Avidyne Traffic Advisory Systems
SkyTrax6XX
TAS6XX, TAS6XXA
and
Avidyne/Ryan 9900BX
INSTALLATION MANUAL

Part Number 600-00282-000
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Date 10/17/18

Document Revisions

Date	Revision No.	Description
04/27/11	00	Initial Release per ECO-10-208
06/03/15	01	Update per ECO-15-170. Updates to format, references, and images. Updated to include the TAS-A information. Guidance for metal covers over TAS6XXA D connectors
12/11/15	02	ECO-15-501. Page 52, Add torque requirements. Page 13, clarify table
10/17/18	04	Added new Avidyne P/N's to Table 1 for trays, ARINC429 labels required for ADS-B, Corrected support phone number, Corrected db loss for RG400 cable, Added TAS-A ARINC-429 Labels and caution notes, Added status light table, added more maintenance codes to the table, Added RS-422 termination requirements, Added Audio suppression text, updated configuration setup pages and instructions for a serial to USB converter setup, Added Command interface menu instructions, Added instructions how to use PuTTY, Added Audio suppression input description, Added SkyTrax6XX references. Added software references for ADS-B capable processors.
10/17/18	04	Update section 1.5, Table 1 addition of Black Antenna parts

This document is applicable to the SkyTrax6XX, TAS6XX, TAS6XXA, and 9900BX series of traffic advisory systems.

The latest installation manuals are available to authorized dealers on the web at www.avidyne.com.

Special Notes to Installers

The following important issues regarding the Avidyne TAS, TAS-A, and Ryan 9900BX TCAD (collectively identified as TAS in this manual) installation should be noted during the planning stages. The TAS-A is unique as it has ADS-B in capabilities and when identified in this manual as TAS-A, those notes only apply to a TAS-A unit.

TAS-A processors with TAS-A Application Software 510-00296-000 or higher (See step 17 in the CVI Monitor Section 4.3.3) have ADS-B features available.

1. Installation of some TAS models are limited to aircraft with a service ceiling of 18,500 feet or 25,000 feet. See LIMITATIONS in section 1.15 on page 25.
2. A compatible WAAS approved GPS system certified to TSO-C145( ) or TSO-C146( ) will be required for the TAS-A ADSB-In function. Contact Avidyne for future interface details.
3. Make each antenna cable the same length (within two inches or 5 cm) for proper bearing performance. The antenna cables should meet the 3dB (±0.5dB) requirement. See Section 1.8.
4. The location of the antenna is important. The antenna "view" ahead of the aircraft must not be obstructed. Proper bonding of the antennas to the ground plane is critical to reliable bearing data. Use precautions to minimize the possibility of cross talk between antenna cables. There are special considerations for composite airframes. See Section VI for more information.
5. Suppression between the transponder, the TAS and DME (if installed) is required. See Table 13 for Availability of Suppression for Popular Transponder Models.
6. Connecting the TAS audio to an audio panel without internal amplification or into a shared audio port can affect the maximum audio level. See section 6.2.5 on page 124 for more information.
7. A personal computer with serial port is required for checkout of the TAS.
8. The Suppression I/O is sensitive to short circuits and can be damaged. Be certain there are no shorts before applying power, and only apply power when the connector containing the suppression pin is fully inserted.
9. Individual RS-232 input and output connections should go to each display. There is no master display. Each RS-232 display can control the TAS. Unused RS-232 receive ports should be grounded as shown in the wiring diagrams.
10. The Annunciator circuit supplies a ground. Applying battery voltage directly to this input will damage the TAS Processor.
11. Connect the antennas to the Processor and check all connections before applying power.
12. The TAS is approved under TSO-C147. Section I lists the components that make up the equipment system complying with the standards prescribed in the TSO. The TAS ½ 3ATI Traffic Display/Controller is not part of the TAS TSO Authorization, and was awarded a separate Parts Manufacturing Approval by the FAA.
13. Upgrade of the Model 9900B installation to the TAS requires checkout in accordance with this Manual. Installation requirements for the 9900B and TAS differ by the addition of an inductor on the power return line, and some recommended connections. Upgrade instructions are available. An inductor on the power return line is permitted, but not required for TAS-A installations. Contact Avidyne Corporation for more information.Power Switch. Pin 16 of P1 must be grounded for operation (Reference Page 74). It can be routed through a switch on the panel, or permanently grounded to permit turning the system on through the avionics master (the system can then be isolated by the circuit breaker).
14. Altitude data can be accepted via ARINC-429 in lieu of gray code. See section 1.16 on page 28 for detailed information.

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15. Section VI contains useful tips that will assist in planning an installation.
16. This installation manual provides guidance for installing the Processor, Transponder Coupler, and Antennas in a structurally sound manner in compliance with the certification basis for the aircraft listed on the Approved Model List (AML) STC. Any Installation Deviations from the instructions listed in this manual requires additional Structural Approval.
17. Mounting the antenna on composite and pressurized aircraft requires engineering guidance beyond the scope of this manual. With respect to the Approved Model List STC, the physical mounting of the antenna is specifically excluded from the approval in the case of installation on the pressure vessel of a pressurized aircraft, composite aircraft, and aircraft with a certification basis of Amendment 23-45 or later, unless approved installation data is listed in the Master Document List of the STC. All early amendment, metal construction, non-pressurized aircraft antenna installations must be installed consistent with accepted industry practice. The installation must be structurally sound and in accordance with FAA Advisory Circular 43.13-( ).
18. Except for the Avidyne ½ 3ATI, a separate installation approval is required for installing a Traffic System Display. The ½ 3ATI Display/Controller must be installed in accordance with this manual and FAA AC43.13-( ).
19. The TAS Audio Outputs must be suppressed by all higher priority messages (e.g. EGPWS, Windshear, etc.)
20. Installation location of the TAS System components must not violate the environmental qualifications of the equipment. Reference Section 1.12 for equipment qualifications.
21. Documentation regarding certification and installation may be found on the Internet at www.avidyne.com. The TAS meets the requirements of TSO-C147, Traffic Advisory System (TAS) Airborne Equipment, and Avidyne is authorized to mark the system with this TSO marking. It is appropriate, if desired, to identify the product as a TAS.
22. The TAS-A may be shipped with metal covers over the D-style connectors. These covers are securely mounted with screws and may be left in place for unused connectors to protect the pins from accidental short circuits. If the metal cover is removed from a D-style connector, then the hex head jack screws for that connector should be re-torqued to between 4.5 and 5.5 inch-pounds.
23. To access the software and hardware version of the TAS unit, go to section 4.3.3 Calibration and Verification Interface, CVI Monitor Access instruction #17.

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SECTION I
GENERAL INFORMATION

1.1. INTRODUCTION

This manual contains information regarding the physical, mechanical and electrical characteristics, as well as installation information pertaining to the Avidyne Traffic Advisory Systems (TAS). For maintenance and repair information, contact Avidyne Corporation. Installation Planning tips are found in Section VI.

1.2. PRODUCT DESCRIPTION

The Avidyne SkyTrax6XX, TAS6XX, TAS6XXA, and Ryan Model 9900BX Traffic Advisory Systems (collectively known as TAS units) are actively interrogating, on-board, air traffic detection systems used to identify potential collision threats. Each model offers similar features, but are limited in the types of aircraft the equipment can be installed in. In this manual the TAS600, TAS605, TAS610, TAS615, and TAS620 will be abbreviated "TAS" or "TAS6XX". The SkyTrax600, SkyTrax605, SkyTrax615, SkyTrax620, TAS605A, TAS615A and TAS620A will be abbreviated "TAS-A" or "TAS6XXA". The generic term "TAS" will be used to refer to all models of the SkyTrax6XX, TAS6XX, TAS6XXA and 9900BX. The TAS-A systems are ADSB-In hardware provisioned. See Limitations in Section 1.15.

The Avidyne TAS has received TSO authorization under TSO-C147 with the following deviations:

Furnished Data ..... Avidyne does not provide a qualification test report, nameplate drawing, or PSAC with manufactured units.

Content of Aural Alerts ..... Improved audible position alerts are provided for both Class A and Class B operation.

Inhibiting Aural Alerts ..... Aural annunciations are not inhibited when landing gear is extended for aircraft without a radio altimeter.

Out of Band Rejection..... Allowance for out of band rejection for direct conversion receiver.

Mode-S Broadcast Reception..... The count of TCAS interrogators is determined using an alternate means.

The TAS computes relative altitude and range of threats from nearby transponder-equipped aircraft. Aircraft with non-Mode C transponders can provide range information. The TAS does not detect aircraft without operating transponders.

The TAS systems are available in four configurations:

- The TAS without display
- The TAS with Avidyne Multi-Hazard Display (MHD)
- The TAS with ½ 3ATI Traffic Display/Controller

- The TAS integrated with a Multi-Function Display

NOTE:	Refer to the Avidyne Multi-Hazard Display Installation Manual for more information about the MHD (Reference Avidyne Installation Manual, P/N 32-2401).

Up to four RS-232-compatible displays may be connected with one TAS6XX. Up to six RS-232 compatible displays may be connected with one TAS6XXA. The TAS will respond to control inputs from any of the displays. The system will also connect to many displays that support the ARINC-429 TCAS protocol. See section 1.16 for label information.

The TAS is advisory only, and is a back up to the See and Avoid Concept, and the ATC radar environment.

1.3. EQUIPMENT SPECIFICATIONS

Weight:	
Processor:	6.5 pounds (3.1 Kg), with any mounting tray
Transponder Coupler:	0.5 pound (0.23 Kg)
Antennas:	Single-blade antenna, 10.5 ounces (298 grams) Twin-blade antenna, 12 ounces (340 grams)
½ 3ATI Traffic Display:	(optional, aka display/controller) 1.0 pound (0.45 Kg), with mounting clamp
Cooling:	Radiation, Convection
Processor Installation Dimensions:	7.25 in. (18.4 cm) wide; 3.1 in. (7.9 cm) high; 9.325 in. (23.7 cm) deep; 11.675 in. (29.6 cm) deep with connectors

NOTE: The Processor mounting tray allows for two mounting configurations. The height and width dimensions are interchanged when using upright mounting.

½ 3ATI Traffic Display Installation Dimensions:	3.26 in. (8.3 cm) wide 1.55 in. (3.9 cm) high 6.75 in. (17.2 cm) deep 8.5 in. (21.6 cm) deep with connector
Transponder Coupler Dimensions:	1.8 inches (4.6 cm) wide 1.603 inches (4.1 cm) high 2.7 inches (6.9 cm) long
Operating Voltage:	11 - 29 Volts DC
Current:	TAS6XX – 2.9Amp @ 14VDC; 1.55 Amp @ 28VDC
	TAS6XXA – 2.1 Amp @ 14VDC; 1.0 Amp @ 28VDC
Audio Output:	Maximum 10 mW @ 600 ohms
Annunciator Output Current:	Switched Ground; 1 A maximum
Receiver Frequency:	1090 MHz ±3 MHz
Transmitter Frequency:	1030 MHz ±0.2 MHz
Suppression Bus Compatibility:	Both Mutual and Unidirectional Systems
Encoder Compatibility:	TSO-C88 or TSO-C88a encoder, 0.5mA maximum
Display Dimming:	Automatic
Coupler Signal Loss & VSWR:	Less than 0.2 dB & 1.08:1 at 1090 MHz
Antenna Maximum Design Operating Speed	Mach 0.8
ARINC-429 Input/Output	See ARINC-429 Information in sections 1.16 and 2.11

1.4. FACTORY SETTINGS

The TAS is delivered with the following setting: Audio Volume: Mid Range

1.5. UNITS AND ACCESSORIES SUPPLIED

The following list of Components make up the equipment system complying with the standards prescribed in the TSO-C147:

1) TAS System Ship Kit, comprising (refer to Table 1 and Table 2 below for part numbers):
   a. Processor Assembly

2) Tray and Connector Kit, Ordered Separately, Dependent on the TAS Orientation and rotary wing/fixed wing installation
   a. Vertical or horizontal mounting tray
   b. Connector Kit

3) Transponder Coupler, P/N 70-2040 and Accessory Kit; P/N 62-2040:
   a. Type 'N' Plug Connectors
   b. Mounting screws, 6-32 x 1-3/8", and
   c. #6 elastic stop nuts

NOTE: If **dual transponders** are installed on the aircraft, a second Transponder Coupler with accessories is necessary. If **diversity Mode S transponders** are installed, a coupler is required in each antenna coax. All four inputs can then be paralleled to the single TAS Coupler input.

4) Literature Pack, P/N 63-2024

5) TAS Pilot Operating Handbook P/N 32-2352

6) Bearing Antenna Kit P/N 70-2410 (White)
   a. Two L-Band antennas, conforming to TSO-C74c.
      i. Sensor Systems P/N S72-1750-31L [single-blade]
      ii. Sensor Systems P/N S72-1750-32L [twin-blade]
   b. Two Doubler Plates
      i. Sensor Systems P/N S72-1750025-1

Bearing Antenna Kit P/N 70-2411 (Black)
   c. Two L-Band antennas, conforming to TSO-C74c.
      i. Sensor Systems P/N S72-1750-31L (black) [single-blade]
      ii. Sensor Systems P/N S72-1750-32L (black) [twin-blade]
   d. Two Doubler Plates
      i. Sensor Systems P/N S72-1750025-1

7) The optional TAS ½ 3ATI Traffic Controller / Display is not required under the conditions of TSO-C147.
The top assembly part number for the ½ 3ATI Traffic Controller / Display is 71-2520, which includes:
    a. ½ 3ATI Traffic Display Unit P/N 70-2520
    b. ½ 3ATI Traffic Controller / Display Clamp Assembly P/N 28-3110
    c. ½ 3ATI Traffic Controller / Display Connector kit P/N 61-2003, including:
        i. 9 pin 'D' Connector – Socket
        ii. 9-pin 'D' Shell, Jack Screw Kit and Socket Pins

TAS System		**Reference**	**Additional Components Required**		
Model	**Processor Ship Kit Part Number**	**Processor Part Number**	**Tray Ship Kit Part Number**	**Tray & Connectors Ship Kit Part Number**	**Connectors Ship Kit Part Number**
TAS600	71-2460 (White Antenna)	70-2420-8TAS600	850-00216-000 Legacy Horizontal	850-00216-003 Legacy Horizontal	62-2001
TAS600A	850-00215-000 (White Antenna)	700-00185-000	850-00216-001 Fixed Wing Vertical/Horizontal Helicopter Horizontal 850-00216-002 Helicopter Vertical	850-00216-004 Fixed Wing Vertical/Horizontal Helicopter Horizontal 850-00216-005 Helicopter Vertical	820-00106-000
TAS605	71-2465 (White Antenna) 71-2466 (Black Antenna)	70-2420-8TAS605	850-00216-000 Legacy Horizontal	850-00216-003 Legacy Horizontal	62-2001
TAS605A	850-00215-001 (White Antenna) 850-00215-006 (Black Antenna)	700-00185-001	850-00216-001 Fixed Wing Vertical/Horizontal Helicopter Horizontal 850-00216-002 Helicopter Vertical	850-00216-004 Fixed Wing Vertical/Horizontal Helicopter Horizontal 850-00216-005 Helicopter Vertical	820-00106-000
TAS610	71-2470 (White Antenna)	70-2420-8TAS610	850-00216-000 Legacy Horizontal	850-00216-003 Legacy Horizontal	62-2001
TAS610A	850-00215-002 (White Antenna)	700-00185-002	850-00216-001 Fixed Wing Vertical/Horizontal Helicopter Horizontal 850-00216-002 Helicopter Vertical	850-00216-004 Fixed Wing Vertical/Horizontal Helicopter Horizontal 850-00216-005 Helicopter Vertical	820-00106-000

TAS System		Reference	Additional Components Required		
Model	**Processor Ship Kit Part Number**	**Processor Part Number**	**Tray Ship Kit Part Number**	**Tray & Connectors Ship Kit Part Number**	**Connectors Ship Kit Part Number**
TAS615	71-2475 (White Antenna) 71-2476 (Black Antenna)	70-2420-8TAS615	850-00216-000 Legacy Horizontal	850-00216-003 Legacy Horizontal	62-2001
TAS615A	850-00215-003 (White Antenna) 850-00215-008 (Black Antenna)	700-00185-003	850-00216-001 Fixed Wing Vertical/Horizontal Helicopter Horizontal 850-00216-002 Helicopter Vertical	850-00216-004 Fixed Wing Vertical/Horizontal Helicopter Horizontal 850-00216-005 Helicopter Vertical	820-00106-000
TAS620	71-2480 (White Antenna) 71-2481 (Black Antenna OEM) 71-2482 (Black Antenna)	70-2420-8TAS620	850-00216-000 Legacy Horizontal	850-00216-003 Legacy Horizontal	62-2001
TAS620A	850-00215-004 (White Antenna) 850-00215-008 (Black Antenna)	700-00185-004	850-00216-001 Fixed Wing Vertical/Horizontal Helicopter Horizontal 850-00216-002 Helicopter Vertical	850-00216-004 Fixed Wing Vertical/Horizontal Helicopter Horizontal 850-00216-005 Helicopter Vertical	820-00106-000
9900BX	71-2420	70-2420	850-00216-000 Legacy Horizontal	850-00216-003 Legacy Horizontal	62-2001

Table 1: TAS System Ship Kit and Processor Part Number Matrix

Connector Kit Item Part Number	TAS6XX	TAS6XXA
Description (Kit Contents)	**62-2001**	Not Applicable
COM 1 Shunt	61-2006	Not Applicable
15 Pin “D” connector, jackscrews, contacts, and backshell	61-2004	Not Applicable
25 Pin “D” connector, jackscrews, contacts, and backshell	61-2005	Not Applicable
Description (Kit Contents)	Not Applicable	**820-00106-000**
78 Pin “D” connector, jackscrews, contacts, and backshell	Not Applicable	030-00136-000
Description (Kit Contents)	**62-2003**	Not Applicable
Qty 2 - Diode	15-3001	Not Applicable
Qty 2 - Inductor	21-1043	Not Applicable

Table 2: Connector Kit Item Part Number Matrix

1.6. UNITS AND ACCESSORIES NOT SUPPLIED

NOTE: ALL installation and/or material deviations require a separate installation approval.

A. Altitude Encoding Device, conforming to TSO-C88 or TSO-C88a.

B. WAAS GPS Position Source, conforming to TSO-C145( ) or TSO-C146( ) (for TAS-A only)

C. Wiring (Reference FAA AC 43.13-( ) as needed):

   i. Antennas: See section 1.8 for cable requirements.

   ii. Display and RS-232 Multi-function displays (transmit and receive is required): Twisted, shielded pair or triple cable for RS-232 applications.

   iii. Processor: #22 AWG (power and ground); #24 AWG (other connections), verify all wire sizes per FAA AC 43.13-( ).

   iv. Suppression and Coupler: Use 50-ohm coaxial cable.

   v. ARINC-429 connections use twisted, shielded pairs.

   vi. Wiring type: Use MIL-C-27500/MIL-W-22759 or equivalent wiring.

D. Circuit breaker, trip-free resettable, 3 Amp. (28-volt systems), or 4 Amp. (14-volt systems). Use MIL-C-5809 qualified (or equivalent) circuit breaker.

E. Power Switch. Pin 16 of P1 must be grounded for operation. It can be routed through a switch on the panel, or permanently grounded to permit turning the system on through the avionics master (the system can then be isolated by the circuit breaker). If a switch is used, a single-pole single-throw switch (on/off toggle) may be used. Use MIL-DTL-83731 qualified (or equivalent) switch.

F. An annunciator light (1A, max, the TAS supplies a ground) is required when no display is used with the system, and is recommended for all other configurations. The light should be white or amber, and identified as “TRAFFIC” or “TRAFFIC ALERT”, such as Eaton P/N 17211-7550 from Dallas Avionics.
NOTE: A yellow or amber light is recommended for compliance with future ADS-B traffic application TSO authorizations.

G. A mute/update switch (momentary on), rated current of 1mA or more, is required when no display/controller is used with the system or when the display/controller does not provide a TAS mute function. It is recommended for all other configurations. Eaton P/N 17212-7549 from Dallas Avionics or equivalent is a suitable switch.

H. A BNC T-adapter is required for each additional Transponder Coupler that is used after the first (for example, two BNC T-adapters if using three Transponder Couplers). (Military Style Number UG-274A/U or equivalent part)

I. Eight Standard TNC plug connectors for antenna cable ends and standard BNC plug connectors for Coupler cable ends, two per transponder. Use MIL-C-39012 qualified (or equivalent) coaxial connectors.

J. An airspeed switch may be used in lieu of the weight on wheels input (see Section 2). Note: If installing an airspeed switch, a separate installation approval is required.

1.7. EQUIPMENT REQUIRED FOR SETUP AND CHECKOUT

A computer with serial communications capability (such as a PC with Microsoft Windows HyperTerminal*) is required. In addition, the following devices are required:

A. A null modem cable (often called a file transfer cable)
B. A Transponder tester, such as the IFR ATC-601 or equivalent
C. A Serial to USB converter for computers without a 9 pin serial connector

A TCAS tester such as the IFR TCAS-201 is recommended for easier checkout, but is not required.

1.8. ANTENNA CABLE REQUIREMENTS

The attenuation of each antenna cable should be three 3±0.5 dB at 1GHz. Proper bearing performance is dependent on equal loss in each antenna cable pair. This is normally accomplished by keeping the lengths and configurations the same for each cable pair. See Table 3 for recommended cable types. Cables from other manufacturers can be used.

NOTE:	Match the length of each of the cables going to the top antenna to within two inches (5 cm). Match the lengths of the bottom cable pair also. It is desirable, but not essential, that the length of the top pair matches the length of the bottom pair.

NOTE:	The TAS processor antenna terminations must be connected to antennas or appropriate loads before applying power to the Processor. Failure to connect the antenna terminations can cause transmitter damage.

* HyperTerminal may be found in Windows 98 or Windows XP under Start>Programs>Accessories>Communications

Cable Length to meet the 3dB requirement	Cable Attenuation (dB/100 feet @ 1 GHz)	Recommended Cable Note: Equivalent cable may be used.
15 feet	19.6	ECS* 3C058A
18 feet	17.0	RG400
24 feet	13.0	ECS 3C142B, EMTEQ* PFLX175-100 or PIC* S44191
26 feet	11.5	ECS 311901, EMTEQ PFLX 195-100 or PIC S44193
35 feet	8.6	ECS 311601
45 feet	6.6	EMTEQ PFLX340-100
**High-performance cables usually require special connectors. Contact the cable manufacturer. To Contact ECS, call 1-800-ECS-WIRE (www.ecsdirect.com); EMTEQ, 888-679-6170 (www.emteq.com); and PIC Wire & Cable 1-800-742-3191 (www.picwire.com).*		

Table 3: Antenna Cable Requirements

1.9. INSTALLATION APPROVAL BASIS

The FAA has awarded Avidyne Corporation an Approved Model List (AML) Supplemental Type Certificate (STC) for the Avidyne TAS System. Aircraft listed on the Approved Model List for the STC may use the installation data listed in the Master Document List to install the TAS System.

Aircraft not listed on the AML may use the STC data for a follow-on installation (FAA Form 337 approval). Data that can be used as a basis for approval for return to service are:

A. STC Documents (Supplied in the Literature Pack).
B. AC 43.13-1( ) and -2( ); Acceptable Methods, Techniques, and Practices.
C. TSO Markings and PMA markings.
D. Manufacturer's installation instructions.

Installation of a Traffic Advisory System (TAS) may or may not be eligible for approval by means other than an STC. TAS will not automatically qualify for a field approval; TAS requires evaluation of the scope and complexity of the alteration and review of guidance by the FSDO to determine if the field approval process may be used.

The Avidyne TAS is an isolated self-contained system operating as a supplement to “see and avoid” procedures. The installation and operation of the TAS does not materially affect aircraft operation or performance. Equipment installation procedures do not differ significantly among various aircraft. The Sample Description of Work Accomplished is suggested language provided as a convenience to the installing agency. A person who performs or supervises the installation of the TAS may be required to prepare FAA Form 337 for installation approval. See the Sample Description of Work Accomplished in Figure 1. The information and wording should be modified to correctly describe the particular installation. Avidyne Corporation, Ryan International Division assumes no responsibility for alterations to the airframe. The TAS complies with the requirements of TSO-C147.

8. Description of Work Accomplished

(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)

A. The following equipment and components were installed:
   1. Avidyne TAS (TAS615) System Processor, P/N 71-2420-x with mounting tray, conforming to TSO-C147.
   2. Transponder Coupler, P/N 70-2040 conforming to TSO-C147.
   3. Two L-band antennas conforming to TSO-C74c.
   4. Avidyne TAS Optional ½ 3ATI Traffic Display/Controller, conforming to PMA.

B. The ½ 3ATI Traffic Display/Controller Unit was installed in (*position in the Instrument panel, if installed*) according to instructions in the TAS Installation Manual, P/N 600-00282-000, dated *Insert date of manual*), and guidance in FAA Advisory Circular 43.13-1( ).

C. The Processor was installed in the Mounting Tray Assembly, located at (*location in the aircraft*) according to instructions in the Installation Manual, P/N 600-00282-000, dated (*insert date & part number of manual*),and guidance in FAA Advisory Circular 43.13-1( ). *(if mounted at a location other than the avionics bay, substantiate the structural integrity)*

D. The Transponder Coupler was installed in (*position of mounting in the aircraft*) according to instructions in the *Avidyne TAS* Avidyne/Ryan TAS Installation Manual, P/N 600-00282-000, dated (*insert date & Part number of manual*), and guidance in FAA Advisory Circular 43.13-1( ).

E. An L-band Antenna was installed on the top of the aircraft fuselage in accordance with instructions and guidance contained in *Avidyne TAS* Installation Manual, P/N 600-00282-000,dated *(insert date & revision of manual*) and FAA Advisory Circular 43.13-2( ). *NOTE: Include structural substantiation of antennas.*

F. An L-band Antenna was installed on the bottom of the aircraft fuselage in accordance with instructions and guidance contained *Avidyne* TAS Installation Manual, P/N 600-00282-000,dated *(insert date & revision of manual*) and in FAA Advisory Circular 43.13-2( ).
   NOTE: Include structural substantiation of antennas.

G. An electrical load analysis was performed and found that the continuousload of the alternator (*generator or other supply*)does not exceed 80% of capacity.

H. A complete operational test was performed according to the Installation Manual, P/N 600-00282-000,dated *(insert date & revision of manual*). The equipment performed satisfactorily and did not adversely affect existing components or systems in the aircraft as required by 14 CFR 23.1301 (*or 14 CFR 25.1301, 14 CFR 27.1301, or 14 CFR 29.1301 as applicable*).

I. The aircraft equipment list was revised to reflect these changes; weight and balance data was revised and placed in the aircraft records. A *Avidyne TAS* Pilot's Handbook, P/N 600-00145-000 dated *(insert date of Handbook)*, was placed in the aircraft.
   NOTE: Interconnection with a Multi-Function display should also be documented).

Figure 1: Sample Description of Work Accomplished

1.10. INSTRUCTIONS FOR PERIODIC MAINTENANCE AND CALIBRATION WHICH ARE NECESSARY FOR CONTINUED AIRWORTHINESS ONCE THE EQUIPMENT IS INSTALLED

The Avidyne TAS uses self-test diagnostics to detect most malfunctions of the equipment. A thorough checkout of the system in accordance with the Installation Manual is required if there is a possibility that work on the aircraft could affect performance of the TAS. Otherwise, maintenance is on-condition. If traffic on the TAS correlates with visual estimates of the range and bearing of nearby aircraft, the requirements for continued airworthiness are met.

The antennas should be periodically inspected in accordance with 14 CFR 43 Appendix D.

1.11. LOCATION OF DATA REQUIRED BY TSO-C147

- Operating Instructions are found in the Pilot's Handbook, P/N 600-00145-000 (formerly 32-2352).
- Equipment Limitations are found in the Pilot's Handbook, P/N 600-00145-000 (formerly 32-2352).
- Installation procedures and limitations are included in this manual.
- Schematic drawings as applicable to the installation procedures are in Section 2 of this manual.
- Wiring drawings as applicable to the installation procedures are in Section 2 of this manual.
- Equipment Specifications are found in Section I of this manual.
- List of the Components (by part number) that make up the equipment system complying with the standards prescribed in the TSO are in Section I of this manual.
- An environmental qualification form for each component of the system is found in Section I of this manual.
- Instructions for periodic maintenance and calibration, which are necessary for continued airworthiness of installed equipment is found in Section I of this manual.

NOTE:	The Avidyne TAS complies with the requirements of TSO-C147 class B. The TAS is considered a Class A system when installed with a Class A approved display as listed in the document titled: Class A TSO Approved Displays for the TAS, reference Table 4 for approved displays.

1.12. ENVIRONMENTAL QUALIFICATION FORMS – PROCESSORS AND COUPLER

NOMENCLATURE: TAS6XX Processor
PART NUMBERS: 70-2420-x
MANUFACTURER'S SPECIFICATION: TSO-C147
MANUFACTURER: Avidyne Corporation

CONDITIONS	DO-160D SECTION	DESCRIPTION OF TESTS CONDUCTED
TEMPERATURE & ALTITUDE	4.0	EQUIPMENT QUALIFIED TO CATEGORY F2
TEMP. VARIATION	5.0	AS CATEGORY 'X', NO TEST REQUIRED
HUMIDITY	6.0	EQUIPMENT QUALIFIED TO CATEGORY A
OPERATIONAL SHOCK AND CRASH SAFETY	7.0	EQUIPMENT QUALIFIED TO CATEGORY B
VIBRATION	8.0	EQUIPMENT QUALIFIED TO CATEGORY S, AIRCRAFT ZONE 2 FOR FIXED WING AIRCRAFT USING VIBRATION TEST CURVE B & M (Table 8-1). EQUIPMENT QUALIFIED TO DO-160C CURVE N FOR HELICOPTERS
EXPLOSION	9.0	EQUIPMENT QUALIFIED TO ENVIRONMENT II, CATEGORY H
WATERPROOFNESS	10.0	CATEGORY 'X', NO TEST REQUIRED
FLUIDS SUSCEPTIBILITY	11.0	CATEGORY 'X', NO TEST REQUIRED
SAND AND DUST	12.0	CATEGORY 'X', NO TEST REQUIRED
FUNGUS	13.0	CATEGORY 'X', NO TEST REQUIRED
SALT SPRAY	14.0	CATEGORY 'X', NO TEST REQUIRED
MAGNETIC EFFECT	15.0	EQUIPMENT QUALIFIED TO CATEGORY Z
POWER INPUT	16.0	EQUIPMENT QUALIFIED TO CATEGORY B
VOLTAGE SPIKE CONDUCTED	17.0	EQUIPMENT QUALIFIED TO CATEGORY B
AUDIO FREQUENCY CONDUCTED SUSCEPTIBILITY	18.0	EQUIPMENT QUALIFIED TO CATEGORY B
INDUCED SIGNAL SUSCPT	19.0	EQUIPMENT QUALIFIED TO CATEGORY A
RADIO FREQUENCY SUSCEPTIBILITY	20.0	EQUIPMENT QUALIFIED TO CATEGORY U (CONDUCTED) AND CATEGORY U (RADIATED)
RADIO FREQUENCY EMISSION	21.0	EQUIPMENT QUALIFIED TO CATEGORY M (CONDUCTED AND RADIATED)
LIGHTNING INDUCED TRANSIENT SUSCPT	22.0	CATEGORY 'X', NO TEST REQUIRED
LIGHTNING DIRECT EFFECTS	23.0	CATEGORY 'X', NO TEST REQUIRED
ICING	24.0	CATEGORY 'X', NO TEST REQUIRED
ELECTROSTATIC DISCHARGE	25.0	CATEGORY 'X', NO TEST REQUIRED
FIRE FLAMMABILITY	26.0	EQUIPMENT NOT TESTED

NOMENCLATURE: TAS6XXA Processor
PART NUMBERS: 700-00185-( )
MANUFACTURER'S SPECIFICATION: TSO-C147
MANUFACTURER: Avidyne Corporation

CONDITIONS	DO-160G SECTION	DESCRIPTION OF TESTS CONDUCTED
TEMPERATURE & ALTITUDE	4	EQUIPMENT QUALIFIED TO CATEGORY F2
TEMPERATURE VARIATION	5	EQUIPMENT QUALIFIED TO CATEGORY B
HUMIDITY	6	EQUIPMENT QUALIFIED TO CATEGORY A
OPERATIONAL SHOCKS & CRASH SAFETY	7	EQUIPMENT QUALIFIED TO CATEGORY E
VIBRATION (2 MOUNTING CONFIGURATIONS)	8	EQUIPMENT QUALIFIED TO CATEGORY S, CURVES B & M, ZONE 2. HELICOPTER – EQUIPMENT QUALIFIED TO CATEGORY U, CURVE G , ZONES 1A AND 2 .
EXPLOSION PROOFNESS	9	EQUIPMENT QUALIFIED TO CATEGORY E
WATERPROOFNESS	10	CATEGORY X, NO TEST REQUIRED
FLUIDS SUSCEPTIBILITY	11	CATEGORY X, NO TEST REQUIRED
SAND AND DUST	12	CATEGORY X, NO TEST REQUIRED
FUNGUS RESISTANCE	13	CATEGORY X, NO TEST REQUIRED
SALT SPRAY	14	CATEGORY X, NO TEST REQUIRED
MAGNETIC EFFECTS	15	EQUIPMENT QUALIFIED TO CATEGORY Z
POWER INPUT	16	EQUIPMENT QUALIFIED TO CATEGORY B
VOLTAGE SPIKE	17	EQUIPMENT QUALIFIED TO CATEGORY A
AUDIO FREQUENCY CONDUCTED SUSCEPT	18	EQUIPMENT QUALIFIED TO CATEGORY B
INDUCED SIGNAL SUSCEPT	19	EQUIPMENT QUALIFIED TO CATEGORY AC
RADIO FREQUENCY SUSCEPTIBILITY	20	EQUIPMENT QUALIFIED TO CATEGORY T (CONDUCTED), CATEGORY T (RADIATED)
EMISSION OF RF ENERGY	21	EQUIPMENT QUALIFIED TO CATEGORY M
LIGHTNING INDUCED TRANSIENT SUSCEPTIBILITY	22	EQUIPMENT QUALIFIED TO CATEGORY B2K2XX
LIGHTNING DIR. EFFECTS	23	CATEGORY X, NO TEST REQUIRED
ICING	24	CATEGORY X, NO TEST REQUIRED
ELECTROSTATIC DISCHARGE	25	EQUIPMENT QUALIFIED TO CATEGORY A
FIRE/FLAMMABILITY	26	CATEGORY X, NO TEST REQUIRED

NOMENCLATURE: Transponder Coupler
PART NUMBER: 70-2040
MANUFACTURER'S SPECIFICATION: TSO-C147
MANUFACTURER: Avidyne Corporation

CONDITIONS	DO-160D SECTION	DESCRIPTION OF TESTS CONDUCTED
TEMPERATURE & ALTITUDE	4.0	EQUIPMENT QUALIFIED TO CATEGORY F2
TEMPERATURE VARIATION	5.0	CATEGORY X, NO TEST REQUIRED
HUMIDITY	6.0	EQUIPMENT QUALIFIED TO CATEGORY A
OPERATIONAL SHOCK AND CRASH SAFETY	7.0	EQUIPMENT QUALIFIED TO CATEGORY B
VIBRATION	8.0	EQUIPMENT QUALIFIED TO CATEGORY S, AIRCRAFT ZONE 2 FOR FIXED WING AIRCRAFT USING VIBRATION TEST CURVE M (Table 8-1). EQUIPMENT QUALIFIED TO DO-160C CURVE N FOR HELICOPTERS
EXPLOSION	9.0	EQUIPMENT QUALIFIED TO ENVIRONMENT II, CATEGORY H
WATERPROOFNESS	10.0	CATEGORY X, NO TEST REQUIRED
FLUIDS SUSCEPTIBILITY	11.0	CATEGORY X, NO TEST REQUIRED
SAND AND DUST	12.0	CATEGORY X, NO TEST REQUIRED
FUNGUS	13.0	CATEGORY X, NO TEST REQUIRED
SALT SPRAY	14.0	CATEGORY X, NO TEST REQUIRED
MAGNETIC EFFECT	15.0	EQUIPMENT QUALIFIED AS CLASS A
POWER INPUT	16.0	CATEGORY X, NO TEST REQUIRED
VOLTAGE SPIKE CONDUCTED	17.0	CATEGORY X, NO TEST REQUIRED
AUDIO FREQUENCY CONDUCTED SUSCEPT	18.0	CATEGORY X, NO TEST REQUIRED
INDUCED SIGNAL SUSCEPT	19.0	CATEGORY X, NO TEST REQUIRED
RF SUSCEPTIBILITY	20.0	CATEGORY X, NO TEST REQUIRED
RF EMISSION	21.0	CATEGORY X, NO TEST REQUIRED
LIGHTNING INDUCED TRANSIENT SUSCPT	22.0	CATEGORY X, NO TEST REQUIRED
LIGHTNING DIR. EFFECTS	23.0	CATEGORY X, NO TEST REQUIRED
ICING	24.0	CATEGORY X, NO TEST REQUIRED
ELECTROSTATIC DISCHARGE	25.0	CATEGORY X, NO TEST REQUIRED
FIRE FLAMMABILITY	26.0	CATEGORY X, NO TEST REQUIRED

1.13. ENVIRONMENTAL QUALIFICATION FORMS – ½ 3ATI TRAFFIC DISPLAY

NOMENCLATURE: Avidyne TAS ½ 3ATI Traffic Display/Controller
PART NUMBER: 70-2520
MANUFACTURER'S SPECIFICATION: TAS Performance Requirements
MANUFACTURER: Avidyne Corporation

CONDITIONS	DO-160C SECTION	DESCRIPTION OF TESTS CONDUCTED
TEMPERATURE & ALTITUDE	4.0	EQUIPMENT QUALIFIED TO CATEGORY F1
TEMPERATURE VARIATION	5.0	EQUIPMENT QUALIFIED TO CATEGORY B
HUMIDITY	6.0	EQUIPMENT QUALIFIED TO CATEGORY A
OPERATIONAL SHOCK AND CRASH SAFETY	7.0	EQUIPMENT QUALIFIED PER DO-160C PARAGRAPHS 7.2 AND 7.3
VIBRATION	8.0	EQUIPMENT QUALIFIED TO CATEGORIES M, N, AND B (Table 8-1)
EXPLOSION	9.0	CATEGORY X, NO TEST REQUIRED
WATERPROOFNESS	10.0	CATEGORY X, NO TEST REQUIRED
FLUIDS SUSCEPTIBILITY	11.0	CATEGORY X, NO TEST REQUIRED
SAND AND DUST	12.0	CATEGORY X, NO TEST REQUIRED
FUNGUS	13.0	CATEGORY X, NO TEST REQUIRED
SALT SPRAY	14.0	CATEGORY X, NO TEST REQUIRED
MAGNETIC EFFECT	15.0	EQUIPMENT QUALIFIED AS CLASS A
POWER INPUT	16.0	EQUIPMENT QUALIFIED TO CATEGORY B
VOLTAGE SPIKE CONDUCTED	17.0	EQUIPMENT QUALIFIED TO CATEGORY A
AUDIO FREQUENCY CONDUCTED SUSCEPT	18.0	EQUIPMENT QUALIFIED TO CATEGORY B
INDUCED SIGNAL SUSCEPTIBILITY	19.0	EQUIPMENT QUALIFIED TO CATEGORY A
RF SUSCEPTIBILITY	20.0	EQUIPMENT QUALIFIED TO CATEGORY T
RF EMISSION	21.0	EQUIPMENT QUALIFIED TO CATEGORY A
LIGHTNING INDUCED TRANSIENT SUSCPT	22.0	CATEGORY X, NO TEST REQUIRED
LIGHTNING DIR. EFFECTS	23.0	CATEGORY X, NO TEST REQUIRED
ICING	24.0	CATEGORY X, NO TEST REQUIRED
ELECTROSTATIC DISCHARGE	25.0	EQUIPMENT NOT QUALIFIED
FIRE FLAMMABILITY	26.0	EQUIPMENT NOT QUALIFIED

1.14. ENVIRONMENTAL QUALIFICATION FORM – TAS ANTENNAS

NOMENCLATURE: L-Band (TCAD) Antenna
PART NUMBER: S72-1750-31L/-32L
MANUFACTURER'S SPECIFICATION: TSO-C74c
MANUFACTURER: Sensor Systems, Inc.

CONDITIONS	DO-160C SECTION	DESCRIPTION OF TESTS CONDUCTED
TEMPERATURE & ALTITUDE	4.0	EQUIPMENT QUALIFIED TO CATEGORY D2
TEMPERATURE VARIATION	5.0	EQUIPMENT QUALIFIED TO CATEGORY A
HUMIDITY	6.0	EQUIPMENT QUALIFIED TO CATEGORY C
OPERATIONAL SHOCK AND CRASH SAFETY	7.0	OPERATIONAL AND CRASH
VIBRATION	8.0	EQUIPMENT QUALIFIED TO CATEGORY C
EXPLOSION	9.0	CATEGORY X, NO TEST REQUIRED
WATERPROOFNESS	10.0	EQUIPMENT IDENTIFIED AS CATEGORY S
FLUIDS SUSCEPTIBILITY	11.0	EQUIPMENT IDENTIFIED AS CATEGORY F
SAND AND DUST	12.0	EQUIPMENT IDENTIFIED AS CATEGORY D
FUNGUS	13.0	EQUIPMENT IDENTIFIED AS CATEGORY F
SALT SPRAY	14.0	EQUIPMENT IDENTIFIED AS CATEGORY S
MAGNETIC EFFECT	15.0	EQUIPMENT QUALIFIED TO CATEGORY X
POWER INPUT	16.0	EQUIPMENT QUALIFIED TO CATEGORY X
VOLTAGE SPIKE CONDUCTED	17.0	EQUIPMENT QUALIFIED TO CATEGORY X
AUDIO FREQUENCY CONDUCTED SUSCEPTIBILITY	18.0	EQUIPMENT QUALIFIED TO CATEGORY X
INDUCED SIGNAL SUSCEPTIBILITY	19.0	EQUIPMENT QUALIFIED TO CATEGORY X
RADIO FREQUENCY SUSCEPTIBILITY	20.0	EQUIPMENT QUALIFIED TO CATEGORY X
RADIO FREQUENCY EMISSION	21.0	EQUIPMENT QUALIFIED TO CATEGORY X
LIGHTNING INDUCED TRANSIENT SUSCPT	22.0	EQUIPMENT QUALIFIED TO CATEGORY X
LIGHTNING DIRECT EFFECTS	23.0	EQUIPMENT QUALIFIED TO CATEGORY X
ICING	24.0	EQUIPMENT QUALIFIED TO CATEGORY X
ELECTROSTATIC DISCHARGE	25.0	EQUIPMENT NOT QUALIFIED
FIRE FLAMMABILITY	26.0	EQUIPMENT NOT QUALIFIED

1.15. LIMITATIONS

The TAS units comply with the requirements of TSO-C147 Class B. Supplemental displays may be connected to a TAS when appropriately approved. The Displays listed in Table 4 are approved compatible displays.

