MGL Avionics

Odyssey and Voyager
G2

Getting started guide

Table of Contents

The G2 EFIS Getting started guide

This guide is intended to assist with first configuration and use of the G2 EFIS system.

This guide is made up of two parts:

First part: How to setup the EFIS for your first use

Second part: How to use the EFIS

Introduction

This is the first time you have an MGL EFIS in your system. This guide assumes that you have installed one (or more) G2 EFIS systems in your aircraft and everything seems connected and working, such as your AHRS and engine monitoring system. You can switch your Avionics power on and the EFIS is coming to life.

What now ?

The most obvious thing you need to do is to install a few files. These files would contain things like maps, terrain data or navidata. "Navidata", BTW is a term used amongst MGL users to refer to one or more files containing aeronautical information such as waypoints, airport information, airspaces, even obstacles and much more. This is different from "maps" which provide the background to a moving map system with things like roads, towns and rivers as well as topographical information (hills, mountains etc).

At this point, we would like you to set this manual aside and look at another manual called "MGL EFIS Files". This short manual shows the various files used with the G2 EFIS and what they do.

In order to understand your EFIS, it is important that you know these files as they change over the life of your EFIS. For example, the navidata files get updated quite often to reflect changes in aeronautical information.

The "MGL EFIS Files" document also gives a nice overview on how these files are used to make your maps in the EFIS.

Good, you know your files and you have prepared your SD card (it may be an SD or SDHC type card). All the files you need are now in the root folder of your SD card.

Here is a typical listing of such a root folder on my SD card using Windows Explorer:
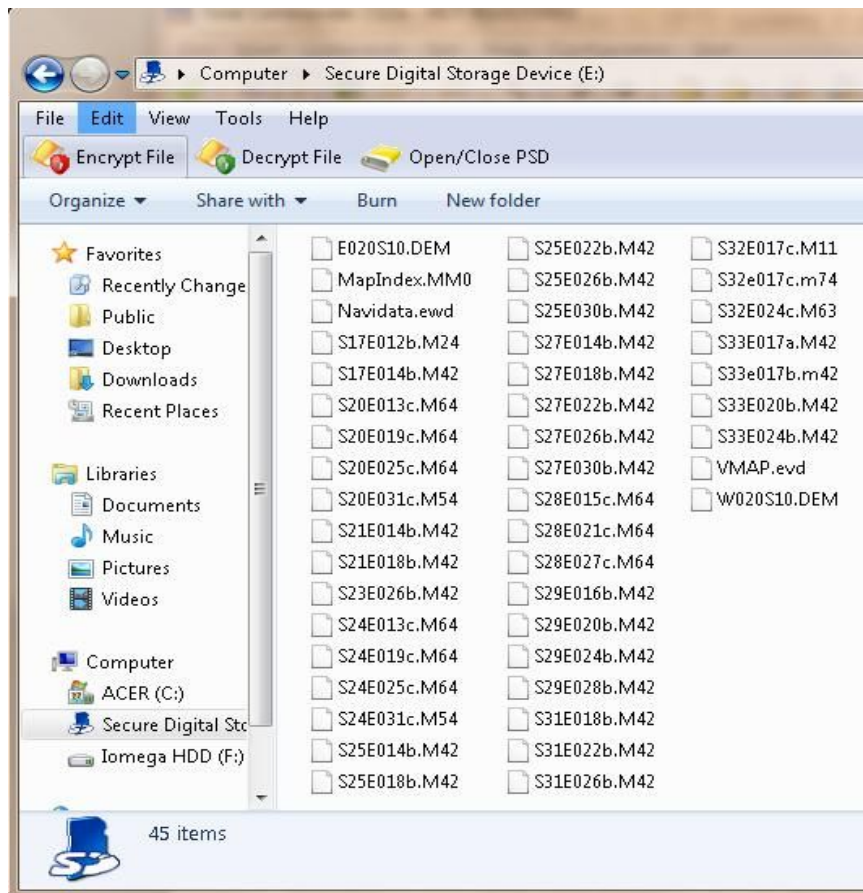
This SD card has a lot of files, but most of them are raster map files that you may not have yet. Of importance are the "DEM" files – that is the terrain elevation data, the VMAP.EVD file – that is the "vector map" containing our roads, towns etc. The Navidata.ewd file is also important. That contains all our aeronautical information.

This file is interesting and more on this later.

Note that many of your filenames may be different as they contain location specific information. The above names are used in Southern Africa.

Also note that all of the above files are in the "root folder" of the SD card. This is important. Do not copy these files into a "folder", the EFIS will not find them if you do.

Right, ready ? Let's install these files into your EFIS.

Installing your first EFIS data files

Installing these files is easy. The EFIS contains premade functions for this. These functions will do things like check available internal disk space, remove older files if required and these files also know where all the files must go.

Note that this is not the only way to copy files into the EFIS – there is a "File manager" as well that allows you more detailed access which you might use in future for more specific tasks.

However, even once you are an expert on the system, you will most likely still use the premade installation functions as they are very convenient.

Where do we find these functions ?

Easy – from the normal screen image (normal screen image means "no menu is open"), press the "Menu" button twice. You should now see "Main menu level 2":
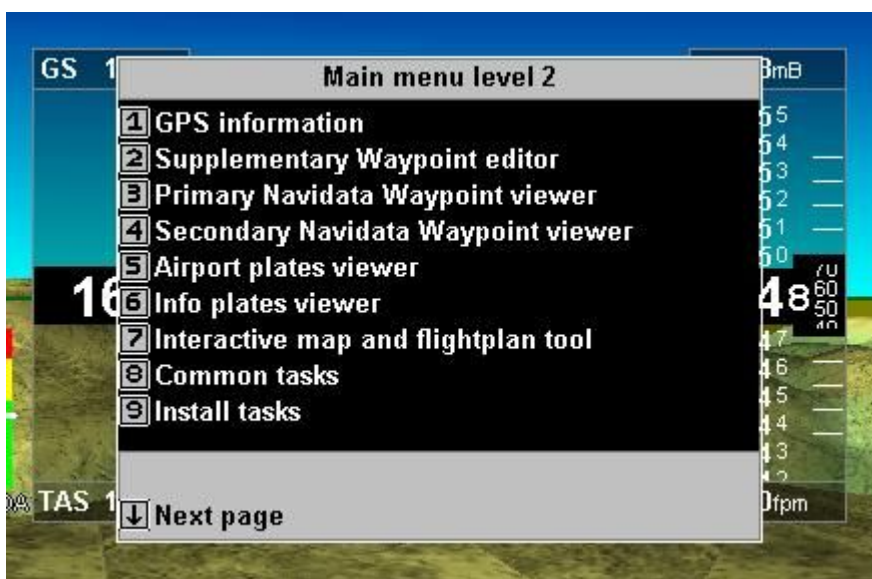
Note the "**Install tasks**" function attached to "**Button 9**" ? Let's click on Button 9.

Now we get:

This is starting to look interesting. OK, insert your SD card (if you have not done so before) and you should get a small blue message saying "MMC Mounted". If it is a red message saying "MMC Mount failed" then the EFIS cannot read your card. Try again, and if it does not work, try another SD card or format the card in your PC before copying the files again. Something like this may happen if there is something on the SD card the EFIS cannot understand or the SD card is not compatible with the card reading system of the EFIS which can happen in rare cases.

