

Illustrated Parts List and Maintenance Instructions

FOR

TDR-950 TRANSPONDER SYSTEM

USED ON HUGHES HELICOPTERS

500D (MODEL 369D), 500E (MODEL 369E), 530F (MODEL 369F)

AND 530F PLUS (MODEL 369FF)

**THIS REISSUE SUPERSEDES ALL
PREVIOUS ISSUES OF THIS PUBLICATION**

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MDHC HELICOPTERS TECHNICAL MANUAL RECOMMENDED CHANGE REPORT

This manual has been prepared and distributed by the Commercial Service Publications Department and is intended for use by personnel responsible for the maintenance of Hughes Helicopters. Periodic revision of this manual will be made to incorporate the latest information. If, in the opinion of the reader, any information has been omitted or requires clarification, please direct your comments to this office via this form (or a duplicate). An endeavor will be made to include such information in future revisions.

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F-1. PURPOSE AND CONTENT OF THIS MANUAL.

F-2. This manual supplements information contained in the Handbook of Maintenance Instruction (HMI) - Vol 1, and 369D and 369E/F - Illustrated Parts Catalog (IPC), and contains instructions for maintenance of the TDR-950 Transponder and associated components.

F-3. APPLICABILITY.

F-4. The Transponder system is applicable for use on any Hughes 500D (Model 369D), 500E (Model 369E), 530F (Model 369F) and 530F Plus (Model 369FF) helicopter.

F-5. COMPATIBILITY OF COMBINED OPTIONAL EQUIPMENT.

F-6. For compatibility information on which optional equipment may or may not be used in combination at the same time, refer to Section 21 of the HMI - Vol 1.

F-7. ORGANIZATION OF CONTENTS.

F-8. The contents of this manual are grouped into sections and sub-sections as outlined in the Table of Contents.

F-9. USE OF THIS MANUAL.

F-10. This manual is for use by operators of Hughes helicopter's equipped with the Collins TDR-950 Transponder. Although this manual is a separate publication, it should be kept with HMI - Vol 1, HMI - Vol 2, 369D and 369E/F - IPC and other handbooks listed in HMI - Vol 1, Section 1, that form the primary information file for the helicopter.

F-11. RELATED PUBLICATIONS.

F-12. Reference is made to HMI - Vol 1, 369D and 369E/F - IPC, the CSP supplement to basic handbook, and the Collins Transponder manual as required to accomplish instructions contained herein.

F-13. LITERATURE CHANGES AND REVISIONS.

F-14. Changes and revisions to contents of this manual are made as defined in HMI - Vol 1, Section 1.

1-1. SCOPE AND CONTENTS.

1-2. This illustrated parts list provides, by means of text (parts list) and companion illustrations, a complete parts requirement for installation of the TDR-950 Transponder, provided by McDonnell Douglas Helicopter Company, Culver City, California.

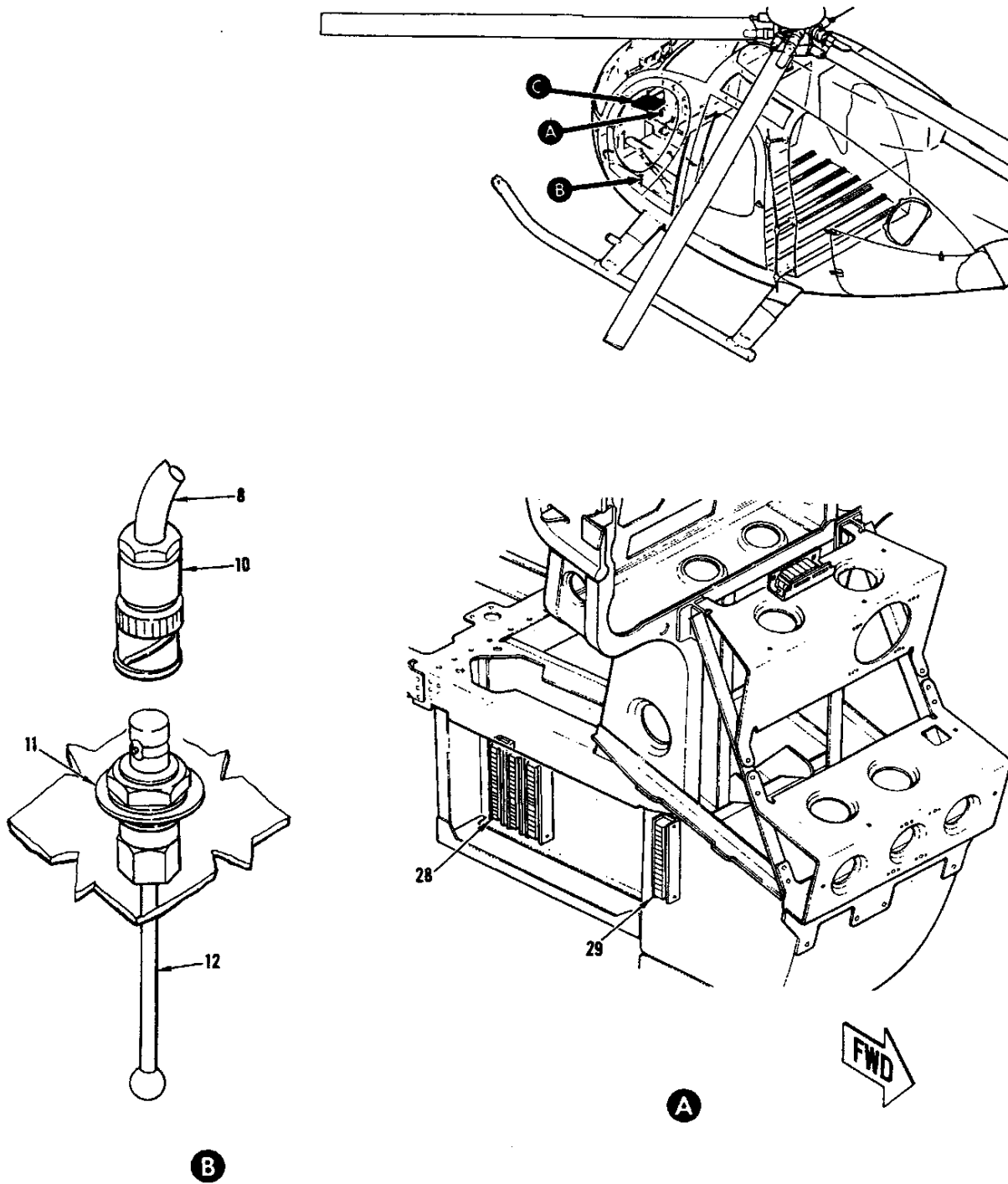
1-3. DETAILED PARTS LIST.

1-4. The detail parts list furnishes information for procuring replacement parts for the TDR-950 Transponder system. A normal "Installation drawing-assembly drawing-component" column indenture relationship cannot be fully adhered to

in this parts list because of engineering requirements. No "installation drawing" exists. A "REF" in the quantity column indicates the item is required by engineering configuration, in another publication, but is identified in this manual for system continuity. Items listed, however, represent a complete parts definition of components required to maintain the TDR-950 Transponder system.

1-5. ILLUSTRATIONS.

1-6. Isometric illustrations are provided for the detailed parts list. The illustration is exploded to the extent necessary to show parts relationship for the Transponder system.



