and, if the jettavators fail to operate on rechecking, an open battery circuit exists and the missile MUST NOT be fired.

Warning

The SS-11 missile weighs 62.83 pounds. DO NOT strike the warhead against the detonator and DO NOT subject the warhead detonator to any jars or sharp blows.

14-48. Installation — SS-11 Missile. (See figure 14-5.) Install missiles as follows:

a. (Refer to WARNING Paragraph 14-46.)

b. Make certain that the launcher-jettison-explosive-bolt cables are connected to the shorting plugs.

Warning

The SS-11 missile weighs 62.83 pounds. DO NOT strike the warhead against the detonator and DO NOT subject the warhead detonator to any jars or sharp blows.

c. Remove the top and front covers of the missile container. Remove and discard the protective covering of the missile. Remove the detonator protector plate and the three missile batteries. Remove the protective tape from the batteries and test each battery. (Refer to paragraph 14-47.)

d. Install the missile batteries in the battery receptacles in the missile body. Make certain that the batteries are firmly and fully seated and that the leaf springs fit securely over the batteries.

e. Remove the missile body from the container and place it on the container cover.

f. Install batteries in missile body and check circuitry. (Refer to paragraph 14-47.)

Note

If open circuit exists, missile must not be fired.

g. Remove the warhead from the missile shipping container by carefully pulling it forward and out of the cradle.

h. Assemble the warhead to the missile body and tighten until the warhead fits snug. Seat the warhead firmly by unscrewing it one-half turn and twisting it sharply to the right.

i. Remove the protective cap from the junction box connector.

Note

Install inboard missiles first and work to the outboard. Two personnel are required to install the missiles.

Warning

In order to guard against danger in case of accidental firing, personnel not engaged in installation of missiles should remain at least 100 meters (approximately 328 feet) to the rear of the missile launcher, and clear of the missile flight path.

j. Open the rear access covers on the launcher.

k. Make certain that the junction-box-jettison spring is in the vertical position and that the ejection plunger (23), is fully retracted. Disconnect the missile cable (15), from the launcher.

l. Loosen the knurled locking nut (16), which secures the quick-disconnect connector (17), and open the clamp.

m. Remove the protective cap from the junction box end of the missile cable (15) and route the cable through the hole in the launcher post.

n. Install the junction-box-jettison explosive cartridge (22), in the receptacle on the rear of the launcher.

o. Position the missile below the launcher so that the hooks (24), on the rear of the junction box are pointing upward.

p. Connect the missile cable (15), (previously routed through the hole in the launcher post) to the seven pin connector (25) on the rear of the junction box (26).

q. Position the missile on the guide rails (21), located on the underside of the launcher

and carefully slide the missile toward the rear of the launcher until the junction box hooks (24), are secured by the locking latch.

r. Secure the quick-disconnect connector (17) by closing the previously opened clamp, and tighten the knurled locking nut (16). Connect the missile cable (15) to the launcher.

s. Press the junction-box-jettison-spring-compression lever (14) down to the horizontal position.

t. Open the rear access cover and remove the locking wrench (18). Fit the wrench on the locking lever shaft (19), and pull upward on the wrench until the locking lever (27) engages the hole (28) in the forward end of the missile body.

u. While maintaining the locking lever (27) in the engaged position with the locking wrench (18), install the missile-release explosive cartridge (20). Make certain that the cartridge is properly seated. Slowly and carefully release pressure on the locking wrench (18) and permit the locking lever shaft (19) to return to normal position.

Note

Make certain that the locking lever (27) does not retract when the locking wrench (18) is released.

v. Remove the locking wrench (18) and store inside the rear access cover of the launcher. Close and secure the access cover.

w. Open pylon access cover and make certain that the launcher-jettison-explosive-bolt cable is connected to the shorting plug.

Note

The explosive-bolt cable must not be connected to the explosive bolt circuit until immediately before take-off.

Warning

Temperature limits stenciled on the missile shipping container should not be exceeded.

14-49. Preparation for Storage or Shipment — SS-11 Missile. a. Remove the two access covers on the missile container.

b. Carefully place the missile on the missile body cradle in the container.

c. Remove the warhead from the missile body and place it in the warhead cradle below the missile body.

d. Remove the three missile batteries and store in a dry location.

e. Install the detonator protector plate over the detonator on the missile body.

f. Install and secure the two container access covers.

Warning

Temperature limits stenciled on the missile container should not be exceeded.

14-50. Launcher and Pylon — SS-11 Missile.

(See figure 14-5.) The SS-11 missile launcher consists, basically, of a cast alloy frame which is attached to a pylon by means of a centrally located explosive bolt and a locating dowel. The explosive bolt permits the launcher to be jettisoned. A fifteen pin quick-disconnect receptacle on top of the launcher mates with a plug on the bottom of the pylon to provide electrical connections to the missile. The missile is installed on guide rails (21) on the bottom of the launcher and is locked in place with a locking lever (27). A locking wrench (18), stored inside the access covers on the rear of the launcher, is used to pull the spring-loaded locking lever down into the locked position, where it is held in place by an explosive cartridge. This cartridge functions on the fire command, allowing the spring-loaded locking lever (27) to be retracted, and the missile firing sequence to begin. The missile is electrically connected to the launcher through a junction box (26) located on the rear of the missile. The junction box is equipped with a connector which mates with another connector on the launcher. On the front of the junction box (26) are two terminals for connecting the guidance wires of the missile, and a connector for the missile firing circuits. At termination of a missile flight, the junction box is jettisoned by a spring-loaded plunger (23), which is released by activation of an explosive cartridge (22). Launcher and junction box jettisoning are controlled by the gunner from the command box.

Double access covers on the rear of the launcher provide access to the junction box jettisoning mechanism, the locking wrench (18), and the launcher cabling to the missile firing and control circuits. The pylon secures the launcher to the helicopter boom assembly, and is attached to the boom assembly by two "U" bolts. Electrical connections from the helicopter to the missile are made by a wiring harness inside the boom assembly. This harness has a branch going into each pylon. Inside the pylon the branch wiring harness is attached to two connectors. One of these connections is for the launcher-jettison explosive bolt, and the other is for the launcher.

14-51. Removal — SS-11 Missile Launcher and Pylon. (See figure 14-5.) a. Remove SS-11 missile. (Refer to paragraph 14-46.)

Note

Two personnel are required to perform the following operation.

b. Remove nuts, washers and "U" bolts attaching launcher and pylon combination to the boom assembly. Carefully lower combination from boom assembly in such a manner as to avoid damaging the electrical wiring.

Note

The electrical plug on the end of the wiring harness inside the pylon is soldered on and will not permit complete removal of the pylon from the boom assembly.

Note

Total weight of launcher and pylon combination is approximately 30.0 pounds.

c. Support the launcher and pylon combination in such a manner that electrical wiring will not be damaged and remove the explosive bolt and locating dowel which attaches the launcher to the pylon.

d. Remove the launcher and adequately support the pylon.

e. Remove the missile release explosive cartridge (20), from the forward end of the launcher. Open the access covers at the aft end

of the launcher and remove the junction box jettison explosive cartridge (22).

14-52. Cleaning — SS-11 Missile Launcher and Pylon. a. Clean all metal parts of the launcher with alcohol, (item 313, table 1-1).

b. Clean connector of explosive bolt with alcohol, (item 313, table 1-1).

14-53. Inspection — SS-11 Missile Launcher and Pylon. a. Check the cable and shielding of the previously removed explosive bolt for damage and serviceability.

b. Check all moving parts for excessive wear or damage.

14-54. Lubrication — SS-11 Missile Launcher and Pylon. Under normal conditions the following points are to be lubricated every six months, with AIR 4215 grease or GL-grease, aircraft and instrument.

a. Pivot of missile locking lever (27).

b. Locking lever shaft (19)

c. Guide rails (21).

d. Jettison device inside rear access covers (14, 16 and 23).

Note

Abnormal conditions may necessitate more frequent lubrication.

14-55. Repair or Replacement — SS-11 Missile Launcher and Pylon. a. Replace explosive bolt cable if damaged or unserviceable.

b. Replace all moving parts that are excessively worn.

14-56. Installation — S-11 Missile Launcher and Pylon. (See figure 14-5.) a. Install the junction box jettison explosive cartridge (22), inside the access covers at the aft end of the launcher and the missile release explosive cartridge (20), in the forward end of the launcher.

b. Raise the pylon from support and position the top of the launcher against the bottom of the pylon. Connect electrical wiring and install attaching explosive bolt and locating dowel.

c. Carefully raise the launcher and pylon combination and position against the boom assembly. Install attaching "U" bolts, washers and nuts.

d. Install SS-11 missile. (Refer to paragraph 14-48.)

14-57. Boom Assembly — SS-11 Missile. (See figure 14-5.) The two boom assemblies for the SS-11 missile installation are mounted externally (one on each side of the helicopter) at a 90 degree angle to the center line of the helicopter. The inboard ends of the boom assemblies are mounted in a mechanical jettison device (5), which makes it possible to jettison the boom assemblies in case of an emergency. The boom assemblies are equipped for transporting and firing SS-11 missiles, and contain the necessary wiring for the explosive bolt circuits, explosive cartridge circuits, and the firing and control circuits of the missile. The electrical wiring in the boom assemblies is routed through a quick disconnect plug on the mechanical jettison device. Three pylons are mounted on each boom assembly, with a launcher and missile mounted below each pylon.

14-58. Removal — Boom Assembly. (See figure 14-5.) a. Disconnect the quick disconnect connector (29) on each boom assembly.

b. Remove SS-11 missiles. (Refer to paragraph 14-46.

Note

Both boom assemblies will be removed simultaneously. Both boom assemblies must be adequately supported, either by mechanical means or by sufficient personnel, before proceeding with step c. Weight of each boom assembly, including pylons and launchers, is approximately 56.85 pounds.

c. Pull the emergency mechanical jettison lever to the full aft position and both boom assemblies will be released simultaneously.

Note

The emergency mechanical jettison lever is located on the side of the center console where it is readily available to the pilot.

d. Remove launchers and pylons. (Refer to paragraph 14-51.)

14-59. Cleaning — Boom Assembly. (See figure 14-5.) Clean SS-11 missile installation boom assembly with alcohol, (item 313, table 1-1).

14-60. Inspection — Boom Assembly. See figure 14-5.) a. Check wiring harness for damage, excessive wear and serviceability.

b. Check grommets for damage or deterioration.

14-61. Installation — Boom Assembly. (See figure 14-5.) Install SS-11 missile system installation boom assembly as follows:

Note

Both boom assemblies must be installed simultaneously.

a. Place the emergency mechanical jettison lever (located on the right-hand side of the center console) in the full aft position.

b. Loosen the lock-nuts on the hook adjustment cam (30), inside the mechanical jettison device.

c. Insert the adapter end of the boom assemblies into the mechanical jettison device in such a manner that the launchers, when installed, will be facing forward.

Note

Force the boom assemblies inboard until the locking hook (31), inside the mechanical jettison device drops.

d. Push the emergency mechanical jettison lever full forward to lock the boom assemblies in place.

e. If end play or looseness is evident remove the cover over the adjustment hole (32), in the side of the mechanical jettison device and insert a screwdriver in the adjustment hole. Turn the hook adjustment cam (30), counterclockwise until both boom assemblies fit snug.

Warning

Do not overtighten the hook adjustment cam. If the cam is too tight the

hook may not release when the emergency mechanical jettison lever is pulled.

f. After the boom assemblies are installed and adjusted, connect the boom assembly wire harnesses at the quick disconnect connectors (29).

g. Install the launchers and pylons. (Refer to paragraph 14-56.)

h. Install SS-11 missiles. (Refer to paragraph 14-48.)

14-62. Gunner Sight and Control Stick Assemblies. (See figure 14-6.) The gunner sight for the SS-11 missile installation is used in conjunction with the pilot sight to track the SS-11 missile during flight. It consists, basically, of two telescopes which are gimbal mounted on a pedestal. The pedestal is attached to the copilot's seat. Shock mounts, attached to the gimbals, reduce to an acceptable level the harmful effects of vibration on optical performance. A control knob, connected to the diaphragm of the shock mounts, adjusts the excursion limits of the shock mount. To insure that the gunner does not come in contact with the gimbals, and destroy the vibration isolation characteristics of the system, a headrest is rigidly mounted on the outer frame. The headrest may be locked in any one of three positions, on an adjustable bar, by lifting the spring-loaded arm and sliding the headrest to the desired position. A very large field of vision, with medium magnification, provides excellent spotting of moving objects. A pip pin enables the gunner to lock the gimbals in position when the sight is not in use. The control stick is mounted in a vertical position and is attached to the forward side of the gunner sight pedestal just below, and forward of, the two telescopes. This control stick when actuated by the gunner, originates the commands transmitted to the missile by the signal generator. The control stick is mechanically connected to sliding contacts on two variable resistors. These sliding contacts determine the polarity and amplitude of the output signal from the signal generator.

14-63. Removal — Gunner Sight and Control Stick Assemblies. a. Disconnect electrical wiring on the underside of the gunner's seat.

b. Remove the vertical adjustment quick release pin (1) which attaches the pedestal to the

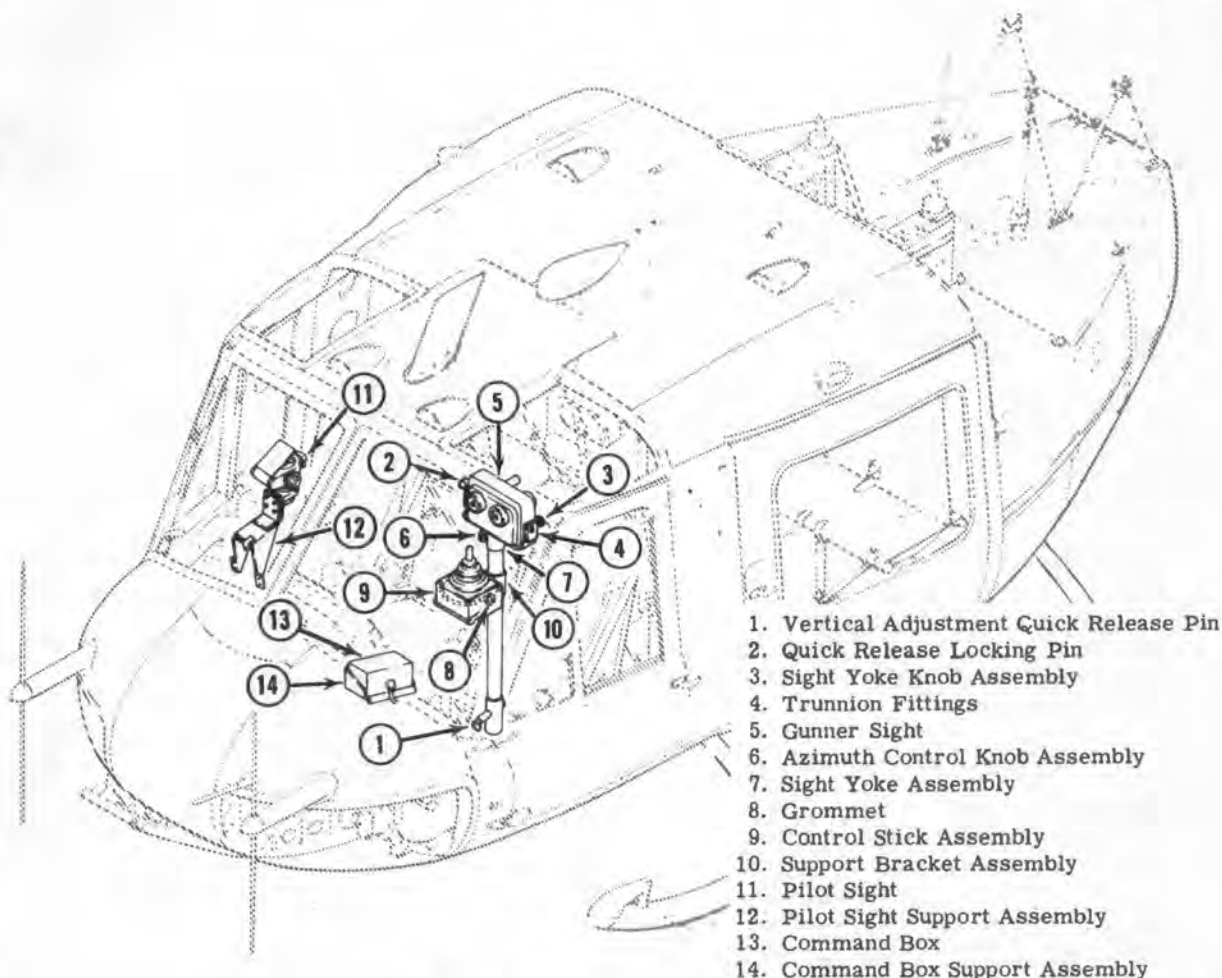


Figure 14-6. Gunner sight and control stick, pilot sight

204071-7

front of the gunner's seat, and remove pedestal, sight and control stick from the helicopter as a unit.

c. Remove gunner sight quick release locking pin (2) and sight yoke knob assembly (3). Cut safety wire on screws attaching trunnion fittings (4) to yoke (7). Remove screws and washers attaching fittings to yoke, and remove fittings from yoke.

d. Support the gunner sight (5) and remove the azimuth control knob assembly (6) which attaches the sight to the pedestal support. Remove the gunner sight and the sight yoke assembly (7).

