

Ryan International Corporation

**Multi-Hazard Display
Pilot Operating Handbook**

—
Traffic Application

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Supplement to the Ryan Multi-Hazard Display
Pilot Operating Handbook – General Information

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CHAPTER 1

General Information

Revision Index

Revision	Date	Description of Change
00	18Dec2003	Initial Release
01	12Feb2004	Referenced 9900BX Pilot's Operating Handbook and clarified display pop up criteria.
02	6Jun2004	Reformatted, added reference to the MHD Pilot Operating Handbook.
03	22Oct2004	Corrected typographical errors. Reformatted. Added section describing the traffic volume dialog.
04	18Apr2005	Corrected typographical errors. Correct hectopascal glossary definition.
05	18May2005	Table 15.1 was corrected to indicate that the left rotary knob is used for brightness.

Welcome

Thank you for becoming an owner of the Ryan Multi Hazard Display (MHD) with the Traffic Application. This Operating Handbook is intended as a guide to the capabilities and operation of the Ryan MHD Traffic Application. This manual will help you get the best performance from your system.

This Traffic Application Pilot Operating Handbook should be used in conjunction with the Multi-Hazard Display Pilot Operating Handbook – General Information, part number 32-2402.

Special terms and definitions are found in the Glossary in Chapter 10.

TSO Information

The MHD complies with the requirements of TSO-C118 (TCAS I) and TSO-C147 Class A (TAS). The Ryan MHD installed with a compatible Class A approved Traffic Advisory System (such as the Ryan Model 9900BX TAS) is considered a Class A Traffic Advisory



System (TAS). The Ryan MHD installed with a compatible TCAS I meets the requirements of a TCAS I system. The Ryan MHD also complies with the requirements of TSO-C113, Airborne Multipurpose Electronic Displays.

Conventions Used in this Manual

- *Italics* are used to identify the mechanical controls.
- **Bold** is used to denote a menu item, which can be activated with a *Soft Key*.
- CAPITALS are used to identify the screen labels of the four unlabeled pushbuttons beneath the LCD screen. These push buttons access menus or dialogs. The *MENU* and *SEL* keys to the right of the LCD screen are also capitalized.
- “Quotation marks” are used to highlight specific wording as it appears on the LCD screen.
- The location of a particular menu or dialog is specified as a sequence of buttons, menus and dialogs separated with “/”. This is called the path to the menu or dialog. For example, the traffic altitude filter can be set to above mode with the path *MENU/Quick/Filter/ABV*. This path indicates that you would press the MENU button, and then the *Soft Key* labeled **Quick**, and then the *Soft Key* labeled **Filter**, and then the *Soft Key* labeled **ABV**.
- A knob can be rotated and pushed.
- A button can be pushed or held.
- A Menu is a set of options displayed at the bottom of the screen that indicates the current function of each *Soft Key*. Each menu also has a title that is displayed to show the functional grouping of its options. When a menu is displayed, the system is said to be in Menu Mode.
- A Dialog is a special display used for setting or adjusting features for the system or an application. When a dialog is displayed, the system is said to be in Dialog Mode.

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CHAPTER 2

Fast Start



The operation of the MHD is generally intuitive and there is more than one way to access many functions. Here is what you need to know to operate the MHD with the Traffic Application.

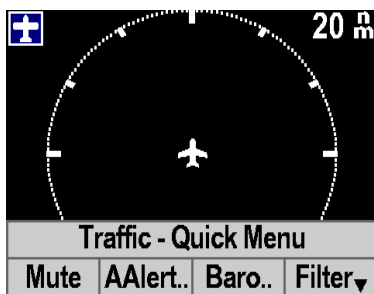
- Turn the unit on by pressing the *VIEW/BRT* knob (*Left Rotary knob*).
- Turn the unit off by pressing and holding the *VIEW/BRT* knob (*Left Rotary knob*).
- Twist the *VIEW/BRT* knob to adjust display brightness (The cockpit dimmer controls knob brightness).
- Press the *VIEW/BRT* knob to select either Single or Multi-View mode. The multi-view mode shows two thumbnail images of other applications. If the system consists of only one application, the thumbnail images are blank.
- Twist the *DATA/RNG* knob (*Right Rotary Knob*) to adjust the range.
- Press the *DATA/RNG* knob to display more data for traffic on the display.
- Pressing any *Soft Key* button will access the “Traffic – Quick Menu”, providing instant access to commonly used functions. See Figure 2.1: Example of the Traffic – Quick Menu when the MHD is connected to a 9900BX TAS. Note that the item on the traffic quick menu may vary depending upon what traffic system is connected to the MHD.
- Press *MENU* to provide access to other functions such as Ground mode, Approach mode, and configuration options. The menus for these functions will appear above the *Soft Key* buttons.
- Figure 6.1: Graphical Illustration of the Traffic Application Menu Structure is a complete list of the Traffic Application Menu Structure.



- Surrounding aircraft are displayed using three symbols. A Traffic Advisory (TA) is an amber filled circle (●); a Proximate Advisory (PA) is depicted with a cyan filled diamond (◆); Other Traffic (OT) is depicted with a cyan open diamond (◇).
- The relative altitude of surrounding traffic is displayed using two digits that give the difference in altitude in hundreds of feet. A plus sign (+) precedes the digits if the intruder is above the host, a minus sign (-) if the intruder is below the host, and no sign if the intruder is at the same altitude as the host.

FIGURE 2.1

Example of the Traffic - Quick Menu when the MHD is connected to a Ryan 9900BX TAS



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CHAPTER 3

MHD Basics



Product Description

The Ryan Multi-Hazard Display (MHD) consists of a rugged high-resolution Active Matrix Liquid Crystal Display (AMLCD) with anti-glare lens, Light Emitting Diode (LED) backlit optical rotary knobs, and tactile electroluminescent (EL) pushbuttons. The MHD receives inputs from the pilot and provides visual and tactile feedback. Refer to figures 3.1 and 3.2 below.

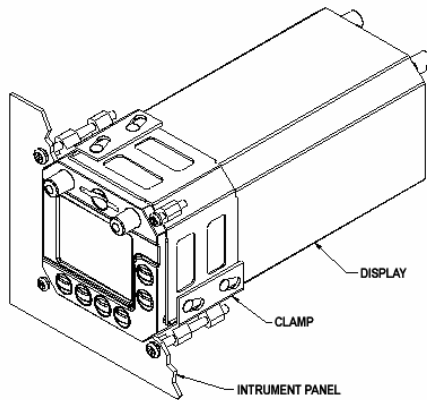


FIGURE 3.1
Multi-Hazard
Display,
Illustrating the
Instrument
Panel Mounting
Arrangement

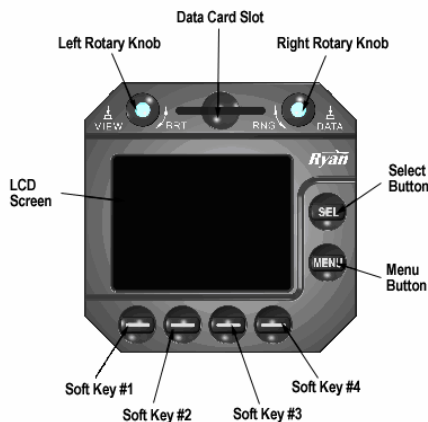


FIGURE 3.2
The MHD
Controls





NOTE: The MHD may be connected to a variety of traffic systems. Every effort has been taken to identify to the reader all information that is specific to a particular traffic system, but please be aware that oversights may be present.

The MHD serves as a common location to display aviation hazards while reducing clutter on navigation displays. Many hazards are better viewed at ranges that differ from those preferred on moving map displays. Traffic, for instance, is best viewed at five to ten miles. However, satellite and lightning weather is normally viewed at two hundred miles or more. Terrain warnings are optimally set to less than twenty miles. Thus, when hazard information is overlaid on a navigation map, an optimal range setting is impossible for all data, and vital information may be so cluttered so as to reduce effective communication to the pilot. The Ryan MHD presents each hazard individually, allowing the flight crew to optimize the range of each application while minimizing the space used to display them.

The MHD Traffic Application communicates with an external traffic processor (such as the Ryan Model 9900BX Traffic Advisory System or TCAS I) and displays the data gathered during the communication. Multiple hazard information can be displayed on the equipment individually or three at a time using two thumbnails. The system is designed to operate with minimal pilot interaction.



CAUTION: The Ryan MHD Traffic Application is advisory only. It is a backup to the See and Avoid concept and the ATC Radar environment. See Limitations.