The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. The article may be installed only if the installation is performed in accordance with Part 43 or the applicable airworthiness requirements.

Manufacturer	Model or Type
Avidyne	3ATI MHD[1]
Avidyne	½ 3ATI Display (FAA PMA'd)
Avidyne	EX5000 Series MFD[1]
Avidyne	EX500 Series MFD[1]
Avidyne	EX600 Series MFD[1]
Avidyne	EX5000 MFD[1]
Avidyne	IFD Series[1]
Garmin	GNS/GNC 400/500 Series
Garmin	GTN6XX/7XX Series
Garmin	GIA63/63W (G1000)

Table 4: Compatible Displays

[1] TSO-C147 Class A Display

The display device(s) may require hardware and/or software upgrades to display Traffic data. Contact the display manufacturer for further details.

Verify the Windshear, GPWS and TAS voice alerts are compatible. Depending on configuration of the TAS processor, the mute input to the TAS may be used to momentarily override the TAS audio to prioritize TAWS or EGPWS audio. See Section 2 for more information.

The TAS models are limited in the following ways:

	TAS600	TAS600A	TAS605	TAS605A	TAS610	TAS615	TAS615A	9900BX/ TAS620	TAS620A	What the limit means
Display Range	7nm	7nm	13nm	13nm	12nm	17nm	17nm	21nm	21nm	The maximum range that non-TA traffic will be displayed
Vertical Filter of Displayed Traffic	±3500 ft.	±3500 ft.	±5500 ft.	±5500 ft.	±3500 ft.	±10,000 ft.	±10,000 ft.	±10,000 ft.	±10,000 ft.	The maximum altitude separation that non-TA traffic will be displayed
Maximum Operating Altitude	18,500 ft.	18,500 ft.	55,000 ft.	55,000 ft.	25,000 ft.	55,000 ft.	55,000 ft.	55,000 ft.	55,000 ft.	The TAS has full functionality to the altitude limit identified.
WAAS GPS Position Input	Not Included	Included	Not Included	Included	Not Included	Not Included	Included	Not Included	Included	Only approved WAAS GPS's are approved for ADSB-In functionality
TSO Certification	TSO-C147	TSO-C147	TSO-C147	TSO-C147	TSO-C147	TSO-C147	TSO-C147	TSO-C147	TSO-C147	Each System has full TSO certification
Traffic Alert Limits	TSO-C147 warning times	TSO-C147 warning times	TSO-C147 warning times	TSO-C147 warning times	TSO-C147 warning times	TSO-C147 warning times	TSO-C147 warning times	TSO-C147 warning times	TSO-C147 warning times	Traffic alerts are not limited in range or altitude on any model
ARINC-429 Heading Input	Not included	Not included	Included	Included	Included	Included	Included	Included	Included	Heading input permits rapid repositioning of targets during high-rate turns
Mounting Tray	Use P/N 60-2006 Only	See limitations on page 27	Use P/N 60-2006 Only	See limitations on page 27	Use P/N 60-2006 Only	Use P/N 60-2006 Only	See limitations on page 27	Use P/N 60-2006 Only	See limitations on page 27	TAS-A processors can be installed in tray p/n 60-2006 or 700-00187-001 when installed in fixed wing aircraft in any orientation, and in helicopters when the processor is mounted horizontally. For helicopter vertical installation use tray p/n 700-00187-002
All other features	Included	Included	Included	Included	Included	Included	Included	Included	Included	Available on all systems

Table 5: TAS and TAS-A Processor Limitations

There are various combinations of trays and processors that are authorized for use for new installations and for retrofit of existing installations to the new TAS-A configuration. The table below summarizes the options for the installer when upgrading or installing a TAS-A. The new trays offer an easier method of removing the units from the tray after installation, so they are preferred for all forward-fit installations.

The TAS-A units ship from the factory with three captive screws installed. The table below lists some configurations that do not require that many screws. In these cases, the extra screws can be removed from the unit and discarded.

Install Type	Aircraft Type	Orientation	Approved Tray Type	Screws Needed	Notes
Retrofit	Fixed-Wing	Horizontal	Existing or New Rail Tray	2 3	Only 2 screws required if the existing try is used, 3 otherwise.
Retrofit	Fixed-Wing	Vertical	Existing or New Rail Tray	2 3	Only 2 screws required if the existing try is used, 3 otherwise.
Retrofit	Helicopter	Horizontal	New Rail Tray	3	Cannot use existing tray due to increase in helicopter vibration standards
Retrofit	Helicopter	Vertical	New Vertical Tray	0	Cannot use existing tray due to increase in helicopter vibration standards
Forward Fit	Fixed-Wing	Horizontal	New Rail Tray	3	
Forward Fit	Fixed-Wing	Vertical	New Rail Tray	3	
Forward Fit	Helicopter	Horizontal	New Rail Tray	3	
Forward Fit	Helicopter	Vertical	New Vertical Tray	0	

Table 6: TAS-A Tray Limitations

Note that the existing tray part number is 60-2006 (or 700-00187-000), the new rail tray is 700-00187-001 and the new vertical tray is 700-00187-002.

1.16. ARINC-429 INFORMATION

The two ARINC-429 receive ports can receive either high-speed or low-speed data. The ports must be the same speed for the 70-2420-( ) processor. They can be different speeds for the 700-00185-( ) processor. The TAS 70-2420-( ) processor can receive any of the following labels:

164 Host radio altitude (binary). This input provides for automatic Approach Mode as the aircraft descends. Generally, this application is for aircraft that are operated at airports with a control tower. It is normally not used.

165 Host radio altitude (BCD). This input is an alternative to label 164.

203 Pressure altitude (uncorrected). This input can be used instead of encoder gray code.

234 Barometric pressure (mb). This input can be used to permit barometric pressure adjustment from another ARINC-429 communicator on the aircraft.

235 Barometric pressure (inches Hg). Identical to label 234 except it uses inches of mercury for adjustment.

314 Heading. True. This input is used to improve display performance during turns.

320 Heading. Magnetic. This input is used to improve display performance during turns.

The TAS-A 700-00185-( ) processor can receive any of the following labels from an ARINC-429 compatible WAAS GPS:

103 Track. Either pair 103/112 or 166/174 required for ownship shadow detection.

110* Course Latitude.

111* Course Longitude.

112 Ground Speed. Either pair 103/112 or 166/174 required for ownship shadow detection.

136 Vertical Figure of Merit. Unless ownship quality validation is disabled. Translates to GVA

145 Horizontal Figure of Merit for Velocity. Currently unused, but will be required for ATAS unless quality validation is disabled or ownship NACv configured >= 1.

166 North/South Velocity. Either pair 103/112 or 166/174 required for ownship shadow detection.

174 East/West Velocity. Either pair 103/112 or 166/174 required for ownship shadow detection.

203 Pressure Altitude. Either gray code or label 203 required.

247 Horizontal Figure of Merit. Unless ownship quality validation is disabled. Translates to NACp.

370* Geometric Altitude. Height above Ellipsoid.

* No more than one GPS device that transmits labels 110, 111, 370 should be connected to each ARINC-429 receive port on the TAS-A

The TAS-A 700-00185-() processor can receive and use these additional ARINC-429 labels if present. All other labels will be ignored by the processor.

076	MSL Altitude. Not currently used
101	Horizontal Dilution of Precision
102	Vertical Dilution of Precision
120	Latitude Fine
121	Longitude Fine
125	UTC. (BCD) Currently only used for log file timestamps, but either label 125 or 150 will be required for ATAS.
130	Horizontal Integrity Limit
133	Vertical Integrity Limit
142	Vertical Figure of Merit for Velocity
147	Magnetic Variation
150	UTC. (Binary) Currently only used for log file timestamps, but either label 125 or 150 will be required for ATAS.
165	Vertical Velocity. Cannot be combined with 165, Radio Altitude. Currently unused, but will be required for ATAS.
214	Ownship ICAO Address. (High) Labels 214 and 216 can be used instead of configuring ICAO address during installation.
216	Ownship ICAO Address. (Low) Labels 214 and 216 can be used instead of configuring ICAO address during installation.
260	Date
314	Heading. (True) This input is used to improve display performance during turns.
320	Heading. (Magnetic)
377	Equipment ID. Not currently used

NOTES:

- For 70-2420-( ) Processors Only: Both receive ports must be the same speed. If this is not followed, the TAS will fail to receive data from one of the ports.
- The same label should not be transmitted to the TAS on both ports as this can create an unsatisfactory mixed signal condition.
- Dual Air Data Computers (ADC) operating simultaneously and transmitting on the ARINC-429 data bus will permit the TAS to operate properly; however, failure of one ADC will generate failure indications on the TAS even if the other ADC is continuing to operate properly.
- An ARINC-743 GPS and a radar altimeter cannot be connected to the same receive port/bus as they both transmit labels 165 & 166 for different things.

CAUTION: TAS-A currently does not support label 147 for UTC leap second from an ARINC-743A GPS. It only supports label 147 for magnetic variation. UTC leap second data should NOT be sent to the TAS-A on any ARINC-429 receive port.

The Avidyne TAS transmits ARINC-429 data at the high-speed data rate. A data file is sent twice per second and is ARINC-735 compliant. For a complete description of the label formats, refer to the ARINC-735A and ARINC-429 Part 1-16 documents. Up to 30 targets are supported, sent in priority order as required by ARINC-735A.

Each data set contains the following sequence of ARINC-429 labels:

377 - Equipment ID 035
371 - General Aviation Equipment ID
350 - Maintenance data / TCAS Fault Summary Word
274 - Selected Sensitivity Level
016 - TCAS Mode/Sense
270 - TCAS vertical RA data output word (SSM=Test (demo) or NCD)
015 - Altitude Select Limits Word
203 - Own Aircraft Altitude (uncorrected)
320 - Magnetic Heading (Processor part number suffix of -4 and subsequent)
357 - RTS (Start of the traffic data file)
130 - Intruder Range
131 - Intruder Altitude
132 - Intruder Bearing
***Labels 130, 131 and 132 are repeated for each intruder
357 - ETX (End of the traffic data file)

Label 371 is formatted as follows:

Company code: 27 (011011)
EQ Code: 0x35 (0011 0101)
Company Private: 0 (00000)

1.17. NO AVIDYNE DISPLAY CONFIGURATION

When a display other than an Avidyne display is used, it is not always possible to take the TAS out of Ground Mode. The pilot should always have the ability to take the TAS out of Ground Mode. If the installation includes the Avidyne/Ryan ½ 3ATI display/controller or the Avidyne/Ryan MHD (using RS-232 connection), then this requirement is fulfilled. Other displays may or may not provide the ability to take the TAS out of the Ground Mode. Displays that use ARINC-429 input from the TAS do not have the ability to take the TAS out of Ground Mode.

NOTE:	If at least one of the display systems operating with the TAS has a control to take the TAS out of Ground mode, then the "No Avidyne Display" jumper need not be grounded. When Pin J1 15 or pin P2 37, depending on processor model, is jumpered to ground, use Weight on Wheels (or equivalent) for customer convenience.

Pin 15 of J1 or Pin 37 of P2 prevents the TAS from entering the Ground mode upon startup unless the Weight on Wheels input shows the aircraft is on the ground. The following table illustrates the configuration of these pins.

Configuration	**Pin 15 of J1 for 70-2420-( ) Processor**	**Pin 37 of P2 for 700-00185-( ) Processor**	**Condition**
Avidyne ½ 3ATI Traffic display/controller (Allows access to deselect the Ground Mode)	Not jumpered	Not jumpered	Automatic, encoder-based Ground mode on startup is available.
Avidyne/Ryan Multi-Hazard Display (MHD) with RS-232 connection (Allows access to deselect the Ground Mode)	Not jumpered	Not jumpered	Automatic, encoder-based Ground mode on startup is available.
RS-232 Display that allows access to deselect the Ground Mode	Not jumpered	Not jumpered	Automatic, encoder-based Ground mode on startup is available.
Any ARINC-429 display connection	Jumpered	Jumpered	Automatic, encoder-based Ground mode on startup is disabled.
No Display at all	Jumpered	Jumpered	Automatic, encoder-based Ground mode on startup is disabled.
RS-232 Display that does not allow access to deselect the Ground Mode	Jumpered	Jumpered	Automatic, encoder-based Ground mode on startup is disabled.

Table 7: No Display/Controller Jumper Configuration Table.

1.18. PIN ASSIGNMENTS

The TAS6XX processors, 70-2420-(), provide three signal connectors; P1, J1 and COM1. The new TAS-A processors, 700-00185-(), provide the P1 and J1 connectors; however, all functions of P1 and J1 have been replicated onto the new P2 connector. The new TAS-A processors do not provide a separate COM1 connector, so P2 provides the only connection to RS-232 Port #1. The TAS-A processors also provide a P3 connector that provides functionality not previously available on the TAS6XX processors.

It is recommended for new installations to only wire functions on P2, leaving P1 and J1 blank. Retrofit installations may reuse the existing P1 and J1 harnesses in their entirety without connecting to P2. It is acceptable to make connections to any combination of connectors simultaneously as necessary to simplify the installation; however, connection should never be made to the same signal in two different connectors.

1.18.1. P1 CONNECTOR

The following table provides pinouts and signal descriptions for the 25-pin male D connector, P1, and a cross-reference to the pin number on P2 (of the TAS-A) for those signals. Note that this table does not represent a complete pinout for P2; only those signals on P2 that duplicate a signal on P1 are listed.

CAUTION:	It is important to remember that the RS-232 ports are paralleled between P1 and P2. Do not connect to the same signal in two different connectors.

P1	P2[1]	Description
1	58	Battery. An inductor is required for TAS6XX, 70-2420-(). Install the inductor as close as possible to the TAS6XX.
2	77	Battery. An inductor is required for TAS6XX, 70-2420-(). Install the inductor as close as possible to the TAS6XX, this is a second connection for redundancy and should be paralleled through the inductor.
3	5	Audio. This can be connected to an unswitched audio input, or installed in an available audio input. If it must be paralleled, resistors will normally be necessary to attain acceptable impedance.
4	25	Audio Ground. This is the return line for the audio and should be connected to the audio panel.
5	15	Remote Mute; connect to momentary switch. Remote mute can also be used to prioritize Windshear and TAWS announcements (Only on TAS6XXA processors and TAS6XX processors with a part number suffix of -6 or later)
6	18	Annunciator output, supplies a ground. Normally a yellow or amber light marked “Traffic” or “Traffic Alert” is used.
7	56	Mutual suppression bus for transponder and DME suppression.
8	49	429 Tx1+ (Tx1 A) ARINC-429 transmit, see ARINC-429 Information in Section 1.16
9	50	429 Tx1– (Tx1 B) ARINC-429 transmit, see ARINC-429 Information in Section 1.16
10	67	429 Rx1+ (Rx1A) ARINC-429 receive, see ARINC-429 Information in Section 1.16

P1	P2[1]	Description
11	68	429 Rx1– (Rx1B) ARINC-429 receive, see ARINC-429 Information in Section 1.16
12	69	429 Rx2+ (Rx2A) ARINC-429 receive, see ARINC-429 Information in Section 1.16
13	70	429 Rx2– (Rx2B) ARINC-429 receive, see ARINC-429 Information in Section 1.16
14	59	Power Ground. An inductor is required for TAS6XX, 70-2420-(). Install the inductor as close as possible to the TAS6XX.
15	78	Power Ground. An inductor is required for TAS6XX, 70-2420-(). Install the inductor as close as possible to the TAS6XX, this is a second connection for redundancy and should be paralleled through the inductor.
16	54	Power Switch; this is used to energize the TAS, and must be grounded for operation. It can be routed through a switch on the panel, or permanently grounded to permit turning the system on through the avionics master (the system can be isolated by the circuit breaker)
17	43	RS-232 port 2, transmit. See Note 2.
18	24	RS-232 port 2, ground. See Note 2.
19	44	RS-232 port 2, receive. See Note 2.
20	45	RS-232 port 3, transmit. See Note 2.
21	57	RS-232 port 3, ground. See Note 2.
22	46	RS-232 port 3, receive. See Note 2.
23	60	RS-232 port 4, transmit. See Note 2.
24	66	RS-232 port 4, ground. See Note 2.
25	61	RS-232 port 4, receive. See Note 2.

Table 8: P1 and P2 Pin Assignments and Signal Descriptions.

Note 1: P2 applicable to 700-00185- ( ) processors only.

Note 2: Use twisted shielded pairs. Do not parallel the wires to other displays. Both transmit and receive lines should be connected to each display. There is no master or slave display.

1.18.2. J1 CONNECTOR

The following table provides pinouts and signal descriptions for the 15-pin female D connector, J1, and a cross-reference to the pin number on P2 (of the TAS-A) for those signals. Note that this table does not represent a complete pinout for P2; only those signals on P2 that duplicate a signal on J1 are listed.

CAUTION:	It is important to remember that the signals are paralleled between J1 and P2. Do not connect to the same signal in two different connectors.

J1	P2[1]	Description
1	12	A1, for the Altitude Encoder
2	13	A2, for the Altitude Encoder
3	14	A4, for the Altitude Encoder
4	32	B1, for the Altitude Encoder
5	33	B2, for the Altitude Encoder
6	53	B4, for the Altitude Encoder
7	51	C1, for the Altitude Encoder
8	52	C2, for the Altitude Encoder
9	71	C4, for the Altitude Encoder
10	19	Do not connect. Ground test function, must not be used in flight.
11	35	Gear position, used to change Sensitivity Level (SL). When open the system operates in SLB (Basic). When grounded the system operates in SLA (for approach and departure). This is not a required connection. See the Pilot Operating Handbook for more information. A Glideslope Selected Discrete can also be used to engage this mode.
12	72	D4, for the Altitude Encoder
13	34	Ground, connected to the encoder ground
14	36	Weight on Wheels (aircraft on ground input). An airspeed switch can also be used (separate installation approval required). This input is expecting a ground. Weight on wheels input is very useful for the flight crew because it automatically puts the Avidyne TAS into the Ground Mode upon touchdown.
15	37	No Display Jumper. This prevents the TAS from initializing in the Ground Mode unless the Weight on Wheels is enabled. The purpose of the no-display jumper is to prevent the system from initializing in the Ground Mode if the power must be cycled in flight, unless there is a way to deselect the Ground Mode.

Table 9: Connector Pin Assignments

Note 1: P2 applicable to 700-00185- ( ) processors only.

1.18.3. COM1 CONNECTOR (TAS6XX Only)

The following table provides pinouts and signal descriptions for the 9-pin male D connector, COM1. This connector is only available on TAS6XX processors, part numbers 70-2420-(). The RS-232 port provided by the COM1 connector (RS-232 port #1) is available on pins 40, 41, and 42 of the P2 connector on TAS-A processors, part numbers 700-00185-().

This connector is normally used as the null modem connection to a computer for checkout of the system. It can be used as another RS-232 connection for a display after configuration if necessary.

Since the COM1 connector is not available on TAS-A processors, part number 700-00185-(), an alternate method of connecting a computer for installation checkout and configuration must be provided. Any RS-232 port on connector P1 or P2 can be used for this purpose. Refer to the RS-232 installation guidance in section 0 on page 49 for recommendations regarding how to provide an alternate computer connection in TAS-A installations.

CAUTION: It is important to remember that the RS-232 ports are paralleled between TAS-A P1 and TAS-A P2. Do not connect to the same signal in two different connectors.

TAS COM1	9 Pin RS232 Serial Computer Cable Required for Configuration	Description
1		Not connected
2	3	TAS RS-232 port 1, receive. See Note 1.
3	2	TAS RS-232 port 1, transmit. See Note 1.
4		Not connected
5	5	RS-232 port 1, ground. See Note 1.
6		Not connected
7		Not connected
8		Not connected
9		Not connected

Table 10: COM1 Pin Assignments and Signal Descriptions.

Note 1: Use twisted shielded pairs. Do not parallel the wires to other displays. Both transmit and receive lines should be connected to each display. There is no master or slave display.

1.18.4. ANTENNA CONNECTORS

The following table provides pinouts and signal descriptions for the four TNC antenna connectors labeled “TO J1”, “TO J2”, “TO J3” and “TO J4”.

Connector	Description
J1	Connected to J1 of the single-blade antenna. Forward antenna element.
J3	Connected to J3 of the single-blade antenna. Aft antenna element.
J2	Starboard antenna element of the twin-blade antenna. Twin-blade antenna mounted on the bottom of the aircraft: Connected to J2 of the twin-blade antenna. Twin-blade antenna mounted on the top of the aircraft: Connected to J4 of the twin-blade antenna.
J4	Port antenna element of the twin-blade antenna. Twin-blade antenna mounted on the bottom of the aircraft: Connected to J4 of the twin-blade antenna. Twin-blade antenna mounted on the top of the aircraft: Connected to J2 of the twin-blade antenna.

Table 11: Antenna Connector Pin Assignments and Signal Descriptions.

1.18.5. COUPLER CONNECTOR

The BNC connector labeled “COUPLER” on the TAS unit provides an input for the transponder coupler signal. The TAS-A processor, 700-00185-(), duplicates this signal on pin 39 of P2; however, it will typically be more convenient to use the BNC connector since the transponder coupler uses a BNC connector as well.

1.18.6. P2 CONNECTOR (TAS-A Only)

The following table provides pinouts and signal descriptions for the 78-pin male D connector, P2, and a cross-reference to the legacy TAS6XX connector and pin number for those signals.

CAUTION: It is important to remember that the signals are paralleled between P2 and the legacy TAS6XX connectors (P1, J1, and COM1). Do not connect to the same signal in two different connectors.

P2[1]	TAS6XX	Description
1	Multiple	Signal Ground.
2	N/A	Future feature, do not connect.
3	N/A	Future feature, do not connect.
4	Multiple	Signal Ground.
5	P1-3	Audio. This can be connected to an unswitched audio input, or installed in an available audio input. If it must be paralleled, resistors will normally be necessary to attain acceptable impedance.
6	N/A	Future feature, do not connect.
7	Multiple	Signal Ground.
8	N/A	RS-422 Rx0+, receive port 0 positive. See Note 2.
9	N/A	RS-422 Rx0–, receive port 0 negative. See Note 2.
10	N/A	RS-422 Rx1+, receive port 1 positive. See Note 2.
11	N/A	RS-422 Rx1–, receive port 1 negative. See Note 2.
12	J1-1	A1, for the Altitude Encoder
13	J1-2	A2, for the Altitude Encoder
14	J1-3	A4, for the Altitude Encoder
15	P1-5	Remote Mute; connect to momentary switch. Remote mute can also be used to prioritize Windshear and TAWS announcements (Only on TAS6XXA processors and TAS6XX processors with a part number suffix of -6 or later)
16	N/A	Audio Suppression Input
17	N/A	Audio Suppression Output
18	P1-6	Annunciator output, supplies a ground. Normally a yellow or amber light marked “Traffic” or “Traffic Alert” is used.
19	J1-10	Do not connect. Ground test function, must not be used in flight.
20	Multiple	Signal Ground.
21	N/A	Future feature, do not connect.
22	N/A	Future feature, do not connect.
23	N/A	Future feature, do not connect.
24	P1-18	Signal Ground.
25	P1-4	Audio Ground. This is the return line for the audio and should be connected to the audio panel.
26	N/A	Future feature, do not connect.

P2[1]	TAS6XX	Description
27	N/A	RS-422 Tx0+, transmit port 0 positive. See Note 2.
28	N/A	RS-422 Tx0–, transmit port 0 negative. See Note 2.
29	N/A	RS-422 Tx1+, transmit port 1 positive. See Note 2.
30	N/A	RS-422 Tx1–, transmit port 1 negative. See Note 2.
31	Multiple	Signal Ground.
32	J1-4	B1, for the Altitude Encoder
33	J1-5	B2, for the Altitude Encoder
34	J1-13	Signal Ground.
35	J1-11	Gear position, used to change Sensitivity Level (SL). When open the system operates in SLB (Basic). When grounded the system operates in SLA (for approach and departure). This is not a required connection. See the Pilot Operating Handbook for more information. A Glideslope Selected Discrete can also be used to engage this mode.
36	J1-14	Weight on Wheels (aircraft on ground input). An airspeed switch can also be used (separate installation approval required). This input is expecting a ground. Weight on wheels input is very useful for the flight crew because it automatically puts the Avidyne TAS into the Ground Mode upon touchdown.
37	J1-15	No Display Jumper. This prevents the TAS from initializing in the Ground Mode unless the Weight on Wheels is enabled. The purpose of the no-display jumper is to prevent the system from initializing in the Ground Mode if the power must be cycled in flight, unless there is a way to deselect the Ground Mode.
38	N/A	Future feature, do not connect.
39	COUPLER	This is the transponder coupler input signal. This input duplicates the BNC input.
40	COM1-5	Signal Ground.
41	COM1-3	RS-232 port 1, transmit. See Note 2.
42	COM1-2	RS-232 port 1, receive. See Note 2.
43	P1-17	RS-232 port 2, transmit. See Note 2.
44	P1-19	RS-232 port 2, receive. See Note 2.
45	P1-20	RS-232 port 3, transmit. See Note 2.
46	P1-22	RS-232 port 3, receive. See Note 2.
47	N/A	ARINC-429 Tx2+ (Tx2 A) ARINC-429 transmit, see ARINC-429 Information in Section 1.16
48	N/A	ARINC-429 Tx2– (Tx2 B) ARINC-429 transmit, see ARINC-429 Information in Section 1.16
49	P1-8	ARINC-429 Tx1+ (Tx1 A) ARINC-429 transmit, see ARINC-429 Information in Section 1.16
50	P1-9	ARINC-429 Tx1– (Tx1 B) ARINC-429 transmit, see ARINC-429 Information in Section 1.16
51	J1-7	C1, for the Altitude Encoder
52	J1-8	C2, for the Altitude Encoder
53	J1-6	B4, for the Altitude Encoder
54	P1-16	Power Switch; this is used to energize the TAS, and must be grounded for

P2[1]	TAS6XX	Description
		operation. It can be routed through a switch on the panel, or permanently grounded to permit turning the system on through the avionics master (the system can be isolated by the circuit breaker)
55	N/A	Future feature, do not connect.
56	P1-7	Mutual suppression bus for transponder and DME suppression.
57	P1-21	Signal Ground.
58	P1-1	Battery. An inductor is required for TAS6XX, 70-2420-(). Install the inductor as close as possible to the TAS6XX. The inductor is not required for TAS6XXA installations.
59	P1-14	Power Ground. An inductor is required for TAS6XX, 70-2420-(). Install the inductor as close as possible to the TAS6XX. The inductor is not required for TAS6XXA installations.
60	P1-23	RS-232 port 4, transmit. See Note 2.
61	P1-25	RS-232 port 4, receive. See Note 2.
62	N/A	RS-232 port 5, transmit. See Note 2.
63	N/A	RS-232 port 5, receive. See Note 2.
64	N/A	RS-232 port 6, transmit. See Note 2.
65	N/A	RS-232 port 6, receive. See Note 2.
66	P1-24	Signal Ground.
67	P1-10	ARINC-429 Rx1+ (Rx1A) ARINC-429 receive, see ARINC-429 Information in Section 1.16
68	P1-11	ARINC-429 Rx1– (Rx1B) ARINC-429 receive, see ARINC-429 Information in Section 1.16
69	P1-12	ARINC-429 Rx2+ (Rx2A) ARINC-429 receive, see ARINC-429 Information in Section 1.16
70	P1-13	ARINC-429 Rx2– (Rx2B) ARINC-429 receive, see ARINC-429 Information in Section 1.16
71	J1-9	C4, for the Altitude Encoder
72	J1-12	D4, for the Altitude Encoder
73	Multiple	Signal Ground.
74	N/A	Future feature, do not connect.
75	N/A	Future feature, do not connect.
76	Multiple	Signal Ground.
77	P1-2	Battery. This is a second connection for redundancy.
78	P1-15	Power Ground. This is a second connection for redundancy.

Table 12: P2 Connector Pin Assignments and Signal Descriptions.

Note 1: P2 applicable to 700-00185- ( ) processors only.
Note 2: Use twisted shielded pairs. Do not parallel the wires to other displays. Both transmit and receive lines should be connected to each display. There is no master or slave display.

1.18.7. P3 CONNECTOR (TAS-A Only)

P3 on the TAS-A, 700-00185-(), processor is not used at this time. Do not connect any wires to P3.

SECTION II
INSTALLATION

2.1. GENERAL

The Avidyne TAS should be installed according to this manual, AC 43.13-1( ) and AC 43.13-2( ). This Section contains interconnect diagrams, mounting dimensions, antenna placement and other information pertaining to installation. See Section VI for installation tips.

The Avidyne TAS consists of two major components, plus antennas:

- Processor with Mounting Tray
- Transponder Coupler

Two special L-band directional antennas are required. The single blade antenna is normally top mounted on the aircraft fuselage, and the dual blade is normally bottom mounted. For more information see paragraph 6.2.2. A ½ 3ATI Traffic Display/Controller is optional, and is not part of the TSO'd system.

Refer to Section IV for checkout and Customer Care checklist.

Interference from DME and the transponder can affect the TAS performance. Inspect the transponder (s) and DME(s) to assure performance is within specification. Also check for frayed or loose coaxial connections or excessive bends in the antenna cables that could emit Electromagnetic Interference (EMI), especially L-Band interference such as the transponder or DME.

Exercise care when unpacking the equipment. Make a visual inspection of the unit for evidence of damage incurred during shipment. If a claim for damage is made, save the shipping container to substantiate the claim. The claim should be filed with the transportation company. Retain the container and packaging material after the equipment has been removed should equipment storage or reshipment become necessary.

The TAS6XXA may be shipped with metal covers over the D-style connectors. These covers are securely mounted with screws and may be left in place for unused connectors to protect the pins from accidental short circuits. If the metal cover is removed from a D-style connector, then the hex head jack screws for that connector should be re-torqued to between 4.5 and 5.5 inch-pounds.

2.2. TRANSPONDER AND ENCODER REQUIREMENTS

The on-board transponder(s) must accept suppression input (often called DME or mutual suppression). An altitude data source is required. Encoders that conform to TSO-C88 or TSO-C88A can be used. The TAS can normally be paralleled on the output of an encoder without degrading the encoder performance. The installing agency must make this determination. TAS altitude input lines are diode isolated internally. The altimetry source used for the TAS must meet the accuracy requirements of CFR Part 43, Appendix E or equivalent.

Ordinarily, TAS should be connected to the encoder that is connected to the transponder.

Altitude data can be received via ARINC-429 protocol in lieu of gray code. See section 1.16, ARINC-429 Information.

The following pages contain isometric views of the processors, trays, displays, and coupler.

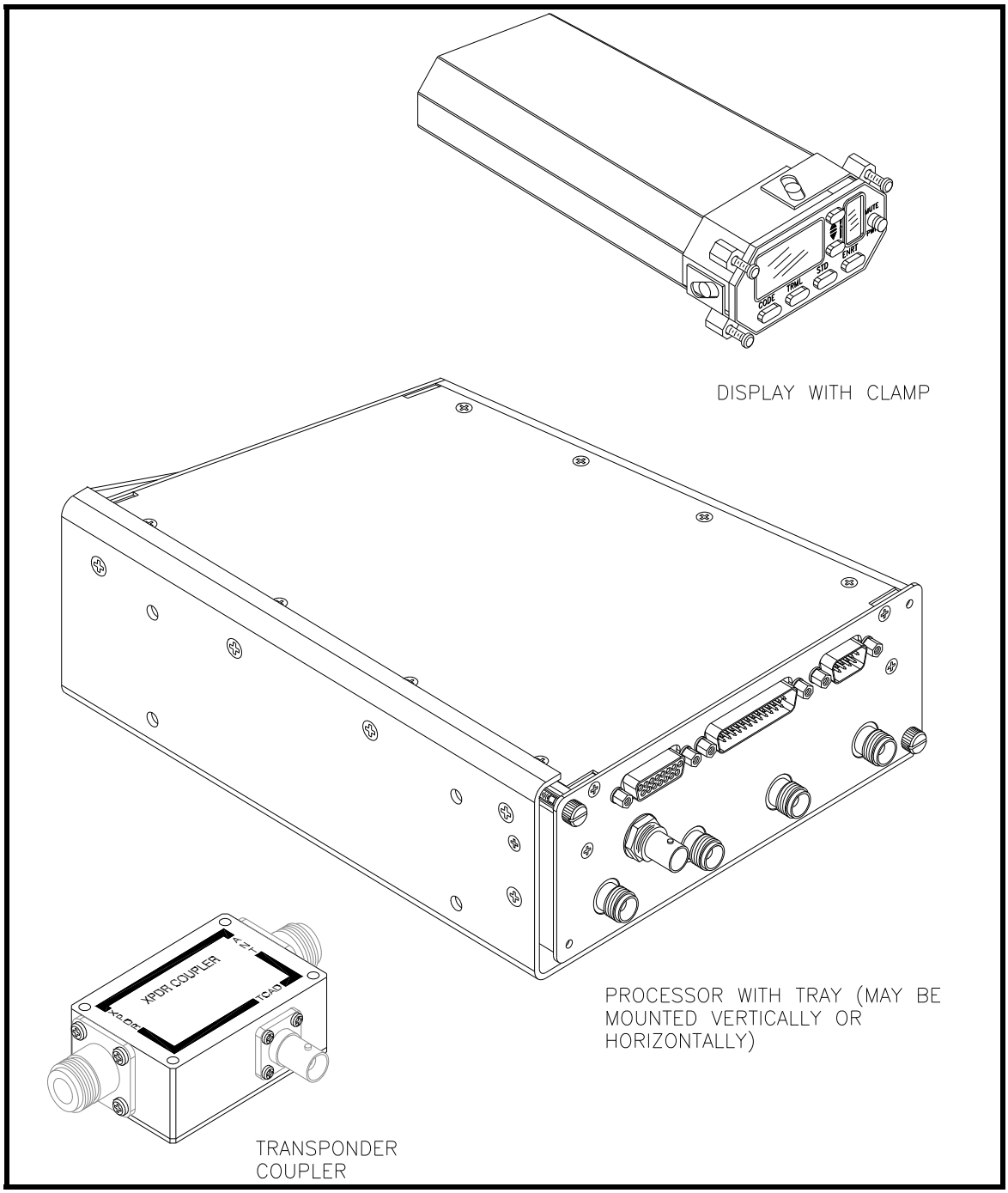


Figure 2: TAS6XX Processor, Transponder Coupler, and Optional ½ 3ATI Display.

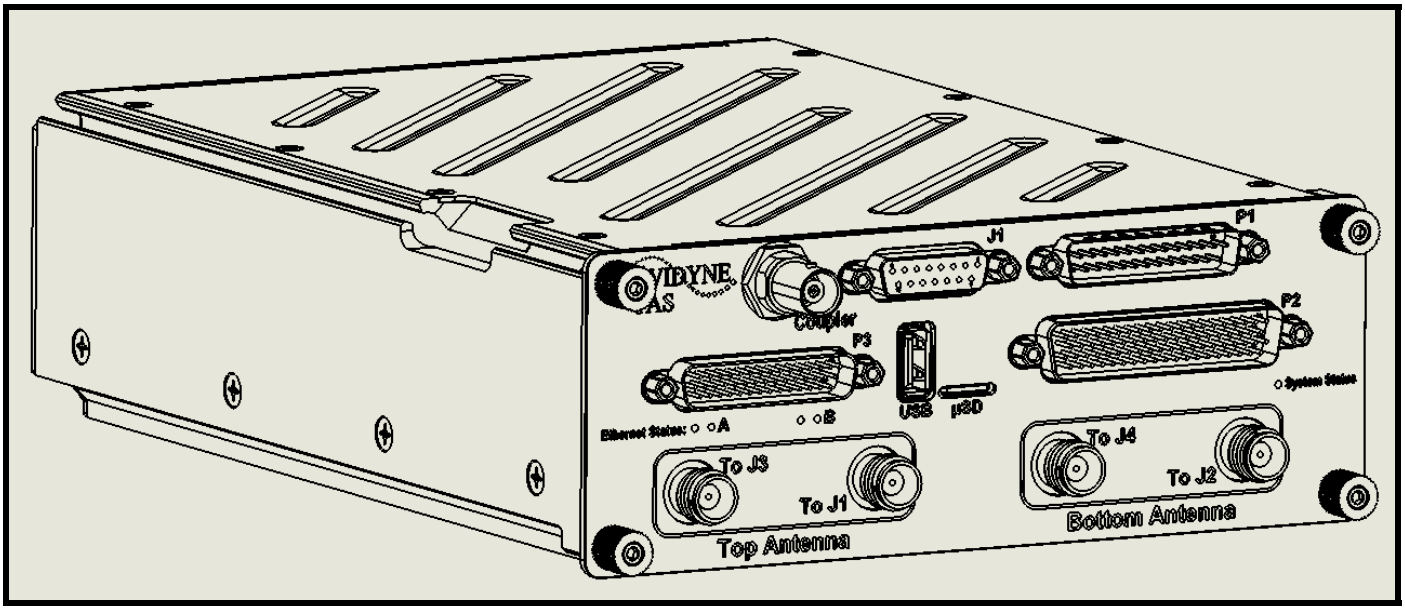


Figure 3: TAS-A Processor Without Tray.

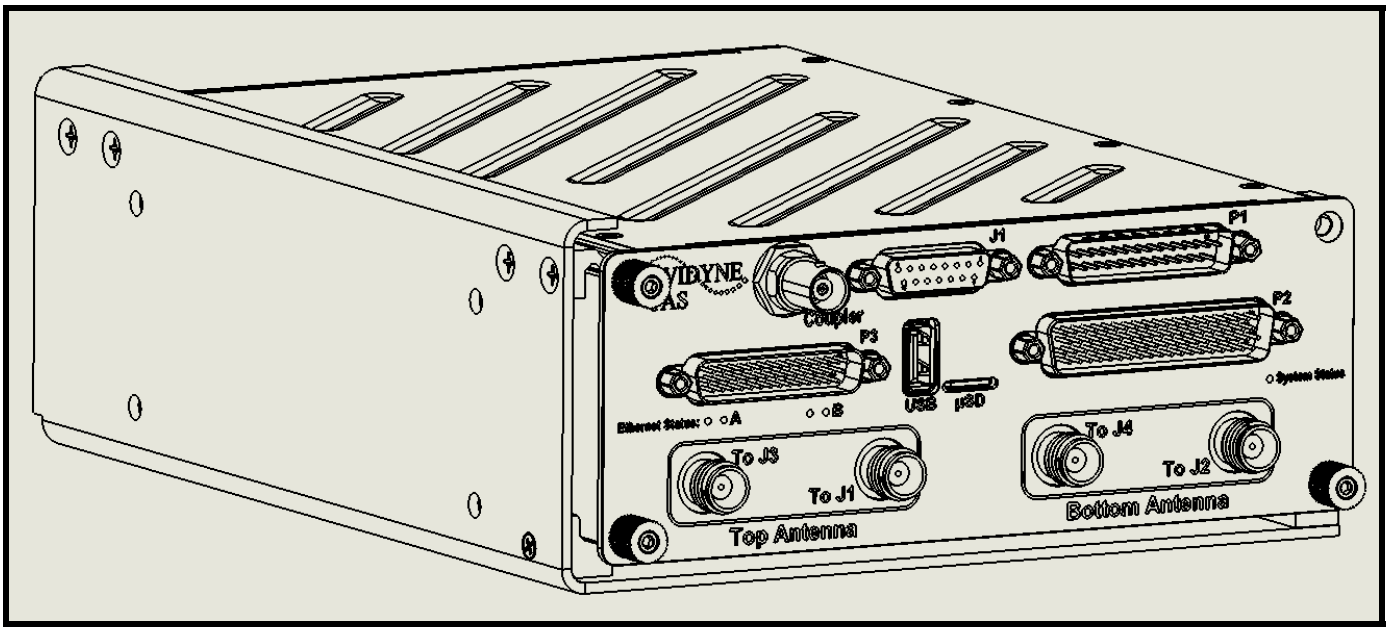


Figure 4: TAS-A Processor In Fixed-Wing / Horizontal Helicopter Tray.