Caution

The gunner sight is a delicate optical instrument. Handle with care.

e. Remove grommet (8) from the pedestal support tube, and withdraw the electrical wiring from the support tube.

f. Remove four nuts, washers and screws which attach the control stick assembly (9) to the support bracket assembly (10), and remove the control stick.

g. Remove two nuts, washers and bolts which attach the control stick support bracket assembly (10) to the pedestal support tube, and remove the bracket assembly from the tube.

14-64. Inspection — Gunner Sight and Control Stick Assemblies. (See figure 14-6.) a. Check grommet for damage or deterioration.

b. Check the sight mount decal for legibility and damage.

14-65. Repair and Replacement — Gunner Sight and Control Stick Assemblies. (See figure 14-6.)
a. Replace grommet if damaged or deteriorated.

b. Replace sight mount decal if damaged or illegible.

14-66. Installation — Gunner Sight and Control Stick Assemblies. (See figure 14-6.) a. Position the control stick support bracket assembly (10) on the pedestal support tube and install attaching bolts, washers and nuts.

b. Position the control stick assembly (9) on the support bracket assembly (10), and install attaching screws, washers and nuts.

c. Thread control stick electrical wiring into pedestal support tube and install grommet (8).

d. Position sight yoke assembly (7) on pedestal support tube. Position gunner sight (5) in yoke assembly, and install azimuth control knob assembly (6).

e. Position trunnion fittings (4) and install attaching washers and screws. Safety wire screws. Install sight yoke knob assembly (3) and insert quick release locking pin (2).

f. Insert the lower end of the pedestal support tube in the hole in the gunner's seat, making sure that control stick is toward the front of the helicopter.

g. Adjust the pedestal to the desired height and insert the vertical adjustment quick release pin (1).

Note

The control stick support bracket assembly (10) may also be vertically adjusted. Refer to paragraph 14-67 if necessary to adjust the control stick and bracket assembly.

h. Connect electrical wiring on the underside of the gunner's seat.

14-67. Adjustment — Control Stick Support Bracket. (See figure 14-6.) a. Remove two nuts, washers and bolts which attach the control stick support bracket assembly (10) to the pedestal support tube and remove the bracket assembly from the tube.

b. Position the control stick support bracket assembly (10) on the pedestal support tube and secure with bolts, washers and nuts.

14-68. Pilot Sight Assembly. (See figure 14-6.) The SS-11 missile installation sight is used by the pilot 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 with a Mark 4 MOD O reflector assembly. A small control panel on the center console contains a FIL 1 — FIL 2 switch and an intensity control for illumination of the reticle.

14-69. Removal — Pilot Sight Assembly. (See figure 14-6.) a. Remove four nuts and bolts attaching pilot sight (11) to support assembly (12), and remove pilot sight.

Caution

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

b. Remove five nuts, washers and screws attaching pilot sight support assembly (12) to right-hand side of instrument panel, and remove support assembly.

14-70. Installation — Pilot Sight Assembly. (See figure 14-6.) a. Position pilot sight support assembly (12) on instrument panel, and install attaching screws, washers and nuts.

b. Position pilot sight (11) against support assembly (12), and install attaching bolts and nuts.

14-71. Command Box. (See figure 14-6.) The command box for the SS-11 missile installation is located on a support assembly which is attached to the lower, left-hand, forward corner of the center console. The command box contains the controls necessary for operation of the SS-11 missile system. The controls on the command box enable the gunner to perform the following functions:

a. Energize the signal generator.

b. Select and fire a missile.

c. Jettison the junction box of a fired missile.

- d. Jettison individual missile launchers.
- e. Simultaneously jettison all missile launchers.
- f. Adjust the supply voltage to the signal generator.

14-72. Removal — Command Box. (See figure 14-6.) a. Disconnect electrical wiring from bottom of command box.

b. Remove two screws attaching command box (13) to support assembly (14). Carefully lift command box from support assembly.

c. Remove 36 pin electrical connector cover from side of command box and install over 36 pin electrical connector on bottom of command box.

d. Remove four screws attaching command box support assembly (14) and remove support assembly.

14-73. Installation — Command Box. (See figure 14-6.) a. Position command box support assembly (14) on lower, left-hand, forward corner of center console and install attaching screws.

b. Remove 36 pin electrical connector cover and store by installing on side of command box.

c. Position command box (13) on support assembly (14) and install two attaching screws.

d. Connect electrical wiring to bottom of command box.

14-74. Selector Box. The selector box for the SS-11 missile installation automatically makes electrical connections to the missile selected by the missile-selection dial on the command box. The selector box has seven external connectors. The twelve pin connector marked GUIDANCE is for the signal-generator cable. The remaining six connectors each have seven pins, and each connector is marked with the number of the missile to which the cable is connected. The selector box is located in the helicopter baggage compartment.

14-75. Removal — Selector Box. a. Make sure that the helicopter master battery switch is in the "OFF" position and that external power is disconnected.

b. Disconnect all electrical wiring from the selector box.

c. Cut safety wire and remove two wing-nuts holding tie-down support assembly on top of selector box and remove support assembly.

d. Remove selector box from helicopter.

14-76. Installation — Selector Box. a. Position selector box on mounting rack with the twelve pin connector pointing away from the generator rack.

b. Connect electrical wiring to selector box connectors.

Note

Wiring harness connectors are marked to indicate proper connection with selector box connectors.

c. Position tie-down support assembly on top of selector box and tie-down rod assemblies and install wing-nuts. Safetywire wing-nuts.

14-77. Signal Generator. The signal generator for the SS-11 missile installation receives command voltages from the control stick assembly and converts them to command signals which are transmitted through the selector box and guidance wires to the appropriate missile. The command voltages produced are proportional to the position of the control stick, and determine the type of command signals generated by the signal generator. All controls and indicators are located on the front panel, however, the functions of the MISSILE SELECTION dial, the FIRE switch and the ON-OFF switch are transferred to the command box. The signal generator is located in the helicopter baggage compartment.

14-78. Removal — Signal Generator. a. Make sure that the helicopter master battery switch is in the "OFF" position and that external power is disconnected.

b. Disconnect all electrical wiring from the signal generator.

c. Cut safety wire and remove two wing-nuts holding tie-down support assembly on top of signal generator and remove support assembly.

- d. Remove signal generator from helicopter.

14-79. Installation — Signal Generator. a. Position signal generator on mounting rack.

- b. Connect electrical wiring to signal generator connectors.

Note

Wiring harness connectors are marked to indicate proper connection with signal generator connectors.

- c. Position tie-down support assembly on top of signal generator and tie-down rod assemblies and install wing-nuts. Safety wire wing-nuts.

14-80. XM 22 Missile Installation. (See figure 14-7.) Model UH-1B helicopters, Serial No. 62-1997 and subsequent, may be equipped with an XM22 missile installation. This installation is very comparable to the SS-11 missile installation. In the XM22 installation the gunner and pilot (10) sights are attached to the cabin roof, and the remote control stick (8) is mounted on a support assembly (9). The air selector box (12) and remote control box (13) control the operation of the system as signaled by the gunner through the remote control stick.

14-81. XM22 Missile. The XM22 missile installation utilizes the SS-11 missile. (Refer to paragraph 14-45.)

14-82. Removal — XM22 Missile. (Refer to paragraph 14-46.)

14-83. Test Procedure — XM22 Missile. (Refer to paragraph 14-47.)

14-84. Installation — XM22 Missile. (Refer to paragraph 14-48.)

14-85. Preparation for Storage or Shipment — XM22 Missile. (Refer to paragraph 14-49.)

14-86. Launcher and Pylon — XM22 Missile Installation. (See figure 14-7.) (Refer to paragraph 14-50.)

14-87. Removal — XM22 Missile Installation Launcher and Pylon. (Refer to paragraph 14-51.)

14-88. Cleaning — XM22 Missile Installation Launcher and Pylon. (Refer to paragraph 14-52.)

14-89. Inspection — XM22 Missile Installation Launcher and Pylon. (Refer to paragraph 14-53.)

14-90. Lubrication — XM22 Missile Installation Launcher and Pylon. (Refer to paragraph 14-54.)

14-91. Repair or Replacement — Launcher and Pylon XM22 Missile Installation. (Refer to paragraph 14-55.)

14-92. Installation — XM22 Missile Installation Launcher and Pylon. (See figure 14-7.) (Refer to paragraph 14-56.)

14-93. Boom Assembly — XM22 Missile Installation. (Refer to paragraph 14-57.)

14-94. Removal — XM22 Missile Installation Boom Assembly. (Refer to paragraph 14-58.)

14-95. Cleaning — XM22 Missile Installation Boom Assembly. (Refer to paragraph 14-59.)

14-96. Inspection — XM22 Missile Installation Boom Assembly. (Refer to paragraph 14-60.)

14-97. Installation — XM22 Missile Installation Boom Assembly. (Refer to paragraph 14-61.)

14-98. Gunner Sight and Control Stick Assemblies. (See figure 14-7.) The XM22 missile installation utilizes a gunner sight mounted to a bracket which is attached to the cabin roof. This sight is used in conjunction with the pilot sight to track the missile during flight. The control stick assembly in this configuration incorporates an adjustable arm rest and is mounted on a panel assembly which is attached to the cabin floor.

14-99. Removal—Gunner Sight and Control Stick Assemblies. (See figure 14-7.) a. Support the gunner sight (7) and detach from bracket in cabin roof. Remove sight.

Note

The gunner sight is a delicate optical instrument. Handle with care.

- b. Disconnect electrical wiring from bottom of control stick (8).

- c. Loosen bolt, washer, nut combination holding control stick in guide and remove control stick.

1. Missile
2. Launcher
3. Pylon
4. Boom Assembly
5. Mechanical Jettison Device
6. External Stores Support
7. XM55 Gunner Sight
8. Remote Control Stick
9. Remote Control Stick Support
10. Mark VIII Pilot Sight
11. Manual Emergency Jettison Controls
12. Air Selector Box
13. T10K3 Remote Control Box

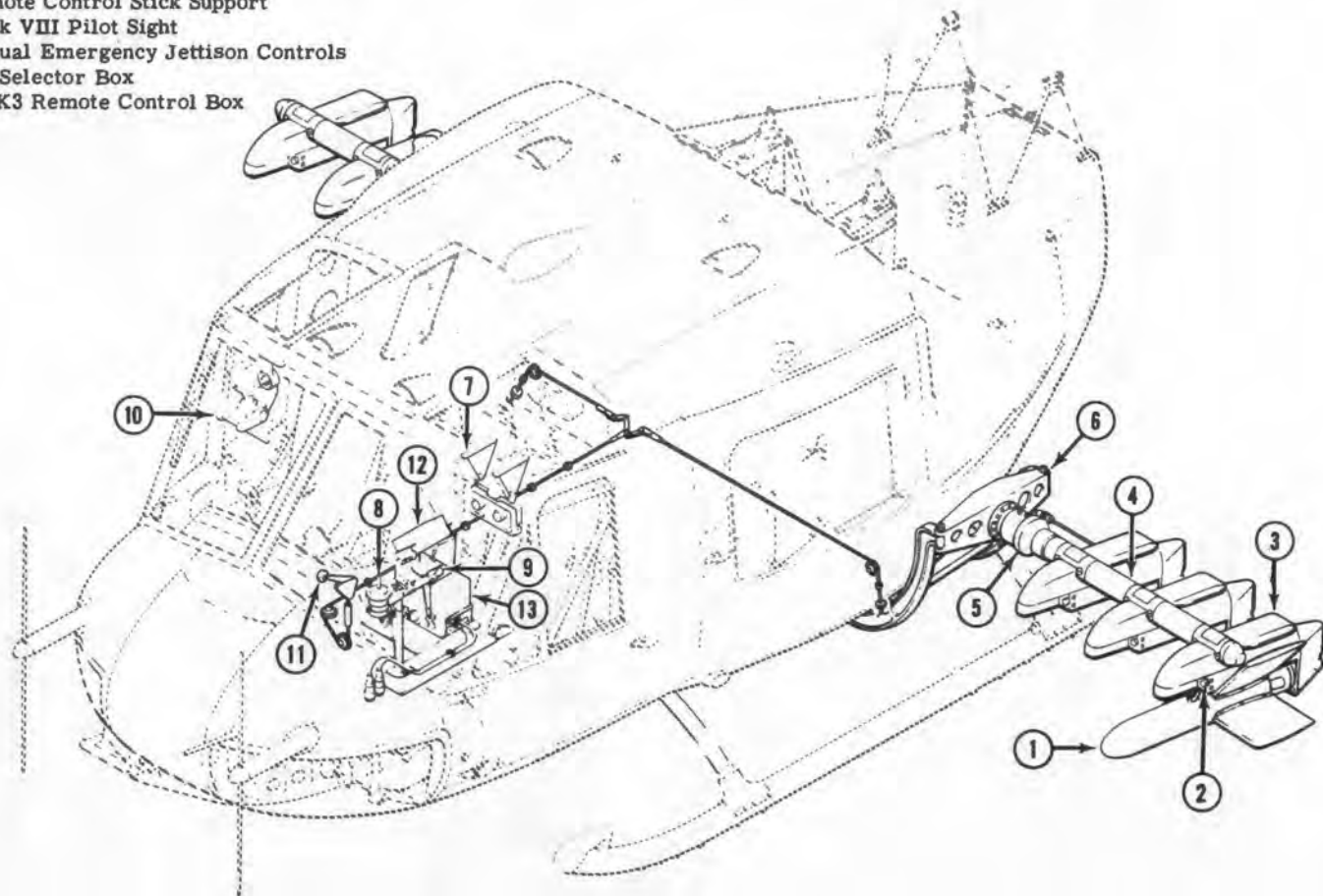


Figure 14-7. XM22 missile installation and command box assemblies

d. Remove nuts, washers, screws and clamps attaching cable assemblies to control stick stand and panel assembly.

Note

Remove interfering seat belt fitting before attempting to remove panel assembly.

e. Remove screws and washers attaching panel assembly to cabin floor. Slide panel back until it clears aft end of instrument pedestal and remove panel assembly with control stick stand and support assembly still in place.

14-100. Installation — Gunner Sight and Control Stick Assemblies. (See figure 14-7.) Install gunner sight and control stick assemblies as follows:

Note

Remove interfering seat belt fitting before attempting to install panel assembly.

a. Position panel assembly with control stick stand and support assembly in place, on cabin floor and install attaching washers and screws.

b. Position cable assemblies to panel assembly and control stick stand and install attaching clamps, screws, washers and nuts.

c. Place control stick in guide and tighten bolt, washer, nut combination to hold control stick securely in guide.

d. Connect electrical wiring to bottom of control stick.

e. Position gunner sight (7) to bracket in cabin roof and attach to bracket.

14-101. Pilot Sight Assembly — Mark VIII. (See figure 14-7.) The pilot sight for the XM22 missile installation is used by the pilot as an aid in maintaining alignment of the helicopter with the target during firing of a missile. It is mounted to the cabin roof.

14-102. Removal — Mark VIII Pilot Sight Assembly. Remove hardware attaching pilot sight to cabin roof and remove sight.

Caution

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

14-103. Installation — Mark VIII Pilot Sight Assembly. Position pilot sight to cabin roof structure and install attaching hardware.

14-104. Air Selector and Remote Control Boxes. (See figure 14-7.) The air selector and remote control boxes for the XM22 missile installation are located in the cabin area just aft of the instrument pedestal between the gunner and pilot. These units select and control the firing of missile(s) as required by signals from the remote control stick. Switches on the air selector box enable the gunner to jettison individual missiles and launchers; simultaneously jettison all missiles and launchers or jettison the junction box and missile guidance wires after a missile has been fired.

14-105. Removal — Air Selector and Remote Control Boxes. (See figure 14-7.) a. Make sure that the helicopter master battery switch is in the "OFF" position and that all external power is disconnected.

b. Disconnect electrical wiring from air selector and remote control boxes.

c. Remove nuts, washers and screws attaching air selector box to mount and remove selector box.

d. Remove wing nuts and strap assembly holding remote control box in mount and remove control box.

14-106. Installation — Air Selector and Remote Control Boxes. (See figure 14-7.) a. Position remote control box in mount and install attaching strap assembly and wing nuts.

b. Position air selector box in mount and install attaching screws, washers, and nuts.

c. Connect electrical wiring to air selector and remote control boxes.

CHAPTER 15

EXTERNAL STORES — NONARMAMENT

Section I — Scope

15-1. Scope. The purpose of this chapter is to provide all the essential information for maintenance personnel to accomplish organizational maintenance on the various nonarmament external stores. Maintenance information includes a detail description and chronological instructions as to methods and procedures. It also includes special tools and equipment re-

quired for accomplishment of those maintenance phases as are applicable in accordance with the Maintenance Allocation chart. Special tools required for performance of organizational maintenance will be found in TM 55-1520-211-20P, Organizational Maintenance Repair Parts and Special Tools List Manual.

Section II — Maintenance Instructions

15-2. Maintenance Instructions. This section covers maintenance of the various nonarmament external stores in accordance with the functions prescribed in the Maintenance Allocation Chart.

15-3. 60.0 U. S. Gallon External Auxiliary Fuel System (UH-1B). Two 60.0 U. S. gallon capacity external auxiliary fuel tanks (1, figure 15-1) may be installed on UH-1B helicopters, Serial No. 62-1872 and subsequent. Each of these tanks is attached to a pylon assembly (2), from which they may be simultaneously released by either manual (3) or electrical (4) 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 right-hand side of the instrument pedestal. Electrical jettisoning is accomplished by placing the "JETTISON-SAFE" switch on the instrument pedestal control panel (5) 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 (2) and the system is interconnected so that if one pump fails the other will still supply the required pressure. The pylon assemblies (2) are attached to pylon supports (6), which, in turn,

are attached to external stores support assemblies (7). The external stores support assemblies are attached to "hard-points" on the helicopter structure.

