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1.1 INTRODUCTION

In support of the Narco Avionics AR-850 Altitude Reporter, this manual provides detailed installation and maintenance procedures. This manual is intended for use only by persons who are qualified to service this equipment described in this manual pursuant to current regulatory requirements.

1.1.1 MANUAL ORGANIZATION

Organized into six major sections, the manual provides the following:

- SECTION 1 GENERAL INFORMATION --- Product description, ordering information, specifications, environmental category and licensing requirements.
- SECTION 2 INSTALLATION --- Detailed information for performing the mechanical and electrical installation.
- SECTION 3 OPERATION --- Operation of the AR-850 system is covered only to the extent of making electrical tests necessary to confirm proper operation.
- SECTION 4 THEORY OF OPERATION --- Technical description of electrical circuits.
- SECTION 5 MAINTENANCE --- Provides test, alignment and troubleshooting procedures.
- SECTION 6 SCHEMATICS & ILLUSTRATED PARTS LISTS --- Contains exploded views of mechanical parts, complete components parts lists, component layout drawings and circuit schematics.

NOTE: INSTALLATION/OPERATION MANUALS CONTAIN SECTIONS 1, 2 & 3. MAINTENANCE MANUALS CONTAIN, IN ADDITION TO SECTIONS 1, 2 & 3, SECTIONS 4, 5 & 6.

NARCO AVIONICS AR-850

1.2 PRODUCT DESCRIPTION

The AR-850 Altitude Reporter is a TSO'd pressure altitude digitizer. Sensing atmospheric pressure, the AR-850 converts pressure/altitude information into digitized altitude data, ready for transmission to air traffic control centers via the aircraft's transponder during a Mode C interrogation.

1.3 DESIGN FEATURES

- . Reports altitude up to 25,000 feet or 30,700 feet depending on model installed.
- . Incorporates a Piezoresistive pressure sensor.
- . No complex gears, shafts or optical discs are used which increase the unit's reliability.
- . Directly compatible with most current production transponders.
- . Meets FAA TSO C88(a).
- . Lightweight: less than 1 lbs.
- . Compact: Remote mounts easily within the aircraft's structure.
- . Operates on either 14 or 28 Vdc.

1.4 PRODUCT SPECIFICATIONS

ALTITUDE OPERATING RANGE

-1,000 to 25,000/30,700 feet referenced to 29.92 inches of mercury.

CODE OUTPUT

The digitized output format is in accordance with the U.S. National Standard for Common System Component Characteristics for the IFF Mark X (SIF)/Air Traffic Control Radar Beacon System, SIF/ATC RBS as amended December 27, 1963 and is the same code specified in the International (ICAO) Standard Code for SSR Pressure Altitude Transmission.

ACCURACY

The digitizer reproduces the pressure altitude input in digital form with a tolerance of ± 50 feet referenced to 29.92 in Hg as measured at any transition point of the digital code over the range of -1,000 to 25,000/30,700 feet, as shipped from the factory.

1.4 PRODUCT SPECIFICATIONS, Continued

MECHANICAL

SIZE : 3.35w x 4.45h x 6.15 inches deep overall
85.1w x 113h x 156.2 mm deep overall

WEIGHT: AR-850 Unit 0.7 Lbs (.318 Kg)
AR-850 Tray 0.08 Lbs (.036 Kg)

ELECTRICAL

INPUT POWER: 11 to 32 Vdc at 1.4 amps maximum during
the first 3 minutes of operation. 0.35 amps
average after 3 minutes of operation.

ENVIRONMENTAL

TSO C88(a)

DO160B INV. CAT. B1B/A/NOM/XXXXXXBBBBBB

CODE LINE OUTPUT CHARACTERISTICS

Data bit outputs are compatible with DTL, TTL, MOS, CMOS,
ECL or any other logic interface requiring the following
characteristics:

BIT OFF OUTPUT STATE: Will accept from the transponder
a voltage pullup of +50 Vdc at a leakage current
of 100 microamps.

BIT ON OUTPUT STATE:
0.75 Vdc at 50 milliamps sinking current
1.1 Vdc at 100 milliamps sinking current

DIGITIZER ENABLE SIGNAL INPUT

The AR-850 will accept either "continuous" or "strobed" type
digitizer enable signal information according to the following:

DIGITIZER ENABLED:

1. J102-22: When pin 22 is grounded the digitizer is enabled.
2. J102-23 (STROBE): When a negative going pulse of 5V max, 4V min is applied to pin 23, the digitizer is enabled.

DIGITIZER INHIBITED:

1. J102-22: When pin 22 is open circuited or a DC voltage greater than 0.5 volts is applied, the digitizer is inhibited.
2. J102-23: An open circuit, any DC voltage or a negative going pulse of less than 4 volts will inhibit the digitizer.

NARCO AVIONICS AR-850

1.5 ORDERING INFORMATION FOR UNITS AND ACCESSORIES

The following list identifies the AR-850 system and the order number to use to obtain the complete system. The accessory items of the system may be ordered by using the part numbers listed opposite the item.

ITEM	SYSTEM ORDER NO.	DESCRIPTION	PART NUMBER
1	03753-0300	AR-850 30,700 ft less mounting tray, with Installation Kit and Environmental Qualification Form (03753-0621)	
1	03753-0302	AR-850 25,000 ft less mounting tray, with Installation Kit and Environmental Qualification Form (03753-0621)	

ACCESSORIES

Mounting Tray Kit	03753-0301
Installation Kit 30,700Kft	03753-0500
Installation Kit 25,000Kft	03753-0502

INSTALLATION KIT 03753-0500 CONSISTING OF:

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	41303-0002	25 pin connector (P201)
2	1	41307-0003	Connector Hood (P201)
3	1	41308-0003	Connector Slide Lock (P201)
4	12	41317-0001	Connector Crimp Type Contacts (P201)
5	1	04968-0001	Label 30,700 ft.

INSTALLATION KIT 03753-0502 CONSISTING OF:

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	41303-0002	25 pin connector (P201)
2	1	41307-0003	Connector Hood (P201)
3	1	41308-0003	Connector Slide Lock (P201)
4	12	41317-0001	Connector Crimp Type Contacts (P201)
5	1	04968-0002	Label 25,000 ft.

MOUNTING TRAY KIT 03753-0301 CONSISTING OF:

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	53873-0102	AR-850 Mounting Tray Assembly

1.5.1 Miscellaneous Items Required But Not Supplied

In order to complete the AR-850 installation, the following items may be required:

1. Sufficient length of #22 AWG stranded hook-up wire.
2. A thermal resettable circuit breaker or fuse rated at 2 amps for device protection.
3. A panel mounted "power failure indicator" device.
4. Sufficient length of $\frac{1}{4}$ in. ID hosing to connect to the AR-850's plastic static adaptor for venting to atmosphere.

1.6 LICENSING REQUIREMENTS

There are no operator or aircraft license requirements for this type of equipment.

1.7 TSO EXPLANATION

The AR-850 is designed to be remote mounted within a non-pressurized but controlled temperature location within an aircraft that is operated up to 25,000/30,700 ft. MSL.

This equipment requires direct current power, but may be installed in aircraft having additional on-board alternating current sources.

