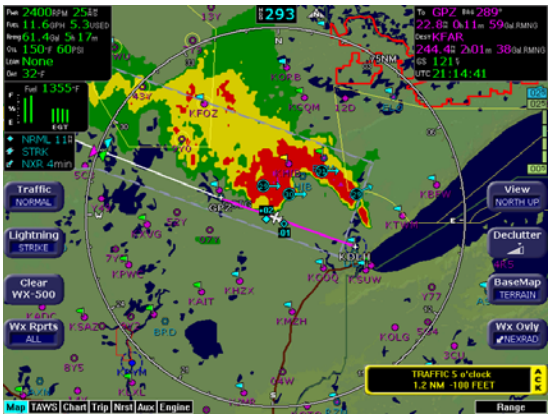
TAS600 Series

TRAFFIC ADVISORY SYSTEM

PILOT'S OPERATING HANDBOOK



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AVIDYNE

PREFACE

Thank you for becoming an owner of an Avidyne TAS600 series Traffic Advisory System. You have demonstrated a concern for yourself, for those who depend on you for flying safely, and for those who share the airspace around you.

Now you can fly with greater confidence and greater peace of mind knowing that your aircraft is equipped with the latest technology available for traffic alerting.

This Operation and Performance Handbook is intended as a guide to the capabilities and operation of the TAS600 Series System. By carefully reading this manual, you can become familiar with the TAS600 Series System and how to get the best performance from your investment.

Warning: The TAS600 Series System does not detect all aircraft. It is designed as a backup to the See and Avoid concept and the ATC Radar environment. See Limits, Appendix 1.

Refer to this handbook for the TAS600 Series System limits.

Caution: This handbook and the Avidyne TAS600 systems are advisory only. Any action recommended in this manual or made as a result of data supplied by the TAS600 Series System must be in accordance with applicable Aviation Regulations and common sense. The pilot in command is the final authority as to the operation of the aircraft.

TSO INFORMATION

The Avidyne TAS600, TAS605, TAS610, TAS615, TAS620, and the 9900BX, collectively known as the TAS600 Series, comply with the requirements of TSO-C147 Class B. The TAS600 Series System is considered a Class A system when installed with a compatible Class A approved display.

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Avidyne warrants the Product manufactured by it against defects in material and workmanship for a period of twenty-four (24) months from delivery. If Avidyne's Product fails to conform to this warranty, Avidyne, in its sole discretion, will either repair or replace the Product or provide a refund of the purchase price paid for the Product. This warranty is made upon the express conditions that:

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(b) The Product is returned to Avidyne or to an Avidyne authorized service facility;

(c) The Product has not been altered in any manner other than as previously authorized by Avidyne in writing; and

(d) Repairs to the Product have not been made by anyone other than Avidyne or an Avidyne authorized service facility.

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Some jurisdictions may not allow the exclusion or limitation of warranties or liabilities, in which case the above limitations or exclusions, or some of them, may not apply in those jurisdictions.

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1 Introduction

Glossary

The following terms are used throughout this document. For the purposes of this document, they have these definitions:

Term	Meaning
Acquire	Identify and locate (as in acquire an intruder)
Acquisition	The process of identifying and locating an intruder
AGL	Above Ground Level
ATC	Air Traffic Control
Audible Position Alert	An audible advisory of the traffic location
Closest Point of Approach	The occurrence of minimum range between the TAS600 Series System-equipped aircraft and the intruder
Traffic Display	The ½ 3ATI digital Traffic Display
CPA	Closest Point of Approach
Display	Either a Traffic Display or an MFD
Host	The aircraft equipped with the TAS600 Series System
Interrogator	The transmitting portion of the TAS600 Series System that interrogates nearby transponders
Intruder	A transponder-equipped aircraft within the surveillance range for which the TAS600 Series System has established a track
MFD	Multi-Function Display
MSL	Mean Sea Level
OT	Other Traffic
Other Traffic	A condition when the TAS600 Series System has detected an intruder that is not a TA or PA
PA	Proximate Advisory
PAV	Proximate Airspace Volume
Proximate Advisory	A condition when an intruder is within ±1200 Feet and 5 nm.

Term	Meaning
Scheduled Advisory	Multiple TAs are announced sequentially. A TA that is scheduled but not yet announced is a Scheduled Advisory
Sensitivity Level	Parameters used to specify the size of the protected airspace volume around the TAS600 Series System-equipped aircraft
Sensitivity Level A	The sensitivity level when the host's landing gear is extended
Sensitivity Level B	The normal sensitivity level
SL A	Sensitivity Level A
SL B	Sensitivity Level B
TA	Traffic Advisory
Tau	The time to intruder CPA
TCAD	Traffic/ Collision Alerting Device
Traffic	Any nearby aircraft
Traffic Advisory	An advisory indicating the current track of an intruder could result in a near-hit or a collision

Product Description

The Avidyne Traffic Advisory System is a series of active surveillance traffic detection models derived from and including the Ryan (TCAD) Model 9900BX. It is used to identify the altitude, range and bearing of nearby transponder-equipped aircraft. Aircraft equipped with non-Mode C transponders can provide range and bearing information. The TAS600 Series System does not detect aircraft without operating transponders.

There are three capability levels of the TAS600 Series System that correspond to aircraft performance:

- TAS600 for aircraft with a Service Ceiling of up to 18,500 feet.
- TAS610 for aircraft with a Service Ceiling up to 25,000 feet.
- TAS605, TAS615, TAS620, and 9900BX for aircraft with a Service Ceiling up to 55,000 feet.

When operated within the Service Ceiling the TAS600 Series System displays all Traffic Alerts and Proximity Alerts. The display of Other Traffic (OT) is available according to Table 1. Display of Other Traffic.

Above the TAS Service Ceiling, traffic intruders will not be displayed.

TAS605, TAS615, TAS620, and 9900BX systems include the ability to connect an external heading indicator to better track traffic intruders during turns.

Table 1. Display of Other Traffic

	Display of Other Traffic - Vertical Limit	Display of Other Traffic - Horizontal Limit	Maximum Operating Altitude
TAS600	±3500 feet	7 nm	18,500 ft.
TAS605	±5500 feet	13 nm	55,000 ft.
TAS610	±3500 feet	12 nm	25,000 ft.
TAS615	±10,000 feet	17 nm	55,000 ft.
TAS620 / 9900BX	±10,000 feet	21 nm	55,000 ft.

All TAS600 Series Systems are available in three configurations:

- Integrated with an MFD
- With a ½ 3ATI Traffic Display
- Without a display

Up to four displays may be connected to the same TAS600 Series System.

The TAS600 Series System is advisory only, and is a back up to the See and Avoid Concept, and the ATC radar environment.

The following sections describe the TAS600 Series operation.

Concept

The TAS600 Series System interrogates transponders. The vertical separation of the host and intruder is determined by comparing the decoded altitude replies to the host's altitude (from the altitude encoder). The range is determined using radar time of arrival technique. Bearing to the traffic is determined using the dual directional antennas, on the top and bottom of the aircraft.

The altitude data from the intruder is referenced to pressure altitude (29.92 inches or 1013hPa), as is the onboard encoder, thus separation is not dependent on the altimeter setting.

The TAS600 Series System monitors the altitude and range difference and warns the flight crew when the calculated time to closest approach (CPA) of the intruder meets a certain threshold (15 to 30 seconds, depending on aircraft configuration).

Components

The TAS600 Series System components consist of the remote Processor and the Transponder Coupler.

A display is optional. The Avidyne Multi-Hazard Display (MHD), the Avidyne ½ 3ATI Traffic Display, or certain Multi-Function displays are normally used to provide additional intruder information.

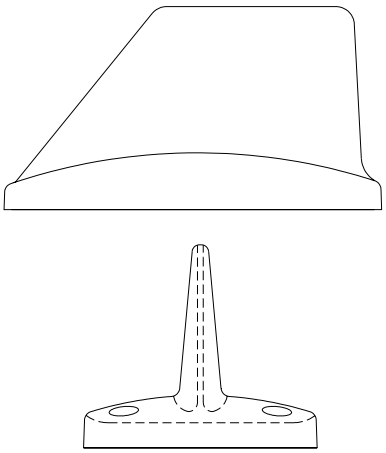

Figure 1. TAS600 Series Single-blade Antenna

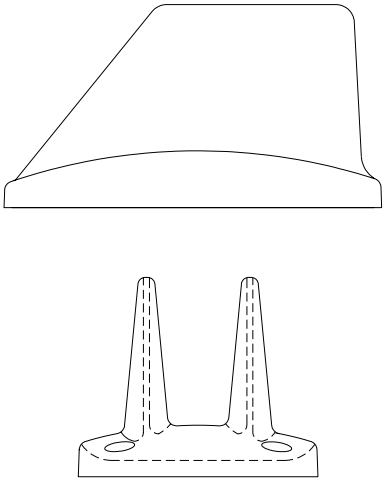

Figure 2. TAS600 Series twin-blade antenna

2 TAS600 Series Operation

This section pertains to general operation of the TAS600 Series System.

Advisory Levels

There are three advisory levels: Traffic Advisories (TA), Proximate Advisories (PA), and Other Traffic (OT). A Traffic Advisory is audibly announced, a Proximate Advisory is displayed traffic within the flight crew-defined display parameters, and Other Traffic is defined as intruders that are not TAs or PAs.

A TA is generated if the TAS600 Series System detects that the current track of the intruder could result in a near miss or collision.

The TAS600 Series System uses tau (the time to closest approach) and the time to coaltitude to calculate TAs. An intruder that is very close but not closing can also generate a TA.

Only TAs generate audible warnings.

When the landing gear is extended, a smaller tau and a smaller volume of airspace are used as criteria to generate TAs. This condition is termed Sensitivity Level A, or SL A. All other flight conditions use a larger volume of monitored airspace, called Sensitivity Level B, or SL B.

A TA is generated and an initial TA announcement is issued when an intruder's tau value is less than the "TA threshold" (see Tables 1 and 2). A TA is also generated when an intruder's range and altitude separation are both less than the "TA threshold".

Table 2. SLA TA Thresholds

Intruder type	Host to Intruder		
	Tau (seconds)	Range (nm)	Altitude Separation (ft)
Altitude reporting intruders	< 20	< 0.20	< 600
Non altitude reporting intruders	< 15	< 0.20	N/A

Table 3. SLB TA Thresholds

Intruder type	Host to Intruder		
	Tau (seconds)	Range (nm)	Altitude Separation (ft)
Altitude reporting intruders	< 30	< 0.55	< 800
Non altitude reporting intruders	< 25	< 0.20	N/A

A TA remains in effect until the range between host aircraft and the intruder aircraft begins to diverge or is no longer detected for 8 seconds, whichever is longer.

An audible position alert informs the crew of a TA. The audible position alert message is described below in “Audible & Visual Advisories”. Audible advisories are normally inhibited when the host aircraft is on the ground. Advisories of traffic on the ground are inhibited in the Approach and Departure Modes.

Audible & Visual Advisories

The TAS600 Series System uses voice, tones, and an annunciator light (marked “Traffic” or “Traffic Alert”) to communicate information to the flight crew.

When a detected intruder meets the criteria for traffic advisory, the TAS600 Series System generates an audible voice annunciation. The announced phrase is always preceded by a tone and then begins as “Traffic”. The clock position of the alert is given, and then the relative altitude of the intruder and range is announced. If the intruder is more than 200 feet above or below the host aircraft, then the phrase is “high” or “low” is added as appropriate. If the intruder’s altitude is within 200 feet of the host altitude, the ending phrase is “same altitude”.