Field loadable software updates allow additional applications to be added without the need to return the MHD to the factory. The MHD accepts data via the standard ARINC 429 aviation databus and other RS-232 protocols to interface with current and future hazard sensors.

Startup

The MHD turns on automatically with the avionics master switch, or with a press of the *Left Rotary* knob (the *VIEW* button/*BRT* knob). It may take 20 seconds or more to display an image. At low temperatures this time may be slightly longer. If the system appears to have not turned on, check the brightness setting of the display by turning the *Left Rotary* knob clockwise. Press and hold the same button to turn the unit off.

Display Brightness

The brightness of the display may be adjusted using the *Left Rotary* knob labeled “*UBRT*”.

Control Backlighting

The pushbuttons and rotary knobs are backlit. The intensity of the control backlighting can be adjusted using the panel dimmer controls in the cockpit (if connected during installation). The buttons use reflective technology for daytime viewing and backlighting for nighttime; consequently, the backlighting is very dim and appears to change very little when adjusting with the panel dimmer, especially compared to the knobs.

Controls

The following table summarizes the control functions of the display with the Traffic Application. Refer to figure 3.2 for an image of the MHD with the controls labeled. Refer to the **MHD Pilot Operating Handbook – General Information** for a more detailed description of the MHD basic controls.

The operation of the unit is designed to be intuitive, with quick access to the most used functions. To aid in the intuitive operation it is possible to accomplish some functions in more than one way. Use this guide with the display in order to understand the operation and explore all the functions. Once the process is understood it will normally not be necessary to refer to this table for operation.



Button (and Action)	Function
Left Rotary Knob (twist)	Adjusts brightness of the LCD
Left Rotary Knob (momentary press)	<p>Selects Single-View or Multi-View. Pressing the button when a dialog is displayed saves and exits the dialog.</p> <p>When the MHD is turned off, pressing this knob will turn it on.</p>
Left Rotary Knob (press for 6 - 10 seconds)	Turns the MHD off.
Right Rotary Knob (press)	<p>Provides additional data for items of interest on the primary display. For TAS, the range and msl altitude are displayed. When available, the N-number of the aircraft or squawk code is also shown. If there is insufficient room near the symbol to show the additional data, a white rectangle is displayed with the information inside. Pressing the button when a dialog is displayed saves and exits the dialog.</p>
Right Rotary Knob (twist)	Changes the range for the TAS. Used to adjust the barometric pressure, the altitude alerter, and other dialog parameters.
SEL, Multi-view Mode (press)	Rotates the applications from the main display to the thumbnail displays. When only one application is installed, the thumbnail other windows are blank.
SEL, Single-View Mode (press)	Rotates the applications from the main display to the background (that is, operating but not displayed). When only one application is installed, the SEL button has no apparent function in the Single-View mode.

Button (and Action)	Function
MENU (press)	<p>When not in menu mode, this button invokes the menu for the primary application.</p> <p>When in menu mode, this button causes the next higher menu in the menu hierarchy to be display. If a <i>Soft Key</i> button is mistakenly pressed, the <i>MENU</i> button allows the user to go back to the previous selection.</p>
Soft Key (press)	<p>When not in menu mode, the Soft Keys invoke the quick menu for the primary application.</p> <p>When in menu mode, pressing a Soft Key activates the corresponding menu option shown on the screen just above the Soft Key.</p>
(automatic)	<p>TRAFFIC ADVISORIES</p> <p>When a new TA occurs, a special TRAFFIC ADVISORY screen is automatically displayed if the primary application is not already set to traffic (or the range is set to more than three miles on the traffic screen). The image is bordered in green and the range is three miles. The Soft Keys show “Dismiss” and “Traffic”. Dismiss returns to the application shown previously. Traffic will make Traffic the primary application and switch to Single-View mode.</p>

Single-View and Multi-View Modes

There are two basic display modes: Single-View and Multi-View. The Single-View mode displays only one application, such as Traffic. While in the single-view mode, different applications are selected in a round-robin sequence using the *SEL* button.

The Multi-View mode can show up to three applications at once. The Primary Application is in the large display area, and two secondary applications are presented in small thumbnail displays.



Pressing the *SEL* button while in multi-view mode will rotate application positions in a clockwise fashion. Each press of the *SEL* button moves the secondary application in the upper thumbnail onto the main screen, making it the primary application. The secondary application in the lower thumbnail is moved into the upper thumbnail, and the primary application is moved into the lower thumbnail making it a secondary application.

Pressing the left rotary knob switches between the Single-View and Multi-View modes. Detailed information about the Operator controls is found in the booklet **Multi-Hazard Display Pilot Operating Handbook – General Information** that accompanies this manual.

Figures 3.3 and 3.4 below show the single-view mode and multi-view mode respectively. In Single-View mode, the entire screen is dedicated to a single application (Traffic, in this instance). Three types of traffic are shown in figure 3.3, a Traffic Advisory (TA) 200 feet above at about 11 o'clock, a Proximate Advisory (PA) 500 feet below at about 4 o'clock, and Other Traffic (OT) at the same altitude as the host (own) aircraft at about 9 o'clock. Note the aircraft icon in the upper left corner, which identifies this as the Traffic Application display.




FIGURE 3.3
Single-View
Mode

In multi-view mode, the screen is divided into sections displaying three different applications. In this example, Traffic is the primary application. Weather and TAWS are the secondary applications displayed in the thumbnails. The arrows in figure 3.4 show the rotation sequence that occurs when the *SEL* button is pressed.



FIGURE 3.4
Multi-View
Mode (the white
arrows indicate
the rotation
sequence when
SEL is pressed)

The Traffic Application Display

The  icon in the upper-left corner of the display region identifies it as the Traffic Application.

Host Aircraft Symbol

The host aircraft is depicted using a white aircraft symbol. The preferred shape of the host symbol can be selected in the “Host Symbol” dialog, accessible via the System Menu. Helicopters or fixed wing aircraft can be selected. To get to the host symbol dialog press *MENU/MENU/System/Prefs/Hosts...* See Chapter 4 for more details about the System Menu structure.

Host Aircraft Offset

The host aircraft symbol is shown either in the center or offset slightly below the center of the screen (rear offset). Offsetting the host symbol slightly below center provides more range in front of the host aircraft than behind, and is especially useful for maximizing screen utilization in the single-view mode. The offset of the host symbol can be configured differently for the single-view and multi-view modes. By selecting a centered view in the Multi-View mode and the offset view in the Single-View mode will then permit quickly selecting either offset or normal view with a single press of the *Left Rotary* knob, providing an optimum view with little effort.

The position of the host symbol can be switched via the *MENU/Config/Offset* menu. The host symbol offset selection will apply to the currently active mode (either single-view or multi-view).

Display Range

When Traffic is the Primary Application, the current display range is shown in the upper-right corner. This value corresponds to the distance between the host aircraft symbol and the outer range ring on the display.

The display range is adjusted by rotating the *Right Rotary* knob. Ranges of 1, 3, 6, 12, and 20nm are available. During range adjustments, the range label is momentarily duplicated on the left side of the outer range ring (See figure 3.5 below). The duplicate range label is provided for convenience, since the user's hand may obstruct the view of the upper right corner of the LCD screen while the *Right Rotary* knob is used.

FIGURE 3.5
Example of the momentary duplicate range label shown while adjusting the range.



When the Traffic Application is displayed in a thumbnail region in Multi-View mode, the display range is shown at the top right part of the thumbnail. However, the traffic display range cannot be adjusted using the *Right Rotary* knob when the traffic is displayed in a thumbnail. Use the “Traffic – Display Range” menu instead by pressing *MENU/MENU/Traffic/Config/Range*.

A 2 nm ring of white clock ticks is displayed, centered about the host, when Traffic is the Primary Application and the display range is 3 or 6 nm.

Altitude Filter Indication

When Traffic is the Primary Application, the Altitude Filter (Vertical Display Viewing Limit) used by the TAS is indicated in the lower left corner of the application window. The label is an abbreviation of the filter name. Ground and Approach modes (only available with the Ryan 9900BX TAS) are also displayed in this area. The Approach mode indication is displayed in a smaller font above the altitude filter indication (See Chapter 7 – Operating with a Ryan TAS, for more information on Ground Mode and Approach Mode). The possible abbreviations are listed in Figure 3.6 below.



Abbreviation	TAS Mode
GRND	Ground (Ryan TAS only)
APP or APPR	Approach (Ryan TAS only) (This indication appears above and in addition to the altitude filter indication)
NORM	Normal Vertical view
ABV	Above Vertical view
BLW	Below Vertical view
UNR	Unrestricted Vertical view

FIGURE 3.6
Mode and Altitude Filter abbreviations for the Ryan MHD/TAS

See “Vertical Display (Viewing) Limits” in the Glossary for more information about NORM, ABV, BLW and UNR.