There are eighteen "Environmental Test Procedures" established in RTCA Document DO-160B, dated July 1984. These are identified on the TSO Nameplate. The following identifies the Environmental Categories to which the AR-850's are designed, the sections of DO-160B covering the test procedures, and an explanation of each category.

Temperature and Altitude (Section 4.0 Rev. 1)

Temperature Variation (Section 5)

Humidity (Section 6)

Vibration (Section 8)

Explosion (Section 9)

Waterproofness (Section 10)

Fluid Susceptibility (Section 11)

Sand and Dust (Section 12)

B1/B/A/NMO/X X X X

X X Z B B B B B B

Fungus Resistance (Section 13)

Salt Spray (Section 14)

Magnetic Effect (Section 15)

Power Input (Section 16)

Voltage Spike (Section 17)

Audio Frequency Conducted Susceptibility (Section 18)

Induced Signal Susceptibility (Section 19)

Radio Frequency Susceptibility (Section 20) 1-5

4/85

Emission of Radio Frequency Energy (Section 21)

NARCO AVIONICS AR-850

1.7 TSO EXPLANATION (Continued)

* The AR-850 was also tested for shock operation. Sections 7, 7.2 and 7.3

Temperature and Altitude - Category B1

Temperature, Operating:

Low Operating Temperature	-20°C	(-4°F)
High Operating Temperature	+55°C	(+131°F)
Short Time Operating Temperature, High	+70°C	(+158°F)

Temperature, Non-Operating:

Ground Survival Temperature, Low	-55°C	(-67°F)
Ground Survival Temperature, High	+85°C	(+185°F)

Altitude, Non-Pressurized: 7,62M (25,000 ft.)

Temperature Variation - Category B

Low operation (-20°C) to	Temperature may vary between high and low limits at a rate of 5 degrees C minimum per minute.
High operation (+55°C)	

Humidity - Category A

These units have been tested under the Standard Humidity Environment of: +50°C (+122°F) at 95% relative humidity, reduced to +38°C (+100°F) with relative humidity maintained in excess of 85%.

This cycle was repeated twice for a total of 48 hours of exposure. Within 15 minutes* after exposure, the units were operated and met all specifications.

*TSO requires that all specifications be met within 4 hours after exposure.

Vibration - Categories NMO

Maximum vibration limits are:

- 0.100" double amplitude from 5 Hz to 17 Hz.
- 1.5G constant acceleration from 17 Hz to 500 Hz.
- 0.5G constant acceleration from 500 Hz to 2000 Hz.

Not Applicable - Category X

The following six Environmental Conditions do not normally exist in Civil Aircraft, when recognized installation practices are adhered to and are, therefore, not tested.

- Explosion - Category X
- Waterproofness - Category X
- Hydraulic Fluid - Category X
- Sand and Dust - Category X
- Fungus Resistance - Category X
- Salt Spray - Category X

1.7 TSO EXPLANATION, Continued

Magnetic Effect - Category Z

With this equipment operating, it may be placed at a distance less than 0.3 meter from a free magnet with a 1°, or less, deflection of the magnet.

Power Input - Category B

This equipment is designed for use in aircraft electrical systems supplied by an engine driven alternator/rectifiers or DC generator with a battery of significant capacity floating on the DC bus at all times.

	<u>28V System</u>	<u>14V System</u>
Normal Operating Conditions (Vdc) are:		
Maximum	30.3	15.1
Nominal	27.5	13.8
Minimum	24.8	12.4

Voltage Spike - Category B

This equipment has been designed to withstand the transient voltage characteristics specified by RTCA Document DO-160B.

Audio Frequency Conducted Susceptibility - Category B

This equipment has been designed and tested to assure compliance with the requirements of RTCA Document DO-160B.

Induced Signal Susceptibility - Category B

This equipment has been designed to withstand the effects of audio frequency electric and magnetic fields and induces voltage spikes as specified by Category B.

Radio Frequency Susceptibility - Category B

This equipment has been tested and is not affected by interference from other on board electronic equipment which meet Category B, Emission of Radio Frequency Energy Test of RTCA Document DO-160B.

Emission of Radio Frequency Energy - Category B

This equipment has been tested and does not emit radio frequency energy in excess of that specified.

1.8 ENVIRONMENTAL QUALIFICATION FORM

An Environmental Qualification Form (Number 03753-0621) is included with each AR-850 as shipped from the factory. This two-page form identifies the TSO categories to which the AR-850 was designed and tested as outlined in RTCA Document DO-160B dated July 1984.

NARCO AVIONICS AR-850

1.8 ENVIRONMENTAL QUALIFICATION FORM, Continued

The installing agency must ensure that the owner of the AR-850 is given this form which he should place in his avionics equipment file.

1.9 AR-850 TO AR-500 INTERCHANGEABILITY

The AR-850 is directly interchangeable with the older Narco AR-500 Altitude Reporter when the transponder is an AT150.

The AR-850 uses the same mounting tray as the AR-500 and its connector (and pin assignments) is identical with the AR-500's.

When the transponder is an AT6/A or AT50/50A, a minor modification to the transponder will ensure compatibility. See Section 2.4.1.

2.1 INTRODUCTION

This section provides all the electrical and mechanical installation information. Electrical and Mechanical Installation sections are independent and self-supporting. This permits their removal from the manual allowing the electrical and mechanical installation efforts to proceed in parallel.

2.2 PRELIMINARY PROCEDURES

2.2.1 Preliminary Inspection

Carefully unpack the equipment, noting any damage to shipping cartons or avionics. If damage is noted, retain the cartons to corroborate damage claims.

Inventory the received items against the lists in Section 1.5 to assure a complete order.

2.2.2 Preinstallation Bench Check

A preinstallation bench check may be performed without connection to a transponder. The test equipment required is:

- a. 14/28 Vdc, 2 amp power supply
- b. Ohmmeter
- c. Pitot Static System Test Set

Prepare an AR-850 mating connector (PN41303-0002) as shown in Figure 2-1. Connect a clip lead to the wire on pin 22.

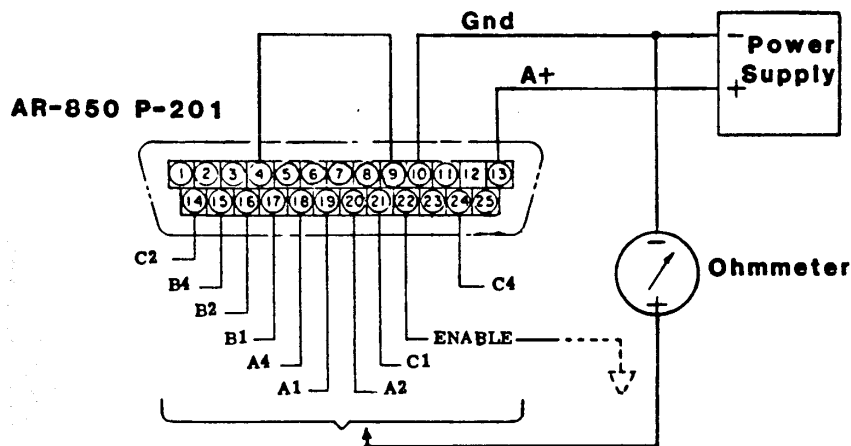


FIGURE 2-1 BENCH TEST SET UP

NARCO AVIONICS AR-850

2.2.2 Continued

1. Connect the AR-850 to the Pitot Static System Test Set. Apply 14V power and allow the system to stabilize for 5 minutes.
2. Check pins 14 to 21 with the ohmmeter. They should all read a high resistance of 1 megohm or higher.
3. Clip pin 22 to ground.
4. Pump the AR-850 to the following altitudes to check for operation of all code lines. An active code line will read a low resistance of 200 ohms or lower.