For example, a TA about an intruder at two o’clock and 500 feet above one mile away generates: [tone] “Traffic. Two o’clock, high, one mile.” An intruder directly to the left within two hundred feet elevation would generate [tone] “Traffic. 9 o’clock, same altitude, less than one mile.”

When installed, a remote TA annunciator light illuminates whenever a TA is in effect and extinguishes when the TA is no longer valid.

Caution: TAs are calculated values. Intruders will not always be detected at a distance far enough out to provide the TA warning time described in the Advisory Levels paragraph. See Appendix 1.

Update Rate

The TAS600 Series System interrogates up to 56 times per second, providing excellent intruder resolution in high traffic density.

Range Determination

The TAS600 Series System transmits interrogation signals in a manner similar to an ATC radar facility to elicit a reply from nearby aircraft. The time between the interrogation and the receipt of the reply is measured and converted into range from the intruder.

This method is often called an active ranging technique.

Note: The range at which an intruder is acquired depends on many factors, including the performance of the intruder's transponder and the geometry of the encounter. Not all intruders are acquired at the maximum range.

Bearing To The Intruder

The direction of the intruder is determined using the top and bottom directional antennas.

Note: The TAS600 Series System diagnostics continually monitor for bearing reliability. When the TAS600 Series System detects a low-reliability signal, the bearing information is momentarily unavailable. All other information continues to be available. The phrase "Traffic… No Bearing" is announced for non-bearing TAs.

Multiple Intruders

More than one TA can exist at the same time. All TAs are announced, and the intruder with the smallest tau is announced first.

Intruders with No Altitude Data

The TAS600 Series System can detect intruders without altitude-reporting capability (non-Mode C intruders). For these intruders, the TAS600 Series System provides range, bearing and horizontal closure information only. The TAS600 Series System announces "Altitude Unavailable" for non-mode C TAs.

When the host aircraft is above 12,000 feet pressure altitude, non-Mode C intruders are not tracked.

Visual And Non-Visual Acquisition

It is often difficult to visually acquire aircraft, even when the TAS600 Series System identifies the intruder.

When under positive control, a deviation based solely on the TAS600 Series System data is not sanctioned by regulatory

authorities. Intruder information provided by the TAS600 Series System is an aid to the See and Avoid process. Federal Regulations state that "When an ATC clearance has been obtained, no pilot in command may deviate from that clearance, except in an emergency, unless he obtains an amended clearance." Intruder information provided by the TAS600 Series System does NOT relieve the pilot in command of this responsibility.

Caution: The intruder that you see may not be the intruder that the TAS600 Series System has detected. Continue to monitor the TAS600 Series System and visually scan outside even after the traffic is observed.

Inputs to the TAS600 Series System That Affect Operation

Altitude Encoder

The TAS600 Series System recognizes the altitude of the host aircraft using the onboard encoder. The altitude encoder is based on standard pressure, so comparison of the host aircraft standard pressure altitude with the standard pressure altitude of the intruder aircraft produces the separation information.

It is not necessary to adjust the altimeter setting in the TAS600 Series System. Adjustment of the altimeter setting has no effect on the separation data.

Mute/Update

When configured, a Mute/Update button is available. It provides a mute and “say again” function to request an audible update of Traffic Alerts. If the button is pressed once during an audible announcement, the announcement is stopped. Only scheduled advisories are removed. Double-pressing the Mute/Update button announces any current TAs. If no Traffic Advisories are in effect, the double-press elicits a “No Advisories” statement.

Aircraft-on-the-Ground Detection System

Some aircraft have a system to detect when the aircraft is on the ground. An airspeed switch or weight-on-wheels switch is normally used for this purpose. The TAS600 Series System makes use of the aircraft-on-ground detection system if it is

installed. The use depends on the display configuration, and is explained in later sections of this handbook.

Gear Position
When the landing gear is down, or during Approach and Departure modes, the TAS600 Series System uses Sensitivity Level A. SL A reduces the tau values used to determine when a TA should be issued, so there are fewer warnings in the high traffic areas close to the landing runway. Fixed gear aircraft automatically use SL A during departure and arrivals when using the Approach Mode.

For more information on SL A and SL B, see the Advisory Levels paragraph.

Traffic Density
In order to maintain the integrity of the ATC system, all transponder-based active systems such as TCAS and TAS reduce interrogator power when in areas of high traffic density. This can affect the detection range of the equipment.

Ground Mode
When the host aircraft is on the ground, traffic taxiing or parked nearby can transmit replies. To avoid nuisance indications on the ground, a special feature called the Ground Mode is normally activated automatically upon startup. Intruders on the ground are not displayed and all advisory tones are muted. Airborne Traffic is displayed.

The Ground Mode is normally activated automatically upon startup. The aircraft-on-the-ground detection system (if installed) also engages the Ground Mode. When the Ground Mode is asserted, an audible “Ground Mode” is announced.

The TAS600 Series System automatically transitions from Ground Mode to flight after takeoff. When the host aircraft climbs 400 feet, the Advisory tones are restored.

Caution: Do not operate the TAS600 Series System in the Ground Mode when in flight.

Approach and Landing

The Ground mode eliminates unwanted audible warnings during startup and departure. There is a corollary for approach and landing called the Approach mode.

When approaching a very busy airport where there are many aircraft operating on the ground, it is useful to set up the system to eliminate warnings from traffic on the ground.

Approach Mode
The Approach Mode eliminates intruder announcements caused by aircraft on the ground as the host aircraft approaches the ground. Upon landing, the TAS600 Series System enters the Ground Mode.

The TAS600 Series System must be supplied with the destination elevation to use the Approach Mode. Destination elevation adjustment is available with the ½ 3ATI display, the Ryan MHD and some MFDs.

Note: The TAS600 Series System operates in Sensitivity Level A when in the Approach Mode.

As the host aircraft descends to within 1700 feet above the field elevation, the TAS600 Series System enters the Approach Mode. When the host aircraft descends below 400 AGL, the TAS600 Series System transitions to the Ground Mode and TA announcements are muted.

Note: The TAS600 Series System can accept ARINC 429 Radar Altitude Input. If connected, the Radar Altitude data from the Radar Altimeter will be continuously communicated to the TAS600 Series System and will enable and control the Approach Mode.

The Approach Mode can be set at any time, but engages only when the host aircraft is more than 1700 feet above the field elevation.

Note: In many operations, setting Approach mode is not necessary. For example, when approaching a remote runway it is useful to interrogate aircraft that are operating on the ground.

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3 Operation with a Multi-Function Display (MFD)

Introduction

Please refer to the MFD documentation for illustrations of the traffic information for the particular MFD. Refer to this document for operating tips and information regarding the traffic system.

The MFD shows traffic information in a plan-view, graphical presentation. The MFD initializes normally. When communication between the Multi-Function display and the TAS600 Series System is established, a message indicating the existence of the link is displayed on the MFD.

The TAS600 Series System is an Airborne Surveillance Radar system. It is very simple to use and requires no operator input for normal operations.

Traffic Alerts are automatic. The TAS600 Series System sends all the data it has to the display system, and the display system then limits the displayed data. The pilot can select the volume of airspace in which PA and OT traffic is displayed. There are two methods:

- Many systems use Above, Below, Norm and Unrestricted. Above means the display of traffic is normally from -2700 to +9000 feet, Below is +2700 to -9000, NORM is +/- 2700 and Unrestricted is +/- 9900. These are just display thresholds. Traffic Alerts (TAs) outside of these limits will still be shown.

- Some display systems provide display limits called Terminal. Standard, Enroute and Unrestricted. These display limits are based on the following table:

Table 4 Display Limits Using Terminal, Standard and Enroute

Display Type	Limits
Terminal	±500 FT, 1.0 NM
Standard	±1000 FT, 2.0 NM
Enroute	±1200 FT, 5.0 NM
Unrestricted	Maximum limits of the equipment, see Product Description

4 Operating Tips

Visual Acquisition

Many near-collisions have occurred as a result of the flight crew seeing and fixating on an aircraft that is not the real intruder. Maintain awareness of the information provided by the TAS600 Series System. Take note of any discrepancy between the intruder location and the TAS600 Series System data. If there is a difference, look for another aircraft.

Do not rely on the TAS600 Series System as the only means of traffic avoidance. The TAS600 Series System does not detect every aircraft (see Appendix 1).

Tau

Tau is an approximate measure of the time to closest approach based on the rate of closure. Many variables can affect tau, including changing rates of approach and acquisition time. TAs are based on tau until the intruder is very close. Then the intruder is a TA even when there is no range closure.

Caution: Because of encoder variations, any intruder within 300 feet of your altitude should be considered at your altitude.

"No Alt" Replies

Most flight hours are flown by Mode C equipped aircraft. Replies received from non-Mode C aircraft cause NO ALT to be displayed on the TAS600 Series System along with the range. If the intruder is a TA, the audible warning is “[tone] Traffic X o’clock, altitude unavailable.” The flight crew must analyze this intruder without knowing the altitude difference. Since the TAS600 Series System range indications are based on distance from your aircraft, some altitude information can be inferred from non-mode C traffic. For example, non-mode C traffic 6,000 feet (one mile) directly above your aircraft will never show closer than 1 mile.

Many aircraft have encoding altimeters that require warm-up time and do not transmit altitude data. The TAS600 Series

System treats the intruder as non-mode C, until the intruder's encoder provides altitude data.

Detection Range

The range at which intruders are detected is dependent on the transmitter and receiver performance of the intruder transponder and the TAS600 Series System, the antenna geometry between the host and the intruder, and the reflectivity of the surface the aircraft are flying over. The TAS600 Series System uses top and bottom antennas, variable transmitter levels, multiple receivers and other techniques to help eliminate signal limitations. Nonetheless, signal degradation is unavoidable and can affect the detection range.

The TAS600 Series System monitors the airspace for TCAS-equipped aircraft in order to provide more transmitting power when the traffic is light. In high traffic areas, the number of aircraft can reach a threshold where the transmission power of the TAS600 Series System is reduced. The transmitter power of all other similar equipment in the area is also reduced. This reduces the TAS600 Series System effective range.

The practical result of detection range limitations is range reduction in high traffic areas and target drop-off at longer ranges.

Intruder Priority

When more than one TA is detected, the one with the smallest tau is declared first.

Data

Some MFDs provide additional information about intruders. U.S. registered Mode S traffic transmit their N-number, which can be displayed. The N-number is helpful when following traffic or anticipating an ATC advisory. N-number reception is dependent on several factors and may not always be available.

Bearing

The TAS600 Series System bearing data gives the flight crew a direction to look for intruders. Antenna placement, the relative elevation of the traffic, airframe obstructions and rate of angular change can cause discrepancies between the observed angle and the angle measured by the TAS600 Series System. When the TAS600 Series System has insufficient information to determine the direction, bearing is momentarily unavailable.

Pop-ups, Drop-offs and Duplicate Tracks

Pop-ups and drop-offs are events where a displayed intruder suddenly appears or disappears within the selected range. Factors, such as reflections (especially over water) and reduced interrogator power (in high-density areas) contribute to pop-ups and drop-offs.