Polarized Sunglasses

The liquid crystal display is not compatible with polarized sunglasses.

Changing Units of Measure

The barometric pressure can be changed in units of inches of mercury or Hectopascals by selecting either English or Metric units in the system menu (*MENU/MENU/System/Prefs/Units*). When changing between hectopascals and inches, the conversion may not appear to be precisely correct. The difference is minor and due to rounding error.

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CHAPTER 4

Menus



Menu Basics

Menus on the Ryan MHD appear at the bottom of the display as a bar of button labels above the four *Soft Keys*. The menu bar consists of a menu title on top and four button labels on the bottom (see figure 4.1 below for an example). The *Soft Keys* are identified from left to right as *SoftKey1*, *SoftKey2*, *SoftKey3*, and *SoftKey4* (see figure 3.2).



FIGURE 4.1
Traffic Menu

During normal operation the menus are hidden to maximize screen area for useful data. There are two methods of bringing up the menu bar.

- Press a *SoftKey* – This will take you directly to the Quick Menu for the primary application.
- Press the *MENU* button – This will take you to the top-level menu for the primary application.

There is no direct means of getting to the menu for a secondary application, or to the system menu. When a menu is being displayed, pressing the *MENU* button will return you to the menu that is directly above the current menu. This is a convenient way of backing up if you select the wrong menu, but it also provides the means to access the system menu and the menu for secondary applications. The “Main Menu” is the top-most menu in the menu hierarchy. Access the Main Menu by pressing the *MENU* button repeatedly until it is displayed. The easiest way to get to the Main Menu is to press the *MENU* button twice when not in the menu mode



(when the menus are hidden). The first press will bring up the menu for the primary application, and the second press will go up one menu to the Main Menu. From the Main Menu you can access the system menu and the menus for all applications.

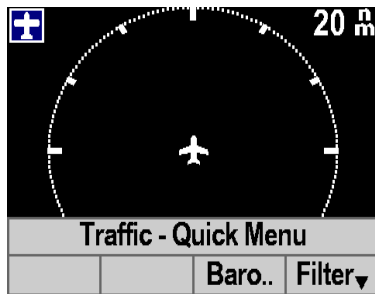
The Main Menu

Since the Main Menu is the top-most menu, the *MENU* button is used to access additional pages of buttons associated with the Main Menu. For example, if there were four applications active in the MHD there would be five items on the Main Menu, One for each of the four application menus, and one for the System Menu. Since there are only four SoftKeys, there would be two pages of button labels on the Main Menu. The *MENU* button would allow you to navigate between these two pages.

The Quick Menu

The concept of the Quick Menu is to provide a quick way for a pilot to access the most frequently used functions. Since any one of the four *SoftKeys* will bring up the quick menu, this menu can be accessed with a single button press. Once familiar with the items on the quick menu, the quick menu functions of the primary application can be accessed simply by pressing the associated *SoftKey* twice. The first press will bring up the quick menu, and the second press will select the associated function. For instance, to bring up the Barometric Pressure dialog when traffic is the primary application, simply press *SoftKey3* twice. The first press brings up the “Traffic - Quick Menu”, and the second press selects “**Baro..**” from the quick menu. See figure 4.2 below.

FIGURE 4.2
Quick Menu
Selections for
Traffic Systems
other than the
9900BX TAS



The Traffic Application Menu

The Traffic Menu allows control over the display of traffic data, and is also the primary means of interacting with the traffic remote processor. A graphical depiction of the menu structure is shown in figure 4.3 below. A short description of each menu item follows.



NOTE: Depending upon which traffic system is interfaced to the MHD the menus may vary from those shown here. Any deviations from this menu structure will be discussed in the “Operating with...” section that pertains to the specific traffic system being used.

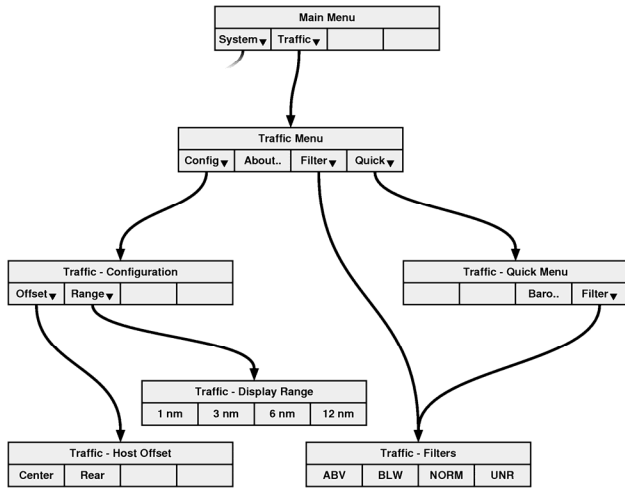


FIGURE 4.3
Graphical Illustration of the standard Menu Structure

TRAFFIC MENU

- Config ▼** Invokes the **Traffic - Configuration** menu.
- Filter ▼** Invokes the **Traffic - Filter** menu.
- Quick ▼** Invokes the **Traffic - Quick Menu**.



TRAFFIC – CONFIGURATION

- Offset▼** Invokes the **Traffic - Host Offset** menu.
- Range▼** Invokes the **Traffic - Display Range** menu.

TRAFFIC - QUICK MENU

- Baro..** Invokes the Barometric Pressure dialog, which is used to change the barometric pressure as used in the computation of msl altitude from pressure altitude.
- Filter▼** Invokes the **Traffic – Filter** menu, to define the vertical display limits.

TRAFFIC - HOST OFFSET

- Center** Sets the display of the Traffic Application so that the host is vertically centered within the window, allowing the same visible range both in front of and behind the host.
- Rear** Sets the Traffic Application display so that the host is offset toward the rear, allowing a larger display distance in front of the host than behind the host.

TRAFFIC – DISPLAY RANGE

- 1, 3, 6 and 12 nm** (This is the same as changing range with the *Right Rotary Knob* except that 20 nm is not available on the menu)

TRAFFIC - FILTER

- ABV** Switches the altitude separation viewing limits of traffic to Above.
- BLW** Switches the altitude separation viewing limits of traffic to Below.
- NORM** Switches the altitude separation viewing limits of traffic to Normal.
- UNR** Switches the altitude separation viewing limits of traffic to Unrestricted.

The System Menu

The following diagram shows the System Menu Structure. More detailed information can be found in the **Ryan MHD Pilot Operating Handbook – General Information**. Press the *MENU* button twice when the menus are hidden to access the System Menu.

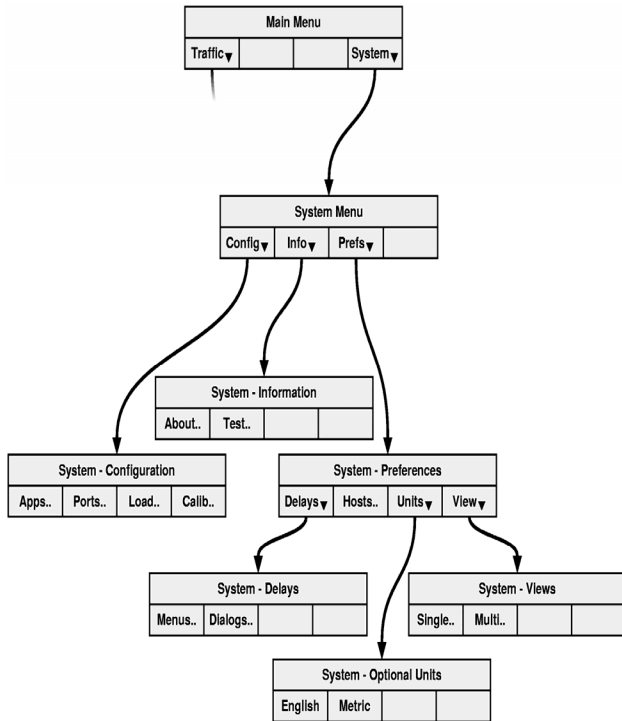


FIGURE 4.4
Graphical
Illustration of
the System
Menu



CHAPTER 5

Dialogs



Dialog Basics

Some parameters or configuration items cannot be effectively set using a simple four-option menu. In these cases a full-screen Dialog is used. In Dialog mode all of the controls except the *Left Rotary* knob “*UBRT*” function are dedicated to interacting with the displayed Dialog. On-screen labels are used to identify the action associated with each control. Typically the *Right Rotary* knob is used for adjusting numeric values or for scrolling through selection lists. Pressing the *Right Rotary* knob will typically accept changes. The *SoftKeys* are typically used for selections.