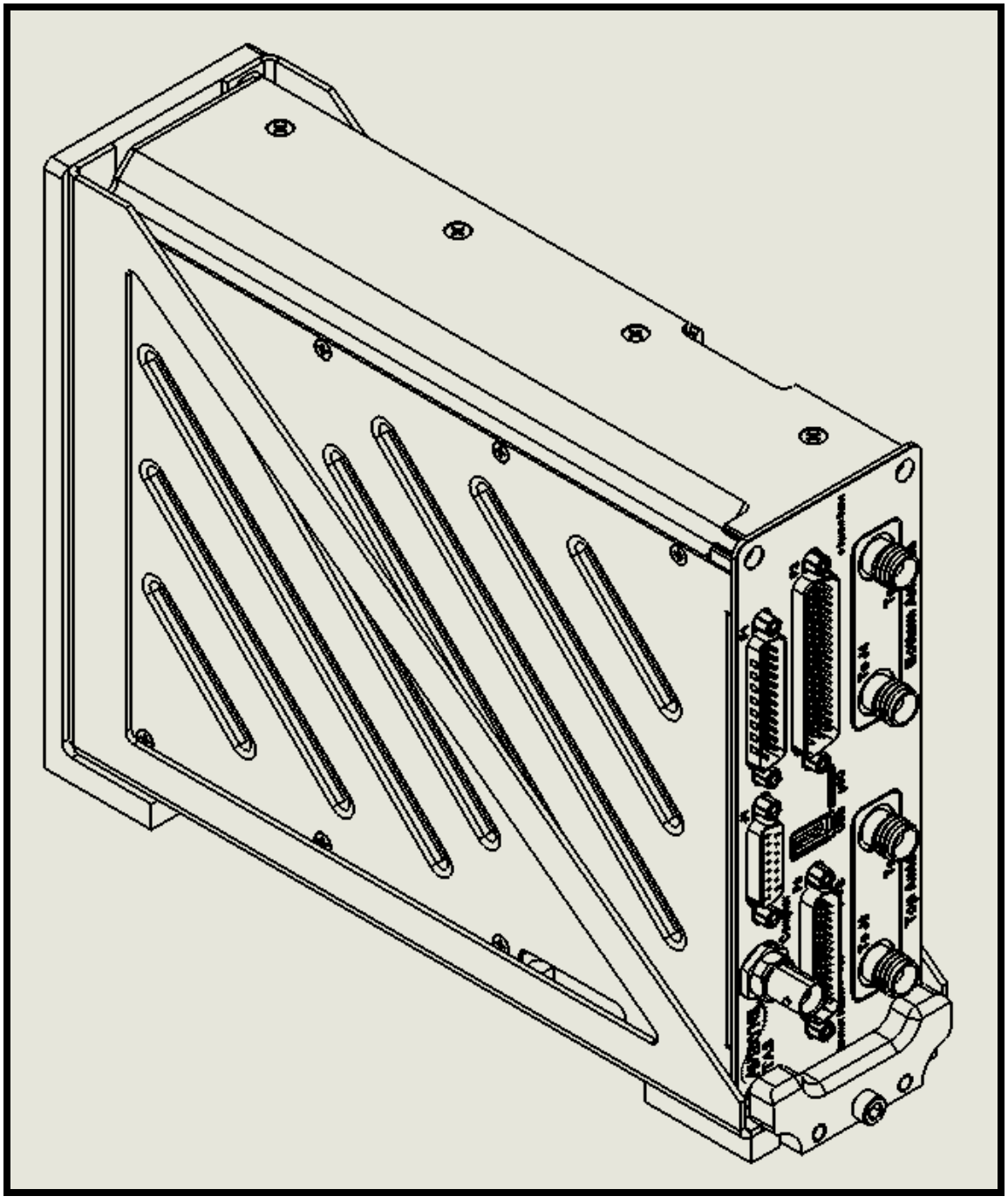


Figure 5: TAS-A Processor In Vertical Helicopter Tray.

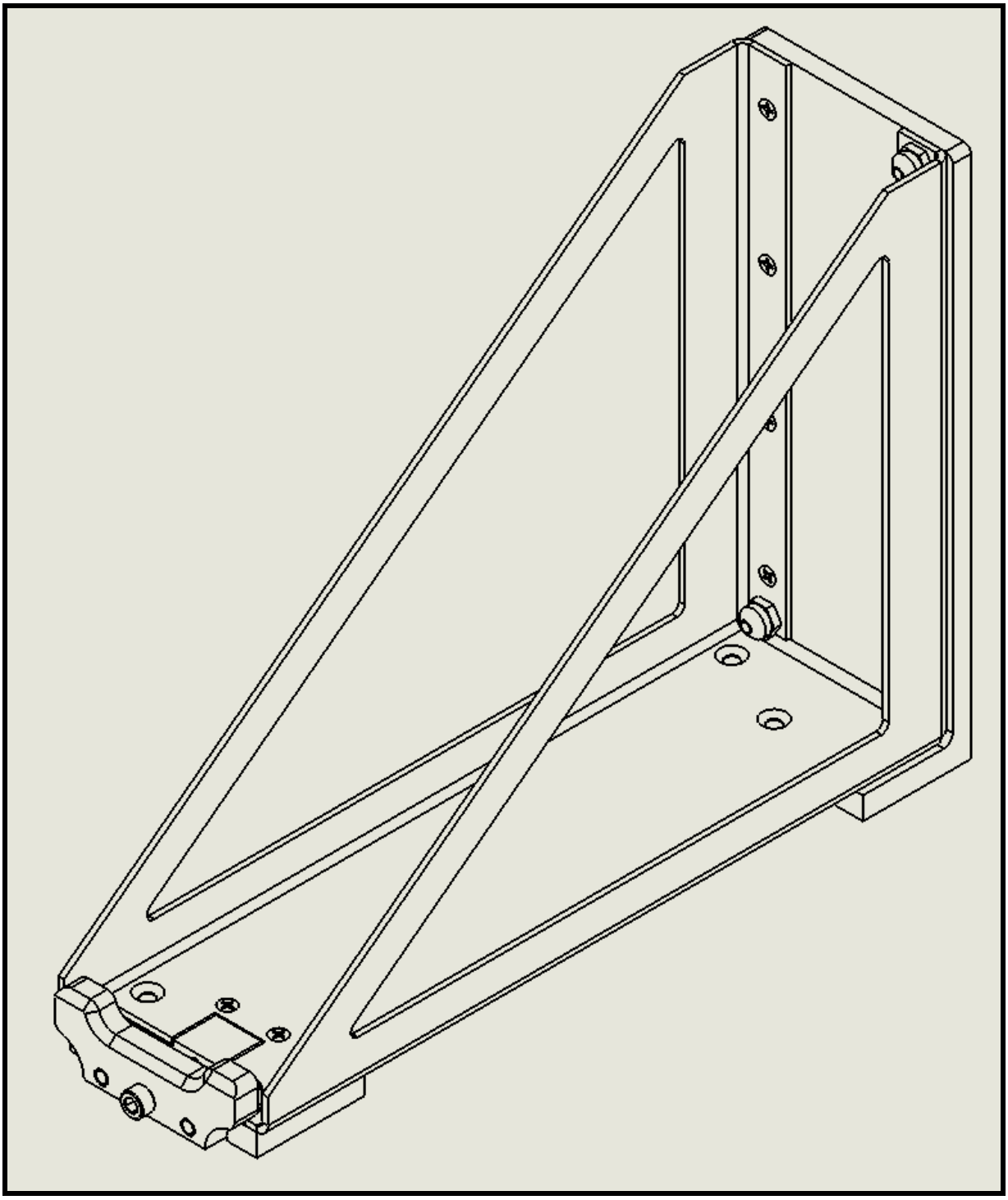


Figure 6: TAS-A Vertical Helicopter Tray.

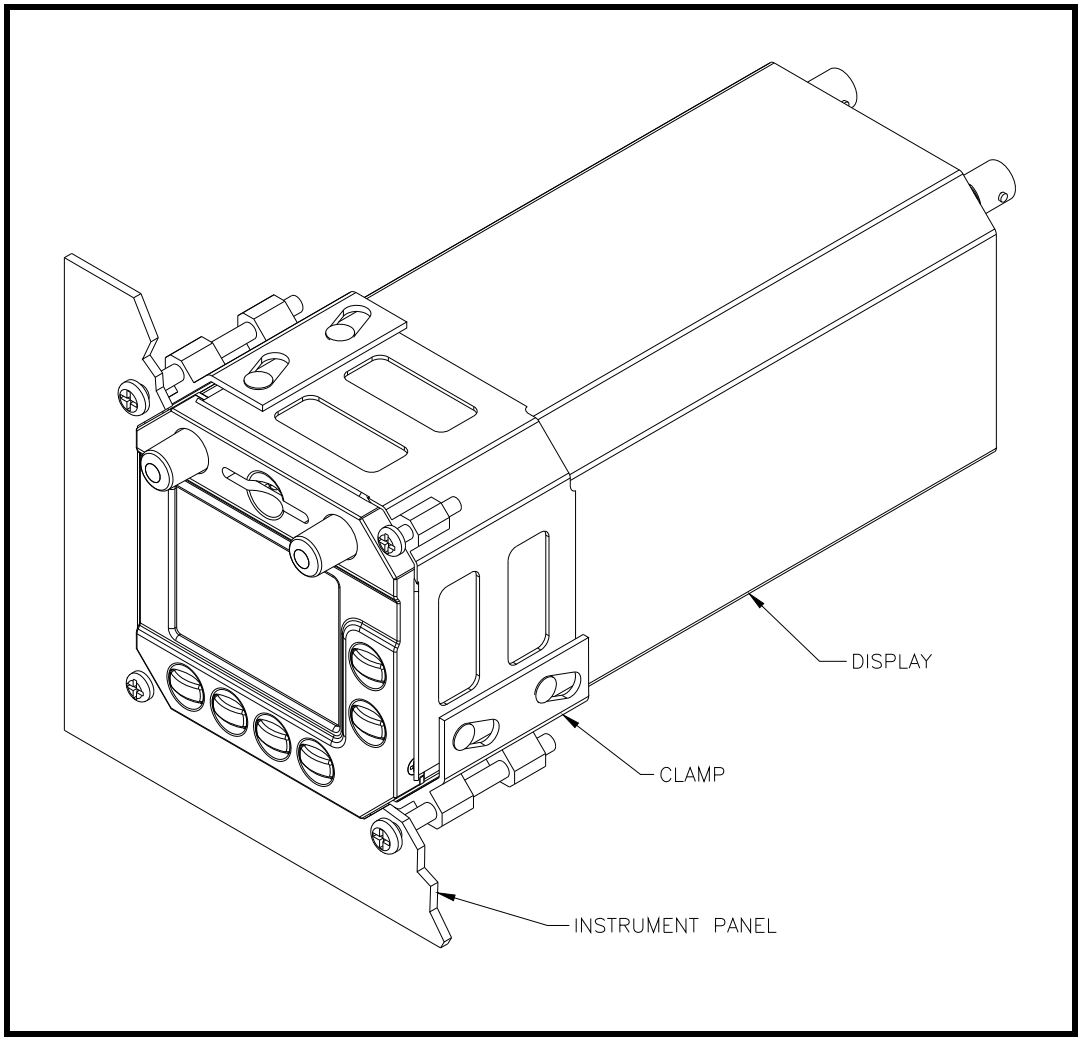


Figure 7: Avidyne 3ATI Multi-Hazard Display (MHD)

See the MHD Installation Manual or STC 02061CH for installation data.

2.3. SUPPRESSION

Transponder and DME suppression are required for TAS operation. The TAS sends and receives positive-going suppression signals. The outgoing suppression amplitude is approximately battery voltage.

DME suppression is used to ensure the DME does not interfere with the transponder or the TAS. Interference that causes transponder squitter (unsolicited replies) from any source reduces data available to the TAS. See Transponder Suppression, Section 6.2.8.

The TAS is compatible with both mutual and unidirectional suppression systems. Table 13 below lists the availability of suppression for popular transponders.

The TAS suppression can be connected directly to any ARINC-standard mutual suppression bus.

NOTE:	Not all transponder suppression configurations conform to ARINC standards. See Electrical Wiring of Suppression in this Section for conformance information.

NOTE:	A momentary short to ground on the Suppression line will cause internal damage to the Processor, requiring repair at the factory

Manufacturer	Model	Suppression	Remarks
Avidyne	AXP340 AXP322	Yes Yes	
ARC	359 459 859 1060	Yes Yes Yes Yes	Must be modified to accept suppression. Contact Sigma Tek, Inc.
Collins	TDR-950 All Others	Yes Yes	Some must be modified to accept suppression. See Collins Manual.
King	KT 76 KT 78 KT 76A KT 78A All Others	None None Yes Yes Yes	Not compatible Not compatible See Figure 20 See Figure 20
Narco	AT-50 AT-50A All Others	Yes Yes Yes	
Garmin	All	Yes	
Terra	Radair 250 TRT 250	N/A N/A	These transponders are not compatible with the TAS
Trig	TT31	Yes	

Table 13: Availability of Suppression for Popular Transponders

2.4. ANNUNCIATOR OUTPUT

An annunciator light is required when no display is used. The annunciator light is recommended for all other applications because it places the TA indication in the pilot's line of sight, and when the light extinguishes the pilot is thus informed that the TA is no longer valid.

A switched ground is available from the Processor Unit for illuminating the annunciator light. The output is grounded when traffic is displayed, and the circuit opens when traffic is no longer displayed. The light should be yellow or amber, and marked "Traffic" or "Traffic Alert". A white light may be acceptable; however, for compatibility with future ADS-B traffic applications a yellow or amber light is recommended. The light should be dimmable, and clearly visible to the pilot.

The annunciator output is an active low discrete that is typically used to illuminate a lamp to provide visual notification to the pilot of traffic alerting conditions. This single output serves multiple purposes in the TAS/TAS-A.

- **TRAFFIC ALERT** – the annunciator output will be asserted whenever there is an active Traffic Alert (TA) condition present.
- **FAULT INDICATOR** – the annunciator output will be asserted for as long as a failure or warning condition is detected in the TAS/TAS-A system.

The maximum current through the annunciator output must be limited to 100mA.

NOTE:	The annunciator circuit supplies a ground. Applying a voltage to this input will damage the TAS Processor.

2.5. REMOTE MUTE INPUT

The Mute function is required, and the Update function is required when the TAS is installed without a traffic display. The mute function is available in the ½ 3ATI traffic display/controller. For display options that do not provide a mute function (including no display) a remote Mute/Update button must be used. The switch provides audible updates and muting of Traffic Alerts. The Remote Mute input can also be used to prioritize the TAS with EGPWS/TAWS systems; however, the audio suppression input is preferred for prioritizing audio.

The remote mute input serves multiple purposes in the TAS and TAS-A systems

- **MUTE** – when the remote mute input becomes asserted it causes the audio output to cease generating audio and clears the audio output queue of all pending audible announcements.
  AUDIO SUPPRESSION – while the remote mute input remains asserted the TAS/TAS-A will not generate audio output.
- **AUDIO UPDATE** – If the remote mute input becomes asserted (is pressed) twice within a short period of time it will cause an audible update of all currently active alerts.
  Note: The audio update function is an "update", not a "repeat". It will only cause currently active alerts to be annunciated, and the announcement will be updated to represent the current state of the alert. Audio updates will also include detected failure and warning conditions. If there are no active alerting conditions, then "No Advisories" will be annunciated.

The mute function is *not* timed; therefore, a new alert that occurs immediately after de-asserting the remote mute input will cause an audible announcement.

Note: The audio update function was intended to be initiated by human interaction. Automation of this function may be inconsistent and should not be relied upon for safety critical functions.

Note: The Mute function is required, and the Update function is required when the TAS is installed without a traffic display. The mute function is available in the ½ 3ATI traffic display/controller.

2.6. PRIORITIZATION WITH WINDSHEAR AND EGPWS/TAWS

The Remote Mute input can also be used to prioritize the TAS with Windshear and EGPWS/TAWS systems.

2.7 AUDIO SUPPRESSION INPUT

A dedicated audio suppression input has been added to the TAS-A to facilitate prioritization of audible alerts in installations that include multiple devices capable of generating audio. The audio suppression input is not available on older TAS designs. The audio suppression input is an active low discrete that will silence the TAS-A audio whenever asserted.

The behavior of the audio suppression input is different from the remote mute input, so the audio suppression input should never be used in place of the remote mute input. The audio suppression input is intended to be connected to another device with higher priority audio. The audio suppression input will not recognize a "double-press" to repeat audible alerts. If a traffic alert, altitude alert or failure notification is interrupted or preempted by assertion of the audio suppression input, then the announcement will be made when the audio suppression input returns to the non-asserted state (assuming that the condition still exists). If the traffic alert or failure condition no longer exists, then the announcement will not be made. Any announcements made will be updated to reflect current conditions. For example, traffic alerts will be updated to reflect the current location of the traffic.

NOTE: The assertion of the audio suppression input does not automatically cause the TAS-A to assert the audio suppression output, so any lower priority devices must also be wired in parallel to the audio suppression output of the higher priority devices.

2.8 AUDIO SUPPRESSION OUTPUT

A dedicated audio suppression output has been added to the TAS-A to facilitate prioritization of audible alerts in installations that include multiple devices capable of generating audio. The audio suppression output is not available on the older TAS design. The audio suppression output is an active low discrete that will be asserted whenever the audio output is active.

Depending upon the software version installed in the TAS-A, additional configuration items may be available to customize the behavior and timing of the audio suppression output. A dedicated audio suppression output discrete has been added to the TAS-A design. This active low discrete is available on pin 17 of the 78-pin high-density 'D' connector (P2).

2.9 RS-232 COMMUNICATIONS

There are several RS-232 communication ports. They can be used for interfacing to displays and WAAS GPS receivers (TAS-A systems only). The TAS communicates information to certain displays using a proprietary RS-232 protocol. Many popular displays use this protocol. The communication is bi-directional, meaning the traffic information can be transmitted to the display and requests can be sent from the display to the TAS. Features such as N-number display, altitude alerter, and Approach mode can only be communicated by RS-232. Not all displays utilize all features. RS-232, if available, is the preferred communications protocol. The display manufacturers have information regarding the interface capability of their equipment with the TAS.

Compatible WAAS GPS receivers that support RS-232 can be connected to any of the TAS-A processor available RS-232 ports (see pin assignments in Section 1.18).

The Avidyne ½ 3ATI display/controller uses RS-232 communications. The MHD is capable of both RS-232 and ARINC-429 communication; RS-232 is preferred.

NOTE:	RS-232 transmit and receive must be connected for all RS-232 connections. Each port must be connected to only one display. Do not parallel connections.

The TAS-A processor, 700-00185-(), does not provide an RS-232 port on a 9-pin D connector, so the installing agency should consider how a computer will be connected to one of the TAS-A serial ports. Some possible strategies follow:

- In a new installation that does not utilize P1:
  Plan to leave RS-232 port #4 unused in the aircraft installation (in other words, don't use RS-232 port #4 in P2). An adapter cable can be built to connect a computer into RS-232 port #4 on P1 for checkout and configuration.
- In a retrofit installation that does not utilize P2:
  Since the TAS-A provides two additional RS-232 ports on P2 (port #5 and port #6), ether one of these ports can be used for a computer connection. An adapter cable can be built to connect a computer into one of the new/unused RS-232 ports on P2 for checkout and configuration. The example below uses RS232 port 4 as an example, but any port may be used for this purpose.
- Wire a 9-pin female D connector into the aircraft harness to provide access to a spare RS-232 port. The 9-pin connector and short attached cable would be tied off and labeled "TAS Configuration" so that it can be used for easy connection to a computer for checkout and configuration. The example below uses RS232 port 4 as an example, but any unused port may be used for this purpose.

TAS-A P1	TAS-A P2	9 Pin RS232 Serial Computer Cable Required for Configuration	Description
N/A	N/A		Not connected
25	61	3	TAS-A RS-232 port 4, receive.
23	60	2	TAS-A RS-232 port 4, transmit.
N/A	N/A		Not connected
24	66	5	RS-232 Signal ground.
N/A	N/A		Not connected
N/A	N/A		Not connected
N/A	N/A		Not connected
N/A	N/A		Not connected

Table 14: Computer Cable Pin Assignments and Signal Descriptions.

2.10 RS-422 COMMUNICATIONS

The TAS-A has 2 receive and transmit RS-422 communications ports with the following requirements for terminations.

- The receiving end of the RS-422 interface should be terminated with a parallel resistance that is approximately equal to the characteristic impedance of the cable.
- The terminating resistance should be between 100 and 500 ohms.
- No termination is required if there is only one transmitter and one receiver on a cable length less than 5 feet (1.5 meters) and operating at less than 200kbps.
- Multiple receivers on a single line is discouraged. Stub lengths over 3.6 inches (9.1 cm) should be avoided.

2.11 ARINC-429 COMMUNICATIONS

The TAS transmits information to certain displays using standard ARINC-429 protocol. Many popular displays use this protocol. The communication is one way, meaning the display information is only transmitted and control signals cannot be sent from the display to the TAS. Features such as N-number display, altitude alerter, and Approach mode are not available.

See Section 1.16, ARINC-429 Information.

NOTE: The Avidyne Multi-Hazard Display is capable of either RS-232 or ARINC-429 communication. RS-232 provides all the features described in the Avidyne MHD Traffic Application manual. ARINC-429 communication does not.

2.12 GEAR POSITION AND WEIGHT-ON-WHEELS

Discrete inputs are provided for gear position and weight-on-wheels (aircraft on ground). The gear position input changes the Sensitivity Level (SL) of the TAS from SL B (gear up) to SL A when the gear is down. The TAS expects a ground when the landing gear is down. If gear position is impractical or unavailable, leave the input unconnected.

The weight-on-wheels input adds convenience for the flight crew by allowing automatic enabling of the Ground mode upon landing. The TAS expects a ground when the aircraft is on the ground. The weight-on-wheels input will cause the Ground mode to be engaged when it detects a transition from the airborne (input open or not grounded) state to the on-ground (input grounded) state. All other states or transitions have no effect during normal operation. If an aircraft on-ground input is impractical or unavailable, leave the input unconnected.

Both of these inputs are internally diode isolated as shown in the Internal Diode Isolation diagram.

2.13 COOLING

Elevated operating temperatures reduce reliability. Allow sufficient space around the Processor and the ½ 3ATI Traffic Display/Controller to allow adequate convective cooling.

2.14 ANTENNA PLACEMENT CONSIDERATIONS

CAUTION:	FCC RF Exposure Requirement; this transmitter must be restricted to work related operations in a Controlled RF exposure environment. All qualified end-users of this device must have the knowledge to control their exposure conditions and/or duration, and the exposure conditions and/or duration of their passengers and bystanders, to comply with the General Population / Uncontrolled MPE limit and requirements. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 0.2m (0.67 ft) from all persons.

The top antenna should be mounted as high up and as far forward as practical, normally directly above the cockpit. Mounting the antenna aft of this location will usually result in unsatisfactory performance. The antenna should be a minimum of twelve inches aft of the windshield, with a minimum of 12 inches of undisturbed ground plane around the antenna (See Section VI).

The bottom antenna should be toward the front of the aircraft and at least 36 inches from other L-band transmitting antennas. Twelve inches of undisturbed ground plane with no large obstructions beyond is needed for best bearing performance. See the Mechanical Installation of Antennas paragraph in Section 2.20. Section VI contains additional information on antenna placement.

NOTE: The following statement from Sensor Systems, the manufacturer of the TAS antennas, constitutes the antenna considerations with respect to icing:

"The S72-1750-31L/-32L L-Band (TAS) antennas have not been QUALIFIED for icing per RTCA/DO-160C, Section 24.0. The design and shape of these antennas with the slanted 40° leading edge, the thin airfoil section, less than 13%, and low profile 2.75 inches, preclude ice from accumulating. Typically, ice has very little, if any, effect on the electrical performance of this type of antenna.

Because of the small size of this antenna, there could not be enough ice accumulation to degrade the aerodynamic performance of the aircraft.

The TAS antennas are designed for speeds up to Mach 0.8."

The two top antenna coax cables should be the same length. The two bottom antenna cables should also be the same length. See Table 3.

2.15 TRANSPONDER COUPLER

The Transponder Coupler supplies the Processor with a signal indicating the transponder is transmitting a reply.

The Transponder Coupler is required for each transponder antenna to provide a blanking pulse to prevent display of the host transponder. The Transponder Coupler is normally installed near the transponder, behind the instrument panel or in the equipment rack.

When routing the Coupler Cable, make the run as short as practical, and avoid routing with any cable that may emit excessive EMI, such as DME, transponder cables, suppression lines from other equipment or high-current power cables.

When mounting the Transponder Coupler, use the type-N connectors provided. Use of BNC to Type-N adapters can increase the VSWR in the transponder cabling. Check the output frequency of the transponder at its antenna after installing the Coupler to ensure that a standing wave has not been introduced.

NOTE: Ensure that the mounting location for the coupler is accessible and at a location that provides a good ground. Normally, the mounting tray or avionics rack is <u>not</u> a good ground.

2.16 CHECKOUT PRECAUTIONS

The TAS antenna outputs require connection to antennas or to 50-ohm loads whenever power is applied. Failure to do so could result in damage to the TAS transmitter. Before applying power, double check power, ground, suppression and annunciator lines for proper connection. Improper connections can result in severe damage to the TAS.

2.17 MECHANICAL INSTALLATION OF OPTIONAL ½ 3ATI TRAFFIC DISPLAY

The optional ½ 3ATI Traffic Display/Controller is rigidly mounted in the instrument panel, and is secured using the clamp provided. Allow adequate space for installation of cables and connectors.

CAUTION:	When removing the Display, do not pull the ON/OFF switch. Pull from behind the trim ring of the bezel.

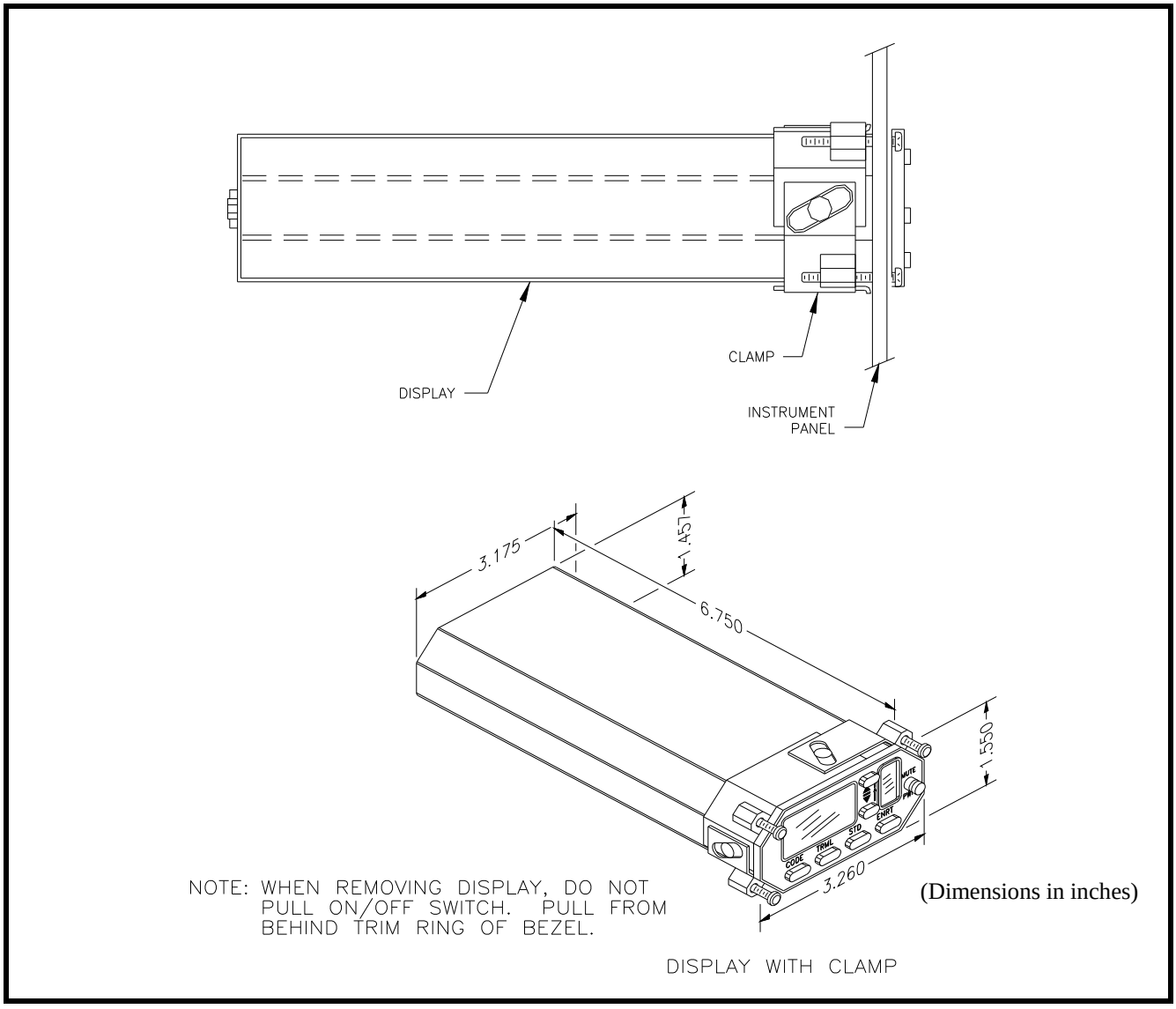


Figure 8: Avidyne ½ 3ATI Traffic Display/Controller Mounting and Dimensions

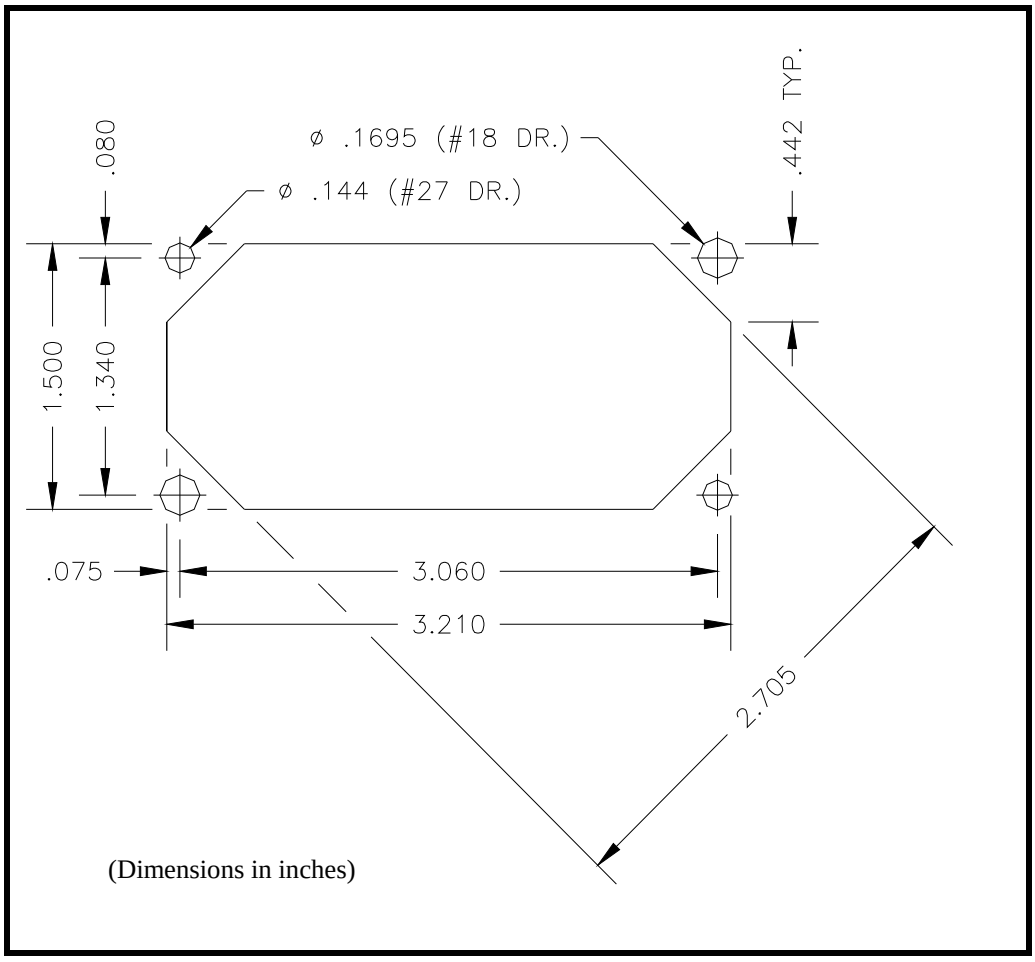


Figure 9: Panel Cutout for optional ½ 3ATI Traffic Display/Controller

2.18 MECHANICAL INSTALLATION OF PROCESSOR

Listed below are factors and suggestions to consider before installing the TAS Processor and Mounting Tray. Close adherence to these suggestions will assure optimum performance. Also refer to FAA Advisory Circular 43.13-1B Chapter 4 as needed.

A. Allow adequate space for installation of cables and connectors.

B. Trays 60-2006, 700-00187-000 and 700-00187-001 have the same outline and mounting dimensions. These trays may be mounted in a horizontal or vertical orientation using four screws through either side of the tray. Tray part number 700-00187-002 is designed for helicopter vertical mounting and uses a different hole pattern. See section 1.15, Limitations.

C. Install the Processor in the avionics bay, following guidance in AC43.13-(). If installed at a location other than the avionics bay, the location should be structurally substantiated.

D. All Processor Mounting Trays can be installed using the mounting holes provided. For specific spacing see Figure 10 on page 55 and Figure 11 on page 56.

E. Use four #10-32 pan head (MIL spec MS-51958 or equivalent) screws for mounting the 60-2006, 700-00187-000 and 700-00187-001 trays. A doubler plate may be provided with the 60-2006 tray and may be used for vertical mounting.

   Note: Alternative Hardware may be used, but a separate engineering approval is required.

F. Use five #8-32 100-degree flat head (MIL spec MS-24693-CXXX or equivalent) screws for mounting the 700-00187-002 tray.

   Note: Alternative Hardware may be used, but a separate engineering approval is required.

G. The Processor is mounted in the tray by sliding the unit along the rails until the rear of the Processor contacts the tray. Then tighten the TWO or THREE diagonal retaining screws securely, depending on which tray is installed. Torque screws to 8.0 ± 0.5 in-lbs for 700-00185-() TAS-A processors. The tray for vertical mounting in helicopters does not require any screws and does not have the same rail system.

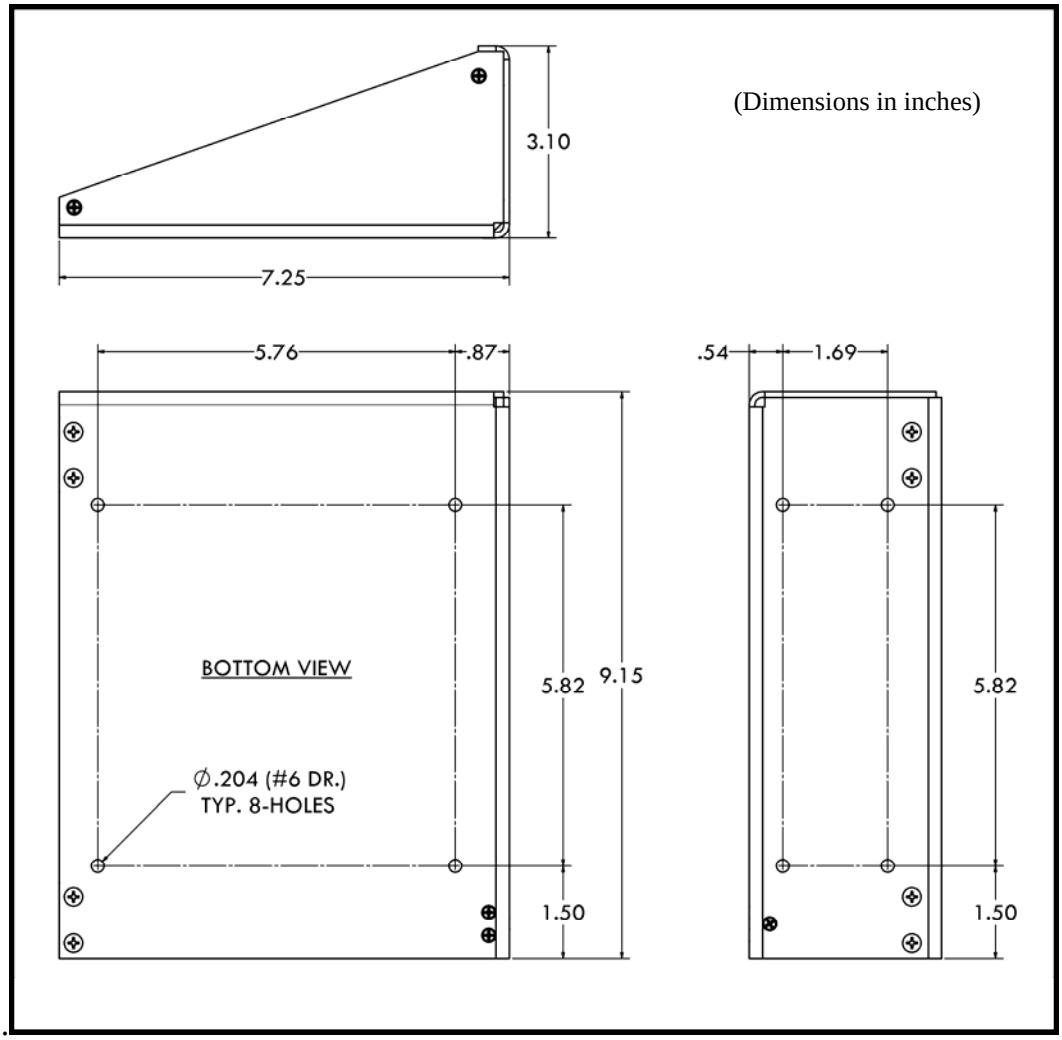


Figure 10: Processor Mounting Tray Hole Pattern for 60-2006 and 700-00187-000 and 700-00187-001 trays

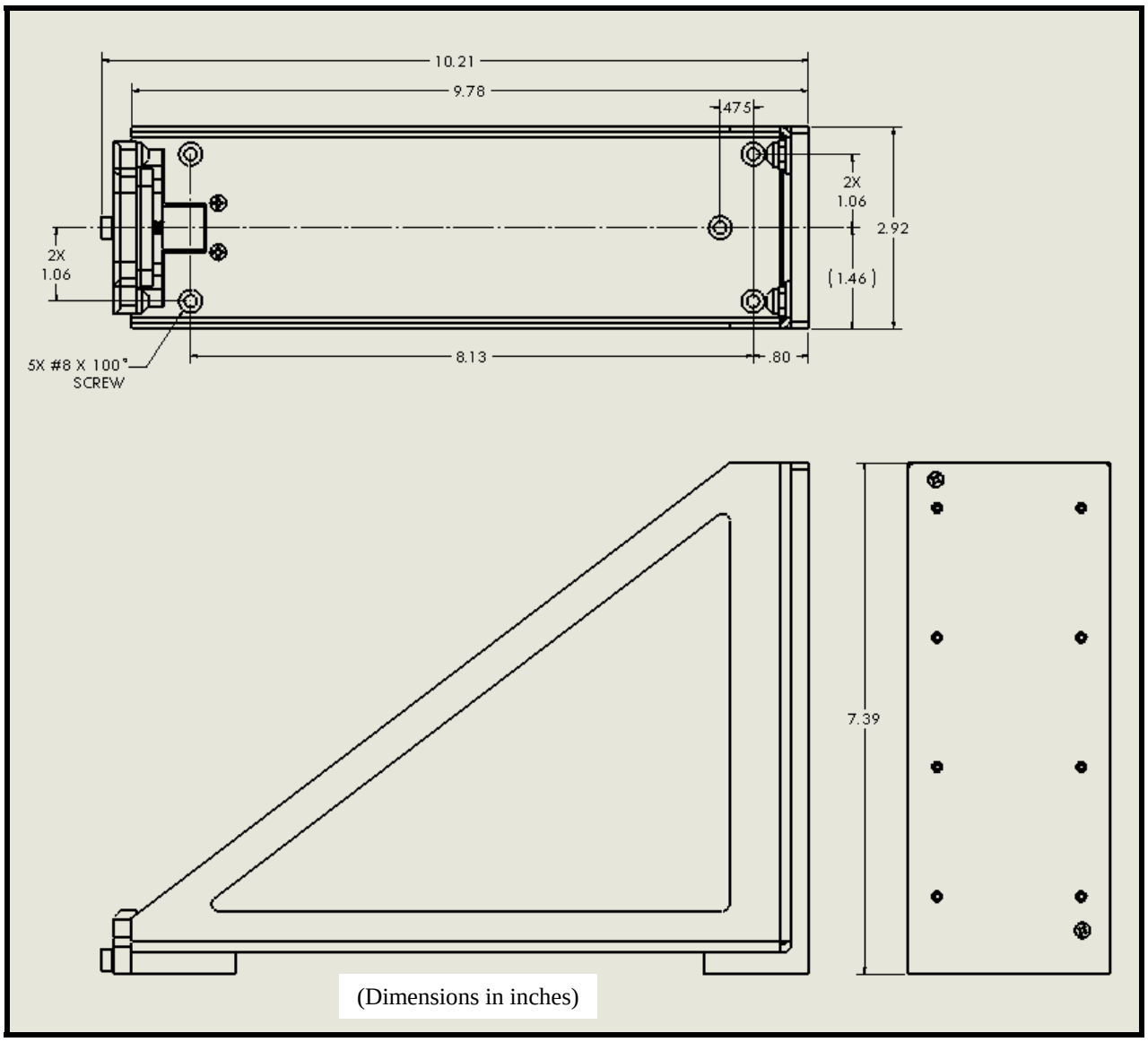


Figure 11: Processor Mounting Tray Hole Pattern for 700-000187-002 tray

NOTE:	For proper performance in a high vibration environment, the Processor must be mounted with the four antenna ports closest to the mounting tray, as shown in Figure 4 on page 43.

2.19 MECHANICAL INSTALLATION OF TRANSPONDER COUPLER

The following considerations should be observed for installation of the Transponder Coupler:

A. The Transponder Coupler can be installed in the avionics bay or behind the instrument panel, using the mounting holes provided. Mounting location should be accessible. Use number six screws.

B. The Transponder Coupler can be installed vertically, horizontally, or upside down.

C. See Figure 12 below for mounting dimensions.

D. Grounding of the coupler is important. Be sure the coupler is well grounded to the airframe (10 milliohm or less).

NOTE:	Ensure that the transponder antenna cabling is serviceable, and the shielding is properly secured to the connectors. Poor shielding of the transponder radiation can result in interference. If there is any question about the condition of the transponder cable, replace it.

NOTE:	Any deviations from this Installation Manual will require additional engineering approval.