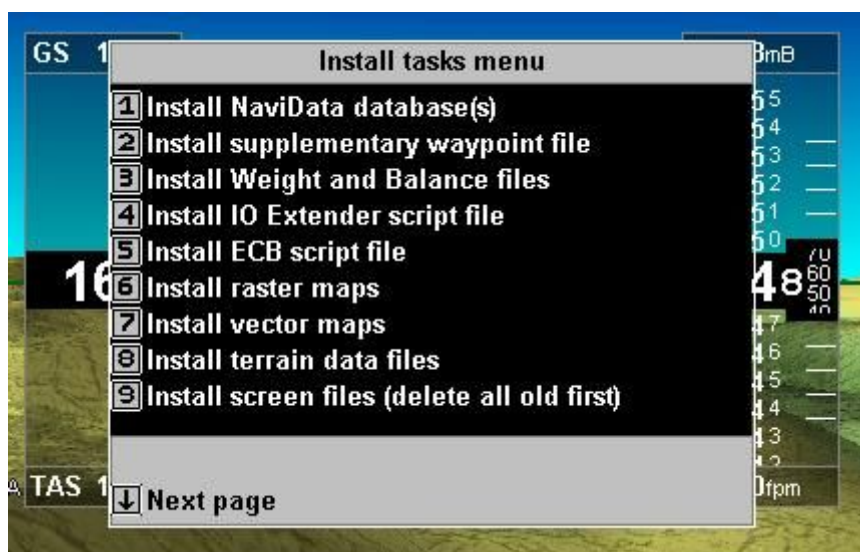If all is well, try "button 1" - "Install NaviData database(s) ".

You should now see a message showing copy progress. Wait until it is done which depends on how large your file is.

Did that work ? Great, Let's try "Vector maps", then try "Terrain data". Terrain data is very big, so that may take a short while. If you have raster maps, why not install those too ?

All Done ?

You have now completed your first installation of EFIS data files.

Let's find out if things are working.

First, the EFIS needs to know where it is so it knows how to draw the map. Is your GPS antenna connected and do you have a valid position ? Let's have a look at your screen:

Look for a 2D or 3D fix and look at the latitude longitude position on the right. Are you getting that ? If not, recheck your GPS antenna installation – make sure it if connected to the EFIS and that the GPS antenna has a clear view of the sky. Don't forget that the antenna has a "right side up" - it will not work upside down.

The number after the "2D" or "3D" shows the number of satellites being tracked. That gives you an indication of how well your GPS is performing. You should normally have at least 5 of them in view, often you may find 8 or more. The more satellites, the more accurate the position gets.

Happy so far ? Good. Let's change to a page that has a map. Close any open menu (press "Menu" until all menus are gone) and then press button 5. You should now see a page with a nice big map and smaller flight and engine instruments:
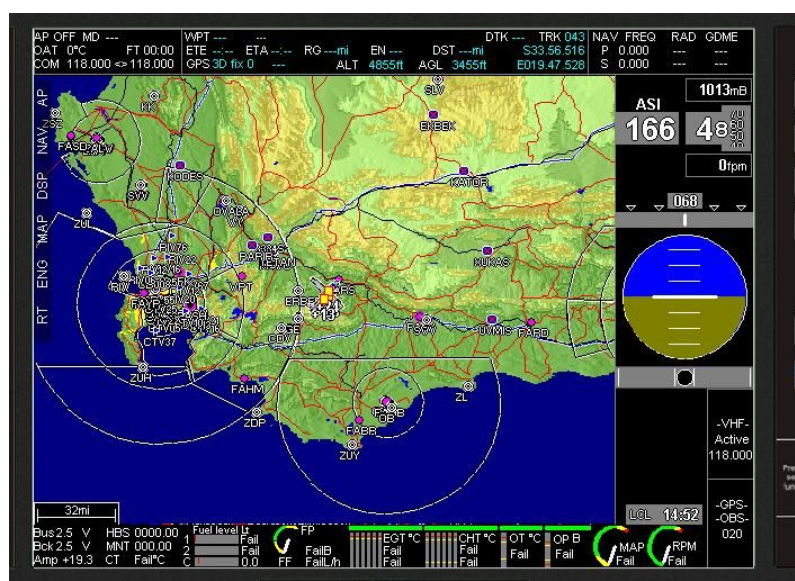
Are you getting a picture like this ? No ? OK let's have a look.

Notice the writing on the left side of the screen ?

Press the button "F4" - it has the word "MAP" next to it. This brings up a menu that is dedicated to map functions.

```
Map viewing options (Moving Map)
1 Map normal, terrain and VMap on
2 Change map to Raster
3 Map Mode: North up
  Declutter settings for zoom level: 5
4 Declutter: Airspace - All no details
5 Do not show Class E and D airspaces
6 Large airfields:                    ☑
7 Medium airfields:                   ☑
8 Small airfields:                    ☑
1 Helibases:                          ☑
2 Waterbases:                         ☑
3 Navigation:                         ☑
4 Waypoints:                          ☑
5 Intersections:                      ☑
6 Base map Borders:                   ☑
7 Base map points/places:             ☑
8 Base map urban areas:               ☑
9 Base map rivers/lakes:              ☑
1 Base map roads/rail:                ☑
2 Declutter: Map text - Allow
3 Current Vector map (VMAP) Region: A
```
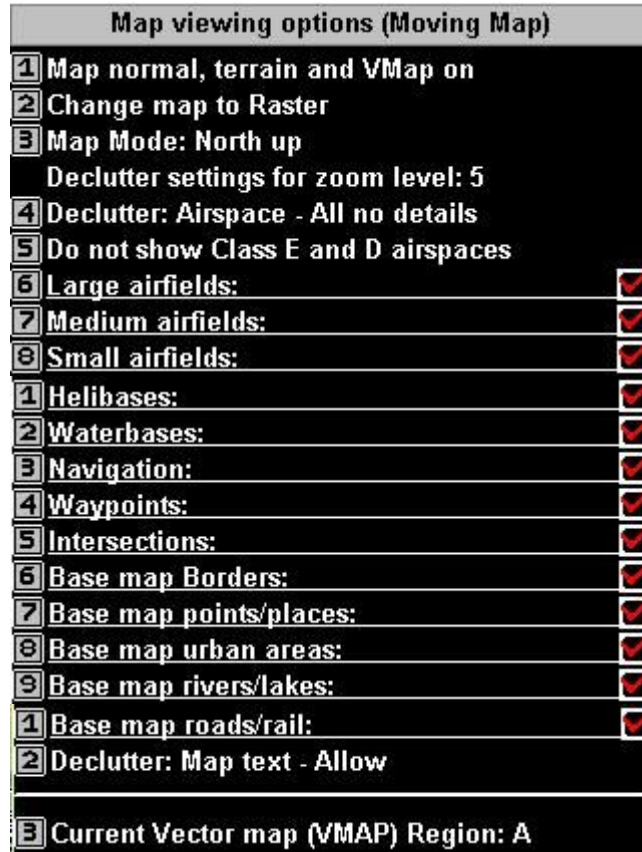
Here we are showing the entire Map menu (use the up and down arrows to navigate).

Here you can switch between vector and raster maps at any time. In case you have a vector map selected you can also decide to use the map "track up" or "north up". In case of "track up" the aircraft symbol moves to the lower half of the map and points up and the whole map rotates around the aircraft symbol depending on your track.

With vector maps you can also quickly switch between various display modes where you can switch map layers on or off. Pehaps you do not want to see roads rivers and towns, no problem – switch the map mode until you are happy.

You will also notice that you can enable or disable individual items for display and that you can choose this independent for every zoom level.

This is something you might want to do for your first setup. Zoom the map for every level and open the map menu – then select exactly what you want displayed and what you do not want displayed.

The final comment on this menu relates to the last item, the VMAP region.

Vector maps are available to cover any area of the World. It is possible for you to install more than one vector map. You might want to do this for your next adventure.

Let's say you want to fly from the U.S.A via Europe to South Africa and give us a visit.

