



# ***GRT SPORT***

## Set Up & Configuration Guide

Rev. A  
24 March 2007

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## FORWARD

Welcome to Grand Rapids Technologies' GRT Sport! We are pleased that you have chosen our product to meet your flying needs.

Visit the Grand Rapids Technologies (GRT) website ( [www.grtavionics.com](http://www.grtavionics.com) ) for the latest updates and supplemental information concerning the operation of this and other GRT products.

This manual describes the operation of GRT Sport EFIS using the software version shown in the Record of Revisions. Some differences may be observed when comparing the information in this manual to other software versions. Every effort has been made to ensure that the information in this manual is accurate and complete. GRT is not responsible for unintentional errors or omissions in the manual or their consequences.

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## CAUTIONS

**WARNING:** Obstacle clearance is not assured in Synthetic Approach Mode.

**WARNING:** Various functions of this system may be incomplete or untested. Please exercise caution when using the EFIS until a software update and a user manual corresponding to the software version are provided.

**CAUTION:** If any display unit is inoperable, the display units will not be able to swap information. The pilot must account for this down-graded mode of operation and expect data will not transfer between displays.

**CAUTION:** If GPS position data is lost for more than 30 seconds, the EFIS Sport issues a **No GPS Position** warning and automatically reverts to dead-reckoning using the AHRS heading, true airspeed, last known winds and time. This data is used to estimate changes in position, which are applied to the last known GPS position to give an approximate navigation solution. The accuracy of the dead-reckoning function will degrade with time depending on the accuracy of this data and changes in the winds.

**CAUTION:** When the ground track indicator is hollow, indicating it is display limited, the ground track indicated is necessarily inaccurate. This means the aircraft's track over

the ground is not as indicated and the pilot should be aware of this inaccuracy with regard to obstacle and terrain clearance.

## RECORD OF REVISIONS

Rev	Date	SW Rev	Change(s)
A	3 Mar 2007	3f	Initial Release

## LIST OF EFFECTIVE PAGES

Page Rev	Page Rev	Page Rev	Page Rev	Page Rev	Page Rev	Page Rev
i.....A	ii.....A	iii.....A	iv.....A	v.....A	vi.....A	1-1....A
1-2....A	2-1....A	2-2....A	2-3... A	2-4....A	2-5....A	2-6....A
2-7....A	2-8....A	3-1....A	3-2....A	3-3....A	3-4... A	3-5....A
3-6....A	3-7....A	3-8....A	4-1....A	4-2....A	5-1....A	5-2....A
5-3....A	5-4....A	5-5....A	5-6....A	5-7....A	6-1....A	6-2....A
6-3....A	7-1....A	7-2....A	7-3....A	7-4....A	7-5....A	7-6....A
7-7....A	7-8....A	8-1....A	8-2....A	9-1....A		

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## Chapter 1 INTRODUCTION

The Settings Menu is provided to configure your GRT Sport EFIS for your preferences and to setup interfaces to other equipment in your aircraft. This manual is intended to assist you in using the Settings Menu.

When you have completed configuring your GRT Sport, you may want to backup the settings to a USB flash drive (memory stick). This is done on the Display Unit Maintenance page and must be done for each Display Unit.

The pages in the Settings Menu are:

- General Setup
- Primary Flight Display
- Engine Information System
- Engine Limits
- Moving Map
- Graphical Engine Display
- Display Unit Maintenance
- AHRS Maintenance
- Altimeter Calibration

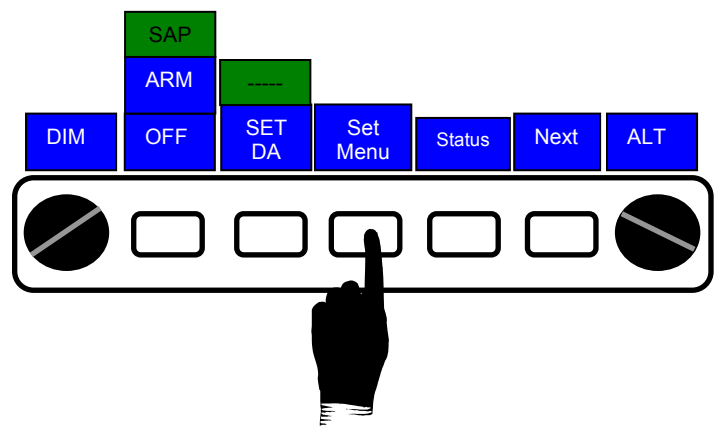
Some pages only appear if certain equipment is installed (Moving Map, Engine Monitoring etc). Some pages appear on each display unit (DU) in two DU systems. They are to be setup on each unit.

All user settings are stored in non-volatile memory, and thus are not lost when power is removed from the DU. The data is stored with error detection algorithms to detect loss or changes to the data caused by memory failure. All user settings are retained when software is upgraded. When software upgrades result in new user settings becoming available, these settings will default to the values described in the revised Users Guide.

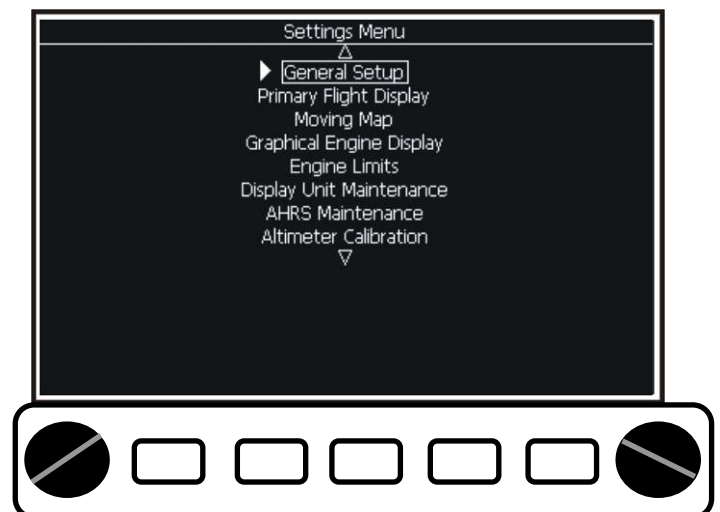
## How to Access the Settings Menus

To access Settings Menu:

1. Press any button
2. Press button labeled **NEXT** (more than once may be required)
3. Press button labeled **SET MENU**
4. Scroll (either knob) to **desired menu**
5. Press knob to select



1. Press Set MENU



2. Scroll to desired menu  
Press knob to select

**To change a setting.** Note that the box around the setting is dim. Push either knob. The box will become bright to indicate you are in change mode. Rotate either knob to view the choices. When the desired choice is in the window, push either knob to select. The box will return to dim.



## Chapter 2 GENERAL SETUP

General Setup configures the serial ports which are used to communicate between display units and other installed equipment; units of measure and other interface items.

Detailed information on each choice follows this table which shows suggested values:

Setting	Selection	Suggested Value
Inter-Display Link	Auto/Primary/2/3/4	Set one unit (PFD) to <b>PRIMARY</b> , all others to <b>AUTO</b>
Valid Frames Received	None	<b>N/A</b>
Compare Limits	Yes/No	<b>Yes</b>
Send DEMO Data	Yes/No	<b>Yes</b>
Serial Port 1, 2, 3,4 Rate	Multiple Baud Rate	<b>Depends on use – see text following</b>
Serial Port 1, 2, 3, 4 Input	Off / EIS / GPS 1 or 2 NMEA 0183 / GPS 1 or 2 Aviation / SL30 1 or 2 / SL40 / Display –Unit Link / Weather / Zaon Traffic / CO Guardian / GTX330 Traffic	<b>Depends on use – see text following</b> <b>S200: #2=EIS, #3=Inter-Display Link, #4=SL30</b> <b>S100: #1=Inter-Display Link, #2=EIS, #3=Not Available –used for Internal GPS, #4 = Weather</b>
Serial Port 1, 2,3, 4 Output	Off / Autopilot NMEA 0183 / Autopilot Aviation / Fuel/Air Data (Z Format) / Fuel/Air Data (S Format) / Fuel/Air Data (D Format) / Alt Encoder 1 or 2 / SL30 1 or 2 / SL40 / GPS 1or 2 NMEA 0183 / Display-Unit Link / Weather / CO Guardian	<b>Depends on use – see text following</b> <b>S200: #1=Autopilot, #2 = Encoder, #3 = Inter-Display Link, #4=SL30</b> <b>S100: #1= Inter-Display Link, #3 = Not Available - used for Internal GPS, #4 = Weather</b>
Serial Port 1, 2, 3, 4 Input Counter	None	<b>N/A</b>
EIS Model	4000/6000/9000 / 2000 / GRT Chelton	<b>4000/6000/9000</b>
EIS Temperature Units	Deg F / Deg C / Deg C except CHT / Deg F except OAT / Deg C except FADEC	<b>Deg F</b>
EIS Fuel Flow Units	Gallons / Liters / Liters with extra conversion	<b>Gallons</b>
EIS Baroset Units	Inches Hg / millibars	<b>Inches Hg</b>
AltEnc1 Serial Format	#AL +12345T + 25CK / ALT 12345 with 99900 flag / ALT 12345 with -2500 flag /	<b>See text following</b>

Setting	Selection	Suggested Value
	\$MGL+12345+25CK	
AltEnc2 Serial Format	Same as above	See text following
Page Change	Single Click / Double Click	Double Click
Default Page	MAP / ENG / MAP/ENG / MAP Circle View / MAP/North UP	MAP
Page Selection	See text following	On
Speed/Distance Units	Knots, nautical miles / MPH, statute miles / KMH, kilometers	Knots, nautical miles
Temperature Units	Deg F / Deg C	Deg F
Fuel Units	Gallons / Liters	Gallons
Tachometer Units	RPM / Percent RPM	RPM
Manifold Pressure Units	In Hg / 100mm Hg	In Hg
Pressure Units	Psi / atm (kg/cm2)	Psi
Outside Air Temp Source	Auto / AHRS / EIS	Auto
SL30 OBS Source	SL30 NAV Head / EFIS Course Knob	SL30 NAV Head
GPS 1 Flight Plan Source	Internal / External	See text following
GPS 2 Flight Plan Source	Internal / External	See text following
Virtual GPS 2	Off / On	See text following
Flaps & Trim Calibration	Table	See text following
Clock	Off / On	On
Local Time Offset		See text following
Lateral Autopilot Functions	Off / On	On
Autopilot Serial Output	Normal / GPS Coupler	Normal

### Inter-Display Link

Press either knob to access the Inter-Display Link sub menu. This sub menu allows the GRT Sport EFIS to be configured so data may be shared between display units.