USE EITHER LOWER OR HIGHER ALTITUDE TESTS.

PIN NO. CODE LINE	14 C2	15 B4	16 B2	17 B1	18 A4	19 A1	20 A2	21 C1	24 C4
ALTITUDE									
2400	Lo	Hi	Hi	Lo	Hi	Hi	Hi	Lo	Hi
2800	Hi	Hi	Hi	Lo	Lo	Hi	Hi	Hi	Lo
5500	Lo	Lo	Lo	Hi	Lo	Hi	Hi	Hi	Hi
7500	Lo	Lo	Hi	Hi	Lo	Hi	Lo	Hi	Hi
15500	Lo	Lo	Hi	Hi	Hi	Lo	Lo	Hi	Hi
6500	Lo	Hi	Hi	Hi	Lo	Hi	Hi	Hi	Hi
7300	Hi	Lo	Hi	Hi	Lo	Hi	Lo	Lo	Hi
8600	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo
9500	Lo	Lo	Lo	Lo	Lo	Hi	Lo	Hi	Lo
15500	Lo	Lo	Hi	Hi	Hi	Lo	Lo	Hi	Hi

NOTE: Lo denotes Low Resistance
Hi denotes High Resistance

This completes the preinstallation bench check.

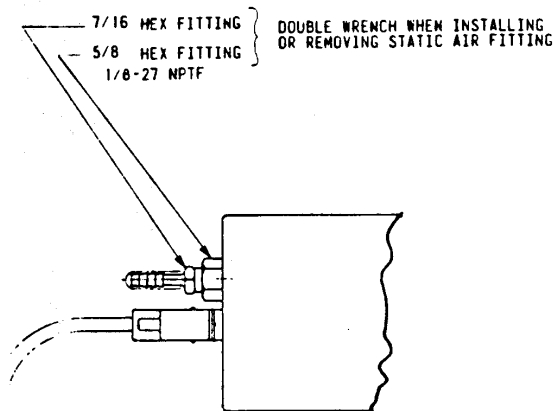
2.3 MECHANICAL INSTALLATION

The AR-850 must be located within the internal structure of the aircraft. The location area may be either non-temperature or temperature controlled. It should be located away from heater or fresh air vents that lead to very rapid changes of temperature. It may be mounted in any plane as well as inverted. It should always be mounted such that none of the labels on the AR-850 are on top. The mounting base should be adequately secured in accordance with all applicable FARs. NO safety wire is necessary on the securing nut as a friction locking material is incorporated on the screw.

Refer to Figure 2-2 for the mechanical dimensions of the Unit and Tray. Figure 2-3 is a 1:1 Tray Template.

2.3.1 Static Connections

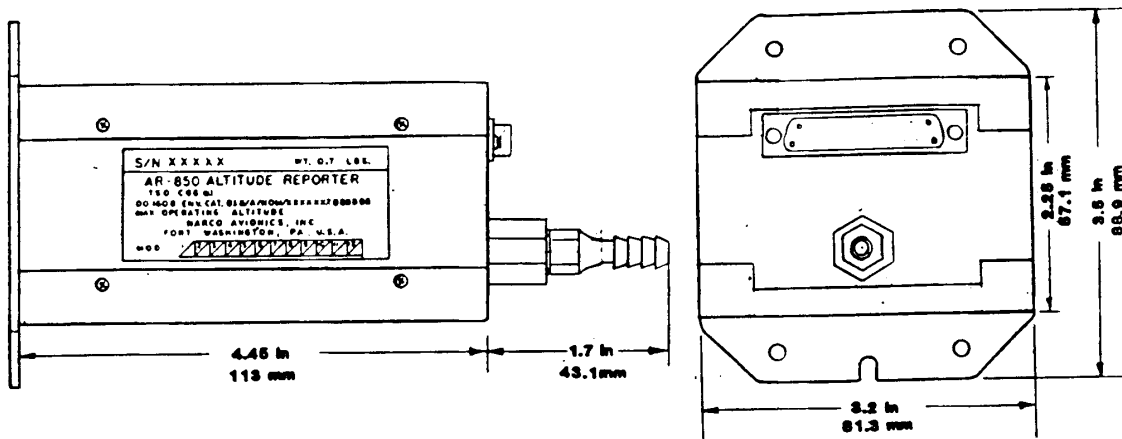
As shown here, a plastic static adaptor is shipped installed on the AR-850 to facilitate preinstallation bench checks and/or installation with 1/4 inch ID hosing to the aircraft's static system.



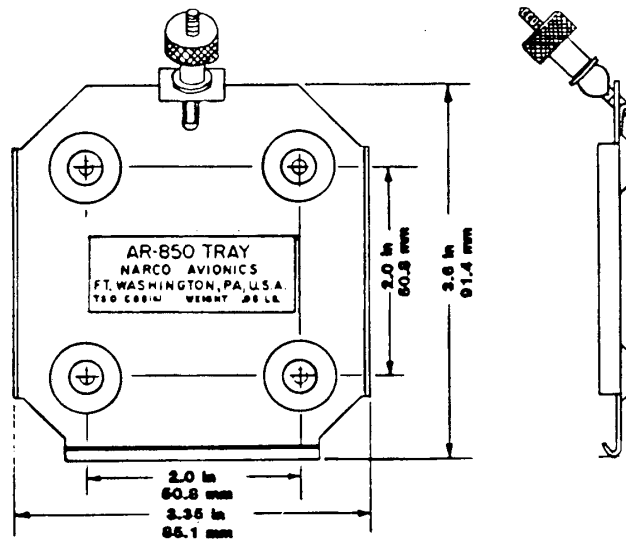
If another static connection is desired, the plastic adaptor may be removed and replaced with any other acceptable 1/8-27 NPTF fitting.

The 5/8 inch hex fitting is permanently secured to the AR-850 and should NOT be turned. Use a double wrench technique when installing or removing connections or adaptors. Secure the static line adequately to the fitting.

NARCO AVIONICS AR-850



AR-850 UNIT



AR-850 TRAY

To mount the tray, drill 4 holes 9/64(3.6mm)in dia.