Occasionally a target will appear to split into two targets tracking at the same altitude and close to the same range. The tracks will follow and overlap each other for several seconds, and then one of the targets will disappear. These are called duplicate tracks and are usually caused by reflections from the ground or water. Duplicate tracks are actually one aircraft and are not of operational significance. When using the TAS600 Series System on the ground, reflections from hangars can create several duplicate tracks.

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5 Built-in Test & Fault Indications

An extensive battery of self-test functions is run at startup of the TAS600 Series System. In addition, the TAS600 Series System constantly performs an internal self-test. A pilot-initiated test is not necessary; however, the system may be tested using the mute/update button if desired. When a TAS600 series Traffic Display is used, another self-test routine is available. If a failure of the TAS600 Series System is detected, the MFD will indicate a traffic failure.

"Ground Mode" is normally annunciated upon startup, indicating that the TAS600 Series System is in the Ground Mode. If the TAS600 Series System 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 TAS600 Series System.

Table 5. Self Test Without the TAS600 Series System ½ 3ATI Traffic Display

Action	Positive Result	Negative Result
Double press the mute/update button	Either a TA or "No advisories" is announced.	No audible announcement, or a "TCAD Code" announcement. Discontinue use of the TAS600 Series System until identified and corrected.

Note: Some aircraft configurations do not include a mute button. In this event then a pilot-initiated self-test is not available.

Some faults can be detected. If "TCAD Code" followed by a number is announced, then a malfunction has been detected. Discontinue use of the TAS600 Series System and contact the factory or your dealer for more information.

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

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 “TCAD Code” announcement, do not use the TAS600 Series System data.

Invalid Host Altitude Data

The TAS600 Series System must receive valid altitude data in order to compute separation information. If the data is invalid or incorrect, the information the TAS600 Series System provides will be incorrect. The TAS600 Series System cannot always detect incorrect altitude input. The installing agency must ensure the altitude inputs are correct at installation.

When invalid altitude data is detected and the TAS600 Series System is not in the Ground Mode, an unsolicited audible announcement is generated stating, “TCAD Altitude Data Invalid”. When the TAS600 Series System is in the Ground Mode, double-pressing the Mute/Update button will generate the “TCAD 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 TAS600 Series System is receiving invalid altitude data. The TAS600 Series System should not be used until the problem is corrected.

Ground Mode

The TAS600 Series System should not be in the Ground Mode when in flight. The phrase “Ground Mode” is announced upon initialization. “Ground Mode” is also included in the annunciation when the mute/update button is double-pressed. If the TAS600 Series System is operating in “Ground Mode” in flight, discontinue operation until a qualified technician can evaluate it.

If, after a power reset in the air, the TAS600 Series System enters the Ground Mode, select another mode on the MFD to exit the Ground Mode. Operators without a display will not enter the Ground Mode after a reset.

Appendix 1 Limits

The TAS600 Series System only displays intruders equipped with operative transponders. The TAS600 Series System provides no indication of traffic conflicts with aircraft without transponders.

Though every effort is made to preclude the possibility, it is still possible for the TAS600 Series System to fail to detect intruders. The TAS600 Series System should not be relied upon as the sole means of traffic detection. See and Avoid is an important flight crew function.

Not all traffic within the selected range is displayed. If the communications link between the TAS600 Series System and the other transponder is not established, then the traffic will not be displayed. A poor transponder receiver on the intruder aircraft, a geometry where the antennas are shadowed from each other and high traffic density can limit the detection range. Normally, the result is traffic 'pop ups' at closer ranges.

TAs are calculated values and are subject to acquisition time. Intruders, especially "pop ups" will not always be detected far enough out to provide the TA warning times described in the Advisory Levels paragraph.

Caution: Federal Regulations state, "When an ATC clearance has been obtained, no pilot in command may deviate from that clearance unless an amended clearance is obtained, an emergency exists, or the deviation is in response to a traffic alert and collision avoidance system resolution advisory." Avidyne TAS 6XX TAS systems do not provide resolution advisories and should not be used as the sole basis for deviating from an ATC clearance.

Some displays used to show traffic information have range selections that exceed the maximum range of the particular TAS. The maximum range of the TAS600 Series System is limited to the ranges defined in the Product Description in this handbook.

Appendix 2 Operation with No Display

When the TAS600 Series System is configured to operate with no display, audible announcements and an annunciator light (marked “Traffic” or “Traffic Alert”) inform the flight crew of Traffic Alerts (TAs). All TAs are announced. There are no audible warnings for PAs or OTs.

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 position alert 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 TAS600 Series System announces “No Advisories”.

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

Ground Mode

When the host aircraft is on the ramp, ground traffic can transmit replies. To avoid nuisance advisories, a special feature called the Ground Mode is automatically activated when the on-the-ground input is asserted (if the host aircraft is so equipped, see Aircraft-on-the-Ground Detection System. All advisory announcements are muted in the Ground Mode. The Mute/Update button and the TA annunciator light are active and can be used to provide advisory information for any intruder above 200 feet meeting the requirements for a TA.

Upon startup and when the mute/update button is double-pressed, “Ground Mode” is included in the annunciation to alert the pilot that the TAS600 Series System is operating in the Ground Mode. If the TAS600 Series System announces “Ground Mode” in flight, discontinue operation. It should not be

relied on for intruder information until serviced by a qualified technician.

On departure, the automatic announcement of TAs is restored when the host reaches 400 feet AGL.

Note: If there is no aircraft-on-ground detection system connected to the TAS600 Series System, TAs are always announced.

Note: If there is no display used and there is no aircraft-on-ground detection system input, then the Ground Mode does not function.

Examples of Operation Without a Display

The TAS600 Series System tracks altitude separation, altitude closure, range and range trend of intruder aircraft. Only TAs are announced. The following sequences could be encountered during a typical flight with a displayless TAS600 Series System:

The flight crew applies power to the TAS600 Series System by energizing the TAS600 Series System power switch. If the aircraft is equipped with an aircraft-on-the-ground detection system the TAS600 Series System will announce Ground Mode. In this case the audio is muted and will not warn of traffic on the ramp or on approach. Pressing the Mute/Update button twice will cause the TAS600 Series System to announce TAs for airborne intruders. If there are no TAs, then the TAS600 Series System will announce “Ground Mode. No Advisories.”

Before takeoff, check the area visually for traffic and check the TAS600 Series System. Traffic is detected above 200 feet and determined to be within 15 to 20 seconds of CPA, so the TA annunciator light illuminates. If the Mute/Update button is double-pressed, the TAS600 Series System announces, “Ground Mode [tone] Traffic 9 o'clock, high, one mile”. The intruder is then visually acquired on a close-in base to final and lands before the host's departure.

Warning: The TAS600 Series System may not detect all intruders on approach. Check the area visually before departing.

After the host climbs 400 feet, TA announcements are automatically enabled.

“[Tone] Traffic, 10 o’clock, high. Two miles.” sounds. A TA only sounds when the intruder is computed to be within 30 seconds of closest approach. The intruder is visually acquired to the left front, descending. The flight crew continues to monitor the intruder visually.

As the intruder passes, the flight crew double-presses the Mute/Update. “No Advisories” sounds because the intruder has passed by.

The flight crew visually acquires an intruder above, at 12 o'clock. There is no voice annunciation from the TAS600 Series System, so the intruder has not generated a TA.

On descent, the TAS600 Series System announces "[tone] Traffic, 10 o'clock, low, two miles." The intruder that generated the TA is then visually acquired 1,000 feet below, at approximately 10 o'clock.

The flight crew double-presses the Mute/Update button and the TAS600 Series System advises that the intruder is below, at 1.5 miles, and 9 o'clock. A second TA is detected and it is announced also. After a few seconds, both aircraft no longer create TAs.

The host aircraft begins its approach. An intruder on a parallel approach generates a TA. Intruders within 1200 feet horizontally and 800 feet vertically generate TAs without a closure requirement. Intruders holding on or near the runway can also generate a TA. When the host aircraft touches down, the host aircraft on-the-ground- detection system mutes the TA announcements.

Appendix 3 Operation with the AVIDYNE ½ 3ATI Traffic Display

The TAS600 Series System equipped with the Avidyne ½ 3ATI Traffic Display displays Traffic Alerts (TAs) and Proximity Alerts (PAs). Intruders generating TAs are displayed in order of increasing time to CPA. Intruders generating PAs are displayed in increasing order of proximity (based on range) within a volume of airspace defined by the flight crew. Display of TAs takes precedence over PAs.

The TA annunciator light, a star in the upper left cell of the TAS600 Series System display and audible announcements identify a TA. When the light and the star extinguish and the intruder is still on the display, the associated TA was downgraded to a PA.

Terminal, Standard & Enroute Proximate Airspace Volumes

The TAS600 Series System uses a flight crew-programmable Proximate Airspace Volume (PAV) to designate PAs. The pre-selected PAV settings are identified as Enroute (ENRT), Standard (STD) and Terminal (TRML).

The TRML, STD and ENRT buttons on the TAS600 Series System Traffic Display allow the flight crew to restrict the display of intruders (e.g., only those in the terminal area) and to expand the PAV when at cruise altitude.

Each pre-selected PAV is easily programmable by the flight crew. The pre-selected PAV values are retained in memory by the TAS600 Series System for future flights.

Note: The TAS600 Series System always displays TAs without regard to the Proximate Advisory threshold.

Operator Controls and Basic Displays

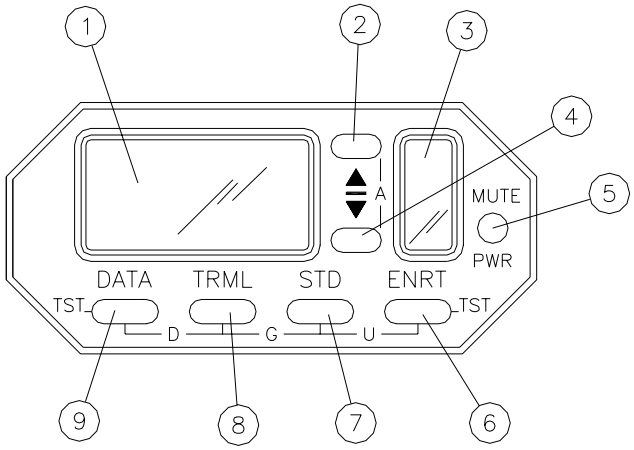


Figure 3. Traffic Display Layout

The TAS600 Series System Traffic Display uses 20 characters to communicate visual information to the flight crew. These cells are organized in two windows. The Traffic Display provides seven buttons for control of the TAS600 Series System. In addition to the Traffic Display, an annunciator light can be installed to indicate a TA condition.

1) **MAIN WINDOW**: This window contains 16 characters in a rectangular configuration organized in two rows with eight on each line. The main window is typically used to indicate information about intruders. The right-most cell in the bottom row is called the mode cell.
2) **UP BUTTON**: This button is used for data entry and user programming; it is also used to display information about secondary intruders.
3) **STATUS WINDOW**: This window contains 4 LED cells in a vertical configuration. The top- and bottom-most cells are used to indicate the presence of secondary and tertiary intruders, respectively. The second cell from the top is used to indicate the status of the altitude alerting function. The

third cell from the top indicates when the audible warnings are muted.

4) **DOWN BUTTON**: This button is used for data entry and user programming; it is also used to display information about tertiary intruders.