#### Inter-Display Link ID (Primary / Auto / 2/3/4/...)

Set one display unit to **Primary** (usually the PFD display unit) and all others to **Auto**. The numeric entries may be useful for troubleshooting, but should not normally be used.

#### Valid Frames Received

This field will be continuously changing when the inter-display link is operating correctly.

#### Compare Limits (Yes / No)

**Yes is recommended** as it allows display units to compare limits (such as engine Min Max) and prompts the user to correct mismatched limits between display units. Normally limits are automatically transmitted between display units when changed by the user.

### **Send Demo Data (Yes / No)**

**Yes is recommended** as it allows all display units to show demo data being re-played from any other display unit. (Note: The data flow is slowed if the high speed port is not used.)

### **Serial Port Settings**

All serial ports can be configured for any of the functions listed below. The function of the port, and the baud rate, **must be set to correspond** to the equipment wired to the port. The default settings correspond to the recommended wiring described in the installation and cable description documents. Each GRT Sport EFIS display unit has four serial ports.

### **Serial Port Rate (Baud Rate)**

110 / 600 / 1200 / 2400 / 4800 / 9600 / 14400 / 19200 / 38400 / 56000 / 57600 / 115200 / 128000 / 25600

**NOTE:** Serial Port 4 is a high speed port and must be used for weather if the GRT Weather module is used.

Note that both input and output of each Serial Port Rate will have the same baud rate.

### **Serial Port Input Functions**

**Off**

#### **EIS (Engine Monitor)**

Used to accept data from EIS via RS232 format (9600 baud)

#### **NMEA 0183 GPS 1 or 2**

Used to accept GPS data via NMEA0183 data format. Used to interface to internal GPS if equipped. (4800 baud). **1** or **2** denotes position not number of.

#### **GPS 1 or 2 Aviation/MapCom**

Used to accept GPS data via RS232 Aviation format (9600 baud). **1** or **2** denotes position not number of.

#### **SL-30/SL-40 1 or 2**

Used to accept data from a SL-30 / SL-40 via RS232 format (9600 baud). **1** or **2** denotes position not number of.

#### **Display-Unit Link**

Used to connect to other display units via RS232 format (19200 baud)

**Weather (must be Serial Port 4)**

Used to accept XM Weather data via RS232 format (115200 baud)

**Zaon PCAS XRX**

Used to accept traffic data via RS232 format (57600 baud)

**CO Guardian**

Used to accept CO warning data via RS232 format (4800 baud)

**GTX 330**

Used to accept traffic data via RS232 format (9600 baud)

**Serial Port Output Functions****Off****Autopilot NMEA 0183 format**

For controlling autopilots that accept NMEA 0183 data. If Autopilot accepts both RS 232 Aviation and NMEA 0183 format, this format is preferred.

**Autopilot RS232 Aviation format****Fuel/Air Data (Z Format)**

Provides fuel flow, fuel totalizer airspeed and altitude data output. If the equipment receiving this data does not accept it, try the "S" and "D" formats.

**Fuel/Air Data (S Format)****Fuel/Air Data (D Format)****Altitude Encoder 1 or 2**

Configures output format of altitude encoding data. Format is determined by **Altitude Encoder Setting** below.

**SL-30 1 or 2**

Provides tuning and frequency present for communication and navigation radio functions to SL-30. 1 or 2 denotes nav/com position not number of.

**SL40**

Provides tuning and frequency present for communication radio functions to SL-40

**GPS NMEA 0183 1 or 2**

Provides GPS output for other equipment. Used to interface to internal GPS, if equipped. 1 or 2 denotes gps position not number of.

**Display-Unit Link**

Used to connect to other display units via RS232 format

**Weather (must be Serial Port 4)**

Used to interface to XM Weather data via RS232 format

This chart summarizes common interface settings.

Serial Port Settings			
Unit	Baud Rate	Display Unit Format(Notes)	Unit Settings
Inter-Display Link	19200		
GRT GPS	4800	NMEA	
GRT Weather	115200	Port 2 Horizon, Port 4 Sport	
EIS	9600		
SL30	9600		
SL40	9600		
GTX327	9600	FAD (Z Format)	Shadin FADC w/ ALT
GTX330	9600	FAD (Z Format)	Shadin FADC w/ ALT
CO Guardian 353P	9600	CO Guardian	
Zaon PCAS	57600	Zaon PCAS XRX Traffic	
TruTrak	4800 or 9600	A/P NMEA or A/P Aviation	
GPSMap196	NMEA	NMEA	
GPSMap296	NMEA	NMEA	
GPSMap396	NMEA	NMEA	

**Serial Port Input Counter**

This counter increments when any data, valid or invalid, is received. This function is useful for verify an electrical connection to the port is providing data.

**EIS Model**

This setting allows you to choose which EIS Engine monitor you are using. The default is the 4000/6000/9000 series. The following settings pertain to the engine monitor.

- EIS Temperature Units
- EIS Fuel Flow Units
- EIS Baroset Units

**To change a value:**

1. Press either knob.

2. Turn knob to change value
3. Press knob to set

### **Altitude Encoder Setting**

For transponders that do not accept fuel/air data from the GRT Sport EFIS for altitude encoding, this setting defines the format of the serial altitude output. The required format should be specified in the transponder installation manual. Note that the GRT Sport EFIS can simultaneously provide two different altitude encoding outputs to drive two different transponders.

### **Page Change (Single / Double click)**

This setting controls how page views change. When **Double Click** is selected, the page may not be changed unless the softkey labels are on the screen. **Single Click** allows page changes on the first push of the button, when labels are not displayed. **Double Click is recommended.**

### **Default Page**

This setting sets the default page after the start up screen is acknowledged. S200 displays defaults to PFD and is not user selectable.

### **Page Selection**

This setting enables or disables the various available page views.

### **Speed /Distance Units**

Knots-Nautical Miles, MPH-Statute Miles, or Kilometers-KPH. This selection defines the units used for all displays, except those specifically labeled otherwise. The selection changes both speed and distance units.

### **Temperature Units (Fahrenheit or Celsius)**

Used for all temperature data unless otherwise specified.

### **Fuel Units (Gallons or Liters)**

Defines units used for fuel flow totalizer function and flow rate. This selection does not alter the data received from EIS.

### **Tachometer Units (RPM / Percent RPM)**

### **Manifold Pressure (in Hg / 100 mm of Hg)**

### **Pressure Units (PSI / Kg/cm<sup>2</sup>)**

### **Outside Air Temperature Source (Auto, AHRS or EIS)**

Auto will use the data from EIS if it is valid or the Sport EFIS AHRS if it is valid. Valid OAT data must be greater than -40 deg F. The AHRS/EIS selections force the specified source to be used. OAT is used for true airspeed calculations which affect wind calculation and other flight plan predicted data.

### **SL30 OBS Source (EFIS Course Knob / SL30 NAV head)**

This selection allows the SL-30's external navigation head to provide the selected course (OBS) data to the EFIS permitting the external nav head and EFIS to show the same course at all times. If no course data is provided by the SL-30, the EFIS automatically reverts to the EFIS course knob for course selections.

### **GPS1 Flight Plan Source (Internal / External)**

This selection specifies if the internal EFIS flight planning function is active or if the external GPS flight plan is to be used for GPS receiver 1. Select External if an external GPS is configured as GPS 1. Select Internal if the EFIS is equipped with internal GPS and it is configured as GPS 1.

### **GPS2 Flight Plan Source (Internal / External)**

Same as above except for GPS 2.

### **Virtual GPS2 (On/Off)**

When **On**, a second GPS 2 navigation mode is provided, whose flight plan is entered via the internal GPS flight plan selection. The position data for this virtual GPS is provided by the GPS1 source. This allows the pilot to enter one flight plan into the external GPS, and a second flight plan into the EFIS internal flight plan. The desired flight plan can be selected by setting the navigation mode to GPS1 or GPS2. Waypoint sequencing will not occur when the **GPS source** is a GPS configured for external flight plan. The **GPS source** is the last GPS that was selected and is annunciated on the PFD screen, directly below the GPS CDI indicator at the bottom center of the screen.

### **Flaps and Trim Calibration**

If Flap and or Trim position sensors have been fitted, this page provides for calibration of the on-screen indicators. GRT Sport assumes that sensors are connected to EIS auxiliary inputs. EIS is designed to interface with Ray Allen trim motors and use the position indicator output provided by Ray Allen.

### **Clock**

#### **Sub Menu**

#### **Clock (Off / On)**

Turns on clock

#### **Local Time Offset**

Used to set clock to local time – enter hours difference from Zulu time. If left 0, clock will display Zulu time.

You can display Zulu time on the PFD and local time on the MFD if you set the Offset on the PFD DU to 0 and the Offset on the MFD to local time.

### **Lateral Autopilot Functions (On / OFF)**

This setting turns on page view labels for **LAT A/P**.

### **Autopilot Serial Output (Normal / GPS Coupler)**

This setting configures the data sent to the autopilot. **Normal** should be used by most modern autopilots, as this allows the autopilot to function as it was designed. The GPS Coupler selection formats the data to allow GPS couplers, such as those used with Navaid Devices or S-Tec autopilots.

### **Adjusting GPS Coupler-equipped Autopilot Response**

Gain adjustments are provided to allow the user to optimize the commands provided to the autopilot **if a GPS Coupler is used**. If a GPS Coupler is not used these settings are not required; the autopilot handles all functions.

#### **To access Gain Adjustments:**

1. Press a button
2. Press **NEXT** button (more than once may be required)
3. Press **SET MENU** button
4. Select **General Setup**, press knob
5. Scroll to **Autopilot Serial Output**
6. Highlight by pressing knob (setting will have a white box around it)
7. Change setting to **GPS Coupler**
8. Press knob to **CHANGE**

The adjustment of these gains allows the user to account for variations in the response of the autopilot, airplane and pilot's preferences for the aggressiveness of autopilot tracking.

The following guidelines are provided to assist the pilot with adjustments to these gains.