Get the maps for U.S.A, Europe, Africa and Southern Africa and rename them so you have VMAPA.EVD, VMAPB.EVD, VMAPC.EVD and VMAPD.EVD then use the installation tasks menu to install them (You can download the free map files from MGL Avionics website)

Now you can simply switch to your desired map using the map menu at any time.
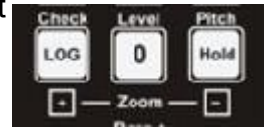
Not sure where to zoom a map ? Use the buttons marked "Zoom":

As a final exercise to do with maps, I have kept something for last. Start zooming out. Eventually you should see a black map background and the writing "World.bmp" not found.

For these large areas, the EFIS uses a premade, very large Windows bitmap image to represent the entire globe. As you guessed the file is called "World.bmp". You can download this file from the MGL Website if you do not have it.

Yes, you could install this file using the installation tasks (there is a function just for this), but that would not be fun. I want you to use the File manager.

You will find it on menu level 2, after pressing the down arrow:
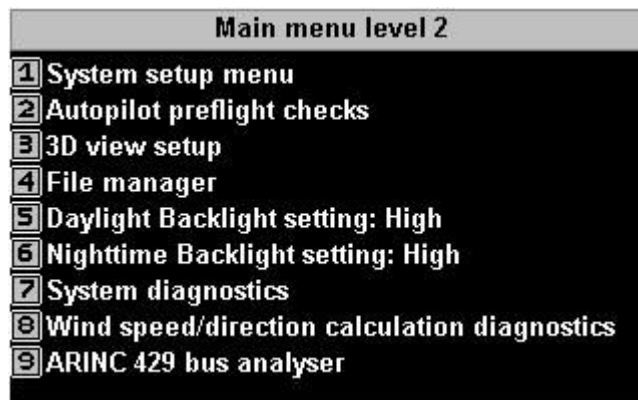
Select the button shown next to the phrase "File manager". In this case "4". Don't worry if it is a different number in your case, some menu entries may be disabled which means everything shifts up.
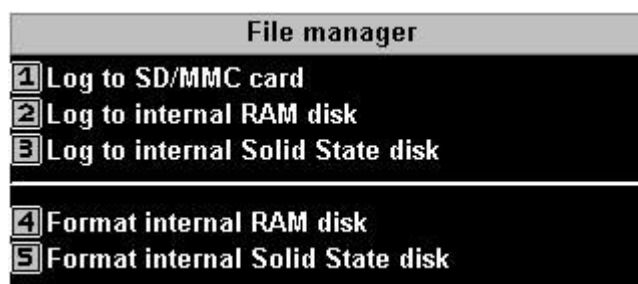
The file manager works very simple. You "log" to the "source" drive that you want to want to use.

In this case, we have copied the file "World.bmp" to the SD card, In Windows explorer it looks like:

Insert the card and after getting the blue "MMC mounted" message, let's copy that file onto the EFIS.

Where to ? We'll just do it and then I'll explain the various folders.

Press button "1" as our SD card is the source of our operation (the file copy).
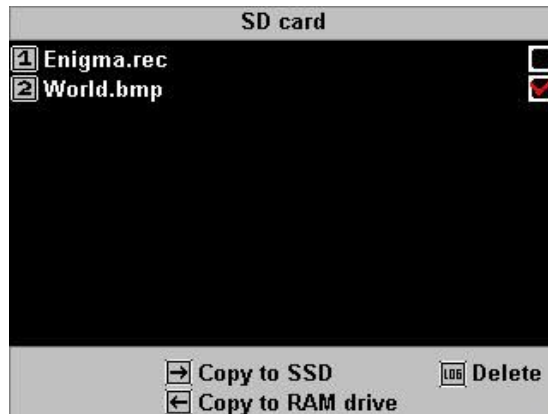
We see a list of files on the SD card. Let's press button "2" to "check" the file "World.bmp". As we do this we get a few options at the bottom. We need to copy to the "SSD" drive or "Solid State Disk" which is a nerdy term for the built in disk drive of your EFIS. "Solid state" means there are no moving parts".

After we press the "right arrow" button we get a small selection window opening:
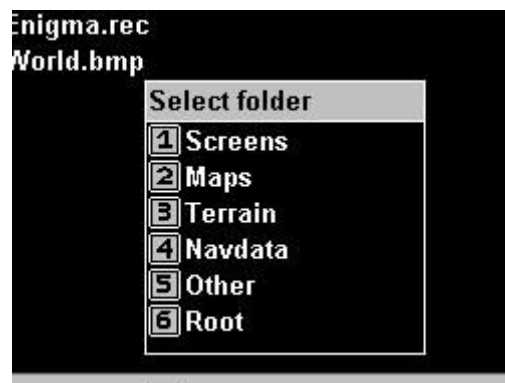
The EFIS is now asking us where to copy the file to.

The EFIS has only a few folders and all of these are shown. You might think the "World.bmp" file should be copied to the "Maps" folder, but in this case this is not done.

We need to select the "Terrain" folder. The reasoning behind this is that with vector maps the terrain data is used to create the terrain background of the map. The same is happening with the World.bmp file.

Simply press button "3" to select the Terrain folder and the file will be copied.

Your map can now zoom to continent-wide proportions.

As an exercise for yourself, use the file manager to look at the contents of the various

folders. Do you recognize those files ?

Yes, nothing has happened to them, they simply get copied by the installation tasks functions to where they belong. All very straight forward (we like to keep things as simple as we can).

Basic setups

Before you can start to fully use the EFIS, you will need to perform a few basic setups. Most of these setups relate to engine monitoring and a few relate to how the EFIS should operate or what kind of navigation functions you want to use.

These setups can be performed in no particular order as you require.

This guide concentrates only on the most important setups and configurations. Please view companion manuals for the G2 for items such as "autopilot setup".

The first and most fundamental setup normally performed involves the following items:

1) Setup of automatic flight detect and related parameters

2) Choose units of measurement for the various quantities, for example feet or meters

3) Setup basic operation

4) Setup navigation sources you want to use

After this you will want to configure your engine monitoring:

1) Choose from a built-in system that matches your engine as close as possible

2) Selection of sensor/sender types

3) Configure display ranges for indicators, for example range of oil temperature display

Once you have this you can move onto setting up how you would like your alarms to be enabled or disabled and select various external equipment you might have installed.

Regardless of what you want to setup, you will find all items that need permanent configuration and setup in the "System setup menu".

There are two ways to activate this menu. Either press "SHIFT" and then "Menu" (notice the word "Setup" over the "Menu" button ?) or access the "System setup menu" menu via "Menu level 2".
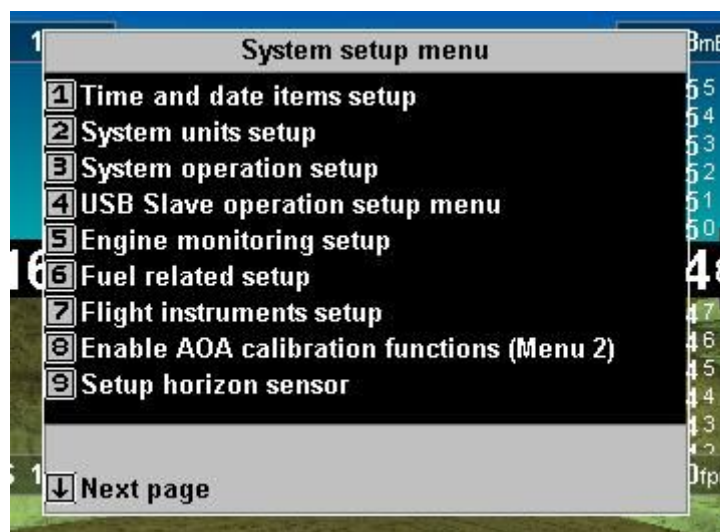
This is the largest of the menu systems and you will be spending some time in this menu. Nearly everything your EFIS can do is subject to you telling it how to do it.