5) **POWER/MUTE BUTTON**: This is a push-on, pull-off button for controlling power to the TAS600 Series System. Also, momentarily touching this button stops announcement of the current scheduled advisories. The Power/Mute button is not used for traffic updates.

6) **ENRT BUTTON**: This button is used to set the Proximate Airspace Volume to the pre-selected Enroute range and values.

7) **STD BUTTON**: This button is used to set the Proximate Airspace Volume to the pre- selected Standard range and values.

8) **TRML BUTTON**: This button is used to set the Proximate Airspace Volume to the pre- selected Terminal range and values.

9) **DATA BUTTON**: This button is used to display the MSL altitude and N-number (for U.S. registered Mode-S aircraft) of the intruder that is displayed in the main window. Pressing the Data button twice in quick succession provides an audible update of traffic alerts.

Pressing two buttons simultaneously accesses six additional functions.

- **UP & DOWN BUTTONS**: Pressing these two buttons engages or disengages the Altitude Alerter. This function is indicated by -A- on the Traffic Display faceplate.
- **DATA & TRML**: By pressing these two buttons, the Density Altitude function is engaged or disengaged. This function is indicated by -D- on the Traffic Display faceplate.
- **TRML & STD**: Pressing these two buttons engages the Ground Mode. This function is indicated by -G- on the Traffic Display faceplate.

- **STD & ENRT**: Pressing these two buttons engages the Unrestricted Mode. This function is indicated by -U- on the Traffic Display faceplate.
- **DATA & ENRT**: Pressing these two buttons engages the built-in test function. This function is indicated by -TST- on the Traffic Display faceplate.
- **TRML & MUTE**: Pressing these two buttons engages the Approach Mode set-up function.

These functions are described later in this section.

Description of Operator Controls 1/2 3ATI Display

When an intruder is detected, information about it appears in the Traffic Display main window. The first line of information in the main window is the intruder's relative altitude. A star in the upper left cell indicates a Traffic Alert is being displayed. Plus and minus symbols indicate the vertical direction of an intruder. Plus means above and minus means below the host aircraft. Relative altitude trend information is shown at the end of the first line by a closing symbol (two triangles pointing together in an hourglass shape) and by a parting symbol (two triangles pointing apart in a diamond shape). The second line of information in the main window is the intruder's range in nautical miles.

Intruder information on the Traffic Display is updated approximately once per second. If the intruder shown on the Traffic Display is not a TA, then the TA annunciator light is not illuminated.

The letter or letters in the lower right-most cell of the main window on the Traffic Display (the mode cell) indicates the active Proximate Airspace Volume selection.

Table 6. Proximate Airspace Volume Modes

Letter	PAV Mode
E	Enroute
T	Terminal
S	Standard
G	Ground

U	Unrestricted
Dp	Departure
Ap	Approach

One (or two) aircraft symbols in the status window on the TAS600 Series System Traffic Display indicate that a second (or third) intruder has been detected. The up button can be used to momentarily display information about the secondary intruder in the main window. The down button can be used to display information about the tertiary intruder. When the up or down button is pressed, the associated symbol reverses (i.e. from a light aircraft on a dark background to a dark aircraft on a light background) to indicate which intruder is associated with the data in the main window.

Symbols

Special symbols displayed on the TAS600 Series System are shown below:

+	Threat is above
−	Threat is below
FT	Feet
	Threat is closing in altitude
	Threat is parting in altitude
M	Mute activated
NM	Nautical Miles
T	TRML (Terminal) Mode selected
S	STD (Standard) mode selected
E	ENRT (Enroute) mode selected
G	Ground Mode activated
U	Unrestricted Mode selected
	Additional threat
	Additional threat has been selected for display
>>	Chevrons indicate an adjustable parameter
	Transition symbol between Ground Mode and Enroute
	Symbol indicating activation of Approach Mode
A	Altitude Alert active, on altitude
	Altitude Alert active, off altitude
	Traffic 12 o'clock
	Traffic 1:30
	Traffic 3 o'clock
	Traffic 4:30
	Traffic 6 o'clock
	Traffic 7:30
	Traffic 9 o'clock
	Traffic 10:30
	Traffic Alert

Basic Displays

There are two basic displays shown in the main window on the TAS600 Series System Traffic Display:

- When the system is monitoring for traffic.
- When the system acquires an intruder.

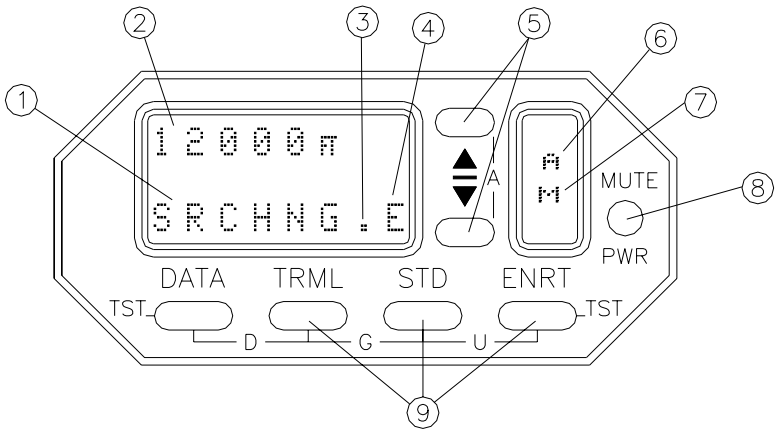


Figure 4. ½ 3ATI Traffic Display When Monitoring for Traffic

1) Monitoring the Proximate Airspace

2) Aircraft altitude

3) Self-Test Cursor

4) Mode indicator (shown indicating the Enroute Proximity Airspace Volume)

5) Adjusts parameters, barometric pressure (altimeter setting); and Altitude Alert

6) "A" - Altitude Alert engaged

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

8) Mutes current audible announcements; push/pull for on/off. Also used to switch between millibars or inches for the TAS600 Series System altimeter setting adjustments

9) Used to select Proximate airspace volume, and for initiating barometric pressure adjustment prior to using the up and down buttons

Intruder Acquisition Display

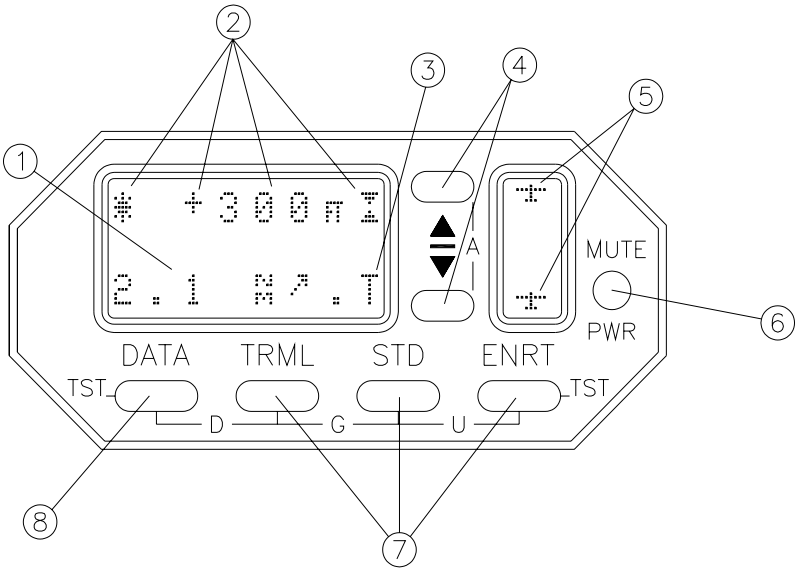


Figure 5. ½ 3ATI Traffic Display After Traffic Acquisition

1) Range 2.1 Miles about 1:30

2) The Intruder is a Traffic Alert, 300 feet above, converging in altitude

3) Mode indicator (Terminal selected)

4) Up button used to show secondary intruder and the Down button is used to show a third level intruder

5) Secondary and tertiary intruders

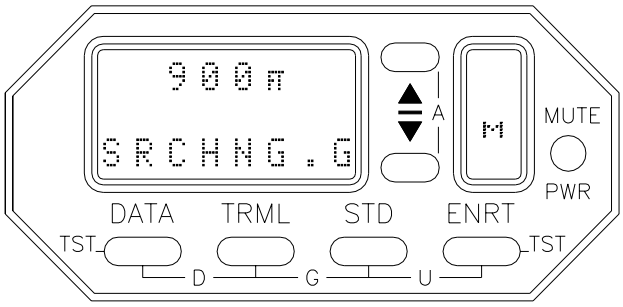
6) Mutes audible alerts; push/pull for on/off

7) Used to select Proximate Airspace size

8) Press for additional intruder data Double-press for audible update of Traffic Alerts

Ground Mode

When the host aircraft is on the ground, traffic taxiing or parked nearby can transmit replies. To avoid nuisance indications on the ground, a special feature called the Ground Mode is automatically activated upon startup. Intruders on the ground are not displayed and all advisory tones are muted. Data from airborne Traffic Advisories and Proximity Advisories are displayed. Airborne TAs are displayed without consideration for the Proximity Airspace thresholds.



The Ground Mode is activated automatically upon startup, or by pressing the TRML and STD buttons simultaneously to engage the Ground Mode. The aircraft-on-the-ground detection system (if installed) also engages the Ground Mode. The Traffic Display shows the letter "G" in the mode cell, and the small letter "M" is displayed indicating that the Advisory tones are muted.

Double pressing the Mute/Update (or Traffic Display DATA button) button elicits a detailed aural advisory of any detected TAs.

The TAS600 Series System automatically transitions from Ground Mode to the Enroute Proximate Airspace setting after takeoff. When the host aircraft climbs 400 feet, the Advisory tones are restored (the "M" disappears from the Traffic Display) and a transition symbol "Dp" (indicating Departure Mode) replaces the Ground Mode symbol. The Proximate Airspace volume expands above the departure elevation as the aircraft climbs. The monitored airspace height continues to increase until the ENRT Airspace setting is reached. Then the symbol in the

Mode cell changes to an "E" indicating the Enroute Airspace volume is being monitored.

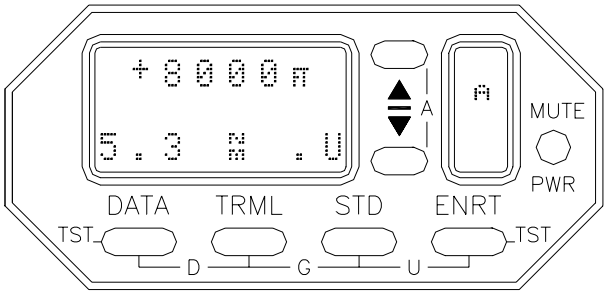
Some encoders require a warm-up period before valid data are available. When in the Ground Mode, initialization automatically halts at the altimeter adjustment until the encoder indicates it is supplying valid data. If another mode is selected, then stars in place of the altitude display show invalid altitude data. The TAS600 Series System does not function properly when the host altitude data is invalid. An encoder normally takes less than ten minutes to warm up.

Note: The TAS600 Series System operates in Sensitivity Level A when in the Departure Mode.

Caution: Do not operate the TAS600 Series System in the Ground Mode when in flight.

Unrestricted Mode

During the enroute phase of flight, in low traffic densities, a larger volume of viewable airspace may be desirable.



The Unrestricted Airspace setting can be selected by pressing the Enroute and Standard buttons simultaneously (the letter "U" is indicated in the mode cell when the Unrestricted Mode is functioning). This enlarges the monitored airspace to display intruders to the maximum Proximity Alert Volume. Aircraft detected within the unrestricted airspace limit are then designated as Proximate Advisories.