Start with all gains at 1.0

**Cross Track Gain (XTGain)** - Normally this gain should not be altered, as it currently affects GPS and Synthetic Approach. With the **Roll Gain** adjusted as desired, airplane on course with minimal cross-track error, change to heading mode, select a heading 20 degrees different from the current heading. When the airplane is 500-1000' off course, and heading 20 degrees away from the course, change back to NAV mode for the lateral autopilot mode. Adjust the **XTGain** so that the airplane recaptures the GPS course with a small overshoot. If **XTGain** is too low, the intercept angle will be at shallow angles, and will be sluggish. If too high, overshoot will be observed.

**Roll Gain** - Put the airplane on the course; with zero cross-track error (use the GPS on a 500' range scale to see when very close to being on track.) Note how much activity there is in the ailerons in smooth air while on course. Set the roll gain as high as possible, but not so high that it results in any noticeable roll activity in smooth air. Note that Roll Gain affects all modes except Heading.



**Heading Gain** - Slow the airplane to the minimum speed at which you will use the heading select function. Adjust the Heading gain as high as possible without excessive roll or heading oscillations.

## Chapter 3 PRIMARY FLIGHT DISPLAY

The Primary Flight Display Setup Menu allows you to set your preferences on the PFD.

Detailed information on each choice follows this table which shows suggested values

<b>Setting</b>	<b>Selection</b>	<b>Suggested Value</b>
Up Reference	Heading / Trak	<b>Heading</b>
Stall Speed Vs1		<b>POH Value</b>
Max Flap Ext Speed Vfe		<b>POH Value</b>
Max Struct Cruise Speed Vno		<b>POH Value</b>
Never Exceed Speed Vne		<b>POH Value</b>
Speed Bug 1		<b>See text following</b>
Speed Bug 2		<b>See text following</b>
Speed Bug 3		<b>See text following</b>
Below Stall	None / Red	<b>Red</b>
HITS Frame Color	Magenta / Green / White	<b>White</b>
Attitude Reference Index	Bars / Nose	<b>Nose</b>
GPS CDI	On / Off	<b>On</b>
Slip Indicator	On / Off	<b>On</b>
Turn Rate Indicator	On / Off	<b>On</b>
Wind Indicator Mode	Off / Vector & Digital Speed / Vector & Digital Speed & Direction	<b>Vector &amp; Digital Speed &amp; Direction</b>
Digital Head / Cross Wind Display	On / Off	<b>On</b>
Baro set units	Inches Hg / millibars	<b>Inches Hg</b>
Artificial Runways	On / Off	<b>On</b>
Flight Path Marker	On / Off	<b>On</b>
Obstacle alarm	On / Off	<b>On</b>
Airspeed display size	Normal / Large	<b>Normal</b>
Altimeter Size	Normal / Large	<b>Normal</b>
Track/Heading display size	Normal / Large	<b>Normal</b>
Airspeed Resolution	Fine / Coarse	<b>Fine</b>
Max indicator vertical speed	1000 / 2000 / 3000 / 5000	<b>1000</b>
Pitch ladder offset		<b>See text following</b>
Flight level altitude		<b>18000</b>
Altitude Alerting	On / Off	<b>On</b>
Max Altitude Deviation		<b>200</b>
Upper Left Corner Box	Ground speed / True Airspeed	<b>Ground speed</b>
Data Boxes	On / Off	<b>See text following</b>
Left Box, Upper Left Entry		<b>Data: Dest Waypoint ID</b>
Left Box, Upper Right Entry		<b>Data: Dest Waypoint Est Time Enroute</b>

Setting	Selection	Suggested Value
Left Box, Lower Left Entry		Data: Dest Waypoint Range
Left Box, Lower Right Entry		Data: Dest Waypoint Bearing
Right Box Upper Left Entry		Data: RPM
Right Box, Upper Right Entry		Data: MAP
Right Box, Lower Left Entry		Label: RPM
Right Box, Lower Right Entry		Label: MAP
Approach Glideslope Angle		3.0
Approach Height Intercept	Reserved for Future Use	N/A
ILS Type Requires SL30	Off / Needles / Scales	Scales
Show VOR CDI on Localizer Requires SL30	Yes / No	Yes
ILS Inhibit of HITS Requires SL30	Inhibit / No Inhibit	No Inhibit
Default Decision Height		200
G-Meter Mode	Off / Auto / On / On with Min Max	On with Min Max
G-Meter Maximum		See text following
G-Meter Minimum		See text following
G-Meter Caution Max		See text following
G-Meter Caution Min		See text following
Auto G-Meter High Threshold		See text following
Auto G-Meter Low Threshold		See text following

### Up Reference (Heading/Track)

Selects whether the yaw axis reference for the PFD screen is heading or ground track. **Heading is the recommended setting**, as this allows the EFIS to provide an artificial view that matches the view out the window. This makes the position of runways, obstacles and other traffic appear on the screen in the same relative position that they appear out the window and is especially useful when strong cross winds exist, as the difference between ground track and heading can be significant.

### Stall Speed (Vs1) (IAS)

Stall speed is the lower end of the airspeed tape at the bottom of the green and white sections. Use the speed from your Aircraft Pilot Operating Handbook (POH) for this and the following settings.

### Max Flap Extension Speed (Vfe) (IAS)

This setting is the top of the white section on the airspeed tape.

### **Max Structural Cruising speed (Vno) (IAS)**

This setting is the top of the green and the bottom of the yellow section of the airspeed tape.

### **Max Speed (Vne) (IAS)**

Never Exceed speed. This setting is the bottom of the red and the top of the yellow section of the airspeed tape.

### **Speed Bug 1-3 (IAS)**

These are user selectable speed bugs that can be used to indicate Vx, Vy, Va etc. They display as blue horizontal line. Setting them to 0 disables them.

### **Below stall (Red or None)**

This allows user selectable color of the airspeed tape for speeds below stall speed.

### **HITS (Highway – In – The – Sky) frame color (Magenta, Green or White)**

Sets the color of the HITS boxes and is user selectable.

### **Attitude Heading Reference Index (Bars / Nose)**

Selects whether the pitch reference on the PFD are traditional pitch reference bars, or a non-traditional nose reference cyan colored circle. The traditional bars are bolder but tend to clutter the PFD screen a little more than may be desired, especially near the center of the screen where the depiction of the runway, flight path marker and HITS occurs. Since the PFD includes a flight path marker, the need for traditional bars is reduced. **Nose is recommended**, but try both to chose your preference.

### **GPS CDI (On/Off)**

Enables or disables the GPS CDI on the PFD page. **ON is recommended.**

### **Slip Indicator (On/Off)**

Controls the display of the slip indicator. **ON is recommended.**

### **Turn Rate Indicator (On/Off)**

Controls the display of small green triangles on the roll scale that indicate the bank angle required to achieve a standard rate (2 minute) turn. **ON is recommended.**

### **Wind Indicator Mode**

**OFF** – No display of wind data.

**Vector and Digital Speed** – The vector (arrow) points to the wind direction relative to the aircraft's heading. Speed is displayed.

**Vector and Digital Speed/Direction** Same as previous except a digital value of direction is also displayed. Digital value is relative to magnetic north.

### **Digital Head/Cross Wind Display (On/Off)**

Controls display of head and cross wind components in the lower left portion of the PFD screen. Head/Tailwinds are shown with H/T and cross winds are shown with L/R for left/right.

### **Baro set Units (In Hg/milliBar)**

Defines the units used for setting barometric pressure in the altimeter. Inches of Hg is used in the US; millibars are used in many places outside the US.

### **Artificial Runways (On/Off)**

When ON, an artificial view of the runways at airports within 10 miles of the aircraft is depicted on the PFD. **ON is recommended.**

### **Flight Path Marker (On/Off)**

The Flight Path Marker (FPM) is the projected flight path the aircraft will take with current flight/wind conditions. It shows where the aircraft will be if the present flight/wind conditions continue. **ON is recommended.**

### **Obstacle Alarm (On/Off)**

Enables/disables alarms that warn of nearby obstacles. When enabled, an obstacle alarm will be provided when an obstacle is projected to be within 250 feet of the aircraft's flight path within 60 seconds time and 25 degrees of ground track. Since flight path is used, an alarm will be generated if the aircraft is above the obstacle but descending at a rate that will allow it to collide with it. Likewise, if the aircraft is below an obstacle but climbing at a sufficient rate to miss it, an alarm will not be generated. **ON is recommended.**

### **Airspeed Display Size (Normal/Large)**

Controls size of digital display of IAS on the PFD. **Normal is recommended.**

### **Altimeter Display Size (Normal/Large)**

Controls size of digital display of Altitude on the PFD. **Normal is recommended**

### **Track/ Heading Display Size (Normal/Large)**

Controls size of digital display Heading/Track on the PFD. **Normal is recommended**

### **Airspeed Resolution (Fine/Coarse)**

Fine shows graduations of 5 mph on the airspeed tape, compared to 10 mph in Coarse. **Fine is recommended.**

### **Max Indicator vertical speed (1000/2000/3000/5000)**

Selects the maximum range for the vertical bar graph display. With the 1000 or 2000 fpm scale, the bar graph represents vertical speed in a linear manner, that is a speed of 750 fpm is represented by a bar  $\frac{3}{4}$  of full scale. With the 3000 or 5000 fpm scales, 0 to +/- 1000 fpm is linear and the remainder of the scale is compressed. **1000 fpm is recommended.**

### **Pitch Ladder Offset (+/- 15 deg, 1 deg increments)**

Like a traditional attitude indicator, this allows the pitch indicator to be set for zero pitch during normal cruise. A positive setting causes the pitch ladder to be displayed above the actual zero point. Note that the PFD includes a flight path marker (FPM) that shows the aircraft's path relative to the horizon, and unlike the pitch ladder, the FPM shows climb or descent (above or below the horizon) independent of airspeed.

### **Flight Level Altitude**

This setting automatically sets the baroset to standard pressure (29.92 in Hg) when at or above this preset altitude **18000 is recommended in the US.**

### **Altitude Alerting (On/Off)**

Enables/disables alarms to warn of deviation from desired altitude.

### **Max Altitude Deviation (0-500ft in 50 ft increments)**

Altitude deviation which will trigger the above mentioned alarm

### **Upper Left Corner Box (Ground Speed / True Airspeed)**

Select the data to be displayed in the upper left corner of the PFD. **Groundspeed is recommended.** If two display units are installed, Groundspeed is displayed on the map page of the MFD, so display TAS here.