Illustrations and descriptions of the Traffic dialogs are given in the following sections.



NOTE: Some dialogs are associated with specific traffic systems such as the Ryan 9900BX TAS. Only those dialogs that are available for all traffic systems will be described in this chapter.



Barometric Pressure Dialog

The Barometric Pressure dialog (See figure 5.1 below) is used to adjust the barometric pressure setting used by the Traffic Application. When the Traffic Application is the primary application, the barometric pressure dialog can be accessed by pressing any *SoftKey* and then pressing the “Baro..” button. The barometric pressure can then be adjusted using the *Right Rotary* knob.

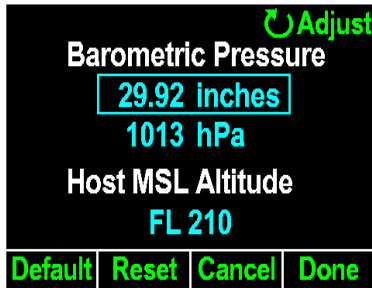


FIGURE 5.1
The Barometric
Pressure Dialog

The barometric pressure is displayed both in inches of mercury (inches) and in Hectopascals (hPa). The host MSL altitude is also shown for convenience. While adjustments are being made, the three values are updated simultaneously. The barometric pressure can be changed in units of inches of mercury or Hectopascals by selecting either English or Metric units in the system menu (*MENU/MENU/System/Prefs/Units*). A box drawn around the associated value indicates by which units changes will be made when the *Right Rotary* knob is turned.



NOTE: The collision avoidance features of the interfaced traffic system do not require that the barometric pressure be set. The barometric pressure setting is used for the following:

- to make the display of the intruder msl altitude more accurate.
- operation of the Approach Mode (Ryan TAS only)
- operation of the Altitude Alerter (Ryan TAS only)

When operating at and above FL180, the system automatically shows the host altitude in the flight levels. It is not necessary to adjust the altimeter setting. The altitude of intruders below and not in the flight levels will be shown as an msl altitude. If the local altimeter setting indicates that FL180 does not exist, the system will not display FL180 (the same holds for other flight levels).

The relevant functions for the panel controls while in the Barometric Pressure dialog are as follows:

- *RightRotary* knob (“Adjust”) - Rotating the knob will adjust the pressure, with a clockwise rotation increasing the value and a counterclockwise rotation decreasing the value.
- *SoftKey1* (“Default”) - Changes the barometric pressure back to 29.92 inches or 1013 hPa.
- *SoftKey2* (“Reset”) - Resets the pressure to the value it had when the dialog was invoked.
- *SoftKey3* (“Cancel”) - Exits the dialog, discarding any changes.
- *SoftKey4* (“Done”) - Exits the dialog, activating any changes.

If no buttons are pressed, the dialog will be dismissed after a few seconds and any changes made will be activated.



CHAPTER 6

Traffic Application Details

Advisory Levels

There are three Advisory levels for traffic:

- Traffic Advisory (TA): a potential collision threat. This intruder could result in a near-hit or a collision. More than one TA can exist at the same time.
- Proximate Advisory (PA): Traffic within five miles horizontally and 1200 feet above and below the aircraft. These aircraft are nearby and may become a Traffic Advisory.
- Other Traffic (OT) targets are displayed, but are far enough away that they do not meet the requirements of a Proximate Advisory, and are less likely to become TAs.



NOTE: Only Traffic Advisories generate audible warnings.



NOTE: Classifying the advisory level of an intruder is a function of the traffic processor. The MHD is only responsible for displaying the traffic as it is received from the traffic processor.

Traffic Symbols

If Traffic is the Primary Application, then traffic data is shown in the primary window. The Traffic Application can display more data when it is the primary application than when the Traffic Application is a secondary application shown in one of the smaller thumbnails.

Traffic data is displayed according to TCAS I specifications. A detailed description of the display of intruding aircraft and other information associated with the Traffic Application follows.

Each intruding aircraft symbol is positioned relative to the host symbol at a distance and angle corresponding to the range and bearing to the intruder. The heading of the host is in the upward



direction on the screen, so 12 o'clock is up, 3 o'clock is to the right, 6 o'clock is down, and 9 o'clock is to the left.

Intruding aircraft symbols connote the level of threat to the host aircraft as shown in figure 6.1 below. Typically traffic that is at a range greater than that indicated by the outer range ring is not displayed. The exception to this is Traffic Advisories, which are shown at the edge of the outer range ring. The symbol for such a Traffic Advisory is half a TA symbol (half of a filled amber circle). When the traffic indicated by such a half symbol approaches to within the currently displayed range, then a full TA symbol will be displayed for that intruder. A TA that is outside the outer range ring can be specifically located by increasing the range until the icon lies within the outer circle, or by pressing the *Right Rotary (Data)* button to immediately see the range of the highest priority Traffic Advisory. See figure 6.2 below for a sample display.





Symbol	Indication
	Filled amber circle Traffic Advisory (TA)
	Filled amber semicircle Traffic Advisory (TA) whose range is beyond the outer range ring. (orientation of this symbol will vary with the bearing to the intruder)
	Filled cyan diamond Proximate Advisory (PA)
	Open cyan diamond Other Traffic (OT)

FIGURE 6.1
Traffic symbols and their meaning

FIGURE 6.2
Traffic display showing a TA, two PAs, and an OT



Traffic Data Tag

When traffic is the primary application a data tag is displayed for each traffic symbol. Due to the small size of the thumbnail displays, the data tag is not displayed when traffic is a secondary application in one of the thumbnails. See figure 6.2 for some examples of the traffic data tag.

If displayed traffic is transmitting altitude information, then the vertical speed and relative altitude from the host aircraft is displayed. The altitude separation of the intruder from the host is displayed in hundreds of feet using two digits. A plus sign (+) precedes the digits if the intruder is above the host, and a minus sign (-) if the intruder is below the host. No sign and “00” appears if the intruder is at the same altitude as the host. If the intruder is above the host, then the text for the relative altitude is displayed directly above the traffic symbol; otherwise, the relative altitude text is displayed below the traffic symbol. If the intruder is not reporting altitude data, relative altitude is not displayed.



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

If the vertical speed of an intruder is greater than or equal to 500 feet per minute, a vertical trend arrow is displayed to the immediate right of the symbol. An up arrow (↑) indicates that the traffic is ascending



and a down arrow (↓) indicates that the traffic is descending. If the traffic's vertical speed is less than 500 ft/min, or if the intruder is not transmitting altitude data, no arrow is displayed.

If the traffic is non-Mode C, and is therefore not transmitting altitude information, then the data tag "Mode-A" will be shown below the traffic symbol. The flight crew must analyze this intruder without knowing the altitude difference.



NOTE: The vertical speed arrow indicates the intrinsic climb or descent rate of the traffic, **not** the relative vertical closure or separation with respect to the host.

Both the relative altitude and the vertical speed arrow are displayed in the same color as the corresponding intruder symbol (amber for TA's, cyan for PA's and OT's).

Non-Bearing Traffic Advisories

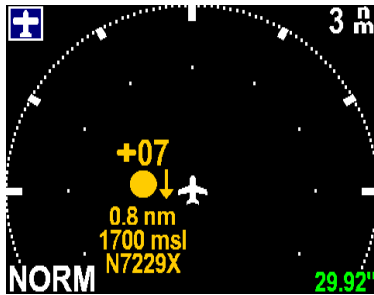
If the bearing to a TA intruder cannot be determined (a non-bearing intruder), then information is presented in text centered just below the host aircraft symbol. Only non-bearing TA's are displayed. Non-bearing PA's and non-bearing OT's are not displayed. A text display of "TA 2.5 +300" indicates a TA at a range of 2.5 nautical miles, 300 feet above the host. If altitude information were also unavailable, then the text reads "TA 2.5", indicating a TA at a range of 2.5 nautical miles.

Additional Traffic Data

Pressing the *Right Rotary* knob labeled *Data* permits access to additional information received for displayed traffic. Data such as the range, msl altitude, and the N-number or squawk code (if available), are shown momentarily for the highest priority intruder when the *DATA* button is pressed. Additional presses of the *DATA* button sequences the data display to the other intruders in order of decreasing priority. If the button is not pressed again, the additional data will disappear after a few seconds delay.

Figure 6.3 below shows an example of additional data displayed for a TA. The additional data tag below the traffic symbol indicates that the intruder is 0.8 nm from the host and is at 1700 feet msl based upon the altimeter setting of 29.92", which is indicated in the lower right corner. The intruders tail number is N7229X (note that tail number and squawk display is only available when used with a Ryan 9900BX TAS).