Caution

When the 60.0 U. S. gallon external auxiliary fuel system is installed on UH-1B helicopters, Serial No. 62-1872 through 62-1996, only, the fuel transfer pump relay, located in the aft electrical compartment, must be rewired as shown on figure 15-2. Upon removal of this auxiliary fuel system the wiring of the fuel transfer pump must be returned to the original configuration.

15-4. 60.0 U. S. Gallon External Auxiliary Fuel Tank (UH-1B). The fuel tank 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.

15-5. Removal — 60.0 U. S. Gallon External Auxiliary Fuel Tank (UH-1B). a. Drain fuel from auxiliary fuel tanks by pumping into main fuel system and defueling main tanks through the defueling valve.

b. Open sump drain ports in bottom of tanks to discharge trapped fuel.

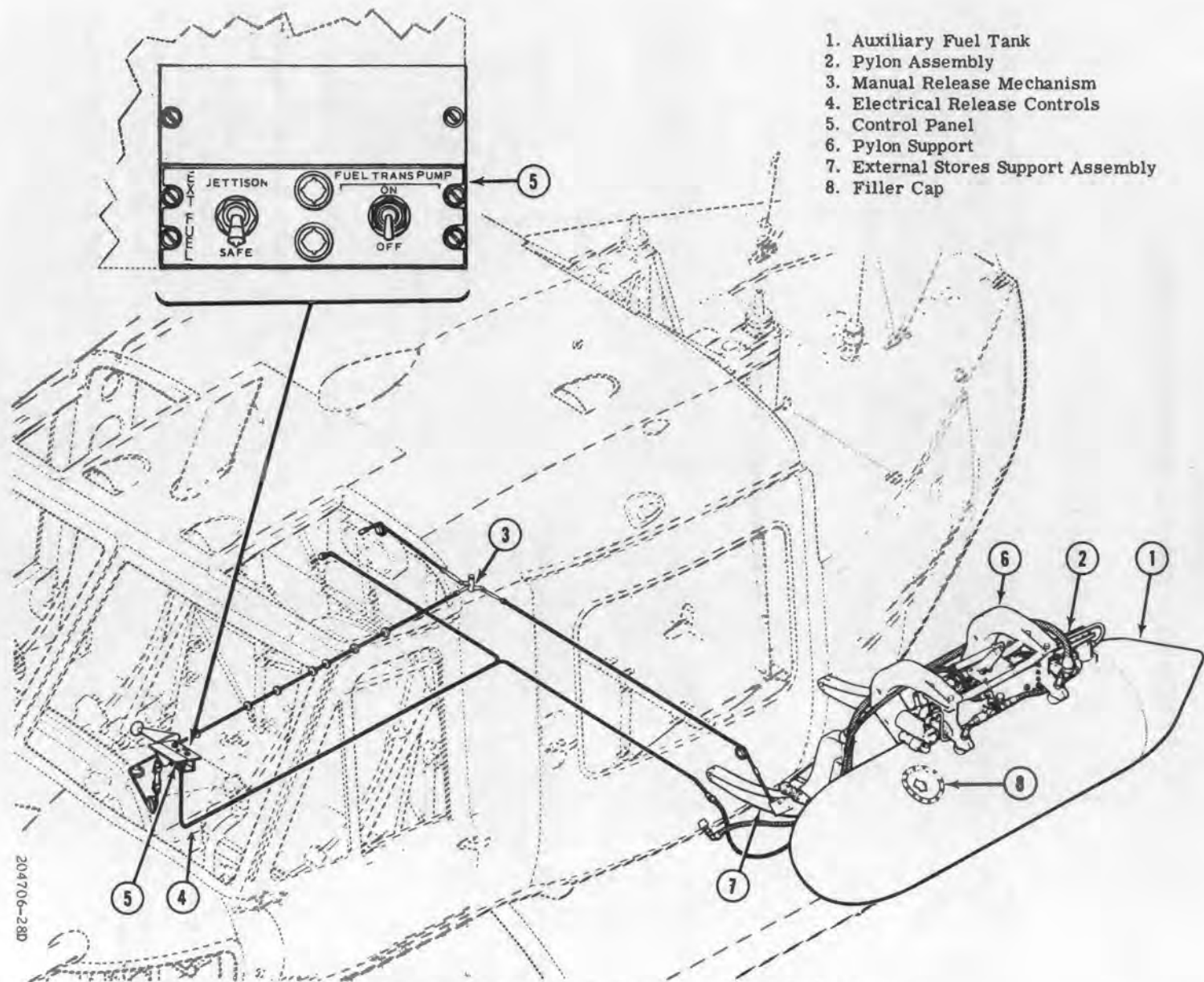


Figure 15-1. 60.0 U.S. gallon auxiliary fuel system

204706-280

c. 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 to suitably support the fuel tank at time of release.

B 15-6. Installation — 60.0 U. S. Gallon External Auxiliary Fuel Tank (UH-1B). The following procedure will be utilized for installation of fuel tanks.

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 15-3) 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 $\frac{3}{4}$ inch to avoid contact with the tank during arming.

Note

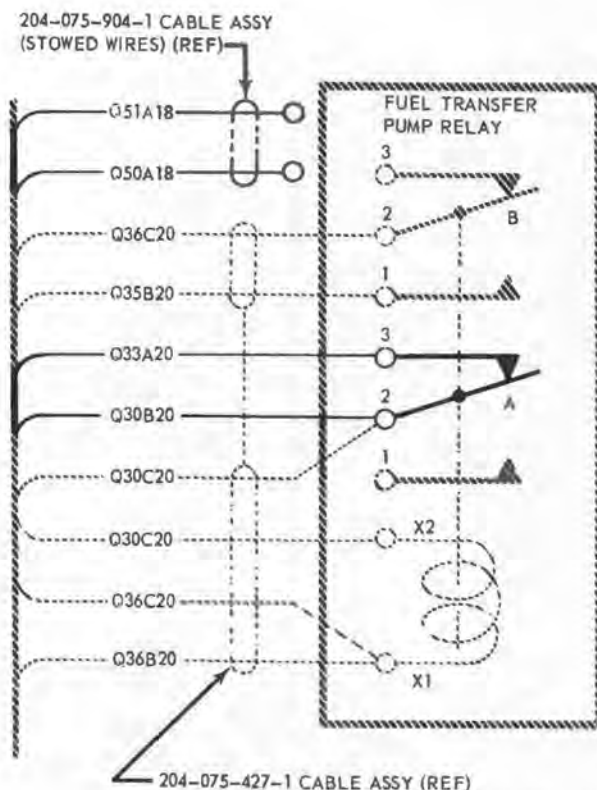
The following step requires a minimum of two personnel.

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.

REMOVE, INSULATE, AND STOW WIRE NO. Q30B20 FROM TERMINAL A2 AND WIRE NO. Q33A20 FROM TERMINAL A3

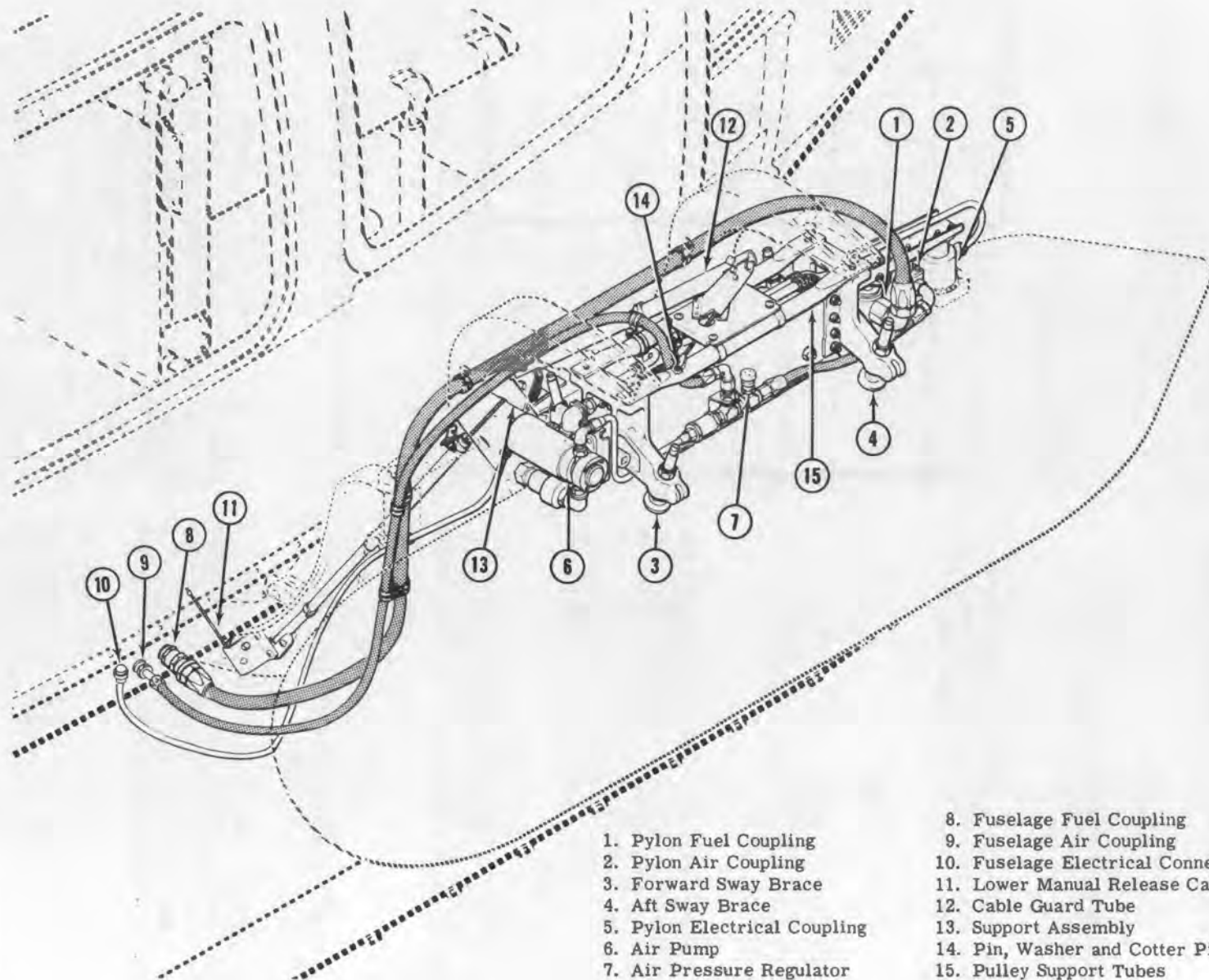
CONNECT STOWED WIRES NO. Q50A18 TO TERMINAL A2 AND WIRE NO. Q51A18 TO TERMINAL A3



204075-62

Figure 15-2. Fuel transfer pump relay wiring

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.



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

Figure 15-3. External components of 60.0 U.S. gallon auxiliary fuel system

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.

Caution

The external auxiliary fuel system is not electrically connected to the MASTER CAUTION system; therefore, the only indication will be derived by monitoring the main fuel quantity indicator.

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.

15-7. External Auxiliary Fuel Pylon (UH-1B). The pylon assemblies are attached to the pylon supports (6, figure 15-1) on both sides of the helicopter, and contain the pylon hooks to which the fuel tanks are attached. An air pump (6, figure 15-3) 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.

15-8. Removal — External Auxiliary Fuel Pylon (UH-1B). a. Remove fuel tank. (Refer to paragraph 15-5.)

b. Disconnect fuel (8, figure 15-3) 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 (6, figure 15-1). Remove pylon assembly. Remove pulley support tubes (15, figure 15-3) with support, cable guard tube (12) and manual release cables still attached.

15-9. Installation — External Auxiliary Fuel Pylon (UH-1B). a. Position the pulley support tubes (15, figure 15-3) (with support, cable guard tube (12) and manual release cables attached) and pylon assembly to the pylon support (6, figure 15-1) and install attaching bolts, washers and nuts.

Note

Air pump (6, figure 15-3) 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 (11) 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.

15-10. External Auxiliary Fuel Pylon Support (UH-1B). The pylon support is a heavy duty aluminum alloy casting. It is attached to the external stores support assembly (7, figure 15-1) and supports the pylon and fuel tank.

15-11. Removal — External Auxiliary Fuel Pylon Support (UH-1B). Adequately support the pylon support and remove nuts, washers and bolts attaching the pylon support to the external stores support assembly. Remove pylon support from the helicopter.

15-12. Inspection — External Auxiliary Fuel Pylon Support (UH-1B). The pylon support may be inspected by Fluorescent Penetrant method, Specification MIL-I-6866.

15-13. Repair or Replacement — External Auxiliary Fuel Pylon Support (UH-1B). Replace support if inspection requirements are not met. (Refer to paragraph 15-12.)

15-14. Installation — External Auxiliary Fuel Pylon Support (UH-1B). 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.

15-15. External Auxiliary Fuel Control Panel (UH-1B). The control panel (5, 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.

15-16. Removal — External Auxiliary Fuel Control Panel (UH-1B). 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.

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

15-17. Installation — External Auxiliary Fuel Control Panel (UH-1B). 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.

15-18. Mechanical Jettison Device. A mechanical jettison device (see figure 15-4) is attached to the center of each external stores support assembly crossbeam. These devices retain the inboard end of the boom assemblies used in conjunction with the SS-11 and XM-22 missile installations. Each mechanical jettison device is equipped with a mechanical release assembly which makes it possible to jettison the boom assemblies in case of emergency. The mechanical release assembly, which is contained in the mechanical jettison device adapter, is actuated by the mechanical jettison lever beside the pilot's seat.

15-19. Removal — Mechanical Jettison Device. a. Remove cotter pin, washer and flat head pin attaching outboard manual release cable to mechanical release assembly bellcrank (13, figure 15-4).

b. Disconnect electrical wiring from mechanical jettison device, cut safety wire and remove

1. Electrical Plug Bracket
2. Mechanical Jettison Device Adapter
3. Aft Electrical Plug Bracket Bolts
4. Forward Electrical Plug Bracket Bolts
5. Plug Support Bolts
6. Plug Support
7. Upper Forward and Lower Aft Bolts
8. Mechanical Release Assembly Housing
9. Upper Aft and Lower Forward Bolts
10. Mechanical Release Assembly Shaft
11. Mechanical Release Assembly Hook
12. Mechanical Release Ejection Spring
13. Bellcrank
14. Sway Brace Assemblies
15. Support Assembly Cross Beam
16. Support Assembly Forward Beam
17. Support Assembly Aft Beam
- *18. Clevis
- *19. Lock-nut
- *20. Support Tube
- *21. Tripod Fitting
- *22. Bolt
- *23. Pad

*On UH-1B 64-14101 and subsequent only.

*Method of attachment does not apply to XM-3 Rocket Installation.
(Refer to figure 14-4.)

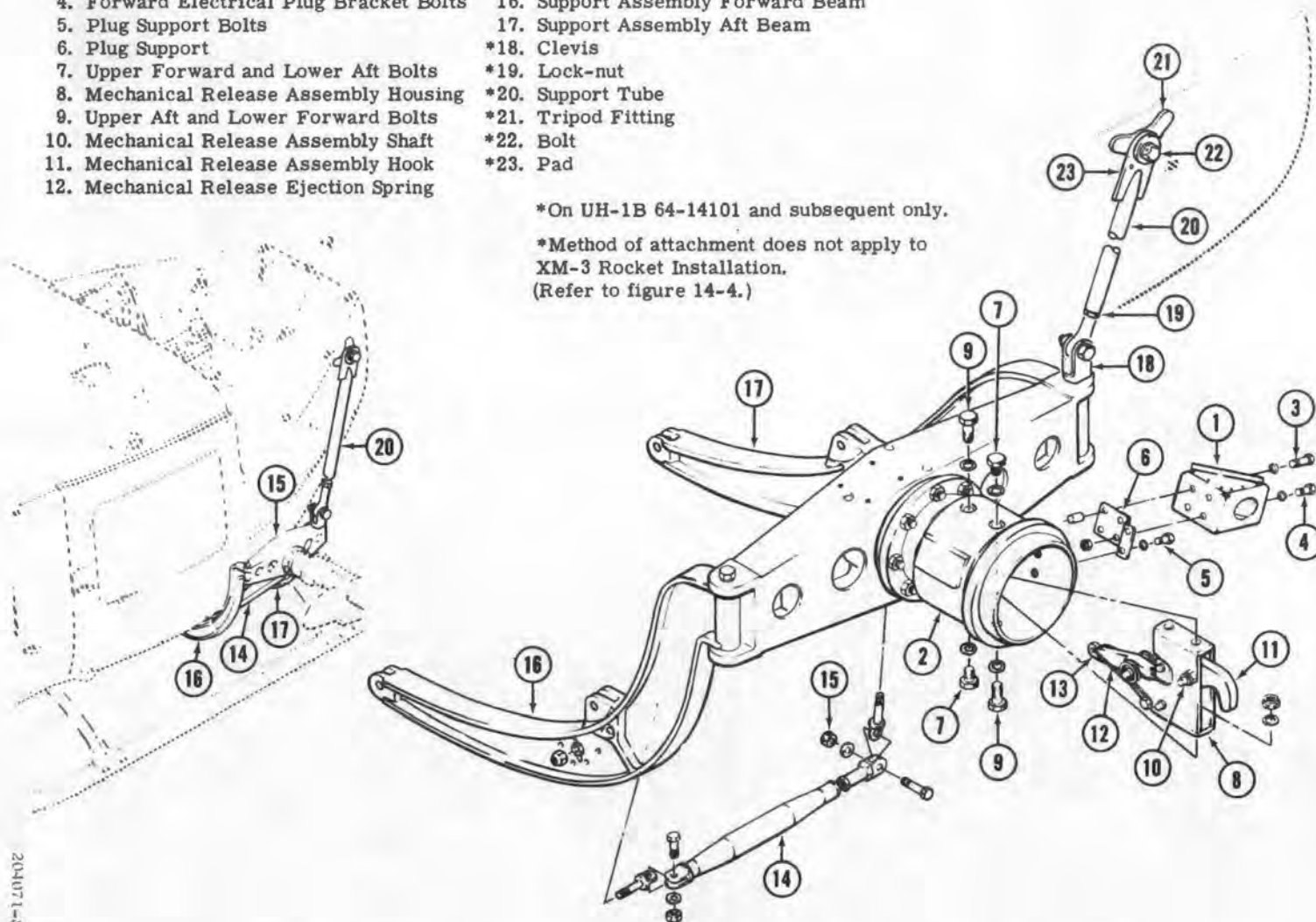


Figure 15-4. Mechanical jettison device and external stores support assembly

screws, washers and nuts attaching cable connector to electrical plug bracket (1) on mechanical jettison device adapter (2). Remove cable connector from bracket.