Many items will be bewildering to you at first. Do not let this intimidate you. Many items you might never need to configure (perhaps your EFIS is NOT installed on a helicopter).

Many items are fairly obvious, consider the first one "Time and date items setup".

Here you will find functions to set your clock and even current hobbs meter reading.

Basic setups: general setups

The first configuration you would want to do is to set system units:

```
Units setup menu
1 Altitude units: Feet
2 VSI units: Feet per minute
3 Speed units: Miles
4 Temperature units: Celsius
5 Oil pressure units: Bar
6 Manifold pressure units: Millibars
7 Fuel pressure units: Bar
8 Liquid quantity units: Liters
9 Atmospheric pressure units: Millibars
```

This menu is easy to do, select all items to suit your personal preference.

Next, have a look at the "Operations setup menu":

```
Operations setup menu
1 Automatic flight detect                    ☑
2 Flight detect minimum RPM: 5500            ☑
3 Flight detect minimum ASI: 30 mph
4 Flight detect on Rotor RPM                 ☐
5 Automatic fuel averaging reset             ☐
6 Hobbs minimum RPM: 2000
7 Copilot mode below airspeed: 55            ☐
8 Audio flight level readout                 ☑
9 Voice alarm interval: 20 seconds
```

```
1 Startup page: 1
2 Show maintenance on startup                ☐
3 Show wind direction relative to heading
4 Flightlog/Aircraft name: ALTLOG
5 Aircraft registration:
6 Allow external OBS setting                 ☑
7 Menu background is transparent             ☐
8 Use alarm output as alarm output
9 Demo mode                                  ☐
```

Interesting items in this menu are "automatic flight detect" (recommended to be switched on) and the limits for this. Select a suitable engine RPM to trigger a possible take-off and a

minimum airspeed below which you are definitely not flying.

Copilot airspeed readout and flight level readout are also quite interesting if your EFIS is connected to your aircraft's intercom system. Airspeed readout can be set to activate when you are flying below a set airspeed. This can be handy for landings if "the office gets busy".

The "Startup page" might also be of interest – select which page should be active when your EFIS starts.

"Demo mode" is only used for static demos. Here the AHRS and other items are simulated for displays at dealers or similar needs. Make sure this is not selected in the real aircraft (unless you want to demonstrate your aircraft at an airshow when it is standing on the ground).

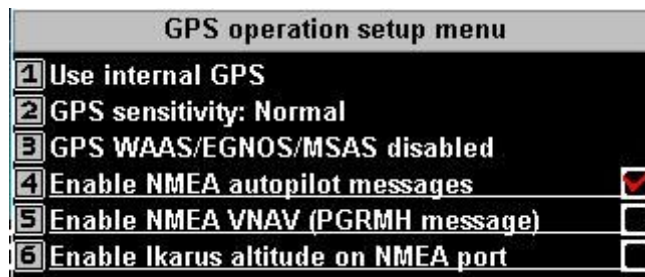Have a look at the GPS setup:

If you have an external device connected that would like to use your built in GPS (such as some autopilots) make sure you have the NMEA messages enabled.

Ikarus altitude message can also be transmitted on the same port. This is used with some transponders as altitude encoder.

GPS sensitivity is usually set to "automatic" or "normal". GPS systems are sensitive to interference from other sources. A high sensitivity may result in excellent satellite signal acquisition but bad tracking if you do not have a suitable installation.

If you find you need a "low" setting to get the GPS to lock, then you have a bad installation. Rather move the GPS antenna to a more suitable location or remove the interfering item.

GPS WAAS/EGNOS/MSAS disabled can be used in some locations to improve the system. It is recommended that this is disabled for Europe until the European satellite navigation constellation is operational.

Finally, have a look at navigation sources (Setup HSI/GSI indicators and GLS/GVOR setup):


This menu is used to enable the navigation sources you want to use. The above is a

typical selection if you have a Garmin SL30 navigation radio connected to a serial port of your system.

You will probably want the last three items checked.

GLS refers to a GPS based simulation of ILS with glide slope landing systems while GVOR refers to a GPS simulation of VOR navigation.

Any item selected here is available as navigation source for your HSI/GSI which you can select using the NAV menu (left buttons) and with that can be used as navigation source for the built in autopilot or a connected ARINC autopilot system.
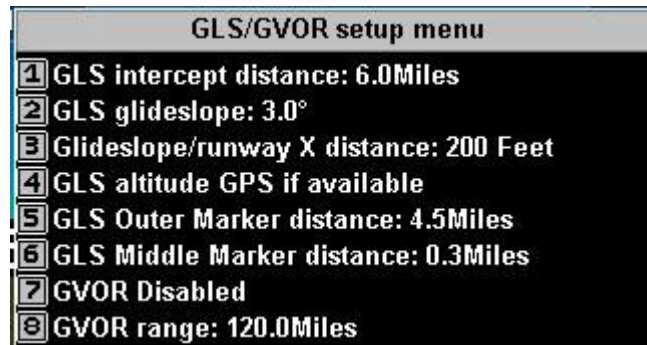
Use the "GLS/GVOR" setup menu to select specifics on how you want your GLS or GVOR simulation to work.

"Glideslope/runway X distance" is interesting. Navigation data sources usualy specify the locations of the runway thresholds. You would want the approach to intercept the runway a little bit deeper into the runway. Here you can select how much to add.

GLS Intercept distance refers to a virtual waypoint aligned with the center line of the runway. This is used if you select a GLS approach that goes "via" this intercept point.

Basic setups: Engine setups

Engine setups are effectively split into three related sections:

Engine setups – a group of menus to configure senders and indicators

Fuel related setup – a group of menues to configure everything to do with fuel tanksm level and flow senders

Select a built in default system – This function you will likely use only once. Here you select from one of the built in engine profiles and related engine setups and screen files (screen files contain descriptors of anything that goes onto a screen).

Built in default systems

The EFIS has a number of built in default systems. Effectively these are selections of similar screens that differ mainly around the engine monitoring part. Typical engine choices are offered.

Note: Your system may have been setup by e third party with custom screens and engine settings. In this case there is no need for you to configure anything and selecting a default system is not recommended as this might overwrite the work your third party has done for you. Please find out first before you select a default system.

We start with the "Select a built in default system".

Built in setup defaults selection

1. Fixed wing, Rotax 912, 4 EGT
2. Fixed wing, 4 cylinder aircooled, MAP
3. Fixed wing, 6 cylinder aircooled, MAP
4. Fixed wing, 4 cylinder aircooled, no MAP
5. Fixed wing, 6 cylinder aircooled, no MAP
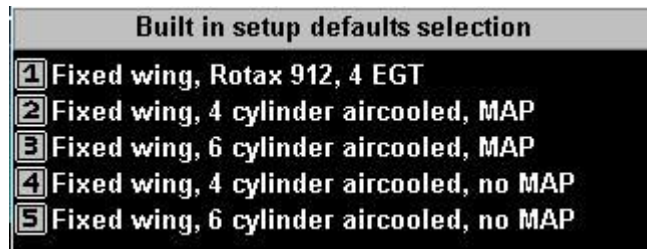
Select your desired engine. Here we select "Fixed wing, 4 cylinder aircooled, MAP". This will setup a standard system around this engine using one RDAC (engine monitor system) connected to the EFIS input "RDAC 1".

