

**Installation Section
for
RCR-650/650A
Receiver**



STEC

section II

installation

2.1 GENERAL

The ADF-650/650A system introduces a revolutionary improvement in general aviation ADF's by eliminating the traditional long-wire ADF sense antenna while at the same time providing superior performance when properly installed. Since proper installation techniques are the key to outstanding performance, it is imperative that the installer thoroughly understand all of the information contained in this section.

This section contains all information necessary to install the RCR-650/650A Receiver, ANT-650A Antenna, and IND-650/650A Indicator into an aircraft, and to ensure system operational readiness after installation.

2.2 UNPACKING AND INSPECTING EQUIPMENT

Unpack the equipment carefully and make a careful visual inspection of each unit for possible shipping damage. All claims for damage should be filed with the transportation company involved. If claims for damage are to be filed, save the original packing carton and materials. If no defects can be detected, replace packing materials in the shipping container and save for future uses, such as storage or reshipment.

2.3 PREINSTALLATION/CUSTOMER ACCEPTANCE TEST PROCEDURES

The practice of testing each unit prior to installation in the aircraft assures the installer that the unit will perform satisfactorily after the installation is complete. Installing a "known good" box will also reduce time spent in isolating problems in an installation that is not yielding optimum performance.

If preinstallation testing is desired, perform the customer acceptance/minimum performance test procedures contained in the maintenance section of this instruction book.

2.4 SPECIAL INSTRUCTIONS

The following special instructions must be observed to ensure proper installation of the equipment.

Damage to the equipment may occur if these instructions are not followed.

- a. When inserting the RCR-650/650A in its mounting tray, exert only enough pressure until some resistance is felt. Insert a 5/64-inch Allen wrench into the bottom left hole on front panel and turn the locking retainer clockwise to fully seat the unit in the tray. Do not overtighten.
- b. When removing the RCR-650/650A, turn the locking retainer counterclockwise to free the unit and disconnect the mating connector. Grasp the RCR-650/650A by the front panel corners and carefully pull unit out of tray.
- c. It is extremely important that the antenna center line (parallel to the fore/aft center line of the aircraft) be determined accurately and marked prior to cutting the mounting holes for the ANT-650A Antenna.
- d. Read all notes on drawings and interconnects before beginning any installation.
- e. The three 50-ohm triaxial antenna cables should be bundled and run together, but they should not be laced in with any other wire bundles.
- f. The ANT-650A must be mounted in a position that provides at least 0.9 m (3 ft) separation from the closest antenna (including a second ADF antenna).
- g. Installation of the triaxial cable interfacing the RCR-650/650A Receiver with the ANT-650A Antenna must be carefully checked for shorts prior to applying primary power to the ADF-650/650A system. Unlike most conventional receiver/antenna interface situations, the ADF-650/650A system X-loop, Y-loop, and sense antenna terminals carry approximately +10 V dc on the center conductor; shorting to ground will result in component damage to the RCR-650/650A Receiver. To prevent damaging the RCR-650/650A and reduce installation problems, always take time to thoroughly check the system interconnect (including antenna triax) for shorts and point-to-point continuity.

2.5 INSTALLATION TIPS

The following paragraphs provide a summary of practices and techniques that will be helpful in

eliminating any of the difficulties that may be encountered during installation.

2.5.1 System Status

It is essential that the installation be of the latest design status; this consists of the following:

- a. The TDR-950/950L Transponder should have Service Bulletin No 2 and 3 installed.
- b. The VIR-351 Navigation Receiver should have Service Bulletin No 3 installed.
- c. The ADF antenna should be an ANT-650A (ANT-650A Antennas use BNC type connectors; earlier models use phono plugs).
- d. If an RCR-650 Receiver is to be installed, the mounting tray should contain the L-band filter kit that uses BNC connectors (refer to figure 2-3).
- e. Triaxial cable must be used.

2.5.2 Installation Practice and Techniques

Good automatic direction finder installation practices must be employed; this includes the following:

- a. Choose a location for the ANT-650A that will provide the best possible signal to the antenna at all times. On a low-wing aircraft, it is best to stay away from the bottom wing area that is defined as the area on the fuselage between the leading and trailing edge of the wing. This area exhibits reduced field strength. On high-wing aircraft, this area also exists, however, it is located on the top of the fuselage. In either case, high- or low-wing, optimum performance will be obtained when the antenna is located aft of the wing trailing edge. This position also has an added advantage in that it minimizes the effect of radiated engine noise. It makes no difference whether top or bottom mount is used with regard to airborne operation; however, performance on the ground using a bottom-mounted antenna is degraded when the aircraft is grounded. In addition to mounting location, also make sure that the minimum specified distances are maintained between L-band antennas and the ANT-650A Antenna. Figure 2-6 illustrates areas that should be avoided when selecting a mounting position.
- b. Variation in the cable dimensions of various manufacturers requires that different preparation techniques be employed. Triaxial cable manufactured by Consolidated and Essex has the same diameter on the inner shield as ordinary RG-58A/U; therefore, a standard UG-88 BNC connector may be used. Other triaxial cables, notably

that available by Times and Belden, have inner shield diameters that are 0.51 mm (0.020 in) to 0.76 mm (0.030 in) smaller than standard RG-58A/U and require the use of sleeving in order to use standard UG-88 BNC connectors.

- c. A solid, short rf ground should be made between the ANT-650A and aircraft ground. A length of 5.6-mm (7/32-in) braid or metal strap no longer than 165 mm (6.5 in) must be used for this purpose. Be sure to remove paint or zinc chromate coating from bonding surfaces, and whenever possible, passivate the cleaned aluminum surface with an Alodine or other suitable process to retard corrosion.
- d. In installations where the antenna connectors are likely to be subjected to conditions of extreme humidity or a water environment, a liberal application of Dow-Corning DC-4 silicon grease, S-TEC part number 005-0201-000, on both the mating and antenna connectors (both inside and outside connector) prior to connection will be helpful in retarding corrosion. Application of DC-4 will not degrade performance in any way.

2.5.3 Alternators/Generators

Generally, most aircraft alternators and generators have filters installed; however, there are some exceptions. Aircraft delivered by the manufacturer that do not contain avionics equipment may not have filters installed. The presence of this interference is easily located by turning off the alternator or generator while in flight and observing ADF operation.

2.5.4 Strobes/Inverters/Motors

Like alternators and generators, strobes, inverters, motors, and other equipment frequently generate interference in the ADF band that cannot be distinguished from a proper signal by any ADF receiver once they reach the antenna. This interference must be suppressed at the source.

2.5.5 Static Wicks

Some aircraft have been found with an insufficient number of static wicks. The number of wicks required to prevent precipitation static is dependent upon aircraft size, structure, and speed.

2.5.6 Cable Continuity Check

It is extremely important that the antenna triaxial cables be tested for shorts before application of system power. If the antenna cable center conductor is shorted to ground for a long duration with power applied to the receiver, it is likely that inductors L401,

L601, and L603 as well as other components in the RCR-650 +10-volt circuit may be damaged.

2.6 INSTALLATION PROCEDURES

2.6.1 RCR-650A Receiver

- a. The installation kit (CPN 628-6934-001) supplied with the RCR-650A is required for installation. Refer to figure 2-1.
- b. The RCR-650A is rigidly mounted to the aircraft instrument panel; front or rear panel mounting may be used. Refer to figure 2-2 for unit outline and mounting dimensions and panel-cutout dimensions.
- c. If the RCR-650A is to be used in a 28-volt system, a 28- to 14-volt power converter must be used.
- d. Using the dimensions shown in figure 2-2, make the appropriate panel cutout and drill the four holes (clearance for #6-32 screw) needed to secure the mounting tray to the aircraft panel mounting rails. Use four #6 flathead screws and self-locking nuts (not supplied) to secure the tray in position. Two additional mounting holes are located approximately 139 mm (5-1/2 in) further back on the mounting tray. These holes may be used with rear mounting straps (not supplied) for added support.
- e. Refer to paragraph 2.7 for cabling information. All outer shields of the three triaxial cables must be grounded at both ends. This is accomplished by crimping eyelets to the outer shield and securing to the RCR-650A mounting tray or convenient grounding location. Do not ground the other end directly to the antenna shell but rather to the mounting plate or airframe adjacent to the antenna. Refer to figure 2-19 while attaching triax to tray-mounted BNC connectors.

Caution

Ensure that the locking retainer located underneath the left front of the RCR-650A is retracted before attempting to insert unit into mounting tray. (Turn locking retainer counterclockwise to retract.) Do not force retainer into position. If difficulty is experienced, remove the RCR-650A and check rear connector assemblies for proper positioning.

- f. Carefully slide the RCR-650A into the mounting tray. Exert only enough pressure until resistance is felt. Using a 5/64-inch Allen wrench, secure the RCR-650A in place by turning the locking retainer clockwise.

2.6.2 RCR-650 Receiver

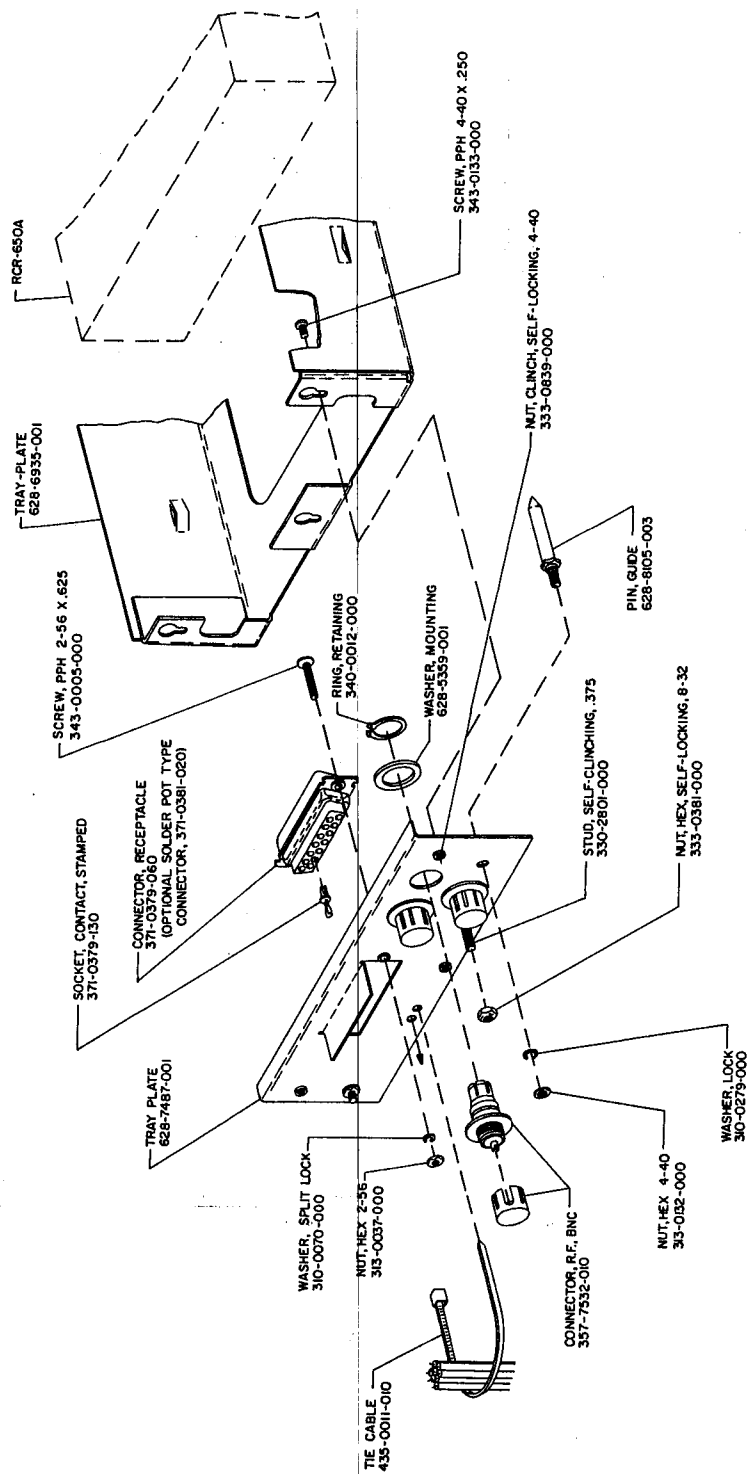
- a. The installation kit (CPN 628-7491-001) supplied with the RCR-650 is required for installation.