c. Remove eight nuts, washers and bolts attaching mechanical jettison device to external stores support assembly cross beam (15) and remove mechanical jettison device from support assembly.

d. Cut safety wire and remove two aft bolts (3), washers and spacers attaching electrical plug bracket (1) to plug support (6) and mechanical jettison device adapter (2). Remove two forward bolts (4), washers and nuts attaching electrical plug bracket to plug support and remove electrical plug bracket (1) from support and adapter. Cut safety wire and remove two bolts (5) and washers attaching plug support (6) to mechanical jettison device adapter (2). Remove plug support from adapter.

e. Cut safety wire on top and bottom of mechanical jettison device and remove upper forward and lower aft bolts (7) and washers attaching jettison device adapter (2) to mechanical release assembly housing (8). Remove upper aft and lower forward bolts (9), washers and nuts and remove mechanical release assembly from mechanical jettison device adapter (2).

f. Remove nuts and washers holding mechanical release assembly shaft (10) in mechanical release assembly housing and remove shaft. Remove mechanical release assembly hook (11) and examine bearing for continued serviceability. If bearing is considered unsuitable for continued use, replace hook assembly.

g. Remove rings and pin which position mechanical release ejection spring (12) in housing (8) and on bellcrank (13). Remove nut, washer and bolt which attach spring to housing and remove spring.

h. Remove rings and pin attaching bellcrank (13) to mechanical release assembly housing (8) and remove bellcrank.

i. Remove dowel pin attaching bellcrank arm assembly and remove arm assembly. Examine arm assembly for continued serviceability. If considered unsuitable for continued use, remove rings and pin which hold bearing in arm and replace bearing.

15-20. Installation — Mechanical Jettison Device.

a. Reassemble bellcrank arm assembly to bellcrank (13, figure 15-4) by installing dowel pin.

b. Position mechanical release ejection spring (12) on bellcrank (13). Carefully insert bellcrank and spring into mechanical release assembly housing (8) and install bolt, washer and nut which attach spring ends to housing. Install pins and rings which attach bellcrank to housing and position spring on bellcrank.

c. Position mechanical release assembly hook (11) in housing (8) and install attaching shaft (10), washers and nuts.

d. Insert mechanical release assembly into mechanical jettison device adapter (2) and install upper aft and lower forward bolts (9), washers and nuts. Install upper forward and lower aft bolts (7) and nuts and torque to 95-110 inch-pounds. Safety wire bolts.

e. Position electrical plug support (6) on mechanical jettison device adapter (2) and install two bolts (5) and washers attaching support to adapter. Safety wire bolts.

f. Position electrical plug bracket (1) against electrical plug support (6) and align mounting holes. Install two forward bolts (4), washers and nuts which attach bracket to support. Install two aft bolts (3), washers and spacers which attach bracket (1) to support (6) and mechanical jettison device adapter (2). Safety wire bolts.

g. Position the mechanical jettison device in center hole of external stores support assembly cross beam (15) and install eight attaching bolts, washers and nuts.

h. Attach electrical cable connector to electrical plug bracket (1) by installing screws, washers and nuts. Safety wire each side. Connect electrical wiring to mechanical jettison device.

i. Align end of outboard manual release cable with hole in end of mechanical release assembly bellcrank (13) and install attaching flat head pin, washer and cotter pin.

15-21. External Stores Support Assembly.

The external stores support assemblies (see figure 15-4) consist of beams and sway braces which are attached to "hard points" on the

fuselage structure by means of clevis bolts, washers, nuts and cotter pins.

15-22. Removal — External Stores Support Assembly. a. (On UH-1B Serial No. 64-14101 and subsequent.) Remove lockwire and unscrew bolt (22, figure 15-4), washer and pad (23) from fitting (21). Remove bolt, washer and nut that attaches support tube (20) to clevis (18) and lift support tube from clevis.

b. Remove four cotter pins, nuts, washers and clevis bolts attaching external stores support assembly to "hard points" on fuselage structure. Remove external stores support assembly from helicopter.

c. Remove nuts, washers and bolts attaching sway brace assemblies (14) to external stores support assembly and remove sway brace assemblies.

d. Remove nuts, washers and bolts attaching external stores support assembly cross beam (15) to forward (16) and aft (17) beam assemblies. On UH-1B Serial No. 64-14101 and subsequent, remove clevis (18) from under head of rear bolt.

15-23. Inspection — External Stores Support Assembly. Visually inspect press fit bushings in forward and aft beam assemblies. Beams may be inspected by Fluorescent Penetrant method.

15-24. Repair or Replacement — External Stores Support Assembly. Replace items which inspection (refer to paragraph 15-23) determines are unsuitable for continued service.

15-25. Installation — External Stores Support Assembly. a. Position external stores support assembly cross beam (15, figure 15-4) between outer ends of forward (16) and aft (17) beam assemblies and install attaching bolts, washers and nuts. (On UH-1B Serial No. 64-14101 and subsequent, fit clevis (18) on rear bolt before installing.)

b. Position sway brace assemblies (14) on external stores support assembly and install attaching bolts, washers and nuts.

c. Position external stores support assembly against "hard points" on fuselage structure and install attaching clevis bolts, washers, nuts and cotter pins.

d. (On UH-1B Serial No. 64-14101 and subsequent.) Attach rod end of support tube (20) to clevis (18) with previously removed bolt, nut and washer. Adjust support tube as necessary so hole in opposite end of tube aligns with hole in tripod fitting (21). Place washer and pad (23) under bolt head and insert bolt (22) through support tube and screw into fitting. Lockwire bolt.

CHAPTER 16

STORAGE OF AIRCRAFT

Section I — Scope

16-1. Scope. This chapter contains a comprehensive procedure for preparing aircraft and component parts for storage. Included are methods and equipment necessary for proper preservation. Procedures for activation of the aircraft after storage are also covered. The three categories of storage are:

a. Flyable Storage — A helicopter that will not be flown for a period of at least 72 hours, nor more than 14 days, shall be preserved and maintained with all components and systems in an operable condition. On the third day, the engine shall be run-up or motored with the starter. If engine is only motored on the third day, it shall be run up on the seventh.

b. Temporary Storage — A helicopter that will not be flown for a period of over 14 days, but

less than 45 days, shall be placed in temporary 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. Limited Storage — A helicopter that will be inactive for a period of more than 45 days, but not exceeding 180 days, shall be preserved and maintained in limited 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 45 to 180 days.

Section II — Procedures

16-2. Parking and Mooring. For parking and mooring procedures, refer to paragraph 1-58 through 1-63.

16-3. Inspection of Stored Helicopters. 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.

g. Check canvas covers for condition and proper drainage.

16-4. Inspection and Servicing — Temporary Storage. a. Perform a daily inspection in accordance with TM 55-1520-211-20PMD, except oil servicing of engine, transmission, and tail rotor gear boxes.

b. Drain following reservoirs and fill with corrosion preventive oil (item 10, table 1-1).

- (1) Engine oil tank.
- (2) Transmission sump.
- (3) Intermediate (42 degree) gear box.
- (4) Tail rotor (90 degree) gear box.

16-5. Inspection and Servicing — Extended Storage. a. In preparing helicopter for extended storage, perform a daily inspection in accordance with TM 55-1520-211-20PMD, except for oil service of engine, transmission, and gear boxes.

b. Drain and fill following reservoirs with corrosion preventive oil (item 10, table 1-1).

- (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.

16-6. Helicopter Preparation — Flyable Storage. Prepare helicopter for flyable storage, 14 days or less, according to paragraphs 16-7 through 16-9. Perform a daily inspection in accordance with TM 55-1520-211-20PMD.

16-7. Airframe Preparation — Flyable Storage. a. Install cover on airspeed (pitot) tube.

b. Park and moor helicopter with main and tail rotor tie-downs installed. (Refer to paragraph 1-58 through 1-63.)

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.

16-8. Engine Preparation — Flyable Storage. a. Preserve an operable engine as follows:

(1) Perform a regular preflight inspection of engine.

(2) Run engine at ground 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 506, table 1-1), and secure with tape, (item 402, table 1-1).

(7) Seal gap between interstage bleed band and compressor housing by encircling engine with a narrow strip of barrier material (item 506, table 1-1) and secure with tape (item 402, table 1-1). An alternate method of protecting installed engines is to cover all openings in engine cowling with suitable covers or barrier material and tape.

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 506, table 1-1), and secure with tape (item 402, table 1-1).

(6) Seal the gap between bleed band and compressor housing by encircling the engine with a narrow strip of barrier material (item 506, table 1-1) and secure with tape (item 402, table 1-1). An alternate method of protecting installed engines is to cover all openings in engine cowling with suitable covers or barrier material and tape.

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 506, table 1-1) and secure with tape (item 402, table 1-1).

(3) Seal the gap between bleed band and compressor housing by encircling the engine with a narrow strip of barrier material (item 506, table 1-1) and secure with tape (item 402, table 1-1). An alternate method of protecting installed engines is to cover all openings in engine cowling with suitable covers or barrier material and tape.

16-9. Fuel System Preparation — Flyable Storage. Service fuel system to normal capacity after each engine preservation run.

16-10. Helicopter Preparation — Temporary Storage. When a helicopter will not be operated for a period not to exceed 45 days, it shall be preserved and maintained according to paragraphs 16-11 through 16-21.

16-11. Engine Preparation — Storage Procedures. All preservation procedures require that the accumulation of dirt be removed from the engine using dry cleaning solvent (item 302, table 1-1). 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 cloth dampened in finger-print remover, (item 319, table 1-1) 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 1-1) is required for engines. Only a synthetic-base corrosion preventive oil can be used to spray the compressor for corrosion prevention.

16-12. Airframe Preparation—Temporary 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. Attach a static ground wire.

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

e. Remove all obstructions from drain holes in fuselage and tail boom.

16-13. Engine Preparation—Temporary Storage. Preservation of an installed engine for temporary storage is the same as for extended storage. (Refer to paragraph 16-24.)

16-14. Fuel System Preparation—Temporary 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.

c. Fog interior of fuel cells with light engine oil (item 5, table 1-1), 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.

16-15. Power Train Preparation—Temporary Storage. a. Clean drive shaft and treat for any evident corrosion.

b. Apply corrosion preventive compound (item 315, table 1-1) to unplated steel surfaces not in contact with bearings.

c. Cover breather holes in transmission and gear boxes with grease-proof barrier material (item 506, table 1-1) secured with tape (item 402, table 1-1).

16-16. Hydraulic System Preparation—Temporary Storage. a. Fill hydraulic reservoir with oil (item 3, table 1-1).

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

16-17. Rotors and Controls Preparation—Temporary Storage. a. Lubricate rotors and controls according to Lubrication Order. (Refer to paragraph 2-1.)

b. Apply fingerprint remover (item 319, table 1-1) to all unpainted metal surfaces. Remove any film residue of fingerprint remover with solvent (item 302, table 1-1).

c. Wipe all parts dry with clean, lint-free cloth, and apply corrosion-preventive compound (item 315, table 1-1) to all unpainted metal surfaces not in contact with bearings.

Caution

Do not apply corrosion preventive compound, cosmoline or any type of grease to the teflon bearings or in the area of the bearings on the 540 rotor configuration helicopters. This instruction will apply, regardless of the ship status, operational, in storage or in preparation for overseas movement. Assemblies affected are: stabilizer bar, main rotor hub, scissors and sleeve, swashplate and support, collective levers and elevator idler pivot bushings located on the aft side of the swashplate support.

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 505, table 1-1) to entire painted area of rotor blades.

f. Apply a light coat of corrosion preventive compound (item 315, table 1-1) to tail rotor cables, sprocket, and chain. Cycle controls through full range for complete coverage.

16-18. Battery Preparation—Temporary Storage.

a. Disconnect battery and allow to remain in helicopter.

b. Wrap battery quick-disconnect with barrier material (item 507, table 1-1) secured with tape (item 402, table 1-1).

16-19. Instruments Preparation—Temporary Storage. a. Install cover on airspeed (pitot) tube.

b. Cut a piece of barrier material (item 507, table 1-1) to fit over each static vent of airspeed system. Secure material in place with tape (item 402, table 1-1).

16-20. Avionic Equipment Preparation—Temporary 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.

16-21. Landing Gear Preparation — Temporary 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.

16-22. Helicopter Preparation — Extended Storage. Prepare helicopter for extended storage, from 46 to 180 days, according to paragraphs 16-23 through 16-35.**Note**

A renewal of preservation shall be accomplished at each 45 day interval. (Refer to paragraph 16-50.)

16-23. Airframe Preparation—Extended Storage. Apply the following procedures in addition to those for temporary storage. (Refer to paragraph 16-10.)

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 320, table 1-1).

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.

16-24. Engine Preparation — Extended Storage. Preserve engine that can be motored as follows:

a. Check oil level; service, if necessary.

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

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

d. Remove two bolts and washers to loosen inline valve from impeller housing.

e. Install a blocker plate between impeller housing and inline valve.

Note

As an alternate method, energize the inline valve to the closed position.

f. Disconnect the main fuel hose from main fuel manifold 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.

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

h. Remove temperature sensing element with housing from engine inlet housing. Wrap element in barrier material (item 506, table 1-1) and secure it to engine to prevent any physical damage. Cover opening in inlet housing.

i. Disconnect airbleed hose from diffuser housing. Apply 40 psi of dry filtered air through airbleed hose to tighten bleed band.

j. Check that engine has cooled enough to prevent auto-ignition.

k. Set throttle arm to ground idle.

l. Motor engine, with starter, to pump lubricating oil into fuel system.

Caution

Do not exceed starter limitations.

m. Using a suitable spray gun with filtered air at a pressure of 90 psi, spray $\frac{1}{2}$ pint of corrosion preventive oil (item 10, table 1-1) 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.

n. Open and close throttle to ensure flushing of the fuel control.

o. Continue motoring until oil is observed draining into container.

p. With engine stopped, spray second stage turbine rotor with sufficient amount of corrosion-preventive oil (item 10, table 1-1) to cover blades.

q. Disconnect air pressure from airbleed hose and connect hose to diffuser housing.

r. Disconnect lubricating oil hose from fuel control and connect fuel inlet line.

s. Remove temporary lines from fuel hoses and connect main fuel hose to main fuel manifold. Connect starting fuel hose to starting fuel solenoid valve.

t. Remove blocker plate at inline valve and connect valve to impeller housing with two bolts and washers. Lockwire bolts.

u. Connect valve connector to ignition exciter.

v. Place four eight-unit bags of desiccant (item 316, table 1-1) in air inlet opening and four bags in exhaust diffuser or tailpipe opening.

w. Install engine inlet and exhaust covers.

Note

When covers are not available, seal openings with greaseproof barrier material (item 506, table 1-1) and secure with tape (item 402, table 1-1).

x. Seal the gap between bleed band and compressor housing by encircling the engine with a narrow strip of barrier material (item 506, table 1-1) and secure with tape (item 402, table 1-1).

y. 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 corrosion-preventive oil (item 10, table 1-1).

z. Record date of preservation, and maintenance during preservation, on engine historical form.

16-25 Engine Preparation — Extended Storage. 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.

a. Disconnect cable connector and disconnect fuel inlet and outlet hoses from fuel control.

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

c. Remove overspeed governor and drain fuel.

d. Connect cable and fuel hoses.

e. Lockwire throttle arm in closed position.

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

g. Pour lubricating oil into overspeed governor while rotating the drive shaft by hand.

h. Reinstall overspeed governor.

i. Spray $\frac{1}{2}$ pint corrosion-preventive oil (item 10, table 1-1) into inlet housing and exhaust diffuser openings. Constantly move spray gun to cover all internal surfaces.

j. Place four eight-unit bags of desiccant (item 316, table 1-1) in air inlet openings and four bags in exhaust diffuser or tailpipe opening.

k. Install engine inlet and exhaust covers.

Note

When covers are not available, seal openings with greaseproof barrier material (item 501, table 1-1) and secure with tape (item 402, table 1-1).

l. Seal the gap between bleed band and compressor housing by encircling the engine with a narrow strip of barrier material (item 506, table 1-1) and secure with tape (item 402, table 1-1).

m. 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 corrosion-preventive oil (item 10, table 1-1).

n. Record date of preservation, and maintenance during preservation on engine historical form.