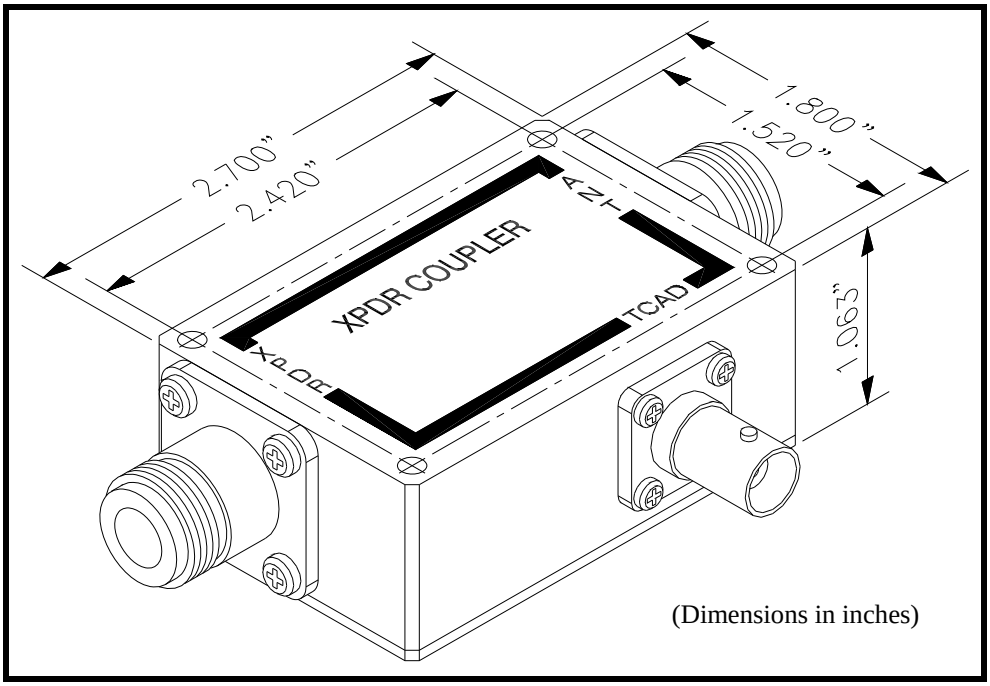


Figure 12: Transponder Coupler

2.20 MECHANICAL INSTALLATION OF ANTENNAS

Refer to FAA Advisory Circular 43.13-2B Chapter 3 and other approved guidance for instructions on proper antenna and doubler plate installation and sealing. Any deviations from FAA Advisory Circular 43.13-2B requires separate structural approval.

NOTE:	The Installing agency is responsible for structural substantiation of the antenna locations. See Section VI for more information.

The TAS normally uses the single blade antenna as the top antenna, and the twin blade antenna the bottom antenna. This is not always the optimum configuration, and the positions may be switched if circumstances warrant it. See Section VI.

CAUTION:	Proper antenna location is important. It is best for one of the two antennas to have line-of-sight to threat aircraft. This is not always possible for every direction from the host aircraft. The antenna should be toward the forward part of the host aircraft. See Section VI for additional information.

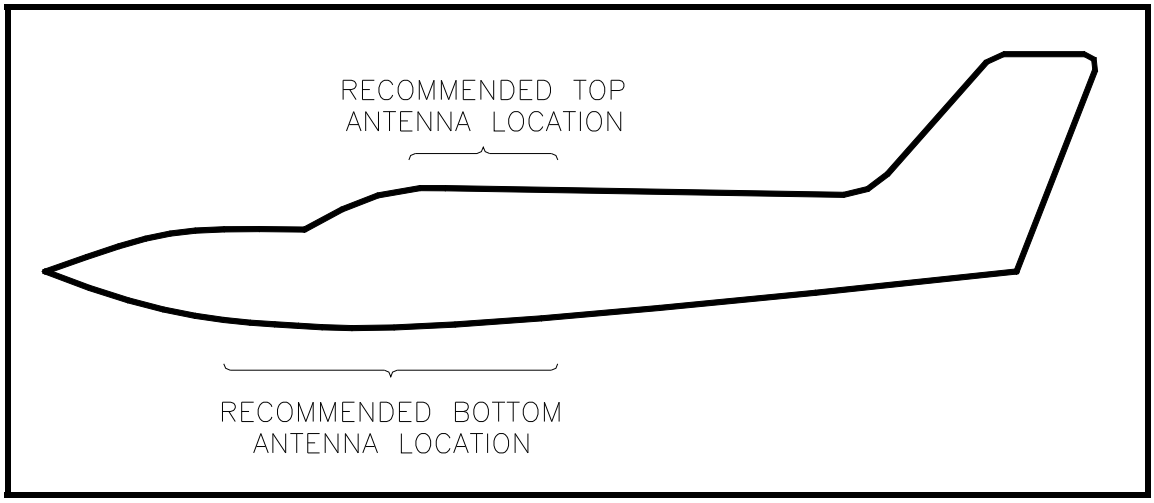


Figure 13: Recommended Antenna Locations

The following considerations should be observed for installation of the TAS antennas:

A. Locate the L-band antenna on the top surface of the aircraft as high on the airframe and as far forward as practical. Mount close to the aircraft centerline and in normal (the base of the antenna is horizontal) position when the aircraft is in level flight. Generally, the antenna mounts above the cockpit.

> **NOTE:** Customer satisfaction is directly related to the proper location of the top antenna.

B. The antennas should be mounted on a conductive surface, at least 18-inches from access panels, doors, or other openings to provide a good ground plane. To the extent practicable, mount the antenna so the base is horizontal when the aircraft is in cruise attitude. The antenna base must be electrically bonded to the airframe and ground plane. Remove nonconductive material from the aircraft skin where the antenna will be mounted to assure sufficient electrical bonding. AC 43.13-2( ) describes acceptable techniques for antenna mounting and corrosion protection.

> **NOTE:** A satisfactory ground plane is necessary for optimum performance. An adequate ground plane and satisfactory bonding of the antenna to the ground plane is important for reliable bearing data. Completely remove the paint from under the antenna to within 0.1 inch of the edge of the antenna for proper ground plane RF connection. The antenna must be mounted so the bare metal of the aircraft skin touches the entire metal base plate of the antenna. Electrical bonding resistance of the installed antenna to the aircraft skin should be .01 ohm or less. Composite airframes are especially challenging. See Section VI for more information about installation on metal and non-metal fuselages.

C. Avoid mounting either antenna within two feet of other antennas, or physical obstructions (three feet for DME or transponder antennas).

> **NOTE:** Some DME and transponder designs permit high-energy Continuous Wave (CW) emissions at the TAS reception frequency, which can affect TAS performance. In order to reduce the possibility of interference, the DME and transponder antenna cables and terminations must be effectively shielded. The three-foot antenna separation requirement is essential to minimize interference from DMEs and transponders with high CW levels. Failure to heed these requirements can result in reduced reception range of the TAS.

D. The cable lengths must be matched and not exceed the 3dB requirement. See Section I.

E. Avoid mounting the bottom antenna where exhaust or oil will contaminate the surface of the antenna.

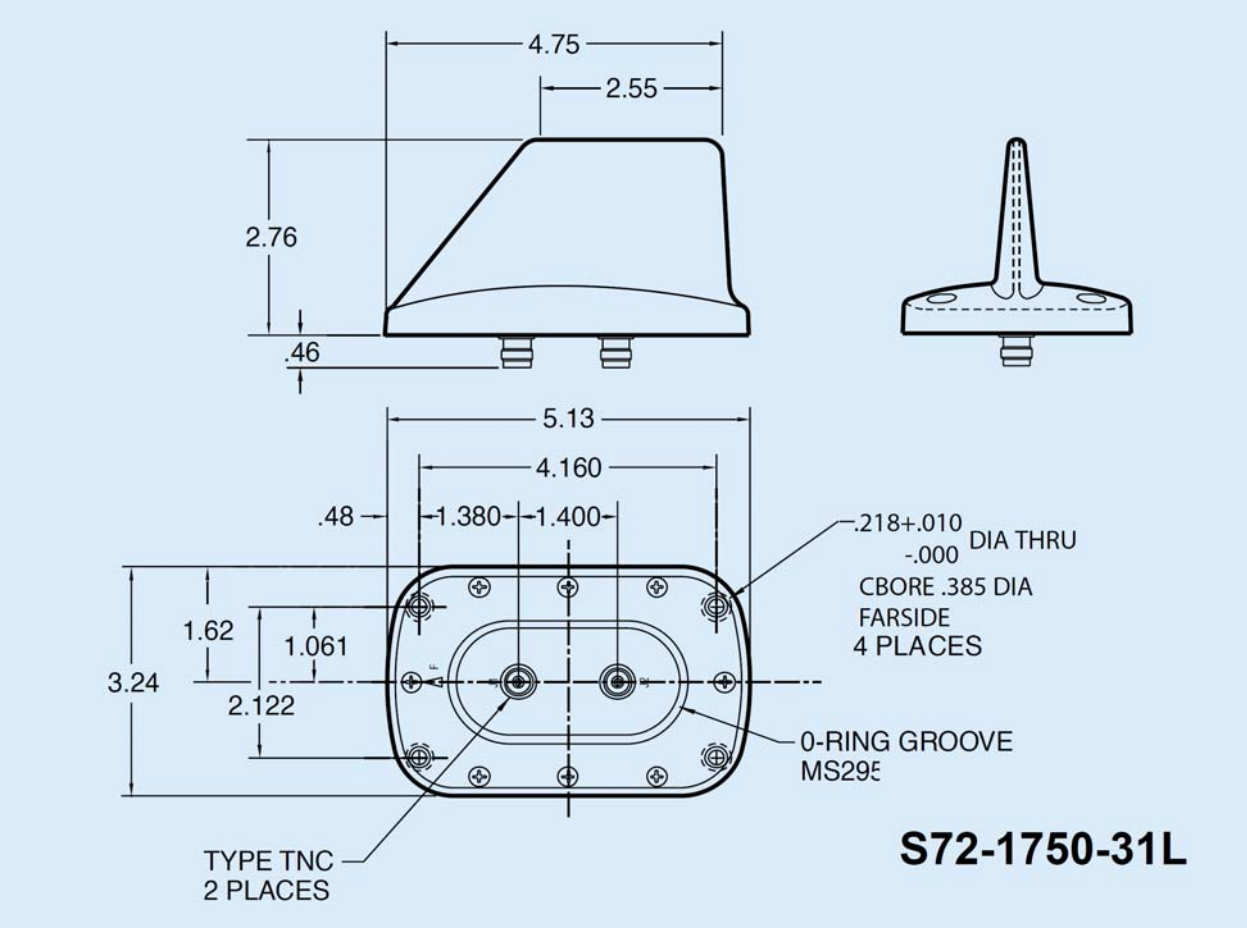


Figure 14: TAS Single-blade Antenna Illustration

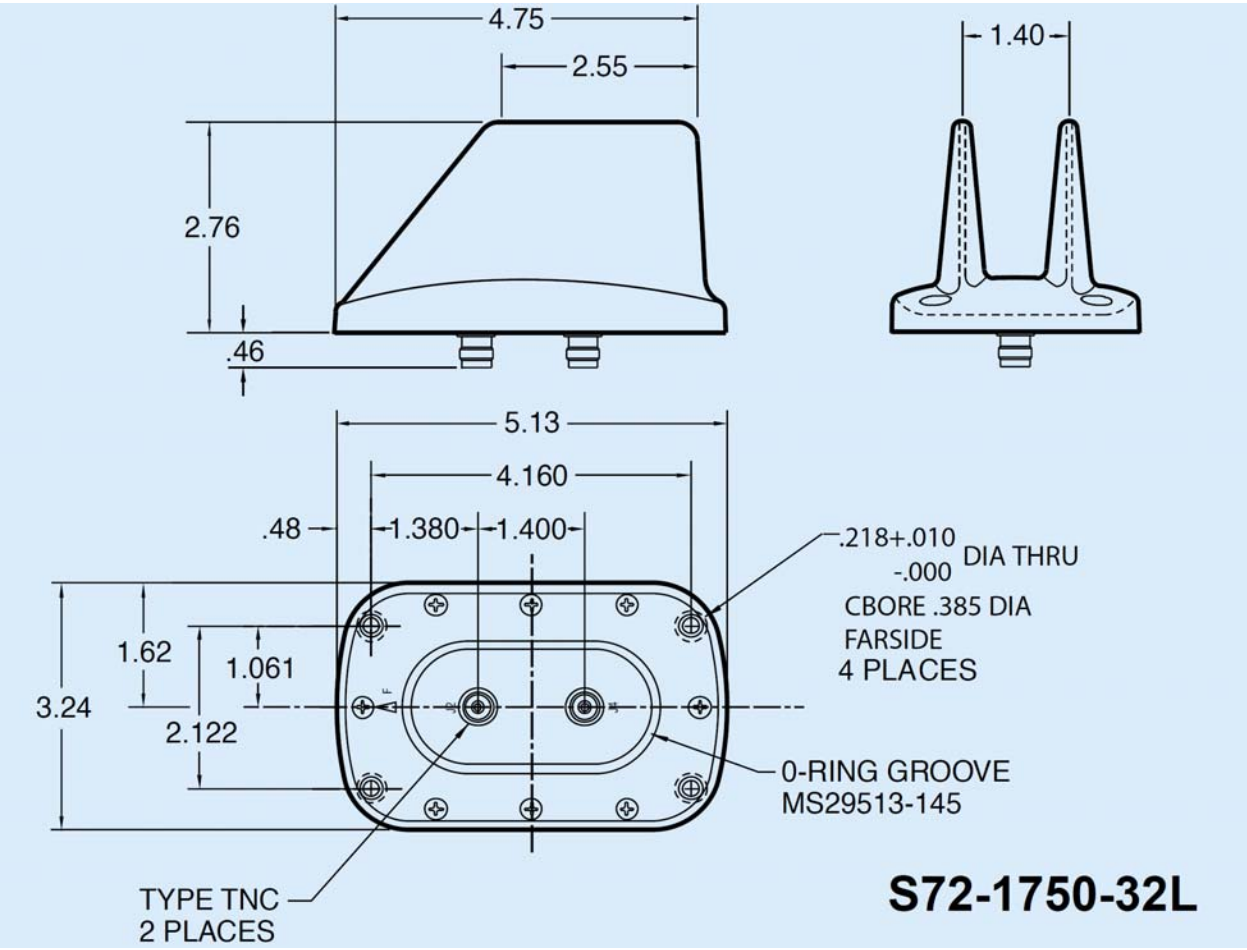


Figure 15: TAS Twin-blade Antenna Illustration

2.21 OVERVIEW OF ELECTRICAL INSTALLATION

The block diagram of electrical wiring in this section provides an overview of TAS wiring. This simplified illustration depicts the basic elements of the electrical wiring, and allows the installer to comprehend the total installation before proceeding with detailed steps.

The 9-pin connector on the Processor marked "COM1" (for 70-2420-() processor only) is for an external computer interface with the TAS, and is used for setup when the optional ½ 3ATI Traffic Display is not used. COM1 is another RS-232 port, and may be used to interface with an additional display. The provided COM1 shunt contains a jumper that must be installed when the COM1 port is not being used.

Compass heading may be connected via ARINC-429 (Label 320). Compass heading is optional and assists in rapid traffic orientation during turns.

All wiring should be secured to prevent chafing and faulty connections. Ensure all wiring is installed clear of all flight controls and flight control cables. Refer to Advisory Circular 43.13-1B .

Refer to FAA Advisory Circular 43.13-1B Chapter 11 for selecting the appropriate wire size and type.

NOTE:	The TAS processor antenna terminations must be connected to antennas or 50 ohm loads before applying power the Processor. Failure to connect the antenna terminations can cause transmitter damage.

2.22 INSTALLATION WITHOUT A DISPLAY

A momentary-on remote mute switch, labeled "Mute/Update", and an annunciator light, labeled "Traffic" or "Traffic Alert" must be installed. Install in a location accessible to the flight crewmembers.

The "No display" jumper, pin 15 of J1 must be installed. See Section 2.4 for a description of this function.

2.23 INSTALLATION WITH A MULTI-FUNCTION DISPLAY

Any RS-232 port on the TAS Processor may be used to connect to a compatible Multi-Function display (see the wiring diagrams in this section). The transmit line (TX) must be connected to the display receive line, and the receive line (RX) must be connected to the display transmit line. Use twisted, shielded pairs or triples, as described in Section I.

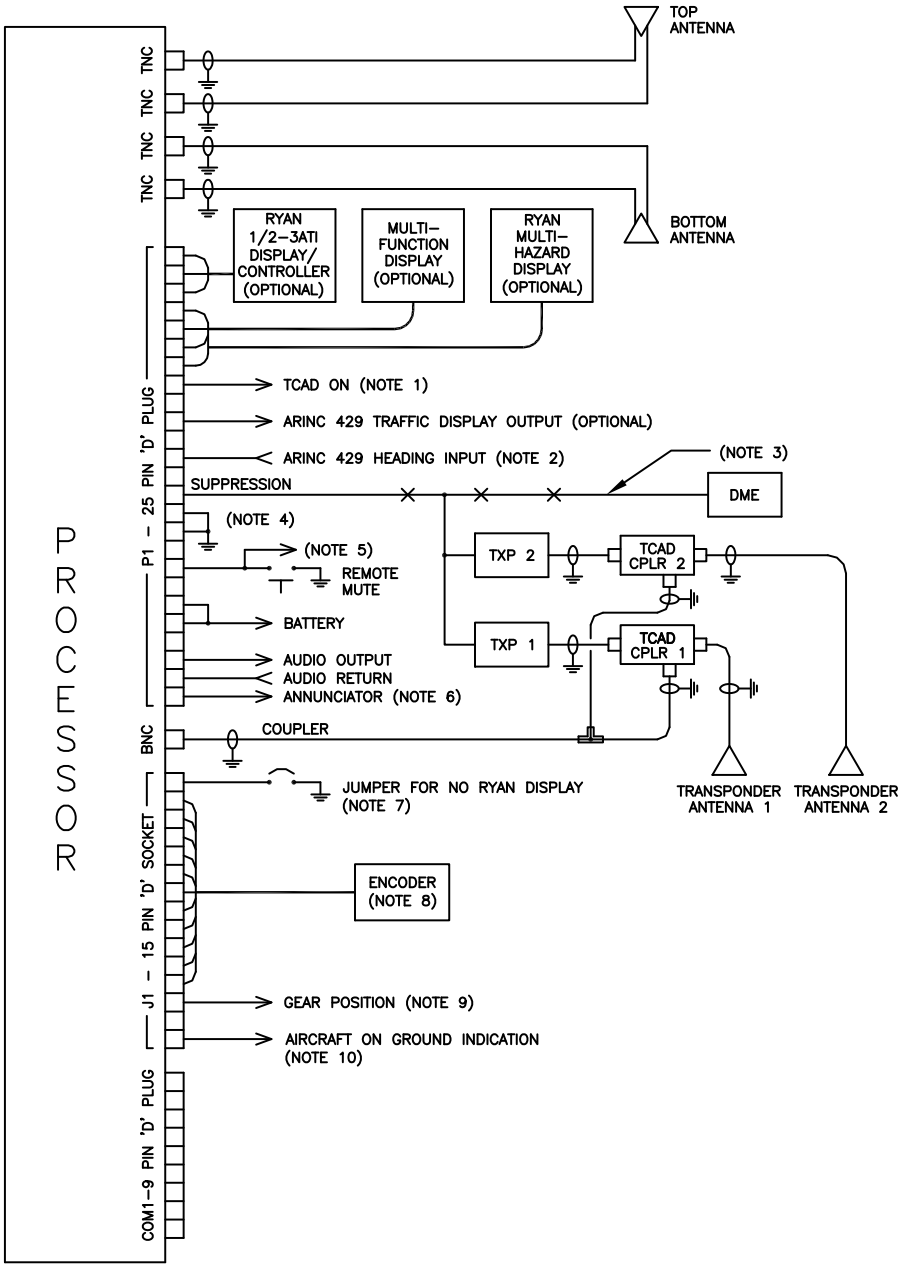
Any combination of displays may be installed using the RS-232 ports and the ARINC-429 ports. Only one device can be connected to an RS-232 port. More than one display can be connected to an ARINC-429 port. See Section VI for more information.

NOTE: If display systems operating with the TAS have a control to take the TAS out of Ground mode, then the "No Avidyne Display" jumper need not be grounded. When jumpered to ground, use Weight on Wheels (or equivalent) for customer convenience. See Section 2.12.

NOTE: The RS-232 transmit and receive lines from each device must be connected to the TAS to meet bi-directional communication requirements. Each display should be connected to its own RS-232 Processor port. There is no distinction of a master or slave display. Do not parallel RS-232 display connections.

2.24 INSTALLATION WITHOUT AN AVIDYNE DISPLAY

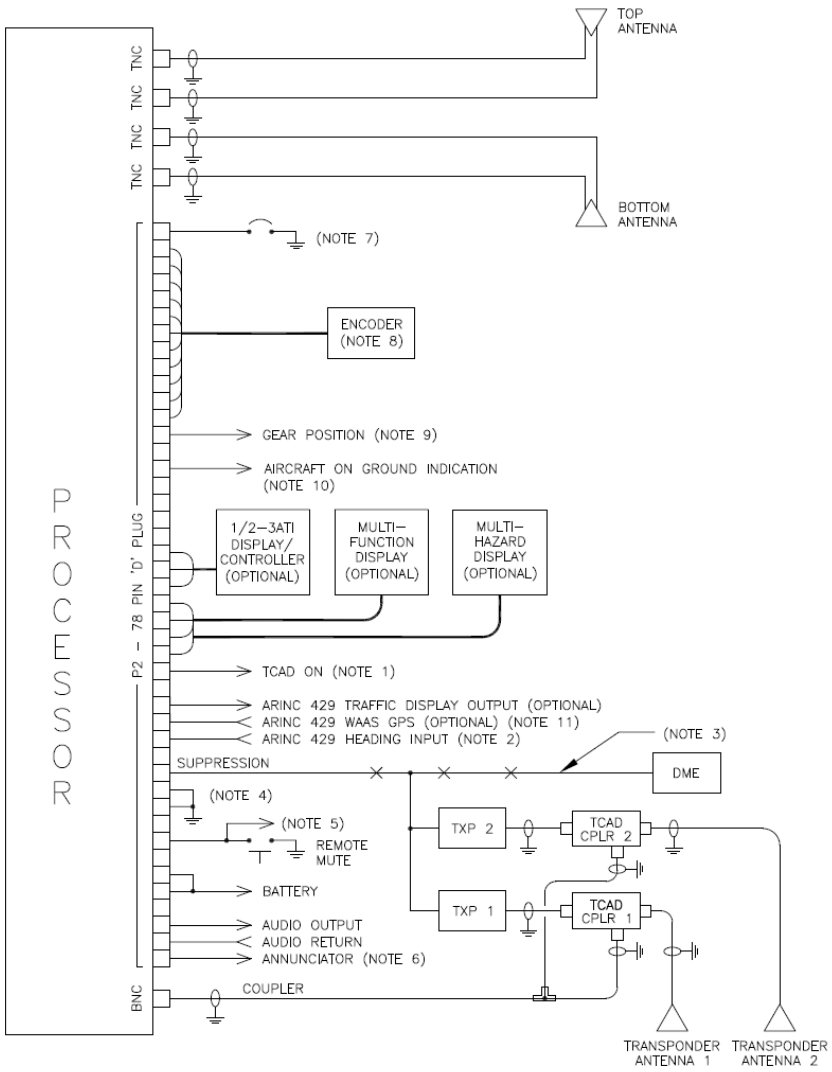
A special "no Avidyne display" jumper is required when an Avidyne Display is not used. See Section 2.4 for a description of this function.



Notes

1. "TCAD on" must be grounded for operation, either switched or permanently grounded to use the avionics master.
2. ARINC-429 input can accept several labels, including altitude in lieu of gray code. See paragraph 0.
3. When connecting to Bendix-King transponders with a DME, such as KT-76A with KN-62, KN-64 or KNS-80, components are needed to conform the suppression circuit closer to ARINC standards. See Figure 20.
4. Unused RS-232 ports should be shunted as shown in the wiring diagram.
5. Momentary button marked Mute/Update, and can be used for prioritizing the audio for TAWS Terrain Alerts (Processor part number suffix of -6 and subsequent). The line is pulled low to mute the TAS. If the TAWS/EGPWS drives or pulls the audio suppression output high, then it must be diode isolated.
6. The input provides a switched ground. The Annunciator light is recommended.
7. This jumper must be installed if none of the installed displays can exit the Ground Mode. All Avidyne displays and most RS-232-connected displays can exit the Ground Mode, but no ARINC-429 connected displays can. See Paragraph 0
8. The encoder can be bypassed or connected if ARINC-429 altitude input is used. See .
9. Gear Position can be used if the signal is available. The input accepts ground potential for gear down.
10. The aircraft on ground input (weight on wheels, airspeed or other means) is especially convenient for the flight crew. It is particularly important if the no-display jumper is used. The input accepts ground potential for aircraft on ground.

Figure 16: Block Diagram of Electrical Wiring for 70-2040 Processor



Notes

1. "TCAD on" must be grounded for operation, either switched or permanently grounded to use the avionics master.
2. ARINC-429 input can accept several labels, including altitude in lieu of gray code. See paragraph 0.
3. When connecting to Bendix-King transponders with a DME, such as KT-76A with KN-62, KN-64 or KNS-80, components are needed to conform the suppression circuit closer to ARINC standards. See Figure 20.
4. Unused RS-232 ports should be shunted as shown in the wiring diagram,.
5. Momentary button marked Mute/Update, and can be used for prioritizing the audio for TAWS Terrain Alerts (Processor part number suffix of -6 and subsequent). The line is pulled low to mute the TAS. If the TAWS/EGPWS drives or pulls the audio suppression output high, then it must be diode isolated.
6. The input provides a switched ground. The Annunciator light is recommended.
7. This jumper must be installed if none of the installed displays can exit the Ground Mode. All Avidyne displays and most RS-232-connected displays can exit the Ground Mode, but no ARINC-429 connected displays can. See Paragraph 0.
8. The encoder can be bypassed or connected if ARINC-429 altitude input is used. See .
9. Gear Position can be used if the signal is available. The input accepts ground potential for gear down.
10. The aircraft on ground input (weight on wheels, airspeed or other means) is especially convenient for the flight crew. It is particularly important if the no-display jumper is used. The input accepts ground potential for aircraft on ground.
11. WAAS GPS receiver ARINC-429 interface for TAS-A processor only.

Figure 17: Block Diagram of Electrical Wiring for 700-00185-() Processor

The front panel views of the processor are shown in the figures below.

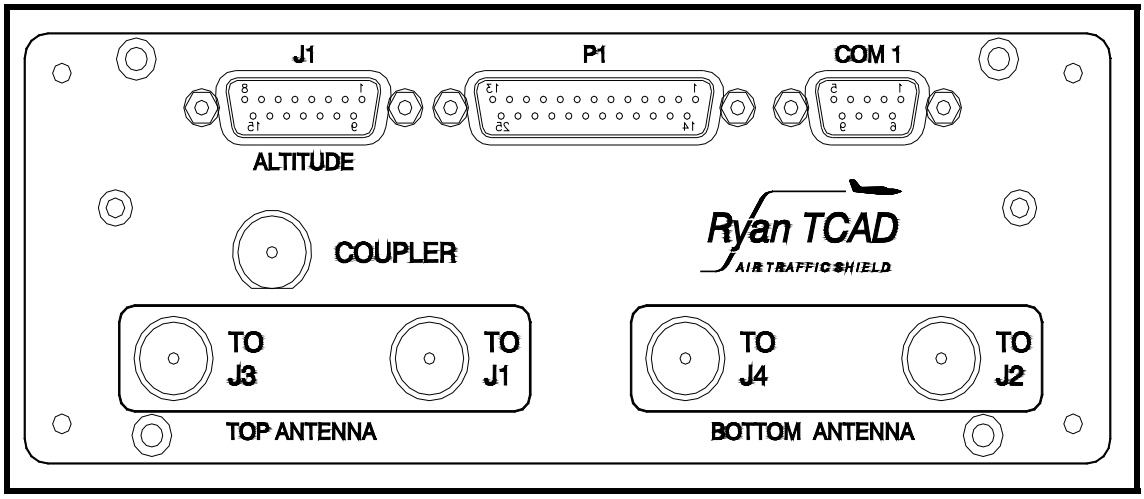


Figure 18: 70-2420-() Processor Front Panel View

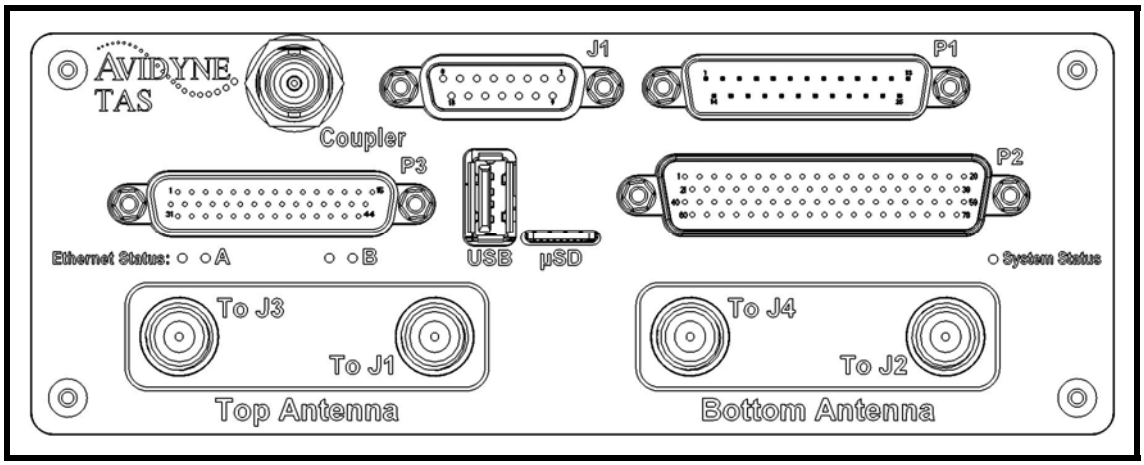


Figure 19: 700-00185-( ) Processor Front Panel View

NOTE:	The TAS Processor antenna terminations must be connected to antennas or appropriate loads before applying power the Processor. Failure to connect the antenna terminations can cause transmitter damage.

The wiring diagrams for the basic installation are at the end of this section. Note the precautions in the following paragraphs before proceeding to the wiring diagrams.

2.25 ELECTRICAL WIRING OF SUPPRESSION

The suppression characteristics of some transponders and DMEs do not conform to ARINC standards, but the condition can be corrected with external components. Most of the components needed are included in the TAS installation kit.

Suppression of DME will assure that the DME does not interfere with the transponder and reduce data available to the TAS. If DME is not on the suppression bus, connect it.

The suppression is positive-going at approximately battery voltage. If the line is shorted to ground, damage to the TAS will result.

Figure 20 shows how to connect the components to bring the Bendix-King unidirectional suppression closer to ARINC conformity. This applies to the KN-62, -62A, -63, -64 and KNS-80.

For additional information see Transponder Suppression, Section 6.2.8.

NOTES:

A. DME Suppression is necessary for best Avidyne TAS operation. If DME is not on the suppression bus, connect it.
B. If the DME or transponder suppression is unidirectional (such as Bendix-King KN-62, KN-62A, KN-64 and KNS-80), install the supplied diode as illustrated. The diode should be near the DME/transponder.
C. When there is a choice of suppression ports (such as the KT-76C or KT-79), connect the Avidyne TAS to the same port as the DME. If there is no DME, connect to the bi-directional port.
D. Only wire suppression to either P1 or P2, not both plugs.

Figure 20: Suppression Configuration for Unidirectional King Transponders and DME

2.26 ELECTRICAL WIRING OF TRANSPONDER COUPLER

The Transponder Coupler connectors are type-N for the transponder antenna cable connections, and BNC for the output to the TAS. The transponder coupler should be installed in an accessible location. Observe the following guidelines when installing the Transponder Coupler:

A. The coaxial cable going from the transponder to the transponder antenna may be cut anywhere along the cable length, and install type-N plug connectors appropriate for the coaxial cable size. Type-N connectors for small diameter coaxial cables are supplied, and type-N connectors for larger diameter (RG-8, etc.) cables are available on request. Connect the cable end from the transponder antenna to the coupler connector marked "ANT".

B. Connect the cable end from the transponder to the coupler connector marked "XPDR".

C. Prepare a 50-ohm coaxial cable, going from the coupler to the TAS processor, with BNC plug connectors on both ends. Connect one end of this cable to the transponder coupler BNC connector labeled "TAS," and connect the other end to the Processor BNC connector marked "COUPLER".

D. For dual transponder installations, use two Transponder Couplers. Connect the Coupler outputs that would normally go to the Processor to a BNC T-adapter. Then connect the coaxial cable from the T-adapter to the Processor.

E. For diversity transponder installations, use two Transponder Couplers; one for each transponder antenna. Connect the Coupler outputs that would normally go to the Processor to a BNC T-adapter. Then connect the coaxial cable from the T-adapter to the Processor.

NOTE: Route the coupler cable away from possible sources of EMI such as DME, transponder cables, suppression lines from other equipment or high-current power cables.

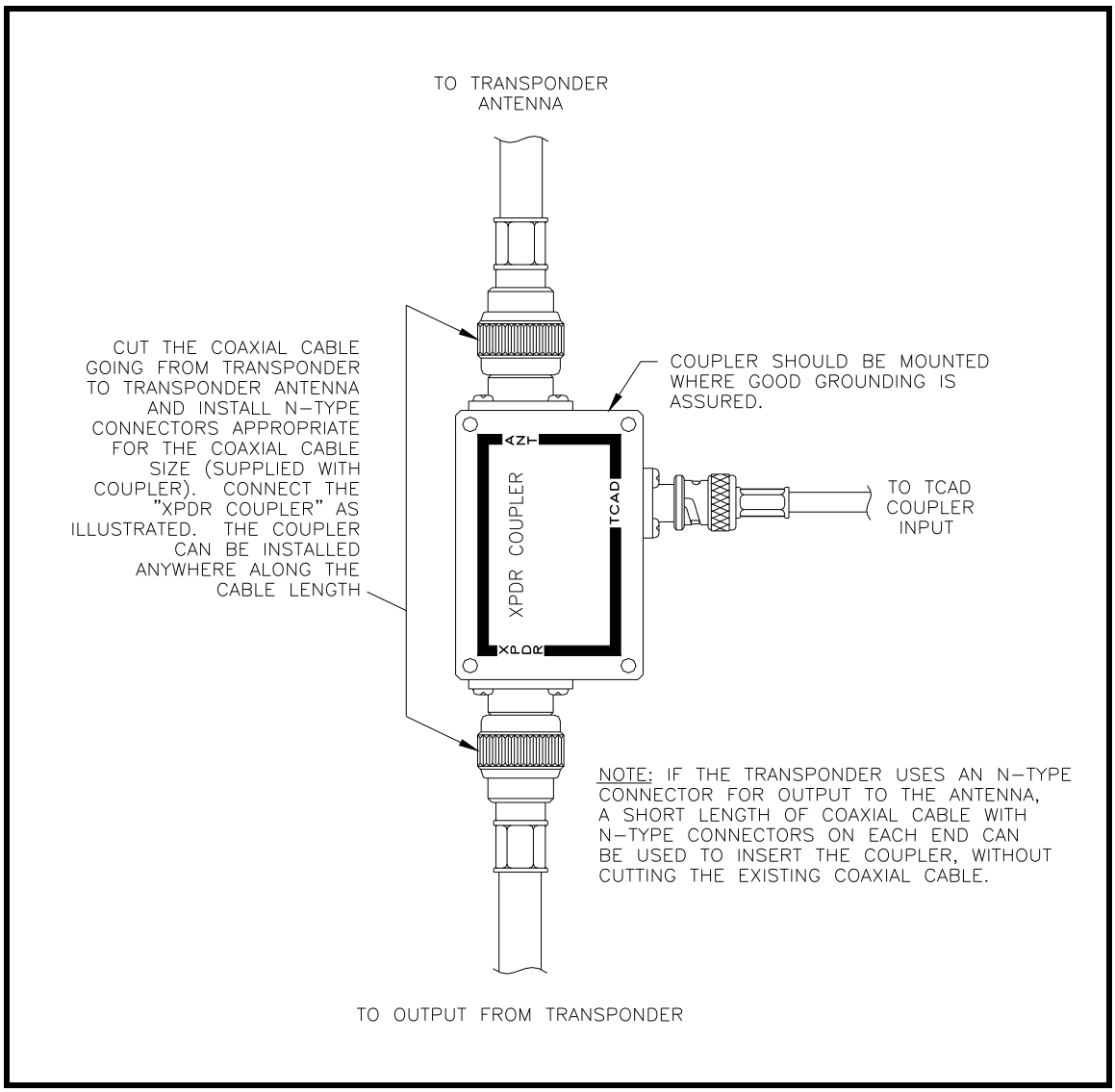


Figure 21: Installing Cables to the Transponder Coupler

2.27 ANTENNA CABLE INSTALLATION

Lengths of 50-ohm coaxial cable are used to connect the TOP and BOTTOM antennas to the Processor. Cable attenuation should be 3dB @ 1 GHz.

The antenna cables must be marked with the antenna connector number (J1 through J4 on the TAS and on the antennas) to ensure proper and antenna connection at the Processor.

Terminate each cable at the Processor and at the antennas with TNC plug connectors. Connect the cable ends at the antennas to each antenna. At the Processor, connect the cables to the appropriate terminals. Do not over-tighten the connectors or internal damage to the Processor or the antenna could result. See Section VI.

Precautions for routing antenna cables:

A. Route the cable avoiding sharp bends and using strain relief. Secure as necessary to prevent chafing. Avoid routing antenna cables with other electrical cables.

B. Avoid tie-wrapping transponder output cables or GPS antenna cables with the TAS antenna cables.

C. Do not tie-wrap a cable bundle so as to deform cables.

D. Separate the coupler line and the TAS antenna lines from each other and from other transmitting cables as much as possible.

E. Avoid routing with any cable that may emit excessive EMI, such as DME, transponder cables, suppression lines from other equipment or high-current power cables.

F. Ensure that all connections are sound, i.e. avoid frayed and exposed shields. Poor connections will result in poor performance.

G. It is normally necessary to run the antenna cables together. If so, attempt to provide some separation between the cables to reduce cross talk. Avoid excessive tie wrapping and sharp bends. If this is not possible, consider using foil-shielded cable to preclude the possibility of interference of the cables with each other. If one antenna cable set is too long, attempt to take up the length by routing rather than looping the cable. Looping can create bearing errors. Some difference in length between the top antenna cable pair and bottom antenna cable pair is acceptable. See Section VI.

H. Ensure antenna cables are routed clear of flight controls and control cables.

NOTE: Carefully mark the cables and connectors per FAA AC 43.13-( ). Some of the cable types specified for the antenna lines have unusual diameters and stiffness. Use the proper connectors and crimping tools to assure good connection and shielding.

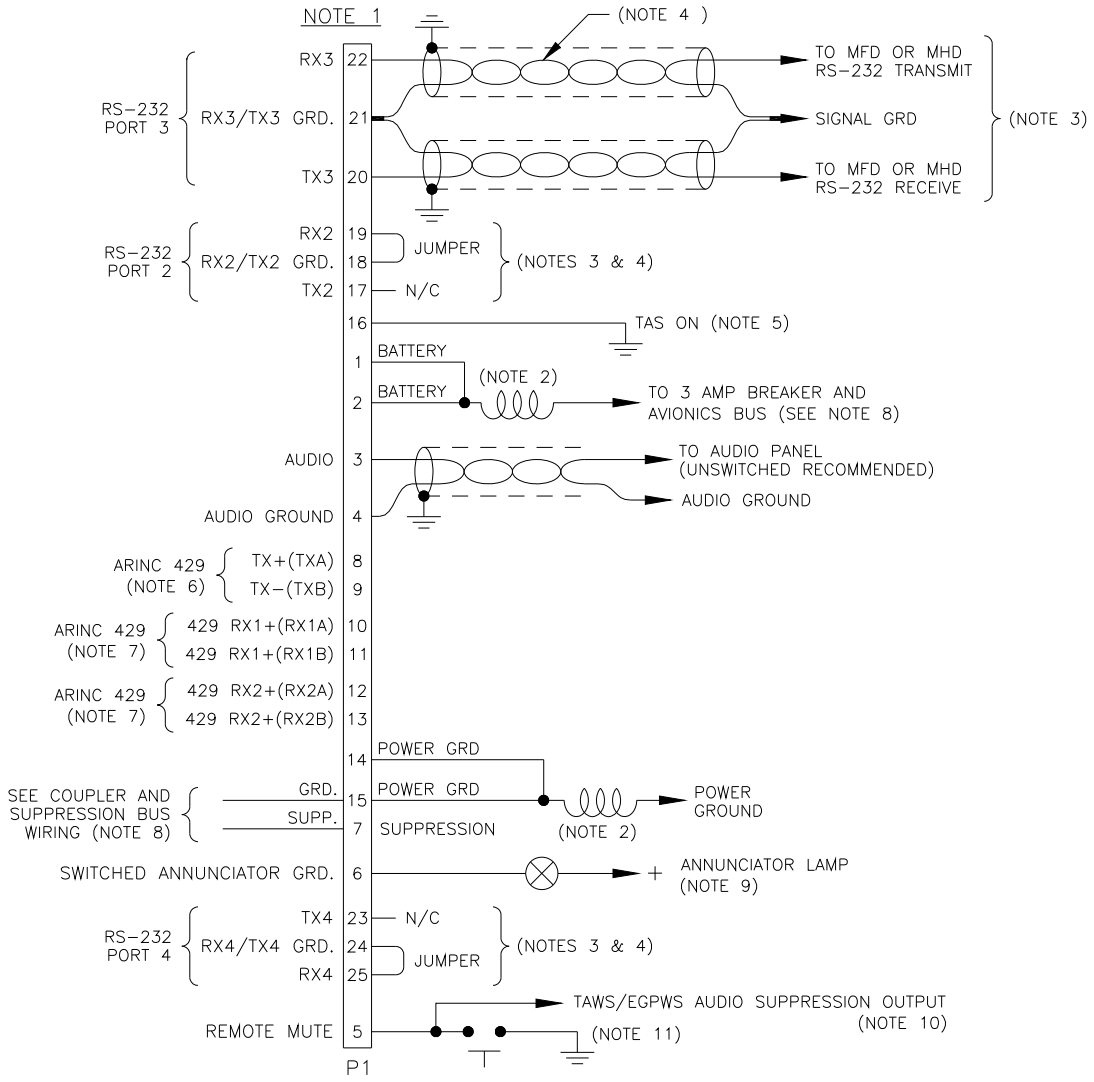
2.28 ELECTRICAL WIRING OF ALTITUDE ENCODER

An altitude encoder is required in order that the TAS can compare the altitude of a threat aircraft with the host aircraft to display altitude separation.