### **Data Boxes (On/ Off)**

This setting turns on data boxes at the bottom of the PFD page. Two boxes are provided and each can display four user definable items. The items can either be data (distance to waypoint, engine RPM etc) or a labels ("RNG", "RPM" etc) that can be used to identify the data above or below the label. If no entry is selected for these boxes, they are not displayed. If entries for the top two positions are not used, the height of the box is reduced to half normal size.

Available choices for these boxes are:

**OFF**

**DATA: Dest Waypoint ID**

**DATA: Dest Wpt Est Time Enroute**

**DATA: Dest Waypoint Range**

**DATA: Dest Waypoint Bearing**

**DATA: RPM**

**DATA: RPM2**

**DATA: N1**

**DATA: N2**

**DATA: Oil Temperature**

**DATA: Oil Pressure**

**DATA: Coolant Temperature**

**DATA: Carb Temperature**

**DATA: Highest EGT (Exhaust Gas Temperature)**

**DATA: Highest CHT (Cylinder Head Temperature)**

**DATA: Highest TIT (Turbine Inlet Temperature)**  
**DATA: Aux 1-6 (from EIS Engine Monitor)**  
**DATA: Outside Air Temperature**  
**DATA: Density Altitude**  
**DATA: Volts (from EIS)**  
**DATA: Fuel Flow**  
**DATA: Fuel Remaining (from Fuel Flow)**  
**DATA: Fuel Range (from Fuel Flow)**  
**DATA: Groundspeed**  
**DATA: True Airspeed**  
**DATA: Percent Power**  
**DATA: Power Bus 1 Voltage**  
**DATA: Power Bus 2 Voltage**  
**DATA: Power Bus 3 Voltage**  
**Label: ETE (Estimated Time Enroute)**  
**Label: RNG (Range)**  
**Label: BEAR (Bearing)**  
**Label: DEST (Destination)**  
**Label: RPM (Revolutions per minute)**  
**Label: RPM2 (Revolutions per minute)**  
**Label: N1**  
**Label: N2**  
**Label: OilT (Oil Temperature)**  
**Label: OilP (Oil Pressure)**  
**Label: Cool (Coolant Temperature)**  
**Label: Carb (Carburetor Temperature)**  
**Label: Hi EGT**  
**Label: Hi CHT**  
**Label: Hi TIT**  
**Label: MAP (Manifold Pressure)**  
**Label: FPrs (Fuel Pressure)**  
**Label: L Fuel (Left Fuel tank)**  
**Label: R Fuel (Right Fuel tank)**  
**Label: AMP (Amps)**  
**Label: Volts**  
**Label: Volt1**  
**Label: Volt2**  
**Label: Volt3**  
**Label: D Alt**  
**Label: OAT (Outside Air Temperature)**  
**Label: GS (Groundspeed)**  
**Label: TAS (True Airspeed)**  
**Label: Power**

**Suggestion:** Many have found that setting the left four Databoxes to show Dest Waypoint ID, Dest Wpt Est Time Enroute, Dest Waypoint Range and Dest Waypoint

Bearing and the right four databoxes to show engine information such as RPM and Manifold Pressure is convenient. This is the factory default.

**Approach Glideslope Angle (2-8 deg, .1 deg increment)**

Defines glideslope angle used for the synthetic approach when no ILS glideslope is associated with the selected runway. **3.0 is recommended.**

**Approach Height Intercept**

(NOT USED-reserved)

**ILS Type (Off, Needles or Scales)(requires SL30)**

**OFF** – Glideslope and Localizer deviation is not shown at any time.

**Needles** – “Needles” and scales are overlaid on the center of the PFD. Format is similar to traditional navigation heads. Scales are depicted as “dots” of deviation. Scales will be displayed when an ILS is tuned. Scales replace the attitude reference “bars” or “nose” indicator and thus function both as scale for localizer deviation and as reference for attitude display. “Needles” will be displayed only when localizer or glideslope is valid and ILS is active. If “VOR Deviation on Loc Display” is enabled, and VOR data is valid, only the localizer scale and needle will be displayed (no glideslope scale or needle will be displayed).

**Scales** – Deviation scales are overlaid on the bottom center of the screen (localizer) and right side (glideslope). Scales are displayed when ILS is tuned. Deviation indicators will display when localizer or glideslope is valid and ILS is active. When ILS is active but localizer or glideslope is invalid, deviation indicator is not displayed. If ILS data is provided to the Sport EFIS via serial input and this input is not providing data to the EFIS, or is reporting the nav receiver failed, a line will be drawn through the scales to indicate the failure.

**Show VOR CDI on Localizer (Yes or No)(requires SL30)**

Yes displays VOR deviation data on the PFD in place of localizer deviation when the Sport EFIS navigation mode is VOR. “VOR” will appear just to the left of the scale on the PFD. To/From is provided to the right of the scale if available

**ILS Inhibit of HITS (Inhibit/No Inhibit)(requires SL30)**

When inhibited, the HITS that is displayed during Synthetic Approach is removed when the navigation mode is LOC or ILS and the localizer is valid. The height above touchdown zone will still appear below the Flight Path Marker.

**Default Decision Height (feet)**

When the height above the runway touchdown zone is lower than this entry, the height above touchdown that is displayed below the Flight Path Marker will flash between Red and Green. **200 ft. is recommended.**

**G-Meter Mode (Off, Auto, On, On with Min/Max)**

**OFF** – G-Meter does not display

**Auto** – G-Meter displays when High or Low threshold is exceeded.



**ON** – G-Meter is displayed.

**ON with Min/Max** – G-Meter displays inside a yellow box when Caution Min or Max is exceeded.

**G-Meter Maximum (+2 to 8, .1 increments)**

Sets the scaling of the analog portion of the G-Meter. Set at or slightly greater than max allowable positive G loading.

**G-Meter Minimum (+.5 to -8, .1 increments)**

Sets the scaling of the analog portion of the G-Meter. Set at or slightly greater than max allowable negative G loading.

**G-Meter Caution Max (2 to 8, .1 increments)**

Sets value where G-Meter displays when **On with Min/Max** is selected.

**G-Meter Caution Min (+5 to -8, .1 increments)**

Sets value where G-Meter displays when **On with Min/Max** is selected.

**Auto G-Meter High Threshold (1.2 to 8, .1 increments)**

Sets value where G-Meter displays when **Auto** is selected.

**Auto G-Meter Low Threshold (-8 to -8, .1 increments)**

Sets value where G-Meter displays when **Auto** is selected.

When all items on this page have been configured, press SAVE or MAIN. SAVE saves the values and returns to the PFD display. MAIN gives a warning message that values have changed and gives the option to save or not.

## Chapter 4 ENGINE INFORMATION SYSTEM SETUP

This set up page configures the PFD to display engine information from the EIS.

Detailed information on each choice follows this table which shows typical values for an RV equipped with a O-360 engine (EIS Aux inputs are assumed to be MAP, L Fuel Qty, R Fuel Qty, Amps and Fuel Pressure:

Setting	Selection	Suggested Value
Number of Cylinders	2 / 4 / 6 / 9	4
Aux 1 Function		MAP
MAP Integer/Decimal		Decimal
Aux 2 Function		Left Fuel
Left Fuel Integer/Decimal		Decimal
Aux 3 Function		Right Fuel
Right Fuel Integer/Decimal		Decimal
Aux 4 Function		Amps
Amps Integer/Decimal		Integer
Aux 5 Function		Fuel Pressure
Fuel Pressure Integer/Decimal		Decimal
Aux 6 Function		Off

### Number of Cylinders (2-9)

Sets how many EGT/CHT graphs are to be displayed. This setting should correspond to the number of EGTs that are measured by the model of EIS that is being used.

### Aux (1-6) Function

EIS Auxiliary Inputs are scaled and labeled appropriately via user settings on the EIS Engine Monitor. This information is **NOT** transmitted to the Sport EFIS, and thus must be entered into the Sport EFIS. For each Auxiliary Input used on the EIS, the name or label of each and whether it is Integer or Decimal data must be entered.

Each Aux input is shown on this setup page and each is programmed in a similar manner. For example, scroll to **Aux 1 Function**.

A number of preprogrammed labels are displayed (**None, Aux, Volt Bus, Left Right Center Fuel, Gear Box Temp, Amp, TIT, Hyd Press, Torque, Flaps, Aileron & Elevator Trim, etc**) If any of these is the correct label for the Aux 1 Input, select it.

To make a custom label, select **AUX**. This will cause a new Setting line (left column) to appear, "Aux 1 Name" and its Value (right column) is "EIS Aux 1".

Scroll to "EIS Aux 1" and press either knob. A new screen, "Aux Name Editor" will appear. The current value, "EIS Aux 1" is displayed at the top and there is a box around "E", indicating that first field, which contains "E" may be edited. To create a custom label, edit each field in turn. To edit "E", use the button under the appropriate column of

characters to select the desired character. Then press the right knob to move to the next field and edit it. Repeat for all fields.

For example, to change “EIS Aux 1” to “MAP”, with the box around “E”, press the second button to select M. Note that over the right knob there is a list and NEXT has a white outline box. Press the knob and the box at the top moves to “I”. Press the first button to select “A”.. Repeat to select “P” in the third position. Note that there is a “blank” in the fifth column. Insert blanks to “erase “Aux 1”.

Select CASE over the right knob to change to lower case characters if desired.

When complete, select SAVE which will return to Setting/Value screen.

### **Aux 1-6 Function Integer/Decimal**

The next line on the Setting / Value screen is now “MAP Integer / Decimal”. Select the same setting as set in EIS.

Repeat for all Auxiliary Inputs.

All Auxiliary inputs that are not in use should be set to **NONE**.

## Chapter 5 ENGINE LIMITS

This set up page configures the Min Max limits that are used to annunciate alarms on the PFD for inputs to the GRT Sport EFIS.

The GRT Sport EFIS uses the GRT EIS Engine Information System to interface to all external inputs. A feature of EIS is the capability to continuously compare each input to user set Min Max limits. If an input exceeds its limits, the error is annunciated by a flashing warning lamp and flashing EIS display. In EIS if a limit is set to 0, then that input is not monitored and will not trigger an alarm.

The GRT Sport EFIS can have Min Max limits set similar to EIS. If this is done, out of limit inputs will trigger an alarm on the display as well as in EIS. Like EIS, setting an EFIS limit to 0 causes it not to be monitored.