FIGURE 2-2 AR-850 MECHANICAL DIMENSIONS

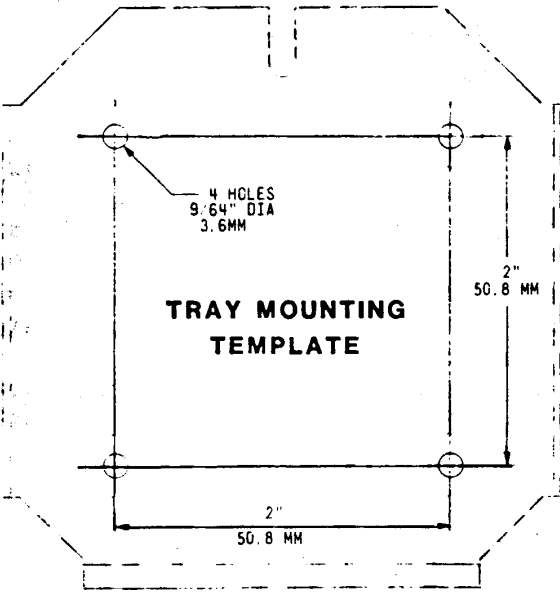
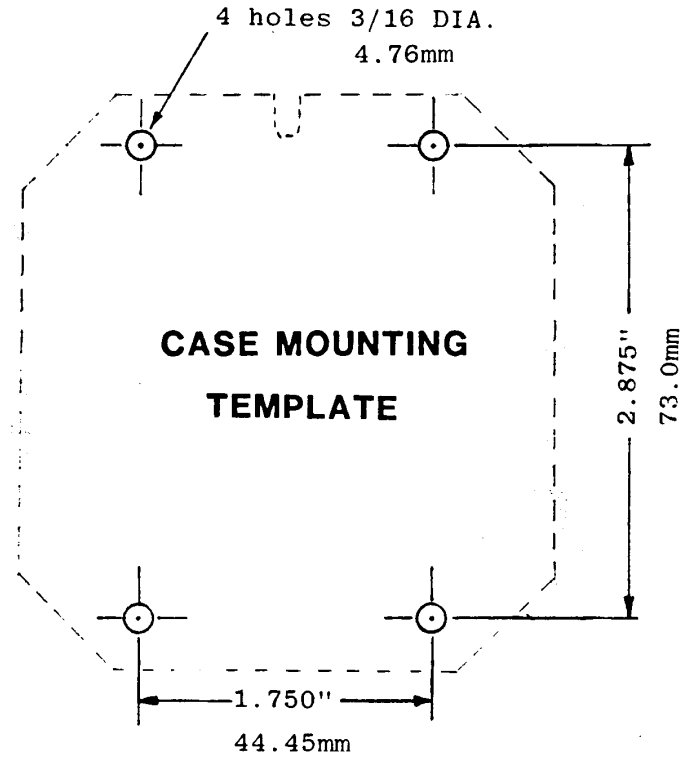


FIGURE 2-3 AR-850 TRAY TEMPLATE

2.4 ELECTRICAL INSTALLATION

This section presents the required technical information necessary to plan and execute and electrical installation of the AR-850. Refer to Section 2.4.11 "Interconnect Wiring Diagrams" for installation instructions for connecting the AR-850 to Narco and King transponders.

2.4.1 AR-850 To Transponder Compatibility

The AR-850 is compatible with all Narco TSO'd transponders as noted here:

1. AT-150: Directly compatible. No modifications required.
2. AT-50/50A: Directly compatible when Narco Service Bulletin AT-50A-5 dated Feb. 19, 1975 is performed on the transponder.
3. AT-5A/6A: Directly compatible when the AT-5A/6A panel unit is modified per Narco Service Bulletins AT-6A-11 and AT-6A-14 and Figure 2-7, page 2-15 in this manual. The AR-850 must be modified per Figure 2-7, page 2-15.

Compatibility with other than Narco transponders depends on the following:

- a. If the transponder has logic circuitry that internally enables and inhibits the transmission of altitude information, the AR-850 will be compatible if it is permanently enabled (ground P201-22).
- b. If the transponder can only control the transmission of altitude information by issuing an enable or strobe signal to the altitude reporter, compatibility depends on the transponder's ability to meet the requirements of Section 2.4.3.

2.4.2 AR-850/AR-500 Interchangeability

In an existing transponder/altitude reporter system that is comprised of a Narco transponder and AR-500 altitude reporter, the AR-500 may be replaced by the AR-850 as noted here:

1. UAT-1/AR-500 system: The AR-850 directly replaces the AR-500 with no modifications required.
2. AT-50-AT-50A/AR-500 system: The AR-850 directly replaces the AR-500 when Service Bulletin AT50A-5 is performed.
3. AT-150/AR-500 system: The AR-850 directly replaces the AR-500 with no modifications required.

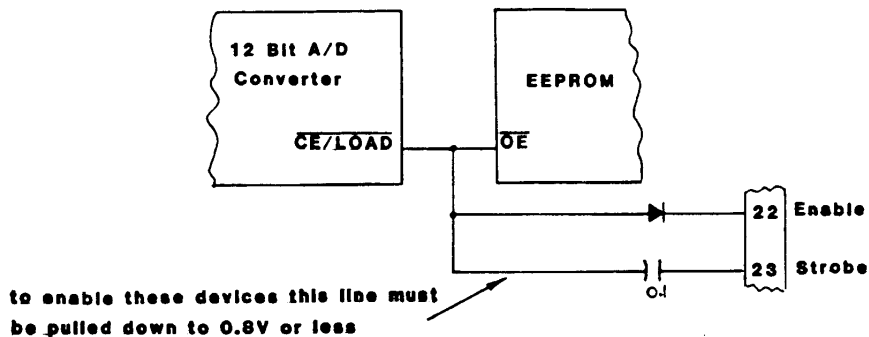
2.4.2 AR-850/AR-500 Interchangeability, Continued

4. AT-5A-AT-6A/AR-500 system: The AR-850 directly replaces the AR-500 with the following modifications required:
 - a. If the AT6-A panel unit has a chassis code of CNP169A or lower, modify the panel unit as indicated in Figure page 2-15.
 - b. If a lead is connected to the panel unit's connector P302-6, remove and tape the wire.
 - c. Modify the AR-850 as noted in Figure 2-7, page 2-15.

In existing systems consisting of a Narco AR-500 and a non-Narco transponder, the AR-500 may be replaced by the AR-850 providing the transponder is able to meet the enabling requirements of Section 2.4.3.

2.4.3 AR-850 ENABLE and STROBE Requirements

As shown here, the AR-850 encoding circuits can be enabled by either of two methods, STROBE or ENABLE. Normally the transponder controls the enabling of the altitude reporter when the transponder is operating in the altitude mode (Mode C). When the transponder is operating in its normal IDENT mode (Mode A), the altitude reporter is inhibited. Transponders may supply both a STROBE and ENABLE output or only one of those two. The requirements for both methods are listed here.



1. The Enable method requires that a ground be applied to P102-22, the ENABLE input, only when the transponder is placed in the altitude mode. Normally the transponder would be the ground source. The installing agency should investigate the transponder ENABLE source and determine if the source is wired permanently to ground, switched to hard ground in the altitude mode, or grounded through an active device (transistor or Inte-

2.4.3 AR-850 ENABLE and STROBE Requirements, Continued

grated circuit) when in the altitude mode. If the ground source is an active device, when it is ON (active low), it must pull the transponder Enable output down to within 0.2V of ground or less. The diode in series with the AR-850 Enable line has a junction voltage of 0.5V. This voltage must be added to the transponder's active device junction voltage, and the sum must not exceed 0.8V or else the EEPROM and 12 Bit A/D converter in the AR/850 cannot be enabled.