47-1000-1A

Figure 1-1. TDR-950 Transponder system, early configuration (sheet 1 of 2)

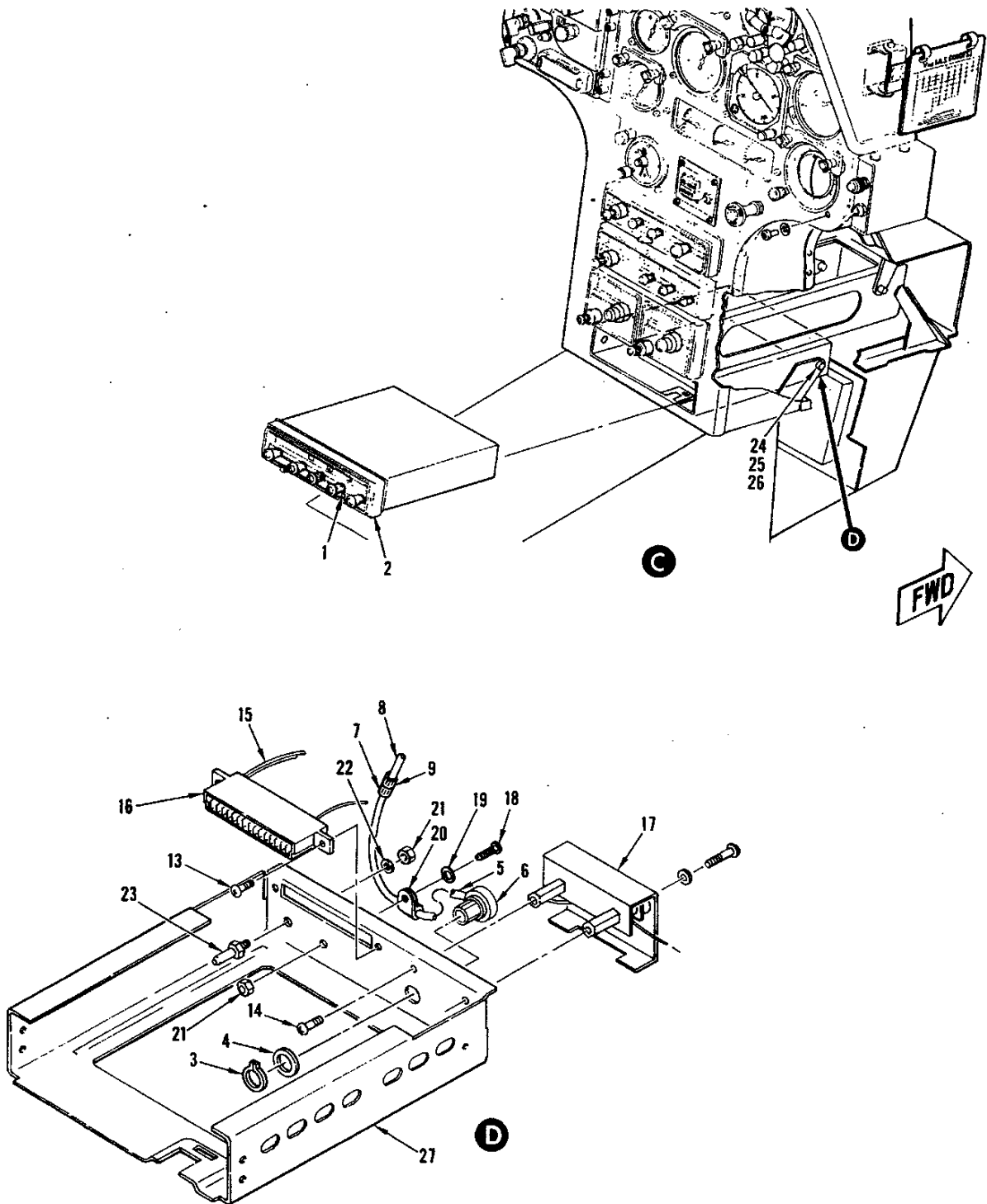
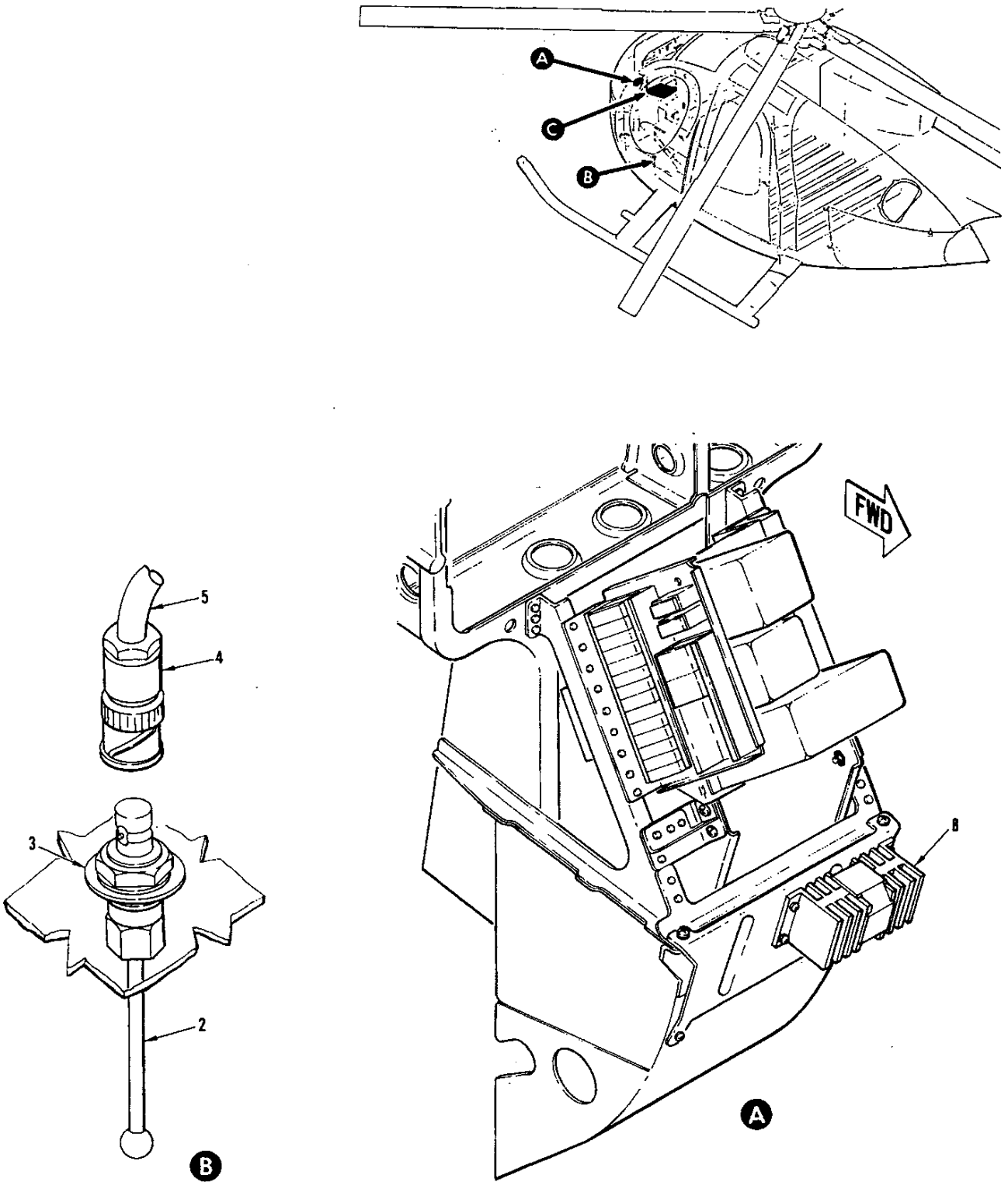