How alarms are annunciated is a user preference. The options are:

EIS only – EIS should be mounted in the panel so the pilot can acknowledge alarm. Set all desired engine limits in EIS and set all engine limits in EFIS to 0.

EFIS only – works well if EIS is mounted remotely, such as for rear engine aircraft. Set all engine limits in EIS to 0 and set all desired engine limits in EFIS.

EIS and EFIS – alarms will have to be acknowledged in both units. Gives some backup in case of EFIS failure, EIS is still capable of generating alarms. Set desired engine limits in both EIS and EFIS.

Definition of Engine Limits and suggested settings are in the table below (this table is identical to the table in the EIS User's Manual).

Setting	Use	Recommended Setting
Max Time	Alerts pilot when flight time exceeds this limit. Useful as a warning to check fuel. Limit is entered in minutes, so 2 hours is entered as 120, etc.  Range is 0-500 minutes.	30-45 minutes less than airplane's endurance.
Interval	Provides a warning that repeats at the interval entered in minutes. Useful as a reminder to perform periodic tasks such as switching fuel tanks. Acknowledging this alarm cancels the warning completely, therefore the warning light will not remain on after acknowledging this alarm.  Range is 0-500 minutes.	As required. Typically 30-60 minutes is used for changing fuel tank selection.

Setting	Use	Recommended Setting
Max Flow	<p>Maximum Fuel Flow – Generates a warning when the fuel flow (rate of fuel burn) exceeds this limit. Useful for detecting badly leaking fuel lines, loose connections to fuel injectors, etc. Very useful safety feature for all engines, but especially fuel injected engines. Be sure to use it!</p> <p>Range of Max Fuel Flow Limit is 0-500 gph, in increments of 1 gallon/hour.</p>	Set about 10-20% above max fuel flow rate at full takeoff power. Applicable only if the fuel flow option is installed.
Max OilP	<p>Maximum Oil Pressure. Useful as a reminder to reduce RPM when warming a cold engine, especially in winter conditions, to avoid excessive oil pressure.</p> <p>Range is 0-99 psi</p>	98 or less. Max oil pressure displayed by the instrument is 99 psi.
Min OilP	<p>Minimum Oil Pressure – Essential! Be sure to use this one! Warns of loss of oil pressure. As this is the most serious alarm, some pilots may take drastic action when seeing this alarm. Consider you situation carefully if you get this alarm. An instrumentation failure (sensor failure) is possible, as is complete engine stoppage or anything in between. Use your judgment!</p> <p>Range is 0-99 psi</p>	As recommended by the engine manufacturer, or 20 psi.
Min Crz_OP	<p>Minimum Cruise Oil Pressure - Generates a warning when the oil pressure is below this limit. This limit is active only when the engine RPM is above the min Lim-RPM setting. This allows setting a low oil pressure limit that apply only at higher engine RPM.</p>	As recommended by engine manufacturer, if available. If not provided, set based on experience.
Max OilT	<p>Maximum Oil Temperature</p> <p>Range 0-300 deg F.</p>	As recommended by engine manufacturer.
Min OilT	<p>Minimum Oil Temperature – Intended for troubleshooting engine problems. Also useful as an “engine not warmed up yet” reminder.</p> <p>Range is 0-300 F.</p>	Set limit based on experience.
Max RPM	<p>Warns when engine exceeds maximum RPM.</p> <p>Range of Max RPM Limit is 0-9990.</p>	Set according to engine manufacturer’s recommendation.
Min RPM	<p>Warns when engine RPM falls below this entry. Useful for troubleshooting engine problems. May also be used as a warning that the engine RPM is dropping too low on the landing rollout which could result in engine stall. No warning is generated when the engine RPM is zero.</p> <p>Range is 0-9990.</p>	Set limit based on experience.

<b>Setting</b>	<b>Use</b>	<b>Recommended Setting</b>
Min Fuel	Minimum Fuel Quantity – Generates a warning when the fuel flow function’s fuel quantity drops below this limit.  Range is 0-500 gallons.	Set to at least enough useable fuel to provide 30-60 minutes of fuel at cruise power. Applicable only if the fuel flow option is installed.
Min Aux (1-6) Max Aux (1-6)	Minimum & Maximum for Aux input. (ideally these limits would use the name the user selected for this input. The displayed value must be either an integer or a decimal number with 1 digit after the decimal, according to the user selections below.)  Range is 0-999, or 0-99.9	Set limit as needed depending on the use of the auxiliary input. Some uses of the auxiliary inputs do not require limits (such as manifold pressure) and some do, such as fuel pressure.
Max H2O	Maximum water temperature limit  Range is 0-300 deg F.	Set limit as recommended by engine manufacturer
Min H2O	Minimum water temperature limit. Intended for troubleshooting engine problems. Also useful as an “engine not warmed up yet” reminder.  Range is 0-300 deg F.	Set limit based on experience.
Max Volt	Maximum Voltage Limit – Allows for detection of failed regulator. Loss of correct voltage regulation resulting in over-charging (and subsequent high voltage) will greatly shorten the life of the battery, and could be dangerous.  Range is 0-35.0 volts (increments of 0.1 volts)	Start with 15.6 volts. Lower as much as possible without getting false alarms. Typical limit should be 14.6 Volts.
Min Volt	Minimum Voltage Limit – Allows for detection of loss of charging.  Range is 0-35.0 volts (increments of 0.1 volts)	Set limit to about 12.8 volts to get immediate alerting of loss of charging, although this will cause low voltage alarm whenever instrument is on while engine is not running. Set to 12.4 volts or less to avoid alarm when engine not running, but still gives alarm shortly after battery discharging has begun.
Max Carb	Carb temp warning is generated when the carb temp falls between the Max Carb and Min Carb Limit.  Range is –30 to +120 deg F	40-60 deg F
Min Carb	See Max Carb Range is –30 to +120 deg F	0-20 deg F
Max EGT	Maximum EGT – Not all engines have published limits, nor do all engines require a maximum EGT limit. This alarm can be useful for troubleshooting engine problems also.  Range is 0-1900 deg F	Set limit according to engine manufacturer recommendation, or based on experience.

<b>Setting</b>	<b>Use</b>	<b>Recommended Setting</b>
Min EGT	<p>Minimum EGT – This alarm is active only when the engine RPM is above the entry for EGT-RPM. This alarm is useful to detecting the loss of a cylinder, or for troubleshooting engine problems.</p> <p>Range is 0-1900 deg F</p>	800-1200 deg F, depending on sensitivity desired. If false alarms are consistently generated, reduce the limit to less than 800 deg F, or set to 0.
Lim-RPM	<p>Defines the RPM at which the following RPM dependant limits become active. These are: Min EGT and Min Crz_OP</p> <p>Range is 0-9990 RPM.</p>	Set limit to an RPM slightly less than the RPM used for the MAG check. This allows the Min Volt test to become active during the MAG test to automatically test for charging.
Max EgtSpan	<p>Maximum difference between the highest and lowest EGT. This limit can be used to help detect changes in normal engine operation. It is also useful when leaning using the digital leaning pages, as it is possible to not notice a EGT that is abnormally low when using these pages to lean the engine. (Its more obvious on the bar graph pages.)</p> <p>Range is 0-1900 deg F.</p>	Set this limit based on experience. It may take some trial and error to arrive at a good limit. After establishing a limit that rarely generates alarms, activation of this alarm may indicate developing engine problem.
Max EGT-Inc	<p>Maximum Increase in EGT from the Lean Point. This alarm is active while lean point is active. This alarm will often generate a false alarm when the load on the engine significantly reduced during descent. To avoid this false alarm, reset the Lean Point. (Selecting “Set Lean Page” and “Yes” activates alarm; “Reset” de-activates alarm.)</p> <p>This limit also sets the Sport red line on the vertical bar graph.</p> <p>Range is 0-1900 deg F.</p>	Set limit based on experience. A small value will allow sensitive detection of EGT increases, which is useful for detection of intermittent problems. Normal operation may require a larger setting to prevent false alarms due to normal EGT fluctuation caused by turbulence or other small power/load fluctuations.
Max EGT-Dec	<p>Maximum Decrease in EGT from the Lean Point. See also Max EGT-Inc description.</p> <p>Range is 0-1900 deg F.</p>	Set limit based on experience. You may find that this limit is significantly different from the Max EGT-Inc. See also Max EGT-Inc description.
Max Crate	<p>Maximum Cooling Rate for CHT – The alarm is provided in degrees/minute, and corresponds to the maximum rate of decrease in CHT. No limit applies to the maximum rate of increase. All cylinders are checked for this limit.</p> <p>Range is 0-255 deg F/minute.</p>	Set limit based on engine manufacturer’s recommendation. If no limit is provided, establish a limit based on experience.

Setting	Use	Recommended Setting
Max CHT	<p>Maximum Cylinder Head Temperature. Often engines will normally operate significantly lower than the engine manufacturer's limit. Consider setting this limit lower than the maximum to get early warning of abnormal CHTs.</p> <p>This limit also sets the Sporttial red line on the vertical bar graph.</p> <p>Range is 0-700 deg F</p>	Set according to engine manufacturer's recommendation.
Min CHT	<p>Minimum Cylinder Head Temperature. Intended for engine troubleshooting problems. Also useful as an "engine not warmed up yet" reminder.</p> <p>Range is 0-700 deg F</p>	Set limit based on experience.

### Other Limits

**Min EFIS Voltage Bus 1**

**Max EFIS Voltage Bus 1**

**Min EFIS Voltage Bus 2**

**Max EFIS Voltage Bus 2**

**Min EFIS Voltage Bus 3**

**Max EFIS Voltage Bus 3**

As discussed in the GRT Sport EFIS Install Manual, there may be up to two independent sources of power for the EFIS. These settings allow monitoring of each power source.

Notice that completion of the labels on the Engine Information System Setup page has transferred the names for the EIS Auxiliary inputs to this page.

### Engine Performance (requires EIS Manifold Pressure Option)

The GRT Sport EFIS uses the information in this table to calculate the percent power being produced by your engine based on RPM, manifold pressure, altitude and outside air temperature.

The table is completed using performance data from the engine manufacturer or the aircraft Pilot Operating Handbook (POH).