16-26. Fuel System Preparation — Extended Storage. Apply same procedures as for temporary storage. (Refer to paragraph 16-10.) Any auxiliary fuel tanks will be removed, preserved, tagged, and returned to stock in accordance with TM 55-405-3.

16-27. Power Train Preparation — Extended Storage. a. If engine is operable, preserve power train for extended storage by same procedures as for temporary storage. (Refer to paragraph 16-15.)

Note

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

b. Remove main rotor. (Refer to paragraph 8-6, 8-51 or 8-97.)

c. Remove mast assembly. (Refer to paragraph 7-83.)

d. Spray inside of transmission, through top opening, with approximately one gallon of cor-

rosion-preventive oil (item 10, table 1-1). While spraying manually rotate internal gears and bearings with input drive quill.

e. Reinstall mast assembly. Apply fingerprint remover (item 319, table 1-1) to all unpainted surfaces of mast assembly. Wipe mast dry with clean lint-free cloth. Apply corrosion-preventive compound (item 315, table 1-1), 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.

16-28. Hydraulic System Preparation — Extended Storage. Apply same procedures as for temporary storage. (Refer to paragraph 16-16.)

16-29. Rotors and Controls Preparation — Extended Storage. Apply same procedures as for temporary storage. (Refer to paragraph 16-17.)

16-30. Battery Preparation — Extended Storage. a. Remove battery and maintain in accordance with TM 11-6140-230-12.

b. Wrap battery quick-disconnect with barrier material (item 507, table 1-1) secured with tape (item 402, table 1-1).

16-31. Instruments Preparation — Extended Storage. Apply same procedures as for temporary storage. (Refer to paragraph 16-19.) Also remove clock, apply condition tag, and turn in to supply.

16-32. Avionic Equipment Preparation — Extended Storage. Apply same procedures as for temporary storage. (Refer to paragraph 16-20.)

16-33. Utility Equipment Preparation — Extended 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.

16-34. Landing Gear Preparation — Extended Storage. Apply same procedures as for temporary storage. (Refer to paragraph 16-21.)

16-35. Preservation of Fuel Regulator Removed From Engine. A fuel control removed from an engine for longer than 48 hours must be preserved as follows:

- a. Remove and clean fuel inlet strainer, pump discharge strainer, and servo filter.
- b. Allow fuel to drain from fuel control.
- c. Reinstall fuel inlet strainer and fitting.
- d. Install high pressure caps on main and starting fuel outlets, fuel inlet fitting, and filter port.
- e. Pour lubricating oil (item 5, table 1-1) into fuel control through pump discharge strainer port and install cap.
- f. If possible, rotate fuel control drive shaft by hand.
- g. Turn fuel control over several times allowing oil to penetrate all sections. Remove cap and add oil as necessary. Recap port.
- h. Reinstall pump discharge strainer and servo supply filter.
- i. Enclose fuel control in plastic envelope.

16-36. Engine Preservation — Permanent Storage. 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 extended storage. (Refer to paragraph 16-24 and 16-25.)

16-37. Activation. 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.

16-38. Helicopter Activation — After Flyable Storage. 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 55-1520-211-20PMD.)

16-39. Helicopter Activation — After Temporary or Extended Storage. A helicopter being removed from temporary or extended storage requires

depreservation in accordance with paragraphs 16-40 through 16-49, in addition to a complete Daily Inspection.

16-40. Airframe — Depreservation. Clean airframe in accordance with instructions in TM 55-405-4. Remove all protective covers, coatings, and barrier material.

16-41. Fuel Cells — Depreservation. Flush fuel cells with dry cleaning solvent (item 302, table 1-1). Thoroughly dry inside of cells with filtered compressed air.

Caution

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

16-42. 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 1-1).

- b. Check and clean transmission oil filters.

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

16-43. Rotors and Controls — Depreservation. a. Clean main and tail rotor assemblies with dry cleaning solvent (item 302, table 1-1). Wipe dry with lint-free cloth.

- b. Lubricate in accordance with Lubrication Order. (Refer to paragraph 2-1.)

- c. Check stabilizer bar dampers to be full of hydraulic oil (item 3, table 1-1). If fluid level is much below top of window on damper, check timing after refilling and replace damper if unsatisfactory. (Refer to paragraph 8-30, 8-76 or 8-117.)

16-44. Battery — Depreservation. Remove protective material from battery connector. Install and connect battery.

16-45. Landing Gear — Depreservation. Remove block from under skid gear. Inflate ground handling wheel tires to normal pressure.

16-46. Engine Activation — After Storage. 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.

16-47. Engine in Aircraft — Activation — After Flyable Storage. Remove covers or barrier material from inlet and exhaust housings and remove any tape residue with dry cleaning solvent (item 302, table 1-1). Engine is ready for ground test.

16-48. Engine in Aircraft — Activation — After Temporary or Extended 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 1-1).

c. Check chip detector for continuity. If continuity exists, remove and clean chip detector and allow oil to drain.

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

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

f. Disconnect main fuel hose from main fuel manifold 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 and inspect engine for leakage.

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

l. Connect cable connector to ignition exciter. Lockwire 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 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.

16-49. Engine — Activation. New, Overhaul, 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 extended storage engine. (Refer to paragraph 16-48.)

16-50. Preservation — Renewal. 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 1-1).

c. Repeat preservation procedure for flyable or extended storage. (Refer to paragraph 16-6 or 16-22.)

16-51. Accident Engines — Preservation.

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 316, table 1-1) 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 506, table 1-1) and secure with tape (item 402, table 1-1).

16-52. Engines — Damaged, Cannibalized or Failed — Activation. 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.

Section III — Demolition

16-53. Destruction of The Helicopter. 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 defensible 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.

16-54. 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.

16-55. 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.

16-56. 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.

APPENDIX I

REFERENCES

The following references, of the issue in effect, in addition to those references contained in TM 55-1520-211-10, Appendix I, are required for use by Organizational Maintenance personnel in performance of their duties.

NUMBER	TITLE
TM 1-8D10-2-3-13	Handbook Overhaul Instructions: Electrically Retractable Landing - Light Assemblies
TM 11-6140-203-12	Operator and Organizational Maintenance Manual Nickel Cadmium Storage Batteries
TM 38-250	Preservation, Packaging and Packing of Military Supplies and Equipment
TM 55-403	Fundamentals of Army Helicopter Maintenance
TM 55-405-1	Army Maintenance Engineering Manual: General Practices
TM 55-405-2	Army Aviation Maintenance Engineering Manual: Aircraft Hardware and Materials
TM 55-405-3	Army Aviation Maintenance Engineering Manual: Maintenance of Aircraft Systems
TM 55-405-4	Army Aviation Maintenance Engineering Manual: Aircraft Structural Repair
TM 55-405-5	Army Aviation Maintenance Engineering Manual: Aircraft Engines
TM 55-405-6	Maintenance of Department of the Army Aircraft: Aircraft Maintenance Tools
TM 55-405-7	Maintenance of Department of the Army Aircraft: Shop Practices
TM 55-405-8	Army Aviation Maintenance Engineering Manual: Ground Support Equipment
TM 55-405-9	Army Aviation Maintenance Engineering Manual: Weight and Balance
TB AVN 7	Painting and Marking of Aircraft
TB AVN 10	First Aid Kits — Aircraft — Without Narcotics
TB AVN 23-10	Aircraft Accessory Replacement and Reuse Procedures

APPENDIX II

MAINTENANCE ALLOCATION CHART

Section I — Introduction

All-1. General. a. The Maintenance Allocation Chart assigns maintenance functions to the lowest available maintenance category based on past experience in the following considerations:

- (1) Skills available.
- (2) Time required.
- (3) Tools and test equipment authorized.

b. Only the lowest level of maintenance authorized to perform a maintenance function is indicated.

c. A maintenance function assigned a level will automatically be authorized to be performed at any higher level.

d. A maintenance function which cannot be performed at the assigned level for any reason becomes the responsibility of the next higher level.

e. The assignment of a maintenance function will not be construed as authority to carry the associated repair parts in stock. Authority to requisition, stock, or otherwise secure necessary repair parts will be specified in the repair parts appendix.

f. Normally there will be no deviations to perform the assigned functions at lower maintenance levels than the assigned level. In cases of operational necessity, maintenance function assigned to a level may, on a one-time basis and at the request of the lower level be authorized specifically by the Maintenance Officer of the level to which the function is assigned. The special tools, equipment, etc., required by the lower level to perform this function will be furnished by the level to which the function is assigned.

g. Changes in the Maintenance Allocation Chart will be based on continuing evaluation and analysis by responsible technical personnel and on reports received from field activities.

h. In any instance of conflict with current tool and equipment lists, or current supply manuals, this Maintenance Allocation Chart will be the final authority.

All-2. Maintenance Functions. Maintenance functions will be limited to and defined as follows:

a. **INSPECT.** To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

b. **TEST.** To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

c. **SERVICE.** To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air.

d. **ADJUST.** To rectify to the extent necessary to bring into proper operating range.

e. **ALIGN.** To adjust specified variable elements of an item to bring to optimum performance.

f. **CALIBRATE.** To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

g. **MAINTENANCE OPERATIONAL CHECK.** Checks accomplished on the ground to insure satisfactory operation of an item that has been replaced or adjusted.

h. **REPLACE.** To replace unserviceable items with serviceable assemblies, subassemblies, or parts.

i. **REPAIR.** To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.

j. **OVERHAUL.** To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.

k. **REBUILD.** To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

l. **SYMBOLS.** The symbol "X" placed in the appropriate column indicates the level responsible for performing that particular maintenance function. The symbol "%%" which applies to organizational maintenance indicates that the particular maintenance function may be performed provided it is specifically authorized by the direct support maintenance officer. Use of the symbol will apply only to replacement of major assemblies and time consuming operations which are within the capabilities of organization, but over which control by the commodity command is considered essential. In no case will the direct support maintenance officer require the accomplishment of a "%%" maintenance function by an organization or unit, and in no case will a "%%" function authorize stockage of parts at organizational level.

ment of major assemblies and time consuming operations which are within the capabilities of organization, but over which control by the commodity command is considered essential. In no case will the direct support maintenance officer require the accomplishment of a "%%" maintenance function by an organization or unit, and in no case will a "%%" function authorize stockage of parts at organizational level.

ALL-3. Explanation of Format. Purpose and use of the format are as follows:

a. Column 1, Group number. Column 1 lists the functional group number.

b. Column 2, Component and related operations. Column 2 lists the noun names of components, assemblies, subassemblies and modules on which maintenance is authorized.

c. Columns 3, 4, 5, 6 and 7, O/C, O, DS, GS and D. These five columns indicate the lowest level responsible for performing the particular maintenance function.

d. Column 8. This column is not used.

e. Column 9, Remarks. Self-explanatory.

Section II — Maintenance Allocation Chart

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
01	Airframe							
	Sheet Metal							
	Minor Repair		x					
	Major Repair			x				
	(Replacement of entire skin panels)							
	Fire Detector Unit							
	Inspect		x					
	Replace		x					
	Repair			x				
	(Aft) Engine Mount Adapters							
	Inspect		x					
	Replace			x				
	Repair			x				
	Engine Mount Support Arms (Brace Rods & Tripod)							
	Inspect		x					
	Replace			x				
	Repair			x				
	(Replacement of rod ends and shock mounts)							
	Engine Shock Mounts							
	Inspect		x					
	Replace			x				
	Engine Mount Trunnion & Bearing Assy							
	Inspect		x					
	Replace			x				
	(As an assembly)							
	Replace Bearing			x				
	Service			x				
	(Bearing)							
	Engine Floor Mount Attaching Brackets							
	Inspect		x					
	Replace			x				
	Adjustment			x				

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
01	Airframe (Cont) Fittings, Bolts, Supports and Castings Inspect (Visual) Inspect (Magniflux, Zieglow, Black Light) Inspect (X-Ray) Replace (Which does not require jig alignment) Replace (Which require minor jig alignment) Bulkheads, Structural Sheet Metal, Structural Members & Fittings (Which do not require jig alignment) Inspect Replace Repair Bulkheads, Structural Sheet Metal, Structural Members & Fittings (Which require jig alignment) Inspect Replace Repair Rebuild Tail Boom Inspect Replace Minor Repair Repair (Requiring replacement of skin panels or sections) Major Repair (Requiring minor jig alignment for which jigs are provided) Rebuild							
			X	X				
				X				
					X			
			X					
					X			
				X	X			
			X					
						X		
						X		
			X					
				X				
					X			
						X		

**MAINTENANCE ALLOCATION CHART
FOR**

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
01	Airframe (Cont)							
	Cargo & Cockpit Doors							
	Inspect		X					
	Repair		X					
	Repair (Such as replacement of Door Latch Mechanism and Rollers)			X				
	Adjust		X					
	Replace Assy		X					
	Handles, Latches and Door Hangers							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair			X				
	Windows All							
	Inspect		X					
	Replace		X					
	Minor Repair		X					
	Major Repair			X				
	Windshield Wiper Blades and Linkages							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Windshield Wiper Motor							
	Inspect		X					
	Replace		X					
	Repair			X				
	Pilot's and Copilot's Seats							
	Inspect		X					
	Replace		X					
	Repair			X				
	Troop Seats							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair			X				

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
01	Airframe (Cont) Seat Belts, Shoulder Harness, Inertia Reel Webbing Inspect Replace Inertia Reels Inspect Replace Repair Sound-Proofing and Blackout Curtains, Sun Visor Inspect Replace Repair Cowling and Fairings Inspect Adjust Replace Minor Repair Repair Weight and Balance of Aircraft							
02	Alighting Gear Tail Skid Inspect Replace Skid Tubes, Cross Tubes and Skid Shoes Inspect Replace Repair Ground Handling Wheel Actuating Mechanism Inspect Service Replace Repair							

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
02	Alighting Gear (Cont)							
	Wheels, Tires and Tubes							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair		X					
03	Engine and Related Systems							
	Engine as a Complete Assembly							
	Inspect		X					
	Test				X			
	Align			X				
	Maintenance Operational Check		X					
	Replace			X				
	Repair		X					
	Overhaul					X		
	Fuel and Oil Hoses							
	Inspect		X					
	Replace		X					
	Electrical Harness and Ignition Leads							
	Inspect		X					
	Replace		X					
	Repair		X					
	Ignition Exciter							
	Inspect		X					
	Replace		X					
	Igniter Plugs							
	Inspect		X					
	Replace		X					
	Fuel Control Assembly							
	Inspect		X					
	Service		X					
	Replace		X					
	Adjust		X					
	Overhaul					X		

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
03	Engine and Related Systems (Cont)							
	Electrical Solenoid Valve							
	Inspect		x					
	Replace		x					
	Overspeed Governor Assembly							
	Inspect		x					
	Adjust		x					
	Replace		x					
	Overhaul					x		
	Fuel System Filter and Strainers							
	Inspect		x					
	Replace		x					
	Starting Fuel Solenoid Valve							
	Inspect		x					
	Replace		x					
	Main Fuel Manifolds							
	Inspect		x					
	Replace		x					
	Repair			x				
	Starting Fuel Manifold							
	Inspect		x					
	Replace		x					
	Starting Fuel Nozzles							
	Inspect		x					
	Replace		x					
	Repair				x			
	(Limited to replacement of parts)							
	Oil Pump							
	Inspect		x					
	Replace		x					
	Adjust (After investigation)		x					
	Overhaul				x			

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
03	Engine and Related Systems (Cont)							
	Bearing Housing Oil Strainers							
	Inspect		X					
	Service		X					
	Replace		X					
	Main Oil Filter							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair		X					
	(Limited to replacement of wafers)							
	Engine Oil Coolers							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Engine Oil Cooler Blower							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Chip Detector							
	Inspect		X					
	Service		X					
	Replace		X					
	Interstage Airbleed Actuator							
	Inspect		X					
	Replace		X					
	Repair			X				
	(Limited to replacement of parts)							
	Overhaul					X		

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
08	Engine and Related Systems (Cont)							
	Interstage Airbleed Band							
	Inspect		X					
	Replace		X					
	Adjust		X					
	Repair		X					
	Interstage Airbleed Hoses							
	Inspect		X					
	Replace		X					
	Inline Valve							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Airbleed Connecting Manifold and Adapter							
	Inspect		X					
	Replace		X					
	Exhaust Thermocouple Harness							
	Inspect		X					
	Test		X					
	Replace		X					
	Combustion Chamber Drain Valve							
	Inspect		X					
	Replace		X					
	Repair			X				
	(Limited to replacement of parts)							
	Oil Temperature Bulb							
	Inspect		X					
	Replace		X					

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
03	Engine and Related Systems (Cont)							
	Accessory Drive Gearbox							
	Inspect		x					
	Replace		x					
	Repair		x*					
	Overhaul					x		
	(*Limited to replacement of seals)				•			
	Overspeed Governor and Tachometer Drive Assy							
	Inspect		x					
	Replace			x				
	Repair			x				
	(Limited to replacement of parts)							
	Adjust		x					
	(Pressure regulating valve)							
	Torquemeter Booster Pump							
	Inspect		x					
	Replace		x					
	Repair			x				
	Overhaul				x			
	Oil Transfer Tubes (For reduction gears)							
	Inspect			x				
	(During special inspection)							
	Replace			x				
	Repair			x				
	Output Shaft Seal							
	Inspect (For leakage)		x					
	Replace			x				
						•		