FIGURE 6.3
Traffic Display with additional information about an intruder



Traffic Range Display

The first line of additional data is the range to the intruder. The range resolution is 0.1 nm.

Traffic MSL Altitude Display

If the intruder is reporting altitude, then the msl altitude or Flight Level of the intruder aircraft is displayed beneath the range as appropriate.



NOTE: Although the collision avoidance features of the connected traffic system do not require that the barometric pressure be set, the displayed msl altitude of the intruder will only be accurate if it is. The relative altitude display does NOT rely upon the barometric pressure setting.

N-number and squawk

The last line of additional data provides the intruder's N-number or squawk code if one of them is available. The squawk is only



displayed if the N-number is not. The N-number is only available for United States registered aircraft equipped with a Mode S transponder. The N-number is helpful when following traffic or anticipating an ATC advisory. N-number and squawk code reception depend upon several factors and are not always available.



NOTE: The tail number and squawk data is only available when the MHD is interfaced with a Ryan 9900BX TAS.

Special Traffic Advisory Screen

If the selected range of the MHD is more than three miles, or another application is the Primary Application, a special Traffic Advisory screen is displayed automatically with a range of three nautical miles when a TA occurs (see figure 6.4 below). This allows quick interpretation of the traffic bearing, altitude and range. If traffic is the primary application and the selected range is already three miles or less, then the special Traffic Advisory screen is not shown. However, in both cases the yellow Traffic Advisory icon is displayed.



FIGURE 6.4
Special Traffic
Advisory
display

The **Dismiss** button on the special traffic advisory display returns the display to its previous view. **Traffic** dismisses the special traffic advisory screen and takes the operator to Single-View mode with Traffic as the primary application.

Visual and Non-Visual Acquisition

Visual acquisition of traffic can often be difficult, even when the Ryan MHD displays the intruder. When under positive control, a deviation based solely on the Ryan MHD data is not sanctioned by regulatory authorities. Intruder information provided by the Ryan MHD is an aid to the See and Avoid concept. 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 Ryan MHD does NOT relieve the pilot in command of this responsibility.



CAUTION: The intruder that you see may not be the intruder that the Ryan MHD has displayed. Continue to monitor the Ryan MHD and visually scan outside even after the traffic is observed.

Operating Modes

Some traffic systems support a standby mode when the aircraft is on the ground. Depending on your system configuration, you may or may not be able to override the standby mode to view aircraft in the terminal area. Refer to your traffic systems Pilot's Guide for information on its operating modes. The Ryan MHD will annunciate the standby mode as shown in Figure 6.6.

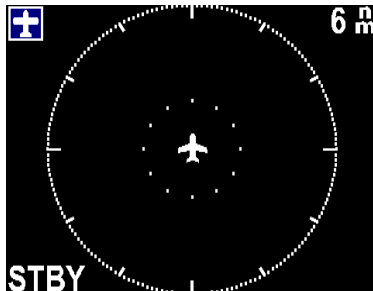


FIGURE 6.6
Traffic system
in Standby
mode

Some traffic system will provide an indication when the traffic processor is executing a self-test operation. Refer to your traffic



systems Pilot's Guide for information on its self-test capabilities. The self-test annunciation is shown in Figure 6.7.



FIGURE 6.7
Traffic system
during Self-Test

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CHAPTER 7

Operating with a Ryan TAS



CAUTION: Critical information regarding the limitations and operation of the Ryan 9900BX TAS can be found in the **Ryan TCAD Pilot Operating Handbook - 9900BX** (part number 32-2352). Do not operate the MHD with a Ryan 9900BX TAS without first reading and understanding the information contained in that document.



NOTE: The discussion in this chapter assumes that the Ryan MHD is communicating with the Ryan 9900BX TAS using an RS-232 based protocol.

The Traffic Application Menus for the Ryan TAS

Figure 7.1 below is a graphical representation of the Traffic Menu structure when the MHD is interfaced with a Ryan 9900BX TAS. The basic structure is similar to the typical traffic application menu structure discussed in Chapter 4, but a few items have been added. A short description of each menu item follows.

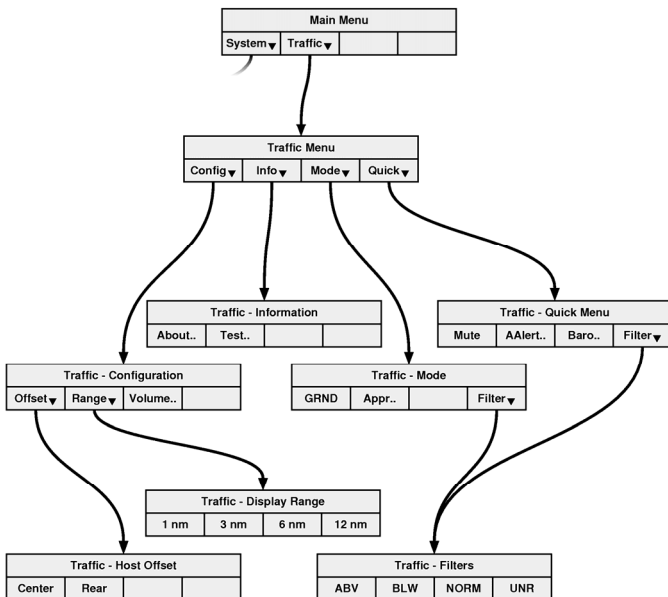


FIGURE 7.1
Graphical Illustration of the Traffic Application Menu Structure when Interfaced to a Ryan 9900BX TAS



TRAFFIC MENU (for the Ryan 9900BX TAS)

Config▼	Invokes the Traffic - Configuration menu.
Info▼	Invokes the Traffic - Information menu.
Mode▼	Invokes the Traffic - Mode menu.
Quick▼	Invokes the Traffic - Quick Menu .

TRAFFIC – CONFIGURATION

Offset▼	Invokes the Traffic - Host Offset menu.
Range▼	Invokes the Traffic - Display Range menu.
Volume..	Invokes the Traffic Volume dialog for adjusting the volume of the remote processor for Traffic.

TRAFFIC - INFORMATION

Test..	Invokes the Self-test dialog for running the self-test of the remote processor for Traffic.
---------------	---

TRAFFIC – MODE

GRND	Switches the operational mode of the Ryan TAS to be Ground Mode. If the system is in the Ground Mode, then it allows selection of NORM, a flight mode. The Ground Mode should only be used on the Ground. If the Ground Mode is inadvertently selected while in flight, select any altitude filter (press any <i>Soft Key</i> , then FILTER) to enter a flight mode or select MENU/MODE/NORM.
Appr..	Invokes the Approach Mode dialog for enabling and configuring the Approach Mode for the Ryan TAS.
Filter▼	Invokes the Traffic – Filter menu, to define the vertical display limits.

TRAFFIC - QUICK MENU

MUTE	Stops the current Traffic Advisory messages.
AAAlert..	Invokes the Altitude Alerter dialog for configuring the Altitude Alerter feature of the Ryan TAS.
Baro..	Invokes the Barometric Pressure dialog, which is used to change the barometric pressure as used in the computation of msl altitude from pressure altitude.
Filter▼	Invokes the Traffic – Filter menu, to define the vertical display limits.

TRAFFIC - HOST OFFSET

Center	Sets the display of the Traffic Application so that the host is vertically centered, allowing the same visible range both in front of and behind the host.
Rear	Sets the Traffic Application display so that the host is offset toward the rear, allowing a larger display distance in front of the host than behind the host.



TRAFFIC – DISPLAY RANGE

1, 3, 6 and 12 nm (This is the same as changing range with the *Right Rotary Knob* except that 20 nm is not available on the menu)

TRAFFIC - FILTER

ABV Switches the vertical viewing limits view of traffic to Above.

BLW Switches the vertical viewing limits view of traffic to Below.

NORM Switches the vertical viewing limits view of traffic to Normal.

UNR Switches the vertical viewing limits view of traffic to Unrestricted.

The Quick Menu for the Ryan 9900BX TAS

The Quick Menu for the Ryan 9900BX TAS is the same as the standard Quick Menu except that the two unused Soft Keys are assigned the Mute and Altitude Alerter functions. See figure 7.2 below.



FIGURE 7.2
Quick Menu
Selections for
the Ryan
9900BX TAS

Ground Mode

When the host aircraft is on the ground, traffic taxiing or parked nearby can transmit replies that cause traffic alerts. 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 is displayed.