Selection details confirmation

Fixed wing standard screens,
Standard aircooled 4 cyclinder 4 stroke
using OP, OT, 4xEGT, 4xCHT, MAP, RPM, CT
2 tanks, FF with tank, FP
ESL with standard limits
Note: Custom screen files in Screens folder
may override default screens.

Please confirm details of selection

1. Accept this selection
2. Cancel selection
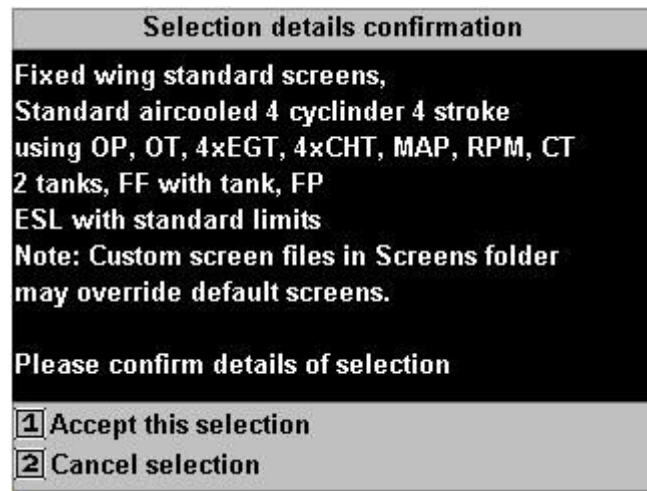
Now we are presented with a bit more information about this configuration. Are we happy ? Yes, let's accept...

You will get a warning screen (last chance to back out) and then you will be asked if you would like to apply default settings for this choice. This applies to things like temperature or pressure limits and other engine monitoring related items. You can choose not to perform these changes and do them yourself later item by item.

Engine and fuel setups

Now we are ready to have a look at the various engine and fuel related setups. We will look at one example engine setup and one example fuel related setup. You will be able to take it from there for the rest.

Lets open the "Engine monitoring setup":

Engine monitoring setup menu

1. System has one RDAC unit connected
2. RPM setup menu
3. Engine HP calculation setup
4. EGT setup menu
5. CHT setup menu
6. OIL temperature setup menu
7. OIL pressure setup menu
8. Coolant temperature setup menu
9. Manifold pressure setup menu
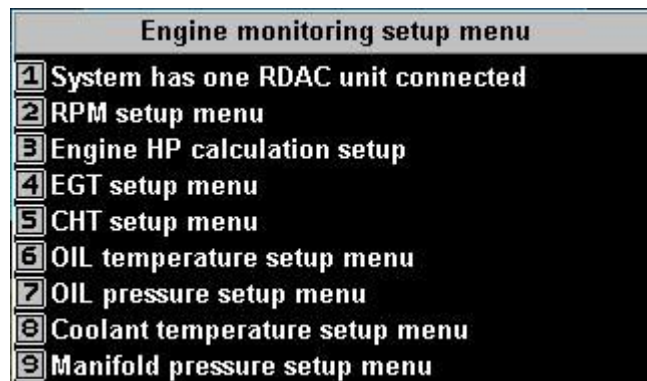
Let's look at the "EGT setup" to configure our EGT sensors.

EGT setup menu

1. Number of EGT channels: 6
2. Highest temperature for display: 900
3. Alarm temperature: 850 ☑
4. Caution temperature: 830 ☑
5. Caution low temperature: 400 ☐
6. Alarm low temperature: 400 ☐
7. Lowest temperature for display: 400
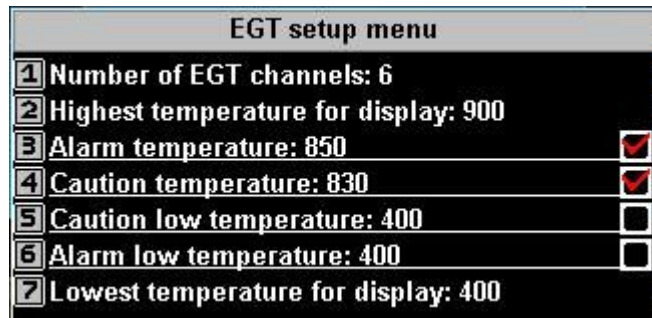
You will find many setups in the system that look similar to this. You will find all items that can result in a graphical display (such as a bargraph) to have the same 6 point setup from lowest value to highest value for display and settings for alarm and caution fields (usualy red and yellow areas of the display).

While we are with the EGT setup a small note as sometimes this is not configured right:

The number of channels for EGT and CHT is used by the system to allocate on which inputs on an RDAC unit these sensors are located.

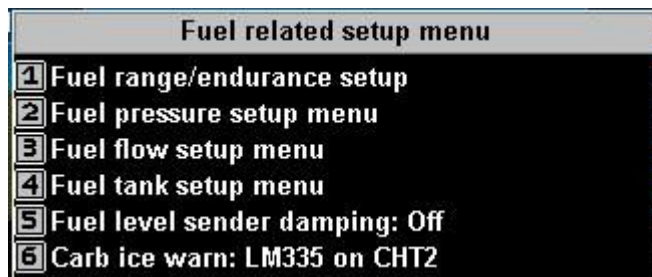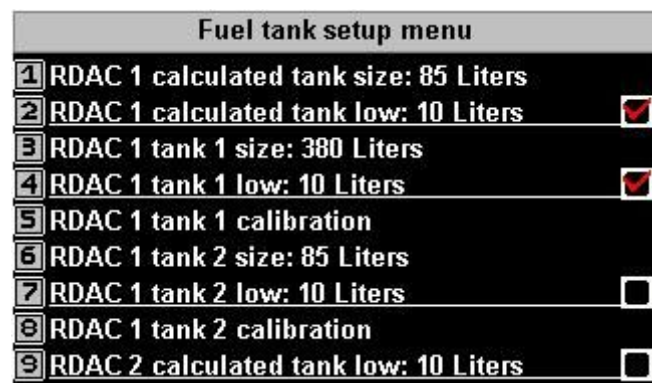The rule is that EGT sensors (if used) start on channel TC-1 and CHT follow on the first available channel after the last EGT sensor. For example, if you have 2 channels of EGT and 4 channels of CHT then the EGT probes are located on TC-1 and TC-2 while the CHT sensors will be on TC-3,4,5 and TC-6.

Note that this is completely independent on the screen design for indicators. The indicators can be allocated to fixed channels and usually if screens are designed to differ from the defaults it is important to ensure that screen indicators and EGT/CHT setups are both configured to operate on the correct channels.

Let us have a brief look at the fuel related setup menu

Fuel related setup menu

1. Fuel range/endurance setup
2. Fuel pressure setup menu
3. Fuel flow setup menu
4. Fuel tank setup menu
5. Fuel level sender damping: Off
6. Carb ice warn: LM335 on CHT2

Let's go to the Fuel tank setup:

Fuel tank setup menu

1. RDAC 1 calculated tank size: 85 Liters
2. RDAC 1 calculated tank low: 10 Liters ☑
3. RDAC 1 tank 1 size: 380 Liters
4. RDAC 1 tank 1 low: 10 Liters ☑
5. RDAC 1 tank 1 calibration
6. RDAC 1 tank 2 size: 85 Liters
7. RDAC 1 tank 2 low: 10 Liters ☐
8. RDAC 1 tank 2 calibration
9. RDAC 2 calculated tank low: 10 Liters ☐

Each RDAC can monitor three tanks and one of these tanks is a calculated tank. This means the tank does not have a physical fuel level sender but has a fuel flow sender. The

pilot would enter the amount of fuel loaded and as fuel gets used this is measured by the flow sender and subtracted from the tank quantity.

The setups here set the size of the tanks and each has a alarm limit than can be enabled.