Refer to figure 2-3 (figure 6-21 shows an early version of the L-band tray assembly).

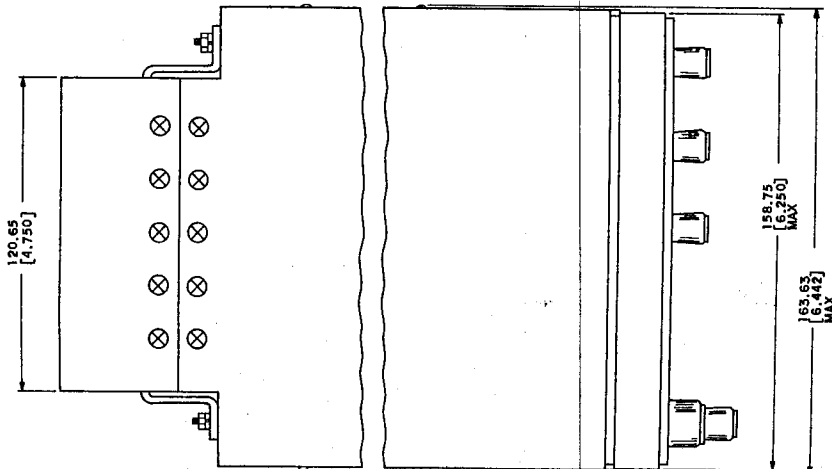
- b. The RCR-650 is rigidly mounted in the aircraft instrument panel. These are two methods that may be used for installing the mounting tray provided in the installation kit. Both methods position the tray with the tray front edges extended through the panel cutout, but flush with the aircraft instrument panel. Refer to figure 2-4 for outline and mounting dimensions and panel-cutout dimensions.
- c. If the RCR-650 is to be used in a 28-V dc installation, an optional 28- to 14-V conversion kit (CPN 628-5986-002) or a 28- to 14-volt converter is required. Attach the resistor included in the kit to a bulkhead or some other remote location away from the radio stack. Connect the resistor in series with the primary power input to the RCR-650. If the RCR-650 is to be installed in a 28-V system, check to ensure SB 3 has been installed. If SB 3 has not been incorporated, perform this modification prior to installation. If the RCR-650 is to be installed in a 28-volt installation with a dropping resistor and has a serial number lower than 9146, service bulletin 6 should be reviewed prior to installation.
- d. Using the dimensions shown on figure 2-4, make the appropriate panel cutout and drill the four holes (clearance for #6-32 screw) needed to secure the mounting tray to the aircraft panel mounting rails. Use four #6 panhead screws and self-locking nuts (not supplied) to secure the tray in position. Two additional mounting holes are located approximately 139 mm (5-1/2 in) further back on the mounting tray. These holes may be used with rear mounting straps (not supplied) for added support.
- e. Refer to paragraph 2.7 for cabling information. All outer shields of the three triaxial cables must be grounded at both ends. This is accomplished by crimping eyelets to the outer shield and securing to the RCR-650 mounting tray or a convenient grounding location. Do not ground the other end directly to the antenna shell but rather to the airframe adjacent to the antenna.

Caution

Ensure that locking retainer located underneath the left front of the RCR-650 is retracted before attempting to insert unit into mounting tray. (Turn locking retainer counterclockwise to retract.) Do not force locking retainer into position. If difficulty is experienced, remove the RCR-650 and check rear connector assembly for proper positioning.



RCR-650A INSTALLATION KIT 628-6934-001



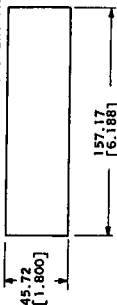
- NOTES:
1. UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETRES [INCHES].
 2. USE NO. 6 SCREWS FOR MOUNTING TRAY (NOT SUPPLIED).

UNIT	UNIT WEIGHT		TRAY WEIGHT	
	kg	LBS	kg	LBS
RCR-650	0.93	2.06	0.38	.84

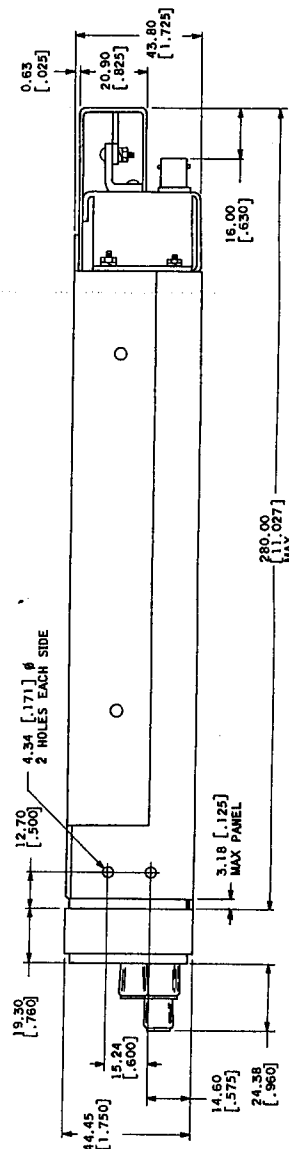
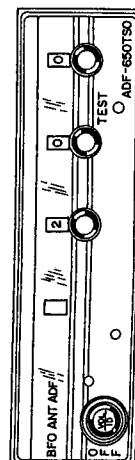
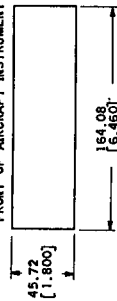
UNIT	A		B		C	
	mm	INCHES	mm	INCHES	mm	INCHES
RCR-650 14 V	119.9	4.72	21.3	.84	79.2	3.12

UNIT	MATING CONNECTOR TYPE	MOUNTING TRAY CONNECTOR
RCR-650	EDGE-ON FINGER	CONNECTOR - CPN 372-7513-180 CONTACTS - CPN 372-7513-200

CUTOUT DIMENSIONS FOR MOUNTING
BEHIND AIRCRAFT INSTRUMENT PANEL



CUTOUT DIMENSIONS FOR MOUNTING FROM
FRONT OF AIRCRAFT INSTRUMENT PANEL



628-6513
TP4-7858-014

RCR-650 Receiver, Outline and Mounting Dimensions
Figure 2-4

Revised 1 August 1978

- f. Carefully slide the RCR-650 into the mounting tray. Exert only enough pressure until some resistance is felt. Using a 5/64-inch Allen wrench, secure the RCR-650 in place by turning the locking retainer clockwise.

2.6.3 ANT-650A Antenna

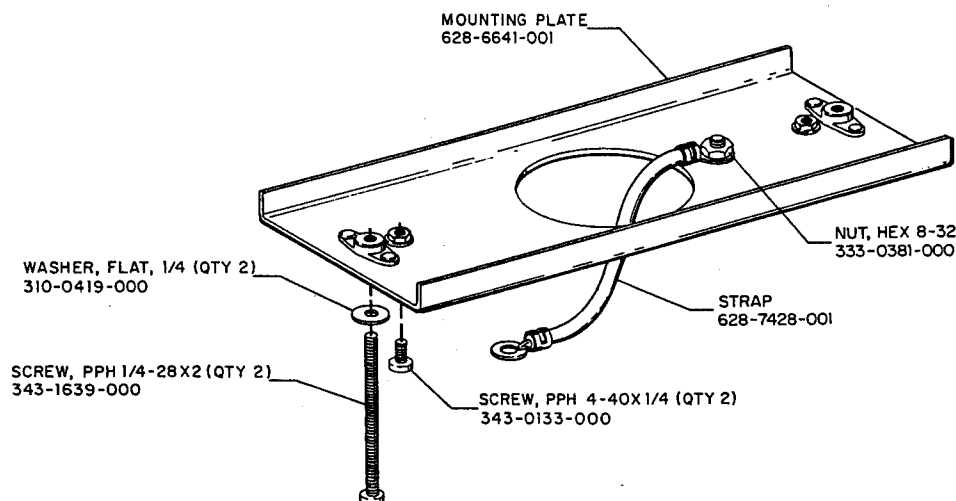
- a. The installation kit (CPN 628-6644-001) supplied with the ANT-650A is required for installation. Refer to figure 2-5.
- b. The ANT-650A can be mounted either on the top or the bottom of the aircraft. Using a chalk line, mark the exact fore/aft center line.
- c. Select a mounting position along the chalk line that provides a minimum of 0.9-m (3-ft) separation between the ANT-650A and other antennas (includes other ADF antennas in dual installations). In addition, the position selected should be as close as possible to a solid airframe ground if the skin is not electrically bonded to the airframe or is of a non-metallic material. Refer to figure 2-6 for areas to avoid when installing the antenna. These areas tend to be noisier than others. The antenna should be mounted on a horizontal surface (in normal straight-line flight attitude) to minimize error when the aircraft is banked. A delayed station passage indication will occur if the antenna is mounted in a nosedown attitude.
- d. Refer to figure 2-7 for antenna outline and mounting dimensions and location of the hole cutout dimensions. Using these dimensions, make the

mounting hole cutout and remove all burrs when completed.

- e. Secure the ground strap provided in the installation kit to the mounting plate as shown in figure 2-5. Do not tighten the fastening nut at this time. From inside the aircraft, install the mounting plate over the mounting hole and secure with two 4-40 x 0.250-inch screws from the outside of the aircraft. Refer to figure 2-8. Longer 4-40 screws (not supplied) may be required, depending upon fuselage thickness.
- f. As shown in figure 2-17, install three standard bayonet-type male BNC connectors (not supplied) on the 50-ohm triaxial cable to be used for interconnecting the ANT-650A with the RCR-650/650A; label each wire. From inside the aircraft, feed the three cables through the hole in the mounting plate and allow enough slack so that the cables extend several centimeters/inches beyond the exterior aircraft skin.
- g. Within the aircraft, attach the three triax outer shields to the mounting plate ground stud and tighten the nut provided. The three triax shields and the ground strap should now be securely fastened to the mounting plate.

Note

For those situations in which installation procedures cannot be followed exactly as

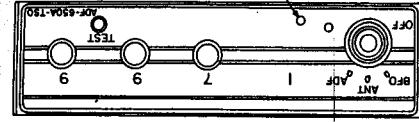
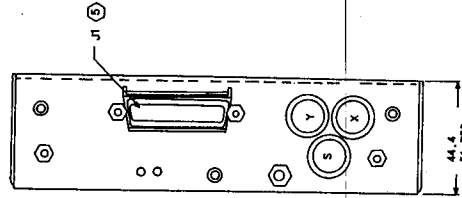


ANT-650A INSTALLATION KIT

ANT-650A Antenna, Installation Kit
Figure 2-5

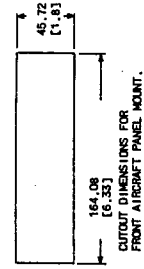
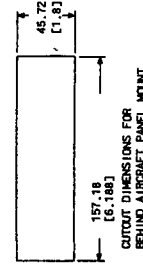
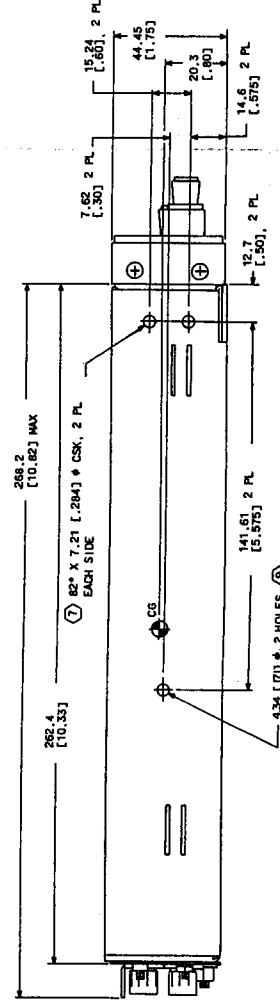
628-6680