UH-1A and UH-1B

All-12

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
03	Engine and Related Systems (Cont) Power Turbine Nozzle and Cylinder Inspect Replace Repair Fireshield Inspect Replace Exhaust Diffuser Inspect Replace Repair Second Stage Turbine Rotor Assembly Inspect Replace (Complete Assembly) Repair (Limited to replacement of parts) First Stage Turbine Rotor Assembly Inspect Replace (Complete assembly) Repair First Stage Turbine Nozzle and Flange Inspect Replace Repair Combustion Chamber Deflector Inspect Replace			X X X X X X X X X X X X X X X X				

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
03	Engine and Related Systems (Cont)							
	Diffuser Housing							
	Inspect		X					
	Replace					X		
	Repair			X				
	Rear Bearing Seal and Seal Housing							
	Inspect			X				
	Replace			X				
	Rear Bearing Seal Liner and Forward and Rear Cones							
	Inspect			X				
	Replace			X				
	Impeller Housing							
	Inspect		X					
	Replace			X				
	Repair			X				
	Compressor Housing							
	Inspect		X					
	Replace			X				
	Repair			X				
	Compressor Stator Vanes							
	Inspect			X				
	Replace			X				
	Repair			X				
	Compressor Rotor Blades							
	Inspect		X					
	Replace			X				
	Repair			X				
	Power Shaft							
	Inspect (During special inspection)			X				
	Replace					X		

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
03	Engine and Related Systems (Cont)							
	Inlet Housing							
	Inspect		X					
	Replace					X		
	Repair			X				
	Inlet Guide Vanes							
	Inspect		X					
	Replace					X		
	Repair			X				
	Engine Oil Cooler							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Engine Oil Cooler Fan Assemblies, and Oil Cooler Fan Drive							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Engine Controls							
	Linkage							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair		X					
	Droop Compensator							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair		X					
	Actuator							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair		X					
	Overhaul				X			

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
04	Rotor and Transmission Systems							
	Main Rotor Hub and Blade Assembly							
	Inspect		x					
	Balance			x				
	Maintenance Operation Check		x					
	Replace		x					
	Main Rotor Blades							
	Inspect		x					
	Align			x				
	Replace		x					
	Minor Repair		x					
	Major Repair					x		
	Main Rotor Hub							
	Inspect		x					
	Service		x					
	Balance			x				
	Replace		x					
	Minor Repair			x				
	Major Repair				x			
	Overhaul					x		
	Main Rotor Hub (540)							
	Inspect		x					
	Balance			x				
	Replace		x					
	Repair			x				
	Overhaul				x			
	Stabilizer Bar							
	Inspect		x					
	Service		x					
	Replace		x					
	Minor Repair		x					
	Overhaul			x				
	Scissors and Sleeve Assembly							
	Inspect		x					
	Service		x					
	Replace		x					
	Repair			x				
	Overhaul				x			

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
04	Rotor and Transmission Systems (Cont)							
	Swashplate & Support Assembly							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Dampers							
	Inspect		X					
	Service		X					
	Adjust		X					
	Replace		X					
	Major repair				X			
	Tail Rotor Hub and Blade Assembly							
	Inspect		X					
	Service		X					
	Adjust		X					
	Balance			X				
	Replace		X					
	Tail Rotor Blades							
	Inspect		X					
	Replace			X				
	Repair		X					
	Major Repair					X		
	Tail Rotor Hub							
	Inspect		X					
	Service		X					
	Replace			X				
	Repair			X				
	Overhaul*				X			
	Tail Rotor 42° and 90° Gear Boxes							
	Inspect		X					
	Service		X					
	Replace		X					
	Minor Repair		X					
	Overhaul					X		
*Part Numbers	204-040-003-23	204-040-003-31					204-040-012-7	
	204-040-003-25	204-040-004-27					204-040-012-9	
	204-040-003-27	204-040-012-1						
	204-040-003-29	204-040-012-5						

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
04	Rotor and Transmission Systems (Cont)							
	Tail Rotor Gear Box Quills (42° and 90°)							
	Inspect		X					
	Replace			X				
	Repair			X				
	Overhaul					X		
	Tail Rotor Drive Shafting							
	Inspect		X					
	Replace		X					
	Repair		X					
	Tail Rotor Drive Shaft Hanger Assemblies							
	Inspect		X					
	Service		X					
	Replace		X					
	Overhaul			X				
	Main Transmission							
	Inspect		X					
	Service		X					
	Replace			X				
	Overhaul					X		
	Mounts							
	Inspect		X					
	Replace			X				
	Repair			X				
	Drive Quill Assemblies							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul					X		

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
04	Rotor and Transmission Systems (Cont)							
	Main Drive Shaft (Engine to Transmission)							
	Inspect		X					
	Service		X					
	Replace		X					
	Overhaul			X				
	Transmission Lubrication System							
	Inspect		X					
	Service		X					
	Lines, Manifolds, Fittings, Magnetic Plugs, Oil Jets and Sight Gages							
	Inspect		X					
	Replace		X					
	Filters, Filter Housings, and Screens							
	Inspect		X					
	Service		X					
	Replace		X					
	Transmission Oil Cooler Assembly, Housing, Tubing, Fittings and Valves							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				
	Oil Pump							
	Replate			X				
	Overhaul					X		
	Relief Valve							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair		X					

MAINTENANCE ALLOCATION CHART FOR UH-1A and UH-1B								
(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
04	Rotor and Transmission Systems (Cont)							
	Mast Assembly							
	Inspect		X					
	Replace		X					
	Repair		X					
	Overhaul				X			
06	Hydraulic System							
	Pumps							
	Inspect		X					
	Replace		X					
	Overhaul				X			
	Reservoir							
	Inspect		X					
	Service		X					
	Replace		X					
	Minor Repair		X					
	Major Repair			X				
	Valves							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Hoses, Tubing and Fittings							
	Inspect		X					
	Replace		X					
	Hydraulic System Filters and Filter Housings							
	Inspect		X					
	Service		X					
	Replace		X					
	Hydraulic Power Cylinders							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul				X			

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
06	Hydraulic System (Cont)							
	Irreversible Valves							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul					X		
08	Instruments							
	Miscellaneous Instruments							
	Clock							
	Inspect		X					
	Replace		X					
	Fuel Quantity Indicator & Amplifier							
	Inspect		X					
	Replace		X					
	Flight Instruments							
	Vertical Velocity Indicator							
	Inspect		X					
	Replace		X					
	Stand-by Compass							
	Inspect		X					
	Calibrate		X					
	Replace		X					
	Airspeed Indicator							
	Inspect		X					
	Test			X				
	Replace		X					
	Overhaul				X			
	Altimeter							
	Inspect		X					
	Replace		X					
	Overhaul				X			

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
08	Instruments (Cont)							
	Pitot System							
	Inspect		x					
	Service		x					
	Test		% %	x				
	Replace		% %	x				
	Engine Instruments							
	Engine and Rotor Tachometer							
	Inspect		x					
	Replace		x					
	Overhaul				x			
	Exhaust Temperature Indicator							
	Inspect		x					
	Calibrate			x				
	Replace			x				
	Overhaul				x			
	Engine Oil Temperature Gage							
	Inspect		x					
	Replace		x					
	Overhaul				x			
	Engine Oil Pressure Transmitter and Indicator							
	Inspect		x					
	Replace		x					
	Overhaul				x			
	Fuel Pressure Indicator and Transmitter							
	Inspect		x					
	Replace		x					
	Overhaul				x			
	Torquemeter and Transmitter							
	Inspect		x					
	Replace		x					
	Overhaul				x			

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
08	Instruments (Cont)							
	Gas Producer Tachometer							
	Inspect		x					
	Replace		x					
	Overhaul				x			
	Transmission Instruments							
	Oil Temperature Gage							
	Inspect		x					
	Replace		x					
	Overhaul				x			
	Oil Pressure Gage & Transmitter							
	Inspect		x					
	Replace		x					
	Overhaul				x			
	Thermocouples & Temperature Bulbs							
	Inspect		x					
	Replace		x					
09	Electrical Systems							
	AC Power System							
	AC Voltmeter							
	Inspect		x					
	Replace		x					
	Overhaul				x			
	Voltage Regulators							
	Inspect		x					
	Adjust		% %	x				
	Replace		x					
	Repair				x			
	Overhaul				x			

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
09	Electrical Systems (Cont)							
	Circuit Breakers, Conduits, Leads, Switches & Wiring							
	Inspect		X					
	Replace		X					
	Repair			X				
	DC Power System							
	Regulators, Relays, Rheostats, Switches, Circuit Breakers, Plugs, Leads, Connectors, Wiring, Conduits, Receptacles, Shunts & Shock Mounts							
	Inspect		X					
	Adjust		% %	X				
	Replace		% %	X				
	Repair		% %	X				
	Overhaul*						X	*Regu- lators
	Battery							
	Inspect		X					
	Service		X					
	Replace		X					
	Battery Sump Jar							
	Inspect		X					
	Service		X					
	Replace		X					
	Generator and Starter Generator							
	Inspect		X					
	Replace		X					
	Repair			X				
	Overhaul				X			

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
09	Electrical Systems (Cont) Lights Landing, Navigation, Instrument, Search, Interior Cabin, Anti- Collision and Flasher Units Inspect Replace Repair Overhaul* Master Caution Panel Inspect Replace Repair RPM Warning Light Inspect Replace Repair		X X X			X		*Landing Light
10	Fuel System and Lines Main Fuel Tanks Inspect Service Test Replace Repair Boost Pumps Inspect Replace Overhaul Valves and Fittings Inspect Replace		X X X X X X	X X X		X X		

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
10	Fuel System and Lines (Cont)							
	Filters and Filter Housings							
	Inspect		X					
	Service		X					
	Replace		X					
	Hoses, Tubing and Filler Caps							
	Inspect		X					
	Replace		X					
	Auxiliary Fuel Tank Assembly							
	Inspect		X					
	Replace		X					
	Repair		X					
	Auxiliary Fuel Tank Bladder							
	Inspect			X				
	Replace			X				
	Repair				X			
11	Flight Control Systems							
	Synchronized Elevator							
	Inspect		X					
	Service		X					
	Adjust		X					
	Replace		X					
	Repair			X				
	Main Rotor Control Tubes, Rod End and Pitch Change Linkage							
	Inspect		X					
	Service		X					
	Replace		X					
	Repair			X				

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
11	Flight Control Systems (Cont)							
	Force Gradient Assembly							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair			X				
	Control Stick (Collective & Cyclic)							
	Inspect		X					
	Replace		X					
	Repair			X				
	Magnetic Brake							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair			X				
	Overhaul				X			
	Collective and Cyclic Linkage							
	Inspect		X					
	Adjust (Rigging)		X					
	Replace		X					
	Repair		X					
	Tail Rotor Pedal Assembly							
	Inspect		X					
	Service		X					
	Adjust		X					
	Replace		X					
	Pedal Adjusting Assembly							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair		X					

**MAINTENANCE ALLOCATION CHART
FOR**

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
11	Flight Control Systems (Cont)							
	Tail Rotor Pitch Control Linkage							
	Inspect		X					
	Adjust (Rigging)		X					
	Replace		X					
	Repair		X					
	Tail Rotor Pitch Control Mechanism							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair			X				
	Pitch Change Rods and Links							
	Inspect		X					
	Adjust		X					
	Replace		X					
	Repair		X					
12	Utility Systems							
	Anti-Icing System							
	Engine Anti-Icing Detector and Interpreter							
	Inspect		X					
	Replace		X					
	Repair			X				
	Hot Air Valve							
	Inspect		X					
	Replace		X					
	Overhaul				X			

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
12	Utility Systems (Cont) Heater Systems Combustion Heater Assembly Inspect Service Replace Repair Fuel Pumps, Solenoid Valves, Lockout Relay, Air Pressure Switch, Selector Valve, Fuel Pressure Regulator, Filters, Filter Housings, Tubing, Fitting and Hoses Inspect Service Replace Ignition System Inspect Replace Repair Combustion Blower Inspect Replace Repair Heater Vent Blower Inspect Replace Repair Combustion and Air Bleed Heaters Nozzles, Registers, Ducts, and Hoses Inspect Replace Repair							

**MAINTENANCE ALLOCATION CHART
FOR**

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
12	Utility Systems (Cont) Fire Detection System Inspect Maintenance Operation Check Replace							
			X					
			X					
			X					
17	Cargo and Personnel Handling Medical Attendant Seat and Litters Inspect Adjust Replace Repair Cargo Suspension Assembly Inspect Service Maintenance Operational Check Replace Repair Cargo Suspension Support Bear- ings and Sliprings Inspect Service Replace Emergency Release Cable and Pedal Assy Inspect Adjust Replace							
			X					
			X					
			X					
				X				
			X					
			X					
				X				
				X				
				X				
				X				
			X					
			X					
			X					
19	Avionics Note TM11-1520-211-20 contains complete preventive maintenance service for avionics.							

MAINTENANCE ALLOCATION CHART FOR

UH-1A and UH-1B

(1) GROUP NO.	(2) COMPONENT AND RELATED OPERATIONS	(3) O/C	(4) O	(5) DS	(6) GS	(7) D	(8)	(9) REMARKS
30	Armament Universal Pylon, Supports and Struts Inspect Replace Repair Mechanical Release, Adapter Assembly Inspect Service Replace Repair Emergency Manual Jettison System, Cables, Levers, Pulleys and Brackets Inspect Maintenance Operational Check Adjust Replace Repair		X X X X X X X X					

APPENDIX III

AIRCRAFT INVENTORY MASTER GUIDE

AIII-1. Introduction. a. Appendix III lists those items of installed or loose equipment required by, and authorized for using organizations to accomplish their primary or alternate mission. This list will serve to standardize present inventory procedures, using the inventory master guide to determine the inventoriable items of installed and/or loose equipment. Insofar as possible, items of equipment are listed in the sequence of their physical location within the aircraft area.

b. Aircraft inventory is subject to change, as a result of authorized changes (MWO's) and additions or deletions of property for special missions requirements; therefore, the selection of items of inventory from the inventory master guide may or may not provide a complete inventory list. When it is known that the master guide does not provide a complete inventory list, it will be necessary to research authorized changes (MWO's) and local command directives in order to compile an accurate and exact inventory list.

c. When the compilation of the inventory list is accomplished, this list will be entered on DA Form 2408-17, "Aircraft Inventory Records." For preparation and use of this form, refer to TM 38-750.

AIII-2. Security. It is desired that aircraft inventory records be unclassified. Therefore, when equipment bearing a security classification or the installation of unclassified equipment is of a confidential or secret nature, accomplishment of the classification will be in accordance with existing security regulations.

AIII-3. Inventoriable Items. The selection of inventoriable items is without regard to the agency, Governmental or contractual, furnishing the items.

a. Items to be listed are:

(1) Items essential to the execution of the designated mission of the aircraft, such as electronic, photographic, armament, special mission instruments and safety and comfort equipment.

(2) Loose equipment delivered with the aircraft and items subject to pilferage or readily converted to personal use.

(3) Modification kits which are issued or distributed to using organizations for installation and which are not immediately placed in work will be recorded on the affected aircrafts DA Form 2408-17 (Aircraft Inventory Record) and identified as loose equipment until modification is completed.

(4) Equipment required for operation in special environment.

b. Items to be excluded are:

(1) Non-accountable items coded as expendable in the applicable stock lists.

(2) Personal issue or furnished on unit allowance or other authority.

(3) Items or components considered as basic or integral parts of the airframe or basic aircraft such as engines, propellers, wheels and standard instruments.

(4) Technical publications, check lists and aircraft forms.

AIII-4. Periods of Inventory. Inventoriable items will be checked against the Aircraft Inventory Record, (DA Form 2408-17) at the following periods:

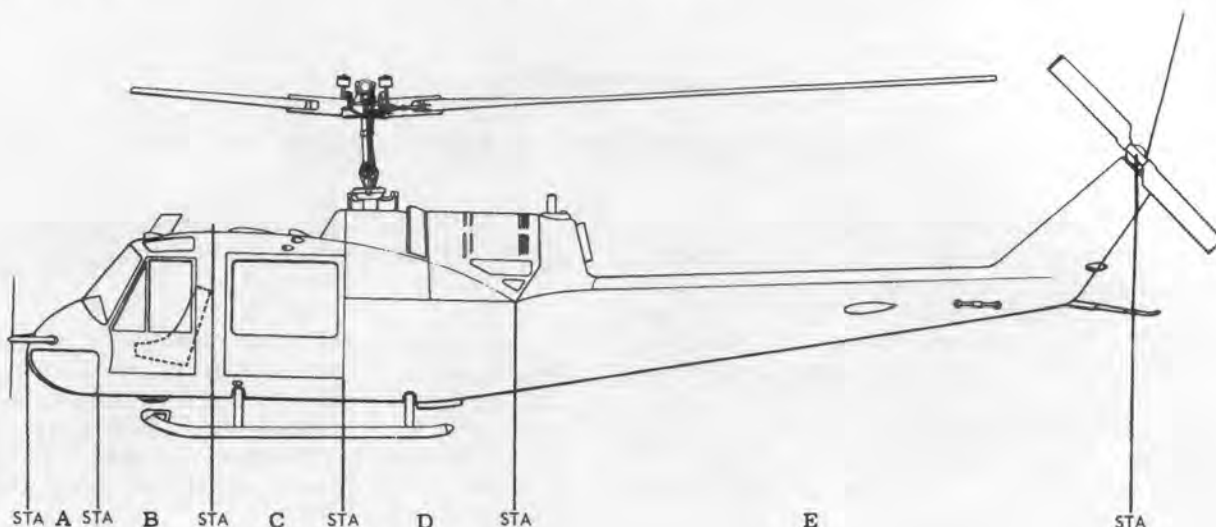
a. Upon receipt of the aircraft.

b. Prior to transfer of the aircraft to another organization.

c. Upon placing aircraft in storage and upon removing from storage. Aircraft need not be inventoried while in storage.

d. Twelve months elapsed time since last inventory.

e. Loose equipment shipped under separate cover are inventoried upon transfer by the sending activity and immediately upon receipt by the receiving activity.