Although the Ground Mode is activated automatically upon startup, it can be manually activated by pressing *MENU/Mode/GRND*. The aircraft-on-the-ground detection system (if installed) also engages the Ground Mode upon landing. When in the ground mode the display shows GRND in the lower-left corner. All Advisory announcements are muted in the ground mode.

Double pressing the Ryan TAS remote Mute/Update button (if installed) elicits a detailed aural advisory of any detected TAS.

As the host aircraft climbs, the Ryan TAS automatically transitions from Ground Mode to Departure Mode and then to a flight configuration, operating using whichever altitude filter was last active (ABV, BLW, or NORM). When the host aircraft climbs to 400 feet AGL, the audible advisory announcements are restored.

Some encoders require a warm-up period before valid data is available. When in the Ground Mode, initialization automatically halts at the altimeter adjustment until the encoder indicates it is supplying valid data. If the warm-up time is more than about 20 seconds, or if a flight mode is selected, then “HARDWARE ERROR” is indicated on the display until valid altitude data is detected. The Ryan TAS does not function properly when the host altitude data is invalid, but invalid altitude data cannot always be detected.



NOTE: The Ryan TAS operates in Sensitivity Level A when the aircraft is in ground or departure mode. If the ground mode is active, the departure mode will engage following takeoff and will remain active until the host aircraft reaches 1700 feet AGL.



CAUTION: Do not operate the Ryan TAS in the Ground Mode when in flight. Select NORM, ABV, BLW or UNR to disengage the Ground Mode.

Approach Mode

The Approach Mode eliminates intruder announcements caused by aircraft on the ground as the host aircraft approaches the ground for



landing. However, the Ryan TAS must be supplied with the destination airport elevation for the Approach Mode to work correctly. Use the Approach Mode dialog to enter the destination airport elevation and to enable the Approach Mode.



NOTE: The Ryan TAS operates in Sensitivity Level A when in the Approach Mode.

As the host aircraft descends to within 1700 feet above the selected field elevation, the Ryan TAS enters the Approach Mode. When the Ryan TAS is in Approach Mode, traffic on the ground will not cause Traffic Advisories. The Approach Mode may be configured at any time or at any altitude; however, the Ryan TAS will not enter Approach Mode unless the host aircraft has been more than 1700 feet above the field elevation at some time since the Approach Mode was configured.

When the host aircraft descends below 400 AGL, the Ryan TAS automatically transitions from Approach Mode to the Ground Mode.



NOTE: The Barometric Pressure should be properly adjusted for best performance of the Approach Mode.

When the Traffic Application is the Primary Application, the MHD provides a visual indication of the Approach Mode status if it is armed. This indication appears in the lower-left corner of the traffic display as the letters “APP” in smaller text directly above the mode indication (see figure 7.3 below). If the pilot has armed the approach mode, but the host has not climbed to 1700 feet or more above the field elevation to activate it, then the “APP” text will be white. If the host aircraft has climbed to an altitude 1700 feet or more above the destination airport field elevation, then the “APP” text will be green to indicate that the Approach Mode is active. When the Approach Mode is active, traffic on the ground will be filtered when the host is at or below 1700 feet above the field elevation.



FIGURE 7.3
Traffic display showing the Approach Mode status in the lower-left corner

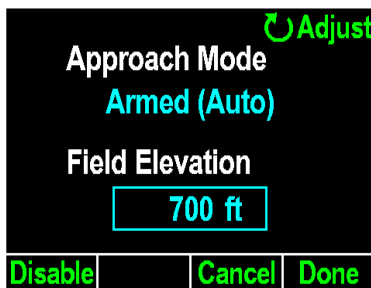


Since reliable operation of the Approach Mode feature depends upon having the correct barometric pressure set, the current barometric pressure setting is displayed in the lower-right corner of the traffic window when the approach mode is enabled.

Approach Mode Dialog

The Approach Mode dialog is used to configure the Approach Mode feature of the Ryan TAS. It allows the pilot to enter the field elevation of the destination airport, and to arm (enable) or disable the approach mode. The image below is an example of the Approach Mode dialog, which shows that the approach mode is “Armed” and that the field elevation of the destination airport is 700 feet.

FIGURE 7.4
The Approach Mode Dialog



When in the Approach Mode dialog, the approach mode may be enabled or disabled by pressing *SoftKey1*. *SoftKey1* will be labeled

either “Arm” or “Disable” depending upon the current status of the approach mode. The field elevation may be adjusted using the *Right Rotary* knob. The field elevation may be set to any multiple of 100 feet from –1000 feet to +15,000 feet.

The relevant functions for the panel controls while in the Approach Mode dialog are as follows:

- *Right Rotary* knob (“Adjust”) - Rotating the knob will adjust the field elevation, with a clockwise rotation increasing the value and a counterclockwise rotation decreasing the value.
- *SoftKey1* (“Arm” or “Disable”) – Arms (enables) the Approach Mode feature if it is currently disabled, or disables the Altitude Alerter feature if it is currently armed. The label for *SoftKey1* will change as appropriate.
- *SoftKey3* (“Cancel”) - Exits the dialog, discarding any changes.
- *SoftKey4* (“Done”) - Exits the dialog, activating any changes.

If no buttons are pressed, the dialog will be dismissed after a few seconds and any changes will be accepted.

Altitude Alerter

The Altitude Alerter feature of the Ryan TAS includes audible alerts for assisting the pilot in reaching and maintaining a desired cruising altitude:

- While the aircraft is approaching the desired altitude, alerts of "One thousand to go" and "Five hundred to go" inform the flight crew of their vertical distance (in feet) from the target altitude.
- When the desired altitude is first reached, an alert of "At altitude" is announced.
- After the desired altitude has been reached, should the host altitude deviate 200 feet or more from the desired altitude, "Check altitude" is announced.





NOTE: The Barometric Pressure should be properly adjusted for best performance of the Altitude Alerter.



CAUTION: The Ryan TAS 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 the Traffic Application is the Primary Application, the MHD provides a visual indication of the Altitude Alerter status if it is armed. This indication appears in the lower-right corner of the traffic display as the letters “Alt Tgt:”, followed by the target altitude (See figure 7.5 below). The altitude alerter text will be white if the host has not yet reached the target altitude; it will be green if the host aircraft has reached the target altitude and is currently within 100 feet of the target altitude; and it will be yellow if the host was previously at the target altitude, but has since deviated by 200 feet or more.

Since reliable operation of the altitude alerter feature depends upon having the correct barometric pressure set, the current barometric pressure setting is also displayed in the lower-right corner of the traffic window when the altitude alerter is enabled.

FIGURE 7.5
Traffic display showing the Altitude Alerter status in the lower-right corner



Altitude Alerter Dialog

The Altitude Alerter dialog allows the pilot to select the target altitude for the Ryan TAS altitude alerter feature. The following illustration of the altitude alerter dialog indicates that the Altitude Alerter feature is enabled (armed) and is configured for a target altitude of 6000 feet. The word “(Auto)” indicates that the altitude alerter was not armed prior to entering the altitude alerter dialog; however it was automatically armed as a result of accessing the altitude alerter dialog. When “(Auto)” is displayed, pressing the “Cancel” *SoftKey* will dismiss the dialog and leave the altitude alerter disabled.



FIGURE 7.6
The Altitude
Alerter Dialog

When in the altitude alerter dialog, the altitude alerter may be enabled or disabled by pressing *SoftKey1*. *SoftKey1* will be labeled either “Arm” or “Disable” depending upon the current status of the altitude alerter. The target altitude may be adjusted using the *Right Rotary* knob. The target altitude may be set to any multiple of 100 feet from 0 feet to +59,900 feet.

The relevant functions for the panel controls while in the Altitude Alerter dialog are as follows:

- *Right Rotary* knob (“Adjust”) - Rotating the knob will adjust the target altitude, with a clockwise rotation increasing the altitude and a counterclockwise rotation decreasing the altitude. For convenience, fast turning of the knob allows large changes in altitude.



- *SoftKey1* (“Arm” or “Disable”) – Arms (enables) the Altitude Alerter feature if it is currently disabled, or disables the Altitude Alerter feature if it is currently armed. The label for *SoftKey1* will change as appropriate. It is generally not necessary to disable the Altitude Alerter since it will not make announcements except at the altitude selected.
- *SoftKey3* (“Cancel”) - Exits the dialog, discarding any changes.
- *SoftKey4* (“Done”) - Exits the dialog, activating any changes.

If no buttons are pressed, the dialog will be dismissed after a few seconds and any changes will be accepted.