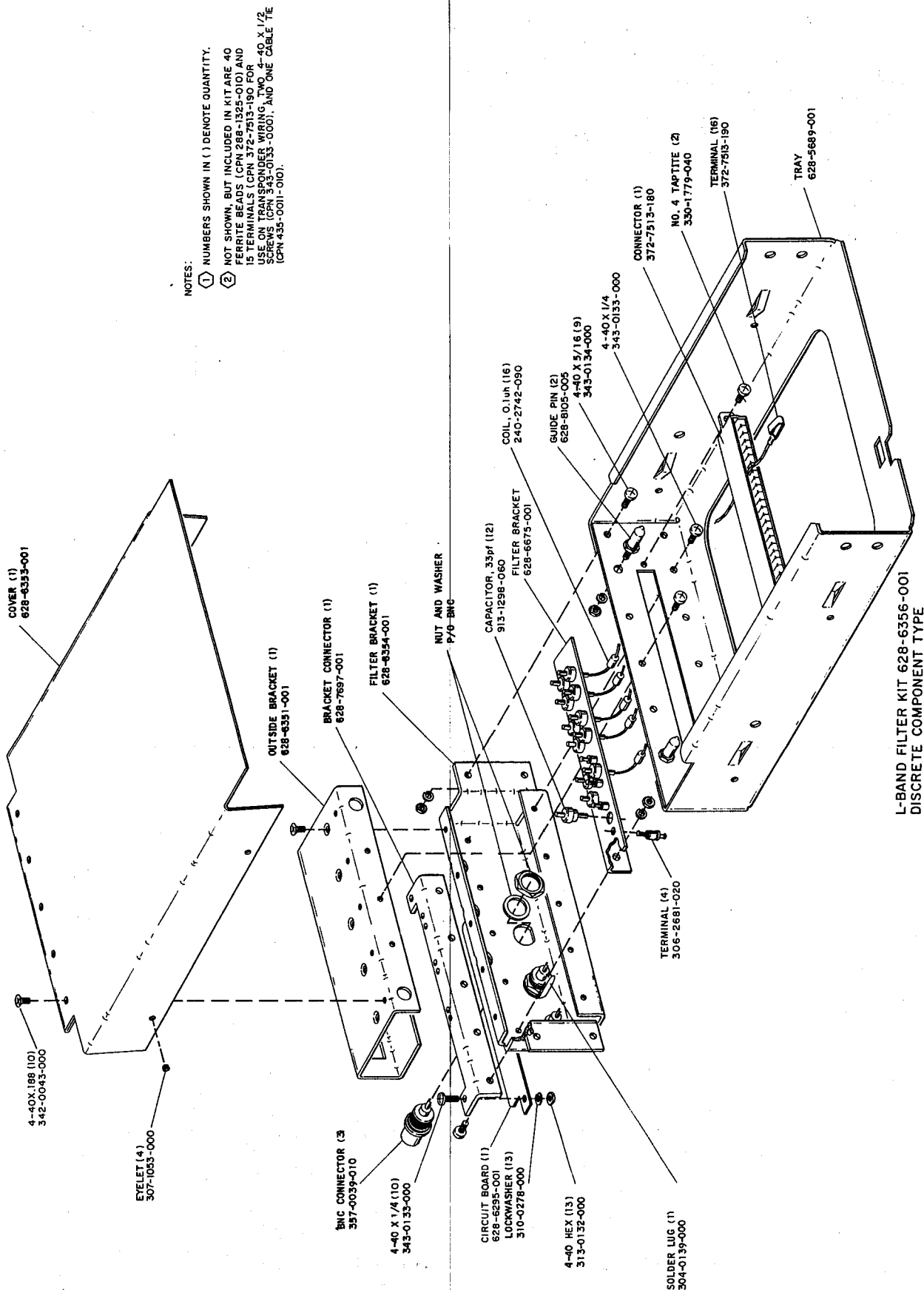
WIRE BUNDLE (REF)



NOTES:

- ① DIMENSIONS ARE IN MILLIMETERS [INCHES].
- ② WEIGHT: UNIT/TRAY 1.36 kg [3.0 LB]
UNIT 1.13 kg [2.5 LB]
TRAY .23 kg [0.5 LB]
- ③ THIS DRAWING APPLIES TO RCR-650A (CPN 622-3587-XXX)
- ④ UNIT CONNECTOR P1 IS AN ITT CANNON ELEC. DBU-25P-BF (CPN 371-0379-470) AND UNIT CONNECTORS S, X, AND Y ARE BNC TYPE 9-50-2, MANUFACTURED BY TED MANUFACTURING CORP. (CPN 357-7332-020)
- ⑤ TRAY CONNECTOR J1 IS AN ITT CANNON ELEC. DBU-25S-FQ (CPN 371-0379-060) AND TRAY CONNECTORS S, X, AND Y ARE BNC TYPE 9-10-Z, MANUFACTURED BY TED MANUFACTURING CORP. (CPN 352-010)
- ⑥ CONTACTS FOR J1 AND TRAY CONNECTORS ARE SUPPLIED WITH ITT CANNON ELEC. D10282-25 (CPN 371-0379-130) REQUIRING FOLLOWING TOOLS:
CRIMP TOOL: ITT CANNON CDT-D-C-1 (CPN 371-0382-010)
INSERTION/EXTRACTION TOOL: ITT CANNON CIET-2040B (CPN 371-8445-010).
- ⑦ TRAY MOUNTED TO PANEL USING NO. 6 X 82° FLAT HEAD SCREWS (NOT SUPPLIED).
- ⑧ Ⓢ DENOTES CENTER OF GRAVITY.
- ⑨ HOLES PROVIDED FOR REAR MOUNTING STRAP. (NOT ESSENTIAL FOR PROPER INSTALLATION). WHEN STRAPPING IS DESIRED, USE NO. 8 PAN HEAD SCREWS.
- ⑩ UNIT SECURED INTO TRAY BY TIGHTENING LOCKING SCREW ACCESSIBLE THROUGH HOLE IN FRONT PANEL. 5/64 ALLEN WRENCH REQ'D.





NOTES:

- ① NUMBERS SHOWN IN () DENOTE QUANTITY.
- ② NOT SHOWN, BUT INCLUDED IN KIT ARE 40 FERRITE BEADS (CPN 288-1325-010) AND 15 TERMINALS (CPN 372-7513-190 FOR USE ON TRANSPONDER WIRING, TWO 4-40 X 1/2 SCREWS (CPN 343-0133-000), AND ONE CABLE TIE (CPN 435-0011-010).

RCR-650 Receiver, Installation Kit
Figure 2-3

described, other methods of grounding the antenna may be used. If the antenna is to operate properly, it must be attached electrically to the aircraft ground. Any impedance between the antenna and aircraft will degrade its performance, therefore, long ground leads and small diameter wire or braid must be avoided. Note that in figure 2-5 the ground strap is shown attached to the antenna mounting plate. If a solid ground cannot be made between the mounting plate and the aircraft, the ground strap should be connected directly to the airframe or another convenient ground source rather than to the mounting plate. When this method of grounding the antenna is used, select the closest possible ground and be sure that the ground strap used does not exceed 165 mm (6.5 in) in length.

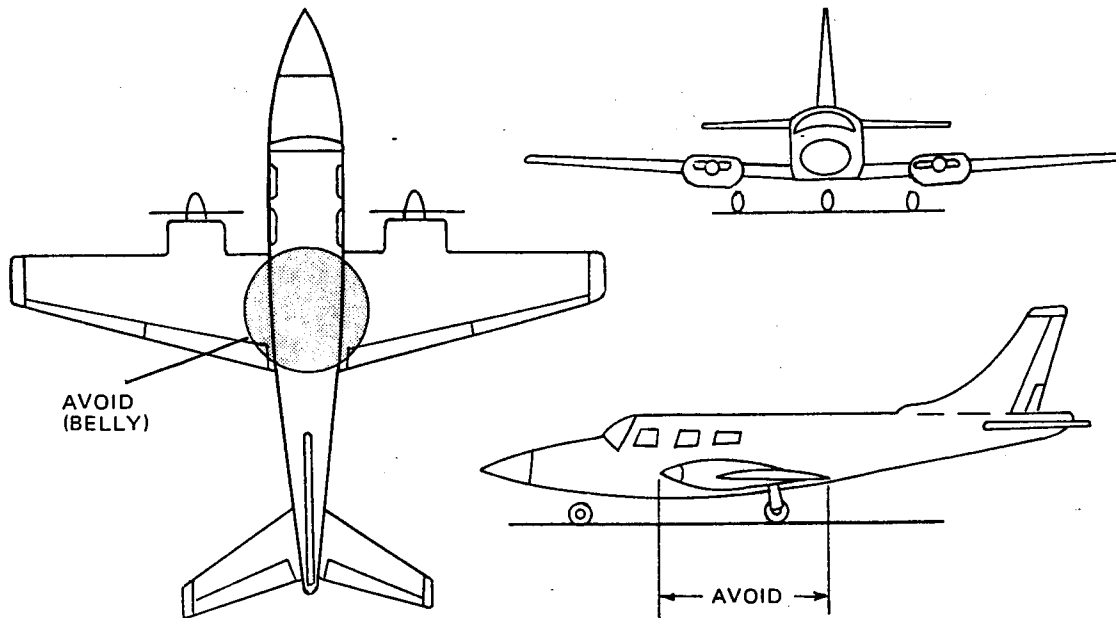
- h. From outside the aircraft, connect the lead-in cables to the antenna-mounted BNC connectors

and secure the ground strap to the antenna-mounted ground stud.

Note

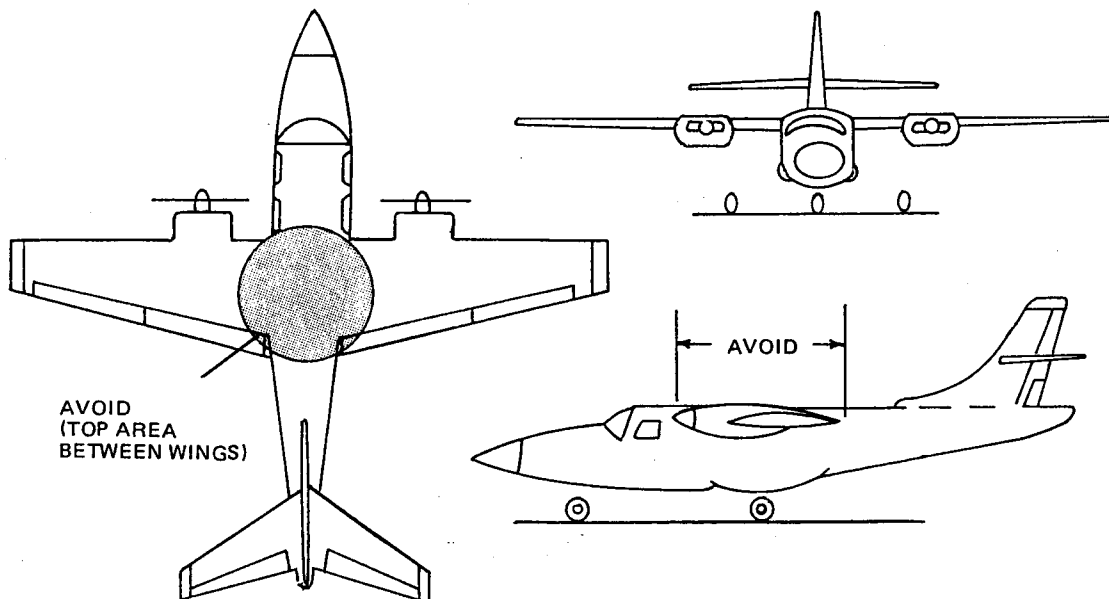
In installations where the antenna connectors are likely to be subjected to conditions of extreme humidity or a water environment, a liberal application of Dow-Corning DC-4 silicone grease, "S-TEC" part number 005-0201-000, on both the mating and antenna connectors (both inside and outside) prior to connection will be helpful in retarding corrosion. Application of DC-4 will not degrade performance in any way. (New ANT-650A Antennas after serial number 16 000 will have DC-4 applied at the factory. Also dust cover caps will be supplied for storage (CPN 150-0876-000).)