Figure 1-1. TDR-950 Transponder system, early configuration (sheet 2 of 2)

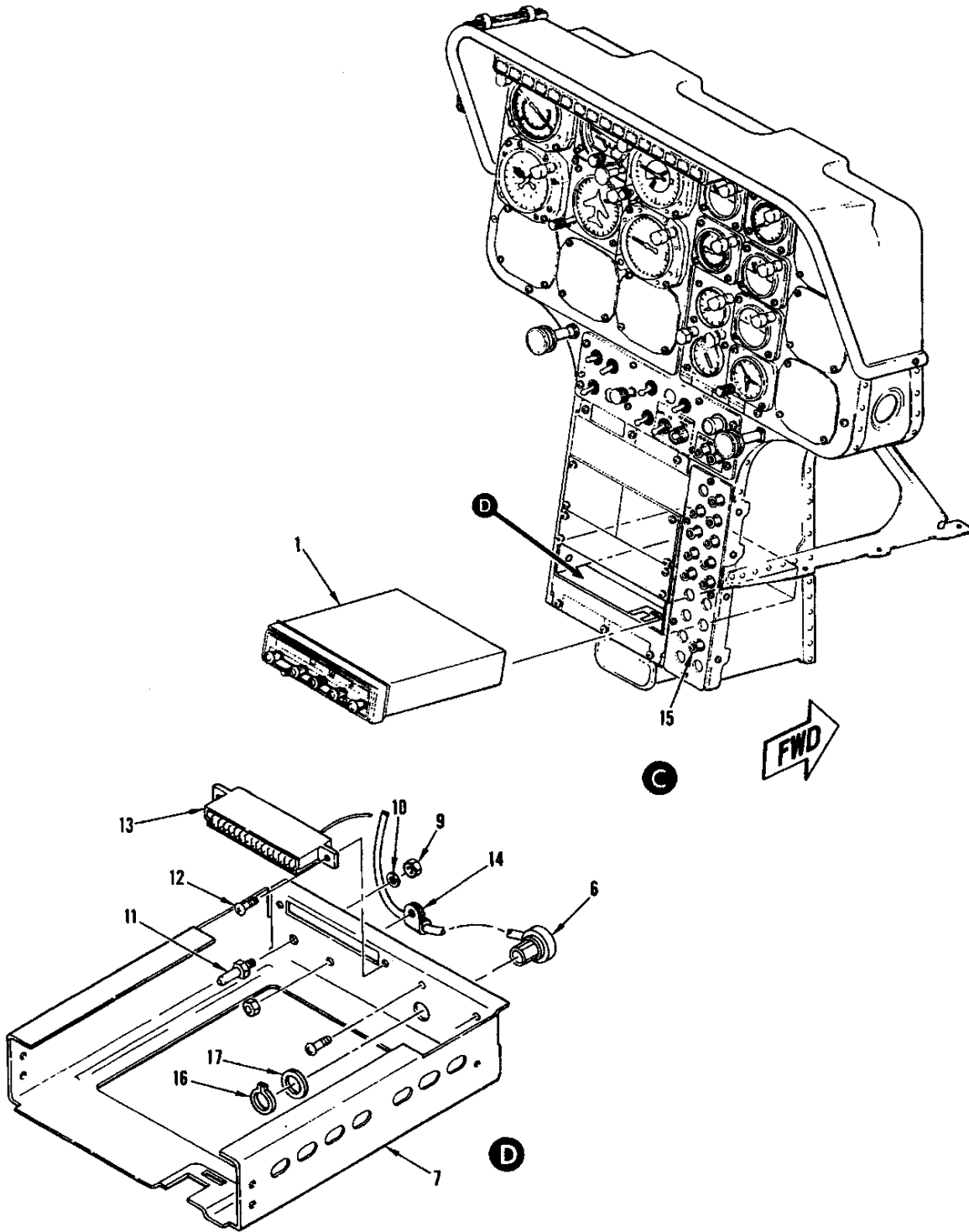
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| FIG. & INDEX NO. | PART NO. | DESCRIPTION | UNITS PER ASSY | USABLE ON CODE |
|------------------------|---------------|---|----------------------|----------------------|
| 1-1- | | TDR-950 TRANSPONDER SYSTEM | | |
| -1 | | . SCREW, LOCKING (Component of Transponder) . | REF | |
| -2 | 622-2092-001 | . TRANSPONDER (Component of 423-021). (See Collins Manual 523-0766464 for bkdn) | REF | |
| -3 | *340-0012-000 | . RING, RETAINING. | 1 | |
| -4 | *628-5359-001 | . WASHER, SHIM. | 1 | |
| -5 | 423-072-711 | . CABLE ASSY, COAXIAL. (Component of 423-071) | REF | |
| -6 | 357-7532-010 | . . CONNECTOR (P48) | REF | |
| -7 | KC59-218 | . . CONNECTOR (P49) | REF | |
| -8 | 423-072-713 | . CABLE ASSY, COAXIAL. (Component of 423-071) | REF | |
| -9 | KC39-51 | . . CONNECTOR (J49) | REF | |
| -10 | KC59-270 | . . CONNECTOR (P50) | REF | |
| -11 | *628-6095-001 | . WASHER, IDENT. | 1 | |
| -12 | *013-1572-010 | . ANTENNA | 1 | |
| -13 | *330-1779-040 | . SCREW, 4-40 x 1/4 | 2 | |
| -14 | *343-0136-000 | . SCREW, 4-40 x 7/16 | 2 | |
| -15 | 423-026 | . WIRE HARNESS ASSY, TDR-950 XPDR. (Component of 423-021) | REF | |
| -16 | 372-7513-080 | . . CONNECTOR, BLOCK (P47). | REF | |
| -17 | 628-5673-001 | . . CONVERSION KIT. | 1 | |
| | MS3367-1-9 | . . TIE STRAP | AR | |
| -18 | *343-0134-000 | . SCREW, 4-40 x 5/16 PPH. | 1 | |
| -19 | *310-0045-000 | . WASHER, FLAT NO. 4. | 1 | |
| -20 | *150-1540-000 | . CLAMP, CABLE | 1 | |
| -21 | *333-0605-000 | . LOCKNUT, 4-40 | 3 | |
| -22 | *310-0046-000 | . WASHER, FLAT NO. 6. | 2 | |
| -23 | *628-8105-004 | . PIN, GUIDE | 2 | |
| -24 | MS24693S26 | . SCREW (Component of 423-021) | 4 | |
| -25 | AN960PD6L | . WASHER (Component of 423-021) | 2 | |
| -26 | MS21042L06 | . NUT (Component of 423-021) | 2 | |
| -27 | *628-5612-001 | . TRAY, MOUNTING | 1 | |
| -28 | 429-4424-31 | . TERMINAL BOARD ASSY (TB300) (Component of 423-047) | REF | |
| -29 | 429-4424-51 | . TERMINAL BOARD ASSY (TB502) (Component of 423-047) | REF | |
| | | *Component of Transponder Kit. Required in Collins TDR-950 Transponder Manual 523-0766464. | | |



47-1006-2A

Figure 1-2. TDR-950 Transponder system, current configuration (sheet 1 of 2)