The physical tanks each have a calibration menu that is used for multi-point fuel tank calibration. Let's have a quick look:
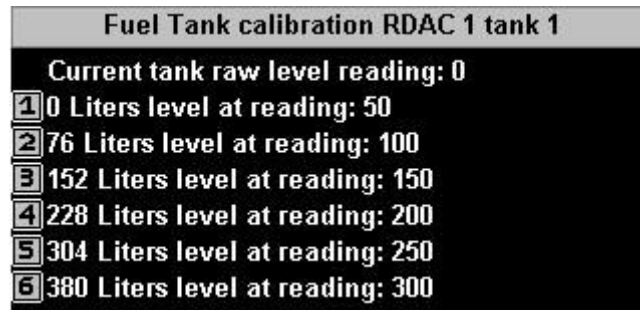
Here is how this works. The top line shows the actual level sender reading at any time.

Using the numeric buttons we can copy this reading into any of the slots. We would ensure that the fuel in the tank is as close as possible to the required value for the slot and then copy the resultant level sender reading into the slot.

We can also enter the value manually if we need to change a value.

Additional setups

We have looked at a few setups to get a feel for how this works. Have a look at every setup menu to see if there is anything there that you would like to change for your particular aircraft or mission.

Most items that you can change are quite self explanatory and you should have little trouble finding the correct settings as you need.

You will find, once you have your system setup the way you like it, you will seldom come back to the "system setup menu".

Using the EFIS

This second part of the G2 getting started guide discusses the various screens of a factory default EFIS system and how to perform common tasks.

The Screens

Please take note that it is possible to customize the screens to a very large extent. If this has been done to your EFIS systems your screens will look different. This may involve minor differences or in extreme cases the screens may have been redesigned from scratch and they could be very different.

This document assumes standard screens.

The G2 EFIS system provides 9 screens. Each of these screens has several additional "page-able" sections.

Screens are switched by simply pressing buttons 1 to 9 when no active menu is showing.

Page-able sections, referred in MGL-speak as "Info screens" are paged using the left and right arrow keys or using SHIFT plus the left and right arrow keys if a GPS flightplan is active (in this case just pressing left/right arrow buttons will move the currently active flight plan leg).

Common to all screens is a top strip containing navigation information with information on GVOR on right and AP status and other information on left.

Each screen has several info pages arranged to overlay the screen. The info screens are used as follows:

Each of the 4 video inputs has one info screen so you can easily switch between the video inputs. The size of the video screen varies for each screen so you can choose small or larger presentations.

A further info screen shows a look-ahead terrain profile that you can use to judge ascents and descents into terrain obstacles.

A last info screen contains text information such as current date, glide ratio and a stopwatch (you operate the stopwatch from menu level 1).

The keypads and rotary controls

MGL EFIS systems distinguish themselves but having an unusual amount of "buttons". The reason for this becomes apparent once you realize the large amount of functionality the system offers. It would just be impossible to operate a system of this nature with just a few "soft keys".

The designers of your system spend a lot of effort in grouping functionality into various setups in a logical fashion to make it easy to access everything you need rapidly. This is most important for items you may access in flight.

The following text and images give an overview on how the keypads and Rotary controls are arranged and how to use them to operate your EFIS.

The left keypad

The left keypad is used as fast access selection to commonly used in-flight functions that require a menu-like access.

The functions available will vary depending on your setup. For example we have an "AP" (Autopilot) button only if the internal autopilot has been enabled. The "PLT" button will only be available if the currently active screen you are looking at has a "Plates viewer item".

Once a menu is active, the buttons F1 to F7 become numeric selections or numbers from 1 to 7. Often, this allows you to speed up selections as you do not have to move your finger to the right keypad in order to push a numeric button.

The [ACK] button is special.

This button is used to "acknowledge" and alarm. This will suppress any audio or screen alarm messages for any currently active alarms until either an alarm re-occurs or a new alarm becomes active.

You can also use this button to "un-acknowledge" alarms that have been acknowledged. Simply press it and any alarms that are active (but have been previously acknowledged) will be re-activated.

Finally, the [ACK] button can be used to close any of the menus you may have opened using the left buttons. Of course you can also use the "Menu" button on the right keypad to close any open menu.

AP – Autopilot control menu
NAV – Navigation functions (other than simple "goto")
DSP – Options for the display. Here you can switch the AHRS background to an attached FLIR camera for example.
MAP – Options for the moving map display
ENG – Engine or related functions such as graphic leaning mode display or electronic circuit breakers.
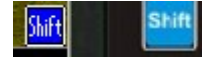**RT** – Functions related to "routes" or "flightplans"
PLT – Functions related to "plates viewing".

The right keypad

The right keypad is used for most of the interaction you will be performing.

When no current menu is active, the numeric keypad can be used with SHIFT active or inactive. If you press the blue [SHIFT] button a small icon appears on the screen next to the button:

When SHIFT is active, you access functions listed above the buttons:

Goto – Quick "direct to" navigation using waypoints and the GPS.
Radio – Functions related to attached radios such as setting of frequencies.
NAV – Select navigation setup menu OR if you have GVOR enabled, selection of VOR stations for GVOR use (like tuning a nav radio to a station, just simulated with a GPS).
Route – Route and Flightplan functions (same as you can access using the left keypad).
Map – Select options for map display. (Same as you can do with the left keypad).
IMS – Information system. Here you will find several "information" pages and functions/
IMU – Quick access to the AHRS setup page
MAG – Quick access to the magnetic compass setup page.
GPS – Quick access to the GPS status page. Here you can view things like satellite positions and signals.
Check – Access the checklists
Level – If your AHRS gets upset (perhaps exceeding rate measurement limits etc) this can be used as a "quick erect" function.
Pitch – Quick AHRS Pitch level function to cater for power/speed changes.

Baro+ and **Baro-** Use this to adjust local pressure for your altimeter (note: SHIFT is not required for this).
Page+ and **Page-** Use this to change "Info" pages (each of your screens has several "info" pages, most of which contain video displays for your external video sources.
If you have an active flightplan, the left and right arrow buttons are used to move forwards and backwards through the flightplan. In this case you need to use the [SHIFT] button to change info pages.

Screen 1 – Large AHRS with synthetic vision and small engine monitor strip below.

Labels (callouts) pointing to screen elements:

- AP status and mode OAT
- Flight time
- COM Frequencie
- Current Waypoint short And long names
- Current GPS Navigation Formation (see below)
- Primary and Secondary GVOR information
- GVOR or VOR radials
- GDME
- Turnrate
- AHRS
- Baro adjust
- Wind Speed Dir
- HITS
- Velocity vector
- GSI
- ASI
- G-force
- Angle of attack
- HSI source
- HSI
- Slip
- Altimeter
- VSI
- Voltages And currents
- Hobbs/maint Timers Carb temp
- Fuel indicators
- Fuel Pressure And flow
- EGT temps
- CHT temps
- Oil temp
- Oil pressure
- Manifold pressure
- RPM
- Functions Allocated To Rotary controls

Screen readouts:

AP OFF M ---
OAT 0°C   FT 00:00
COM 118.000 <> 118.000

WPT FASH STELLENBOSCH   DTK 221 TRK 203
ETE 01:22 ETA 20:14 RG 2419mi EN 41:00 DST 81.2mi S33.04.090
GPS 3D fix 0   ---   ALT 4855ft AGL 2670ft E019.44.666

NAV FREQ RAD GDME
P 0.000 --- ---
S 0.000 --- ---

43mph
227 Mag 231
GS 59mph
130 120 110
95
80 70 60
TAS 102mph
0.0
G/F AOA
GPSNav

1013mB
55 54 53 52 51 50
48 70 60 50 40
47 46 45 44 43 42
0fpm

S 21 24 W
15 2.0 30
12 33
E 06 03 N
OBS 000

LCL 18:52

-VHF- Active 118.000
-GPS- -OBS- 245

Bus 2.5 V HBS 0000.00 Fuel level Lt
Bck 2.5 V MNT 000.00   1 10
Amp +19.3 CT -10°C   2 10
                       C 41.0

FP 0.0B
FF 1.00L/h

EGT °C 737 4-737
CHT °C 206 4-206
OT °C 85
OP B 3.3
MAP 50
RPM 200

Items used in the GPS information bar:

DTK: GPS Track corrected for magnetic variation

TRK: GPS true track

Latitude

Longitude

ETE: Estimated time enroute

ETA: Estimated time of arrival

RG: Fuel range based on ground speed, flow and fuel available.