ANT-650A ANTENNA LOW-WING INSTALLATION



WHENEVER POSSIBLE, AVOID MOUNTING
ANT-650A ANTENNA IN AREAS SHOW

ANT-650A ANTENNA HIGH WING INSTALLATION



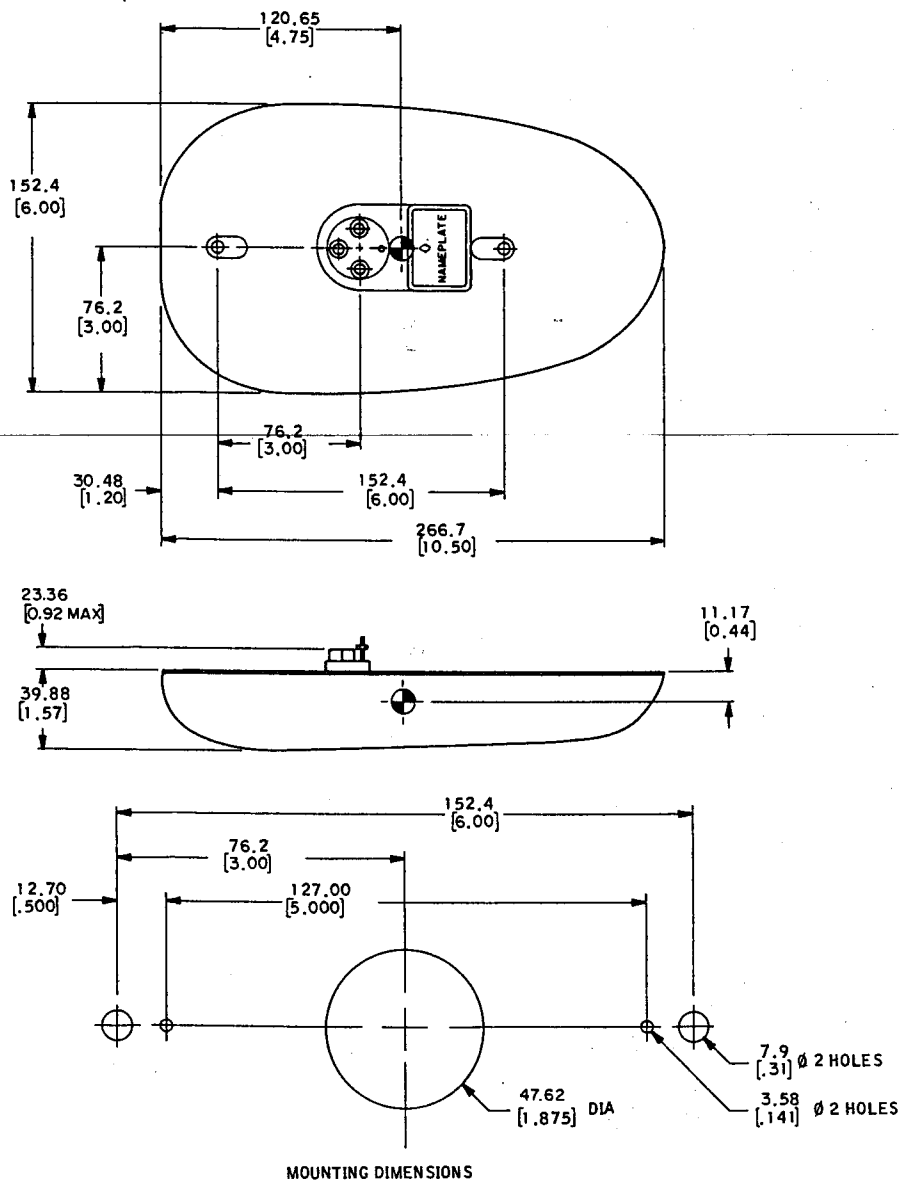
628-6875-001

Areas To Avoid When Installing the ANT-650A Antenna
Figure 2-6

NOTES:

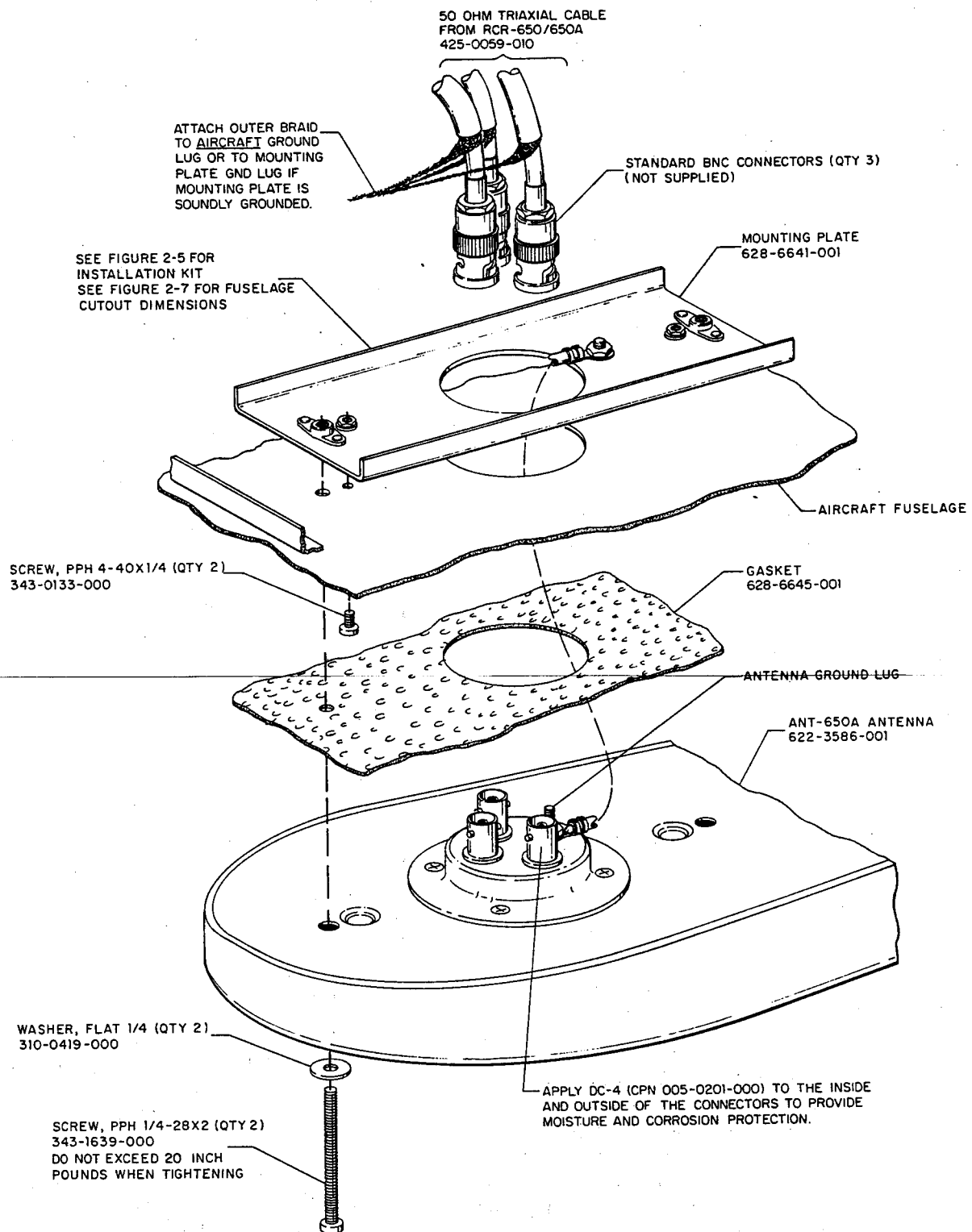
1. CG'S ARE WITHOUT MOUNTING BRACKETS.
2. DIMENSIONS ARE IN MILLIMETRES [INCHES].

357-0038-010	357-0039-040	.15 LBS	.07 kg	2.25 LBS	1.02 kg
MATING CONNECTOR	UNIT CONNECTOR	MTG BKT WEIGHT		UNIT WIEGHT	



628-6001

ANT-650A Antenna, Outline and Mounting Dimensions
Figure 2-7



ANT-650A INSTALLATION DIAGRAM

628-6679

ANT-650A Antenna, Installation Diagram
Figure 2-8

- i. When positioning the ANT-650A in place, ensure the sense antenna plug (marked S on antenna plate) is pointed toward the nose of the aircraft.

Caution

Do not overtighten antenna mounting screws. Do not exceed 225.80 N·m (20 in·lb) when tightening.

- j. After all cables and the ground braid/strap have been connected, push the wires up through the mounting hole and position the ANT-650A on the aircraft skin. Secure in place using two 1/4-28 x 2-inch Phillips panhead screws and two flat washers. Ensure that gasket and antenna are aligned and that gasket is fitted snugly against fuselage.

2.6.4 IND-650A Indicator

The installation kit (CPN 628-7949-001) supplied with the IND-650A should be used for proper installation. Table 2-1 is a list of the materials included in this kit.

Table 2-1. IND-650A Indicator, Installation Kit Materials.

DESCRIPTION	QTY	S-TEC PART NUMBER
Screw, 6-32 x 5/8 Pfh	3	330-4058-060
Screw, 6-32 x 5/8 Pph	3	343-0173-000
Socket contact	7	371-0379-130
*Connector receptacle	1	371-0379-190
Shield	1	371-0379-200
Slide retainer	1	371-0379-210
*An optional solder pot type connector may be substituted, CPN 371-0381-010 (Cannon part number DE-9S).		

- a. Indicator cutout dimensions for front and rear panel mounting are shown in figure 2-9. After determining whether the installation is to be a front or rear mount, make the appropriate cutout. If rear panel mounting is used, secure the indicator in place using three #6-32 screws. If front panel mounting is desired, an optional adapter plate (CPN 628-7035-001) and mooring plate (628-7036-001) must be used. Figure 2-10 illustrates a typical front panel mount configuration.
- b. Refer to paragraph 2.7 for cabling information. After wiring, connect and secure the mating connector to the unit using the slide-lock retainer.

2.6.5 IND-650 Indicator

The installation kit (CPN 628-5845-001) supplied with the IND-650 should be used for proper installation.

- a. Indicator cutout dimensions for front and rear panel mounting are shown in figure 2-11. After determining whether the installation is to be a front or rear mount, make the appropriate cutout.
- b. Refer to paragraph 2.7 for cabling information. After wiring, connect and secure the mating connector to the unit using the slide-lock retainer. Position the unit in place and secure with four 6-32 screws and four self-locking nuts (for front mount) or three 6-32 flathead screws (for rear mount).

2.7 CABLING

Figure 2-12 is the interconnect wiring diagram for the RCR-650A, IND-650A, and ANT-650A; and figure 2-13 is the interconnect for the RCR-650, IND-650, and ANT-650A. Refer to the proper diagram when fabricating the aircraft wiring harness.

Figure 2-13A shows single receiver/dual indicator installation information. This figure contains outline and mounting dimensions, connector pin assignments and a partial interconnection diagram for the dual indicator adapter, 628-7902-001. This coupler must be used in these installations to provide sufficient drive for the dual indicators. Other connections not shown are wired according to the appropriate interconnect wiring diagram. Dual indicator installations must be 28 V.