Traffic Volume Dialog

The Traffic Volume dialog (see figure 7.7 below) allows the pilot to adjust the audio output level of the Ryan TAS processor. While the traffic volume dialog is open, the Ryan TAS processor will generate tones to provide the pilot with audible feedback of the current traffic volume level.

The relevant functions for the panel controls while in the Traffic Volume dialog are as follows:

- *RightRotary* knob (“⤴Adjust”) - Rotating the knob will adjust the volume, with a clockwise rotation increasing the value and a counterclockwise rotation decreasing the value.
- *SoftKey1* (“Default”) - Changes the volume back to 50%.
- *SoftKey2* (“Reset”) - Resets the volume to the value it had when the dialog was invoked.
- *SoftKey3* (“Cancel”) - Exits the dialog, discarding any changes.
- *SoftKey4* (“Done”) - Exits the dialog, activating any changes.

If no buttons are pressed, the dialog will be dismissed after a few seconds and any changes will be accepted.

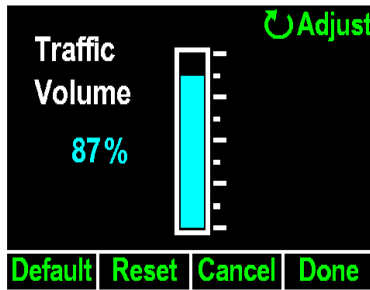


FIGURE 7.7
The Traffic
Volume Dialog

Multiple Display Operation

If multiple displays are installed and interfaced to the Ryan TAS processor, changes to common parameters (such as barometric pressure) made at one display are communicated to the other displays.

Independent functions such as the display of additional data and the display range can be set or performed independently on each display.

Ryan TAS Reset

A momentary power interruption will cause the Ryan TAS to reset to a flight mode. If the power interruption is sufficiently long, then the system will enter the Ground Mode and announce the phrase “Ground Mode”. Select ABV, BLW, NORM or UNR to exit the Ground Mode.

Preflight Check of the Ryan TAS

If desired, the audio volume could be checked before departure to verify that the audio level is satisfactory. Double-press the remote mute/update button (if installed), or use the Traffic Volume Dialog on the MHD to check the audio volume. Adjust, if necessary.



Lexicon

The Ryan TAS uses the following words to communicate the range of an intruder.

Phrase	Purpose
"Traffic"	Used to indicate a Traffic Advisory (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"	The TA is < 300 feet vertical separation.
"Low"	The TA is ≥ 300 feet below the host aircraft.
"No Advisories"	Used when no TA is detected.

FIGURE 7.8
Ryan TAS
Lexicon

The table below indicates what audible phrase is announced for a Traffic Advisory at various ranges:

Range to Target	Phrase Announced
$< 0.4\text{nm}$	"Zero Miles"
$< 1.1\text{nm}$	"Less than one mile"
$< 1.8\text{nm}$	"One mile"
$< 2.8\text{nm}$	"Two miles"
$< 3.8\text{nm}$	"Three miles"
$< 4.8\text{nm}$	"Four miles"
$< 5.8\text{nm}$	"Five miles"
$< 6.8\text{nm}$	"Six miles"
$< 7.8\text{nm}$	"Seven miles"
$< 8.8\text{nm}$	"Eight miles"
$< 9.8\text{nm}$	"Nine miles"
$\leq 10.0\text{nm}$	"Ten miles"
$> 10.0\text{nm}$	TAs are not issued for traffic beyond 10nm

FIGURE 7.9
Ryan TAS
Range
Annunciations



High-Rate Vertical Speed

The Ryan TAS uses a vertical tau calculation to compute altitude warning thresholds. This means that the system warns of traffic at greater vertical distances when the vertical rate of closure is high. In addition, the altitude filter (the display vertical viewing limit) always displays detected traffic at least 2700 feet above or below, and this remains constant through any vertical rate.



CHAPTER 8

Example of Operation

The following sequences could be encountered during a flight with the Ryan MHD connected to a Ryan 9900BX TAS processor, and represent typical encounters with traffic.

Power has been applied, and the Ryan MHD has completed the initialization sequence. “Ground Mode” is announced upon initialization of the Ryan TAS, indicating initial operation in the Ground Mode. The barometric pressure setting can be entered if desired. In the illustration below, the barometric pressure dialog is entered (*Soft Key/Baro..*). The pressure is shown as 29.92 inches and the Host MSL Altitude is 1,700 feet.

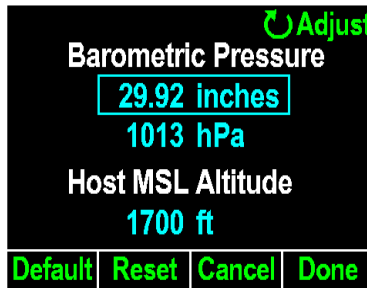


FIGURE 8.1
Example
Barometric
Pressure dialog

Adjusting the Ryan TAS barometric pressure setting is not required for effective Traffic Advisory operation, but it can be helpful for other functions. The altimeter setting is then adjusted to 30.05 inches using the *Left Rotary* knob (“Adjust”).



FIGURE 8.2

Ground mode active,
Approach mode set, Altitude Alerter set to 6000 feet, barometric pressure 30.05 inches, 12 mile range scale



This illustration shows that the Ryan TAS has automatically entered the Ground Mode, and is monitoring for traffic. All tones are muted and aircraft on the ground are not displayed while in the ground mode.

An ATC clearance is received, requiring an initial climb to 6,000 feet. The Altitude Alerter can be set for 6,000 feet (*Soft Key/Alert..*). When passing through 5,000 and 5,500 feet, respectively, tone and voice annunciation of “one thousand to go” and “five hundred to go” sound as a reminder of the approaching assigned altitude.

Before takeoff, check the area visually for traffic and check the Ryan MHD.



WARNING: The Ryan TAS may not display all intruders that are on approach. Always check the area visually before departing.

Upon takeoff and climb out, the Ryan TAS automatically transitions from Ground mode to the “Above” view of traffic (the ABV altitude filter). The unrestricted view (UNR altitude filter) is selected (*Soft Key/Filter..UNR*). Passing through 2,900 feet a tone is sounded followed by the traffic alert, “Traffic, 11 o’clock, high, one mile.” The TA shows 300 feet above the host aircraft, two miles, at approximately 11:00. A TA voice advisory 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. If the selected range of the MHD is more than three miles, a special



Traffic Advisory screen is displayed automatically with a range of three nautical miles. This allows quick interpretation of the traffic bearing, altitude and range. If the selected range is three miles or less, then the special Traffic Advisory screen is not shown and the yellow Traffic Advisory circle is displayed. Two illustrations below show these possibilities:

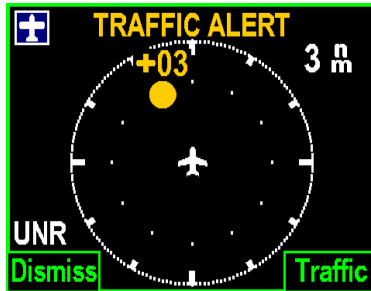


FIGURE 8.3
Special Traffic
Advisory
display



FIGURE 8.4
Normal full-
screen Traffic
Advisory
display

The **Dismiss** button on the special traffic advisory display returns the display to its previous view. **Traffic** dismisses the special traffic advisory screen and takes the operator to the traffic page. When traffic is the only application, then the buttons return the operator to the traffic page.

An open diamond symbol indicates Other Traffic (OT), here 1900 feet above, and a little beyond 1 mile.



FIGURE 8.5

Example traffic display showing OT traffic (an open diamond), 1900 feet above, and about 1.5nm



FIGURE 8.6

Example of extra data being displayed for an OT intruder showing range of 1.2 nautical miles and altitude of 4800 ft msl.



Here, the *Left Rotary knob (DATA)* was pressed to show the range and msl altitude of the traffic. The N-number or the squawk code of the other aircraft would also be shown if available. If multiple intruders are on the display, pressing the data button again will sequence the data tag to the next closest intruder, and so on individually until all the traffic data on the display is shown. Here the barometric pressure has been changed to 29.92".

FIGURE 8.7

Example of extra data being displayed in a box above PA traffic



Extra data is typically shown below the intruder symbol, however when there is not room on the display to show the data below the intruder symbol, the data is boxed by a white rectangle and is placed above the host symbol as shown above.

FIGURE 8.8
Extra data showing an OT intruder that is at flight level 290 (FL290)



The *Data* button is pressed, indicating the traffic is at FL290. The barometric pressure does not need to be adjusted to identify the Flight Level of traffic that is above 18,000 feet.