47-1000-4

Figure 1-2. TDR-950 Transponder system, current configuration (sheet 2 of 2)

| FIG. & INDEX NO. | PART NO. | DESCRIPTION | UNITS PER ASSY | USABLE ON CODE |
|------------------|---|---------------------------------------|----------------|----------------|
| 1-2- | | TDR-950 TRANSPONDER SYSTEM | | |
| | *628-5612-001 | . INSTALLATION KIT | 1 | |
| -1 | 622-2092-001 | . TRANSPONDER | 1 | |
| -2 | *013-1572-010 | . ANTENNA | 1 | |
| -3 | *628-6095-001 | . . WASHER, IDENT. | 1 | |
| -4 | *KC-59-101 | . . COAXIAL, PLUG (P954) | 1 | |
| -5 | *369D24166-11 | . . COAXIAL CABLE ASSY. | 1 | |
| -6 | *357-7532-030 | . . COAXIAL, PLUG (P952) | 1 | |
| -7 | *628-5612-001 | . . TRAY, MOUNTING | 1 | |
| -8 | 628-8108-001 | . POWER CONVERSION KIT | 1 | |
| -9 | *333-0605-000 | . LOCKNUT, 4-40 | 4 | |
| -10 | *310-0046-000 | . . WASHER, FLAT NO. 6 | 4 | |
| -11 | *628-8105-004 | . . PIN, GUIDE | 2 | |
| -12 | *330-1779-040 | . . SCREW 4-40 x 1/4 | 2 | |
| -13 | *372-7513-080 | . . CONNECTOR, BLOCK (P951) | 1 | |
| -14 | *MS3367-5 | . STRAP, TIE | AR | |
| -15 | 2TC13-3 | . CIRCUIT BREAKER (CB202) | 1 | |
| -16 | *340-0012-000 | . RING, RETAINING | 1 | |
| -17 | *628-5359-001 | . WASHER, SHIM | 1 | |
| | *Component of Transponder Kit, Refer to Collins TDR-950 Transponder Manual 523-0766464. | | | |

2-1. GENERAL INFORMATION.

2-2. SCOPE.

2-3. This section contains maintenance information for use by maintenance personnel responsible for organizational (field) maintenance of the TDR-950 Transponder and related components. The information and specific instructions include description, operation, operational check, troubleshooting, inspection, repair, and removal/installation procedures.

2-4. REFERENCE DATA.

2-5. Information on helicopter components that interface with the Transponder installation is contained in HMI - Vol 1 and the 369D - IPC. For information applicable to specific associated optional equipment, refer to the CSP supplement to basic handbook. Although pertaining to higher than organizational level maintenance, reference will be made in this section to Collins TDR-950 Transponder Instruction Manual 523-0766464.

2-6. DESCRIPTION.

2-7. GENERAL.

2-8. The TDR-950 Transponder mounted on the helicopter instrument panel provides identification of the helicopter to interrogating aircraft or ground stations. Interrogated by coded radar pulses transmitted by an aircraft or ground station, the TDR-950 Transponder automatically replies with a series of coded pulses when an interrogation is determined to be valid. A special position identification pulse (SPIP) is also available. This special pulse is added by the pilot upon verbal request of the interrogator.

2-9. The TDR-950 Transponder reply frequency is 1090 ± 3 MHz. Peak power output of the transponder is 250 watts ± 1 dB at a duty cycle of 1% or less. The Transponder is energized at a 14 volt level. The voltage is obtained from a 12-ohm, 30 watt voltage dropping resistor connected through a circuit breaker on the circuit breaker panel to the helicopter 28 volt bus (see figure 2-4). The resistor is one of two voltage

dropping resistors (referred to as "Power Conversion Kit" in this manual) mounted on a bracket attached to the back of the transponder mounting tray (see figure 2-2).

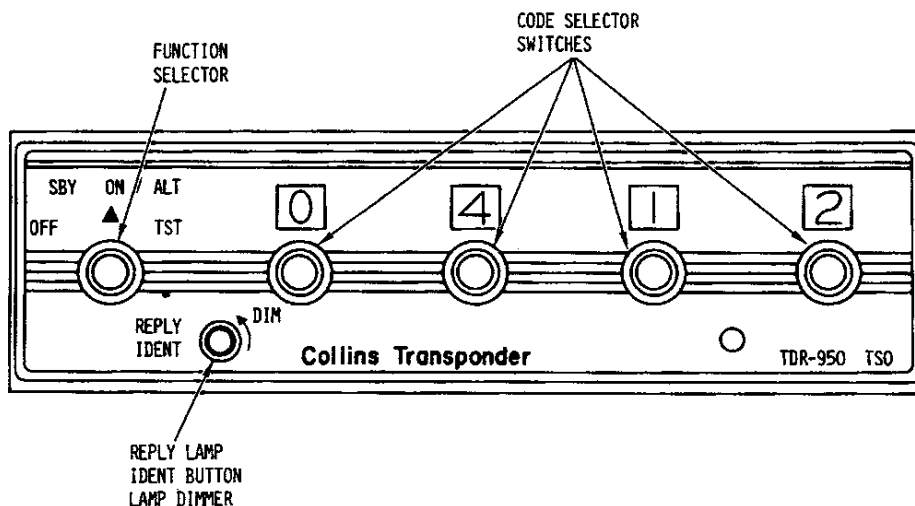
2-10. Two series connected RG-223/U coaxial cables connect transponder to a vertical antenna mounted at the forward underside of the helicopter (see figures 1-1 and 2-3).

2-11. CONTROLS AND INDICATORS.

2-12. Controls and indicators for operating the TDR-950 Transponder are all located on the transponder front panel. The controls are identified in figure 2-1, and functionally explained in table 2-1 and the sub-paragraphs that follow.

a. OFF-SBY-ON-ALT-TST Function Selector. The function selector controls application of primary power to the transponder and also controls transponder mode of operation. A 20-second delay occurs from the time primary power is applied until operation of the transponder is obtained. The 20-second delay allows the transmitter tube in the transponder to warm up and stabilize. Setting the function selector to the ON or ALT position enables the transponder. Reception of a valid interrogation in either of these two modes initiates generation of faulty pulses. For this installation, the ALT position of the function selector is not used. With the function selector to ON, the configuration of the reply pulse train is determined by the setting of the front panel code selector switches and the mode of the interrogating signal. With the function selector set to SBY position, application of power to the transponder is maintained and response to any interrogation is inhibited. The SBY position is normally selected during taxiing operations. Setting the function selector to the TST position enables an operational self-test of the transponder. The self-test is a confidence test and provides a valid indication of the transponder operating condition. The TST position is spring loaded; therefore the function selector shall be held in place to accomplish the test.

b. REPLY Lamp. The reply lamp illuminates whenever (1) a response is made to a valid interrogation, (2) the transponder IDENT button is



47-851

Figure 2-1. TDR-950 Transponder, controls and indicators

Table 2-1. Controls and indicators – functions

| Control or Indicator | Function |
|------------------------|--|
| Function selector | Selects transponder mode of operation: unit off, standby, on, altitude, or test. |
| REPLY lamp | Lamp flashes each time a response is made to a valid interrogation. The REPLY lamp will remain on for approximately 20 seconds after releasing IDENT button; this signifies transmission of the special position identification pulse (SPIP). Selection of TST position lights the REPLY lamp if the transponder is operational. |
| IDENT button | Momentarily pressing IDENT button adds a SPIP to the normal reply pulses for helicopter identification. |
| Lamp dimmer | Rotation of IDENT button sets brightness of the REPLY lamp. |
| Code selector switches | Establish the mode A identification reply code. |