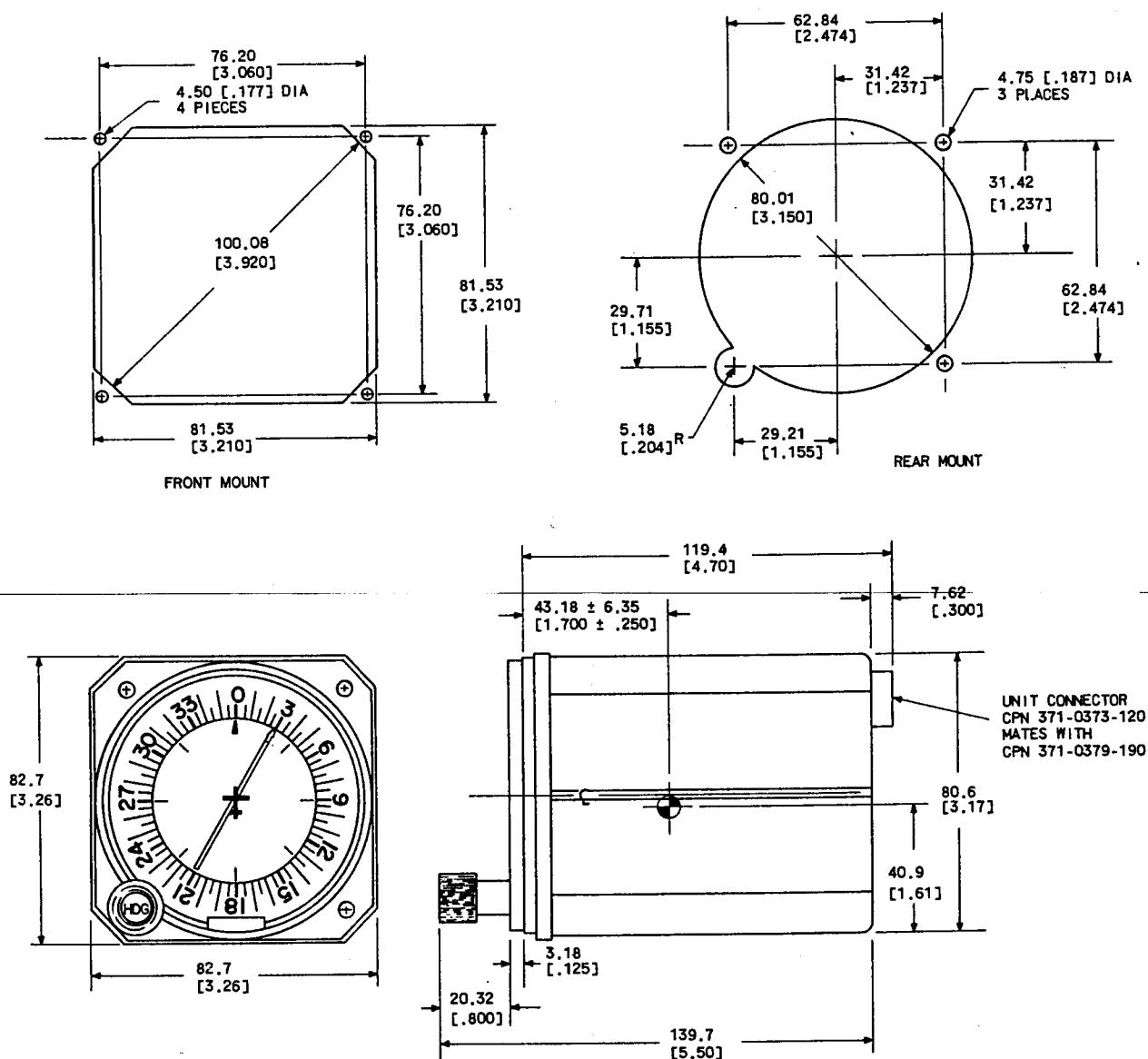
Mating connector pin assignments and part numbers for the RCR-650A are shown in figure 2-14, for the RCR-650 in figure 2-15, and for the IND-650/650A Indicators in figure 2-16. Refer to the ADA-650 ADF to RMI Adapter installation section for the RCR-650/650A, ANT-650A, ADA-650, and an ARINC RMI interconnect wiring diagram.

During preparation of the interconnect wiring harness, observe the following precautions.

Note

On figures 2-12 and 2-13, pay particular attention to the IND-650/650A Indicator connections with respect to top or bottom mounting of the ANT-650A Antenna.

- a. Ensure that all parts of the aircraft electrical system, such as generator and ignition systems, are bonded and shielded.
- b. Keep the interconnect cables away from circuits carrying heavy current, pulse-transmitting equipment, and other sources of interference.

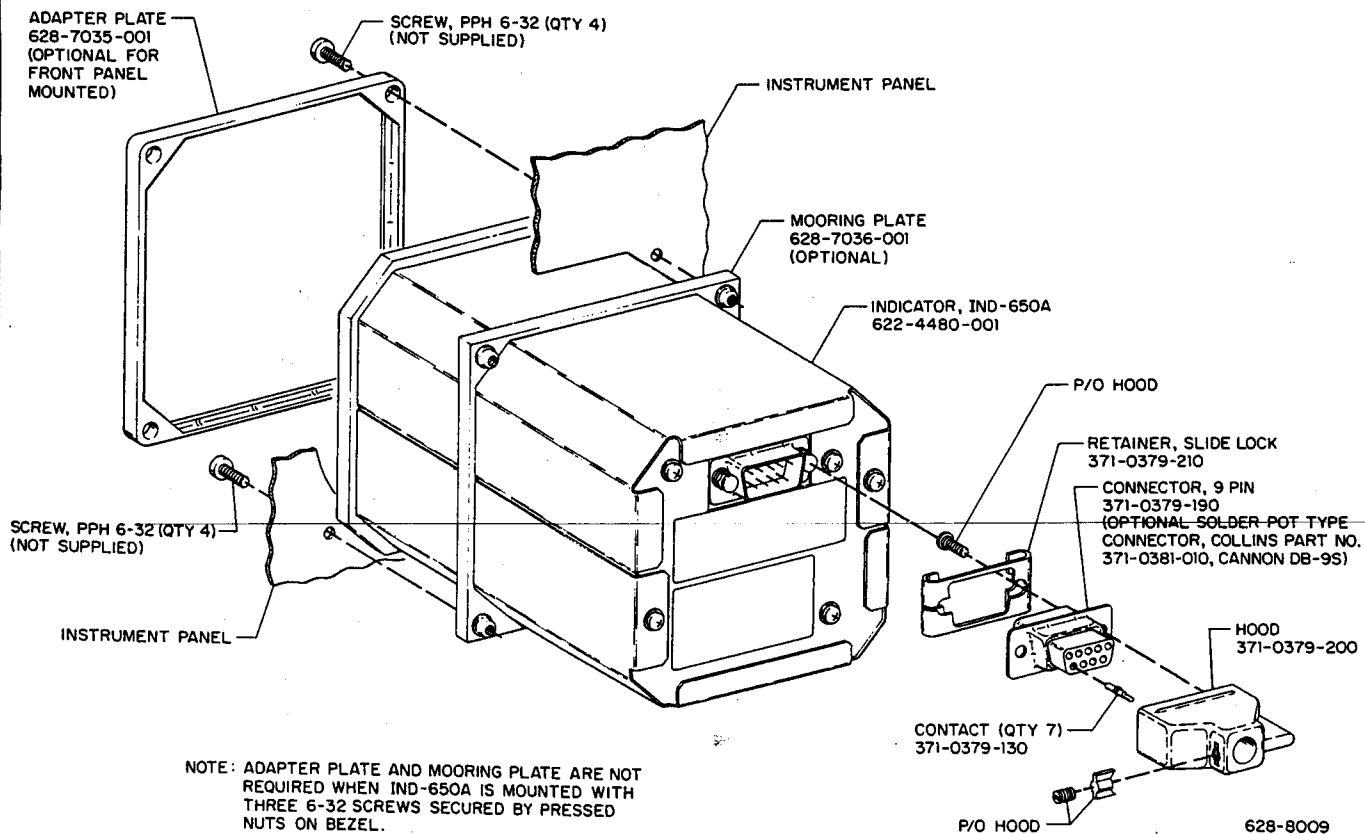


NOTES:

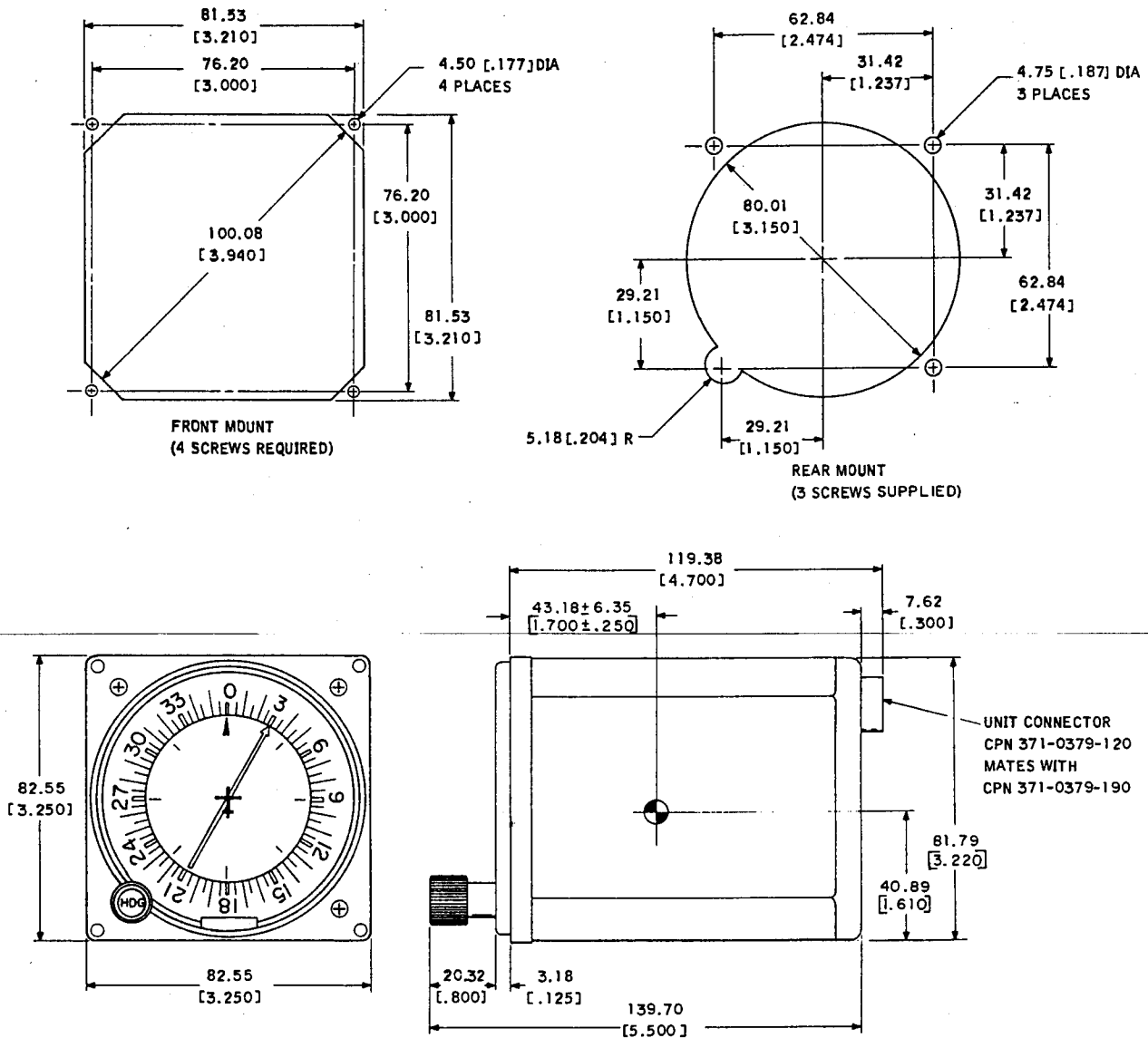
1. DIMENSIONS ARE IN MILLIMETRES [] INCHES.
2. WEIGHT APPROX. .30 kg [.66] LBS.
3. ⊕ DENOTES CENTER OF GRAVITY.

628-8035


IND-650A Indicator, Outline and Mounting Dimensions
Figure 2-9



IND-650A Indicator, Optional Front Panel Mounting
Figure 2-10



NOTES:

- ① DIMENSIONS ARE IN MILLIMETRES.
DIMENSIONS IN [] ARE INCHES.
- ②  DENOTES CENTER OF GRAVITY.
- ③ UNIT WEIGHT 0.34 kg (0.75 lb).