EN: Endurance based on flow and fuel available.

DST: Distance to go to next waypoint

GPS: Status of GPS receiver

ALT: Altitude from GPS (if 3D fix available)

AGL: Altitude above ground, based on altimeter and terrain data at current position

Using the Rotary controls

You can assign each rotary control to a selection of available functions. To do this, "double click" the rotary control (push it like a button twice relatively fast). The background of the rotary control function indicator will turn white and in this state you can rotate the knob to select from the available functions. When done, push the control once.

Many functions make use of two levels of adjustment. For example, with the knob pushed down the number will move in steps of 10 when you rotate the knob. If you turn the knob not pushed, the number changes in increments of 1.

For frequencies, push to adjust the KHZ, not pushed adjusts MHZ. In addition a push sends the selected frequency to an attached radio (if a compatible radio is connected).

***Screen 2 – Synthetic vision AHRS on left, moving map on right, small engine
    monitor strip below.***

This screen is similar in overall arrangement to screen one but shares a moving map image with the synthetic video AHRS.

In this case the map is showing a vector map made up from terrain data for the topographical background, vector map data such as roads and rivers from the VMAP.EVD file and airspace data and waypoints from the Navidata.ewd file.

The vector map is configured "North up". We could change this to "Track up" or select from various map modes by selecting the map menu using the F4 button on the left. We could also start the same map menu by selecting SHIFT followed by the "5" button which has the word "map" written over it.

We can change the map to raster (if you have a raster map product installed), we can zoom in and out to continent wide proportions (if you have the "World.BMP" file installed) using the "Log" and "Hold" buttons (note the word "Zoom" and the [+] and [-] legend).

Screen 3 – As screen 1 but with a large engine monitor strip.

Screen 4 – As screen 2 but with a large engine monitor strip.

Screen 5 – Large moving map, abbreviated but complete primary flight instruments on right, small engine monitor strip below.

This is screen 5 with the large moving map. In this case we used the map menu (F4 button on the left) to switch both terrain background as well as VMAP items off (roads, towns etc).

We also switched the map to "Track up". Note that the aircraft symbol moved lower and now points up. The map rotates around the aircraft depending on the current ground track. This mode of map operation lends itself to navigation tasks by removing "clutter" not related to aeronautical navigation.


Screens 6,7 and 8

These screens are repeats of screens 1, 2 and 5 but without the engine monitor. These screens are suitable for applications where you have no engine monitoring system connected or the task of engine monitoring is dedicated to a second EFIS.

In these cases, consider selecting one of these as the default startup screen. You do this in the "Operations setup menu" and this is found, like most setups, in the "System setup menu".

Screen 9 – Plates viewer tool.

Similar in looks to screen 5 but instead of map uses plates viewer. This screen when active uses button F7 (on left) as plates selection tool. Plate files compiled with the MGL Plates compiler are placed and used directly from an SD card.
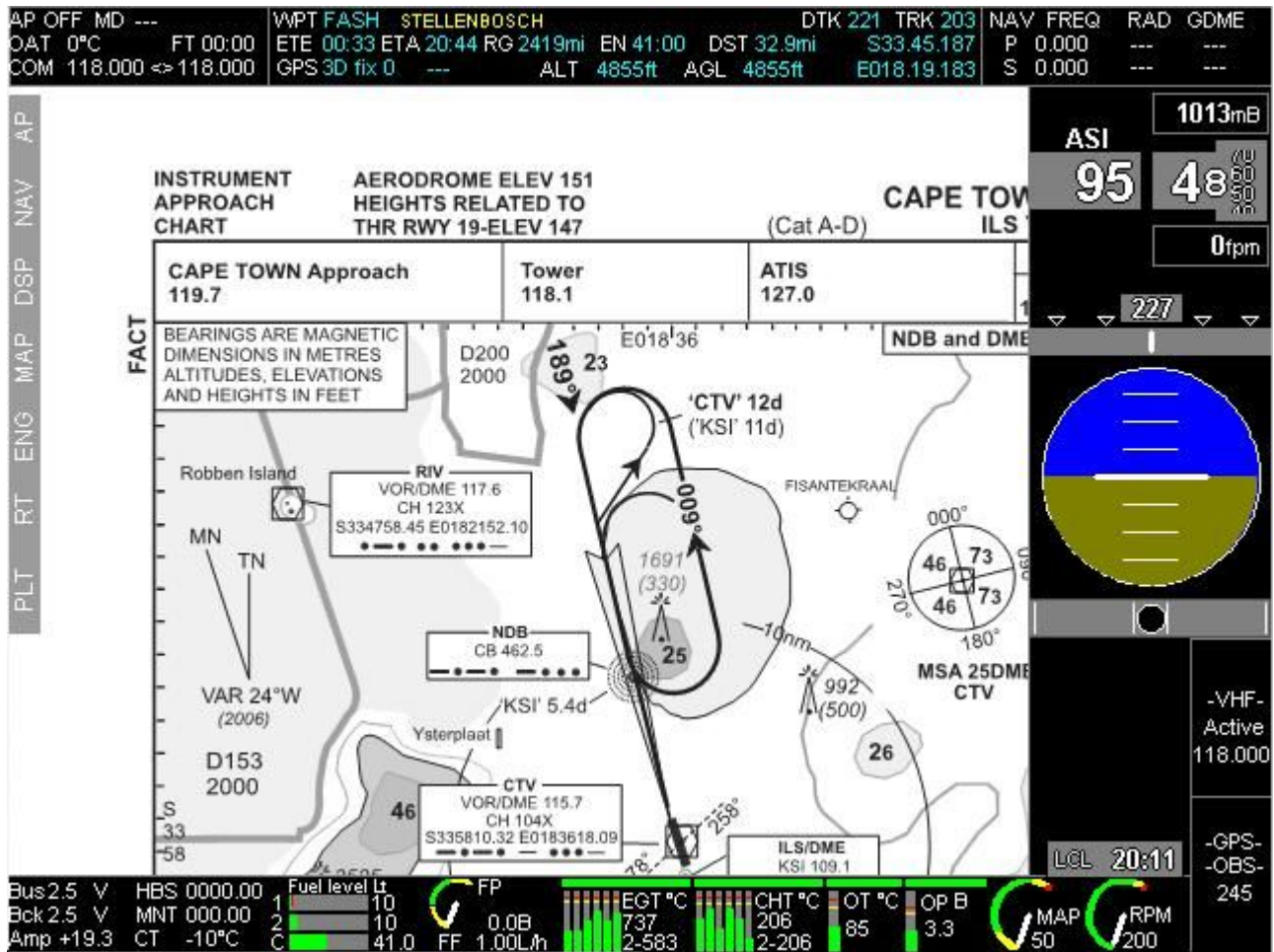
Operating the plates system is quite simple:

Plates are grouped by airport and the plates compiler produces a single file containing all the plates for a single airport.