A — Nose Compartment
Sta 7.6 to Sta 23.0

B — Pilot's Compartment
Sta 23.0 to Sta 70.0

C — Cargo Compartment
Sta 70.0 to Sta 123.0

D — Aft Fuselage Compartment
Sta 123.0 to Sta 195.0

E — Exterior

204900-132A

Figure AIII-1. Inventory items list compartment diagram (UH-1A and UH-1B)

AIII-5. Inventory Items List.

Note

Only those items listed which are installed or assigned to a particular aircraft are to be listed on the DA Form 2408-17, "Aircraft Inventory Record," for the aircraft.

Nomenclature		Aircraft Series and Number of Items Normally Installed		Remarks
		UH-1A	UH-1B	
Section A — Nose Compartment				
AN/ARN-30 () Receiver	Omni Range	1	1	FY63 UH-1B
AN/ARA-31	FM Homing	1	1	
AN/ARN-32	Marker Beacon	1		
AN/ARC-44	FM Radio Set	1	1	
AN/ARC-51X	UHF Radio Set		1	
AN/ARC-55	UHF Radio Set	1	1	
AN/ARN-5g	ADF	1	1	FY64 UH-1B
AN/ARC-73	UHF Radio Set	1	1	
R-1041/ARN	Marker Beacon		1	
T-366/ARC	VHF Transmitter		1	
AN/ARC-54	FM Radio Set		1	

Nomenclature	Aircraft Series and Number of Items Normally Installed		Remarks
	UH-1A	UH-1B	
Section B — Pilot's Compartment			
C-1611/AIC Intercom		3	FY63 UH-1B
SB-329/AR Intercom	3	3	
Clock 1 7/8 inch Dial: Type A-13A	1	1	
Compass, Magnetic: Pilot Standby	1	1	
Pilot Seat and Back Cushions	1	1	
Copilot Seat and Back Cushions	1	1	
Pilot Seat Belt and Shoulder Harness	1	1	
Copilot Seat Belt and Shoulder Harness	1	1	
Fire Extinguisher: Type A-20	1	1	FY61 UH-1B
Fire Extinguisher: Vaporizing Liquid Type		1	
Blackout Curtains	3	3	
Section C — Cargo Compartment			
H-101/U MIC-Headset	1	1	
First Aid Kit(s)	1	1 (3)	(3) on FY 62, 63, 64 UH-1B
Medical Attendant Seat	1	1	
Medical Attendant Seat Belt	1	1	
Passenger Seats Against Firewall	2	2	
Passenger Seat Belts Against Firewall	4	5	
Passenger Seats: Forward Arrangement Includes Medical Attendant's Seat		2	
Passenger Seat Belts: Forward Arrangement		2	
Litter Rack (Number of Patients)	2	3	
Auxiliary Fuel Tank Kit (165 Gallon)	1	1	
Auxiliary Fuel Tank Kit (350 Gallon)		1	
External Fuel Tank Kit (200 Gallon)		1	Two 100 Gallon Tanks Two 60 Gallon Tanks FY64 UH-1B
External Fuel Tank Kit (120 Gallon)		1	
Internal Fuel Tank Kit (60 Gallon)		1	
Blood Bottle Hangers	2	3	
Aft Bulkhead Tiedown Fittings		8	
Cargo Restraint Device		1	
Parachute Anchor Line Cable Kit		1	FY 64 UH-1B
Section D — Aft Fuselage Compartment			
AN/APX-44 Transponder Set	1	1	
AN/ARC-102 HF Radio Set		1	FY 63 UH-1B
J-2 Gyro Compass	1	1	
Luggage Compartment Net	1	1	
100,000 BTU Heater Kit	1	1	
Blade Anti-Icing Kit		1	FY 64 UH-1B

Nomenclature	Aircraft Series and Number of Items Normally Installed		Remarks
	UH-1A	UH-1B	
	Section E — Exterior		
Pitot Tube All Weather Cover	1	1	
Rear View Mirror		1	
Engine Air Inlet All Weather Cover	1	1	FY 61 and Subsequent
Hard Point Fittings		4	UH-1B
External Stores Kit (SS-11)		1	FY 62, 63, 64, UH-1B
External Stores Kit (XM-6E3)		1	FY 62, 63, 64, UH-1B
External Stores Kit (XM-3)		1	FY 62, 63, 64, UH-1B
External Stores Kit (ASW-12)		1	FY 62, 63, 64, UH-1B
External Stores Kit (XM-153MG)		1	FY 62, 63, 64, UH-1B
External Stores Kit (XM-75)		1	FY 62 UH-1B
Engine Exhaust All Weather Cover	1	1	
Main Rotor Blade Tiedown Rig	1	1	
Tail Rotor Blade Tiedown Rig	1	1	
Air Transportability Kit		1	

APPENDIX IV

WEIGHT AND BALANCE

AIV-1. Weight and Balance. For general weight and balance information, refer to TM 55-405-9, Army Aviation Maintenance Engineering Manual, Weight and Balance, Appen-

dix II, Maintenance Allocation chart, should be consulted for responsibility of weighing and balancing of the aircraft.

ALPHABETICAL INDEX

SUBJECT	PAGE	SUBJECT	PAGE
A			
AC Circuit Breakers	12-18	Alternating Current	12-18
AC Voltmeter	10-10	Altimeter	10-2
Access Doors	4-1	Ammunition Feed Group	14-5
Accessory Drive Gear Box	5-31	Anti-Collision Light	12-8
Accident Engines	16-10	Anti-Icing Air Valve	11-31
Accumulator — Hydraulic	6-23A	Anti-Icing — Engine	11-28
Accumulator and Valve — Hydraulic	6-23C	Anti-Icing Interpreter	11-30
Accumulator Drain Valve	6-23B		11-32
Activation After Storage	16-8	Anti-Icing System	11-28
Actuator — Power Turbine Governor	5-100	Anti-Drive Link	8-56C
Adapter — Machine Gun	14-3	Appendix I	AI-1
Adapter — Rocket	14-14	Appendix II	AII-1
Adjuster — Tail Rotor	9-18	Appendix III	AIII-1
Air Blower — Heater	11-8	Appendix IV	AIV-1
	11-22	Armament	14-1
Air Control — Heater	11-9	Armament Control System	14-1
Air Cycling Switch — Heated	11-9	Armored Seat	4-10
Air Flow Regulator	11-28	Attitude Indicator	10-4
Air Induction	5-32	Authorization for Issue	1-1
Air Mixing Valve — Hot	11-16	Auxiliary Exhaust Heater	11-24
Air Pressure Gage — Hydraulic	6-23A	Auxiliary Float Switch	5-49
Air Pressure Switch — Heater	11-8	Auxiliary Fuel Control Panel —	
	11-22	External	15-6
Air Scoops	11-27	Auxiliary Fuel Provisions	5-56
Air Screens — Fresh	11-9	Auxiliary Fuel Pylon — External	15-5
	11-22	Auxiliary Fuel Systems	11-37
Air Selector Box — Missile	14-30	Auxiliary Fuel Tanks — Internal	11-44
Air Separator Valve Control	11-18	Auxiliary Fuel Tank Sump	11-39
Air Separator Valve — Heating	11-18		11-43
Air Valves	11-23	Auxiliary Fuel Tank Transfer Pump	11-39
Air Valve — Anti-Icing	11-31		11-43
Air Valves — Cabin	11-10	Auxiliary Fuel Tank — 165.0 Gal.	11-37
Air Valves — Heated	11-18	Auxiliary Fuel Tank — 350.0 Gal.	11-40
Air Valve	6-23	Auxiliary Fuel Tank — 60.0 Gal.	15-1
Airbleed — Interstage	5-25	Auxiliary Heater	11-19
Aircraft — General	1-21	Auxiliary Power	12-17
Aircraft Inventory Master Guide	AIII-1	Auxiliary Power Unit	11-37
Aircraft — Storage of	16-1	Avionics	13-1
Airframe	4-1	Avionics Storage	16-5
Airframe Depreservation	16-8		16-7
Airframe Storage	16-2	B	
	16-4	Balance and Weight	AIV-1
	16-5	Bar — Stabilizer	8-12
Airspeed Indicator	10-2		8-32A
Alighting Gear	4-1		8-50B
	4-39	Battery	12-14
Allocation Chart — Maintenance	AII-1	Battery Depreservation	16-8
Alternate Fuel	1-29	Battery Relay	12-4

SUBJECT	PAGE	SUBJECT	PAGE
Battery — Servicing	1-34	Cambox — Power Turbine Governor	5-106
Battery Storage	16-4	Cargo Door	4-5
	16-7	Cargo Release — Mechanical	4-22
Battery Sump Jar	12-16	Cargo Suspension	4-20
Battery Sump Jar — Servicing	1-34	Cargo Tiedown	4-15
Bearing — Heading Indicator	10-5	Case — Chart and Map	4-25
Blackout Curtains	4-15	Caution — Definition	1-1
Blade — Main Rotor	8-1	Cell — Fuel	5-39
	8-5	Chart Case	4-25
	8-20	Charts — Lubrication	2-1
	8-23	Chart — Maintenance Allocation	AII-1
	8-41	Charts — Power Load	1-3
	8-46	Check Valves — Fuel	5-50
Blade — Tail Rotor	8-57	Chip Detector — Transmission	7-31
	8-61	Circuit Breakers — AC	12-18
	8-67	Circuit Breakers — DC	12-9
	8-69	Cleaning	1-35
	8-74	Cleaning — Engine	5-11
	8-77	Clock	10-11
Bleed Air Defroster	11-13	Clutches	7-17
Bleed Air Heater	11-13	Coding Data	1-3
Bleed Air Selector Valve	11-13	Collective Idler Bracket	8-56D
Bleed Air Separator Valve	11-18	Collective Idler Link	8-56D
Bleed Air Venturi	11-16	Collective Pitch Control	9-4
Blower — Heater Air	11-8	Collective Pitch Hydraulic Cylinder	6-8
	11-22		6-23D
Blower — Heater Vent	11-8	Collective Sleeve	8-14
	11-22		8-34
Blower — Ventilation	11-26	Collet — Friction	8-54
Bolts — Safety	4-12	Combustion Heater	11-1
Bombing Equipment	14-9	Command Box — Missile	14-26
Boom — Missile	14-23	Compass — Gyro Magnetic	10-5
	14-28	Compass — Radio	10-5
Boom — Tail	4-32	Compass — Standby	10-6
Boost Pump — Fuel	5-53	Components — Heater	11-27
Box — Heater Fuel Control	11-5	Consumable Materials	1-35
	11-20	Contamination — Gear Box	7-5
Bracket — Collective Idler	8-56D	Contents — Manual	1-2
Brake — Magnetic	9-18	Control — Air Separator Valve	11-18
Breakers — AC Circuit	12-18	Control Box Fuel Filter — Heater	11-16
Breakers — DC Circuit	12-9		11-20
Bus Control Relay	12-6	Control Box Fuel Pressure Regulator — Heater	11-6
Bypass Solenoid Valve — Hydraulic	12-10		11-20
		Control Box — Heater Fuel	11-5
			11-20
		Control Box Lockout Relay — Heater	11-6
			11-20
		Control Box — Missile Remote	14-30
		Control Box Solenoid Valve — Heater	11-5
			11-20
		Controls — Cabin Register	11-10
		Control — Collective Pitch	9-4
		Control — Defroster	11-24
		Controls Depreservation	16-8

C

Cabin	4-1
Cabin Air Valves	11-10
Cabin Floor Registers	11-17
Cabin Heat Control Valve	11-10
Cabin Register	11-9
Cabin Register Controls	11-10
Cabin Windows	4-14
Cable — Paratroop Static Line	4-29
Cables — Tail Rotor	9-24

Index 3

SUBJECT	PAGE	SUBJECT	PAGE
Detector — Transmission Chip	7-31	Engines — Damaged	16-10
Device — Mechanical Jettison	15-6	Engine Depreservation	16-8
Diagrams — Wiring	12-20	Engine Fuel System	5-43
Dial — Heat Selector Valve	11-23	Engine Instruments	10-6
Direct Current	12-1	Engine Lubricants	5-11
Distribution System	1-1	Engine Mounts	5-23
Doors — Access	4-1	Engine Oil Cooler	5-64
Door — Cargo	4-5	Engine Oil Filter	5-74
Door — Copilot	4-1		5-75
Doors — Drive Shaft	4-33	Engine Oil Pressure Indicator	10-7
Door — Fuel Cell	5-43	Engine Oil Pressure Transmitter	12-18
Door Latch	4-3	Engine Oil Pump	5-70
	4-7	Engine Oil Shut-Off Valve	5-73
Door — Electrical Compartment	4-1	Engine Oil Strainers	5-68
Door — Equipment Compartment	4-1	Engine Oil System	5-56
Door — Nose	4-3		5-58
Door — Pilot	4-1	Engine Oil Tank	5-64
Door Windows	4-14	Engine Oil Temperature Indicator	10-7
Drain Tubes	11-28	Engine Operation	5-7
Drain Valve	5-53	Engine Painting	5-14
Drain Valve — Hydraulic Accumulator ..	6-23B	Engine Seals	5-15
Drive Gear Box — Accessory	5-31	Engine Storage	16-2
Drive Quill — Generator	7-39		16-3
Drive Quill — Hydraulic Pump	7-39		16-4
Drive Quill — Input	7-37		16-5
Drive Quill — Tachometer	7-39		16-6
Drive Quill — Tail Rotor	7-40		16-8
Drive Shaft Doors	4-33	Engine Trouble Shooting	5-17
Drive Shaft Hangers	7-42	Environment Factors	1-21
Drive Shaft — Main	7-7	Equipment Compartment Door	4-1
Drive Shafts — Tail Rotor	7-41	Equipment — Special	1-35
Dual Tachometer	10-6	Exchanger — Heat	11-24
Dynamic Stops	8-51	Exhaust Heater — Auxiliary	11-24
		Exhaust System	5-35
E		Exhaust Temperature Indicator	10-9
Electrical Compartment Door	4-1	Exhaust Thermocouples	5-37
Electrical Fuel Filter	5-51	External Auxiliary Fuel Control Panel ..	15-6
Electrical Systems	12-1	External Auxiliary Fuel Pylon	15-5
Elements — Filter	6-22	External Auxiliary Fuel Tank —	
Element — Fluid Pressure Filter	6-7	60.0 Gal.	15-1
Element — Fresh Air Sensing	11-20	External Power	1-27
Element — Hot Air Sensing	11-21	External Power Receptacle	12-10A
Element — Reservoir Vent Filter	6-7	External Power Relay	12-11
Element — Temperature Sensitive	11-16	External Stores — Nonarmament	15-1
Elevator — Synchronized	4-34	External Stores Support Assembly	15-8
	4-36	Extinguisher — Fire	4-29
	9-29	Extinguisher System — Fire	11-35
Emergency Fuel	1-29		
Emergency Jettison Controls	4-29	F	
Empennage Section	4-89	Factors — Weather and Environment ..	1-21
Engine	5-1	Fairing — Tail Pipe	4-9
Engines — Accident	16-10	Fairing — Vertical Fin	4-34
Engine Anti-Icing	11-28	Field Control Relay — Generator	12-4
Engine Cleaning	5-11	Filter — Electrical Fuel	5-51
Engine Cowling	4-7		

Index 5

SUBJECT	PAGE	SUBJECT	PAGE
Generator Drive Quill	7-39	Heater Components	11-27
Generator Field Control Relay	12-4	Heater Control Box Fuel Filter	11-6
Generator — Gas Producer Tachometer	12-17	.....	11-20
Generator — Main	12-16	Heater Control Box Fuel Pressure	
Generator — Missile Signal	14-27	Regulator	11-6
Generator — Power Turbine Tachometer	12-17	.....	11-20
Generator — Rotor Tachometer	12-16	Heater Control Box Lockout Relay	11-6
Generator — Starter	5-82	.....	11-20
Governor Actuator — Power Turbine	5-100	Heater Control Box Solenoid Valve	11-5
Governor Cambox — Power Turbine	5-106	.....	11-20
Governor — Fuel Control Overspeed	5-90	Heater Cycling Switch	11-7
.....	5-91	.....	11-21
Gradient — Force	9-11	Heater Four-Way Control Valve	11-17
Ground Handling	1-23	Heater Fuel Control Box	11-5
Ground Handling Mechanism	4-42	.....	11-20
Ground Handling Servicing	1-34	Heater Fuel Control Pump	11-5
Ground Handling Wheels	4-42	.....	11-20
Guide — Aircraft Inventory Master	AIII-1	Heater Igniter Plug	11-1
Gun Adaptor — Machine	14-3	.....	11-19
Gun Control Panel — Machine	14-8	Heater Ignition Assembly	11-4
Gun Firing Relay — Machine	14-8	.....	11-20
Gun Installation — Machine	14-1	Heater Outlet Control	11-11
Gun Mount — Machine	14-3	Heater Overheat Switch	11-7
Gun Sighting Station — Machine	14-8	.....	11-21
Gunner Sight — Missile	14-24	Heater Purge Switch	11-7
.....	14-28	.....	11-21
Gunnery Equipment	14-1	Heater Thermostat	11-11
Gyro Magnetic Compass	10-5	Heater Vent Blower	11-8
		.....	11-22
		Heating Air Separator Valve	11-18
		Heating and Ventilating	11-1
		Heating Control Panel	11-13
		.....	11-24
		Helicopter Depreservation	16-8
		Helicopter — Destruction of	16-10
		Helicopters — Inspection of Stored	16-1
		Hoist Provisions — Rescue	4-24
		Hoisting	1-23
		Hot Air Mixing Valve	11-16
		Hot Air Sensing Element	11-21
		Hub — Main Rotor	8-1
		.....	8-10
		.....	8-20
		.....	8-31
		.....	8-41
		Hub — Tail Rotor	8-57
		.....	8-67
		.....	8-74
		Hydraulic Accumulator	6-23A
		Hydraulic Accumulator Drain Valve	6-23B
		Hydraulic Air Pressure Gage	6-23A
		Hydraulic Air Valve	6-23
		Hydraulic Bypass Solenoid Valve	12-10
		Hydraulic Components	6-14
		.....	6-26