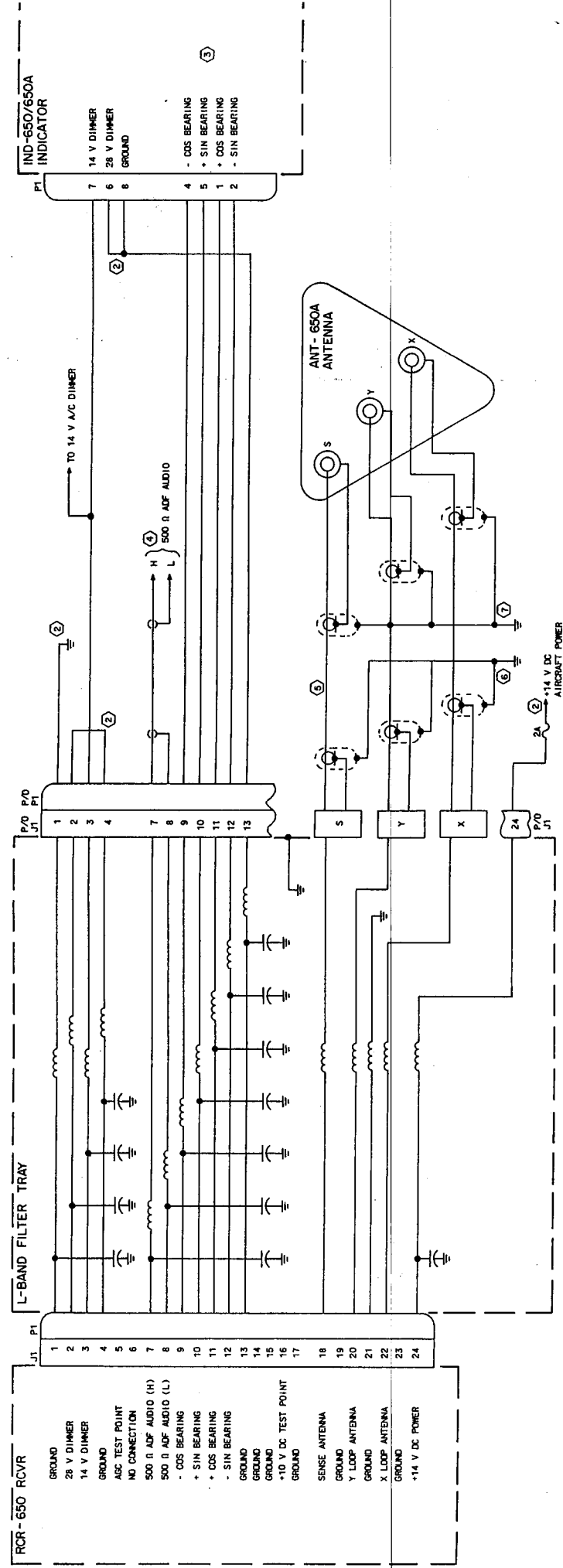
628-6122

IND-650 Indicator, Outline and Mounting Dimensions
Figure 2-11

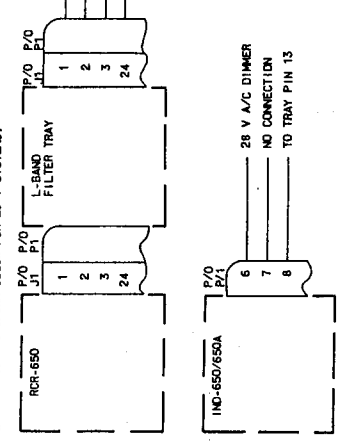


-
- RCR 650A RCVR**
- | Terminal | Label | Connection |
|----------|----------------|-----------------------|
| 11 | GROUND | 2 A |
| 12 | POWER IN | AIRCRAFT POWER (28 V) |
| 13 | SWITCHED POWER | 28 TO 14 V PWR CONV |
| 25 | 14 V IN | 28 TO 14 V PWR CONV |
| 18 | 14 V DIMMER | NO CONNECTION |
| 20 | 28 V DIMMER | TO LIGHT BUS |
- IND-650/650A IND**
- | Terminal | Label | Connection |
|----------|-------------|---------------|
| 6 | 28 V DIMMER | TO LIGHT BUS |
| 7 | 14 V DIMMER | NO CONNECTION |
| 8 | GROUND | |

RCR-650A, IND-650/650A, and ANT-650A, Interconnect Wiring Diagram
Figure 2-12



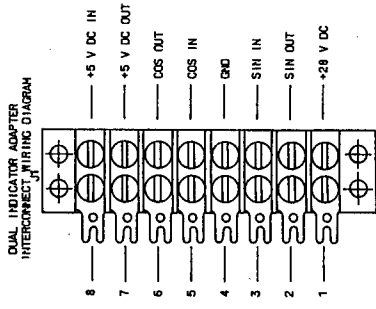
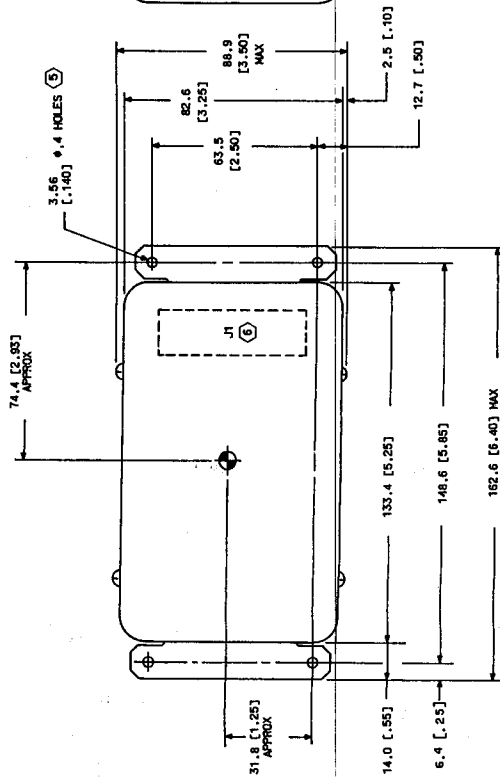
- NOTES:
- CONNECT AS SHOWN BELOW FOR 28 V SYSTEMS.
 - WIRE CARRYING 14/28 VOLT (INCLUDING POWER GROUND) MUST BE NO. 20 AWG OR LARGER.
 - FOR TOP MOUNTED ANTENNA, WIRES ON PINS 2 AND 5 MUST BE NO. 20 AWG. WIRING CONNECTOR MUST BE INTERCHANGED.
 - CONNECT AUDIO L TO AUDIO GROUND AT SPEAKER AMPLIFIER.
 - USE 50 OHM TRIAXIAL CABLE.
 - GROUND OUTER SHIELD OF TRIAXIAL CABLE AT TRAY GROUND LUG.
 - GROUND OUTER SHIELD OF TRIAXIAL CABLE (ANTENNA END) TO AIRFRAME.



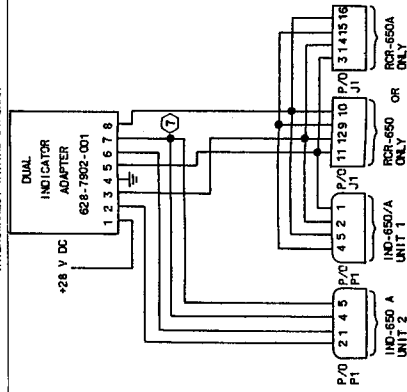
NOTES:

- ① WEIGHT OF UNIT 190 GRAMS (.41 LB).
- ② THIS DRAWING APPLIES TO UNIT CPN 628-7902-001.
- ③ DIMENSIONS ARE IN MILLIMETRES (INCHES).
- ④ DENOTES CENTER OF GRAVITY.
- ⑤ HOLES PROVIDE FOR MOUNTING UNIT.
- ⑥ USE .112-40 (4-40) SCREW (UNIT PROVIDED).
- ⑦ CONTACTS FOR J1 CONNECTOR SUPPLIED WITH UNIT ARE AMP INC. 320773 (CPN 304-1551-020).
- ⑧ WIRES 3, 4 AND 8 FROM INDICATOR COUPLER AND WIRES 1, 2, 4 AND 5 FROM IND-650A UNIT 1 MUST BE CONNECTED ONLY AT RCR-650/A. TRAIL COUPLER MUST BE CONNECTED TO IND-650A UNIT 1.
- ⑨ SEPARATE WIRES FROM EACH IND 650/650A UNIT 2 PINS 4 AND 5 (PINS 2 AND 4 FOR TOP MOUNT) MUST BOTH CONNECT ONLY AT TERMINAL 7 OF DUAL INDICATOR ADAPTER.
- ⑩ FOR TOP MOUNTING ANTENNA INSTALLATIONS, WIRES TO PINS 2 AND 5 OF BOTH IND 650/650A INDICATORS MUST BE INTERCHANGED.
- ⑪ IND-650A UNIT 2 WIRES 4 AND 5 MUST BE CONNECTED TOGETHER ONLY AT INDICATOR COUPLER PIN 7.

DUAL INDICATOR ADAPTER OUTLINE AND MOUNTING DIMENSIONS

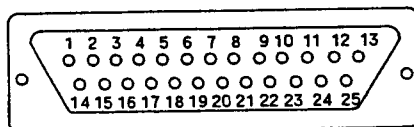


DUAL INDICATOR ADAPTER
INTERCONNECT WIRING DIAGRAM



628-9835-001

Dual Indicator Adapter (CPN 628-7902-001), Interconnect Wiring Diagram
and Outline and Mounting Dimensions
Figure 2-13A



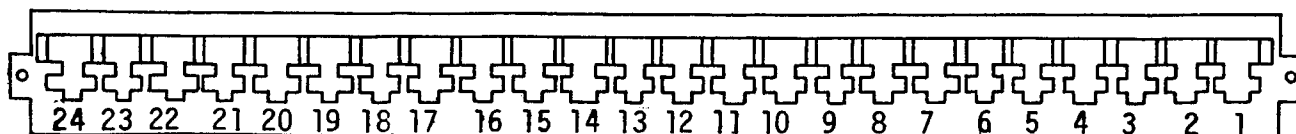
MATING CONNECTOR
(VIEWED FROM WIRING SIDE)

- | | |
|--------------|--------------------|
| 1. SPARE | 13. SWITCHED POWER |
| 2. SPARE | 14. -SIN |
| 3. +COS | 15. -COS |
| 4. NOT USED | 16. +SIN |
| 5. NOT USED | 17. SPARE |
| 6. NOT USED | 18. 14 V DIM |
| 7. NOT USED | 19. GROUND |
| 8. NOT USED | 20. 28 V DIM |
| 9. NOT USED | 21. AGC |
| 10. NOT USED | 22. +10 V |
| 11. GROUND | 23. AF LOW |
| 12. POWER IN | 24. AF HIGH |
| | 25. 13.75 V IN |

628-6849

RCR-650A Receiver, Mating Connector Pin Assignments
Figure 2-14

TOP OF CONNECTOR
J1



FRONT VIEW

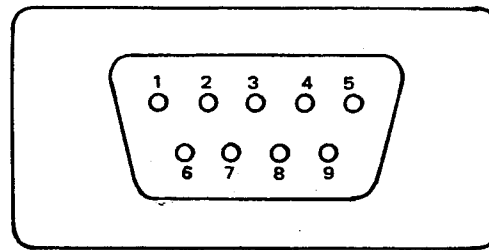
PART NUMBER 372-7513-180

- | | |
|-----------------------------|-------------------------|
| 1. GROUND | 13. GROUND |
| 2. 28 V DIMMER* | 14. GROUND |
| 3. 14 V DIMMER** | 15. GROUND |
| 4. GROUND | 16. +10 V DC TEST POINT |
| 5. AGC TEST POINT | 17. GROUND |
| 6. NO CONNECTION | 18. SENSE ANTENNA |
| 7. 500 OHM ADF AUDIO, HI | 19. SENSE ANT GROUND |
| 8. 500 OHM ADF AUDIO, LO*** | 20. Y LOOP ANTENNA |
| 9. -COS BEARING | 21. Y LOOP ANT GROUND |
| 10. +SIN BEARING | 22. X LOOP ANTENNA |
| 11. +COS BEARING | 23. X LOOP ANT GROUND |
| 12. -SIN BEARING | 24. 14 V DC |

- *THIS PIN GROUNDED FOR 14 V DC OPERATION.
- **NO CONNECTION TO THIS PIN FOR 28 V DC OPERATION
- ***CONNECT AUDIO LO TO AUDIO GROUND AT SPEAKER AMPLIFIER.