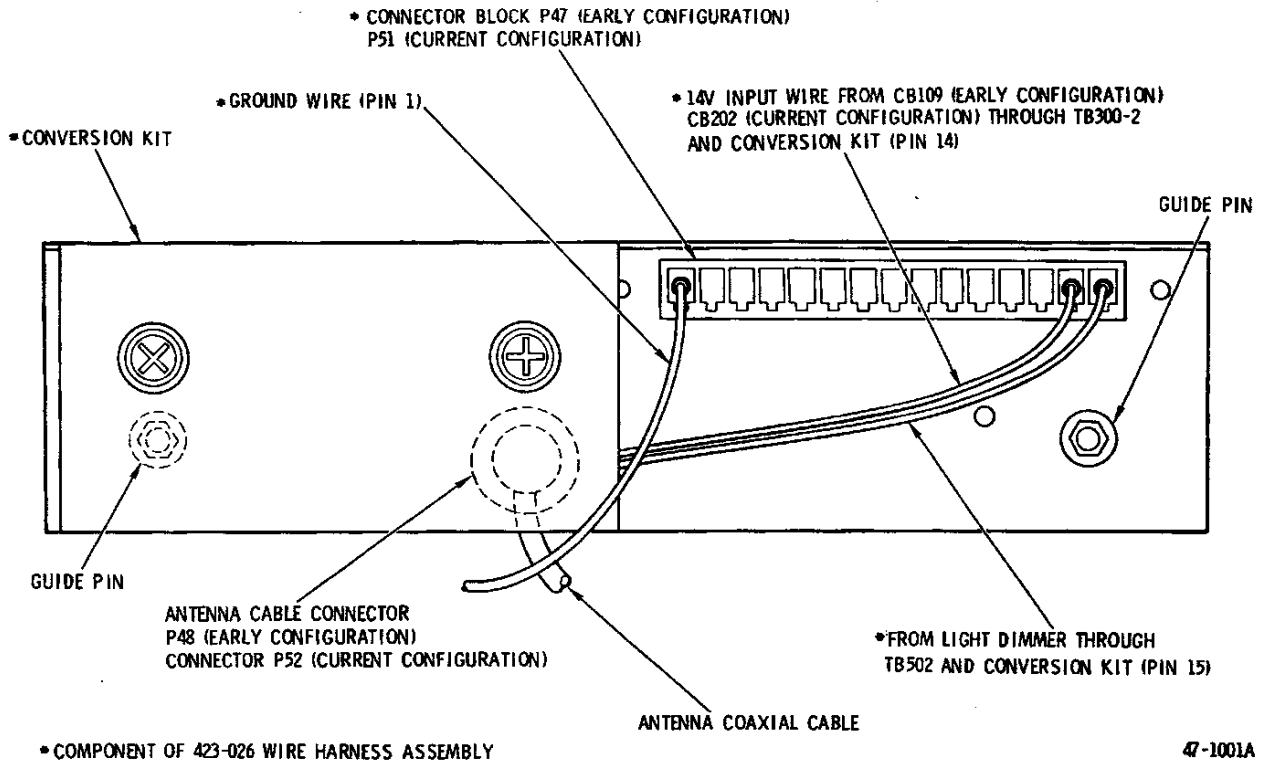


Figure 2-2. Transponder mounting tray – rear view

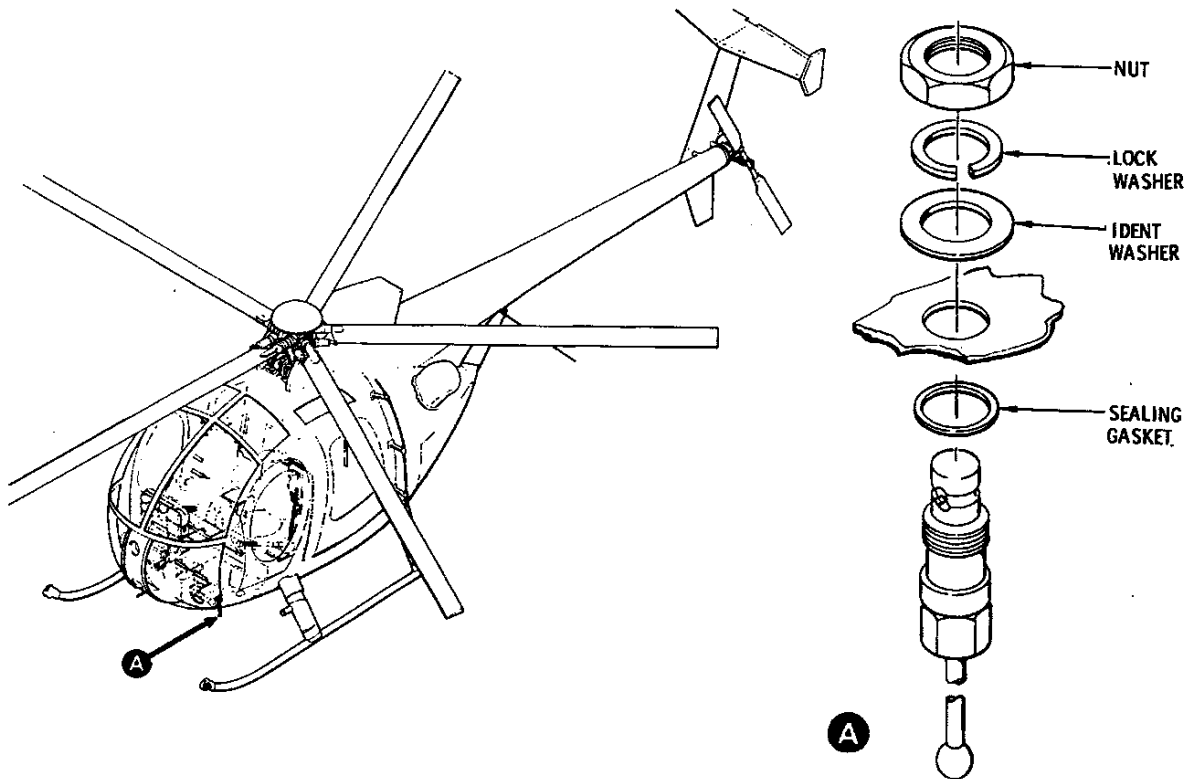


Figure 2-3. Antenna installation

pressed, or (3) the TST function selector position is selected.

NOTE

When a response is made to an interrogation, the reply lamp will flash on and off. Pressing the IDENT button or selection of the TST position lights the relay lamp continuously.

c. **IDENT Button.** Pressing the IDENT button adds a special position identification pulse (SPIP) to the normal reply pulses. This provides an identification display at the interrogating source.

d. **Lamp Dimmer.** Dimming of the reply lamp is accomplished by turning the IDENT button. This allows pilot to maintain an optimum reply lamp brightness for any ambient lighting condition.

e. **Code Selector Switches.** The reply code is selected by rotating the code selector switches. The 4-digit code selected determines the configuration of the reply pulse train. The reply code is displayed in the code windows.

2-13. TRANSPONDER UNIT LIGHTING.

2-14. Transponder indicators are illuminated by three TI - 3/4, 14V lamps internally mounted on the transponder circuit board. The transponder lamps are lighted by pressing the INST PNL circuit breaker CB104 on the circuit breaker panel. Brightness is controlled by the OFF-BRT dimmer knob on the edgelighted switch panel.

2-15. POWER CONVERSION KIT.

2-16. A 28 to 14 volt power conversion attachment is mounted on the rear of transponder mounting tray. This kit consists of a 56-ohm, 15 watt resistor which provides power for illumination of the transponder unit. 28 to 14 vdc is provided by the power adaptor mounted on the back of the instrument panel.

2-17. OPERATION.