Dynamic Proximate Advisory Airspace

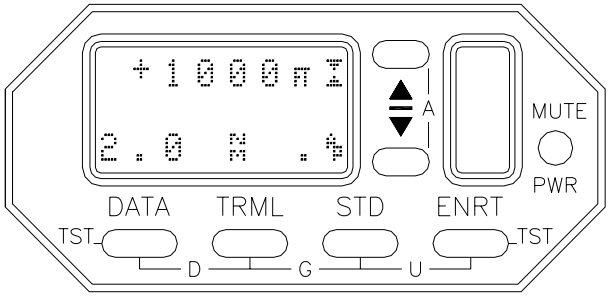
If the host aircraft climbs (or descends) more than 800 feet per minute, traffic 500 feet above (or below) the boundary of the selected Proximate Airspace volume expands in the direction of the climb (or descent). This gives the flight crew awareness of traffic beyond the selected Proximate Airspace Volume.

Approach Mode

The Approach Mode eliminates intruder announcements caused by aircraft on the ground host aircraft approaches the ground. Upon landing, the TAS600 Series System enters the Ground Mode.

The TAS600 Series System must be supplied with the destination elevation to use the Approach Mode. It is enabled by pressing the MUTE and the TRML buttons (thus Muting the Terminal area). The status window shows "APCH". The Traffic Display shows "FldElev:" and the lower line shows ">>xx00ft" (xx is the elevation previously set into this mode). The up and down buttons can be used to enter the destination field elevation. Pressing the mute button again saves the data entry and restores the TAS600 Series System to the previously selected mode (or eight seconds elapsed time automatically saves the entry and returns the TAS600 Series System to the previously selected mode).

Note: The TAS600 Series System operates in Sensitivity Level A when in the Approach Mode.



As the host aircraft descends to within 1700 feet above the field elevation, the TAS600 Series System enters the Approach Mode, as shown by "Ap" in the Mode cell. As the aircraft continues descent, the Proximate Airspace volume shrinks from Enroute to Terminal. The vertical dimension of the Proximate Airspace below the aircraft then becomes smaller to prevent display of intruders on the ground.

When the host aircraft descends below 400 AGL, the TAS600 Series System transitions to the Ground Mode where TA announcements are muted, as indicated by the "M" in the status window, and "G" in the Mode cell.

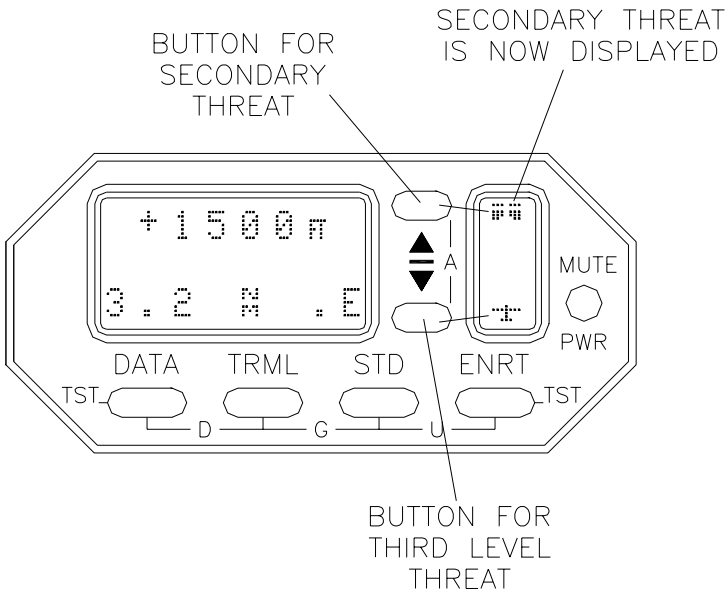
When armed, the TAS600 Series System automatically enters Approach Mode from the Terminal, Standard, Enroute, or Unrestricted Proximity Airspace limit.

The Approach Mode can be set at any time, but engages only when the host aircraft is more than 1700 feet above the field elevation.

Intruder Acquisition

The following paragraphs describe the intruder acquisition portion of the TAS600 Series System operation, and include information on visually acquiring intruders, and situations that could be encountered in operations.

Multiple Intruders
When a second intruder is detected within the selected Air Traffic Proximate Airspace, a small aircraft symbol is shown. Another aircraft symbol is displayed when a third intruder is detected.



The additional intruders can be displayed by pressing and holding the up or down button next to the aircraft symbol. The secondary intruder is displayed when the up button is depressed. A third intruder is displayed when the down button is depressed.

An indication is provided to confirm which intruder is displayed. When the appropriate button is pressed, the corresponding aircraft symbol illuminates to provide a visual indication.

If the primary intruder is above the aircraft and the second intruder is below the aircraft (or vice versa), and both are within 500 feet of the host, and the detected aircraft are also within 1 NM, the small airplane symbol flashes, indicating a strong recommendation to view the secondary display information.

Mute

The mute button on the TAS600 Series System Traffic Display silences audible warnings for a current TA. All unsolicited Advisories are muted in the Ground Mode.

Mute does not disable Altitude Alerter tones.

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.

Non-Altitude Reporting Intruders

The TAS600 Series System can detect aircraft without altitude-reporting capability (non-Mode C traffic) and provides range and horizontal closure information. The TAS600 Series System displays NO ALT and announces "Altitude Unavailable" instead of "High" or "Low".

When the host aircraft is above 12,000 feet pressure altitude, non-Mode C traffic is not displayed.

Data

Pressing the DATA button when an intruder is shown displays the MSL altitude of the intruder. When a Mode-S intruder is acquired, the N-number of U.S. registered Mode S aircraft can be displayed.

Note: Not all N-numbers are displayed. If an aircraft is not Mode-S equipped, is a non-U.S. aircraft, or the data is garbled; the N-number is not available.

Occasionally, if two aircraft are initially close together, the N-number can be tagged to the incorrect aircraft. This is normally corrected quickly and does not affect the ability of the TAS600 Series System to properly show intruder information. The absence of, or an incorrect N-number does not indicate less reliable intruder information.

Altitude Display

When the current ATC-supplied altimeter setting is entered into the TAS600 Series System, the digital altitude display shown is the same as the altitude shown for the host aircraft at the ATC facility. In addition, when an intruder has been acquired and the DATA button is pressed, the MSL altitude (or flight level) of the traffic is displayed.

Note: The altimeter setting does not need to be entered for the TAS600 Series System to perform its traffic alerting function. Since both the host and intruder aircraft encoders are transmitting pressure altitude, displayed altitude separation is not affected by the altimeter setting.

If the TAS600 Series System detects invalid encoder data, a series of stars replace the altitude display. In this situation, intruder separation information is not reliable.

Entering Barometric Pressure Setting
Adjust the barometric pressure by pressing ENRT button and then the up or down symbol button. Normal operation resumes soon after releasing the button.

Note: The TAS600 Series System can accept ARINC 429 barometric pressure correction. If connected, the barometric correction from the aircraft air data system will be continuously communicated to the TAS600 Series System and will control the barometric correction in the TAS600 Series System. Changes to the 9900 BX barometric pressure will not communicate to the aircraft air data system.

Inches or millibars can be used to adjust the barometric pressure on the TAS600 Series System display. To change the unit of measure, first press the ENRT button and the up or down symbol button to configure the TAS600 Series System for setting the barometric pressure. Then immediately press the Mute button on the Traffic Display to toggle between millibars and inches.

Note: The TAS600 Series System does not process traffic information while the altimeter setting buttons are depressed. The TAS600 Series System has returned to normal operation when the "SRCHNG" display appears.

Caution: Altitude encoders and altimeters are not always accurate and could lead to errors in the information provided to the TAS600 Series System. Be sure that your altimeter and encoder are accurate. Maintain enough separation when traffic is encountered.

Host Altitude Display Above & Below 18,000 Feet
The MSL altitude or the flight level of the host aircraft is displayed when there are no intruders displayed on the Traffic

Display. Below 18,000 feet, the TAS600 Series System barometric correction can be adjusted to the local altimeter setting. At 18,000 feet and above the TAS600 Series System automatically adjusts to 29.92 inches (1013mb), and the Traffic Display shows the Flight Level instead of MSL altitude (TAS605, TAS610, TAS615, and TAS620 only).

When the local altimeter is lower than 29.92 inches, FL 180, (and sometimes FL 190) does not exist. The TAS600 Series System does not display flight levels until the barometric correction in the TAS600 Series System indicates that Flight Level display is appropriate.

On descent, the local altimeter setting can be preset. When the aircraft descends below the flight levels, the MSL altitude is displayed.

If the altitude features are not used, a barometric setting of 29.92 inches or 1013mb is recommended for the TAS600 Series System.

Caution: If (after warm-up of the encoder) stars appear in the window in place of the altitude information on the ½ 3ATI Traffic Display then the accuracy of the altitude data is questionable and the TAS600 Series System should not be relied on for intruder information until the problem is resolved.

Caution: Altitude information provided by the TAS600 Series System is advisory only and is not to be used for dispatch purposes.

Intruder Altitude Display

The altitude of the intruder aircraft is displayed when the DATA button is pressed. If the barometric pressure selected in the TAS600 Series System is correct, the TAS600 Series System then provides the MSL altitude of the intruder or the Flight Level, as appropriate.

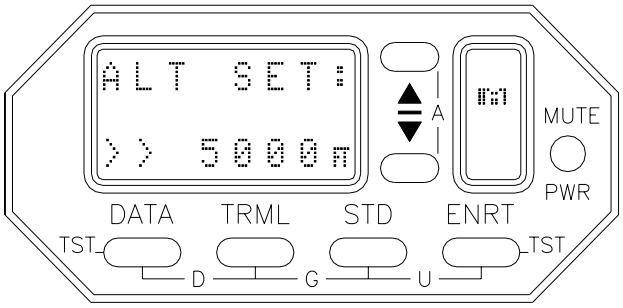
Altitude Alerter

In the Air Traffic Control environment, an unauthorized deviation in assigned altitude can compromise safety. The TAS600 Series System can alert the flight crew prior to arrival at an assigned altitude or to inadvertent changes in altitude.

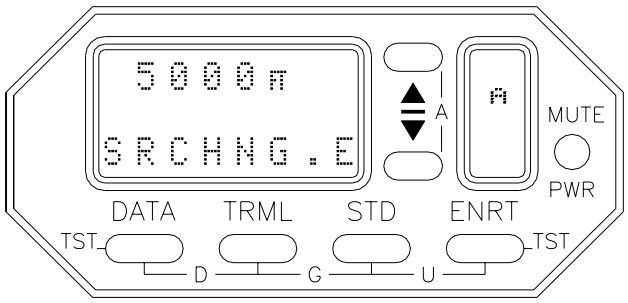
Since the TAS600 Series System can operate without a display, provision has been made to use the TAS600 Series System Traffic Display to show the selected altitude instead of intruder data. Instructions regarding use of the TAS600 Series System Traffic Display for this function are at the end of the Altitude Alerter section.

Engaging the Altitude Alerter

Pressing the up and down buttons simultaneously activates the Altitude Alert function. When this is done, ALT SET: is displayed on the upper display line, with the last entered altitude appearing on the lower line.