If the transponder's internal enable source is a permanent ground and not altitude mode controlled, the AR-850 will be permanently enabled. When the altitude reporter is permanently enabled, the companion transponder must have additional internal circuitry designed to inhibit the transmission of altitude information when it is operating in other than the altitude mode. If the transponder cannot meet this requirement, the AR-850 ENABLE output must be controlled by a panel mounted switch, or if the transponder offers a STROBE output, use this instead of the ENABLE method.

2. The STROBE method requires that a negative going pulse of 4.3V minimum to 5.3V maximum be applied to P102-23, the STROBE input. The STROBE pulse should occur in response to a Mode C interrogation, but only when the transponder is operating in the altitude Mode (Mode C). If the STROBE pulse is not inhibited when the transponder is operating in the normal IDENT mode (Mode A), the altitude reporter must be considered to be permanently enabled. In such a situation, the transponder must have additional internal logic circuitry designed to inhibit the transmission of altitude information when it is operating in other than the altitude mode. If the transponder cannot meet this requirement, the AR-850 STROBE output must be controlled by a panel mounted switch.

If a transponder's STROBE output pulse exceeds the maximum limit of 5.3V, a series resistor must be added externally in the STROBE line to limit the pulse to 5.3V as measured at P102-23.

If a transponder's STROBE output pulse is less than the 4.3 minimum level, it is recommended that the transponder's ENABLE output be used if it has one. If not, the AR-850 may be controlled by a panel mounted switch connected to the ENABLE input.

NARCO AVIONICS AR-850

2.4.4 Primary Power Requirement

The AR-850 accepts 11 to 32 Vdc for its primary power; therefore NO voltage converter is required for 28V aircraft electrical systems.

The AR-850 incorporates an "altitude sensor" heater which is energized when power is applied. Initial current draw is 1.4 amps for approximately 3 minutes, the time required to heat the sensor, after which the current drops to 0.35 amps average. The heater current is only required for warmup.

Primary power is applied to the rear connector at P201 pins 12 and 13 from the avionics bus, not a switched A+ output from the transponder. A 2 amp thermal resettable circuit breaker must be connected between the AR-850 and the avionics bus.

2.4.5 Primary Ground Requirements

The AR-850 has 4 ground connections: P201-1, P201-9, P201-10 and P201-25.

P201 pin 10 is the system ground connection and is to be connected to airframe ground. P201-9 is the sensor heater ground.

P201-1 is to be used for a power failure indicator ground return. P201-25 is a signal ground that may be used to common ground link the transponder to the AR-850.

2.4.6 Power Failure Indicator

A +8V, 4 milliamp maximum current is available from P201-6 whenever primary power is applied to the AR-850. This output may be utilized to drive a "Power ON" indication device, if so desired. The ground return from the device should be connected to P201-1.

2.4.7 Altitude Sensor Heater Jumper

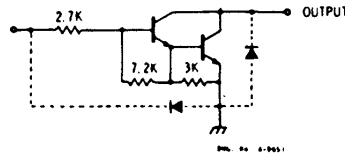
A "heater ground" jumper must be installed between P201-4 (Heater ground) and P201-9 (Airframe ground) to activate the sensor heater.

2.4.8 AR-850 Altitude Code Line Characteristics

The AR-850 altitude code line drivers comprise a high voltage, high sinking current, Darlington transistor array (Sprague ULN 2003A).

2.4.8 AR-850 Altitude Code Line Characteristics, Continued

All drivers feature open collector outputs as shown here.



Series ULN-2003A
(each driver)

In the "OFF" state, the collector can accept from the transponder any pull up voltage up to 50 Vdc.

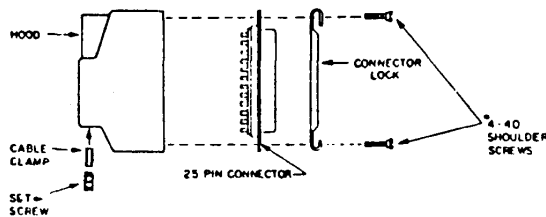
In the "ON" state, the collector to emitter saturation is 0.75V at 50 ma or 1.1V at 100 ma sinking currents.

2.4.9 Interconnect Cable Fabrication

Figure 2-4 shows the assembly of AR-850 connector P201. While constructing the cable between the AR-850 and the transponder, be sure to pass wires through the hood before soldering the #22 AWG wires to the connector.

If the AR-850 is being connected to a Narco AT-150 transponder, 12 molex contacts for the transponder are provided in the installation kit to facilitate the harness construction.

Figure 2-5 lists the pin assignments to P201. Additional interconnect wiring diagrams illustrating the connections between the AR-850 and all Narco transponders are provided in Section 2.4.10 APPENDIX.



NOTES:

1. Before assembling check the hood to be sure the #4-40 screw holes are threaded. If holes are not threaded use the self-threading screws to thread the holes before installing shoulder screws.
2. Hardware included but not used
 - A. two self-threading screws
 - B. two #4 split lock washers
 - C. two #4 nuts

FIGURE 2-4 P201 ASSEMBLY

2.4.9 Interconnect Cable Fabrication, Continued

*DO NOT CONNECT TO ANY EXTERNAL SOURCE

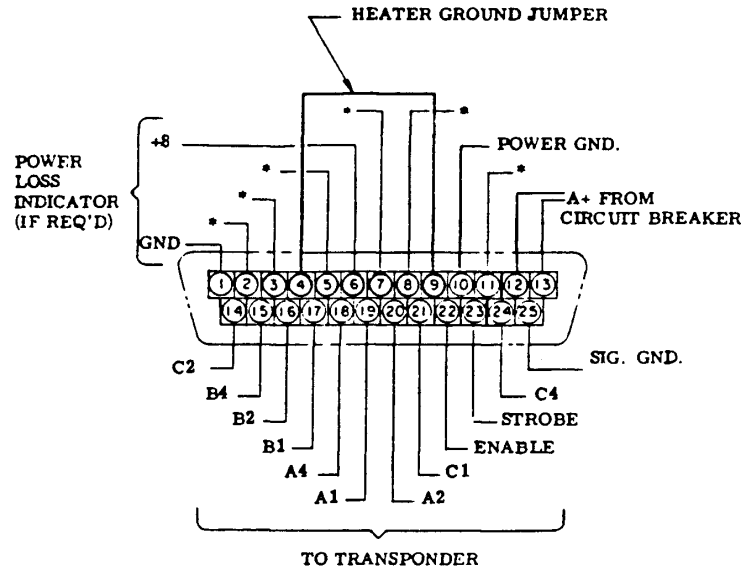


FIGURE 2-5 P201 PIN ASSIGNMENTS

2.4.10 Correspondence Tests

A data correspondence check between automatically reported pressure altitude and the pilot's altitude (aircraft altimeter) reference is required.

The AR-850 Altitude Reporter shall correspond to the aircraft altimeter within ± 125 feet (38.1 meters) when the pressure datum is set for 29.921 inches of mercury absolute (1013.25 millibars).

2.4.10.1 Test Equipment Requirements

Any test equipment capable of "reading" the code generated by the AR-850 and/or replies transmitted by the transponder is acceptable.

The most convenient equipment is the self-contained "ramp check" type available from several manufactures which "reads" the altitude in the ABCD code and/or feet.