Index 7

SUBJECT	PAGE	SUBJECT	PAGE
Leads — Igniter	5-82	Main Rotor Group	8-1
Lead Spool Resistor — Thermocouple	12-9	Main Rotor Hub	8-1
Leveling	1-28	.....	8-10
Lever and Tube — Cyclic	9-8	.....	8-20
Lever — Power Control	5-94	.....	8-31
Lever — Power Turbine Control	5-100	.....	8-41
Light — Anti-Collision	12-8	Main Rotor Mast	7-33
Lights — Interior	12-7	Maintenance Allocation Chart	AII-1
Light — Landing	12-7	Maintenance Functions	AII-1
Lights — Navigation	12-8	Main Transmission	7-17
Light — Search	12-7	Mandatory Requirements	1-1
Limit Warning System — RPM	12-11	Manifold — Fuel	5-50
Limited Storage	16-1	Manifolds — Fuel	5-54
Link — Anti-Drive	8-56C	Manifold — Transmission Oil	7-28
Link — Collective Idler	8-56D	Manual Contents	1-2
Linkage — Cyclic Control	9-12	Manual Improvements	1-1
.....	9-16	Map Case	4-25
Linkage — Pitch Control	9-6	Mast — Main Rotor	7-33
Linkage — Power Control	5-94	Master Guide — Aircraft Inventory	AIII-1
Linkage — Power Turbine	5-106	Materials — Consumable	1-35
List — Inventory Items	AIII-2	Materials — Servicing	1-20
Litters — Curved Stanchion	4-25	Medical Attendant Seat	4-11
Litters — UH-1A	4-25	Mechanical Cargo Release	4-22
Litters — Vertical Stanchion	4-27	Mechanical Jettison Device	15-6
Load Charts — Power	1-3	Mechanism — Ground Handling	4-42
Loadmeter	10-11	Metal Particles Identification	7-5
Lockout Relay — Heater Control Box	11-6	Metal Repair — Sheet	4-38
.....	11-20	Mirror — Rear View	4-24
Lock Out Valve — Hydraulic	6-23B	Miscellaneous Instruments	10-6
Lubricants — Engine	5-11	Missile	14-17
Lubrication Charts	2-1	.....	14-28
Lubrication Instructions	2-1	Missile Air Selector Box	14-30
		Missile Boom	14-23
		.....	14-28
		Missile Command Box	14-26
		Missile Control Stick	14-24
		.....	14-28
		Missile Gunner Sight	14-24
		.....	14-28
		Missile Launcher	14-22
		.....	14-28
		Missile Pilot Sight	14-26
		Missile Pylon	14-22
		.....	14-28
		Missile Remote Control Box	14-30
		Missile Selector Box	14-27
		Missile Signal Generator	14-27
		Mixing Valve — Hot Air	11-16
		.....	11-26
		Modules — Hydraulic	6-21
		Mooring	1-23
		Motor and Converter — Windshield	
		Wiper	11-36
		Mounts — Engine	5-23
		Mount — Machine Gun	14-3

SUBJECT	PAGE	SUBJECT	PAGE
Mounts — Transmission	7-18	Overheat Switch — Heater	11-7
Movable Flight Controls	9-1	.....	11-21
N			
Navigation Instruments	10-5	Overspeed Governor — Fuel Control	5-90
Navigation Lights	12-8	.....	5-91
Navigation Lights Flasher	12-8	Overvoltage Relay	12-6
Noise Suppressors	11-17	Oxygen System	11-32
Non-Essential Bus Relay	12-6	P	
Nonarmament External Stores	15-1	Painting	1-35
Nose Door	4-3	Painting — Engine	5-14
Notes — Definition	1-1	Panels — Control	12-9
Nozzle — Defroster	11-12	Panel — External Auxiliary Fuel Control	15-6
.....	11-13	Panel — Heating Control	11-13
.....	11-18	.....	11-24
Nozzles — Fuel Starting	5-54	Panel — Instrument	10-1
O			
Oil Cooler — Engine	5-64	Panel — Machine Gun Control	14-8
Oil Cooler — Transmission	7-31	Panel — Rocket Control	14-15
Oil Data	1-20	Panel — Rocket Sight Light	14-16
Oil Filter — Engine	5-74	Paratroop Static Line Cable	4-29
.....	5-75	Parking	1-26
Oil Filter — Transmission External	7-21	Pedal — Tail Rotor	9-18
Oil Filter — Transmission Primary	7-21	Periods of Inventory	AIII-1
Oil Gage — Transmission	7-31	Photographic	13-1
Oil Jets — Transmission	7-26	Pilot Door	4-1
Oil Manifold — Transmission	7-28	Pilot Seat	4-10
Oil Pressure Indicator — Engine	10-7	Pilot Sight — Missile	14-26
Oil Pressure Indicator — Transmission	10-8	.....	14-30
Oil Pressure Switch	5-76	Pitch Control — Collective	9-4
Oil Pressure Transmitter	5-76	Pitch Control Linkage	9-6
Oil Pressure Transmitter — Engine	12-18	Pitch Control Mechanism — Tail Rotor	9-21
Oil Pressure Transmitter —	12-18	Pitot — Static System	10-2
Transmission	12-18	.....	10-3
Oil Pump — Engine	5-70	Plates — Inspection	4-5
Oil Pump Screen — Transmission	7-30	Platform — Work	4-15
Oil Pump — Transmission	7-29	Plug — Heater Igniter	11-1
Oil Servicing	1-31	.....	11-19
Oil Shut-Off Valve — Engine	5-73	Plugs — Igniter	5-82
Oil Strainers — Engine	5-68	Plug — Transmission Magnetic Sump	7-31
Oil System	5-56	Pneumatic System	6-26
Oil System — Engine	5-56	Power — Auxiliary	12-17
.....	5-58	Power Controls	5-94
Oil System — Transmission	7-18	Power Control Lever	5-94
Oil Tank — Engine	5-64	Power Control Linkage	5-94
Oil Temperature Indicator — Engine	10-7	Power — External	1-27
Oil Temperature Indicator —	10-9	Power Load Charts	1-3
Transmission	10-9	Power Plant	5-1
One Man Seat	4-11	Power Receptacle — External	12-10A
Operation — Engine	5-7	Power Relay — External	12-11
Outlet Control — Heat	11-11	Power Train Depreservation	16-8
Overhaul Schedule	3-54	Power Train Storage	16-4
		.....	16-7
		Power Train System	7-1
		Power Turbine Control Lever	5-100
		Power Turbine Governor Acuator	5-100

SUBJECT	PAGE
Power Turbine Governor Cambox	5-106
Power Turbine Linkage	5-106
Power Turbine Tachometer Generator	12-17
Power Unit — Auxiliary	11-37
Preservation — Renewal of	16-9
Pressure Gage — Hydraulic Air	6-23A
Pressure Indicator — Engine Oil	10-7
Pressure Indicator — Transmission Oil..	10-8
Pressure Regulator — Heater	
Control Box Fuel	11-6
	11-20
Pressure Switch — Fuel	5-49
Pressure Switch — Heater Air	11-8
	11-22
Pressure Switch — Oil	5-76
Pressure Transmitter — Engine Oil	12-18
Pressure Transmitter — Fuel	5-48
Pressure Transmitter — Oil	5-76
Pressure Transmitter — Torque	12-18
Pressure Transmitter — Transmission Oil	12-18
Pressure Warning Switch — Hydraulic...	12-9
Procedures — Storage	16-1
Provisions — Auxiliary Fuel	5-56
Pump — Auxiliary Fuel Tank Transfer..	11-39
	11-43
Pump Drive Quill — Hydraulic	7-39
Pump — Engine Oil	5-70
Pump — Fuel Boost	5-53
Pump — Heater Fuel Control	11-5
	11-20
Pump — Hydraulic	6-7
	6-21
Pump Screen — Transmission Oil	7-30
Pump — Torquemeter Rotary	5-71
Pump — Transmission Oil	7-29
Purge Switch — Heater	11-7
	11-21
Pylon — External Auxiliary Fuel	15-5
Pylon — Missile	14-22
	14-28
Pylon Section	4-39

9

Quadrant — Tail Rotor	9-20
Quantity Gage Tank Unit	5-48
Quill — Tachometer Drive	7-39
Quill — Tail Rotor Drive	7-40
Quill — Generator Drive	7-39
Quill — Hydraulic Pump Drive	7-39
Quill — Input Drive	7-37

SUBJECT	PAGE
R	
Radio Compass	10-5
Rear View Mirror	4-24
Receptacle — External Power	12-10A
Reel — Inertia	4-12
References	AI-1
Reference Data	1-3
Registers — Cabin Floor	11-9
	11-17
Register Controls — Cabin	11-10
Registers — Heat	11-11
Regulator — Air Flow	11-28
Regulator — Heater Control Box	
Fuel Pressure	11-6
	11-20
Regulator — Voltage	12-4
Relay — Battery	12-4
Relay — Bus Control	12-6
Relay — External Power	12-11
Relay — Generator Field Control	12-4
Relay — Heat Control	11-23
Relay — Heater Control Box Lockout	11-6
	11-20
Relay — Machine Gun Firing	14-8
Relay — Non-Essential Bus	12-6
Relay — Overvoltage	12-6
Relay — Reverse Current	12-6
Relay — Starter	12-7
Release — Mechanical Cargo	4-22
Relief Valves — Thermal	5-50
Relief Valve — Transmission Pressure	7-28
Remote Sensor	11-26
Renewal of Preservation	16-9
Repair — Sheet Metal	4-38
Requirements — Mandatory	1-1
Rescue Hoist Provisions	4-24
Reservoir — Hydraulic	6-7
	6-22
Reservoirs — Rotor Servicing	1-32
Reservoir Vent Filter Element	6-7
Resistor — Thermocouple Lead Spool	12-9
Retirement Schedule	3-54
Reverse Current Relay	12-6
Revision System	1-1
Rheostat	12-9
Rocket	14-9
Rocket Adapter	14-14
Rocket Control Panel	14-15
Rocket Equipment	14-9
Rocket Junction Box	14-17
Rocket Launcher	14-14
Rocket Sight	14-16
Rocket Sight Light Panel	14-16
Roof Windows	4-14

SUBJECT	PAGE	SUBJECT	PAGE
Rotary Pump — Torquemeter	5-71	Selector Valve — Bleed Air	11-13
Rotor Blade — Main	8-1	Selector Valve Control — Heat	11-23
	8-5	Selector Valve Dial — Heat	11-23
	8-20	Selector Valve — Heat	11-22
	8-23		11-27
	8-41	Sensing Element — Fresh Air	11-20
	8-46	Sensing Element — Hot Air	11-21
Rotor Blade — Tail	8-57	Sensor — Remote	11-26
	8-61	Separator Valve Control — Air	11-18
	8-67	Separator Valve — Heating Air	11-18
	8-69	Serviceability Standards	3-62
	8-74	Servicing	1-28
	8-77	Servicing Battery	1-34
Rotors Depreservation	16-8	Servicing — Battery Sump Jar	1-34
Rotor Drive Quill — Tail	7-40	Servicing Dampers	1-32
Rotor Drive Shafts — Tail	7-41	Servicing — Gear Box	1-31
Rotor Gear Box — Tail	7-45	Servicing — Ground Handling	1-34
Rotor Group — Main	8-1	Servicing — Hydraulics	1-33
Rotor Group — Tail	8-1	Servicing Materials	1-20
Rotor Hub — Main	8-1	Servicing — Oil	1-31
	8-10	Servicing Rotor Reservoirs	1-32
	8-20	Servicing Tires	1-33
	8-31	Servicing — Transmission	1-31
	8-41	Servo Valves	6-13
Rotor Hub — Tail	8-57		6-26
	8-67	Shaft Hangers — Drive	7-42
	8-74	Shaft — Main Drive	7-7
Rotor Mast — Main	7-33	Shafts — Tail Rotor Drive	7-41
Rotor Reservoirs Servicing	1-32	Sheet Metal Repair	4-38
Rotors Storage	16-4	Shoes — Skid	4-39
	16-7	Shoulder Harness	4-12
Rotor Tachometer Generator	12-16	Shut-Off Valve — Engine Oil	5-73
RPM Limit Warning System	12-11	Shut-Off Valve — Fuel	5-53
		Signal Generator — Missile	14-27
		Sight Light Panel — Rocket	14-16
		Sight — Missile Gunner	14-24
			14-28
		Sight — Missile Pilot	14-26
			14-30
		Sight — Rocket	14-16
		Sighting Station — Machine Gun	14-8
		Skid Shoes	4-39
		Skid — Tail	4-38
		Skid Tubes	4-39
		Sleeve and Scissors	8-17
			8-38
			8-54
		Sleeve — Collective	7-
			8-14
			8-34
		Slip Indicator	10-8
		Solenoid — Four Way Control Valve	11-17
		Solenoid Valve — Fuel	5-51
		Solenoid Valve — Heater Control Box	11-5
			11-20

S

Safety Belts	4-12
Schedule — Overhaul and Retirement	3-54
Scissors and Sleeve	8-17
	8-38
	8-54
Scoops — Air	11-27
Screens — Fresh Air	11-9
	11-22
Screen — Transmission Oil Pump	7-30
Seals — Engine	5-15
Search Light	12-7
Seat — Armored	4-10
Seat — Copilot	4-10
Seat — Medical Attendant	4-11
Seat — One Man	4-11
Seat — Pilot	4-10
Seats — Troop	4-11
Selector Box — Missile	14-27
Selector Box — Missile Air	14-30

SUBJECT	PAGE	SUBJECT	PAGE
Solenoid Valve — Hydraulic	6-23C	Storage Procedures	16-1
Solenoid Valve — Hydraulic Bypass	12-10	Storage — Rotors	16-4
Soundproofing	4-15	.....	16-7
Special Equipment	1-35	Storage — Temporary	16-1
Special Inspection	3-3	.....	16-2
Special Tools	1-35	Storage — Utility Equipment	16-7
Stabilizer Bar	8-12	Stored Helicopters — Inspection of	16-1
.....	8-32A	Stores — Nonarmament External	15-1
.....	8-50B	Strainers — Engine Oil	5-68
Stabilizer Bar Dampers	8-13	Strainers — Fuel Control	5-87
.....	8-34	.....	5-89
.....	8-51	Strainer — Main Fuel	5-46
Standards of Serviceability	3-62	.....	5-47
Standby Compass	10-6	Sump Assembly — Fuel	5-54
Starter — Generator	5-82	Sump — Auxiliary Fuel Tank	11-39
Starter Relay	12-7	.....	11-43
Starting Nozzles — Fuel	5-54	Sump Jar — Battery	12-16
Static — Pitot System	10-2	Sump Jar — Servicing Battery	1-34
.....	10-3	Sump Plug — Transmission Magnetic	7-31
Stick — Cyclic Control	9-8	Support Assembly — External Stores	15-8
Stick — Missile Control	14-24	Suppressors — Noise	11-17
.....	14-28	Suspension — Cargo	4-20
Stops — Dynamic	8-51	Swashplate	8-14
Storage — Activation After	16-8	.....	8-34
Storage — Airframe	16-2	.....	8-56B
.....	16-4	Switch — Auxiliary Float	5-49
.....	16-5	Switch — Fuel Pressure	5-49
Storage — Avionics	16-5	Switch — Heated Air Cycling	11-9
.....	16-7	Switch — Heater Air Pressure	11-8
Storage — Battery	16-4	.....	11-22
.....	16-7	Switch — Heater Cycling	11-7
Storage — Controls	16-4	.....	11-21
.....	16-7	Switch — Heater Overheat	11-7
Storage — Engine	16-2	.....	11-21
.....	16-3	Switch — Heater Purge	11-7
.....	16-4	.....	11-21
.....	16-5	Switch — Hydraulic Pressure Warning	12-9
.....	16-6	Switch — Oil Pressure	5-76
Storage — Flyable	16-1	Synchronized Elevator	4-34
.....	16-2	.....	4-36
Storage — Fuel Regulator	16-8	.....	9-29
Storage — Fuel System	16-3		
.....	16-4		
.....	16-7		
Storage — Hydraulic System	16-4		
.....	16-7		
Storage — Instruments	16-5		
.....	16-7		
Storage — Landing Gear	16-5		
.....	16-7		
Storage — Limited	16-1		
Storage of Aircraft	16-1		
Storage — Power Train	16-4		
.....	16-7		

T

Tachometer Drive Quill	7-39
Tachometer — Dual	10-6
Tachometer Generator — Gas Producer	12-17
Tachometer Generator — Power Turbine	12-17
Tachometer Generator — Rotor	12-16
Tachometer Indicator — Gas Producer	10-9
Tail Boom	4-32
Tail Pipe Fairing	4-9
Tail Rotor Adjuster	9-18

Index 13

[illegible]