The up and down buttons can be used separately to adjust the displayed altitude to an assigned or desired altitude (or flight level). If no button presses occur for 8 seconds, the Altitude Alert automatically engages at the displayed altitude, and the TAS600 Series System returns to the traffic alerting display. If desired, the Altitude Alert can be quickly engaged by pressing the up and down buttons while the ALT SET: message is displayed.



When the Altitude Alert is engaged, a small upper case "A" appears on the display. A reversed-image "A" is shown prior to arrival at the desired altitude, and a normal "A" is shown when on the desired altitude.

When the host aircraft approaches within 1000 feet of the set altitude, a short, unique tone is issued and a voice announcement states “One thousand to go.” “Five hundred to go” is announced five hundred feet from the selected altitude.

When the host aircraft arrives at the selected altitude, the unique altitude alert tone is issued and the voice announcement indicates “At altitude”. A change of 200 feet generates an altitude tone and “Check Altitude”. The aircraft must then return to the selected cruise altitude to re-arm the altitude alert tones.

Note: The TAS600 Series System is designed to be compatible with altitude encoders featuring 100-foot resolution. Therefore, when the encoder trips the second 100-foot increment, the tone sounds.

Note: The TAS600 Series System operates in the normal traffic alerting function when the Altitude Alert is engaged.

Caution: The TAS600 Series System is an encoder-based altitude alert system limited to 100-foot resolution. It is designed to provide backup information only. It is not designed or intended to provide Decision Height or arrival at minimums information.

When adjusting the Altitude Alert, use the TRML or STD button to make 1000-foot steps to the vicinity of the selected altitude.

Disengaging the Altitude Alerter
Pressing the up and down buttons simultaneously disengages the Altitude Alert function. The "A" symbol disappears from the Traffic Display.

Figure 6 Example of Altitude Alerter Operation

1) Cleared to climb and maintain 11,000 feet. The flight crew activates the Altitude Alert by pressing the up and down buttons. The up button can be used to set the assigned altitude of 11,000 feet. The Traffic Display shows ALT SET: 11000ft, then engages following a short wait (or manually engaged by pressing both the up and down buttons when ALT SET: 11000ft is displayed).

2) As the aircraft passes through 10,000 feet, a short tone is followed by the announcement, “One thousand to go”. At 10,500 feet, the tone is again issued and is followed by “Five hundred to go”. When the altitude is reached, the tone is issued and is followed by “At altitude”.

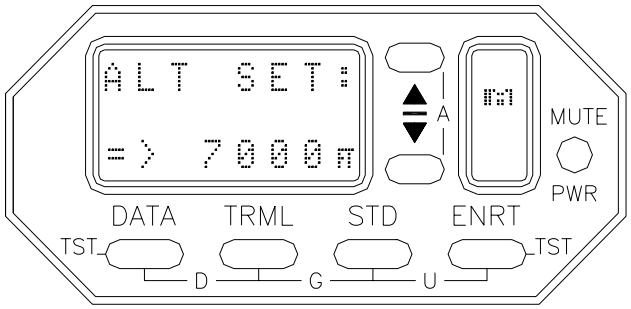
3) If the aircraft deviates more than 200 feet from 11,000 feet, a tone sounds and is followed by “Check altitude”.

4) Cleared to descend and maintain 7,000 feet. Reset the Altitude Alerter by pressing the up and down buttons twice, once to disengage, and again to activate. After 8 seconds, the Altitude Alerter engages (or manually engaged as before).

5) The alerter issues a tone and voice announcement at 8,000 and 7,500 feet as a reminder to level at 7,000 feet.

Using The TAS600 Series System Traffic Display as an Altitude Alerter Display

If the TAS600 Series System Traffic Display is not necessary for intruder information, it may be used to display the selected altitude for the Altitude Alerter.



To enter this function, engage the Altitude Alerter by pressing the up and down buttons. Then press the DATA button. The Traffic Display shows ALT SET: on the first line, and the second line shows a symbol indicating if the host altitude is above (+ >) below (- >) or near
(= >) the desired altitude. Changes to the alerter can be made quickly by using the up or down buttons to make 100 foot changes, or the TRML or STD buttons to change in 1000 foot increments.

To change the barometric pressure setting, press the ENRT button and then the up or down buttons to adjust. Press DATA to return to the Traffic display mode.

Note: The TAS600 Series System Traffic Display does not show intruders if it is being used as an Altitude Alerter Display. All audible warnings operate normally.

Density Altitude

Density Altitude is useful for calculating powerplant performance and for calculating runway requirements for high-altitude, high-temperature departures.

Density Altitude is determined from pressure altitude and temperature. The TAS600 Series System receives pressure altitude from the onboard altitude encoder. By manually entering the outside air temperature (OAT), the TAS600 Series System can compute and display the Density Altitude.

Engaging

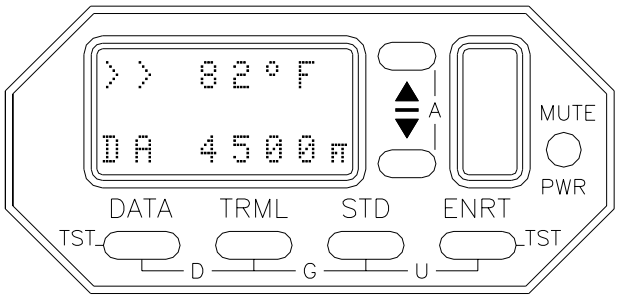
The Density Altitude function is engaged by simultaneously pressing the DATA and TRML buttons. The display shows the previously entered temperature (in degrees F or degrees C) and the Density Altitude corresponding to that temperature and aircraft pressure altitude. The Density Altitude function can be engaged anytime.

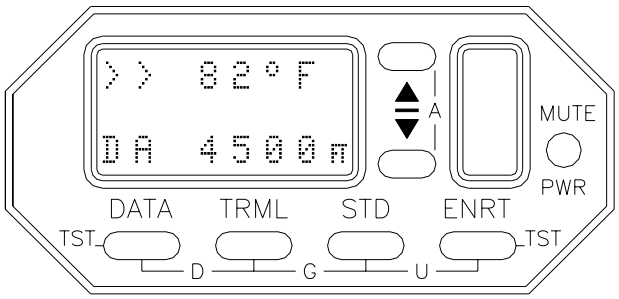
Note: Some altitude encoders have a warm-up period of as much as 10 minutes before the correct altitude is reported. The TAS600 Series System will not provide altitude separation information until the encoder is reporting altitude.

Entering Outside Air Temperature

Depress the up or down button while engaged in the Density Altitude function to adjust the Outside Air Temperature (OAT) input on the TAS600 Series System. The Density Altitude corresponding to the displayed temperature and aircraft altitude is computed and displayed.

The OAT can be adjusted using a degrees Fahrenheit (F) format or a degrees Celsius (C) format. Press the DATA button when in the Density Altitude function to toggle between Fahrenheit and Celsius. When Density Altitude is selected, the display defaults to the previously entered temperature and format. Pressing the TRML or STD button can make 10° steps to the vicinity of the reported OAT.





Note: The TAS600 Series System does not measure the actual Outside Air Temperature. Adjust the TAS600 Series System to reflect the OAT.

Disengaging
The TAS600 Series System can be returned to the traffic alerting function by pressing the DATA and TRML buttons. If no button is pressed for 8 seconds, the TAS600 Series System automatically returns to traffic alerting operation.

Test Function with the Avidyne ½ 3ATI Traffic Display
To initiate a self-test, press the DATA and ENRT buttons simultaneously. The following is displayed:

1) Testing Remote.

2) The Annunciator light illuminates (if installed) and the word "testing" is generated in the audio system.

3) SYS CHK: OK

4) XMT CHK: OK

5) Testing Display.

6) The Traffic Display then displays the software versions.

If there is a fault indication, do not use the TAS600 Series System data.

Caution: The TAS600 Series System does not monitor for TAs or display intruder information during the Test function.

A cursor on the Traffic Display confirms continued operation of the equipment. Two dots in the cell immediately to the left of the

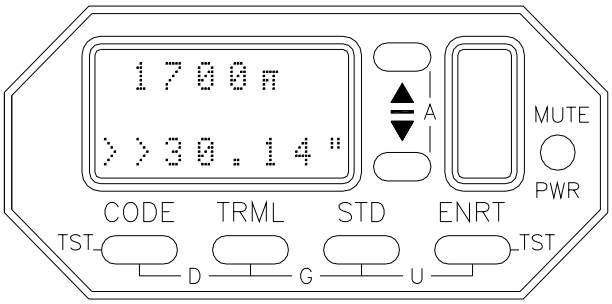
mode cell alternately illuminate, indicating continued operation. If the dots do not alternate, the equipment is not operating. "**Link Failure**" indicates a disrupted communications link between the Processor and Traffic Display.

Flying with the TAS600 Series System Traffic Display

The following sequences could be encountered during a typical flight with the TAS600 Series System using the Traffic Display. The following scenarios represent typical encounters with traffic when using the TAS600 Series System.

Examples of Operation

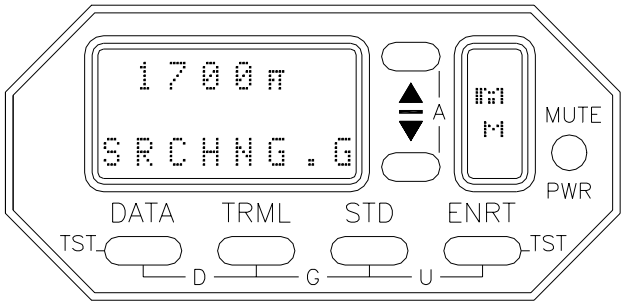
1) Power has been applied, and the TAS600 Series System has completed the initialization sequence. The barometric pressure setting can be entered if desired. In the illustration below, current barometric pressure is 30.14" and the field elevation is 1,700 feet MSL.



2) Adjusting the TAS600 Series System barometric pressure setting is not required for effective traffic alerting operation, but it can be helpful for other functions.

After a few seconds, the TAS600 Series System begins monitoring for intruders. "Ground Mode" is announced, indicating initial operation in the Ground Mode.

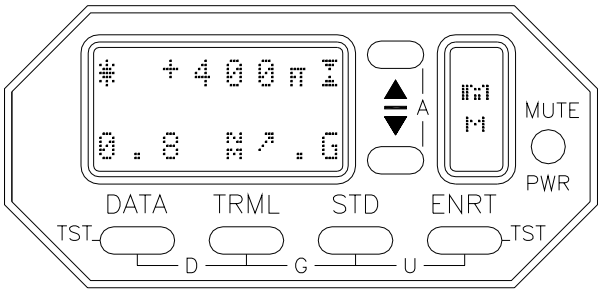
The Proximate Airspace Volumes could be reset, but it is not necessary to adjust them before each flight. For this example, the Proximate Airspace sizes are those set at the factory.



3) This illustration shows the TAS600 Series System has automatically entered the Ground Mode, and monitoring for TAs and proximity alerts. All tones are muted (hence the "M") and aircraft on the ground are not displayed.