If power tables are not available from the engine manufacturer,

1. Kitplanes magazine March 2007 issue has an article which may be useful or
2. power tables may be found on the internet. Be sure to use with caution

The left three columns are used to calculate power based on RPM and MAP



**Rated Horsepower** Enter the maximum sea level rated horsepower of your engine.

**RPM** To be valid, at least two RPM entries must be defined and the values must be increasing as you move down the table.

**55% MAP** Use your engine operating manual to determine the manifold pressure which results in 55% power at the RPM entered on this row, for a standard day at sea level.

**75% MAP** Use your engine operating manual to determine the manifold pressure which results in 75% power at the RPM entered on this row, for a standard day at sea level.

Note that engine manuals are often written in terms of brake horsepower (bhp), not percent power. To convert bhp to percent power, divide bhp by rated horsepower (for example, for a 160 rated hp engine, 120 bhp is 75 percent power ( $120/160=.75$ )).

The right two columns compensate for altitude.

**Altitude** Enter a list of altitudes. Use altitudes that are roughly evenly spaced from some level above sea level (2000 ft is good) up to some altitude that is above any altitude you expect to fly. Only 1000 ft increments are allowed and they must be increasing as you move down the table.

The entry **Delta HP** is how much horsepower increases for a given engine condition (RPM and MAP) between sea level and the altitude in the table. To calculate, the horsepower is determined from the performance data for a particular RPM and MAP at sea level **and** at a particular altitude in the table. The difference is entered into the table. Try to use a RPM, MAP that would be typical cruise setting for your aircraft.

The Delta HP entry for 14000 ft in the example table was calculated like this.

From the Lycoming manual, the altitude performance chart indicates that at 14000 ft with RPM of 2300 and MAP of 17 inHg produces 88 hp. At sea level, the same 2300 RPM, 17 inHg produces 65 hp. The difference ( $88-65=23$ ) is entered into the table for 14000 ft entry.

An example of a filled in table for a Lycoming O-320 is:

**O-320 160 HP**

<b>RPM</b>	<b>55% MAP</b>	<b>75% MAP</b>		<b>Altitude</b>	<b>Delta HP</b>
2000	22.7	27.6		2000	6.0
2100	21.9	26.8		4000	8.0
2200	21.2	26.0		6000	12.0
2300	20.5	25.1		8000	15.0
2400	19.7	24.2		10000	22.0
2500	19.1	23.6		12000	29.0

<b>RPM</b>	<b>55% MAP</b>	<b>75% MAP</b>		<b>Altitude</b>	<b>Delta HP</b>
2600	18.6	23.0		14000	23.0
2700	18.3	22.5			

If you do not data for this table, leave it blank. All that happens is percent power is not calculated.

### **Fuel Data Scale**

The Fuel Data Scale provides a way to calibrate irregular shaped fuel tanks. Fuel level senders are often linear devices; their output or resistance changes linearly as the level of fuel changes. If the shape of the fuel tank is uniform, the volume of fuel will increase linearly with the height of fuel. For example, a 20 gallon tank which is 10 inches tall, every inch of fuel is 2 gallons.

If the tank is irregularly shaped, this is not the case. Perhaps the fuel tank is a wet wing so the tank is the shape of the wing. Obviously in this case as the height of fuel changes the quantity of fuel does not change in a uniform manner. The Fuel Data Scale provides a way to correct for this.

Fuel quantity is one of the Aux Inputs on EIS. Since the sender is likely a linear device, it is convenient to configure the EIS Aux Input to show 0 – 100 (roughly corresponding to 100%) or 0 to H where H is the height of the tank. The entries in this table are then used to correlate the reading from EIS (Probe on the Fuel Data Scale Tables) to the actual fuel (Actual on the Fuel Data Scale Tables). The actual amount must be accurately measured. One method is to drain the tank and incrementally add known quantities of fuel.

There are tables for Left, Center and Right Fuel Tanks and up to 10 entries allowed.

The more entries you have in the table, the more accurate the display. For best results, try to have multiple entries where the shape changes, to get better resolution. For example, if the tank is uniform for the first 5 inches, a couple of entries will suffice for that. If it then changes a lot in the next inch, three or four entries would be good there. If the shape is uniform above that point, just a few entries will work for that portion.

Keep in mind that if this table is used, the fuel levels displayed on EIS may not match those shown on the EFIS.

It is a good practice to provide for an independent fuel quantity measurement, such as a sight gauge or calibrated dipstick.

Note also that fuel quantity discussed here is measurement of the actual fluid. If the EIS Fuel Flow option has been selected, fuel quantity is calculated by the fuel flow transducer. The initial fuel quantity is input either to EIS or EFIS and as fuel is consumed, the fuel remaining is calculated based on fuel flow

## Chapter 6 MOVING MAP SETUP

This set up page allows the user to configure the Moving Map to suit individual preferences.

Detailed information on each choice follows this table which shows suggested values

Setting	Selection	Suggested Value
Up Reference	Heading / Track	<b>Track</b>
Airport Symbol Size	Small / Large	<b>Small</b>
Label Font Size	Small / Large	<b>Small</b>
HSI Plane Symbol Requires SL30	Conventional / Canard	<b>To match your aircraft</b>
Connect Bearing Pointers Requires SL30	Yes / No	<b>No</b>
Max map range:		
Small airports		<b>20</b>
Medium airports		<b>100</b>
large airports		<b>300</b>
VOR		<b>300</b>
NDB		<b>50</b>
airspace		<b>50</b>
Max obstructions distance		<b>10</b>
Obstacle alarm	On / Off	<b>On</b>
Terrain	On / Off	<b>On</b>
Terrain Alarm	On / Off	<b>On</b>
Auto Declutter	On / Off	<b>On</b>
Show Lightning Requires XM Weather	No / On North up Map only / On all MAP pages	<b>See text following</b>
Show AIRMET Requires XM Weather	No / On North up Map only / On all MAP pages	<b>See text following</b>
Color airports using METARS Requires XM Weather	No / On North up Map only / On all MAP pages	<b>See text following</b>
METAR Text Requires XM Weather	Raw / Translated	<b>Translated</b>
TAF Text Requires XM Weather	Raw / Translated	<b>Translated</b>

### Up Reference (Heading/Track)

Selects whether the top center of the map display is heading or ground track. **Track is the typical setting** as it shows the destination at the top of the screen when on course. If Heading is selected, the destination will not appear at the top center of the page if a cross wind exists, but the orientation on the screen will match the view out the window. This makes the position of runways, obstacles and other traffic appear on the screen in

the same relative position that they appear out the window and is especially useful when strong cross winds exist, as the difference between ground track and heading can be significant. For either selection, heading and track indicators are provided on the map page.

### **Airport Symbol Size (Large / Small)**

Controls size of airport symbol on map. **Small is recommended.**

### **Label Font Size (Large /Small)**

Controls size of font used to identify airport. **Small is recommended.**

### **HSI Plane Symbol (Conventional / Canard)**

#### **Connect Bearing Pointers (Yes / No) (requires SL 30)**

The bearing pointer(s) on the HSI page may be shown with the tails connected to the pointers (heads) or with the tail and pointer (head) as separate pieces. **YES** shows bearing pointer as it is typically shown on an RMI with tail and pointer (head) connected. **NO** shows the bearing pointer with the tail and pointer (head) not connected and provides some level of declutter that may be preferred.

**Max Map Range (Off / 1 / 2 / 5 / 10 / 15 / 20 / 35 / 50 / 100 / 150 / 300 / 500 / 1000 )** at which each of the following symbols are displayed. The symbol will appear on the map when the map's range is set to a range equal to or lower than this entry. The available selections are the map ranges with the addition of OFF, which disables the item so it will not be displayed at any time. These selections serve to declutter the map display.

#### **Small airports**

Airports with runways less than 5000 feet.

**20 is recommended.**

#### **Medium airports**

Airports with runways 5000 feet or longer or a control tower **50 is recommended.**

#### **Large airports**

Airports with runways longer than 8100 feet. **150 is recommended.**

#### **VOR**

Includes VORs, VOR/DME, VOR/Tacan (VORTAC). **150 is recommended.**

#### **NDB**

Includes NDBs and NDB/DME. **10 is recommended.**

#### **Airspaces**

Includes Class B, C, and D airspace boundaries. **100 is recommended.**

#### **Max obstructions distance**

Obstacles **10 is recommended.**

**Obstacle alarm (On / Off)**

Enables/disables alarms that warn of nearby obstacles. When enabled, an obstacle alarm will be provided when an obstacle is projected to be within 250 feet of the aircraft's flight path within 60 seconds time and 25 degrees of ground track. Since flight path is used, an alarm will be generated if the aircraft is above the obstacle but descending at a rate that will allow it to collide with it. Likewise, if the aircraft is below an obstacle but climbing at a sufficient rate to miss it, an alarm will not be generated.

**ON is recommended.**

**Terrain (On / Off)**

Enables the Moving Map Soft Key "SHOW" selection that allows terrain to be displayed.

**ON is recommended.**

**Terrain Alarm (On / Off )**

Enables or disables a warning when terrain is within 500 feet of the aircraft's altitude and within 2 minutes. **ON is recommended.**

**Auto Declutter (On / Off)** When enabled, this function limits the number of items displayed on the map to 50, by limiting the number of small airports displayed. **ON is recommended**

**Show Lighting (NO / All Map pages / On North UP Page Only)(requires XM Weather)**

Selects which map pages are to display lightning data. Showing on North UP Only can increase update rate of the other map pages.

**Show AIRMET (NO / All Map pages/ On North UP Page Only)(requires XM Weather)**

Selects which map pages are to display IFR AIRMETS. Showing on North UP Only can increase update rate of the other map pages.

**Color Airports using METARS (NO / All Map pages/ On North UP Page Only)(requires XM Weather)**

Airports may be colored depending on their weather conditions (VFR, MVFR, IFR). This selects which map pages are to display airports in weather colors. Showing on North UP Only can increase update rate of the other map pages.

**METAR Text (Translated / Raw)(requires XM Weather)**

Controls the format of the METAR shown for each airport. Translated selection shows the METAR in plain English. **Translated is recommended.**

**TAF Text (Translated / Raw)(requires XM Weather)**

Controls the format of the TAF shown for each airport. Translated selection shows the TAF in plain English. **Translated is recommended.**

## Chapter 7 GRAPHICAL ENGINE DISPLAY SETUP

There are a six engine display pages. This menu allows the user to select which parameters are displayed and in what manner they are displayed.