Using the F7 key we are presented with:

Choosing "Select from Airport plates" shows all the airport plate files on the SD card, choose the airport, then you get presented with a list of plates for that airport. Simply choose the plate you would like to view.

If the plate is geo-referenced, the aircraft symbol will be drawn on the plate in the correct heading and location.

The most recently used plates can be quickly accessed using the "Select from recent plates" function. You can also create a more permanent "favourite plates" selection using

the plates viewer from "menu level 2".

Should you want to create your own plates, it's quite simple. Use the free "plate compiler" that is available for your EFIS from www.MGLAvionics.co.za.

This handy tool can be used to import "pdf files" and group them into plate files for your EFIS. You can import not just "pdf files" but also image files.

You may have noticed "info plates". This is a special category of plates where you would place information not related to airports, perhaps notes or general procedures or anything you like.

Most aviation authorities that make plates available provide them in the popular "pdf" format for use with Adobe's PDF viewer.

Basic navigation with the G2

The G2 EFIS can provide many navigation sources. These are individually enabled in the system setup.

GPS Navigation sources

GPS navigation to a fix:

This is the most common type of navigation used on a G2 system. It requires an internal or external GPS system that is receiving a valid fix.

You navigate to a fix such as a waypoint using navigation aids such as HITS (Highway in the sky) or a HSI (Horizontal situation indicator) with a CDI (Course deviation indicator).

This type of navigation is used with GPS "direct to" as well as route (Flightplan) navigation where you would follow a string of waypoints.

Waypoints come in a large variety of types. From simple waypoints that are just some particular undefined location to airports and navigation aids such as VOR and NDB stations.

In all cases this type of navigation involves a destination point that you want to get to and a track that you need to follow to get there.

GVOR navigation

VOR works on the principle of identifying a course to or from a VOR station. This is called a "radial". You can follow a radial to or from a VOR station or use the radial to intercept other navigation aids such as another VOR station.

GVOR is a GPS based simulation of a VOR system. This does not require an existing navigation receiver connected to your EFIS but rather uses knowledge of the actual locations of the real VOR stations to simulate these.

GVOR navigation on the G2 system emulates real VOR navigation very closely.

GLS approaches

GLS approaches are similar to ILS approaches except that you use a GPS as navigation source. This kind of approach uses knowledge of a runways exact location, orientation and elevation to simulate a localizer approach with a glide slope.

External navigation sources

You can connect several types of external navigation sources. The simplest of these is an analog navigation source. These types of sources would normally provide a +/-150mV signal to drive a needle in a navigation instrument. The EFIS can use these signals to display a CDI and a glide slope. This means it can be used to connect to an external VOR, ILS or glide slope receiver.

Three ARINC 429 inputs are available and a large variety of navigation sources can be connected here. One popular navigation source would be a Garmin 430W which will provide a certified GPS, VOR, ILS and glide slope.

If you are interested in a G430W, please view the corresponding manual on how to connect and configure both the G430W as well as the EFIS. You can find this manual on the MGL Avionics website www.MGLAvionics.co.za

Using the GPS to navigate to a waypoint

This type of navigation is perhaps the most common and also the most easy to use.

Your system can have waypoint information available from three active sources at the same time. These sources are:

The primary navidata file

This is your main aeronautical navigation database. It contains just about everything you need: Waypoints, navaids, airports, airspace data, obstacle data and more.

You can have up to 26 of these files installed in your system but only one is active at any one time. You select the currently active navidata file using the "NAV" button on the left keypad.

Most users will only be using one primary navidata file.

The secondary navidata file

You can install a secondary navidata file that will be active at the same time as the primary navidata file. This is useful if you are using a subscription product as your primary navigation database (for example Jeppesen navdata). You might want to maintain your own navidata database which indeed, you can do using a free Windows application called "MGL Central", a nifty flight planning and aviation database tool.

This way you can use both a subscription product and your private database all at the same time.

The G2 EFIS only uses waypoints (including navaids) and airport information from a secondary file. Airspaces and other items are always used from the primary database.

The supplementary waypoint file

This file is always present on your EFIS even if it is empty.

Using the "Supplementary waypoint editor" on your EFIS you can create any type of waypoint "on the fly" right inside your EFIS.

Please view the document "MGL EFIS Files" from the MGL Avionics website at www.MGLAvionics.co.za for more detailed information on the various navidata files and region codes.

Selecting a waypoint for "direct to" navigation using the GPS.

Press the [SHIFT] button and then press the [1] button (notice the word "goto" above the button). You will see a window like the following:

Use the "LOG" key to activate a filter that will allow you to select the type of waypoints to want to consider. You can select items like "waypoints", "airports", "navaids" and so on.

All items will appear in order of distance from your current position and you can page right through all available waypoints – but if you need to find a waypoint that is far away, it is much easier to use the "search" function (press [ENTER] to open the search function. You can search short or long waypoint names.

In the search function you enter characters much like you do using a mobile phone using the numeric keypad.

Let's have a look at the information shown:

Each waypoint starts with a single letter: W, N, or S. This is just for your information and tells you where this waypoint comes from: Supplementary waypoint file, primary navidata or secondary navidata.

This is followed by the waypoints short identifier. This can be up to 6 characters long. This is then followed by the long, descriptive file name and finally the distance from your current position to that waypoint.

Want to go somewhere ? Just select the waypoint using the numeric keypad.

For this example we chose to fly to "Battle Mountain". Now the GPS information bar at the top of the display shows some interesting information:

Also, in the following picture we captured no less than three navigation aids telling us what to do:
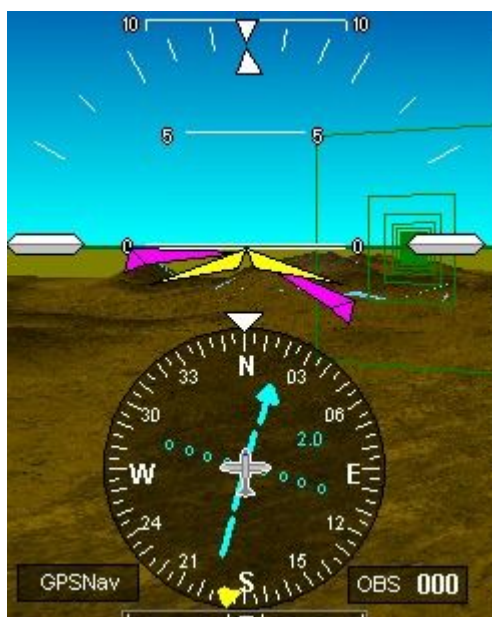
The purple wings are banking slightly to the right. This is the "Flight Director" often referred to as "FD". That means we are not pointing in quite the right direction.

The HSI tells us the same story – we need to turn right a bit but we are pretty much on track.

This agrees with the alignment of the green boxes, the "Highway in the sky".

As a side note, if those boxes would show in red, it means we are going the wrong way...

Need to go to a new waypoint, just select it. Want to "deselect a waypoint" ? If a waypoint is active you will find a function on "Menu level 1" to deactivate it.

Route/Flightplan navigation

Route and flightplan navigation and creating flightplans on the EFIS is covered in a separate manual.

Have a look at the "Flightplan" menu as well as the "Interactive map and flightplan tool".

Finally...

Of course, this guide has only touched on the more important parts of the G2 EFIS system. There is much more.

In an effort to make the manual more handy, the total documentation is split into smaller units with the aim of not making any of these longer than 30-50 pages maximum.

These documents are "live". They get updated and new documents will appear. Some are written by MGL Avionics and some are even written by users of the systems.

Please have a look at the EFIS manuals section at www.MGLAvionics.co.za for more documents as they become available. These documents typically concentrate on a subject or group of related subjects.