The pneumatic equipment must be of high quality and precision and be capable of exercising the AR-850 and aircraft altimeter over the range of -500 TO +25,000 feet. The equipment must be capable of holding an altitude long enough to obtain accurate data to confirm correspondence.

2.4.10.2 Test Procedure

1. Allow the AR-850 to warm up 15 minutes before beginning the test.
2. Attach the vacuum/pressure pump system and set up the altitude reporter/transponder test equipment.
3. Adjust the altimeter barometric setting to 29.92 inches of mercury so the altimeter hands correspond with the altitude reporter's data output.
4. Pump the altimeter and altitude reporter or static system between -500 and +7,000 feet. Verify at several test points (chosen by the checking technician), after AR-850 data transition, that the altimeter reads within ± 125 feet of the reported altitude transmitted by the transponder. Be sure to tap the altimeter lightly before each reading to minimize the effects of friction. If the altimeter correspondence exceeds 125 feet, altimeter calibration should be suspected.

The zero foot calibration may be adjusted as follows:

NOTE: Low and high altitude adjustments are accessible thru marked holes in the dust cover.

Pump the system such that the altimeter reads -50 feet. Adjust the low ALT pot until the reported code flickers between -100 and 0 feet (codes 0660 & 0620). This adjustment affects the calibration at all altitudes and must be done first.

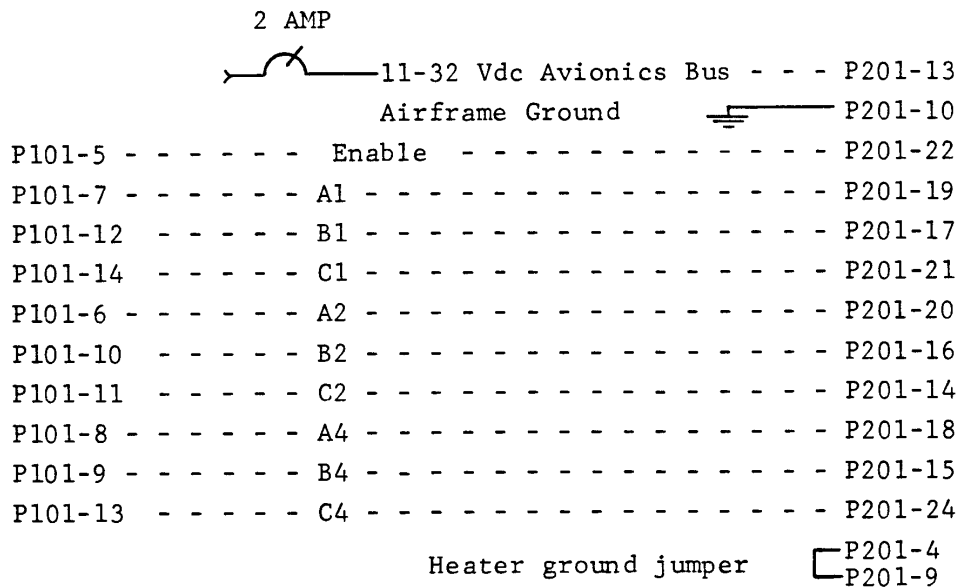
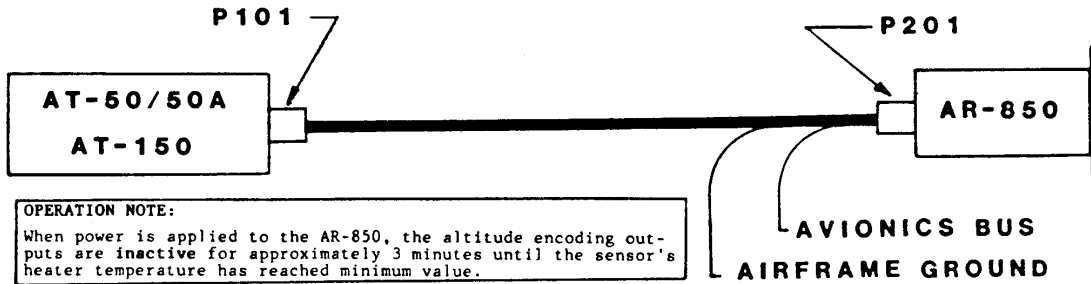
5. Pump the system between 7000 and 25,000 feet. Verify that at several chosen test altitudes, after transition, the altimeter reads within 125 feet of the reported altitude. If the correspondence is acceptable, go to steps 9 and 10; if not, go to step 6.
6. Adjustment of correspondence above +7,000 feet.
 - a. Pump the system to make the altimeter read 24,950 feet.
 - b. Adjust the High ALT to make the transponder read alternately 24,900 to 25,000 feet.
 - c. Check correspondence at 10,050, 15,050 and 24,950 feet.
7. Recheck the -50 feet calibration and adjust, if necessary.
8. Repeat step 6. If correspondence is not acceptable, altimeter calibration should be suspected.
9. Turn transponder to Mode A only. Ensure there are only framing pulses (F1 & F2) present.
10. Conduct an aircraft static leak test at the conclusion of correspondence tests.
11. Placard Placement and Alteration
 - a. 049680001 for 30,700 ft. AR 850
 - b. 049680002 for 25,000 ft. AR 850
 - 1) the placard should be prominently displayed on the aircraft instrument panel.
 - 2) if the tested altitude, is less than 25,000/30,700 feet, the placard should be altered by inserting the altitude tested after "OPERABLE TO".

NARCO AVIONICS AR-850

2.4.11 Interconnect Wiring Diagrams

This section provides interconnect wiring instructions for connecting the AR-850 to Narco and King transponders.

2.4.11.1 AR-850 To AT-150/AT-50/50A Installation



NOTE:

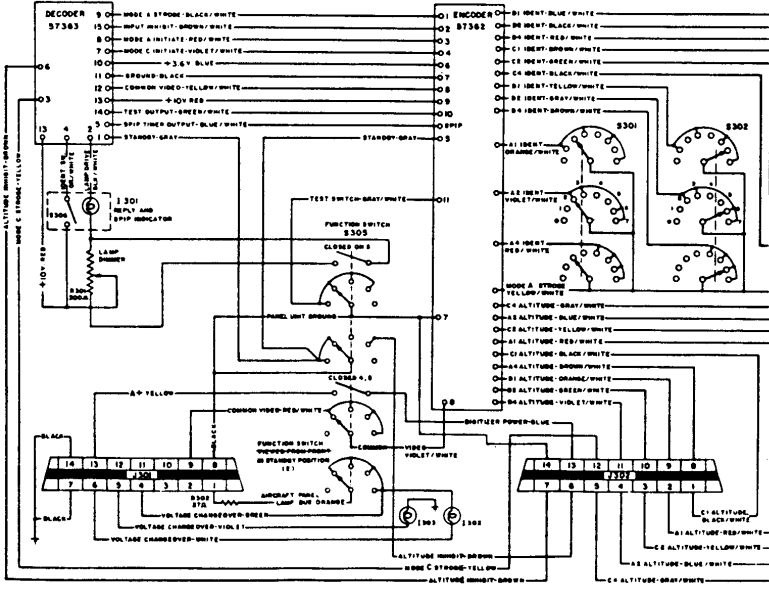
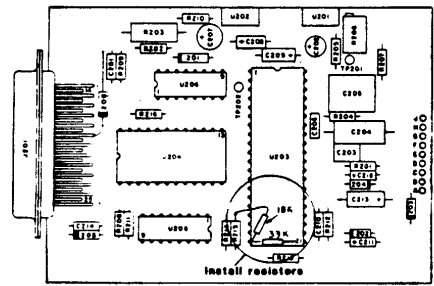
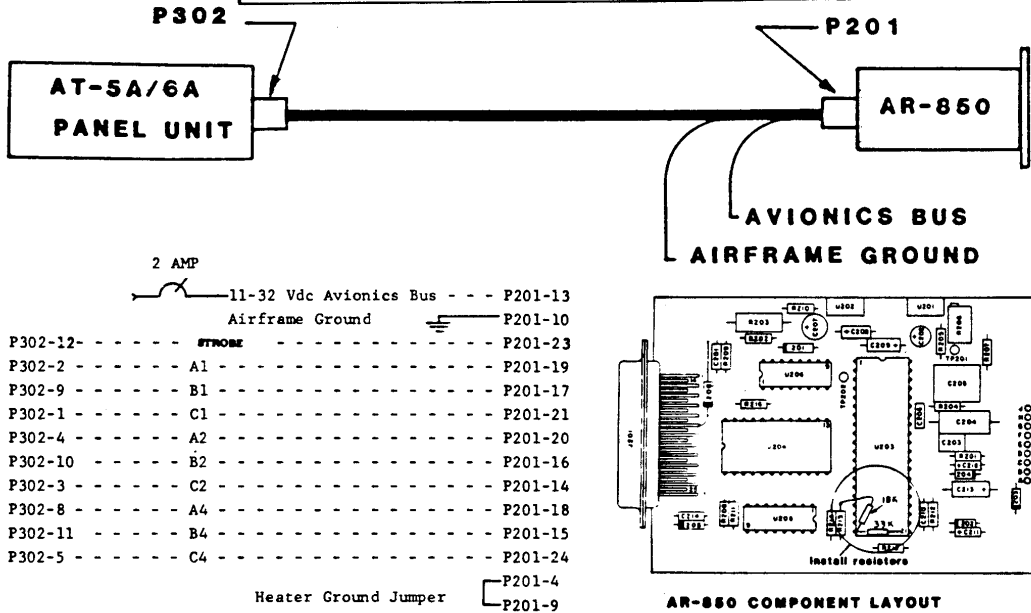
AT-50/50A Transponders must comply with Narco Service Bulletin AT-50A-5 dated Feb 19, 1975

FIGURE 2-6 AR-850 To AT-150 or AT-50/50A INTERCONNECTIONS

INSTALLATION
SECTION 2

2.4.11.2 AR-850 To AT-5A/6A Installation

OPERATION NOTE:
When power is applied to the AR-850, the altitude encoding outputs are inactive for approximately 3 minutes until the sensor's heater temperature has reached minimum value.



AT6-A PANEL UNIT MODIFICATION

1. Required for panel unit chassis code CNP169A.
2. Refer to Figure 7-1, page 7-1 of AT6-A manual.
3. Remove the yellow digitizer A+ lead from J301-13.
4. Remove the yellow Mode C strobe lead from J302-12 and splice it to the just removed yellow digitizer A+ lead of Step 3.
5. Remove the blue digitizer power lead from J302-13 and solder it to J302-12.

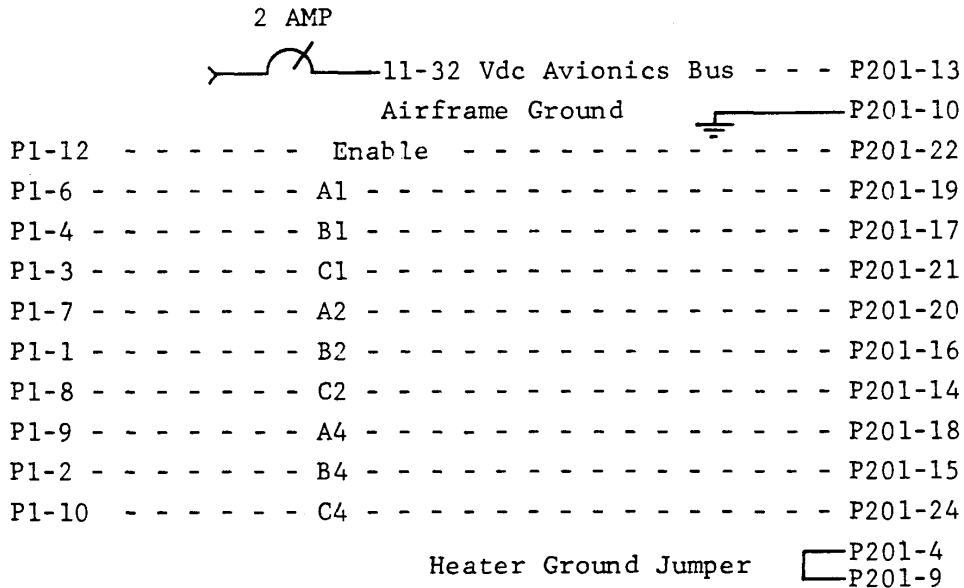
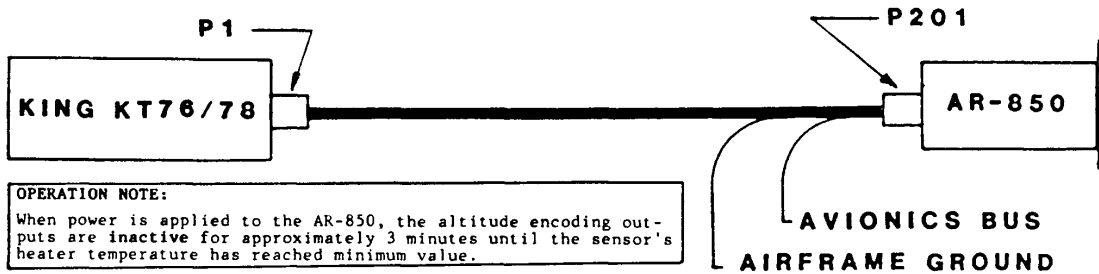
AR-850 MODIFICATION

1. Refer to the AR-850 component layout.
2. Solder a 33K ohm resistor from U203-20 to U203-21.
3. Solder a 18K ohm resistor from U203-20 to the junction of R213/R214.