The following table is an example of a typical setup for a RV with an O 360 engine. It reflects the example pages shown in Section 4, Engine Monitor.

<b>Setting</b>	<b>Selection</b>	<b>Suggested Value</b>
Dial #1 Source		<b>MAP</b>
Dial #1 Scale		<b>0.1</b>
Dial #1 Units Label		<b>in Hg</b>
Dial #1 Start		<b>10.0</b>
Dial #1 End		<b>32.0</b>
Dial #1 Label Increment		<b>5.0</b>
Dial #1 Tick Increment		<b>1.0</b>
Dial #1 Green Start		<b>0</b>
Dial #1 Green End		<b>0</b>
Dial #1 Yellow Start		<b>0</b>
Dial #1 Yellow End		<b>0</b>
Dial #1 Red Start		<b>0</b>
Dial #1 Red End		<b>0</b>
Dial #1 Bug #1 Position		<b>0</b>
Dial #1 Bug #2 Position		<b>0</b>
Dial #1 Bug #3 Position		<b>0</b>
Dial #1 Bug #4 Position		<b>0</b>
Dial #1 Bug #5 Position		<b>0</b>
Dial #1 Bug #6 Position		<b>0</b>
Dial #2 Source		<b>RPM</b>
Dial #2 Scale		<b>100</b>
Dial #2 Units Label		<b>x100</b>
Dial #2 Start		<b>1000</b>
Dial #2 End		<b>2700</b>
Dial #2 Label Increment		<b>200</b>
Dial #2 Tick Increment		<b>100</b>
Dial #2 Green Start		<b>1000</b>
Dial #2 Green End		<b>2400</b>
Dial #2 Yellow Start		<b>0</b>
Dial #2 Yellow End		<b>0</b>
Dial #2 Red Start		<b>2600</b>
Dial #2 Red End		<b>2700</b>
Dial #2 Bug #1 Position		<b>2200</b>
Dial #2 Bug #1 Color		<b>Magenta</b>
Dial #2 Bug #2 Position		<b>0</b>
Dial #2 Bug #3 Position		<b>0</b>
Dial #2 Bug #4 Position		<b>0</b>

<b>Setting</b>	<b>Selection</b>	<b>Suggested Value</b>
Dial #2 Bug #5 Position		<b>0</b>
Dial #2 Bug #6 Position		<b>0</b>
Dial #3 Source		<b>Percent Power</b>
Dial #3 Scale		<b>1</b>
Dial #3 Units Label		<b>%</b>
Dial #3 Start		<b>0</b>
Dial #3 End		<b>100</b>
Dial #3 Label Increment		<b>10</b>
Dial #3 Tick Increment		<b>5</b>
Dial #3 Green Start		<b>0</b>
Dial #3 Green End		<b>0</b>
Dial #3 Yellow Start		<b>0</b>
Dial #3 Yellow End		<b>0</b>
Dial #3 Red Start		<b>0</b>
Dial #3 Red End		<b>0</b>
Dial #3 Bug #1 Position		<b>75</b>
Dial #3 Bug #1 Color		<b>Magenta</b>
Dial #3 Bug #2 Position		<b>0</b>
Dial #3 Bug #3 Position		<b>0</b>
Dial #3 Bug #4 Position		<b>0</b>
Dial #3 Bug #5 Position		<b>0</b>
Dial #3 Bug #6 Position		<b>0</b>
Dial #4 Source		<b>Fuel Flow</b>
Dial #4 Scale		<b>0.1</b>
Dial #4 Units Label		<b>No Label</b>
Dial #4 Start		<b>0.0</b>
Dial #4 End		<b>20.0</b>
Dial #4 Label Increment		<b>5.0</b>
Dial #4 Tick Increment		<b>1.0</b>
Dial #4 Green Start		<b>0</b>
Dial #4 Green End		<b>0</b>
Dial #4 Yellow Start		<b>0</b>
Dial #4 Yellow End		<b>0</b>
Dial #4 Red Start		<b>0</b>
Dial #4 Red End		<b>0</b>
Dial #4 Bug #1 Position		<b>0</b>
Dial #4 Bug #2 Position		<b>0</b>
Dial #4 Bug #3 Position		<b>0</b>
Dial #4 Bug #4 Position		<b>0</b>
Dial #4 Bug #5 Position		<b>0</b>
Dial #4 Bug #6 Position		<b>0</b>
Performance/Fuel Box 2		<b>Carb</b>
Fuel Flow Data		<b>On</b>
Number of Cylinders		<b>4</b>

<b>Setting</b>	<b>Selection</b>	<b>Suggested Value</b>
EGT Vertical Graph Min		<b>900</b>
EGT Vertical Graph Max		<b>1600</b>
EGT Vertical Graph Increment		<b>200</b>
EGT Vertical Graph Ticks		<b>100</b>
CHT Vertical Graph Min		<b>100</b>
CHT Vertical Graph Max		<b>500</b>
CHT Vertical Graph Increment		<b>100</b>
CHT Vertical Graph Ticks		<b>100</b>
EGT Time History Temp Min		<b>900</b>
EGT Time History Temp Max		<b>1600</b>
EIS Volt Graph Min		<b>10</b>
EIS Volt Graph Max		<b>20</b>
EFIS Volt 1 Graph Min		<b>0</b>
EFIS Volt 1 Graph Max		<b>0</b>
EFIS Volt 2 Graph Min		<b>0</b>
EFIS Volt 2 Graph Max		<b>0</b>
EFIS Volt 3 Graph Min		<b>0</b>
EFIS Volt 3 Graph Max		<b>0</b>
Fuel Flow MAX FUEL		<b>0</b>
Flow Rate Bar Graph Max		<b>9.1</b>
Prompt for Fuel Added		<b>No</b>
Aux 1 Function		<b>MAP</b>
MAP Integer/Decimal		<b>Decimal</b>
MAP Graph Min Level		<b>10.0</b>
MAP Graph Max Level		<b>32.0</b>
Aux 2 Function		<b>Left Fuel</b>
Left Fuel Integer/Decimal		<b>Decimal</b>
Left Fuel Graph Min Level		<b>0</b>
Left Fuel Graph Max Level		<b>15</b>
Aux 3 Function		<b>Right Fuel</b>
Right Fuel Integer/Decimal		<b>Decimal</b>
Right Fuel Graph Min Level		<b>0</b>
Right Fuel Graph Max Level		<b>15</b>
Aux 4 Function		<b>Amp</b>
Amp Integer/Decimal		<b>Integer</b>
Amp Graph Min Level		<b>-100</b>
Amp Graph Max Level		<b>+100</b>
Aux 5 Function		<b>Fuel Pressure</b>
Fuel Pressure Integer /		<b>Decimal</b>



<b>Setting</b>	<b>Selection</b>	<b>Suggested Value</b>
Decimal		
Fuel Pressure Graph Min Level		<b>0</b>
Fuel Pressure Graph Max Level		<b>0</b>
Aux 6 Function		<b>Off</b>
Typical Cruise Fuel Flow		<b>9</b>
Reserve Fuel Display at Airports		<b>Yes</b>
Bar Graph A1		<b>Oil Pressure</b>
Bar Graph A2		<b>Oil Temperature</b>
Bar Graph A3		<b>EIS Volt</b>
Bar Graph A4		<b>Amp</b>
Bar Graph A5		<b>Off</b>
Bar Graph A6		<b>Off</b>
Bar Graph B1		<b>Off</b>
Bar Graph B2		<b>Off</b>
Bar Graph B3		<b>Off</b>
Bar Graph B4		<b>Off</b>
Bar Graph B5		<b>Off</b>
Bar Graph B6		<b>Off</b>
Bar Graph B7		<b>Off</b>
Bar Graph B8		<b>Off</b>
Bar Graph B9		<b>Off</b>
Bar Graph B10		<b>Off</b>
Bar Graph B11		<b>Off</b>
Split: Box 1		<b>RPM</b>
Split: Box 2		<b>MAP</b>
Split: Box 3		<b>Oil Temperature</b>
Split: Box 4		<b>Off</b>
Split: Box 5		<b>Off</b>
Split: Box 6		<b>Oil Pressure</b>
Split: Box 7		<b>Off</b>
Split: Box 8		<b>Off</b>
Split: Box 9		<b>Off</b>
Split: Box 10		<b>Off</b>
Split: Box 11		<b>Off</b>
Reset Oil Hours on next SAVE		<b>Yes</b>

### **Dial Settings**

Up to four engine parameters may be displayed as conventional dials. The dials display includes the capability to display red lines, green and yellow arcs, a numeric display of the current value and up to 6 “Bugs”. Dial 1 is the top left dial, 2 is the top right dial, 3 is

the bottom left dial and 4 is the bottom right dial. Dials 1 and 2 are visible on all engine monitor pages. Each dial is configured in the same manner.

**Dial Source (Off, RPM, Aux 1-6, Fuel Flow, Percent Power, N1, N2, Fuel Pressure, CHT 1-2, EGT 1-2, TIT 1-2, Highest CHT, EGT or TIT, Oil Temp, Oil Press, Torque, Fuel Qty, Fuel Remaining, EIS and EFIS Volts, Amps, Coolant Temp, Carb Temp, Gear Box Temp, Hyd Press, Water Press, Air Press, Aux 1-6)**

Select the desired source.

**Dial Scale (.01, .1, 1, 10, 100)**

This is what determines the available resolution of the dial and also the numeric display. It should correspond to the resolution set in EIS. For example, 0.1 would be appropriate for MAP, 100 would be appropriate for RPM, 1 would be appropriate for oil pressure etc.

**Dial Units Label**

This selects the displayed label. Dial Source above will select the name label (RPM, MAP, Pwr, Flow etc), this field selects the displayed units label (x100, in Hg, %, blank).

**Dial Start and Dial End**

Each dial presentation is 270 degrees ( $\frac{3}{4}$  of a circle). Using these two fields, you specify what value the dial starts at and what value it ends at. For example, you want to have a tachometer dial and the maximum RPM is 3000.

If you start the dial at 0 and end at 3000, each 90 degrees ( $\frac{1}{4}$  of a circle) will represent 1000 RPM.

If you start the dial at 1200 and end at 3000, each 90 degrees ( $\frac{1}{4}$  of a circle) will represent 600 RPM, making the dial easier to read.