2-18. To ready the TDR-950 Transponder for operation, proceed as follows:

a. Prior to flight, perform self-test operation (para 2-20). After ensuring transponder is operational, reset function switch selector to SBY position.

b. Set code selector switches to desired reply pulse train configuration.

c. When airborne, set function selector switch to ON.

2-19. OPERATIONAL CHECK.

2-20. SELF-TEST.

2-21. The following is a preliminary test to determine operational readiness.

a. On circuit breaker panel, close XPDR circuit breaker (push in).

b. Set transponder OFF-SBY-ON-ALT-TST function selector switch to ON.

NOTE

Upon setting function selector to ON, a 20-second delay occurs before transponder becomes operative.

c. Rotate and hold function selector to TST (test) position.

NOTE

Setting function selector to the TST position shall cause the REPLY lamp to illuminate, signifying that the transponder is operating properly. The REPLY lamp shall remain on as long as the function selector is held to the TST position.

d. Release XPDR circuit breaker when test is concluded.

2-22. RAMP TEST.

2-23. The following operational/performance tests should be made after transponder maintenance or replacement. The instructions will include tests for (1) transmit power, (2) transmit code, (3) reply radio frequency, (4) receiver sensitivity, and (5) side lobe suppression.

a. **Description of Test Equipment.**

(1) IFR Model ATC-600A Transponder/DME Ramp Test Set with Test Antenna.

(2) 34 dB Attenuator Pad at 1090 MHz.

(3) Bird Electronic Corporation Model 4314 Thruline R. F. Directional Peak Wattmeter.

(4) Bird Electronic Corporation Model 500J High-Power Element.

b. **Initial Conditions.**

(1) Tests are to be performed in an open area.

(2) Connect the 34 dB pad to the OUTPUT Connector of the ATC-600A Test Set.

(3) Disconnect coaxial cable (8, fig. 1-1) from transponder antenna (12) under copilot's floor and connect a coaxial cable direct from the 34 dB pad to disconnected antenna cable (8).

(4) Initially set the ATC-600A controls as follows:

| <u>Control</u> | <u>Setting</u> |
|----------------------------|----------------|
| Frequency/Power Switch | Power |
| Transmitter Frequency | 0 |
| Frequency/Gain Control | CCW |
| Mode Switch | A/C Code |
| Transponder Signal Control | CCW |
| Framing Control | 0 |
| Interspacing | 0 |
| Power Switch | Off |

(5) Set the ATC-600A POWER SWITCH to BATTERY.

NOTE

The battery power to the ATC-600A is turned on by momentarily pressing the POWER SWITCH downward once. The battery power is applied through a seven to ten minute timer. To turn off battery power before timer runs out, press the switch a second time. When the BATTERY TEST SWITCH is pressed, the TRANSPONDER RELAY/DME PRF METER is used to monitor the battery voltage. The left edge of the white band indicates 12.1V or a discharge condition. A fully charged battery will indicate well inside the band. If the battery voltage is below 12.1V, the battery timer will immediately switch the set off.

(6) Set the SYSTEM and LAMP TEST SWITCH in the UP position. The readout on the Test Set must read 0042. Set the MODE SELECTOR SWITCH to the A/C ALT position. Set the SYSTEM and LAMP TEST SWITCH in the UP position. The readout on the Test Set must read 126.7. If these readouts do not appear, there is a malfunction in the ATC-600A. Setting the SYSTEM and LAMP TEST SWITCH in the DOWN position will turn on all indicator lamps on the front panel of the ATC-600A. Return the MODE SELECTOR SWITCH to the A/C code.

(7) Initially set the TDR-950 Transponder controls as follows:

| <u>Control</u> | <u>Setting</u> |
|---------------------|----------------|
| Function Selector | OFF |
| Code Selector Knots | 1, 2, 3, 4 |

(8) Ensure BATT-OFF-EXT switch on helicopter switch panel is set to OFF.

(9) Connect a regulated 28V dc auxiliary power unit to helicopter external receptacle J100.

(10) Set BATT-OFF-EXT switch to EXT.

(11) On circuit breaker panel, press XPDR circuit breaker (CB 109).

(12) Set the transponder function selector switch to SBY (allow 20 seconds warm-up). Verify that the transponder panel lights are on and controllable by the dimmer control.

c. Transmit Power Test.

(1) Set the transponder function selector switch to ON. The REPLY lamp shall be ON.

(2) Take the power reading on the ATC-600A Frequency/Power Meter. The power shall be a minimum of 148 watts with the ATC-600A connected to the 34 dB pad.

NOTE

Power readings depend on length and type of cable.

(3) Turn the ATC-600A power OFF. Place the transponder function selector switch to SBY.

(4) Disconnect the 34 dB pad and coaxial cable test equipment and reconnect helicopter antenna cable (8, fig. 1-1) to antenna (12). Connect the test antenna to the ATC-600A.

(5) Initially, place the test antenna three feet from the helicopter antenna.

(6) Turn the ATC-600A power ON. Place transponder function selector switch to ON.

(7) Take a power reading on the ATC-600A Frequency/Power Meter. If the power reading is not the same as noted at step (2) above, move the test antenna closer or farther from helicopter antenna until power reading is the same.

NOTE

Do not place antennas closer than 15 inches to each other.

(8) Set transponder function selector switch to SBY.

(9) Disconnect transponder cable from antenna under copilot's floor. Connect the

r.f. wattmeter between transponder and antenna using a 18 inch maximum coaxial test lead.

(10) Install the 500J High Power Element in the wattmeter with arrow pointed toward antenna.

(11) Set the transponder function selector switch to ON and record the wattmeter forward power indication.

(12) Set the transponder function selector switch to SBY and reverse the wattmeter element to point toward transponder.

(13) Set function selector switch to ON and record the wattmeter reflected power indication.

(14) Using a VSWR chart or a nomograph, determine the VSWR. The resulting VSWR ratio shall not exceed 1.2 to 1.0.

(15) Set function selector switch to SBY.

(16) Disconnect the r.f. wattmeter and test lead. Reconnect transponder antenna cable to helicopter antenna.

d. Transmit Code Test.

(1) Set function selector switch to ON.

(2) Select three or four different codes on the transponder and verify that the same number is shown on the ATC-600A readout and that the REPLY light is ON.



Do not use codes 0000, 7600, 7700, or 7777 during tests.

e. Reply Radio Frequency.

(1) Set the transponder code selector switches to any code other than 0000, 7600, 7700, and 7777.

(2) Set the ATC-600A Frequency/Power switch to FREQUENCY and adjust the Frequency Gain Control for a midscale reading on the Frequency/Power Meter.

(3) Adjust the Frequency Control for a peak indication on the Frequency/Power Meter. The Frequency Control shall indicate a maximum of ± 3 MHz.

f. Receiver Sensitivity Test.

(1) Set the transponder CODE SELECTOR SWITCHES to any code other than 0000, 7600, 7700, and 7777.

(2) Set the ATC-600A Transponder Signal Control fully CCW. The Transponder Replay Meter shall indicate 100 percent.

(3) Adjust the Transponder Signal Control CW until the Transponder Reply Meter reads 90 percent (the needle will continually fluctuate; take an average reading). The Transponder Signal Control shall indicate -73 ± 4 DBM.

(4) Set transponder function selector switch to ALT.

(5) Set the ATC-600A Selector Switch to A/C ALT (Mode C) and repeat steps (2) and (3) above. The NO LAMP will light and there will be no readout.

(6) The Transponder Signal Level Control reading shall not be greater than +1 DB different than the reading of step (3) above.