628-6057

RCR-650 Receiver, Connector Pin Assignments
Figure 2-15



IND-650/650A MATING CONNECTOR REAR VIEW P1

- 1. + COS BEARING
- 2. - SIN BEARING
- 3. NO CONNECTION
- 4. - COS BEARING
- 5. + SIN BEARING
- 6. 28 V DC DIMMER*
- 7. 14 V DC DIMMER**
- 8. GROUND
- 9. NO CONNECTION

*THIS PIN GROUNDED FOR +14 V DC OPERATION.

**NO CONNECTION TO THIS PIN FOR +28 V DC OPERATION.

NOTE: WIRING AS SHOWN IS FOR A BOTTOM MOUNTED ANTENNA. FOR TOP MOUNTED ANTENNA, WIRES CONNECTED TO PINS 2 AND 5 OF INDICATOR MUST BE INTERCHANGED.

628-6054

IND-650/650A Indicator, Mating Connector Pin Assignments
Figure 2-16

- c. Leave slack in cables to allow for movement due to vibration.
- d. After installation of the cables in the aircraft and before installation of the equipment, a point-to-point continuity check should be made to verify correct wiring. A check should also be made to ensure that aircraft power is applied only to the pins specified.
- e. Remove and install RCR-650 mating connector contacts in accordance with steps f through h. Table 2-2 lists the special tools required to perform the following steps.

Table 2-2. Special Tools for RCR-650 Mating Connector.

DESCRIPTION	MANUFACTURER AND TYPE	S-TEC PART NUMBER
Crimping tool	Molex 11-01-0008 (ratchet)	372-0065-010
	or Molex 11-01-0015 (pliers)	372-0065-020
Extraction tool	Molex 11-03-0004	372-0065-030

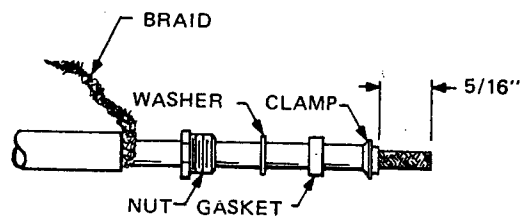
- f. When preparing the mating connector, the connecting wire must be crimped in the contact so

that the crimped portion of the contact can enter the connector shell.

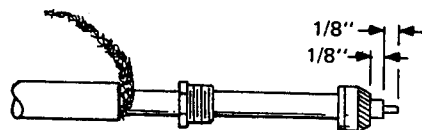
- g. Insert the contact into the proper connector shell hole and press until locked.
- h. During removal of a contact, use the extraction tool to unlock the contact, and pull the contact out of the connector from the rear.
- i. Refer to figure 2-17 for preparation of the ANT-650A cables. Use 50-ohm triaxial cable in the installation. Length of the cables is not critical. Figure 2-17 shows the correct method of installing a male BNC bayonet connector.
- j. Remove and install RCR-650A/IND-650/650A mating connector contacts in accordance with steps k and l. Table 2-3 lists the special tools required to perform the following steps.

Table 2-3. Special Tools for RCR-650A and IND-650/650A Mating Connector.

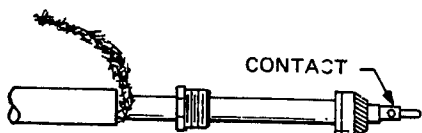
DESCRIPTION	MANUFACTURER AND TYPE	S-TEC PART NUMBER
Crimping tool	Cannon, CCT-D*C-1	371-0382-010
Insertion/extraction	Cannon, CIET-20HDB	371-8445-010



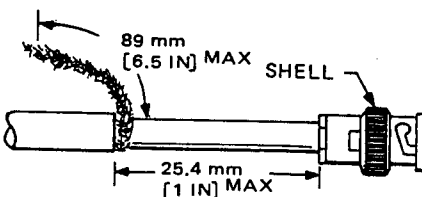
TRIM CABLE INSULATION BACK TO INNER JACKET AND SLIDE PARTS ON CABLE AS SHOWN. COMB OUT BRAID



FOLD BRAID OVER CLAMP WITHOUT CROSSING STRANDS & TRIM OFF EXCESS AS SHOWN. CUT DIELECTRIC AND CENTER CONDUCTOR TO LENGTH AND TIN CENTER CONDUCTOR.



SLIDE CONTACT OVER CONDUCTOR UNTIL FLUSH AGAINST DIELECTRIC & SOLDER. DO NOT HEAT EXCESSIVELY. THIS WILL CAUSE THE DIELECTRIC TO SWELL THEREBY PREVENTING PROPER FITTING IN THE CONNECTOR SHELL.



SLIDE THE CABLE ASSY INTO THE SHELL AND TIGHTEN THE NUT SECURELY.

628-6652

RCR-650A/ANT-650A Triax Cable Preparation
Figure 2-17

- k. During installation of the mating connector, the connecting wire must be crimped in the contact so that the crimped portion of the contact can enter the connector shell and provide a positive lock of the contact in the shell. Use crimping tool (CPN 371-0382-010) and crimp each interconnect wire in a contact. Using the insertion/extraction tool (CPN 371-8445-010), insert the contact into the proper connector shell hole and press until locked. Refer to figure 2-18.
- l. For removal of a contact, use the insertion/extraction tool to unlock the contact, and pull the contact out of the connector from the rear.

2.8 POSTINSTALLATION CHECKS

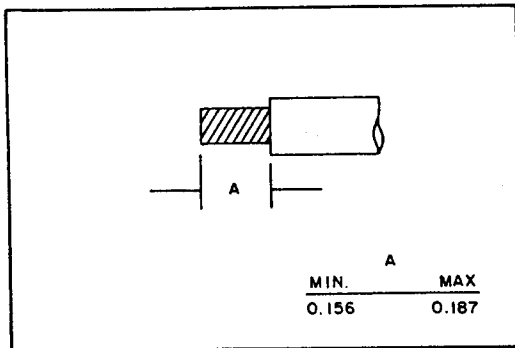
The following postinstallation checks are to be performed with RCR-650/650A, ANT-650A, and IND-650/650A (or ADA-650 RMI converter and an ARINC standard RMI) installed in the aircraft. Preliminary checks may be made using the aircraft battery. A final check should be made with the engine running. No test equipment is required. The aircraft should not be grounded during any of these tests.

2.8.1 Ground Checks

Note

The aircraft directional gyro is used during the following postinstallation check. If the gyro is vacuum operated, it will be necessary for the checks to be performed with the engine running.

- a. Using a sectional map or other reliable document, select a nearby NDB or a compass locator. Draw a line from the selected station to a position on the ramp that is at least 30.48 m (100 ft) from surrounding buildings, etc. Determine the magnetic heading to the selected station.
- b. Position the aircraft on the ramp at the selected test position headed directly toward the selected test station. Ensure that the aircraft is not grounded by tiedown chains, ground power cables, etc. Record this original heading for later use.
- c. With the engine and all other accessories turned off, apply power to the RCR-650/650A by turning the OFF/VOL/ID knob clockwise. Position the mode switch to ADF. Using the frequency select knobs, dial in the frequency of the station selected



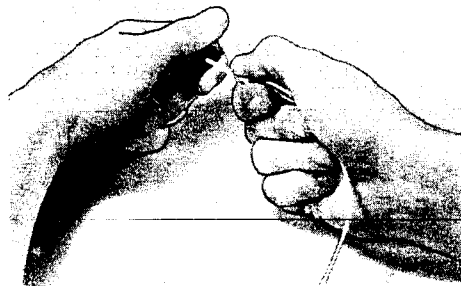
WIRE STRIPPING

1. CUT WIRES TO LENGTH. STRIP INSULATION PER ABOVE ILLUSTRATION. CHECK FOR BROKEN OR FRAYED WIRES.



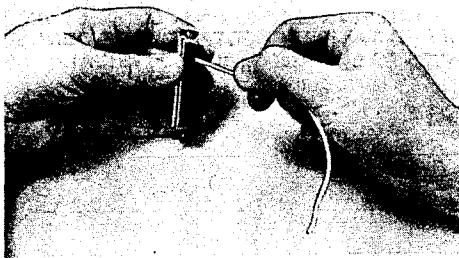
CONTACT CRIMPING

2. INSERT CONTACT AND WIRE INTO PROPER CRIMP TOOL (AND LOCATOR, IF REQUIRED) CRIMP CONTACT TO WIRE. INSPECT CRIMP.

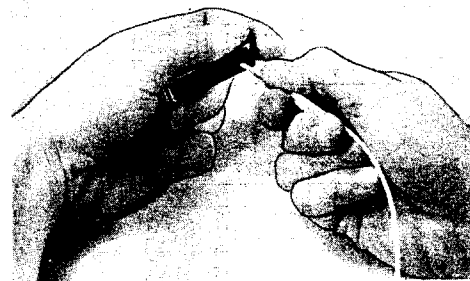


CONTACT INSERTION

3. CENTER WIRED CONTACT IN GROOVE OF INSERTION TOOL, WITH TOOL TIP BUTTING CONTACT SHOULDER. INSERT CONTACT INTO CAVITY UNTIL A POSITIVE STOP IS FELT INSPECT INSERTION.



4. TO BE SURE CONTACT IS LOCKED SECURELY, PULL BACK LIGHTLY ON WIRE. REPEAT FOR BALANCE OF CONTACTS, WORKING ROW BY ROW ACROSS THE INSULATOR.

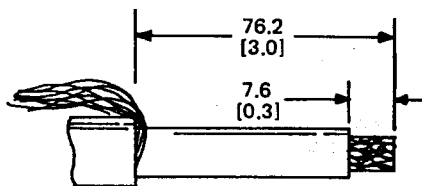


CONTACT EXTRACTION

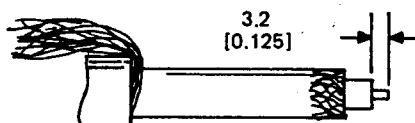
5. PLACE WIRE INTO EXTRACTION TOOL TIP. INSERT TOOL TIP INTO CONTACT CAVITY UNTIL TIP BOTTOMS AGAINST CONTACT SHOULDER, RELEASING TINES. HOLD WIRE AGAINST TOOL WITH FINGER AND REMOVE TOOL AND CONTACT. REPEAT FOR BALANCE OF CONTACTS.

628-5699-001
TP4-2067-017

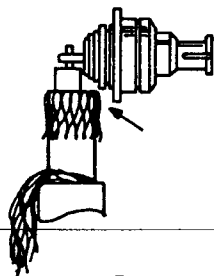
Use of RCR-650A and IND-650/650A Crimping and Insertion/Extraction Tools
Figure 2-18



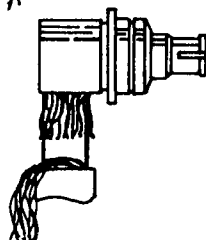
TRIM TRIAX TO EXPOSE SHIELDS AS SHOWN.



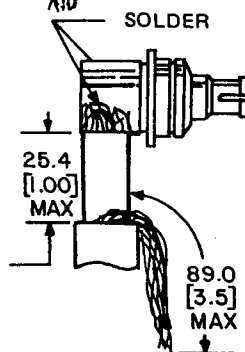
FOLD INNER SHIELD BACK OVER INSULATION AND STRIP BACK CENTER CONDUCTOR. DO NOT CROSS STRANDS OF FOLDED SHIELD.



SOLDER CENTER CONDUCTOR TO CENTER PIN OF CONNECTOR. ENSURE FRONT END OF BRAID IS EVEN WITH BOTTOM OF CONNECTOR. (SHOWN BY ARROW).



SLIDE CONNECTOR CAP, WITH CLEARANCE HOLE IN POSITION TO CLEAR DIELECTRIC, ON TO CONNECTOR UNTIL IT SNAPS INTO PLACE.



PUSH BRAID FORWARD AND FLATTEN AGAINST CONNECTOR CAP AND SOLDER. SOLDER TACK CONNECTOR CAP TO CONNECTOR IN AT LEAST TWO PLACES TO ENSURE GOOD ELECTRICAL CONTACT.