FIGURE 8.9
Special TA screen showing half a TA symbol for traffic that is beyond the three mile selected display range



A TA intruder that would otherwise not be shown because its accurate placement is outside of the display region is instead shown at the edge of the region. The symbol for such an intruder appears to be a half-symbol until its range is inside the current display range.

FIGURE 8.10

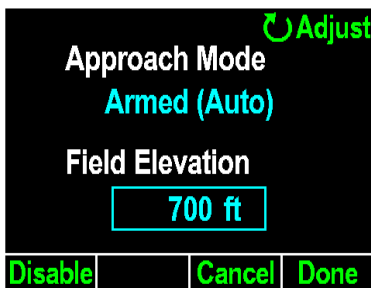
Example of a PA intruder that is 800 feet above and climbing. The altitude alerter is set to FL 210



Traffic shown at about 3:00 o'clock, 800 feet above, climbing at 500 feet per minute or more. The Altitude Alerter was set to FL 210. Green text indicates arrival at the target altitude.

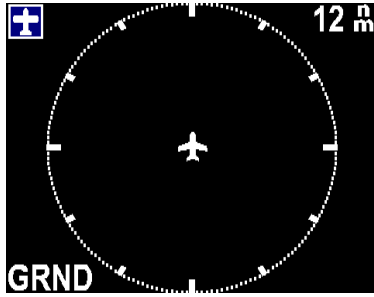
FIGURE 8.11

Approach Mode Dialog, set for 700 feet.



The Approach Mode may be set if desired (*MENU/Mode/Apprr..*). With the Approach Mode activated, the Ryan TAS will not announce Traffic Advisories for traffic on the ground while on approach to the airport.

FIGURE 8.12
Illustration of automatic entry into the Ground mode after setting up the Approach mode.



Approach and landing are uneventful. The Ryan TAS automatically transitions to the Ground Mode upon landing.



CHAPTER 9

Specifications & Warranty

General Specifications of the MHD

Weight:	2.0 pounds (.9kg)
Operating Voltage:	11 - 29 Volts DC
Current:	1.0A @ 14VDC, 0.5A @ 28VDC
Dimming: LCD screen: Controls:	<i>Left Rotary knob. Instrument panel dimmer.</i>

FIGURE 15.1
MHD
Specifications

Parts and Service Warranty

The Ryan MHD is warranted against defects in materials and manufacturing for 18 months from date of shipment to an authorized dealer or one year from the date of original installation, whichever occurs first. The obligation of Ryan International Corporation is limited to the repair or replacement, at the option of Ryan International Corporation, of products that prove to be defective during the warranty period. No other warranty is expressed or implied. Proper installation of the Ryan MHD is the responsibility of the installing agency and is not part of this warranty. Ryan International Corporation is not liable for consequential damages. Warranty protection is ensured only when your Ryan MHD is installed and serviced by an authorized dealer.



Customer Support

We appreciate the confidence you have placed in Ryan International Corporation, and in your avionics dealer. We trust that both the Ryan MHD and your dealer have met your expectations. For questions or comments, contact Customer Service at:

1-800-877-0048 (USA and Canada)

1-614-885-3303 (International)

support@ryaninternational.com

Record of Purchase

The following information will be required when you contact Ryan International Corporation for service or support. For your convenience, we recommend that you record the information here for future reference.

Traffic Processor Model:	
Traffic Processor S/N:	
MHD S/N:	
Date of Purchase:	
Dealer Name:	

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CHAPTER 10

Appendices

Error Messages

When a failure condition has been detected by the 3ATI display or the traffic processor, the failure is annunciated in amber across the display as shown in Figure 10.1. In the full screen or multi-view main screen, additional information regarding the failure may be presented in green to help the user isolate the source of the problem. In the thumbnail view, failure messages may be abbreviated to allow them to fit on the available screen area. When a failure occurs, record all of the displayed information and report it to your maintenance personnel.



FIGURE 10.1
Example of an
Error Message

The following failure messages may be reported on the display:

Failure Message	Cause
Hardware Error	A hardware failure has been detected and reported by the traffic processor. This failure will be accompanied by one of the following messages (in green):
TCAS Computer Fail	A failure has been detected in the traffic processor's computer
Lower Antenna Fail	A failure has been detected in the traffic processor's bottom antenna
Upper Antenna Fail	A failure has been detected in the traffic processor's upper antenna
System Status Fail	A general failure has been detected with the traffic processor



Failure Message

Cause

No Traffic Data

The display has not received any communications from the traffic processor

Traffic Link Lost

The display is no longer receiving communications from the traffic processor (but it had at some point in the past)

Glossary

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

Glossary Term	Definition
Acquire	Identify and locate (as in acquire an intruder).
Acquisition	The process of identifying and locating an intruder.
AGL	Above Ground Level.
Altitude Filter	See “Filter”.
Application	A program installed and operational in the MHD.
ATC	Air Traffic Control.
Audible Position Advisory Feature	An audible advisory of the traffic location.
Closest Point of Approach	The occurrence of minimum range between the Ryan MHD-equipped aircraft and the intruder.
CPA	Closest Point of Approach.
Departure Mode	A transition Mode between Ground Mode and a Flight Mode. Operates in Sensitivity Level A.
Dialog	A window or screen that provides a means of adjusting certain functions on the MHD.
Display	The Ryan MHD.
Filter	The altitude-viewing limit on the MHD. The available selections are Above, Below, Normal and Unrestricted. See Vertical Display (Viewing) Limits below.



Glossary Term	Definition
Flight Mode	Any mode other than Ground and Departure Mode. ABV, BLW, NORM and UNR are all flight modes. Flight modes can be used on the ground, but the audio is enabled so other aircraft in the air or on the ground may generate audible announcements.
Ground Mode	A Ryan TAS operating mode where traffic at and below 100 feet above the ground is not shown and there are no TA announcements. Ground mode should not be used in flight.
Hectopascal	Metric unit of measure for barometric pressure, abbreviate hPa. Note: 1 hPa = 1 millibar \cong 0.02953 inches of mercury.
Host	The aircraft equipped with the Ryan MHD.
Interrogator	The transmitting portion of the traffic system that interrogates transponders.
Intruder	A transponder-equipped aircraft within the surveillance range for which the traffic system has established a track.
Menu	A display of button labels above the <i>Soft Keys</i> .
MFD	Multi-Function Display.
MHD	Multi-Hazard Display.
msl	Mean Sea Level.
Multiple view (Multi-View) mode	One large window and two thumbnail windows are shown on the display.
Non-bearing intruder	An intruding aircraft without a calculated bearing solution.
OT	Other Traffic.
Other Traffic	An intruder that does not cause a TA or PA.
PA	Proximate Advisory.

Glossary Term	Definition
Primary Application	The display application shown on the screen in the Single-View mode and the largest display in the Multi-View mode. The Primary Application in the Multi-View mode is not necessarily the Primary Application in the Single-View mode.
Processor	The portion of the traffic system responsible for receiving and tracking the transponders in other aircraft.
Proximate Advisory	A condition when an intruder is within the proximate airspace volume.
Secondary Application	An application that is not being displayed, or an application that is displayed in one of the two thumbnails in Multi-View mode.
Sensitivity Level	Parameters used to specify the size of the protected airspace volume around the host aircraft.
Sensitivity Level A (Approach/Departure)	The sensitivity level when the host's landing gear is extended; lower sensitivity than SLB.
Sensitivity Level B (Basic)	The normal sensitivity level.
SLA	Sensitivity Level A.
SLB	Sensitivity Level B.
<i>Soft Key</i>	The unlabeled buttons on the lower part of the display. The labels on the <i>Soft Keys</i> change with the application and which button is pressed.
TA	Traffic Advisory.
Tau	The time to intruder Closest Point of Approach.
TAS	Traffic Advisory System.
Thumbnail view	The small application displays on the Multi-View display.
Traffic	Any nearby aircraft. See Intruder.
Traffic Advisory	Traffic with a current track that could result in a near-hit or a collision.



Glossary Term**Definition****Vertical Display
(Viewing) Limits**

Allows selection of altitude viewing limits to prevent display clutter from extraneous traffic. NORM selects a view of 2700 feet above and below the host aircraft. ABV (above) selects a view of 9000 feet above and 2700 feet below the host aircraft. BLW (below) selects a view of 2700 feet above and 9000 feet below the host aircraft. UNR (Unrestricted) selects a view of 9900 feet above and below the host aircraft.

Filter	Altitude Range
NORM	-2700 ft ... +2700 ft
ABV	-2700 ft ... +9000 ft
BLW	-9000 ft ... +2700 ft
UNR	-9900 ft ... +9900 ft

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