Encoders that meet the requirements of TSO-C88 or TSO-C88a can be used. Ordinarily, the TAS should be connected to the encoder connected to the transponder. The encoder inputs to the TAS are diode isolated.

The altitude encoder is connected to the TAS Processor. See Figure 16 on page 66 and Figure 17 on page 67.

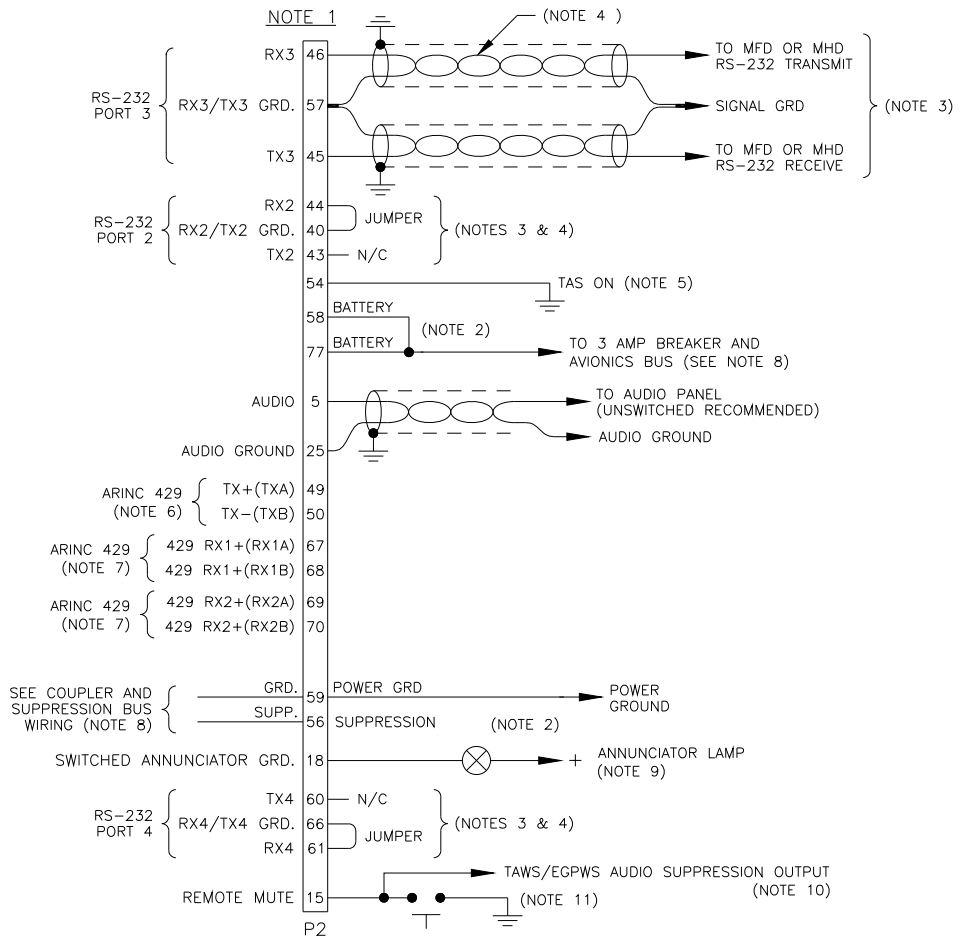
ARNC 429 altitude input can be used instead of a gray code altitude encoder. See Paragraph 1.16.



Notes:

1. For Installations in high EMI/RFI environments, shielded cable or overall braided shield should be used for all interconnections. The shield should be grounded at the Processor end only.
2. Supplied Inductors. Mount as close to P1 as practical. Not required with the 700-00185-() TAS-A processor.
3. Any RS-232 port can be used for a display. Jumper as shown if the port is not to be used. Transmit and receive lines must be connected to each display to meet "handshake" requirements. Do not parallel connections. The signal ground should be connected to the signal ground at the display.
4. Shielded, twisted pairs may be used for RS-232 connections. Multi-conductor twisted/shielded cable may be used.
5. Pin 16 of P1 must be grounded for operation. It can be routed through a switch on the panel, or permanently grounded to permit turning the system on through the avionics master (the system can then be isolated by the circuit breaker).
6. ARINC-429 output for compatible displays. See paragraph 1.16.
7. Accepts ARINC-429 labels. See paragraph 1.16. Both inputs must be high or low speed. No configuration is required.
8. See Figure 20 on page 69 for unidirectional suppression. Otherwise connect suppression directly to the bus as shown in Figure 28 on page 80.
9. Pin 6 supplies a ground when the Annunciator light should be illuminated. The current limit is 1A maximum. The light is normally white and is labeled "Traffic" or "Traffic Alert".
10. If audio muting is necessary for priority of announcements, use this audio suppression output to mute the TAS (Processor part number suffix of -5 and subsequent). The line is pulled low to mute the TAS. If the TAWS/EGPWS drives or pulls the audio suppression output high, then the output must be diode isolated.
11. The remote mute input is required except when the Avidyne ½ 3ATI Traffic Display is used. The switch is momentary.

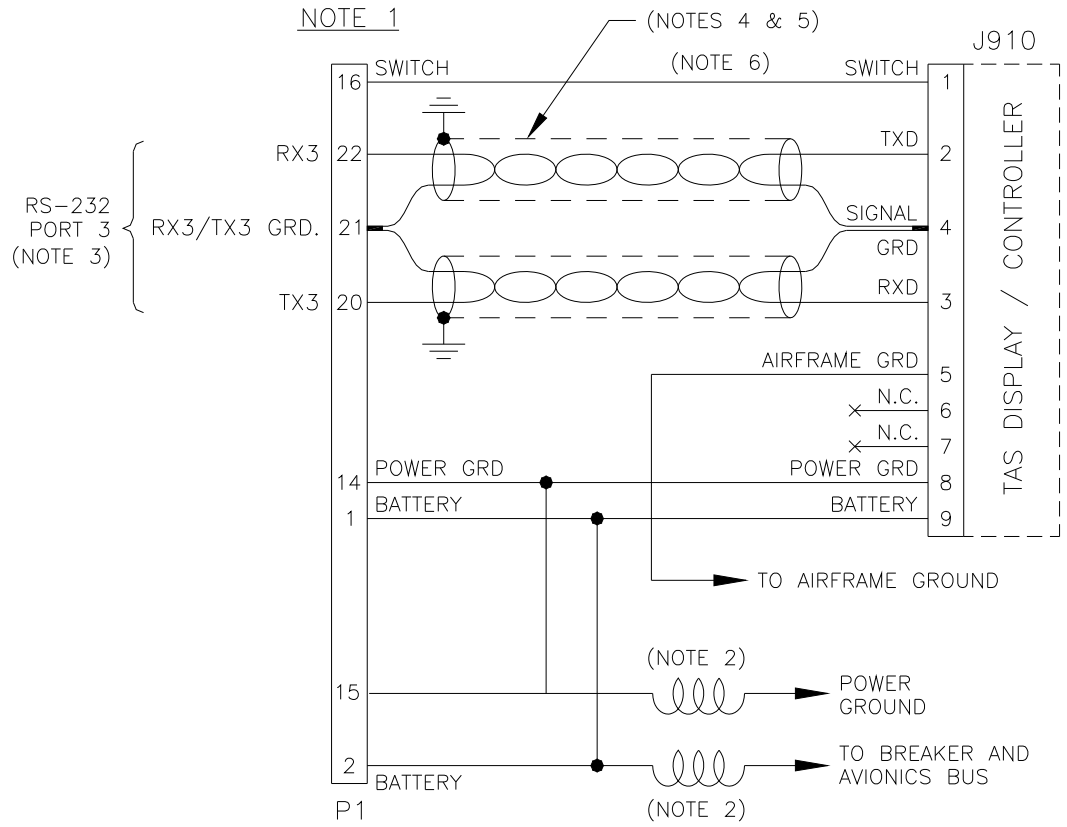
Figure 22: Wiring Diagram – P1 of the TAS Processor.



Notes:

1. For Installations in high EMI/RFI environments, shielded cable or overall braided shield should be used for all interconnections. The shield should be grounded at the Processor end only.
2. For TAS-A processors installations an inductor is not required, but may be left in place during upgrades.
3. Any RS-232 port can be used for a display. Jumper recommended as shown if the port is not to be used for EMI. Transmit and receive lines must be connected to each display to meet “handshake” requirements. Do not parallel connections. The signal ground should be connected to the signal ground at the display.
4. Shielded, twisted pairs may be used for RS-232 connections. Multi-conductor twisted/shielded cable may be used.
5. Pin 54 of P2 must be grounded for operation. It can be routed through a switch on the panel, or permanently grounded to permit turning the system on through the avionics master (the system can then be isolated by the circuit breaker).
6. ARINC-429 output for compatible displays. See paragraph 1.16.
7. Accepts ARINC-429 labels. See paragraph 1.16. Inputs can be high or low speed. No configuration is required.
8. See Figure 20 on page 69 for unidirectional suppression. Otherwise connect suppression directly to the bus as shown in Figure 28 on page 80.
9. Pin 18 supplies a ground when the Annunciator light should be illuminated. The current limit is 1A maximum. The light is normally white and is labeled “Traffic” or “Traffic Alert”.
10. If audio muting is necessary for priority of announcements, use this audio suppression output to mute the TAS (Processor part number suffix of -5 and subsequent). The line is pulled low to mute the TAS. If the TAWS/EGPWS drives or pulls the audio suppression output high, then the output must be diode isolated.
11. The remote mute input is required except when the Avidyne ½ 3ATI Traffic Display is used. The switch is momentary.

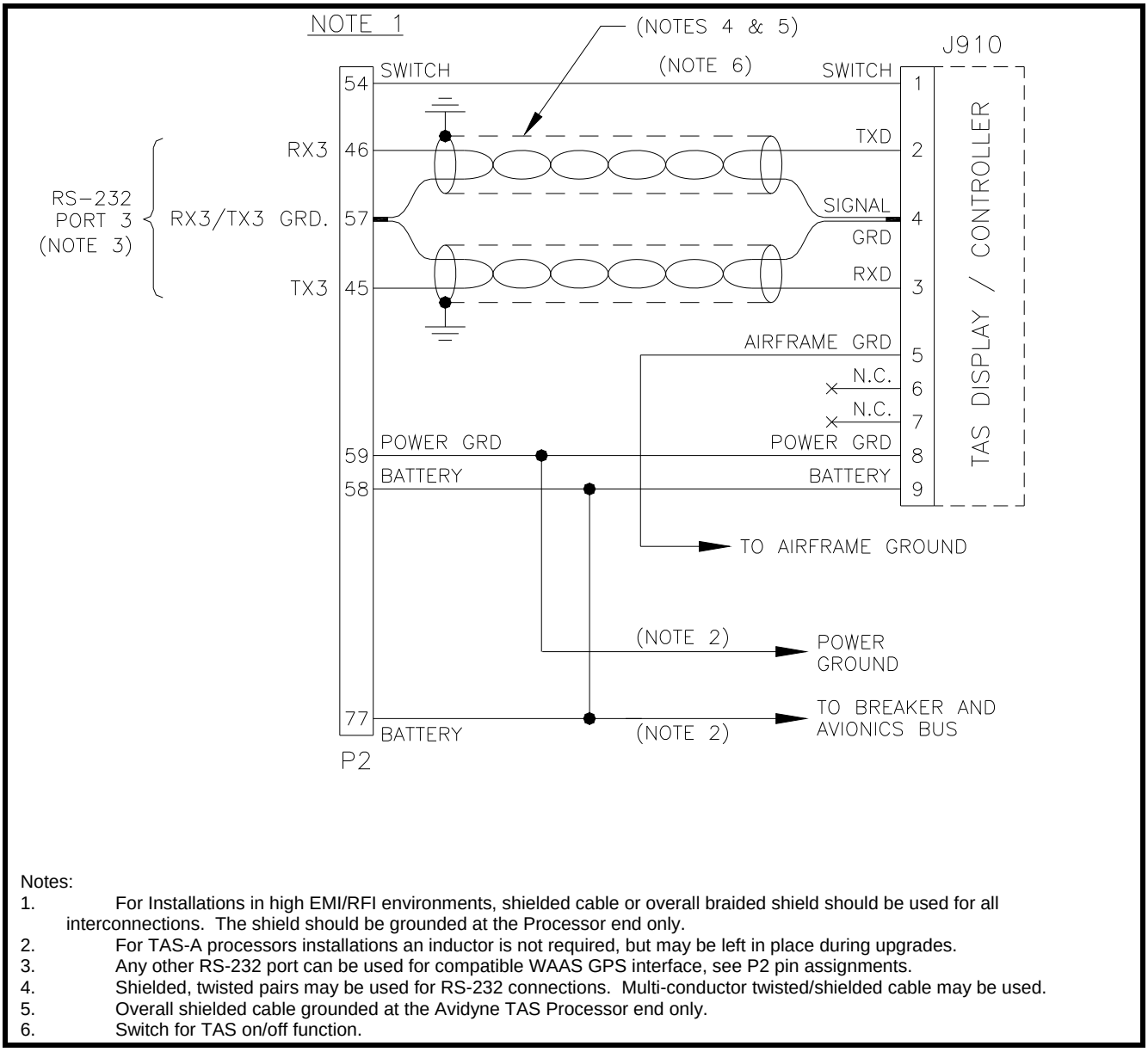
Figure 23: Wiring Diagram – P2 of the 700-00185-( ) TAS-A Processor.



Notes:

1. For Installations in high EMI/RFI environments, shielded cable or overall braided shield should be used for all interconnections. The shield should be grounded at the Processor end only.
2. Supplied Inductors. Mount as close to P1 as practical.
3. Any RS-232 port can be used.
4. Shielded, twisted pairs may be used for RS-232 connections. Multi-conductor twisted/shielded cable may be used.
5. Overall shielded cable grounded at the Avidyne TAS Processor end only.
6. Switch for TAS on/off function.

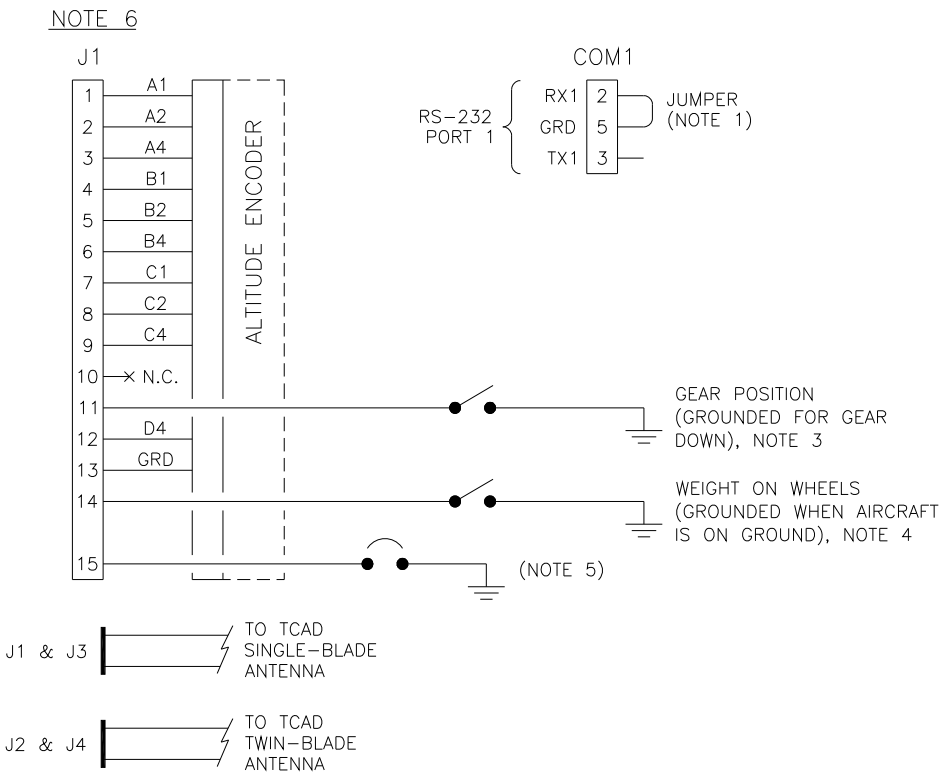
Figure 24: Wiring Diagram – ½ 3ATI Traffic Display/Controller to 70-2420-( ) Processor.



Notes:

1. For Installations in high EMI/RFI environments, shielded cable or overall braided shield should be used for all interconnections. The shield should be grounded at the Processor end only.
2. For TAS-A processors installations an inductor is not required, but may be left in place during upgrades.
3. Any other RS-232 port can be used for compatible WAAS GPS interface, see P2 pin assignments.
4. Shielded, twisted pairs may be used for RS-232 connections. Multi-conductor twisted/shielded cable may be used.
5. Overall shielded cable grounded at the Avidyne TAS Processor end only.
6. Switch for TAS on/off function.

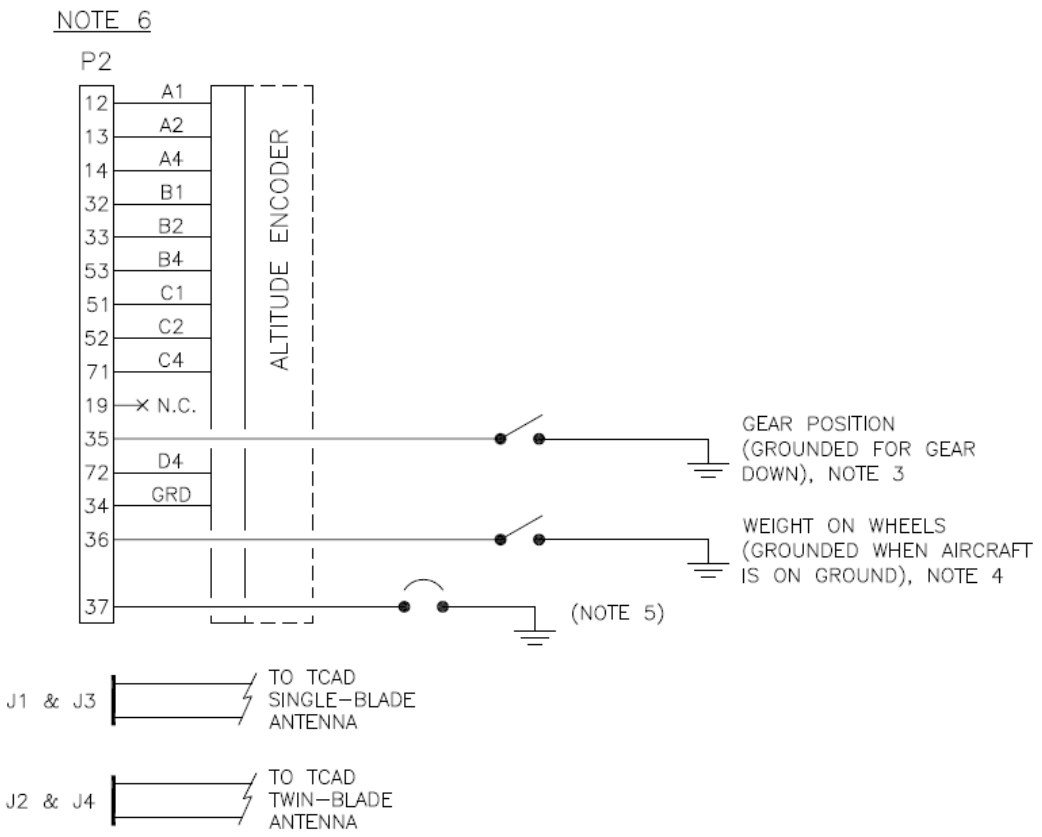
Figure 25: Wiring Diagram – ½ 3ATI Traffic Display/Controller to 700-00185-( ) Processor.



Notes:

1. If COM1 is not used for a display, install the supplied prefabricated shunt housed in the 9-pin D connector.
2. The Twin-blade antenna is normally bottom-mounted. For more information see paragraph 6.2.2.
3. Gear Position, connect if available. Accepts ground potential for gear down.
4. Aircraft on Ground indication (such as weight on wheels, airspeed switch, etc.). Accepts ground potential for aircraft on ground.
5. If none of the installed displays can be used to exit the Ground Mode, then this jumper must be grounded. If this is the case, then an aircraft on ground input (such as weight on wheels) is highly recommended. See paragraphs 2.12 and 6.2.10.
6. For Installations in high EMI/RFI environments, shielded cable or overall braided shield should be used for all interconnections. The shield should be grounded at the Processor end only.

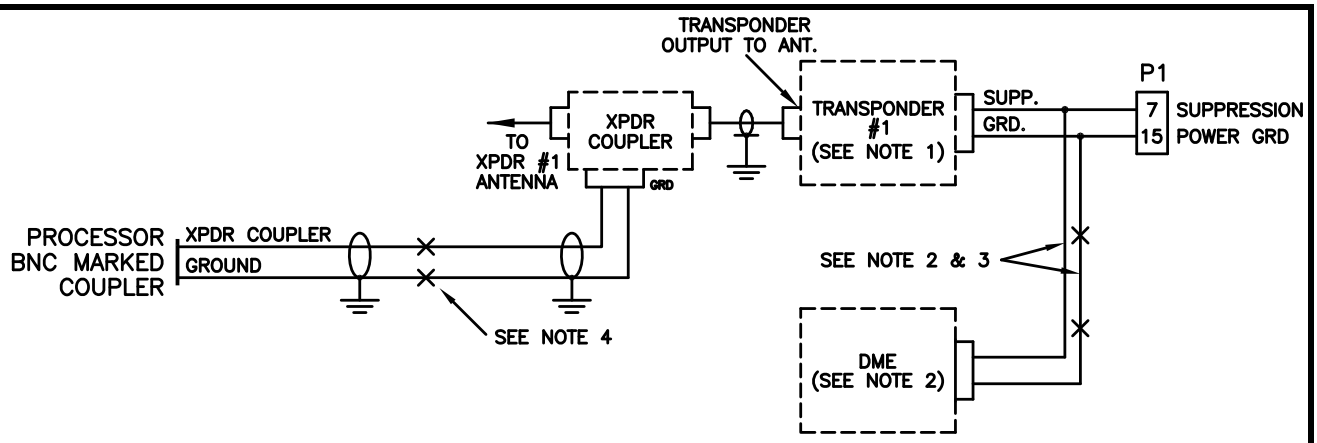
Figure 26: Wiring Diagram – J1, COM1 and Antenna Connections of a 70-2420–( ) Processor.



Notes:

1. If COM 1 is not used for a display, install the supplied prefabricated shunt housed in the 9-pin D connector.
2. The Twin-blade antenna is normally bottom-mounted. For more information see paragraph 6.2.2.
3. Gear Position, connect if available. Accepts ground potential for gear down.
4. Aircraft on Ground indication (such as weight on wheels, airspeed switch, etc.). Accepts ground potential for aircraft on ground.
5. If none of the installed displays can be used to exit the Ground Mode, then this jumper must be grounded. If this is the case, then an aircraft on ground input (such as weight on wheels) is highly recommended. See paragraphs 2.12 and 6.2.10.
6. For Installations in high EMI/RFI environments, shielded cable or overall braided shield should be used for all interconnections. The shield should be grounded at the Processor end only.

Figure 27: Wiring Diagram – P2 and Antenna Connections of a 700-00185-( ) Processor.



Notes:

1. Use 50 ohm type coaxial cable if the transponder is configured for a coaxial cable suppression bus.
2. Suppression bus components may be needed to conform the suppression bus to ARINC standards see Paragraph 2.3.
3. DME suppression is necessary for Avidyne TAS operation. If DME is not on the suppression bus, connect it. See Paragraph 2.3. Suppressions shown for 70-2040-() processor.
4. Suppression on a 700-00185-() processor should be wired to P2. Pin 56 is the suppression input, and Pin 59 is the suppression ground.
5. For dual transponder installations, use two Transponder Couplers. Connect the Coupler outputs that would normally go to the Processor to a BNC T-adapter, and then connect the coaxial cable from the T-adapter to the Processor.

Figure 28: Wiring Diagram – Coupler and Suppression Bus.

SECTION III
OPERATION

3.1. GENERAL

The TAS uses transponder replies to compute bearing, relative altitude and range from nearby Mode C or Mode S-equipped aircraft. Non-Mode C aircraft provide range and bearing information only.

Relative altitude information is derived from decoding the altitude replies from nearby aircraft, and comparing the data with the encoded altitude information from the host aircraft. Range information is determined by active interrogations, using time of arrival and whisper-shout techniques.

The TAS declares Traffic Advisories using audible announcements and an annunciator light output. Additionally, when the Altitude Alert is activated, a distinctive short tone and voice alert is generated to call attention to arrival at a target altitude, or an altitude deviation.

The optional TAS ½ 3ATI Traffic Display/Controller and/or Multi-Hazard Display (MHD) are available to communicate traffic information. See Figure 30 for special symbols used, and Figure 31 and Figure 32 for basic ½ 3ATI Traffic Display information. Multi-Function Displays can also be connected using other RS-232 ports.

Information regarding operation of the Avidyne ½ 3ATI Display/Controller is found in this Section. Information about other displays can be found in their respective Operating Manuals.

3.2. AUDIO & VISUAL ALERT

One visual and four audible alerts are used by the TAS:

TRAFFIC ALERT	A voice alert for Traffic Alerts, indicating the presence, direction and relative height above or below the host aircraft. See the Pilot's Handbook.
ALTITUDE ALERT	A voice and tone for the Altitude Alert function (available when the optional TAS ½ 3ATI Traffic Display or MHD is used).
PERFORMANCE MONITOR	An announcement indicating a detected TAS malfunction.
VISUAL ALERT	An auxiliary output connected to an annunciator lamp, providing a visual alert to displayed traffic.

3.3. OPTIONAL ½ 3ATI TRAFFIC DISPLAY OPERATOR CONTROLS

Operator controls are illustrated and described as follows:

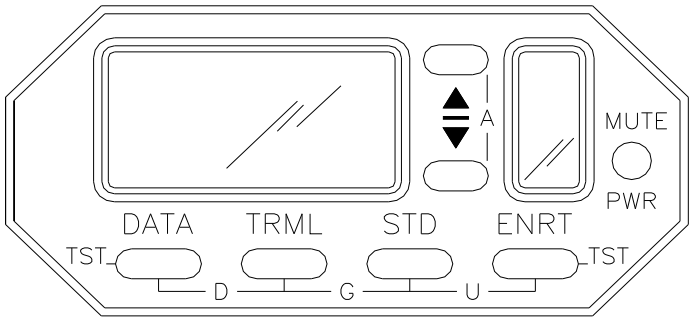


Figure 29: ½ 3ATI Traffic Display/Controller

PWR/MUTE: A push-on, pull-off button for supplying power to the unit. When the threat warning tone sounds, a momentary push of this button stops a current annunciation. See the Pilot Operating Handbook.

DATA: Used to identify the MSL altitude of the primary threat and the N-number if available. Double-pressing the DATA button repeats a TA announcement.

TRML: Terminal Mode, sets the range and altitude Proximity Airspace size to Terminal.

STD: Standard Mode, sets the range and altitude Proximity Airspace size to Standard.

ENRT: Enroute Mode, sets the range and altitude Proximity Airspace size to Enroute.

UP ARROW : For data entry and user programming.

DOWN ARROW : For data entry and user programming.

Pressing two buttons simultaneously accesses six functions:

UP & DOWN ARROW : To engage or disengage the Altitude Alert function.

DATA & TRML: To engage or disengage the Density Altitude function.

TRML & STD: By pressing these two buttons, the Ground Mode can be engaged.

STD & ENRT: These buttons engage the Unrestricted Mode of operation.

DATA & ENRT: These buttons engage the Pilot Initiated Test function.

TRML & MUTE: These buttons engage the Approach Mode set-up.

3.4. SYMBOLS

Figure 30 below is an illustration and brief description of the special symbols used on the Avidyne ½ 3ATI Traffic Display/Controller.

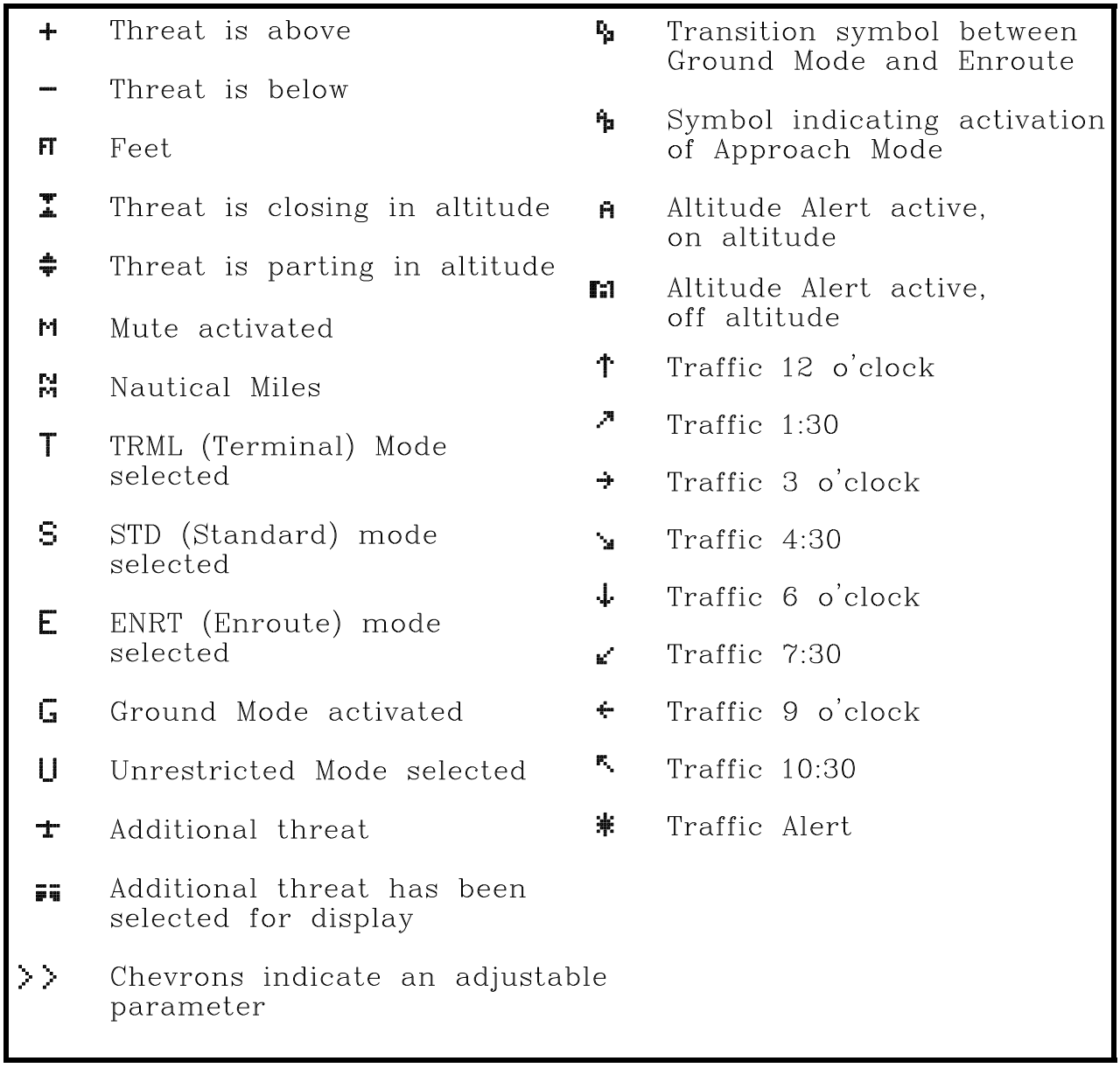


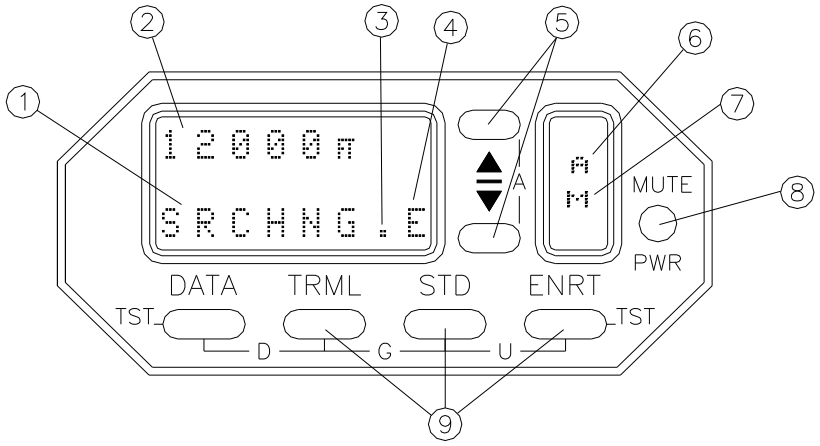
Figure 30: ½ 3ATI Traffic Display/Controller Symbols.

3.5. BASIC DISPLAYS

There are two basic displays in the operation of the Avidyne ½ 3ATI Traffic Display/Controller:

- When the unit is searching, and
- When a threat is acquired.

The following illustrations show typical displays and associated controls:



① The Avidyne TAS is searching for a threat.

② Own Aircraft altitude.

③ Self-Test Cursor.

④ Mode indicator (shown indicating Enroute Mode).

⑤ Used to adjust TAS parameters, barometric pressure, and to engage/disengage the Altitude Alert.

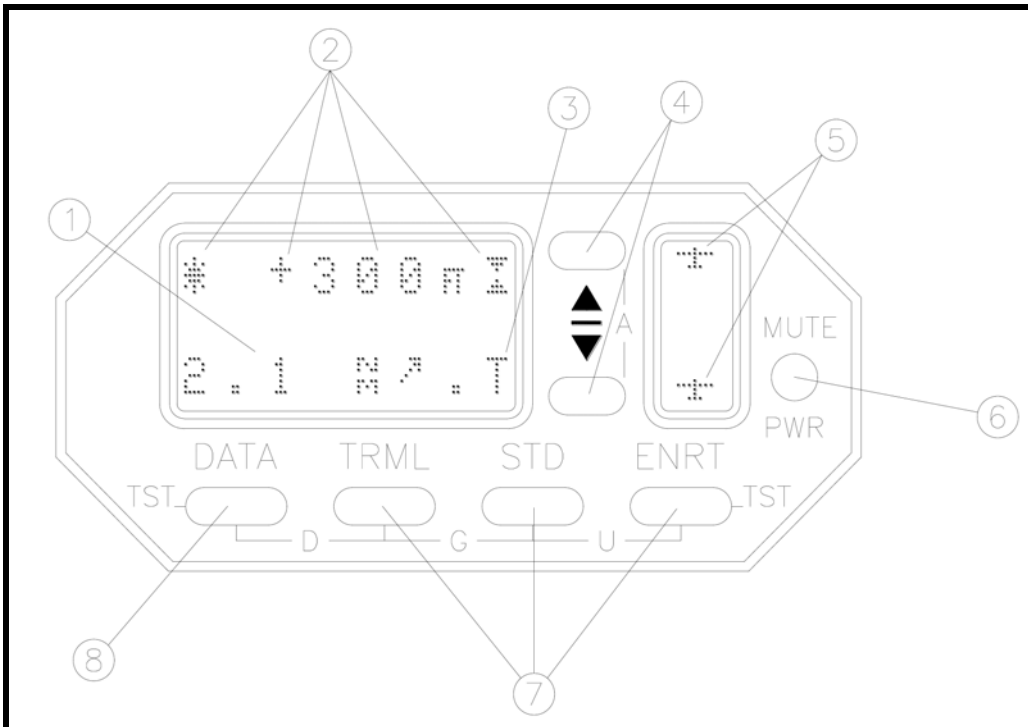
⑥ "A" - Altitude Alert engaged.

⑦ "M" - displayed when audible alerts are disabled (muted).

⑧ Pull off, push on. Used to mute traffic alerts and for changing between inches and millibars for barometric pressure adjustment.

⑨ Used to select mode and for Barometric Pressure adjustment.

Figure 31: ½ 3ATI Display – Searching Configuration, Monitoring for Traffic.



① Traffic range is 2.1 Nautical Miles, approximately 1:30.

② Threat is a Traffic Alert (TA), 300 feet above and converging in altitude.

③ Mode indicator (shown in Terminal Mode).

④ Up button is used to display secondary threat.
Down button is used to display third level threat.

⑤ Second and third level threats have been detected.
Flashing indicates nearby in altitude (See the Pilot's Handbook).

⑥ Pull off, push on. Also used to mute current audible alerts.

⑦ Used to select mode, and for initiating Barometric Pressure adjustment prior to using the up and down buttons.

⑧ Shows additional data about the displayed traffic.

Figure 32: ½ 3ATI Display – Traffic Acquired.

3.6. PROGRAMMING

When completing an installation, the factory settings should be checked, and the programming functions should be used to adjust the settings as necessary. The following paragraphs describe the programming functions.

To engage a programming function, the appropriate button is pressed twice. When this is done, the current setting is displayed. The up and down buttons can be used to adjust the displayed parameter. To select the next parameter, the appropriate button is pressed again. When each parameter has been considered, the Avidyne TAS returns to collision alert operation. In all cases, if no button is pressed for about 8 seconds when in a programming mode, the Avidyne TAS will return to collision alert operation.

Proximity Airspace Limits when the optional ½ 3ATI Traffic Display/Controller is used are as follows:

Terminal Mode	Standard Mode	En Route Mode	Unrestricted Mode
200 to 1000 FT 0.5 to 1.5 NM	500 to 1500 FT 1.0 to 3.0 NM	1000 to 2000 FT 2.0 to 10.0 NM	10,000 FT 21.0 NM

Table 15: Proximity Airspace Limits for the ½ 3ATI Traffic Display.

NOTE:	Support for pilot adjustable proximity airspace limits is provided for compatibility with older traffic alerting systems. This functionality may not be supported in future TAS systems.

3.7. SETTING THE PROXIMITY AIRSPACE SIZE

Depress the selected button (TRML, STD, or ENRT) twice. The Proximity Airspace height in hundreds of feet will be displayed. To change the height, press the up or down buttons. Depress the selected button again for Proximity Airspace radius adjustment. Depress the mode button once more to return the Avidyne TAS to normal operation.

The factory-set airspace limits and other settings for the ½ 3ATI Traffic display/controller are as follows:

ENRT Proximity Airspace Size:	±2000 FT, 3.0 NM
STD Proximity Airspace Size:	±1000 FT, 2.0 NM
TRML Proximity Airspace Size:	±500 FT, 1.0 NM
Barometric Pressure Setting:	29.92 inches (1013mb)
Density Altitude Temperature:	+59°F (+15°C)
Altitude Alert:	5,000 FT

3.8. SETTING DENSITY ALTITUDE

Press the TRML and DATA buttons simultaneously. The previously programmed temperature will be displayed on the right. Use the up and down buttons to set the actual outside air temperature and read the Density Altitude on the left.

3.9. SETTING AUDIO VOLUME

Depress the MUTE button twice. The Audio Volume can be adjusted using the up or down buttons.

If no button is pressed for 8 seconds, the Avidyne TAS will automatically return to collision alert operation. The sequence for tone related set up is as follows:

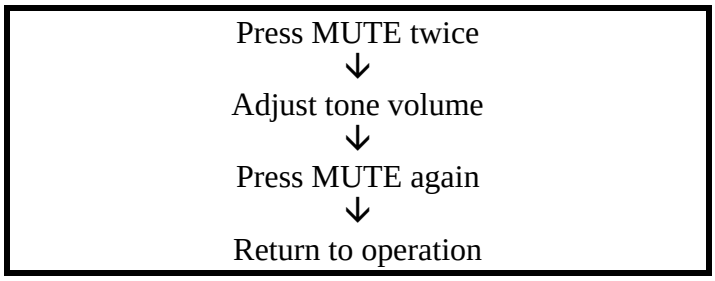


Figure 33: ½ 3ATI Display – Setting the Audio Volume.

The TAS aural alert should be discernible at V_{ne} (V_{mo}) and with full power applied, whether or not the crew is wearing headphones.

3.10. SETTING THE ALTITUDE ALERT

Press the up and down buttons simultaneously. The previously programmed altitude will be displayed. Use the up and down buttons to set the selected altitude. Pressing the up and down buttons again will engage the Altitude Alert. See the Pilot's Handbook for more information.

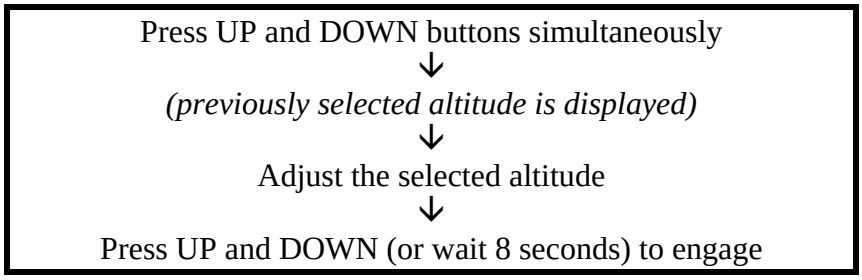


Figure 34: ½ 3ATI Display – Setting the Altitude Alert.

3.11. BUILT-IN TEST & FAULT INDICATIONS

An extensive battery of self-test functions is run at startup of the TAS. In addition, the TAS may be QUALIFIED using the mute/update button. Some displays such as the Avidyne ½ 3ATI Traffic Display/Controller provide access to the TAS self-test function.

Action	**Positive Result**	**Negative Result**
Double press the mute/update button (or the DATA button on the TAS ½ 3ATI Traffic Display)	Either a TA or "No advisories" is announced.	No audible announcement, a failure or warning is announced, or a "TAS Code" announcement. Discontinue use of the TAS until identified and corrected.