FIGURE 7-1. AT6-A PANEL UNIT CHASSIS SCHEMATIC

NARCO AVIONICS AR-850

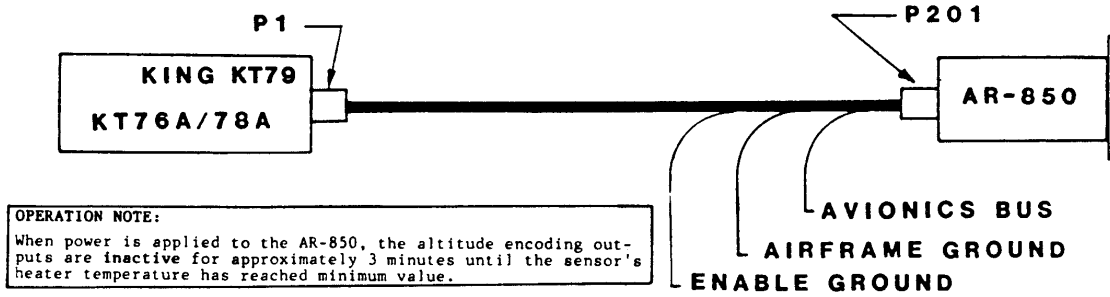
2.4.11.3 AR-850 To KING KT 76/78



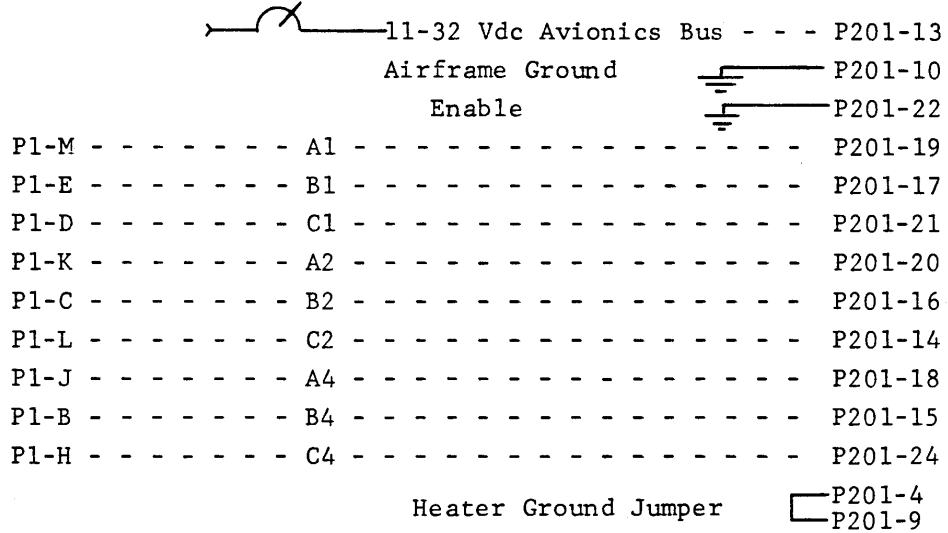
**CAUTION-This drawing is for reference only.
Consult the manufacturers Transponder manual
to confirm proper pin connections**

FIGURE 2-8 AR-850 To KT 76/78 INTERCONNECTIONS

2.4.11.4 AR-850 To KING KT 76A/78A/79



2 AMPS



**CAUTION-This drawing is for reference only.
Consult the manufacturers Transponder manual
to confirm proper pin connections**

FIGURE 2-9 AR-850 To KT 76A/78A/79 INTERCONNECTIONS

3.1 GENERAL

The purpose of the AR-850 Altitude Reporter is to establish a digital code which is a direct function of aircraft altitude. Since the AR-850 is TSO'd, the parallel digital code is that set forth in the International (ICAO) Standard Code for SSR Pressure Altitude Transmission.

3.2 OPERATION

The AR-850 is a remote mounted unit that is fully automatic in operation. The companion transponder normally controls the operation of the AR-850 by automatically enabling or inhibiting its operation. It is in operation (enabled) any time the transponder is set to the altitude (MODE C) mode of operation. The information is inhibited (removed) any time the altitude mode is turned OFF or to IDENT (MODE A).

When the transponder has internal circuitry, designed to inhibit the transmission of altitude information independent of the AR-850, then the AR-850 may be permanently "enabled".

OPERATION NOTE:

When power is applied to the AR-850, the altitude encoding outputs are **inactive** for approximately 3 minutes until the sensor's heater temperature has reached minimum value.

ENVIRONMENTAL QUALIFICATION FORM

NOTE: THIS FORM TO BE FILED WITH THE OWNER'S AVIONICS RECORDS.

NOMENCLATURE: AUTOMATIC PRESSURE ALTITUDE CODE GENERATING EQUIPMENT

MODEL: AR-850 TSO NUMBER: C88a

MANUFACTURER: NARCO AVIONICS, INC.

ADDRESS: 270 COMMERCE DRIVE
FORT WASHINGTON, PA 19034

CONDITIONS	SECTION/2/ PARAGRAPH #	DESCRIPTION OF CONDUCTED TESTS
TEMPERATURE AND ALTITUDE	4.0 Rev. 1	EQUIPMENT TESTED TO CATEGORIES "B1"
LOW TEMPERATURE	4.5.1	-20°C (-4°F)
HIGH TEMPERATURE	4.5.3	+55°C (+131°F)
ALTITUDE	4.6.1	+9357 Meters (30,700 Feet)
DECOMPRESSION	4.6.2	
OVERPRESSURE	4.6.3	
TEMPERATURE VARIATION	5.0	EQUIPMENT TESTED TO CATEGORY "B"
HUMIDITY	6.0	EQUIPMENT TESTED TO CATEGORY "A"
SHOCK	7.0	EQUIPMENT TESTED PER DO-160B
OPERATIONAL	7.2	MEETS REQUIREMENTS OF DO-160B
CRASH SAFETY	7.3	NOT APPLICABLE
VIBRATION	8.0	EQUIPMENT TESTED WITHOUT SHOCK MOUNTS TO CATEGORY "NMO"
EXPLOSION	9.0	EQUIPMENT IDENTIFIED AS 'X', NOT TESTED FOR THIS FEATURE
WATERPROOFNESS	10.0	EQUIPMENT IDENTIFIED AS 'X', NOT TESTED FOR THIS FEATURE
FLUIDS SUSCEPTIBILITY	11.0	EQUIPMENT IDENTIFIED AS 'X', NOT TESTED FOR THIS FEATURE

SAND AND DUST	12.0	EQUIPMENT IDENTIFIED AS 'X', NOT TESTED FOR THIS FEATURE
FUNGUS	13.0	EQUIPMENT IDENTIFIED AS 'X', NOT TESTED FOR THIS FEATURE
SALT SPRAY	14.0	EQUIPMENT IDENTIFIED AS 'X', NOT TESTED FOR THIS FEATURE
MAGNETIC EFFECT	15.0	EQUIPMENT TESTED TO CATEGORY "Z"
POWER INPUT	16.0	EQUIPMENT TESTED TO CATEGORY "B"
VOLTAGE SPIKE CONDUCTED	17.0	EQUIPMENT TESTED TO CATEGORY "B"
AUDIO FREQUENCY CONDUCTED SUSCEPTIBILITY	18.0	EQUIPMENT TESTED TO CATEGORY "B"
INDUCED SIGNAL SUSCEPTIBILITY	19.0	EQUIPMENT TESTED TO CATEGORY "B"
RADIO FREQUENCY SUSCEPTIBILITY	20.0	EQUIPMENT TESTED TO CATEGORY "B"
RADIO FREQUENCY EMISSION	21.0	EQUIPMENT TESTED TO CATEGORY "B"
OTHER TESTS		FIRE RESISTANCE TESTS WERE CONDUCTED IN ACCORDANCE WITH FEDERAL AVIATION REGULATION, PART 25, APPENDIX F