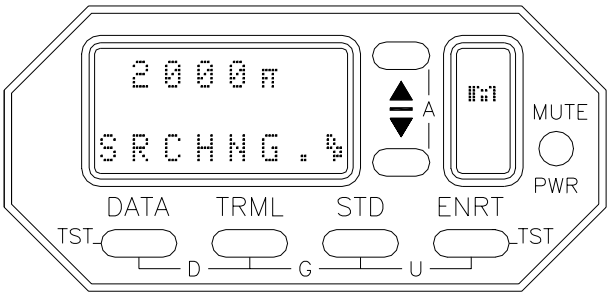
An ATC clearance is received, requiring an initial climb to 4,000 feet. The Altitude Alerter can be set for 4,000 feet. When the Altitude Alert is engaged, a small upper case reversed-image "A" appears on the Traffic Display as illustrated above. When passing through 3,000 and 3,500 feet, a tone and voice annunciation sounds as a reminder of the approaching assigned altitude.

If Density Altitude is of concern for takeoff, depressing the DATA and TRML buttons and entering the Outside Air Temperature (OAT) can provide this.

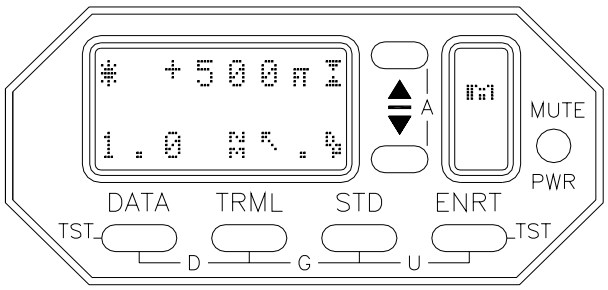


4) Before takeoff, check the area visually for traffic and check the TAS600 Series System. The TAS600 Series System is indicating an intruder 400 feet above, closing in altitude, 0.8 miles away, at approximately 1:30. The intruder is visually acquired on a close-in base to final and lands before your departure. Note the "G" in the lower right-most cell indicating Ground Mode.

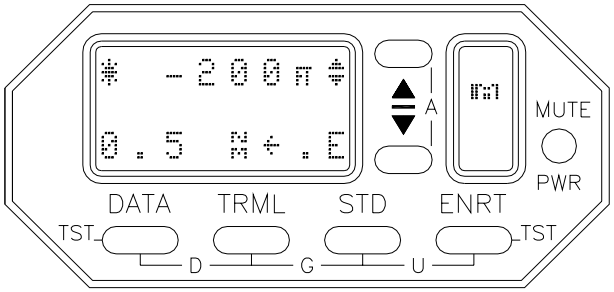
Warning: The TAS600 Series System may not display all intruders on approach. Always check the area visually before departing.



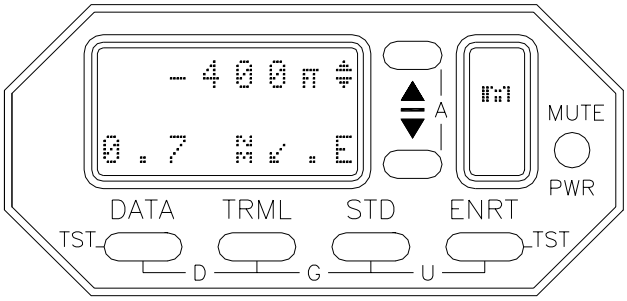
5) After climbing more than 400 feet, the "M" disappears, indicating that the Proximate Advisory tones are enabled. The mode symbol changes to "Dp", indicating departure transition, until the aircraft climbs above the programmed base of the Enroute airspace. If a high-rate climb were made, the Dynamic Proximate Advisory Airspace would expand to monitor for intruders above the set Proximate Airspace. Note the reversed-image "A" remains, indicating that the Altitude Alert is set.



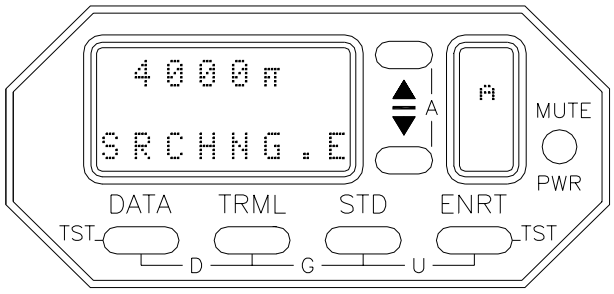
6) Passing through 2,900 feet, “[tone] Traffic, 10 o’clock, high” sounds. The TA shows 500 feet above the host aircraft, closing in altitude, 1.0 mile, at approximately 10 o'clock. A TA only sounds when the intruder is computed to be within 30 seconds of closest point of approach (CPA). The intruder is visually acquired to the left front, descending.



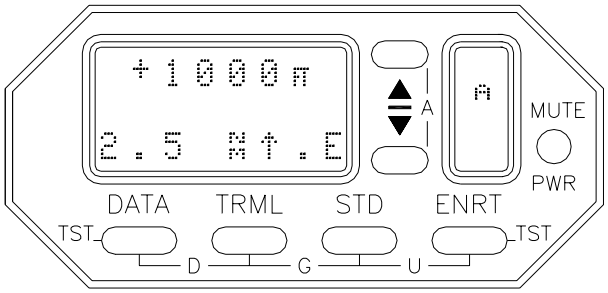
7) The TAS600 Series System shows the intruder 200 feet below and 0.5 miles, off the left wing. The altitude separation and range of the intruder then increase. If another TA was detected, it would be displayed instead of the departing intruder. Note the automatic transition to the Enroute airspace.



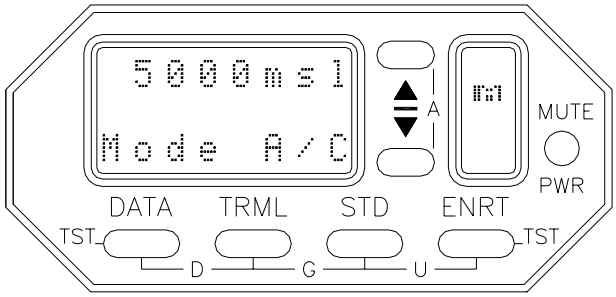
8) The intruder continues to descend, and passes to the left. The star in the upper left part of the display is gone, indicating the traffic is no longer a TA.



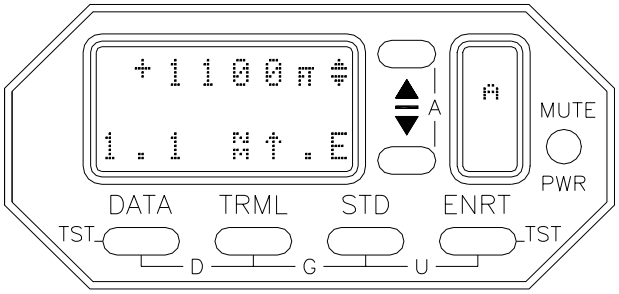
9) At 3,000 and 3500 feet, the Altitude Alert sounds indicating the own (host) aircraft is nearing 4,000 feet. At 4,000 feet the reversed-image "A" changes to a normal "A", indicating arrival at the desired altitude.



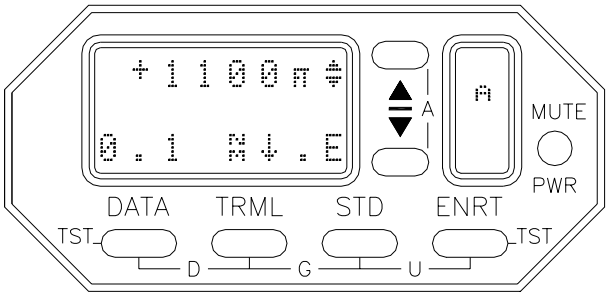
10) An intruder is acquired 1,000 feet above in level flight, 2.5 miles, at about 12 o'clock. There is no voice annunciation, so the traffic is not a TA.



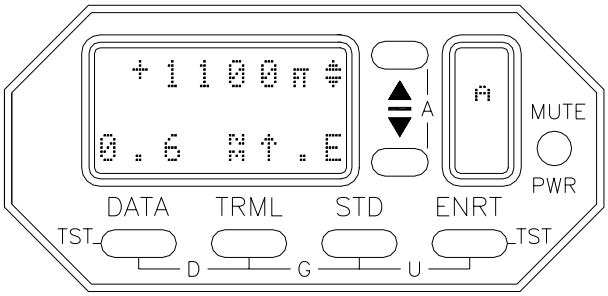
11) Press the DATA button, the intruder is at 5,000 MSL.



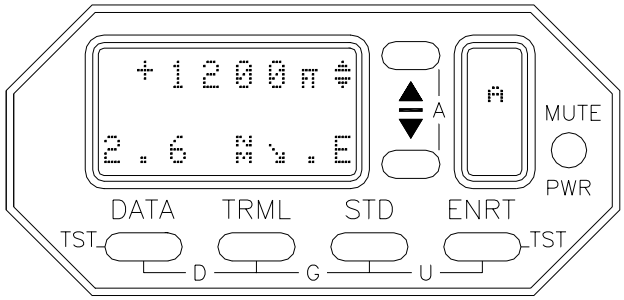
12) The intruder continues to close in range, and has changed slightly in altitude.



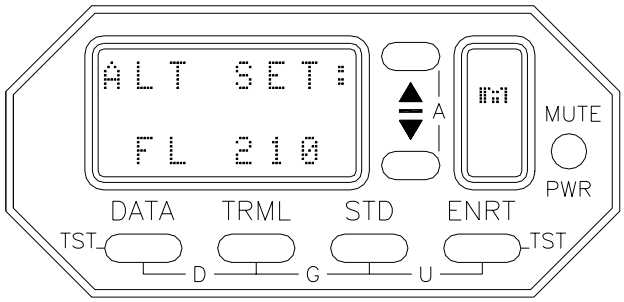
13) The intruder approaches, and is nearly overhead.



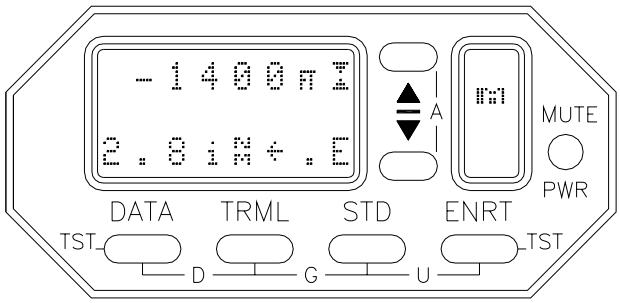
14) The intruder flies directly overhead and passes behind. You are instructed by ATC to turn 45° to the right.



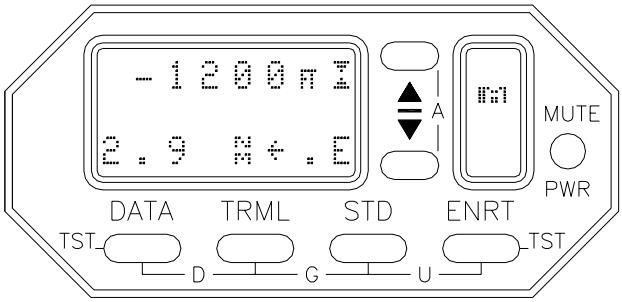
15) Eventually the intruder, which has climbed to 1200 feet above, leaves the monitored area.



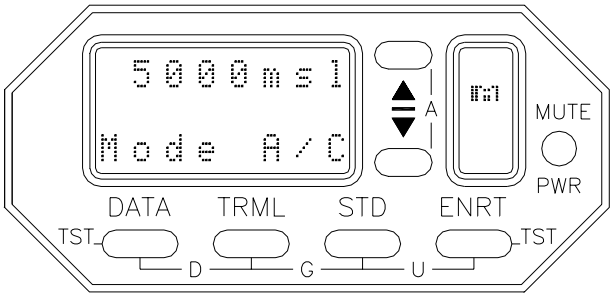
16) Now, cleared out of 4,000 feet for Flight Level 210, the Altitude Alerter is set for to FL 210.