Table 16: TAS Test Function Without A Display.

To initiate a self-test, press the DATA and ENRT buttons simultaneously. The figure below illustrates the expected sequence of events following initiation of a self-test from the ½ 3ATI Traffic Display/Controller.

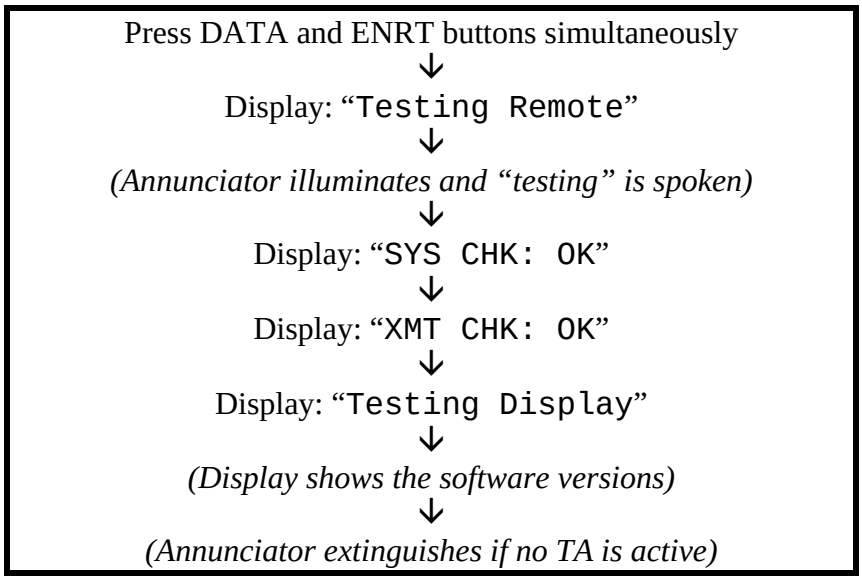


Figure 35: ½ 3ATI Display – Performing a TAS Self-Test.

If there is a fault indication, do not use the TAS data.

CAUTION: The TAS does not monitor for TAs or display intruder information during the Test function.

A cursor on the ½ 3ATI Traffic Display/Controller confirms continued operation of the equipment. Two dots in the cell immediately to the left of the mode cell alternately illuminate, indicating continued operation. If the dots do not alternate, the equipment is not operating. "Link Failure" indicates a disrupted communications link between the Processor and ½ 3ATI Traffic Display/Controller.

"Ground Mode" is annunciated upon startup when the TAS is in the Ground Mode. If the TAS is in the Ground Mode while flying, the system will not properly warn of traffic. The "Ground Mode" annunciation is normal on the ground. If the Ground Mode is announced when flying, discontinue operation of the TAS.

The TAS is designed to revert to a passive operation in the event of transmitter failure. If this occurs, the Annunciator light will remain illuminated, a voice alert of "TAS Interrogator Failure" will be announced and a 'W' will be displayed in place of the Mode indicator on the TAS ½ 3ATI Traffic Display/Controller. Traffic will be announced with bearing and relative height, but not range. This is not a normal mode and the equipment should be repaired as soon as possible.

Some faults can be detected. If "TAS Code" followed by a number is announced, then a malfunction has been detected. Refer to Table 17 below for a list of possible failure codes. Discontinue use of the TAS and contact the factory or your dealer for more information.

Code	Description
1	Transponder coupler input failure
2	Mutual suppression input is shorted
3	Receiver initialization failure -OR- Aircraft is above the maximum altitude for a TAS600 or TAS610
4	Unused
5	Audio suppression input shorted
6	Mute input shorted

Table 17: TAS Failure Codes.

Electronic detection of faults is limited. An observant flight crew is the best and most effective monitor of the equipment.

If there is a fault indication or a "TAS Code" announcement, do not use the TAS data.

The TAS must receive valid altitude data in order to compute separation information. If the data is invalid or incorrect, the information the TAS provides will be incorrect. The TAS cannot always detect incorrect altitude input. The installing agency must ensure the altitude inputs are correct at installation.

If invalid host altitude information is detected and the Avidyne ½ 3ATI Traffic Display/Controller is installed, stars are shown in place of altitude information. Multifunction displays also provide an invalid altitude message. When invalid altitude data is detected and the TAS is not in the Ground Mode, an unsolicited audible announcement is generated stating, "TAS Altitude Data Invalid". When the TAS is in the Ground Mode, double-pressing the Mute/Update button will generate the Altitude Data Invalid message.

A warming-up encoder can transmit invalid data. Therefore, invalid altitude input can be normal if it only happens a few minutes after startup. Otherwise, it should never happen. Even a momentary indication of a problem, such as during a climb, indicates the TAS is receiving invalid altitude data. The TAS should not be used until the problem is corrected.

If the host aircraft operates above the altitude limit identified for the particular model TAS, the message "TAS Altitude Data Invalid" will sound. Double pressing the mute button will cause the Altitude Data Invalid message followed by "TAS code three".

The TAS should not be in the Ground Mode when in flight. There are indicators to advise the flight crew that the TAS is operating in the Ground Mode. The TAS ½ 3ATI Traffic Display/Controller indicates operation in the Ground Mode by showing a "G" in the mode cell. The phrase "Ground Mode" is announced upon initialization. The phrase "Ground Mode" is also included in the annunciation when the mute/update button is double-pressed. If the TAS is inexplicably operating in "Ground Mode" in flight, discontinue operation until a qualified technician can evaluate it. If, after a power reset in the air, the TAS enters the Ground Mode, select another mode to exit the Ground Mode. Operators without a display will not normally enter the Ground Mode after a reset.

The TAS operates in SL A when the landing gear is down (retractable gear aircraft).

The TAS-A has a system status indicator on the front of the unit. The table below has a description of the status depending on the color being displayed by the LED.

Color	Explanation of System Status Indication
White	The System Status LED will be white momentarily immediately following application of power to the TAS-A unit. Note that the LED may have a slight blue tint when it is white.
Blue	The System Status LED will turn blue momentarily during startup while completing initialization.
Green	The System Status LED will be green during normal operation.
Yellow/Orange	The System Status LED will be yellow during normal operation if a warning condition has been detected. Warning conditions represent a degraded mode of operation.
Red	The System Status LED will be red during normal operation if a failure condition has been detected. Failure conditions prevent the TAS-A unit from providing traffic services.

Table 18: TAS-A Status LED Indications.

NOTE: A and B Ethernet Status LED's are currently unused

DISCLAIMER

The TAS has been meticulously designed to provide warning of nearby intruders. As with any device, there are significant limitations. The TAS can only detect signals if they are received. There are many impediments that can prevent the signal from being received, including the lack of transponder replies and the relative signal patterns of the transmitting and receiving antennas. We must declare in the strongest of terms that the TAS is not foolproof, and will not warn of nearby traffic in every instance, nor will it in itself prevent collisions. We make no claim in this regard. The pilot must make the avoidance decisions. We do claim the TAS is a very helpful device that can and has on many occasions helped to save the aircraft and occupants from disaster. Further, it aids in traffic awareness and traffic avoidance. The TAS is an aid to the see-and-avoid process and does not replace the common sense and good judgment of the pilot.

As a pilot, you must be relied upon for a certain level of competence and a high standard of knowledge about the airspace, aerodynamics, regulations, and the TAS. This includes knowledge of the limitations as well as the capabilities of the TAS.

This equipment is designed to increase the pilot's awareness of nearby traffic. It will not detect every aircraft. It is not designed to replace the see and avoid responsibility of the pilot or the ATC responsibility in the IFR environment.

The information provided by the TAS is not intended to lessen in any manner the pilot's obligation to see and avoid traffic.

The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft.

SECTION IV
PERFORMANCE TESTING

Proper testing of the TAS in the host (TAS Equipped) aircraft is essential. Proper operation of critical functions can only be checked during the Performance Test. Failures of these tests mean improper or marginal performance of the TAS. Performance testing is the most important part of the installation.

CAUTION:	Before applying power verify that all cables are properly terminated. The antennas must be connected before power is applied. Verify the suppression bus is correctly connected. A short circuit in the suppression line, excessive current on the annunciator line or reversed-polarity power lines will damage the TAS.

4.1. GENERAL

Performance testing of the TAS is conducted using standard test equipment and a personal computer.

4.2. EQUIPMENT REQUIRED

A. Transponder Test Set, Aeroflex model IFR6000 or equivalent.

B. A personal computer with serial communications capability (such as a PC with Microsoft Windows HyperTerminal*).

C. A newer Serial to USB converter for computers without a 9 pin serial connector. Some of the older Serial to USB converters have drivers that are not compatible with the newer Windows operating systems.

D. A null modem cable (often called a file transfer cable) -or- A configuration cable as described in sections 1.18.3 for a TAS system and section 2.8 for a TAS-A system to use with a serial to USB converter

E. A short coaxial cable with BNC connectors on both ends.

NOTE:	HyperTerminal is not installed on the more modern versions of the Windows operating systems. A 30 day free trial version is available to download via the link below. Alternate communications software is freely available. Some alternatives that have been used successfully are: HyperTerminal (https://www.hilgraeve.com/hyperterminal-trial/) PuTTY (http://www.chiark.greenend.org.uk/~sgtatham/putty/)

* HyperTerminal may be found in Windows 98 or Windows XP under Start>Programs>Accessories>Communications

The following information may be used to prepare a Null Modem Cable required for checkout of the TAS.

Signal Name	9-pin female	9-pin female	Signal Name
FG (Frame Ground)	-	-	FG (Frame Ground)
TD (Transmit Data)	3	2	TD (Transmit Data)
RD (Receive Data)	2	3	RD (Receive Data)
RTS (Request To Send)	7	8	RTS (Request To Send)
CTS (Clear To Send)	8	7	CTS (Clear To Send)
SG (Signal Ground)	5	5	SG (Signal Ground)
DSR (Data Set Ready)	6	4	DSR (Data Set Ready)
DTR (Data Terminal Ready)	4	6	DTR (Data Terminal Ready)

Table 19: Null Modem Cable Pin Assignments

Alternatively, a manufactured cable may be purchased at office supply or computer supply stores. The cable is called a Direct Cable Connection for File Transfer, or a Data Transfer Cable, often made by Belkin. The cable usually has both a 9-pin female and a 25-pin female connector on both ends.

NOTE: The TAS processors provide a 9-pin male COM1 connector that permits direct connection to a computer's 9-pin RS-232 port 1 using a null modem cable. The TAS-A processors do not provide the 9-pin male connector, so an alternate means of connecting the computer must be planned for. Refer to section 0, *2.9 RS-232* COMMUNICATIONS, on page 49 for some suggestions.

4.3. RAMP TEST

This test checks the function of the TAS, and confirms proper operation of the host transponder and altitude encoder with the TAS on.

The following tests are shown as sequential steps. Each test must be completed, but the order is not important. If, for example, the altitude test is not planned until later, then it is not necessary to connect the altitude encoding test device until it is required by a test. All the testing may be done in a hangar except the Ramp Test, Bearing. This must be accomplished away from reflective objects. See the Ramp Test Geometry Considerations diagram in Section VI.

4.3.1. INITIAL TRANSPONDER TEST

A. Place the transponder test set in position to interrogate the transponder of the aircraft under test. The TAS should be off.

B. Set the transponder test set for Mode A/C and interrogate the transponder.

C. Verify proper operation of the host transponder with the TAS turned off, including altitude encoding, frequency and output power.

D. Turn the Avidyne TAS on. Once the system initializes, verify the % reply meter on the transponder test set shows a reduced % reply and is fluctuating. If this test is satisfactory, disregard Paragraph O in the CVI test.

E. Turn off the avionics and the test set until the computer setup is complete.

4.3.2. PERSONAL COMPUTER SETUP

The following instructions describe how to configure HyperTerminal and PuTTY for use with the TAS. HyperTerminal is a terminal emulator available with Microsoft Windows. Any terminal emulator (Kermit, Z-Term, etc.) may be used as long as it supports ANSI escape sequences; the emulator should be configured to communicate at 9600 bits per second with no parity, one start bit, and no flow control. Steps 1 through 16 will establish the required parameters. **If the computer is already set up, proceed to step 17.**

NOTE: The TAS-A processor, part number 700-00185-(), does not provide a COM1 connector. When instructed to connect to COM1 in the following procedures, replace COM1 with the alternate RS-232 connection provided in the installation. Refer to section 0, *2.9 RS-232* COMMUNICATIONS, on page 49 for some suggestions regarding how this alternate connection may be provided.

NOTE: In the instructions that follow COM1 is used to refer to both the 9-pin D connector on a TAS6XX processor and to one of the RS-232 connectors on a personal computer. Context should make it clear which of the two is actually being referenced.

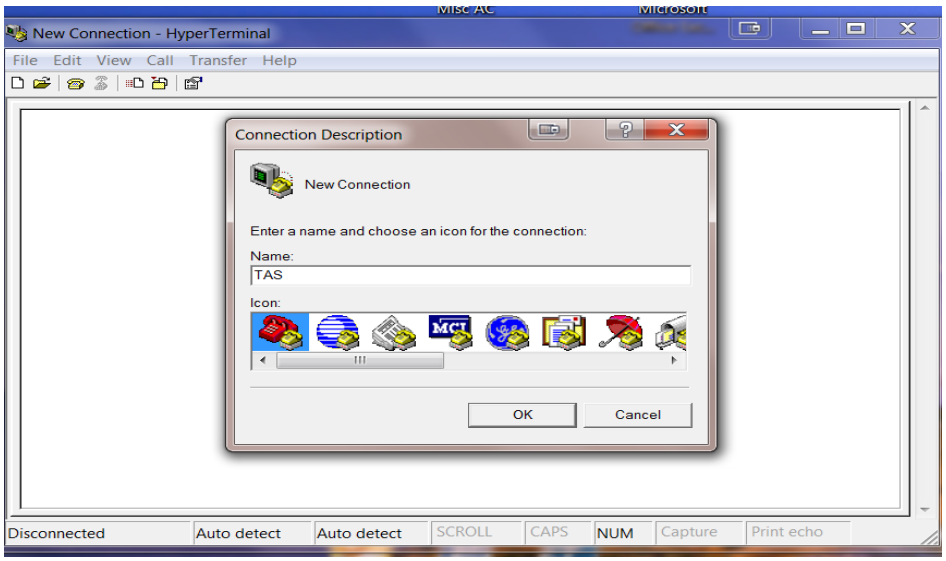
1. With the TAS and the Portable Computer (PC) turned off, connect a null-modem cable (sometimes called data transfer cable) to the plug marked COM1[1] on the TAS Processor and to the 9-pin serial connector on the PC.

2. On computers without a 9 pin serial connector, connect the serial to USB converter to a USB port on the computer. Connect the fabricated cable made from section 2.8 to the 9 pin connector of the serial to USB converter and connect to the TAS processor hard wired “TAS Configuration” plug, or P1, or P2 on the TAS.

[1] COM1 is normally a 9-pin serial connection (sometimes marked IOIOIO). Make sure COM1 is available on the computer (the computer will let you know). If not, any COM port available on the computer may be used.

3. Turn on the PC. Locate the HyperTerminal application (on Windows XP, HyperTerminal is available in the HyperTerminal folder under the Start->Programs->Accessories menu>Communications) or start PuTTY if you are using PuTTY. The following instructions will show HyperTerminal and PuTTY side by side until you get internal access to the TAS system, then the screen displays and operation will be the same for HyperTerminal and PuTTY.

4. When the HyperTerminal "new connection" dialog box appears asking for a connection name, type "TAS" and click on "OK".



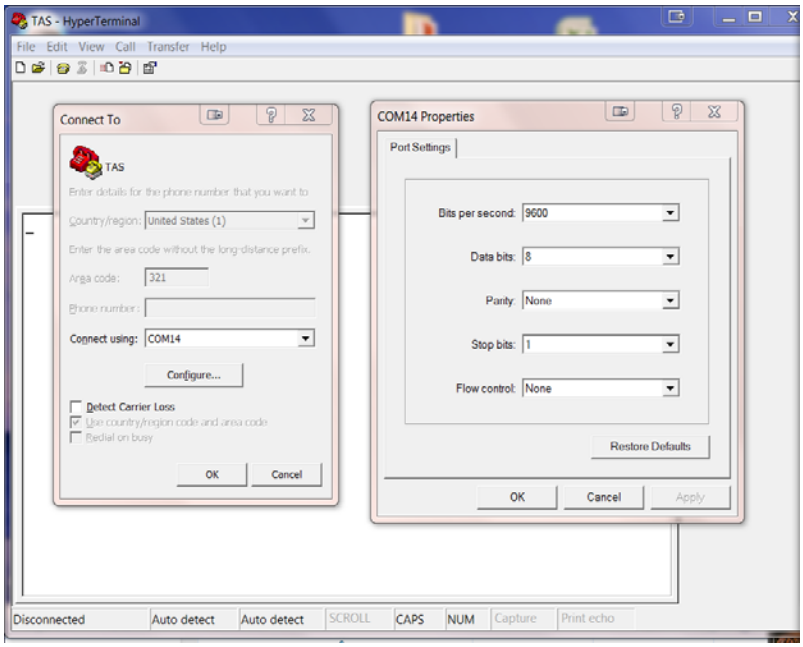
5. When the HyperTerminal “connect to" dialog box appears, select the "Connect using" field to "Direct to Com1" and click "OK" for direct connection to COM1 on a TAS.

6. For connections using a serial to USB converter, open the drop down box in “Connect using” and select the COM port that you are connected to and click “OK”. The examples shown use COM14

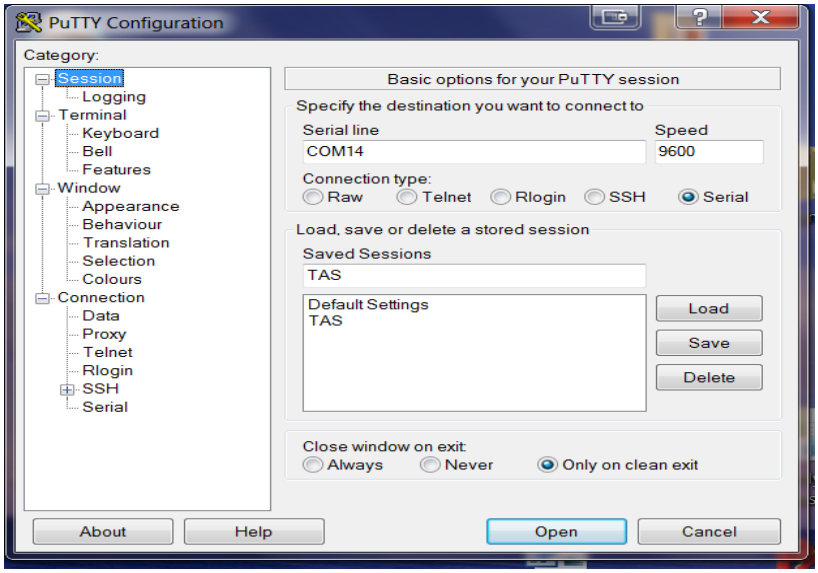
   NOTE: Your computer may have more than one COM USB ports available; you may need to try all of them until you get an active connection –or- (Windows 10) go to Settings, Bluetooth and other devices to see your USB COM port number displayed. (Windows 7) go to settings, device manager, to find the ports available. See # 17 for what an active connection looks like.

7. When the HyperTerminal "COM14 Properties" dialog box appears, set "Bits per second" to 9600. Verify that "Data bits" is set to 8, "Parity" is set to "None", "Stop bits" is set to "1" and "Flow Control" is set to "None"; click "OK".

i. HyperTerminal COM port setup

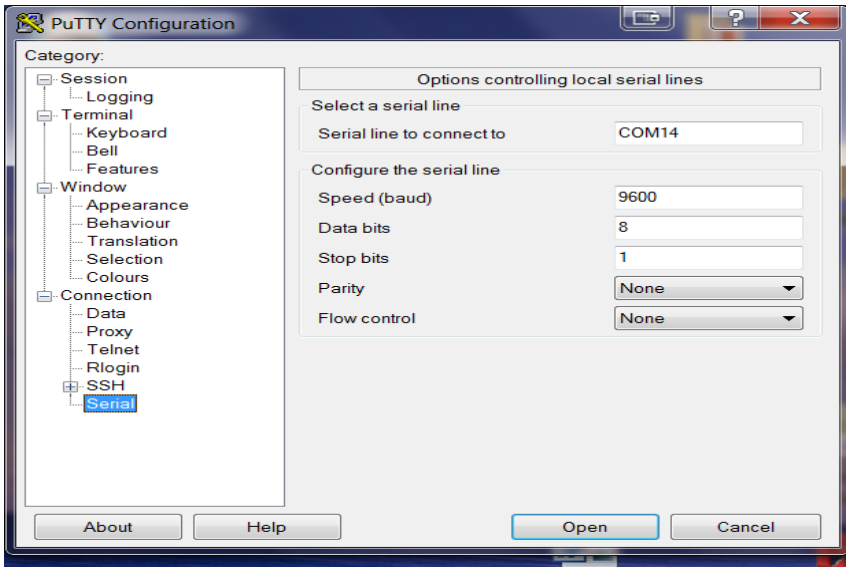


When the PuTTY configuration box appears, click on Session, type in TAS in the Saved Sessions box, select Serial radio button, type in the actual serial line used. (Caution, PuTTY Default comes up as COM1).

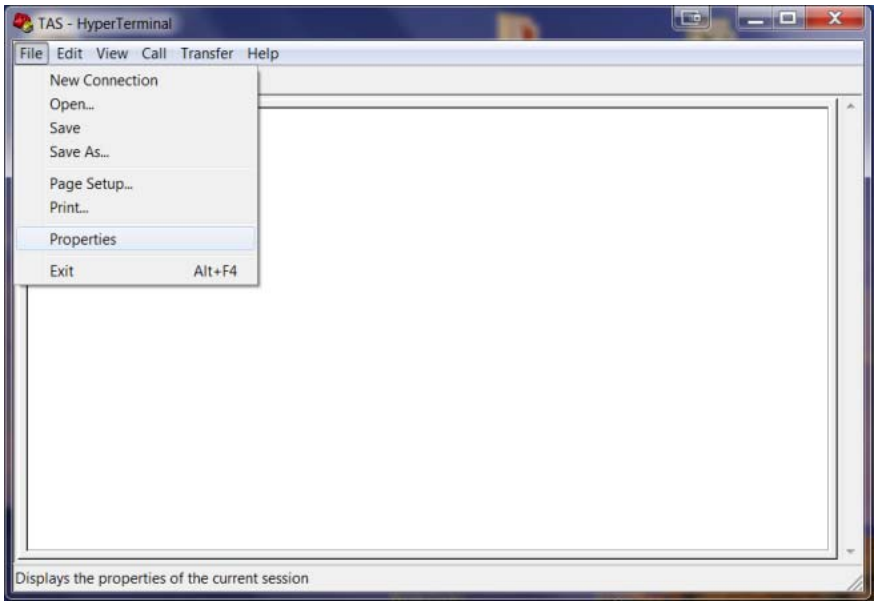


NOTE: Your computer may have more than one COM USB ports available; (Windows 10) go to Settings, Bluetooth and other devices to see your USB COM port number displayed. (Windows 7) go to settings, device manager, to find the ports available. See # 17 for what an active connection looks like.

ii PuTTY COM port setup



8. In the "TAS - HyperTerminal" window, select the File->Properties menu item.

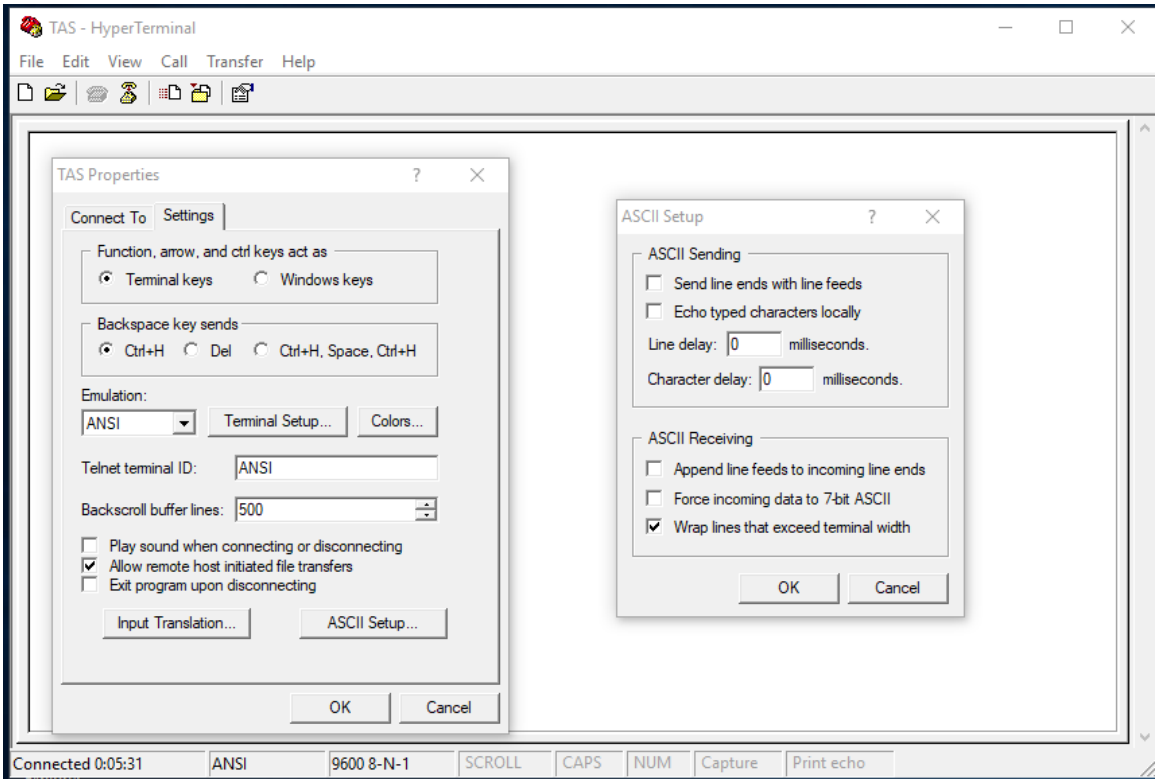


9. When the "TAS Properties" dialog box appears, click the "Settings" tab at the top.

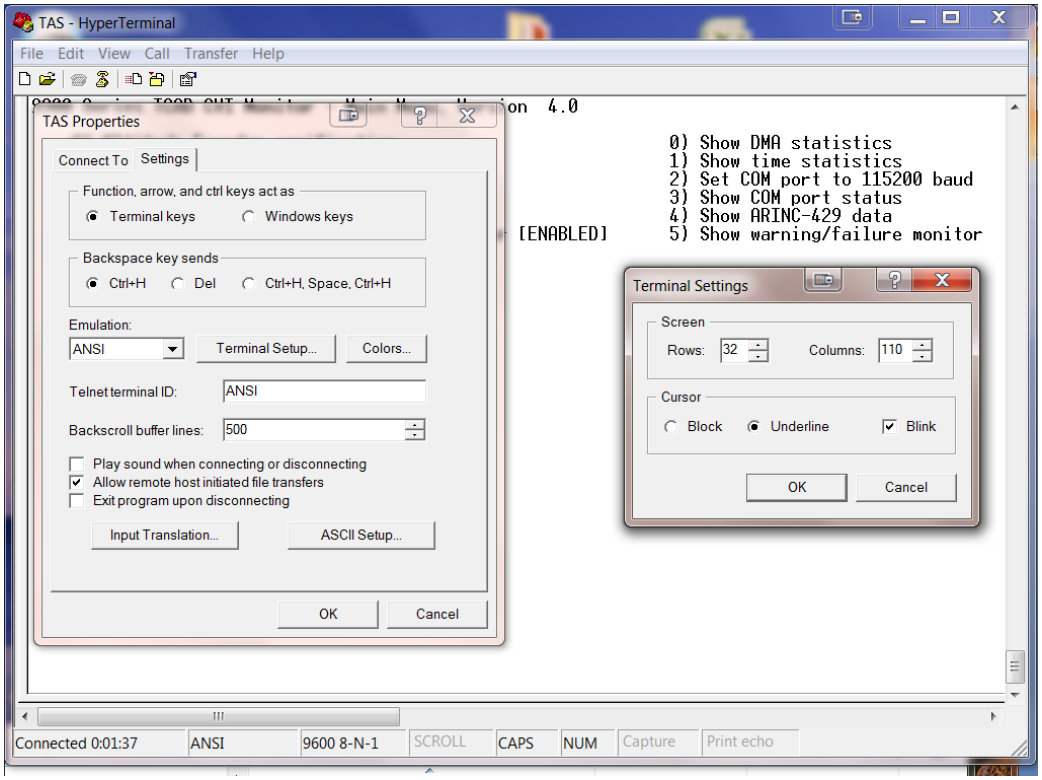
10. On the "Settings" section verify the emulation is ANSI, then click the "ASCII Setup..." at the bottom.

11. On the "ASCII Setup" dialog box, verify that "Character delay" is zero. Neither "send line ends with line feeds" nor "append line feeds to incoming line ends" should be checked. Ignore the other selections. Click "OK".

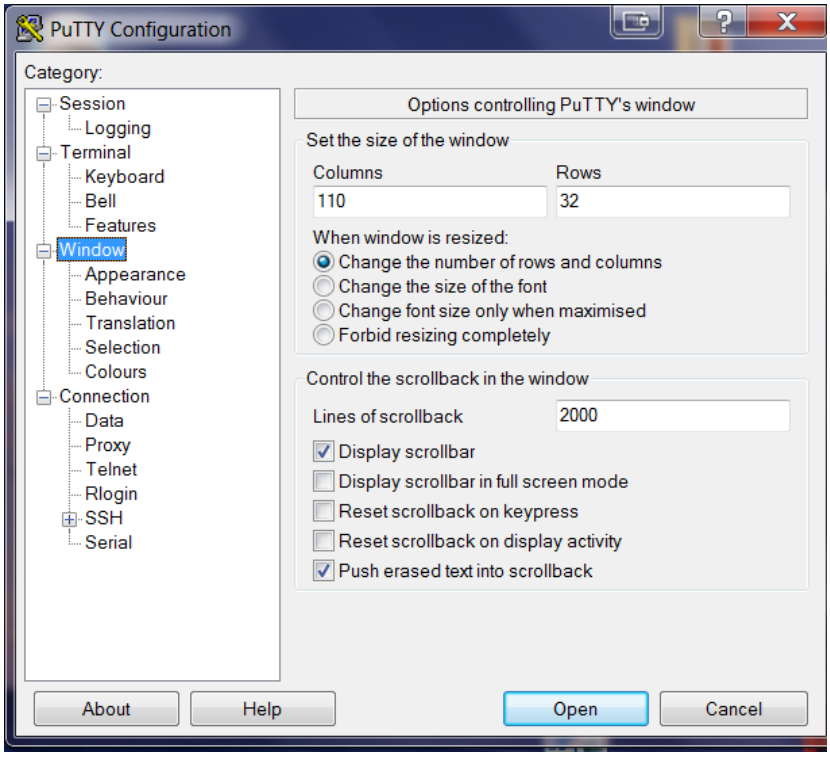
i. HyperTerminal ANSI setup



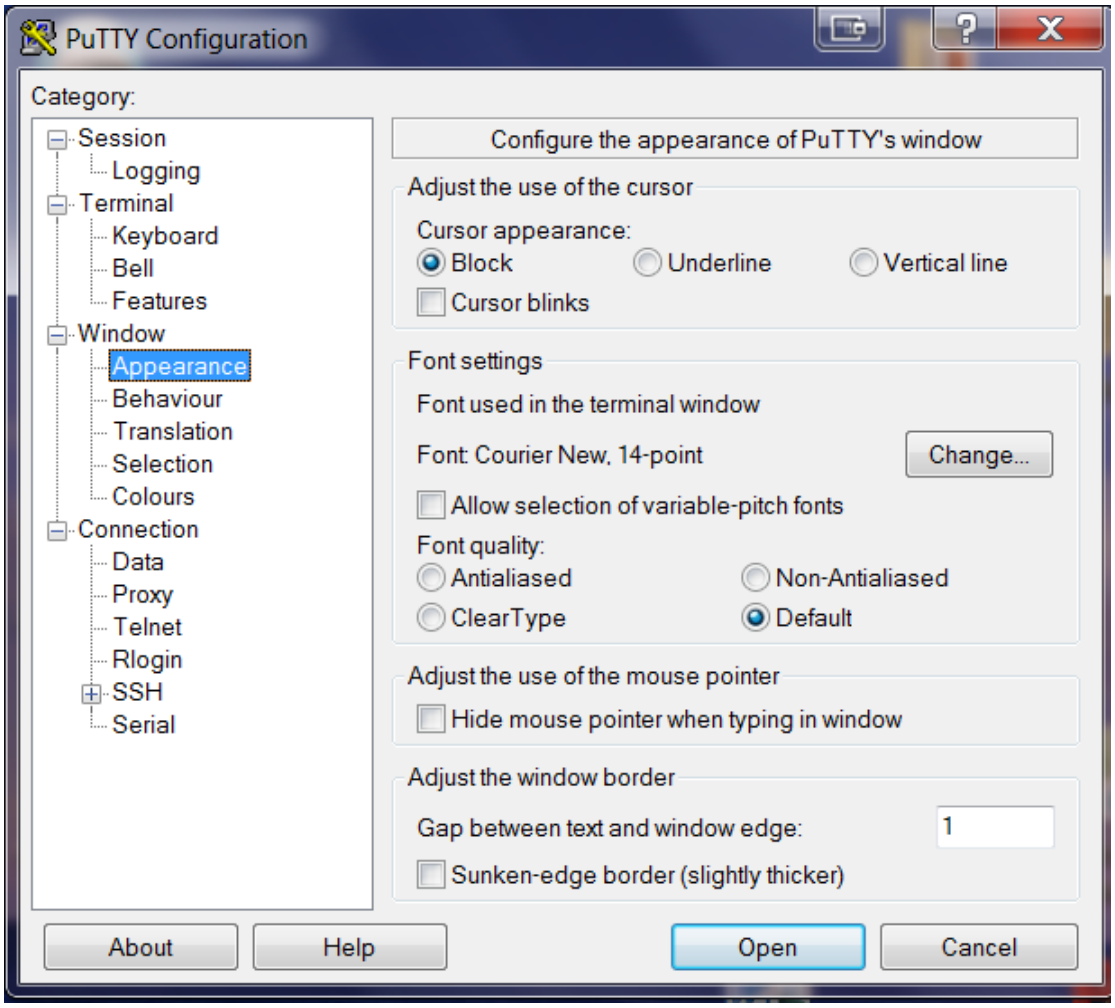
12. To expand the dialog box to eliminate word wrap, on HyperTerminal, under Properties, settings, click on “Terminal Setup” and enter 32 rows, 110 columns.



13. To expand the dialog box on PuTTY, go to window, enter 110 columns, 32 rows



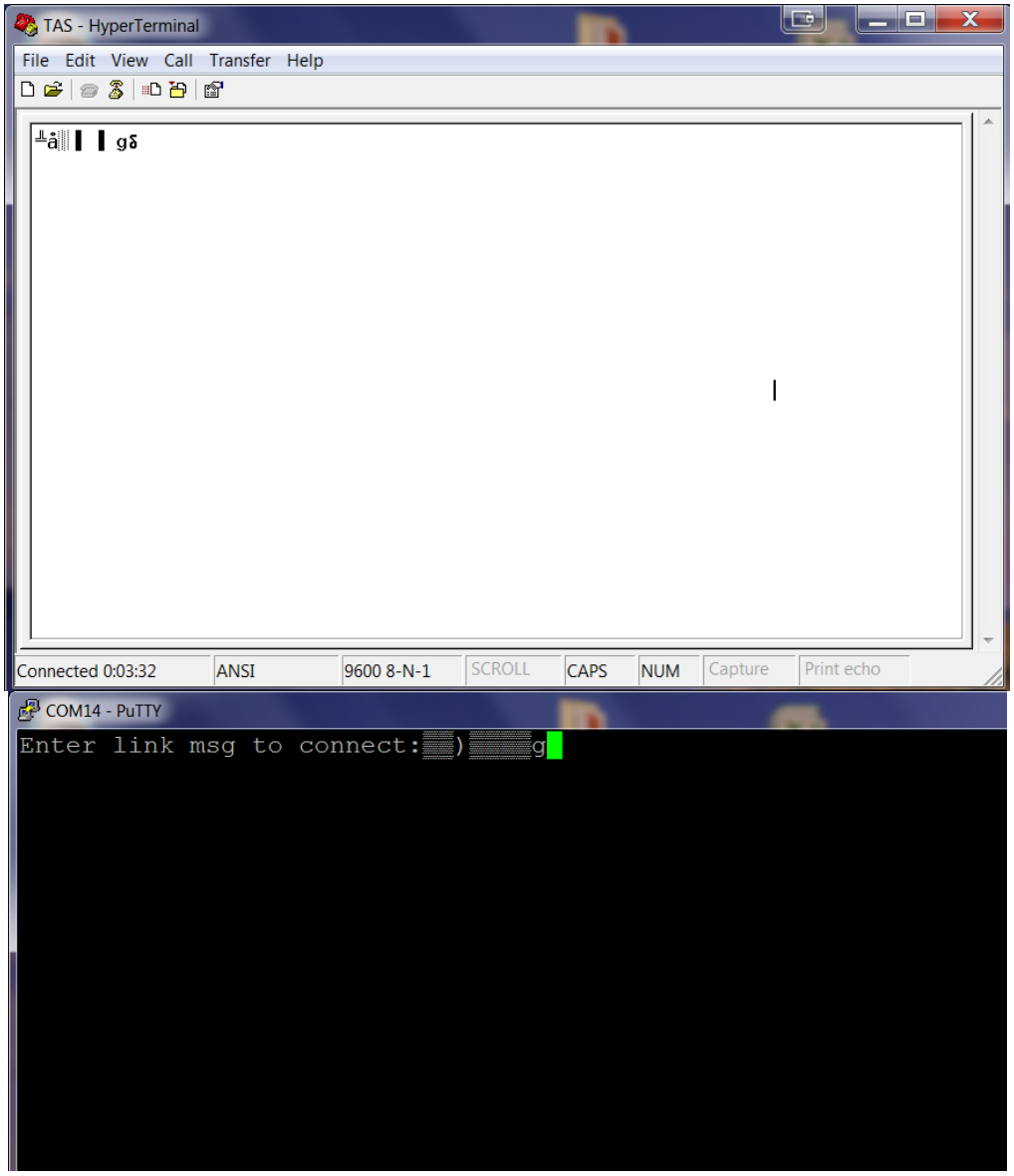
14. On PuTTY you may want to increase the font size for easier viewing. Go to “Appearance”, select “Change” and type in 14. Go back to “Session” and click on SAVE to save all your settings for TAS in the saved settings window.



15. Verify the computer cabling and connections to the TAS.

16. Turn the TAS on.

17. If you have an active connection, you will see some digital noise in the dialog box before the “Enter link msg to connect” appears.



18. Inside the dialog box window, you should see the message "Enter link msg to connect:" as shown below (this may take up to 20 seconds to appear after starting HyperTerminal/PuTTY and the TAS). Recycle power on the TAS if necessary.

19. You must have a clear field after the “Enter link msg to connect” before quickly typing in “command” for Command Interface access or “CVI” for CVI Monitor access. If the keyboard seems dead, click somewhere in the dialog box to activate it again. “NEWCVI” will bypass the math test. Hit the enter key on the computer keyboard if you need to start over. Hit “X” if you want to exit and “Enter link msg to connect” will reappear. If the message does not appear, check the serial connections and cycle the power to the TAS.

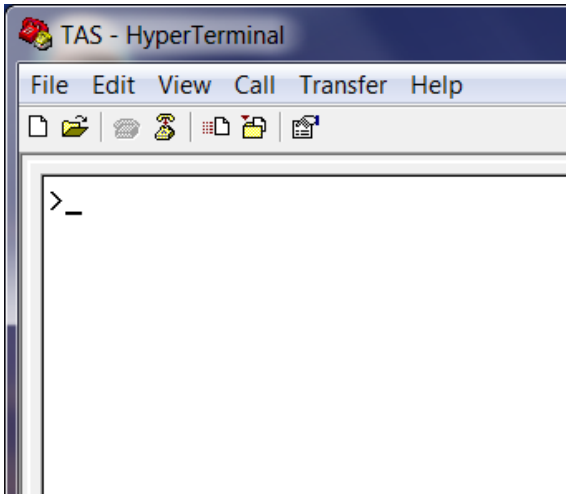
4.3.3. CALIBRATION AND VERIFICATION INTERFACE

Command interface access instructions

The command interface instructions that follow apply only to the ADS-B capable TAS-A processor with TAS-A Application Software 510-00296-000 Revision 01or higher, sometimes referred to as TAS-A Release 2 software.