If you are concerned about clear, easy to read indications in a specific operating region, you may set the dial that way. For example, the tach dial could be set 1700 start and 2600 end, making each 90 degrees represent 300 RPM. This is perfectly safe since EIS and/or EFIS is monitoring for Min Max limits, so the dial presentation doesn't need to include Min or Max values.

Since this is a display to change, you can change it depending on parameters you wish to observe or tests you are performing. In early flight you might want to monitor Oil Temp closely, so set up one of the dials to do that.

**Dial Label Increment. and Dial Tick Increment**

All dials have major (long) and minor (short) graduations or tick marks. Dial Tick Increment defines what values have graduations or tick marks and Dial Label Increment defines which tick marks have labels, making them major tick marks.

For example, MAP dial might have Dial Tick Increment set to 1 and Dial Label Increment set to 5 resulting in lines every 1 inHg and labels (and longer lines) every 5.

Another example, a tach dial, might have Dial Tick Increment set to 100 and Dial Label Increment set to 500 resulting in lines every 100 RPM and labels (and longer lines) every 500.

### **Dial Green, Yellow and Red Start and Dial Green, Yellow and Red End**

These allow the setting of the desired start and end points of the colored arcs.

### **Dial Bug #(1-6) Position and Color**

These allow the setting of user defined “bugs” to identify pertinent values. For example, by setting the same color bugs on MAP and RPM dials, one can easily set a particular power setting.

**This completes the setup of the conventional dial displays.**

### **Performance/Fuel Box 2 (Off, Carb temp, TAS, MPG/KPL)**

The display in the upper left corner of the Engine Monitor displays fuel related information. The second field on the left side is user selectable from the above choices.

### **Fuel Flow Data (Off / On) (EIS Fuel Flow option required)**

Fuel Flow information may be displayed in the upper left corner also.

### **Number of Cylinders (2,4,6,9)**

Sets how many EGT/CHT graphs are to be displayed. This setting should correspond to the number of EGTs that are measured by the model of EIS that is being used.

### **EGT/CHT Vertical Graph Min/Max/Increment/Ticks**

One of the engine display pages shows EGT and CHT as graphs. These settings define the appearance of those graphs.

Similar to other displays, it is not necessary to start these at 0.

### **EGT Time History Temp Min Max**

Used to set the Min Max temps displayed when EGT Time History display is selected. The narrower the band (higher Min, lower Max) the more resolution and ability to observe change.

### **Min Max (EIS Volts, EFIS Volts 1-3, Aux 1-6)**

The GRT Sport EFIS displays a number of parameters as vertical bar graphs. There are a number of parameters for which the Min and Max display values are user selectable.

Note that these are **display** values, not Min Max limits. Usually the display value range will be greater than limit range. For example, you might display voltage from 10 to 16 volts, but the Min Max limits might be set at 12.8 and 15.6 volts.

### **Fuel Flow MAX FUEL**

This is the value EFIS will use when you reset the fuel computer after refueling. You may also leave this number blank and input the fuel quantity from EIS which ensures that EIS and EFIS fuel quantity are the same.

### **Flow Rate Bar Graph Max**

This entry sets the maximum fuel flow rate that will be displayed on the bar graph. Higher flow rates will indicate the same as this flow rate (top of bar graph). Measured flow rate is shown adjacent to the bar graph in numeric form. This parameter sets **display** value, not Max limit.

### **Prompt for Fuel Added (Yes / No)**

On Power up, **YES / NO** enables or disables an on screen message prompting you to enter the amount of fuel added which is used to compute fuel usage and endurance.

### **Aux (1-6) Function**

EIS Auxiliary Inputs are scaled and labeled appropriately via user settings on the EIS Engine Monitor. This information is **NOT** transmitted to the Sport EFIS, and thus must be entered into the Sport EFIS. For each Auxiliary Input used on the EIS, the name or label of each and whether it is Integer or Decimal data must be entered.

Each Aux input is shown on this setup page and each is programmed in a similar manner. For example, scroll to **Aux 1 Function**.

A number of preprogrammed labels are displayed (**None, Aux, Volt Bus, Left Right Center Fuel, Gear Box Temp, Amp, TIT, Hyd Press, Torque, Flaps, Aileron & Elevator Trim, etc**) If any of these is the correct label for the Aux 1 Input, select it.

To make a custom label, select **AUX**. This will cause a new Setting line to appear, "Aux 1 Name" and its Value is "EIS Aux 1".

Scroll to "EIS Aux 1" and press either knob. A new screen, "Aux Name Editor" will appear. The current value, "EIS Aux 1" is displayed at the top and there is a box around "E", indicating that first field, which contains "E" may be edited. To create a custom label, edit each field in turn. To edit "E", use the button under the appropriate column of characters to select the desired character. Then press the right knob to move to the next field and edit it. Repeat for all fields.

For example, to change "EIS Aux 1" to "MAP", with the box around "E", press the second button to select M. Note that over the right knob there is a list and NEXT has a white outline box. Press the knob and the box at the top moves to "I". Press the first

button to select “A”.. Repeat to select “P” in the third position. Note that there is a “blank” in the fifth column. Insert blanks to “erase “Aux 1”.

Select CASE over the right knob to change to lower case characters if desired.

When complete, select SAVE which will return to Setting/Value screen.

The next line on the Setting / Value screen is now “MAP Integer / Decimal”. Select the same setting as set in EIS.

Repeat for all Auxiliary Inputs.

All Auxiliary inputs that are not in use should be set to **NONE**.

### **Aux 1-6 Integer/Decimal**

Each of the Aux inputs must be defined as Integer or Decimal. These settings should correspond to the settings in EIS.

### **Aux 1-6 Graph Min Max Level**

These inputs will be displayed as vertical bar graphs. These settings define the parameter values for the bottom and top of the bar graphs.

### **Typical Cruise Fuel Flow**

Expressed in Gallons per Hour (GPH). This value is used to compute Endurance.

### **Reserve Fuel Display at Airports (On/OFF)**

Need information

### **Bar Graph A1-A6**

Six bar graphs are displayed in the lower left corner of every Engine page. Here is where the selection of these six parameters is made. A1 is the left most display. Off causes that bar not to display.

### **Bar Graph B1-B11**

There are provisions for an additional eleven bar graphs to the right of A6. Here is when the selection of these parameters is made. B1 is the left most display. Off causes that bar not to display. These are displayed only on the **BARS** Engine page.

### **Split: Box 1-11**

On the ENG/MAP split page, there are provisions to display 11 parameters. Box 1 and 2 display at the top of the page and Box 3-11 display in a 3x3 grid beneath them. B3, B4 and B5 are the top row, B6, B7 and B8, the second and B9, B10 and B11 the third.

### **Reset Oil Hours on next SAVE (Yes / No)**

The STATS Engine page has a field that keeps track of engine hours since last oil change. Selecting **Yes**, resets that field if you select **SAVE** at the prompt.

## Chapter 8 DISPLAY UNIT MAINTENANCE

This set up page is used to install GRT Sport EFIS software and database updates and other system maintenance tasks. Most fields are for factory use.

### EFIS Settings Backup

This feature allows all user settings to be stored or recalled from a file on a USB flash drive. The Backup Directory function will name a directory on the flash drive for easy identification. **Backup All Settings** selection will backup the settings for the display unit you are saving from.

To restore the settings previously saved, select the directory that was named during backup and select **Restore All Settings**.

### Load EFIS Software

This feature allows the user to load updated GRT software and databases. This data is available on the GRT website ([www.grtavionics.com](http://www.grtavionics.com) ). The latest Instructions for updating data are also there. Download the data and transfer it to a USB flash drive (memory stick).

The USB flash drive must be installed in the display unit and the unit powered. In multiple display systems the software version must match on each display unit.

#### To Load EFIS Software:

1. Press any button
2. Press **NEXT** knob (more than once may be required)
3. Press **SET MENU** knob
4. Scroll to **Display Unit Maintenance**, press knob
5. Scroll to **Load EFIS Software**, press knob and turn to start

### Copy Terrain

This feature allows you to load terrain data, again from the USB flash drive.

#### To copy terrain data:

Press any knob

1. Press **NEXT** knob (more than once may be required)
2. Press **SET MENU** knob
3. Scroll to **Display Unit Maintenance**, press knob
4. Scroll to **Copy Terrain Data**, press knob and turn to start

To view the terrain data on the MAP page make sure **TERRAIN** is selected with the **SHOW** knob.

### Weather Status

To activate the weather module you must have XM Weather service established and the Sport set to receive incoming signals.

**To activate the weather module (assuming activation has been requested from XM):**

1. Press any button
2. Press **NEXT** knob (more than once may be required)
3. Press **SET MENU** knob
4. Scroll to **Display Unit Maintenance**, press knob
5. Scroll to **Weather Status**, change to activate menu
6. Scroll to **Activation Mode**, turn to **ON** within 4 hours of XM subscription activation

If the activation is successful the **Service Level** will show the subscribed level (or **Undefined**) and the **Signal Status** should be at least **Marginal** or better for good reception.

7. Turn **Activation Mode** to **OFF**. If left **ON** weather data will not show on **MAP** pages.

To find the unit serial number, select the **PIC Calibration Data** to find **Serial Number**.

## Chapter 9 AHRS MAINTENANCE

This page is primarily for factory use. The fields of interest to the user are:

### AHRS Software Version

Should correspond to the latest stable version as listed on the GRT website.

### Load AHRS Software

To load updated AHRS software,

1. Press any button
2. Press **NEXT** knob (more than once may be required)
3. Press **SET MENU** knob
4. Scroll to **AHRS Maintenance**, press knob
5. Scroll to **Load AHRS Software**, press knob and turn to start

### True Airspeed Corrections

The GRT Sport EFIS does not provide any means to correct the indicated airspeed, as this would result in the GRT Sport EFIS showing a different indicated airspeed than other indicators that may be installed in the airplane.

However, the GRT Sport EFIS does provide a means of correcting the true airspeed that it displays in the PFD data box, and which is used in the wind calculation. Since the wind calculation is based on the difference between GPS groundspeed, and true airspeed, it is quite sensitive to true airspeed errors, and a significant improvement in the accuracy of the winds can be achieved by performing this calibration for some airplanes. The correction is made using **True Airspeed Corrections** selection. The instructions are in the Calibration section of the GRT Sport EFIS Users Guide.

### Altimeter Calibration

This Settings page is used to recalibrate the altimeter. Instructions are in the GRT Sport EFIS User Guide.