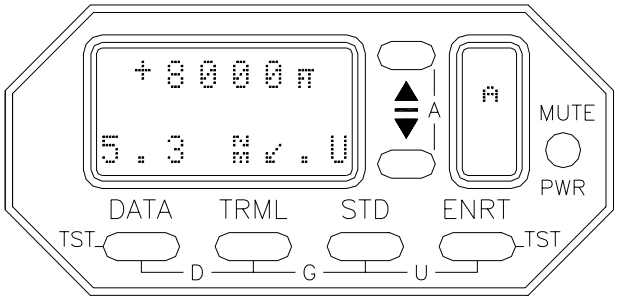
17) Passing through 10,000 feet, the TAS600 Series System shows an intruder 1,400 feet below, closing in altitude at 2.8 miles, off the left wing. Since the intruder is closing in altitude, it is climbing.



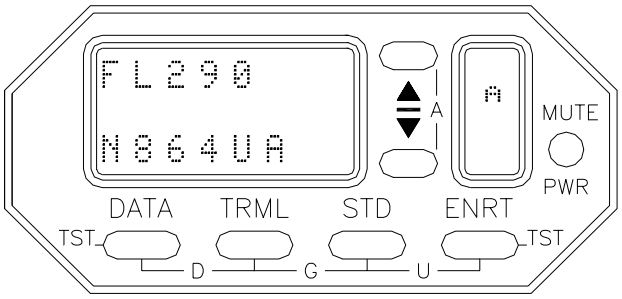
18) Altitude separation is decreasing and the range is increasing. The intruder is flying a nearly parallel course.



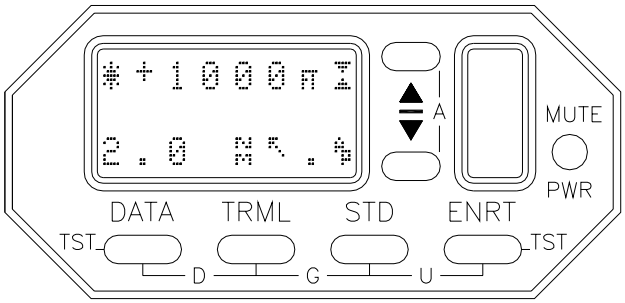
19) The DATA button shows the intruder is at 5000msl.



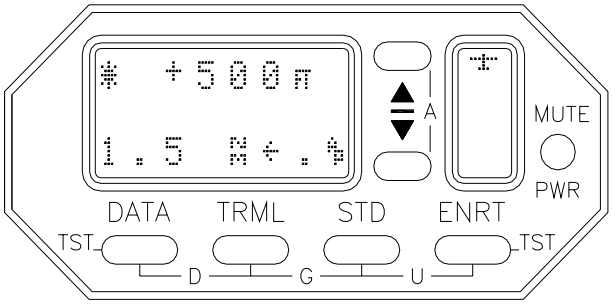
20) Leveling at FL 210, the Unrestricted Mode is selected. Traffic is displayed 8,000 feet above and 5.3 miles, aft and to the left.



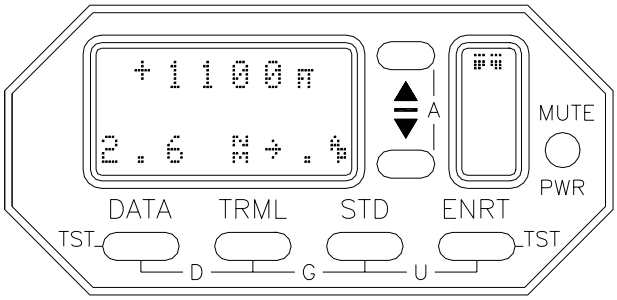
21) Pressing DATA shows the intruder as N864UA, likely airline traffic. Later, the flight crew sets the Approach Mode (or it is automatically set if Radar Altitude input is available) in anticipation of descent and landing.



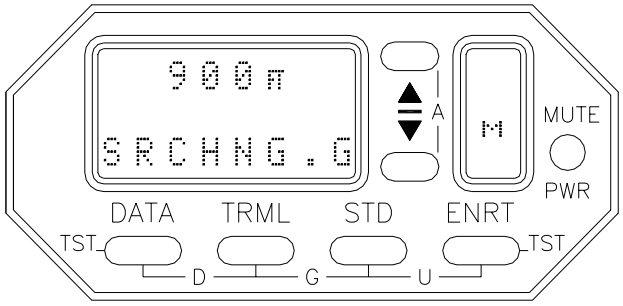
22) Descending now, the TAS600 Series System automatically transitions to the Approach Mode (shown by the “Ap” in the lower right). Intruders on the ground are not displayed. If a high-rate descent were made, the Dynamic Proximate Airspace would expand to monitor for intruders below the set airspace limit. A TA sounds, announcing “[tone] Traffic two o’clock high, 2 miles.” Double pressing the mute/repeat (or Data) button generates “[tone] Traffic two o’clock high, 2 miles.” The intruder is then visually acquired.



23) The intruder now shows 500 feet above, 1.5 miles, about 9 o'clock. Note the second intruder.



24) Press and hold the up button corresponding to the secondary intruder. The Traffic Display then shows the additional intruder 1,100 feet above and 2.6 miles, off the right wing. After a few seconds, only the closer of the two intruders is displayed.



25) The primary intruder eventually passes out of the Proximate Airspace Volume. On short final, the TAS600 Series System automatically transitions to the Ground Mode.

Appendix 4 Operation with the Garmin G1000

General

The G1000 Avionics System provides an optional display interface for the Avidyne 9900BX/TAS System. This section provides instructions regarding this interface. This section assumes that the user has experience operating the G1000 Avionics System and is familiar with the G1000 Pilot's Guide and the 9900BX/TAS system. Refer to the **Traffic Advisory Systems Section** in the Garmin G1000 Optional Equipment Addendum for Configuration and Failure Response information.

The following replaces the G1000 Cockpit Reference Guide Traffic Advisory System (TAS) information.

TAS System Startup

The TAS system powers on with the G1000 Avionics Master and performs an automatic self-test.

Once fully initialized, the TAS system will annunciate "Ground Mode". Ground Mode is not indicated on the display. If self-test fails, the G-1000 will display a TRAFFIC FAIL message.

The 9900BX performs continuous self-test and no pilot-initiated self-test function is provided.

Note: Some aircraft may not be configured for initializing in Ground Mode. In this case, the 9900BX operates in the Flight Mode and the Ground Mode announcement will not be heard.

Note: A startup failure condition may be observed on the G1000 PFD if the altitude encoder takes a period of time to send valid data. This failure will clear when the altitude data becomes valid.

Operation

Displaying Traffic on the Traffic Map Page

1. Press the **ALT MODE** softkey to change the altitude volume. Select the desired altitude volume by pressing the **BELOW**, **NORMAL**, **ABOVE** or **UREST** (unrestricted) softkey. The selection is displayed in the Altitude mode field.
2. Rotate the **Joystick** to adjust the display range.

Displaying Traffic on the Navigation Map

1. With the Navigation Map displayed, press the **MAP** softkey.
2. Press the **TRAFFIC** softkey. Traffic will now be displayed on the map.

Appendix 5 Operation with the Garmin GNS 480 color GPS/NAV/COM

General

The GNS 480 also provides an optional display interface for the Avidyne 9900BX/TAS System. This section provides instructions regarding this interface.

The following supplements the GNS 480 Pilot's Guide Basic Operation Traffic information.

9900BX/TAS600 series System Startup

The TAS system normally powers on with the Avionics Master, and performs an automatic self-test.

Once fully initialized, the TAS system will annunciate "Ground Mode". Ground Mode is not indicated on the display. If self-test fails, the GNS 480 will display a TRAFFIC FAIL message.

The TAS performs continuous self-test and no pilot-initiated self-test function is provided.

Note: Some aircraft may not be configured for initializing in Ground Mode. In this case, the TAS operates in the Flight Mode and the Ground Mode announcement will not be heard.

Note: A startup failure condition may be observed on the GNS 480 if the altitude encoder takes a period of time to send valid data. This failure will clear when the altitude data becomes valid.

Operation

Operation is identical to the SkyWatch operation described in the GNS 480 Pilot's Guide. With the following exception:

There is no self-test or standby mode.

Appendix 6 Specifications, Lexicon, and Warranty

General

Weight: Processor and Coupler	7.3 pounds (3.3kg)
Operating Voltage:	11 - 29 Volts DC
Current Requirements:	2.9 A@ 14 VDC 1.55A@ 28 VDC

LEXICON

The following words are used by the TAS600 Series System. See Built-In Test and Fault Indications for additional phrases.

- “Traffic”: Used to indicate a Traffic Alert (TA).
- Clock position (i.e. “12 o’clock”): Identifies the direction of the traffic from the host aircraft.
- “High”: The TA is ≥300 feet above the host aircraft.
- “Same Altitude”: A TA within 300 feet vertically.
- “Low”: The TA is ≥300 feet below the host aircraft.
- “No Advisories”: Used when no TA is detected.
- The traffic ranges below generate the audibles as shown:

  < 0.4nm = "Zero Miles"
  < 1.1nm = "Less than one mile"
  < 1.8nm = "One mile"
  < 2.8nm = "Two miles"
  < 3.8nm = "Three miles"
  < 4.8nm = "Four miles"
  < 5.8nm = "Five miles"
  < 6.8nm = "Six miles"
  < 7.8nm = "Seven miles"
  < 8.8nm = "Eight miles"
  < 9.8nm = "Nine miles"
  ≥ 9.8nm = "Ten miles"

TAs are not issued for traffic beyond 10nm.

PARTS AND SERVICE WARRANTY

The TAS600 Series System is warranted against defects in materials and manufacturing according to the Avidyne warranty policy. Proper installation of the TAS600 Series System is the responsibility of the installing agency and is not part of this warranty. Avidyne Corporation is not liable for consequential damages.

Warranty protection is ensured only when your TAS600 Series System is installed and serviced by an authorized dealer.

CUSTOMER SUPPORT

We appreciate the confidence you have placed in Avidyne and in your avionics dealer. We trust that both the TAS600 Series System and your dealer have met your expectations. For questions or comments, contact Customer Service at 888-723-7592 (international +1-781-402-7400) or: support@avidyne.com.

Serial Numbers and Purchase Information

Processor: _____

Traffic Display: _____

Date of Purchase: _____

Dealer Name: _____

DISCLAIMER

The Avidyne TAS600 Series Systems have been meticulously designed to provide warning of nearby intruders. As with any device, there are significant limitations. The TAS600 Series System can only detect signals if they are received. There are many impediments that 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 TAS600 Series System 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 TAS600 Series System 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 TAS600 Series System 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 TAS600 Series System. This includes knowledge of the limitations as well as the capabilities of the TAS600 Series System.

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 TAS600 Series System 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.

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AVIDYNE CORPORATION
55 Old Bedford Road
Lincoln, MA 01773
Telephone: 781-402-7400
Toll Free: 800-AVIDYNE (800-284-3963)
FAX:781-402-7599
www.avidyne.com

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