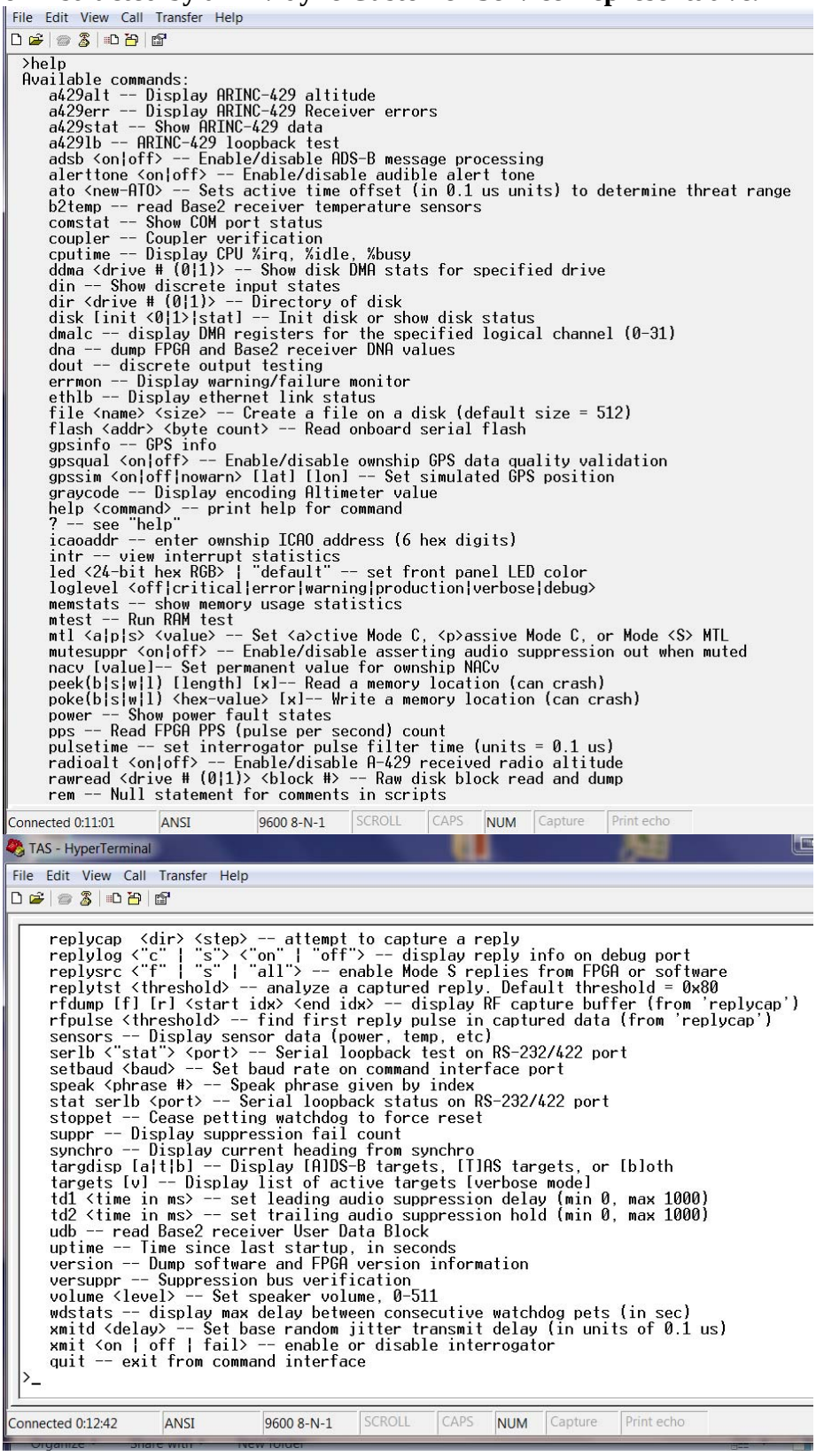
The following instructions will allow access to the Command Interface Menu. Most of these configuration items would normally be unchanged and should only be changed if instructed to do so by Avidyne support, for future product releases, or in depth troubleshooting.

1. When “Enter link msg to connect” is displayed, quickly type in “command”. The screen will now only display a “>” prompt. This is where you type in the commands.

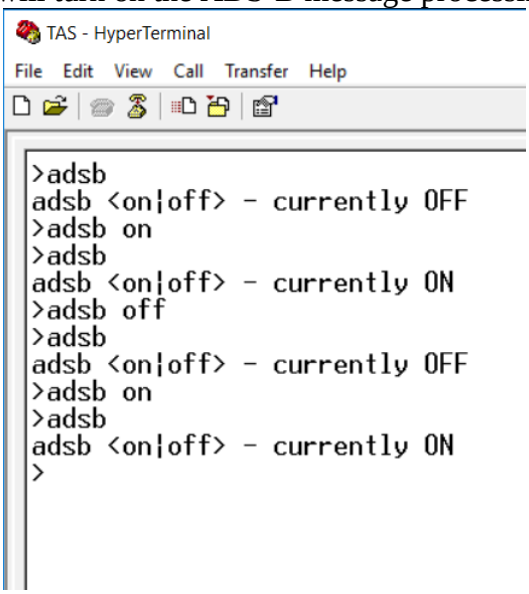


xx

2. Type “help” for a list of available commands in the Command Interface menu. **This is for reference only and you should not alter anything unless directed by a Service Bulletin or instructed by an Avidyne Customer Service Representative.**

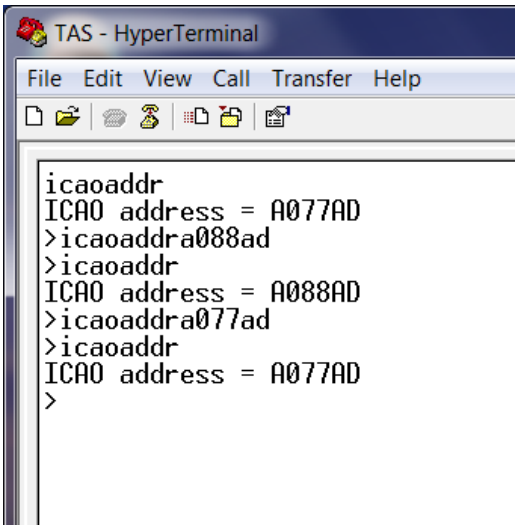


3. The ADS-B capable TAS-A processor is shipped with the ADS-B message processing turned off. If the TAS-A is connected to an approved GPS source, you must turn on the ADS-B message processing and enter the aircrafts ICAO address to use the ADS-B functions.
4. Type “adsb” and hit enter. The screen will now display the status of the ADS-B message processing.
5. The command “adsb on” will turn on the ADS-B message processing.



6. The 6 digit ICAO address must be entered using the command interface in order for ownship shadow detection logic to function properly.

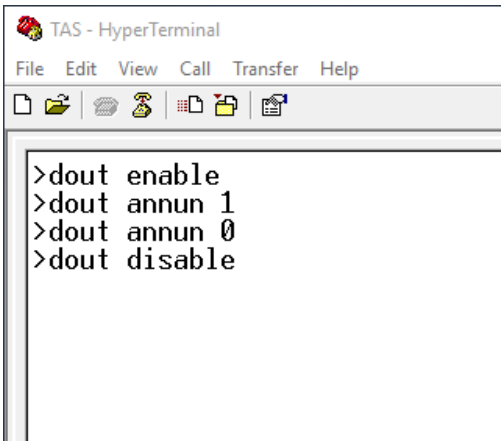
7. Type in “icaoaddr” and hit enter to access the ICAO Address setup screen. The example below shows how to change an address or enter an address for the first time. Type in “icaoaddr” after you enter the ICAO Address of the aircraft to verify the TAS-A has accepted your entry.



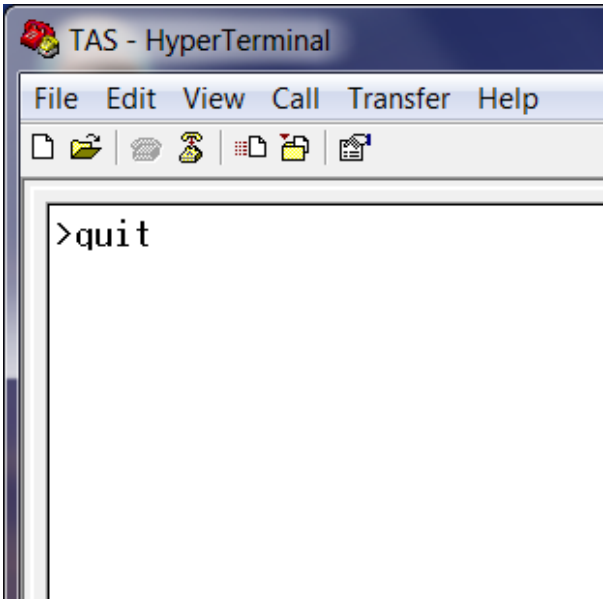
8. The ADS-B capable TAS-A processor with the annunciator light (If installed) can be tested with the following commands:

   “dout enable” will bypass the flight code control of discrete outputs, which will allow manual testing of those outputs.
   “dout annun 1” will enable the annunciator output
   “dout annun 0” will disable the annunciator output
   “dout disable” will return control of the discrete outputs to the flight code.

   Make sure you hit enter after typing “dout disable” to reset the flight code control software.



9. To exit the Command Interface program, type in “quit” after the “>” prompt and hit enter.



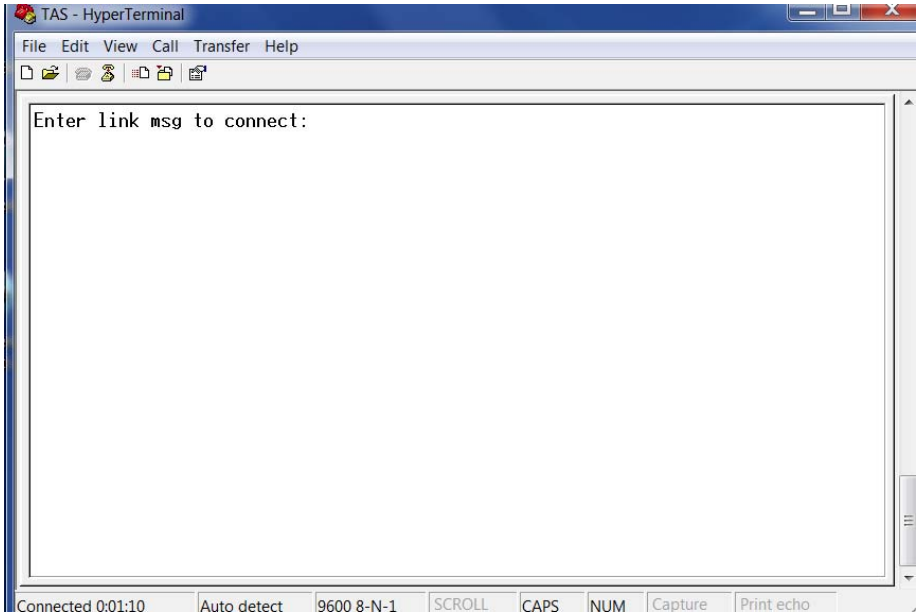
CVI Monitor access instructions

The following instructions will allow access to the CVI monitor menu. The following CVI tests check most of the TAS functions. If you get lost, press Enter on the computer and start again. The TAS ½ 3ATI Traffic Display will show an error message during some of the tests. Disregard the TAS ½ 3ATI Traffic Display indications.

NOTE:	For HyperTerminal Users: Some keyboard entries will change the HyperTerminal settings. If the test display indications are corrupted, select File>>Properties and check for the correct settings, especially the type of emulation (it should be ANSI).

NOTE:	Some menus may differ slightly on a TAS-A processor from those depicted; however, the menu selections used in the procedure have not changed.

1. When the computer shows the message "Enter link message to connect:" Quickly type in "CVI"*.



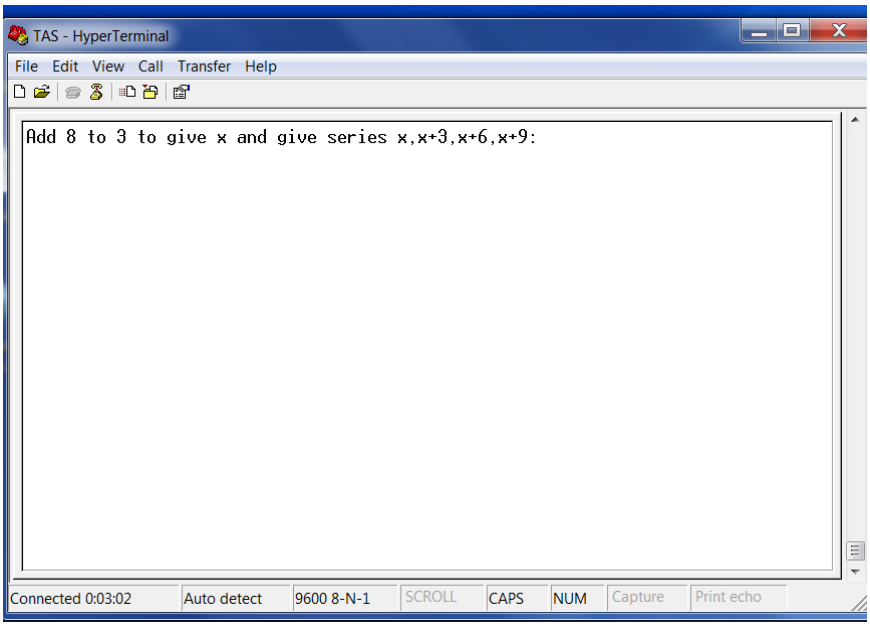
2. The computer will then administer a small math test in order to make sure there is a human there instead of a machine. Relax; there is plenty of time.

NOTE:	The new TAS-A processor also supports an alternate connect message for the CVI menu, "NEWCVI" that bypasses the math test. If you use this new connect message in step 1, then you can skip steps 2 through 5.

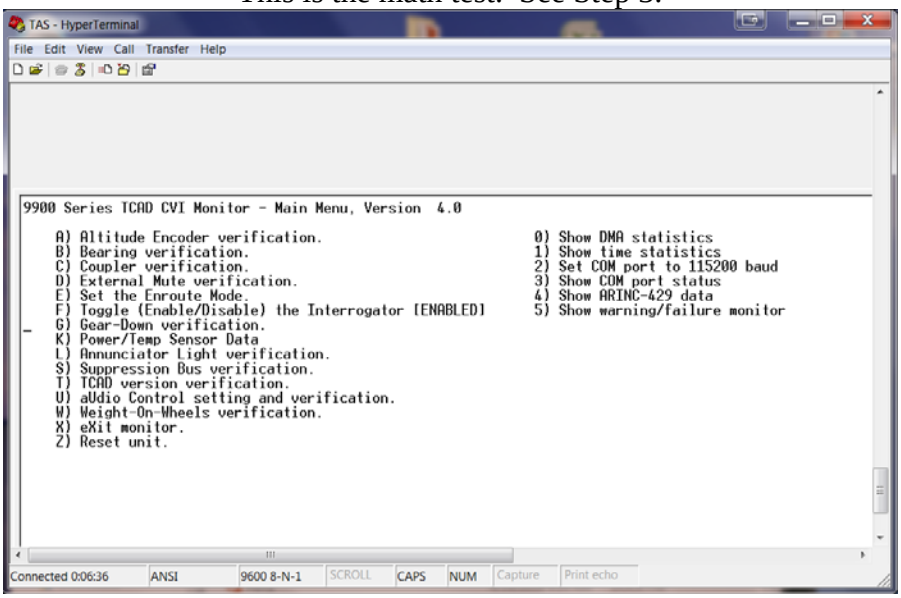
3. Add the first two numbers, then add 3 to the numbers three times and write the numbers down. For instance, if the system says add 8 to 3; write down 11, 14, 17, 20.

* Sometimes the HyperTerminal window is displayed but not selected. If so, the keyboard inputs will do nothing. Use the mouse to click on the border at the top of the TAS HyperTerminal window to select it.

4. Type in the 4 numbers you wrote down including the commas. Continue even if some of the numbers you typed disappear.
5. If it was done right, you will be presented with a menu of tests. Complete each test as shown. If the system does not present the CVI monitor menu, the math test was done incorrectly. Press enter, type CVI and try again.



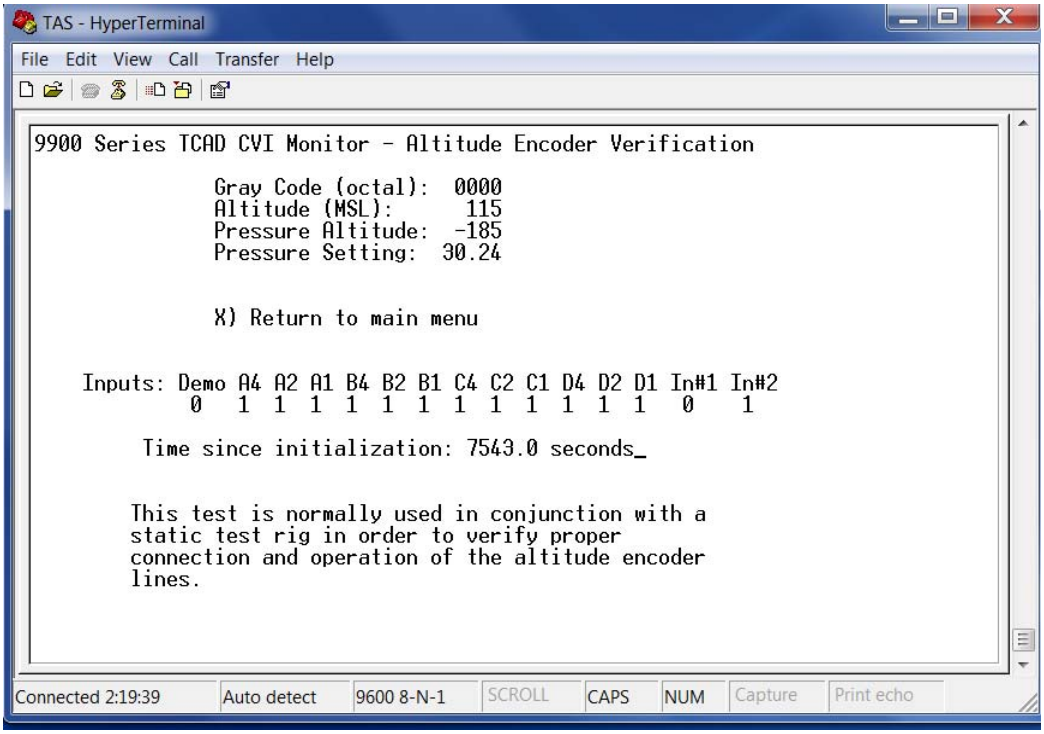
This is the math test. See Step 3.



This is the CVI monitor menu screen. You passed the math test.
Press the letter or number that corresponds to the test conducted.

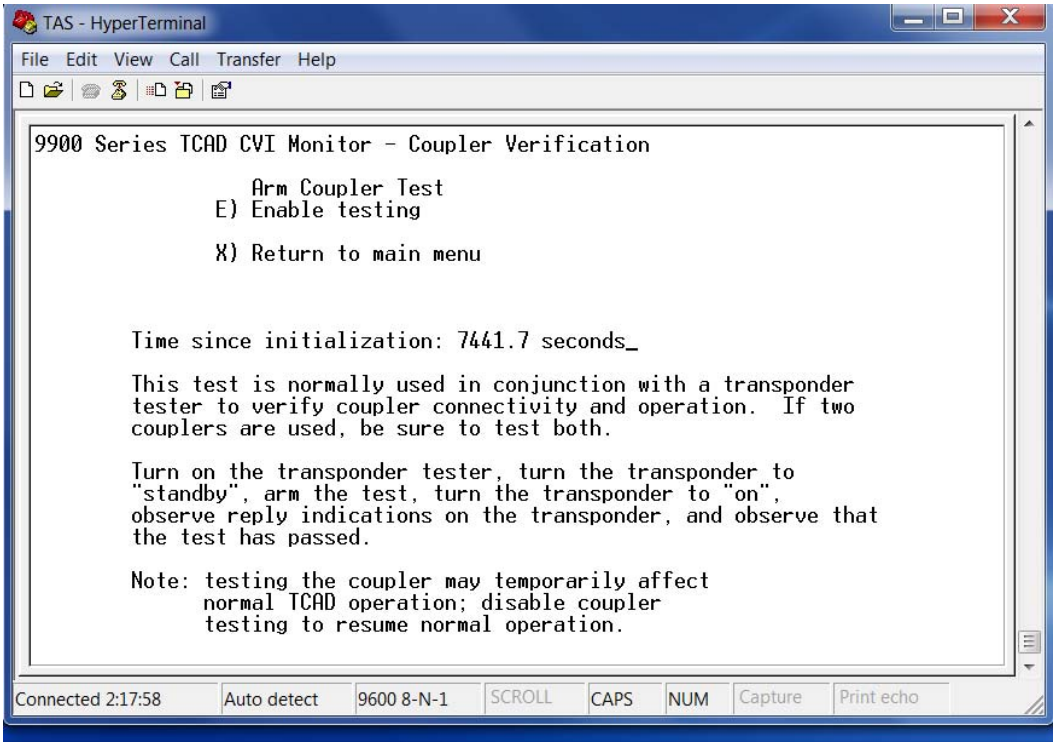
6. If the TAS locks into a “TAS Interrogator Failure” mode with an audio warning and status light illuminated during one of these tests, hit “Z” to reset the unit without having to cycle power. Wait until “Enter link msg to connect’ is displayed and type in CVI to reconnect.

7. Prepare the aircraft for a check of the altitude encoder using a static test rig and then Press A for the Altitude Encoder Verification test.



This is the Altitude Encoder Verification Screen.

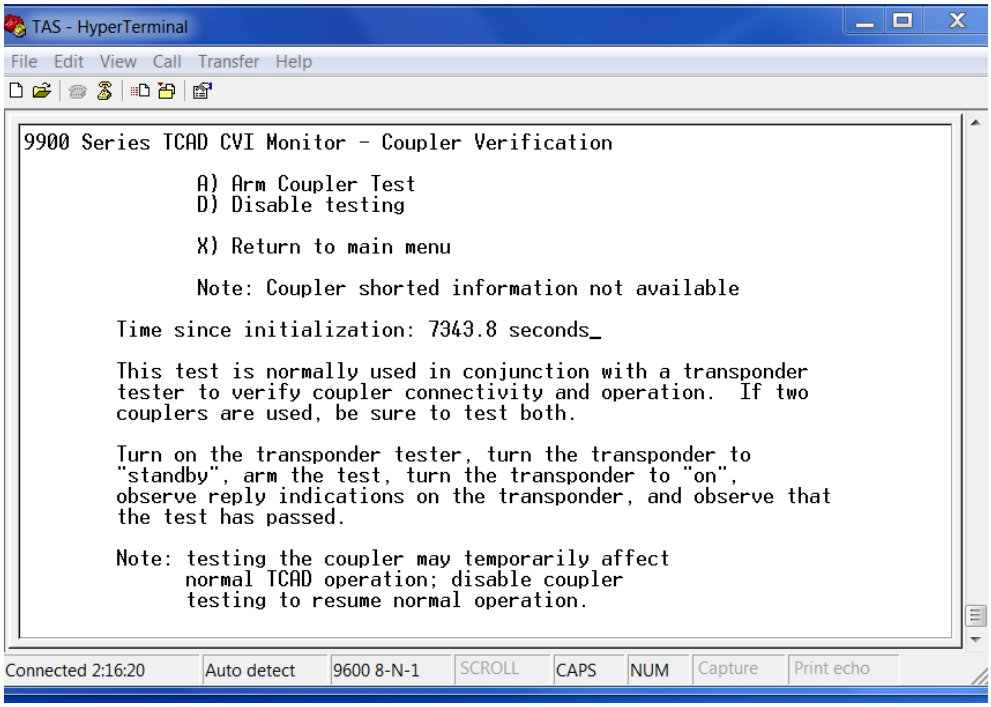
8. Using a Static test rig, raise the altitude of the encoder to verify proper operation of the TAS altitude data. The data on the static test system should match the Pressure Altitude identified on the computer monitor. Each bit line must be checked for shorted or open connections. Proper altitude decoding is essential for correct operation. Ignore D1 and D2. Press X to return to the CVI monitor menu.
9. Bearing Verification is more involved and will be accomplished after the other CVI tests. Press C for Coupler Verification. If the transponder is not being interrogated, a transponder tester is necessary to interrogate the host transponder.



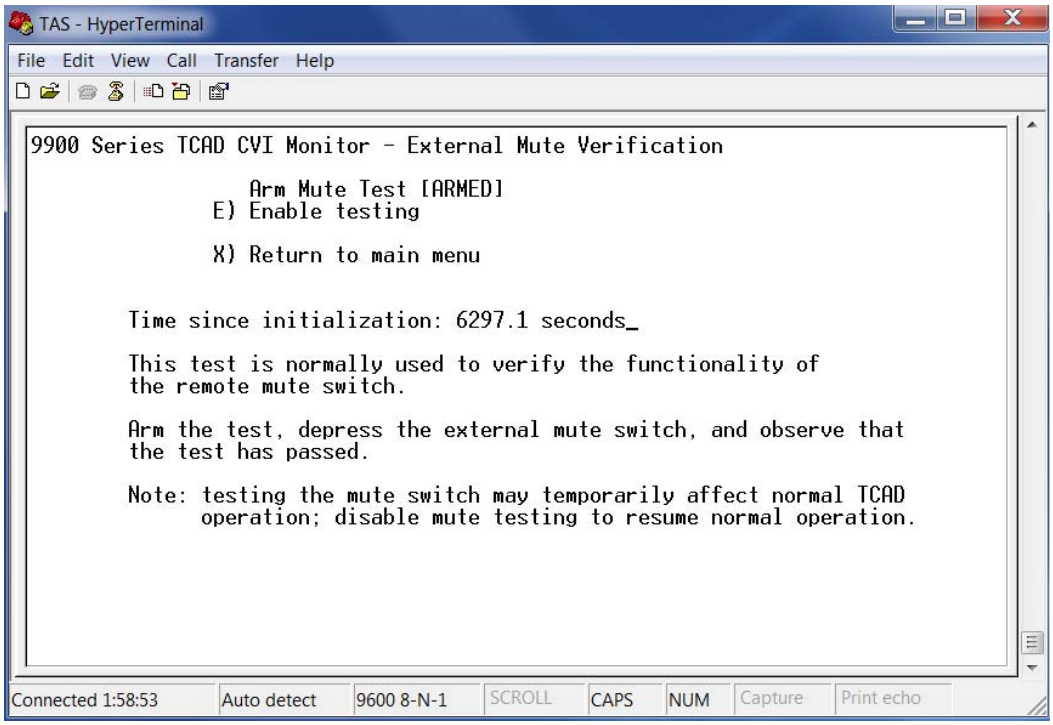
Coupler Verification Test Screen

10. Follow the instructions on the screen for the Coupler Verification Test. This test confirms coupler operation when the host transponder replies. Press E to enable the test. If the test passes, [PASSED] is shown at the Arm Coupler Test line, as shown below. If the transponder is operating prior to enabling the test, the words “ARMED” and “PASSED” alternate. This is normal. If the test shows [PASSED], the test has passed.

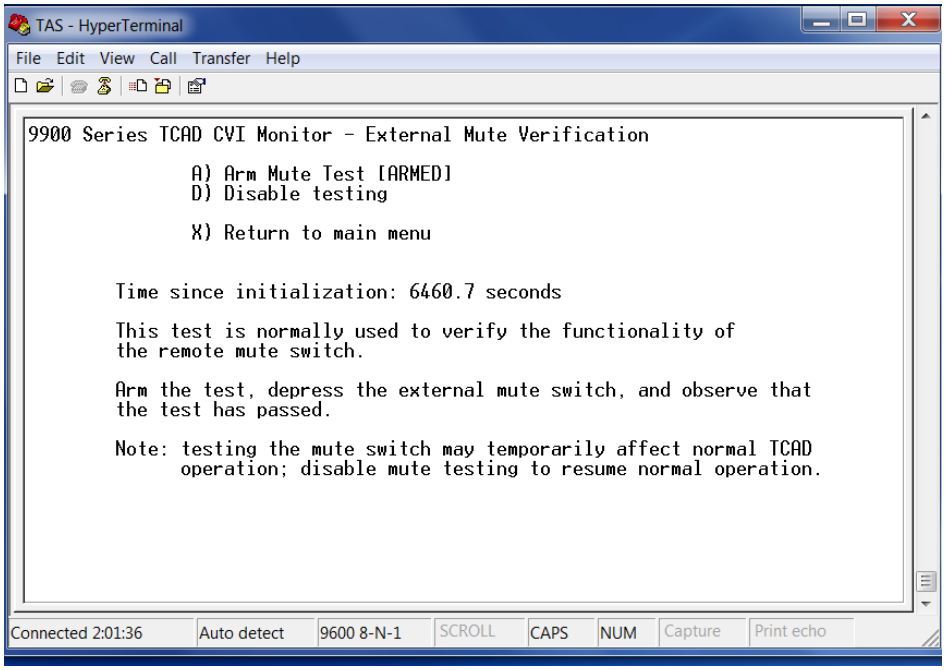
i. **NOTE:** If the installation uses more than one transponder coupler, then the Coupler Verification procedure should be completed once for each transponder coupler. To ensure that the proper coupler is tested, disconnect all transponder couplers except the one being tested.



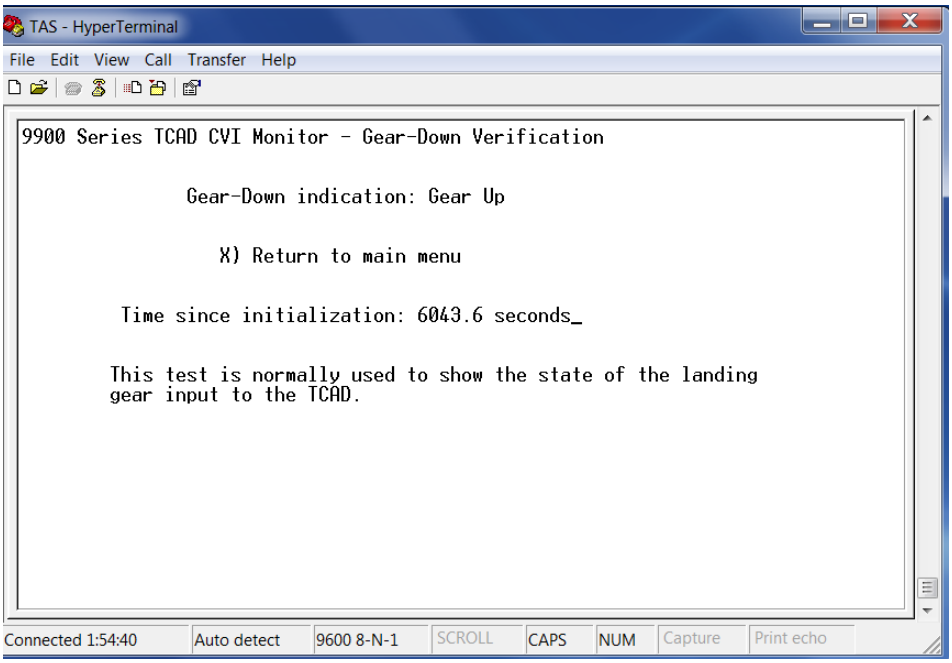
11. Coupler test, passed. Press X to return to the CVI monitor menu and select the External Mute Test by pressing D.



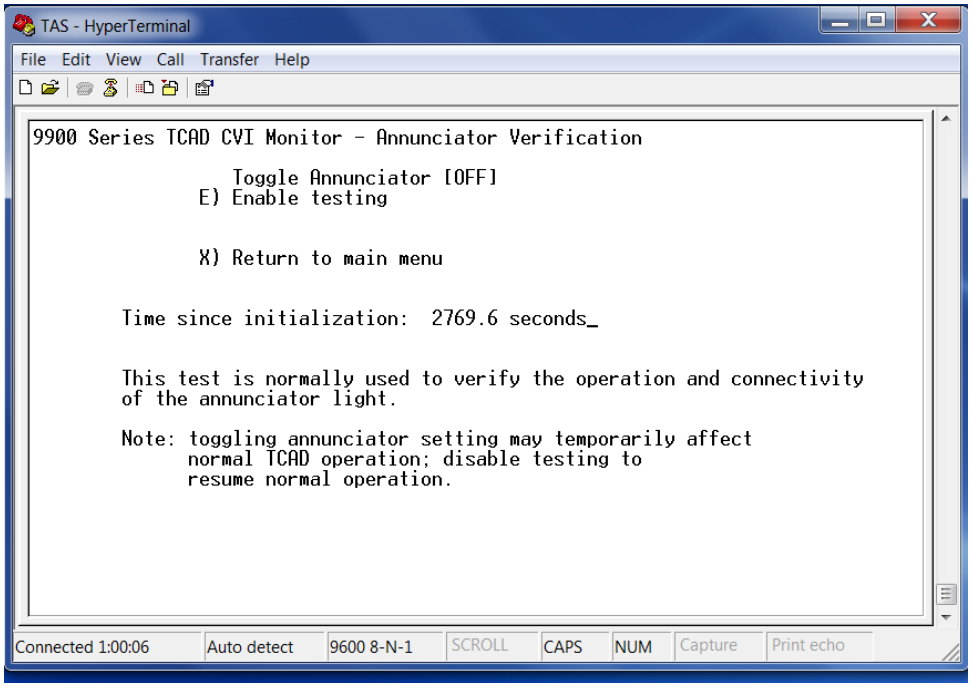
12. External Mute test. Press E to Enable the test. Then press the remote mute button or enable other mute inputs (such as TAWS) to accomplish the test. The Mute/Update button must be installed unless a dedicated traffic display that provides a TAS Mute function is used (such as the Avidyne TAS ½ 3ATI Traffic Display/Controller).



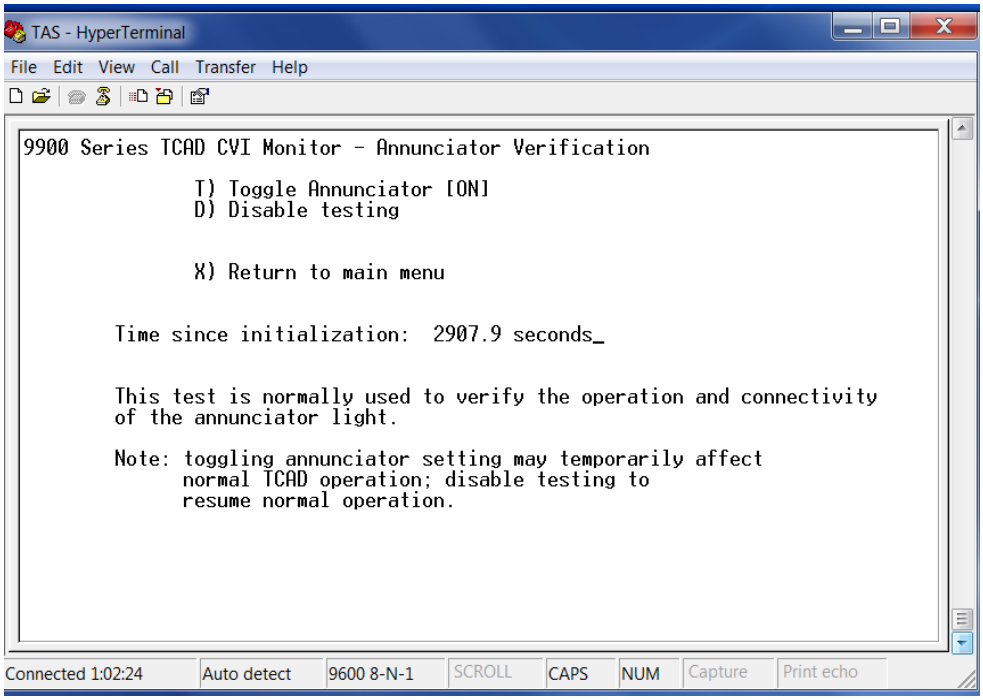
13. After pressing the Mute/Update Button, the External Mute Test should show [PASSED]. Press X to return to the main menu. Then press G for the Gear Down Verification Test.

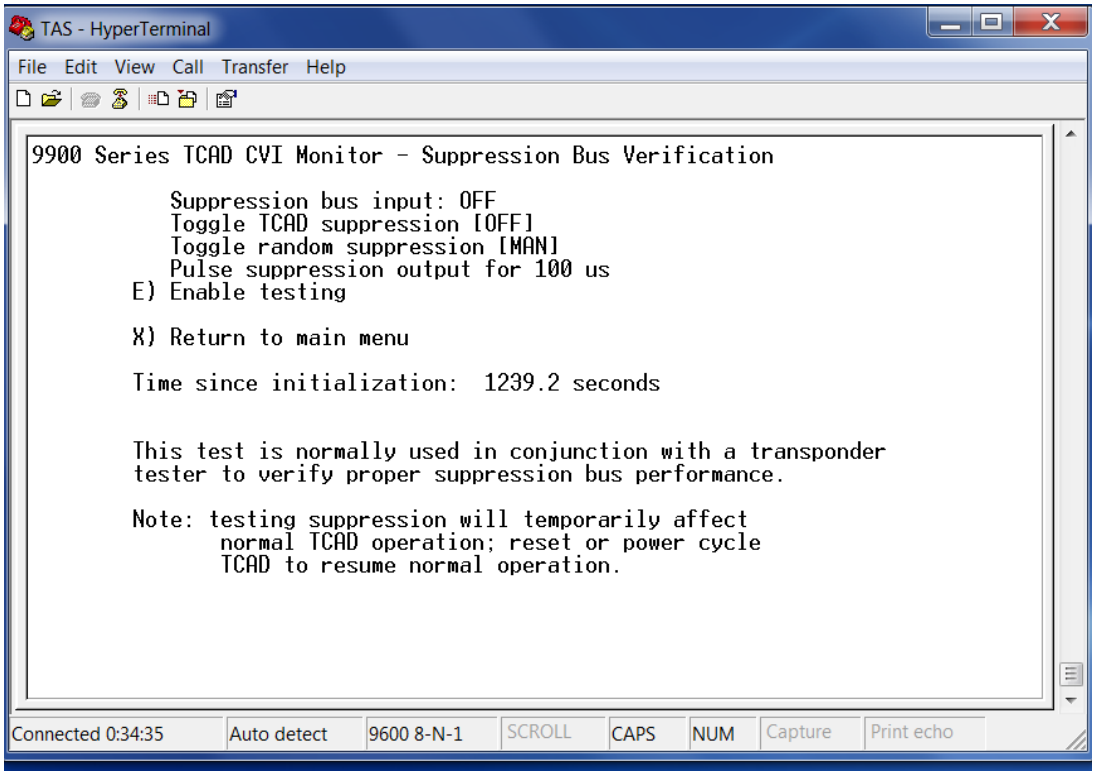


14. Gear down indication. This verifies the system detects the gear down state. The TAS Self Test is designed to find a fault if the TAS fails to detect a gear up state when flying. If the gear position input is not connected, the test must show Gear Up. After the test, press X to return to the CVI monitor menu.



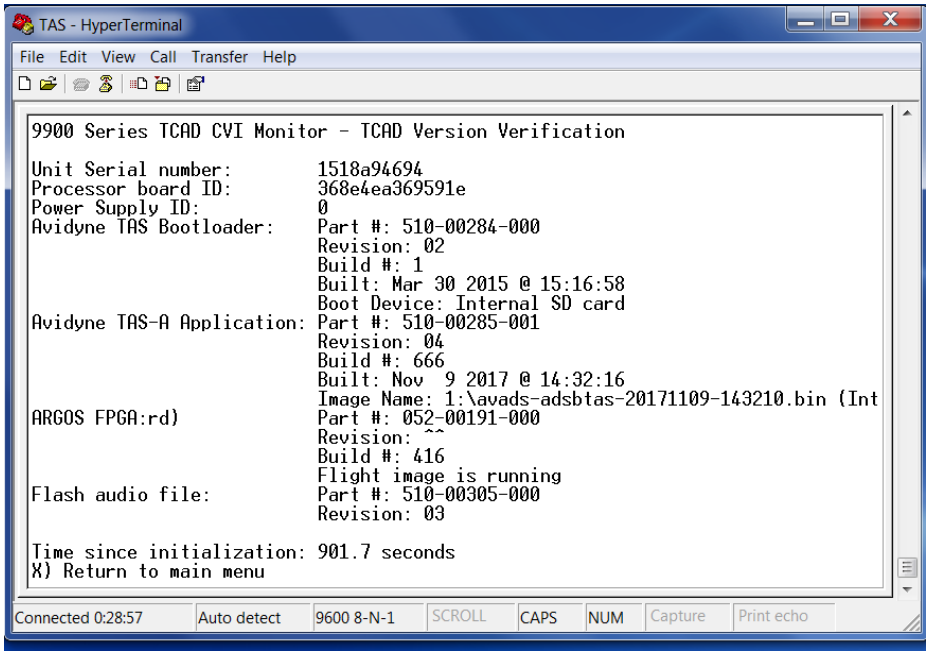
15. Press L for the Annunciator light test (if installed). Press E to enable the test. Press T to toggle the light on and off. Verify the annunciator light does turn on and off. The indications on the computer are shown above and below. Press X to return to the CVI monitor menu. For TAS-A processors with TAS-A Application Software 510-00296-000 or higher (See step 17), go to the Command Interface Menu and follow the instructions for Annunciator Light Testing.



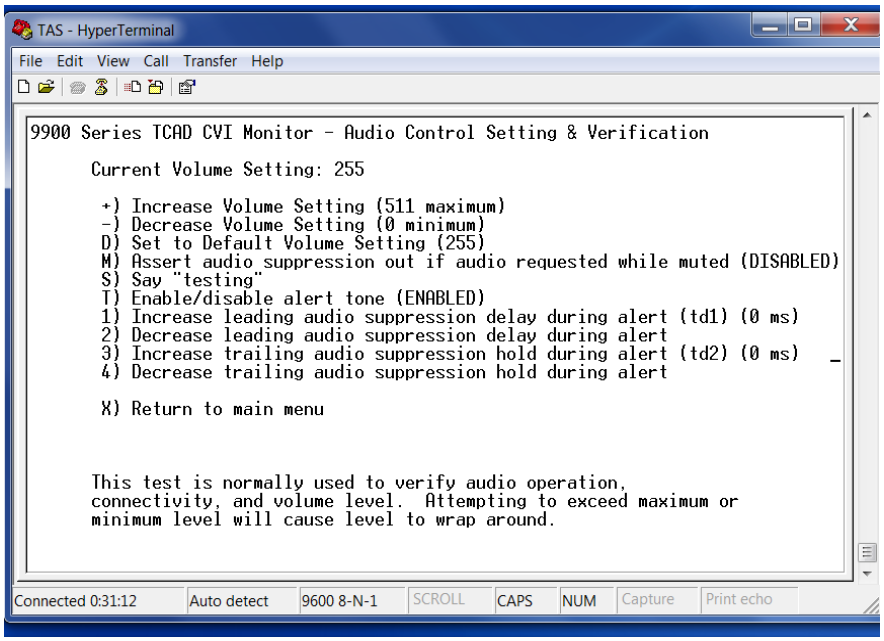


16. Press S for the Suppression Bus Verification test. This must be accomplished with a transponder tester interrogating the host transponder (Reference Section 4.3.1). Press E to Enable testing. Verify the Toggle Random Suppression shows [MAN]. If it shows [AUTO] press R to engage the [MAN] mode. Press T to toggle Suppression on and off. Verify the percent reply of the host transponder reduces when Toggle Suppression shows [ON] and 100% when Toggle Suppression is [OFF].