(7) Set the Transponder Signal Level Control to fully CCW and set the Mode Selector Switch to A/C code.

(8) Set transponder function selector switch to ON.

g. Side Lobe Suppression Test.

(1) Set the Transponder Code Selector switches to any code other than 0000, 7600, 7700, and 7777.

(2) With the Transponder Signal Control full CCW, the Transponder Replay Meter shall indicate 100 percent. Adjust the Transponder Signal Control CW until the meter indicates 90 percent (the needle will continually fluctuate; take an average reading). Note indication on the Transponder Signal Control and adjust the control 3 dB less than this reading. The Transponder Reply Meter should show 100 percent at this setting.

NOTE

If the transponder sensitivity is near the insensitive limit, it may be necessary to move the ATC-600A test antenna closer to helicopter antenna to obtain proper indications. Do not allow antennas closer together than 15 inches. If test antenna is moved, repeat step (2) above.

(3) Set the SLS switch to 0 dB (P2 pulse equals P1 pulse). The transponder shall stop all replies.

(4) Set the SLS switch to -9 dB (P2 pulse is 9 dB less than P1). The transponder shall reply at least 90 percent (minimum) to 100 percent.

(5) Set Transponder Signal Control to fully CCW.

h. IDENT and Self Test.

(1) Set Transponder Code Selector switches to any code other than 0000, 7600, 7700, and 7777.

(2) Activate IDENT switch on transponder. The IDENT pulse lamp on the ATC-600A shall light for a period of 15 to 30 seconds.

(3) Set ATC-600A power switch OFF. Set transponder function selector switch to TST. The REPLY lamp on the transponder shall light.

(4) Hold transponder function selector switch in the TST position and verify dimming of the REPLY lamp is accomplished by turning the IDENT knob.

i. Equipment Shutdown.

(1) Set transponder function selector switch to OFF.

(2) Open XPDR circuit breaker on circuit breaker panel.

(3) On switch panel, set BATT-OFF-EXT switch to OFF.

(4) Disconnect auxiliary power unit from helicopter external receptacle J100.

(5) Disconnect test equipment and stow ATC-600A Test Antenna, 34 dB pad, and coaxial cables in handling case.

2-24. TROUBLESHOOTING.

2-25. Other than procedures outlined under Operational Check (para 2-19) and Inspection (para 2-26), troubleshooting the TDR-950 Transponder system is limited to interconnecting wiring, cables, and components and is outlined in table 2-2. For troubleshooting information pertaining to the transponder itself, refer to Collins TDR-950 Transponder Instruction Manual 523-0766464.

2-26. INSPECTION.

2-27. Panel structure will prevent convenient access to transponder interconnecting components. However, system should be inspected at regular intervals. Inspection checks that shall be performed as part of the regular helicopter maintenance program are listed in table 2-3.

2-28. REPAIR.

2-29. On an organizational level there are no maintenance functions for the TDR-950 Transponder itself. If a malfunction cannot be corrected by maintenance of interfacing components, the transponder unit must be replaced. All

repair should be accomplished by personnel familiar with transponder integrated circuitry, or by the regional Collins Service Center.

2-30. Refer to HMI - Vol 1 for maintenance of wiring and harnesses, electrical bonding, and repair of electrical connectors.

2-31. Refer to Collins TDR-950 Transponder Instruction Manual 523-0766464 for troubleshooting information, component repair and adjustment, power output measurements, detailed test and alignment procedures and required tools.

2-32. REMOVAL/INSTALLATION.

2-33. COMPONENT REMOVAL.

CAUTION

Ensure that electrical power is off.

a. To remove transponder:

(1) Using a 3/32 inch Allen wrench, loosen front panel locking screw (1, fig. 1-1) by turning screw counterclockwise.

(2) Carefully slide out transponder. (Transponder will disengage from 15 pin block connector and antenna connector receptacle.)

b. To remove mounting tray:

(1) Disengage P48 connector (6, fig. 1-1) by removing retaining ring (3) and washer (4).

(2) Disengage conversion kit (17) by removing screws (14).

(3) Disengage P47 block connector (16) by removing two screws (13). Push block connector out through opening in back of tray.

(4) Remove antenna cable (5) from clamp (20). All electrical connections are now free from mounting tray.

(5) Remove the two flat head recessed screws (24) from inside front of tray.

(6) Remove two nuts (26), washers (25), and screws (24) attaching tray to mounting brackets.

(7) Remove mounting tray.

c. To remove antenna:

(1) Disconnect P50 antenna cable connector (10, fig. 1-1).

Table 2-2. Transponder system – troubleshooting

| Symptom | Probable Trouble | Corrective Action |
|--------------------------------------|--|---|
| No response when unit is turned on | Master power switch OFF | Set master power switch to BATT. |
| | Unit controls not set properly | Refer to operating instructions and reset controls. |
| | Defective circuit breaker (CB109) | Replace circuit breaker. |
| | Loose or broken connector pin(s) | Repair pin(s) or replace connector. |
| | Open or shorted wire in wire harness | Repair wire or replace wire harness. |
| | Loose grounding lead connection (E23) | Tighten connection. |
| | Defective circuit or component in transponder unit | Replace transponder unit. |
| Failure during operation | Tripped circuit breaker | Allow unit to cool down (approximately 2 minutes) and press circuit breaker to ON position. If circuit breaker trips again, repair short in interconnecting wiring. Leave unit off, troubleshoot and repair as required. |
| | Loose connectors or contacts | Check and tighten connectors. Secure contacts. |
| | Open or shorted wire in wire harness | Repair wire or replace wire harness. |
| | Damaged or defective coaxial cable | Repair or replace cable. |
| Intermittent operation during flight | Loosened or damaged coaxial cable, connector or wire harness | Check cables, connectors and wire harness. Repair or replace as required |
| | Faulty transponder unit | Replace transponder unit. |

Table 2-3. Transponder system – inspection

| Items/Components | Inspect For |
|---|--|
| Mounting tray, enclosure | Scratches, dents, corrosion, rust, bare spots on painted surfaces, loose or missing attachments. Secure attachment of transponder unit. |
| Mounting tray brackets | Secure attachment to panel structure, physical damage, rust or corrosion. |
| Transponder control panel | Rust, corrosion, illegible markings, loose or missing knobs, broken indicator windows, sticking or inoperative controls, burned out lamps. |
| Antenna cable connectors | Secure connection, loose or distorted sockets, cracked or damaged cases. |
| Coaxial cables | Crimped or damaged outer shield, worn or frayed insulation. |
| Antenna | Secure attachment to structure, rust corrosion or other contamination. |
| <p><u>NOTE</u></p> <p>Accumulation of oil film or other foreign material in and around the transponder antenna may cause transmitter frequency pulling. For preventative measures against contamination buildup, refer to Section II (Installation) of Collins TDR-950 Transponder Instruction Manual 523-0766464.</p> | |
| Wire harness | Evidence of overheating, worn or frayed insulation, loose terminal lugs or splices, missing identification labels. |
| Block connector (component of wire harness) | Secured attachment, cracking or damaged, secured wire connection. |
| Power conversion kit (components of wire harness) | Secured attachment, secured wiring and soldered contacts. |
| Ground wire (component of wire harness) | Secured attachment at block connector and E23 ground connection. |

(2) Remove antenna mounting nut (fig. 2-3).

(3) Remove antenna.

2-34. To remove wire harness and coaxial cables, disconnect wire harness from terminal blocks and ground connection and temporarily free tie straps and clamps as required.

2-35. COMPONENT INSTALLATION.