628-8147

RCR-650/650A Triax Cable Preparation
Figure 2-19

- in step a. Adjust the OFF/VOL/ID knob and verify that the station is being received.
- d. Adjust the HDG knob on the IND-650/650A until 0 on the compass card is under the lubber line. (If a slaved RMI is being used, record the heading under the lubber line.)
 - e. The IND-650/650A (or RMI bearing pointer) should show a relative bearing indication of 0 ± 5 degrees. If not, recheck the actual magnetic bearing to the test station and verify that the aircraft is properly positioned. If the inaccuracy still persists, bench test the RCR-650/650A to verify proper adjustment of the phase zero control, R711. (Refer to the maintenance section of the ADF-650 instruction book, CPN 523-0766207.)
 - f. Start the aircraft engine, turn on the generator and all radios and accessories (such as, strobe lights, electric turn and bank, etc) normally used in flight and verify that the relative bearing error changes less than ± 5 degrees from the bearing obtained in step e. If excessive bearing changes are found, isolate the cause of the interference by turning off accessories, generators, magnetos, etc, one at a time until the source of the interference is located. Apply the necessary suppression to the offending interference source.
 - g. Check to see that the relative bearing errors at 90, 180, and 270 degrees are less than ± 7 degrees. If the aircraft has a slaved compass system, the proper aircraft test headings may be determined by adding increments of 90 degrees to the original test heading (recorded in step b) of the aircraft. If the aircraft has a directional gyro, it may be set to

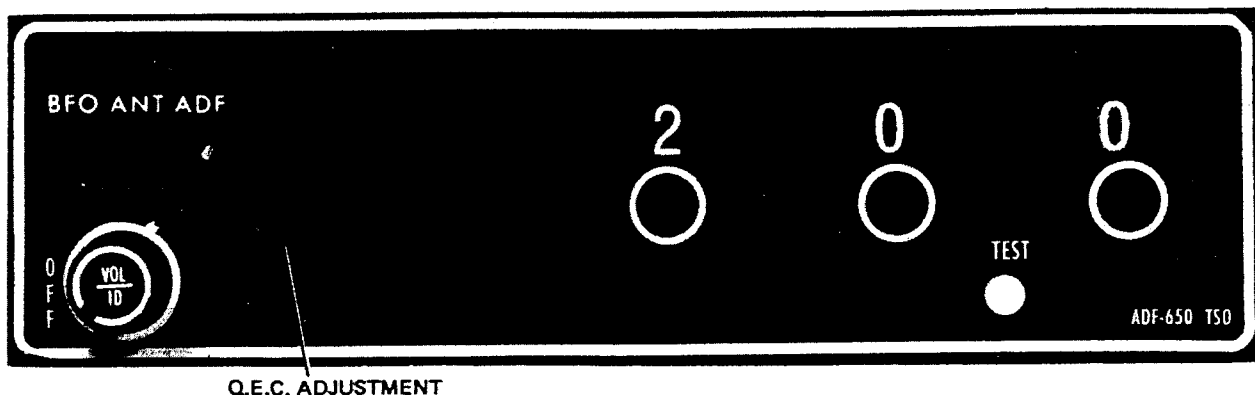
0 degree at the original test heading, and used as a reference to turn the aircraft to 90, 180, and 270 degrees. Be certain to return to the original test heading to verify that the gyro has not precessed significantly during these bearing checks.

- h. The quadrantal error (QEC) adjustment (figure 2-20; RCR-650 shown, RCR-650A similar) does not control the error at 0, 90, 180, or 270 degrees, but does adjust the error at intermediate points, especially 45, 135, 225, and 315 degrees. This error is due to the shape of the aircraft and is slightly different for each aircraft installation. The QEC potentiometer should be adjusted only after the installation checks in preceding steps e through g have been made.

Note

A 63.5-mm (2.5-in) flat blade screwdriver, approximately 3.2-mm (0.125-in) diameter or less, is necessary for this adjustment. If an insulated screwdriver is not available, sleeving or shrink-tubing may be used to insulate the screwdriver shaft.

To adjust the QEC potentiometer, turn the aircraft 45 degrees left from the original test heading using the slaved compass system or directional gyro for reference as in preceding step g. Adjust the QEC potentiometer so that the relative bearing indication shows 45 degrees. Check the error at 135, 225, and 315 degrees and readjust the control as necessary to split the errors at these points to get the best overall tracking performance.



Q.E.C. ADJUSTMENT

628-6126-001
TP4-4620-017

Quadrantal Error Adjustment
Figure 2-20

- i. This completes the postinstallation adjustments. Further checks to be made are functional and verify proper operation. The aircraft can be returned to the parking area.
- j. Position the mode switch to ANT. If possible, select several local and distant stations and verify that audio is present at the headphones and/or loudspeaker. Note that the IND-650/650A (or RMI) pointer is inoperative when in ANT mode.
- k. Position the mode switch to ADF. Tune in a known nondirectional radio beacon such as a compass locator. Verify the identifier. Pull the OFF/VOL/ID knob outward to activate the ID filter. Verify that the identifier is now louder. Push the OFF/VOL/ID knob inward.
- l. Position the mode switch to BFO. Select a compass locator or beacon station and determine that a whistle is present at all times while in the BFO mode (ident tones should be present if the station is a keyed CW station). Select a channel with no station present and verify that the whistle is much reduced in amplitude.
- m. With the mode switch in ADF and a station selected, note the position of the IND-650/650A (or RMI) pointer. Press and hold the TEST button on the RCR-650/650A front panel. Observe that the pointer rotates 90 degrees counterclockwise (for bottom-mounted antenna) or 90 degrees clockwise (for top-mounted antenna) from its previous position. Release the TEST button. Verify that the pointer returns in the opposite direction to its previous position.

Note

If aircraft avionics include a transponder, continue with the following steps. If a transponder is not included, omit steps n and o.

- n. Apply power to the aircraft transponder and allow several seconds for warmup and stabilization. Select code 4421 on the transponder and tune the RCR-650/650A to 240 kHz.
- o. While the transponder is operating and responding to interrogations, observe ADF-650/650A operation. There should be no noticeable audio interference present in the output, and the IND-650/650A bearing indicator should be free of erratic movement. If interference is observed, turn off the transponder and again observe ADF-650/650A performance; return to normal operation indicates ADF-650 sensitivity to L-band interference generated by the transponder. When L-band interference is detected, a thorough check of all interconnect shields should be made to ensure

- p. Rotate the OFF/VOL/ID knob fully counterclockwise. Verify that power is removed from the ADF-650/650A system.

2.8.2 Airborne Checks (Optional)

2.8.2.1 Range

Once airborne, switch on all avionics equipment as well as the ADF-650/650A Automatic Direction Finder System. Select a station in the area and fly to or away from that station while observing the IND-650/650A Indicator. Using the following tabulation, establish that the system is operating properly with usable bearing pointer indications.

Note

Data will be valid only during daylight hours and when atmospheric disturbances are at a minimum.

<u>FACILITY</u>	<u>RANGE</u>
Compass locators	15 nmi
Transmitters — 100 to 200 W	50 nmi
Transmitters — 200 to 400 W	60 nmi
Transmitters — over 400 W	75 nmi

2.8.2.2 Pointer Reversal

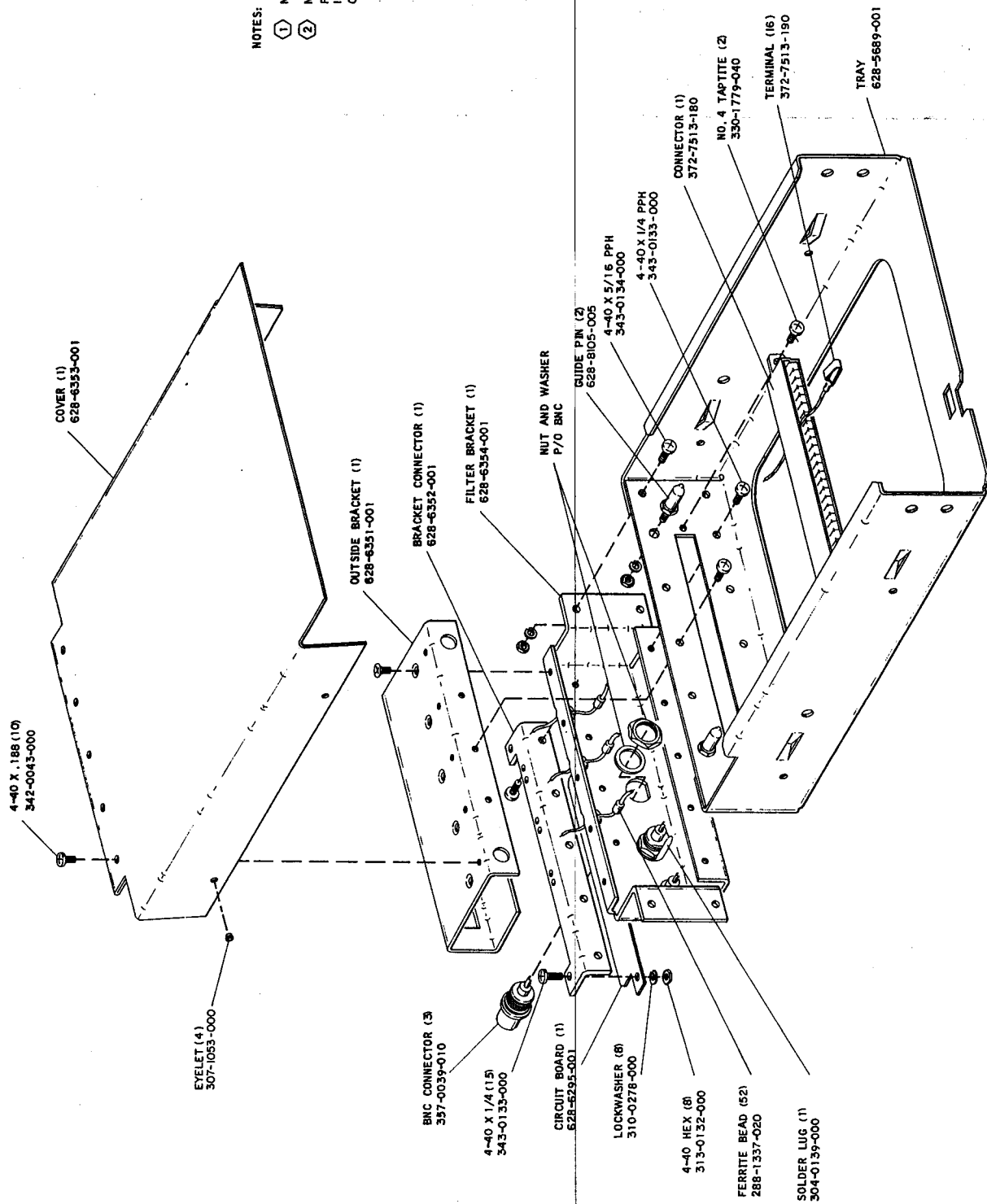
Fly directly over a properly operating ground based station. Note that pointer reversal occurs within a circular area centered over the station and having a radius no greater than the altitude being flown.

2.8.2.3 Bearing Accuracy

For headings within 15 degrees of either 0 or 180 degrees, bearing accuracy should be within 5 degrees of actual. For all other headings, accuracy should be within 10 degrees.

2.8.2.4 Comments

If airborne performance is not satisfactory, repeat the minimum performance test procedures and the postinstallation ground checks.



L-BAND FILTER KIT 628-6356-001
FERRITE BEAD TYPE

NOTES:

- ① NUMBERS SHOWN IN () DENOTE QUANTITY.
- ② NOT SHOWN, BUT INCLUDED IN KIT ARE 40 FERRITE BEADS (CPN 288-1325-010) AND 15 TERMINALS (CPN 372-7513-190) FOR USE ON TRANSPONDER WIRING.

628-6502

L-Band Filter Kit, Ferrite Bead Type (RCR-650 Only)
Figure 2-21

Revised 4 November 1981

2-25/2-26