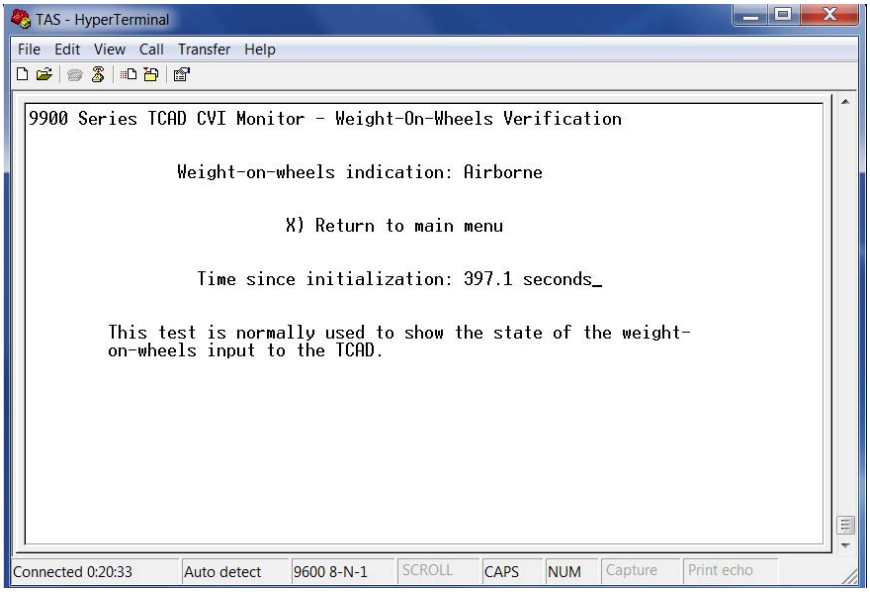
17. Press X to return to the CVI monitor menu.



18. Press T for the TAS software version verification. Use this screen to check the software level and internal tests. Press X to return to the CVI monitor menu.

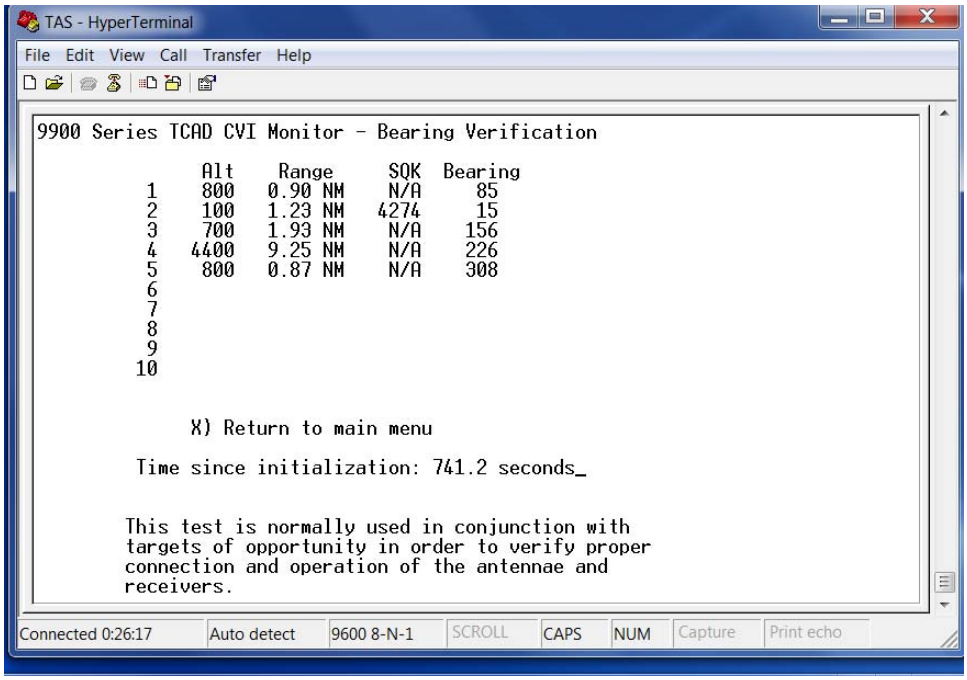


19. Press U for the Audio setting screen. Press S to check the audio level, and use the + and – buttons on the computer to increase or decrease the audio level. This is the only way to adjust the audio on systems without a display. When increasing to the maximum setting, go slowly so as to not exceed 511. If 511 is exceeded the level will go to 0 and it will be necessary to try again (press D to get to 255). Press X to return to the CVI monitor menu.



20. Press W for the Weight-on-Wheels Verification test. This verifies the system detects the "on the ground" state. If an air switch is used, engage the switch to show Airborne. The TAS Self Test will find a fault if the TAS fails to detect a weight off wheels state when flying. Fixed gear aircraft without an air switch will show Airborne.

This concludes the computer testing. Proceed to the Ramp Test, Antennas (Section 4.3.4) if that test is conducted next. Otherwise, turn off the TAS and disconnect the computer.



This page may be used to observe bearing output data for the antenna test. Go to Paragraph 4.3.4, *Ramp Test, Antennas*, in this section. When completed, press X to return to the CVI Monitor Menu.

4.3.4. RAMP TEST, ANTENNAS

This test is used to determine the bearing performance of the installed system. A busy traffic environment can make this test difficult to conduct. Using a TCAS tester such as the IFR TCAS-201 Test Set can reduce the difficulty. The test set must be capable of interrogating for Mode C replies and not require a Mode S address for response. Set the tester altitude well above the field elevation, at an altitude where there is little traffic, but within 10,000 feet of the field elevation. Set the range rate to zero, vertical rate to zero and set the range between and 1.3 to 2.0 miles. If there is little traffic and the Avidyne CVI monitor is used, an operational transponder unit located more than 50 feet but less than 100 feet away from the host aircraft should assure proper performance testing.

The bearing accuracy may be measured using a calibrated antenna range that allows precise echo-controlled, far field, angle of arrival measurements at or slightly above zero degrees elevation and over 360 degrees in azimuth. The bearing accuracy can also be measured using a fixed transponder location by positioning the test aircraft on a compass-rose while measuring the bearing angles at 30-degree intervals. Alternatively, the test aircraft is fixed and the transponder (or TCAS tester) can be positioned. Manual readout of the bearing estimate may be accomplished directly from the traffic display (if installed) or the CVI display on the portable computer (see 4.34 H). A maximum error of ±30 degrees in azimuth is acceptable; however large errors are acceptable in the area of ±45 degrees behind the tail and the area not visible from the cockpit. In these cases, aircraft structures may interfere with the signal path.

It is important to conduct the test in an area where signal reflections are minimal. Outside and away from hangars and other buildings is usually best. Specular reflections from moving aircraft or, ground vehicles or nearby operating transponders can contaminate the test results. If another aircraft with an operating transponder is used for testing, the signal path must not be occluded. If range or bearing indications from the test aircraft are unstable, then reflections from nearby structures or other interfering sources are likely disrupting the signals and a better location is necessary. See Section VI for more information.

NOTE:	For aircraft with weather radar, check the TAS performance at 130° and 210° with the radar on to verify no interference from the radar. Use caution to operate the radar in accordance with recommended procedures and avoid RF exposure to personnel.

A. This test does not require interrogation of the host transponder.

B. Place the aircraft so the test transponder is positioned directly forward of the host aircraft.

CAUTION:	Notification of ATC may be necessary to avoid false airborne TCAS resolution advisories.

C. Verify the TAS shows the target directly forward, at 0° (±30°) relative to the nose of the aircraft. If no display is used, verify using the CVI Interface. Paragraph 4.34.

D. Place the aircraft so the test transponder is oriented at 30° increments around the aircraft.

E. Verify the TAS shows the target at the correct bearing at each of the 30° points, ±30°.

NOTE:	The vertical stabilizer or other appurtenances on the aircraft may affect the bearing performance. A maximum error of ±30° in azimuth is acceptable; however large errors are acceptable in the area of ±45° from the tail and the area not visible from the cockpit. In these cases, aircraft structures may interfere with the signal path.

4.3.5. RAMP TEST, OPTIONAL ½ 3ATI TRAFFIC DISPLAY/CONTROLLER

A. Press the test buttons (DATA & ENRT).

B. When the ½ 3ATI Traffic Display/Controller shows "Testing Display", press the UP arrow and MUTE.

C. The TAS will then perform a 90-second CRC test of the Display. A horizontally oriented number will count down as the test is conducted. The test will conclude with the software version levels indicated.

D. Verify the Display can be seen under all probable lighting conditions and does not interfere with the Pilot's vision.

E. Verify the Display is located in a position easily viewed and accessible to the Pilot.

F. Verify the location and position of the Display does not have any reflections or glare that would interfere with the Pilot's vision.

4.3.6. RAMP TEST, SELF TEST FEATURES AND FAILURE MODE DISPLAYS

This test calls for removal of two connectors to verify proper operation of failure modes. The connectors must be reinstalled in order to restore proper operation of the TAS. Disregard any additional failure indications generated as a result of removing the connectors.

A. Remove the null-modem connection from the TAS Processor and recycle power to the TAS.

B. With the TAS operating, verify no audible or (if a display is installed) visual indications of a TAS failure.

C. If installed, double-press the Mute/update button and verify the voice indication of "No advisories" if there are no computed Traffic Advisories (TA), or a traffic indication if there is a TA. Ground Mode may also be indicated.

D. Remove the connector from J1 on the Processor, or disable the altitude source if J1 is not used. "TAS altitude invalid" should sound. The warning sounds only once. Double-press the remote mute button or the DATA button to repeat the message.

E. Replace the connector or re-enable the altitude source. The warning stops.

F. Remove the BNC connector marked Coupler. Connect a short coaxial cable with BNC connectors on both ends to the Coupler input at the Processor. Short the center conductor of the open BNC connector to the shell. "TAS Code 1" will sound after about one minute or less. Double-press the remote mute button or the DATA button to repeat the message. Disregard any other failure indications.

G. Replace the Coupler connector.

H. Turn the TAS off for a few seconds.

I. Turn the TAS on again. Verify no audible or (if a display is installed) visual indications of a TAS failure. If installed, double-press the Mute/update button and verify the voice indication of “No advisories” if there are no computed Traffic Advisories (TA), or a traffic indication if there is a TA. Ground Mode may also be indicated

4.4. INTERFERENCE CHECK

These checks are designed to ensure interference-free operation of the TAS, to ensure the TAS causes no interference, and the equipment onboard the aircraft does not cause interference with the TAS.

4.4.1. INTERFERENCE CHECK, TRANSPONDER

This check is designed to ensure the TAS has adequate data to acquire and track aircraft. It is critical that the transponder does not 'squitter' as a result of on-board interference. If it does, the data available to the TAS for traffic avoidance is reduced.

A. With the transponder tester turned off, verify the rate of reply light flashes is reasonable for the location. If not, then proceed with the following to determine the source of interference.

B. Turn off all avionics except the transponder.

C. Turn on all the avionics, one at a time. Observe if the reply light flash rate changes. Pay special attention to the DME and select different frequencies to verify there is no interference. The frequencies from 109.2 to 115.2 are especially important and should be specifically checked.

D. Verify there are no other sources of interference (i.e. engines or accessories).

4.4.2. INTERFERENCE CHECK, OTHER EQUIPMENT

This check is to ensure the TAS does not interfere with other equipment in the aircraft.

The TAS employs a microprocessor that relies on a clock oscillator, which may generate interfering emissions at frequencies required for navigation and communication equipment. To substantiate the immunity of the VHF navigation and communications equipment, perform the following tests:

A. Apply power to the avionics bus and to both communications and navigation radios.

B. Open the squelch on the primary communications radio and apply power to the TAS.

C. Select various frequencies for a general test of the communications radio receiver. Then select 120.000 MHz, 122.000 MHz, 124.000 MHz, and 132.000 MHz and attempt to discern RF interference caused by the Model 9900. If such interference is experienced, confirm by removing power to the systems by pulling the respective circuit breakers.

D. Repeat the exercise for the secondary communications radio receiver. Note any unacceptable interference.

E. Tune each of the navigation receivers to the frequency of 109.2 and 115.2 MHz and listen for any discernible interference and, if practical, observe interruption of DME on those corresponding frequencies. Note any unacceptable interference.

F. Observe any other anomaly in other radios such as the ADF, the Marker Beacon, the Transponder, GPS navigation equipment, weather detection, weather radar, autopilot and the DME when operating the TAS.

G. Any unacceptable interference should be addressed prior to delivery to the customer.

4.4.3. TAS AUDIO ALERTS

A. Verify the windshear, GPWS and TAS (TAS) voice alerts are compatible.

B. Verify all higher priority aural alerts can be heard over the TAS aural alerts.

4.4.4. ELECTRICAL SYSTEM

A. Perform Electrical Load Analysis to verify the installation of the TAS System does not adversely affect the electrical system.

4.5. FLIGHT TEST

A. Verify the TAS Aural Alerts can be heard in all possible cockpit noise condition.

B. Verify all higher priority aircraft aural alerts (e.g. stall horn, landing gear horn, etc) is heard with and without headsets.

C. If installed, verify the ½ 3ATI Display/Controller is located in a position free of glare and reflections that could interfere with the Pilot's vision.

4.6. CUSTOMER CARE CHECKLIST

After installation, attention to the following items will help to make our mutual customer pleased with the TAS purchase.

A. Clean: The ½ 3ATI Traffic Display/Controller can be cleaned with a damp cloth.

B. Checkout: Complete and satisfactory.

C. Preset Settings: The factory-preset settings should be enabled (see Section I).

D. Complete the TAS Instructions for Continued Airworthiness, Avidyne Document AVTAS-021, and install in the aircraft's maintenance records.

SECTION V
WARRANTY SERVICE AND PRODUCT SUPPORT

5.1. DOCUMENTATION

After delivery to the customer, fill out and return the warranty document to Avidyne Corporation. The Warranty form may be found and filled out online at:

http://www.avidyne.com/support/registration.asp.

5.2. RETURN AUTHORIZATION

In order to expedite repair of units, call the factory for a return authorization number before returning equipment for service.

5.3. WARRANTY SERVICE

Avidyne warrants products in accordance with the warranty statement in effect at the time of equipment registration. All repairs are performed at the factory. Contact Avidyne Corporation for a warranty/return authorization.

All requests for warranty payment must be submitted electronically to Avidyne via the web based interface. Authorized warranty work performed by the dealer will be limited to removal and re-installation of units on an exchange basis. Avidyne will bear the cost of warranty shipping only on return via UPS surface delivery only. The cost of shipping the unit to Avidyne is the customer's responsibility. Avidyne reserves the right to use reconditioned parts in repairing the product or to use reconditioned units as warranty replacements.

For technical information and service, call 1-888-751-2912 or visit our website at:

http://www.avidyne.com/support/index.asp.

For AOG support, call 1-877-900-4AOG (4264).

SECTION VI
INSTALLATION PLANNING AND TROUBLESHOOTING GUIDE

6.1. GENERAL

The following information is designed to give the technician guidance in planning installations and efficiently troubleshooting problems with the TAS. If there are any problems or difficulties experienced in installing or maintaining the TAS, please contact the factory.

6.2. EXTERNAL CONNECTIONS

6.2.1. ANTENNA BONDING

The antenna should have, at minimum, a ground plane equal to one wavelength (one wavelength is about twelve inches) all around the antenna. The location of the antenna is important. The ideal antenna "view" is ahead of the aircraft must not be obstructed.

An adequate ground plane and satisfactory bonding of the antenna to the ground plane is important for reliable bearing data. Completely remove the paint from under the antenna to within 0.1 inch of the edge of the antenna for proper ground plane RF connection. The antenna must be mounted so the bare metal of the aircraft skin touches the entire metal base plate of the antenna. Electrical bonding resistance of the installed antenna to the aircraft skin should be less than .01 ohm (0.005 ohms will provide best performance). The top antenna should be mounted as far forward as practical, above the cockpit, with no obstructions between the antenna and the nose of the aircraft.

Since the transponder signal from the threat aircraft is essentially line of sight, traffic ahead of the aircraft will be blocked if the antenna is mounted well aft of the cockpit. If the antenna is blocked by the airframe, other antennas, or large metal mass such as an engine, a less than optimum antenna reception pattern will occur. A perfect location does not exist on an airplane, and some compromise is normally necessary. Nonetheless, the TAS top antenna should be at the highest, forward-most part of the aircraft when the aircraft is in level flight, and the lower antenna should also be as far forward as practical. The forward view from the TAS antenna should be better than the view from the cockpit. Since the TAS monitors for traffic all around the aircraft, if possible ensure that the antenna is clear to the rear also. The distance from L-band antennas is especially important. See Operation in a Severe EMI Environment in this Section.

Even small obstructions within 11 inches of the antennas can seriously distort the signal path and significantly affect bearing performance.

Each antenna should normally be mounted so the antenna base is level (± 10º) when the aircraft is in level flight. Significant deviation from this orientation can affect the signal reception and bearing performance. The twin blade antenna is less susceptible to errors from a pitch angle, and the single blade antenna is less susceptible to errors in the roll axis.

The antenna must be well grounded to the airframe. The base of the antenna should be bonded to the airframe, in accordance with AC 43.13-2( ).

A ground plane is necessary for proper operation. Using the supplied screws, mount the antenna to the fuselage skin so contact is made to an inner ground plane. Then bond to an airframe structural ground using solid strapping material. Copper strapping in a one to six ratio of width versus length works best. Bearing performance is only assured by use of a proper ground plane. The greater the compromise regarding the antenna requirements, the less likely reliable antenna performance will result. Contact Avidyne Technical Support for more information.

Customer satisfaction is directly related to proper antenna location and satisfactory bonding to the airframe.

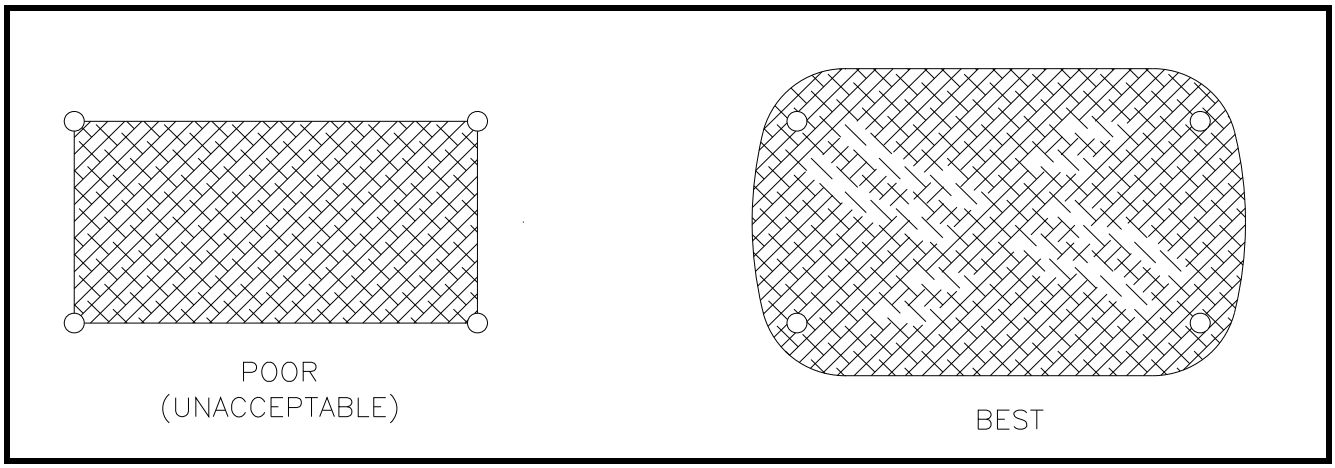


Figure 36: Paint Removal Beneath the Antennas to Assure Proper Antenna Bonding

Structural substantiation of the antenna locations is important and the responsibility of the installing agency. If a structural DER is necessary, the Aircraft Electronics Association has resources you can contact. Their number is (816) 373-6565. Armstrong Engineering in Buffalo Grove, IL has been very helpful and responsive, phone (847) 215-7757.

The bearing antennas must be connected properly. If there are bearing anomalies, see the Malfunction Indications paragraph below.

6.2.2. TOP AND BOTTOM ANTENNA SELECTION

The TAS normally uses the single blade antenna as the top antenna, and the twin blade antenna as the bottom antenna. This is not always the optimum configuration, and the positions may be switched if circumstances warrant it. Circumstances might include the inability to place the twin-blade antenna in an area that provides a clear area ahead of the antenna. In this case the single blade antenna could be used on the bottom to permit mounting the twin blade on the top, in an area that is clear ahead.

If the twin blade antenna is mounted on the top, the antenna cabling changes (see the table below).

Antenna	Antenna Connector	Processor Connector	
		Single Blade On Top	Twin Blade On Top
Single Blade Antenna	J1	J1	J1
Single Blade Antenna	J3	J3	J3
Twin Blade Antenna	J2	J2	J4
Twin Blade Antenna	J4	J4	J2

Table 20: Antenna Connections.

6.2.2.1. ANTENNA CABLING

The antenna cabling is susceptible to interference. Most shielding is only partially effective. Make sure the cabling is properly terminated and the bearing antenna coaxes are not tightly tie-wrapped together. Looping the coaxes and tie-wrapping them can induce currents that can cause bearing interference.

6.2.2.2. PROCESSOR ANTENNA CONNECTIONS

Do not over-tighten the connectors or internal damage to the Processor or the antenna could result. The connectors on the Processor and antenna are hard mounted. If a connector turns in its mounting, it needs repaired.

6.2.3. POWER INPUT LINE AND GROUND RETURN

Ensure that the TAS is well grounded to an effective airframe ground. Poor grounds or ground loops can cause intermittent operation or alternator noise in the headphones. The supplied inductors should be mounted close to the TAS, but are not required for TAS-A installations.

6.2.4. ANNUNCIATOR LIGHT

The annunciator light uses a switched ground. Installation of an annunciator light is necessary for operation of the TAS without a display, and is recommended for use in display configurations. The light should be white or amber, and identified as “TRAFFIC” or “TRAFFIC ALERT”. The maximum current through the annunciator output must be limited to 1 Amp.

6.2.5. AUDIO

The TAS audio is designed to operate into a 600-ohm load. If an audio port must be shared with

another audio input, series resistors must be used in both lines to allow sufficiently high audio for both audio inputs. Usually 220- to 470-ohm resistors are satisfactory.

Connection to an audio panel without internal amplification normally requires a supplemental amplifier.

Low audio is usually caused by a greater than normal load on the line due to multiple inputs to one audio port.

A dedicated audio ground return line is provided to eliminate possible audio whine. Connect the return to the ground for the audio port the TAS is connected to. If no return ground is provided, ground to the case of the audio panel.

The audio line from the TAS to the audio panel should be shielded, with the shield grounded at one end.

6.2.6. ENCODER LINES

The encoder lines are diode isolated inside the TAS. A diagram of this portion of the circuitry is in Section I of the Installation Manual. The common line should not be diode isolated, and should be the same potential as the encoder.

If any lines are shorted or open, several (but not all) altitudes on the TAS will be in error. Using the static tester and raising the altitude of the encoder while monitoring the TAS bit lines with a personal computer can quickly show a malfunction.

Stars (******) on the altitude display of the Avidyne TAS ½ 3ATI Traffic Display/Controller indicate the TAS is not receiving valid altitude data. Voice annunciation of “Altitude Data Invalid” also warns of this condition.

The common line from the TAS to the encoder should never be diode isolated. If it is, improper and unpredictable altitude errors will result. The encoder lines should be shielded, with the shield grounded at one end.

6.2.7. ON-THE-GROUND INDICATIONS AND GEAR POSITION

The Aircraft On-the-Ground indication (typically Weight-on-Wheels or an airspeed switch) is used to automatically put the TAS in the Ground mode upon landing. This is convenient for the pilot because it eliminates audible advisories when on the ground. The landing gear position changes Sensitivity levels on the TAS. When the landing gear is down, the TAS operates in Sensitivity Level A. See the TAS Pilot’s Operating Handbook for more information.

The Aircraft On-the-Ground inputs (Weight-on-Wheels or an airspeed switch) and gear position are diode-isolated inside the TAS processor.

6.2.8. TRANSPONDER SUPPRESSION

The TAS sends and receives suppression signals. Transponder and DME (if installed) suppression are required. Verification that suppression is operating is essential during checkout of the TAS.

The TAS is compatible with both mutual and unidirectional suppression systems.

Table 13 lists the availability of suppression for popular transponders.

The TAS suppression can be connected directly to any ARINC-standard mutual suppression bus. Several older Bendix-King transponder and DME suppression configurations do not conform to ARINC standards, so components must be added to bring those suppression circuits closer to

conformity when DME is also installed. These transponders include the KT-76A, KT-78A, and KN-62, KN-62A, KN-64 and KNS-80 DME.

If a diode is called out in the Installation Manual, it should be installed at the transponder to avoid any capacitive charge build-up. The following items can cause an unsatisfactory suppression signal:

1) Suppression not connected.

   REMEDY: Connect it.

2) The diode used to block the TAS suppression from sinking into the DME is installed backwards.

   REMEDY: Install the diode correctly.

Best performance of the TAS is obtained when the DME and transponder are operating properly. Many aircraft have interference between the DME and transponder and DME interference cannot always be detected. If the DME causes the transponder to transmit often, there is much less time available for the TAS to acquire data.

To preclude possible interference from the DME, connect DME suppression.

The TAS suppression output is intentionally intermittent. This causes the reply meter on analog transponder testers to vary between 80% and 100%. It also causes some automatic testers to frequently indicate failure of the transponder test due to reply rate. This is normal and due to the tester's design expectation of a regular suppression interval.

6.2.9. TRANSPONDER COUPLER

The Coupler consists of a 50-ohm track on the transponder line and a diode detector to provide a signal to the TAS indicating the host transponder has transmitted. No maintenance is required for the coupler beyond the requirements in the periodic maintenance paragraph in Section I.

The most important item regarding the Coupler is the proper mounting and installation of the connectors on the transponder antenna cable. The RF cable must be intact and it should have no bends that exceed the natural radius of the cable. Do not bundle the Coupler output line with any pulse transmission lines.

The type N connectors used with the coupler are designed for RG-58 cable. If the connectors are used on cable that is smaller than RG-58, the cable jacket may not provide sufficient mechanical support for the connector. In this case the shield and the center conductor mechanically support the connector, resulting in an unreliable connection. The coax can easily pull out, creating transponder or TAS problems (where the TAS sees the onboard transponder). Be sure the coax jacket is sufficiently snug in the connector in order to provide mechanical support and a more reliable connection.

The Coupler should be well-grounded to the airframe. Grounding to the side of the Processor or transponder rack is usually not sufficient.

Addition of the Coupler to the Antenna cable increases the cable length, and can cause the transponder frequency at the antenna to shift. Adjust the transponder as necessary.

6.2.10. AVIDYNE ½ 3ATI TRAFFIC DISPLAY, MFD AND PROCESSOR INTERCONNECT PRECAUTIONS

Twisted shielded pairs should be used. Excessive EMI from other aircraft equipment penetrating these lines can cause a Link Failure indication on the TAS Display or a loss of signal to the MFDs.

The Avidyne TAS normally energizes in the Ground Mode, based on the altitude when power is applied. The Ground Mode allows Avidyne TAS to function, but all tones are muted and traffic below 200 feet above the aircraft is not displayed. When the system energizes in the Ground Mode, "Ground Mode" is announced. If the Avidyne TAS momentarily resets in the air, it will not enter the Ground Mode. If the system is intentionally reset in the air, then it can and likely will enter the Ground Mode, which is an abnormal and undesirable condition in flight. Although the System announces "Ground Mode", there must be a way to deselect the Ground Mode. If not, then the automatic Ground Mode function must be disabled. The Avidyne TAS ½ 3ATI Traffic Display/Controller, the Avidyne MHD and most RS-232-connected multi-function displays allow deselection of Ground Mode. Call the factory for more details if necessary. There are no ARINC-429 systems that allow the deselection of ground mode.

The No Display/Controller input discrete must be jumpered to ground when there is no access to deselection of Ground Mode through any display. When the No Display/Controller input is grounded, then the Avidyne TAS will energize in a flight mode and will bypass the automatic, encoder-based Ground Mode on startup. In this case, the system will automatically enter the Ground Mode only when the Aircraft on Ground (such as Weight-on-Wheels) function is installed and operating. Refer to Table 7 on page 31 for details of configuring the No Display/Controller discrete input.

One display may be connected to each RS-232 port. The Transmit and Receive lines must be connected for each display. Several displays can be connected to the ARINC-429 port. If the Ground Mode cannot be deselected on at least one (RS-232-connected) display, pin 15 of J1 must be jumpered to ground as shown in the wiring diagram. ARINC-429 interfaces do not permit Ground Mode deselection. Most RS-232 interfaces, the Avidyne MHD and the Avidyne ½ 3ATI Traffic Display allow Ground Mode deselection.

6.2.11. MUTE/UPDATE INPUT

The Mute/Update button is used to give the pilot a momentary muting of the audible warnings, or (by double pressing the button) an update of the Traffic Alert.

TAs are announced through the audio system. If there is more than one TA, they are prioritized and delivered in sequence. Traffic Alert announcements can be repeated using the mute/update button.

The Mute/Update button mutes a current advisory or elicits a TA update. A single press of the Mute/Update button mutes an audible advisory in progress. A double press of the Mute/Update button repeats any TA announcements (with updated information and the range of the intruder). If no TAs are in effect when the button is double-pressed, the TAS announces "No Advisories".

NOTE:	The mute function only stops advisories scheduled to be reported at the time the mute button is pressed. Advisories that are scheduled after the mute button is pressed are not muted.

The update includes range information as well as the clock position and vertical reference of above or below the aircraft.

The mute input can be used to suppress the TAS audio for prioritization with TAWS and Windshear. This is only available for Processors with a part number with the -5 suffix and subsequent. The Remote Mute line is pulled low to mute the TAS. If the TAWS/EGPWS drives or pulls the audio suppression output high, then the output must be diode isolated.

6.2.12. EMI INTERFERENCE FROM OTHER ONBOARD ELECTRONICS

EMI effects from other devices is rare due to the frequency of the receivers. EMI problems are typically manifested by inability to acquire distant targets, lack of bearing from distant targets, or poor bearing performance of distant targets.

Some DMEs and transponders emit continuous wave (CW) at the designed pulse frequency. Though this is several dB down from the pulse signal, the CW can swamp out the low level signals needed to detect distant targets. Actual measurements indicate the levels can be as high as –30dBm, much higher than the TAS receiver sensitivity.

If the offending CW overloads the bottom receivers, the TAS will fail to show bearing for all but the closest of targets. If all four receivers were affected, then the TAS would fail to show distant traffic. If the antenna cables are receiving interference from other high-level cables (or from each other), then the bearing will be unreliable. The signal used to check the system may be too strong to show the problem. Reduce the test signal levels or observe distant traffic to verify proper performance.

The solution to CW is to verify the integrity of the coaxial cables and connectors from the transmitting device, and keeping the antennas far apart. Some transponders have been shown incompatible. See Section I.

6.3. CHECKOUT

Final checkout of the TAS should be done away from reflective areas. Non-reflective areas can be found a few hundred feet from aluminum structures such as hangars, or opposite the corner of the hangar where reflected signals will reflect away from the aircraft, not toward it. The following diagram from RTCA Document DO-185A “Minimum Operational Performance Standards for Traffic Alert and Collision Avoidance System II (TCAS II) Airborne Equipment” may be helpful in locating non-reflective areas of the ramp.

The vertical stabilizer or other appurtenances such as propellers may affect the bearing performance at very close range. By moving to the left or right the correct bearing measurements can be obtained. Reflections always play a role in bearing measurement. Testing with assurance that no reflections are affecting the results is not practical for most checkouts. Precise, echo-controlled far field angle of arrival measurements may not be possible due to ground and multipath reflections from buildings and other aircraft. If unacceptable errors are encountered, move the test location to change the multipath environment.

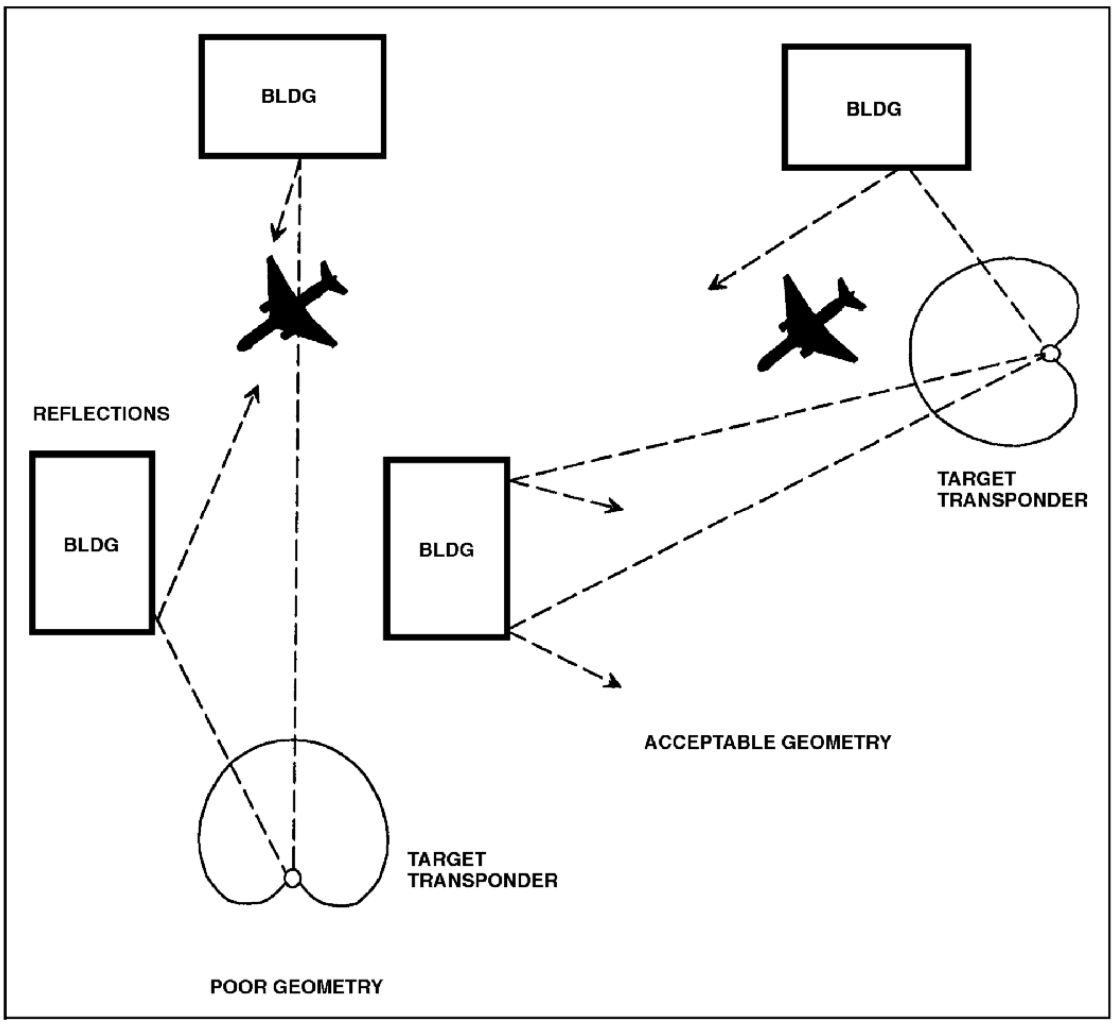


Figure 37: Ramp Test Geometry Considerations

It is important to conduct the test in an area where signal reflections are minimal. Moving aircraft, ground vehicles or nearby operating transponders can contaminate the test results. This is normally shown by erratic range and bearing indications. It may be necessary to test in a different location or reposition the aircraft.

If another aircraft with an operating transponder is used for testing, the signal path must be unobstructed. A high-wing aircraft is normally a better test transponder platform than a low-wing aircraft. A portable test transponder (strapped to an encoded altitude within 10,000 feet of the field elevation) can also be used to satisfy the bearing accuracy test. Notification to ATC may be necessary to avoid false airborne TCAS resolution advisories.

If range or bearing indications from the test aircraft are unstable, then reflections from nearby structures or other interfering sources are likely disrupting the signals and a better location is necessary. See Section VI for more information.

6.4. INSTALLATION IN A SEVERE EMI ENVIRONMENT

Good grounding of the TAS and associated components (particularly the encoder) is essential.

Many precautions have been taken and tests have been conducted to ensure trouble-free operation of the Processor in high EMI environments. Nonetheless, common sense should be used when deciding on the mounting location of the Receiver/Processor. Clearly, mounting it close to L-band transmitters like DME or transponders should be avoided. If the Receiver/Processor must be mounted near an L-band transmitter, make sure the transmitter antenna cables are well shielded, and the L-band transmitter units are not emitting high levels of EMI. In addition, shield the TAS cables per the notes on the wiring diagrams.

Some DME designs permit a relatively high level of Continuous Wave (CW) emissions, which can affect the TAS performance. Interference from the onboard transponders can also affect performance. In order to reduce the possibility of interference, the DME and transponder antenna cables and terminations must be effectively shielded. Frayed cables at the RF connectors or lousy antenna cabling can introduce a high EMI level. The three-foot antenna separation requirement is essential to minimize interference from DMEs and transponders.

6.5. COMPASS HEADING INPUT

Compass heading may be connected via ARINC-429 (Label 320). Compass heading assists in rapid traffic orientation during turns. Compass heading input is optional.

6.6. MALFUNCTION INDICATIONS

PROBLEM: The TAS displays its own transponder. The suppression circuit is disabled. There are normally four possible reasons:

a. Internal Suppression fuse is blown. This can be checked by verifying continuity between the suppression pin and case ground. If the circuit is open, the suppression line is open. The Processor must be returned to Avidyne for repair. Verify the circuit is not shorted before reinstalling the Processor.
b. The DME diode is installed backwards, or it is installed unnecessarily.
c. DME diode is not installed when it should be.
d. Open suppression line.

PROBLEM: Erroneous host aircraft altitudes, asterisks instead of an altitude display, or voice annunciation of “Altitude Data Invalid”:

Check the altitude lines for shorted or open connections, and make sure the altitude encoder ground on J1 is properly connected to the altitude encoder.

PROBLEM: Annunciator light is on all the time:

Check for other failure conditions, such as altitude data invalid (double press the mute button to check this while in Ground Mode). The annunciator light will remain illuminated when other failure conditions are present.

PROBLEM: Whine in the audio caused by the TAS:

The TAS audio return line should be connected to the TAS audio port at the Audio Panel.

Check the primary source of the audio noise. Reduce the noise from this source as required. If the problem persists, shield the encoder lines and the audio line. Normally the shield is grounded at one end for optimum effectiveness. Sometimes grounding at both ends is the most effective arrangement. If audio interference is still a problem, contact the factory.

PROBLEM: The TAS bearing shows opposite to the traffic forward and aft, and it shows correctly left and right:

The antenna coaxes for the single-blade antenna are backwards. Recheck the antenna connections; J1 on the antenna connects to J1 on the TAS processor.

PROBLEM: The TAS bearing shows opposite to the traffic left and right, and it shows correctly forward and aft:

The antenna coaxes for the twin-blade antenna are backwards. Recheck the antenna connections.

PROBLEM: The TAS bearing shows opposite to the traffic sometimes, but not always:

If the traffic shows incorrect bearing sometimes, then one coax is shorted or open. If the problem is left or right, check the twin-blade antenna coax connectors. If the problem is front or aft, check the single-blade coax connectors.

NOTE:	The TAS processor antenna terminations must be connected to antennas or a 50-ohm load before applying power to the Processor. Failure to connect the antenna terminations can cause transmitter damage.

PROBLEM: The TAS bearing is unreliable and traffic on the display moves all around. Multiple targets appear on the display, and then disappear.

Unreliable bearing causes the TAS to erroneously initiate new tracks on known targets, creating the appearance of multiple targets. Lack of a ground plane, poor bonding of the antennas to the ground plane, or poor ground connections from the antennas to the airframe can cause this. Looped and tie-wrapped antenna coax cables can induce interference and affect bearing, especially for distant traffic. Check the antennas for proper bonding and separate the antenna cables as much as possible to avoid cross talk.

PROBLEM: The TAS bearing is frequently not available, especially for distant traffic.

This and the next problem have the same cause and solution.

PROBLEM: The TAS never shows distant traffic beyond ten miles away.

The TAS receivers are capable of receiving signals lower than –73dBm. Continuous Wave (CW) EMI at or near 1090 MHz at levels greater than –73dBm can interfere with the ability of the TAS to detect distant traffic. The interference must be reduced below –73dBm for best TAS performance. Determine if the transponder or DME causes the problem. Select 112.3MHz (1094MHz is the collocated DME frequency) to check the DME since this is the most likely frequency to cause interference. If distant traffic cannot be detected with the interfering device on and can be detected with the device off, then steps should be taken to reduce or eliminate the interference. Check for proper and secure coaxial cables and connectors and verify the antennas are at least the minimum distance identified in the TAS Installation Manual. Verify the device in question can be installed with the TAS equipment. Consider moving the antenna of the offending equipment farther away from the TAS antenna. See Installation in a Severe EMI Environment above or contact the factory for more information.

PROBLEM: The TAS displays the onboard transponder.

Check the suppression connection.

SECTION VII
STC Permission

Avidyne Corporation hereby grants to all National Aviation Authority (FAA, CAA, JAA) approved installers the use of data from STC SA02013CH to install the Avidyne Traffic System. Copies of the STC data are available on the Avidyne website Technical Publications page or upon request. The latest data revisions are listed in Avidyne TAS6XX Series Traffic System Master Document List, AVTAS-020.

Installers must abide by the conditions and limitations stated in both the STC and this manual in order to maintain compliance. The use of this data by itself does not constitute installation approval.

-End-