CAUTION

Ensure that electrical power is OFF.

a. To install mounting tray:

(1) Position mounting tray (27, fig. 1-1) and attach to brackets using two screws (24), washers (25) and nuts (26).

(2) Attach front of tray to panel with two screws (24).

b. To install wiring harness assembly:

(1) Attach conversion kit (17, fig. 1-1) to back of mounting tray with two screws (14).

(2) From conversion kit, attach wire TDR950-1C20 to terminal block TB300, pin 2B and TDR950-2A20 to terminal block TB502, pin 5F. (See figure 2-4.)

NOTE

Ensure wires TDR950-1D20 and TDR950-2B20 from conversion kit to block connector are securely connected.

(3) Attach block connector P47 (16) to back of mounting tray with two screws (13).

(4) Attach ground wire TDR950-3A20N from connector block. (See figure 2-4.)

c. To install antenna coaxial cables:

(1) Position coaxial cable connector P48 (6, fig. 1-1) into opening in back of mounting

tray (see figure 2-2). From front, position shim washer (4, fig. 1-1) over connector and secure in place with retaining ring (3).

(2) Route cable (5) through clamp (20) attached to back of mounting tray.

(3) With antenna cable (8) in hand, engage J49 connector (9) with P49 connector (7).

(4) Route cable (8) along structure at lower left of instrument panel to copilot's under-seat compartment.

CAUTION

Excessively sharp bends in the antenna cable may result in reduced power output and a decrease in effective range.

(5) Install antenna per figure 2-3.

CAUTION

Ensure good bonding between antenna body and aircraft skin. The inside surface of aircraft skin must be clean and free of paint and oxidation.

(6) Attach connector P50 (10) from cable in step (4), to antenna.

d. To install transponder:

NOTE

Before inserting transponder, ensure that front leg of locking pawl is in the down position (turn locking screw (1, fig. 1-1) counterclockwise).

(1) Slide transponder in mounting tray ensuring engagement with guide pins and block connector.

CAUTION

Do not force unit into mounting tray. If difficulty is experienced, remove transponder unit and check rear connector and guide pins for proper installation.

(2) To lock transponder in place, turn locking screw clockwise with a 3/32 inch Allen wrench.

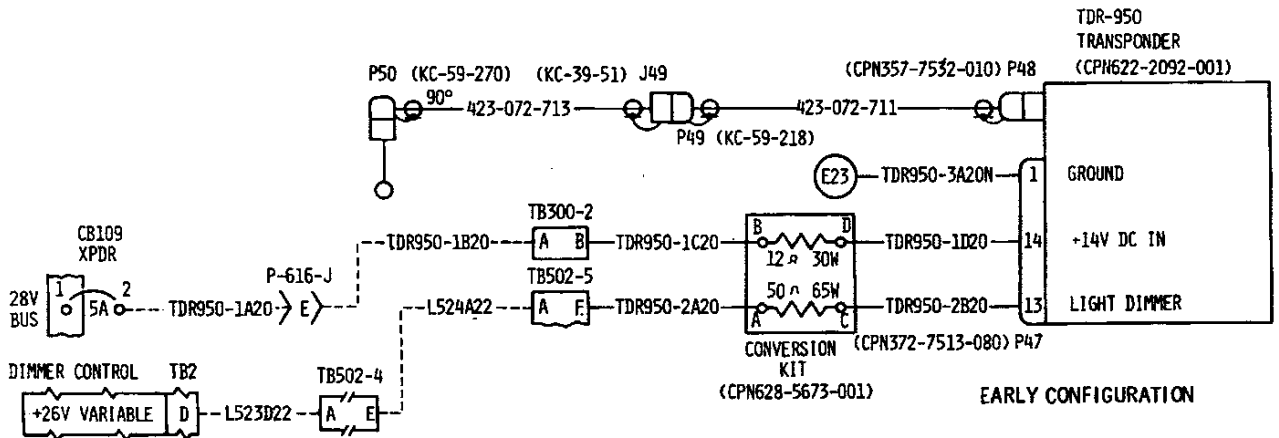
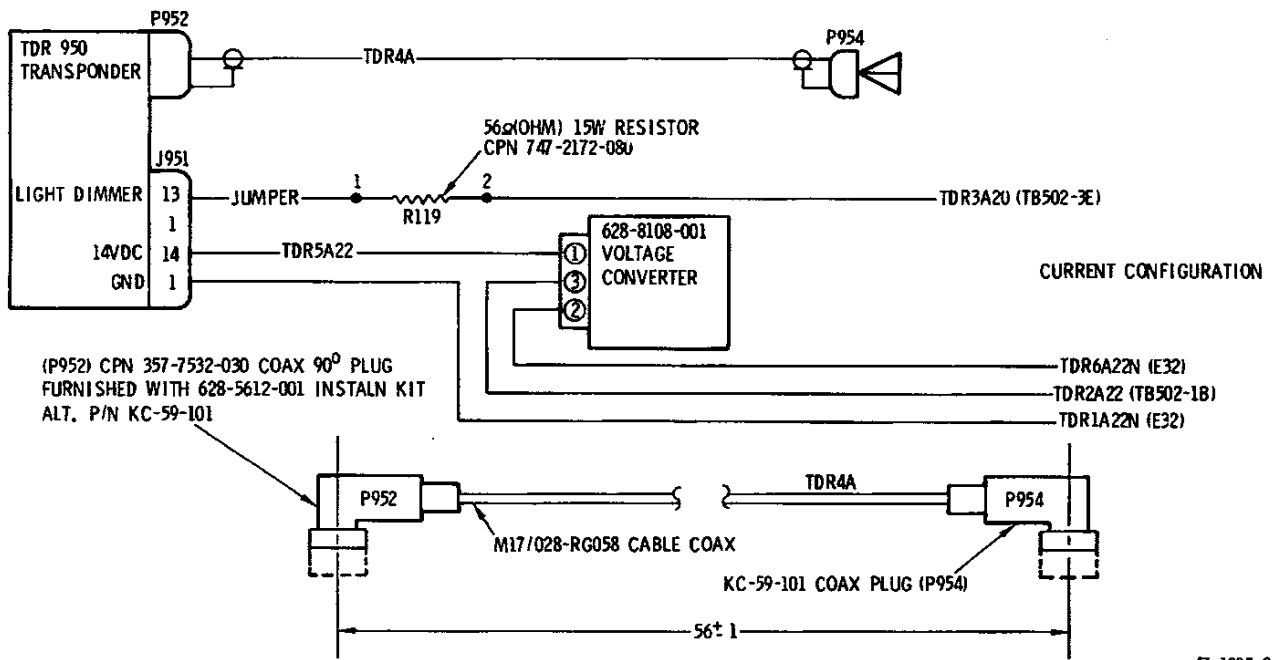


Figure 2-4. Transponder interconnect diagram

2-36. WIRING AND SCHEMATIC DIAGRAMS.

2-37. Figure 2-4 shows the TDR-950 Transponder system interconnect diagram. For schematic diagram of the entire avionics system, refer to Opt Eqpt CSP-038.

2-38. WEIGHT AND BALANCE.

2-39. Weight and balance changes resulting from installation of the TDR-950 Transponder system are listed in table 2-4.

Table 2-4. Weight and balance data

| | Weight (pounds) | Longitudinal Arm (inches) | Longitudinal Moment (in. -lb/100) |
|---------|-----------------|---------------------------|-----------------------------------|
| Added | 2.9 | 45.9 | 1.33 |
| Removed | 0 | 0 | 0 |
| Changed | +2.9 | +45.9 | +1.33 |

