

# TracMap



# Flight Pro

Operation Manual

## **Software License Agreement**

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# 1.0 Overview

## 1.1 Flight Pro components

TracMap Flight Pro is a simple GPS guidance system for agricultural aircraft. The system provides proof of placement in the form of logged data that can be exported.

The system has three parts:

### GPS receiver

Provides a GPS signal to the Flight Pro head unit



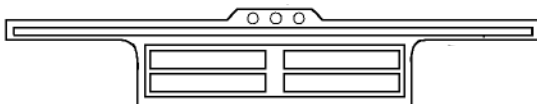
### Flight Pro head unit

Records data and provides detailed GPS placement information



### Lightbar

Provides visual guidance for your aircraft



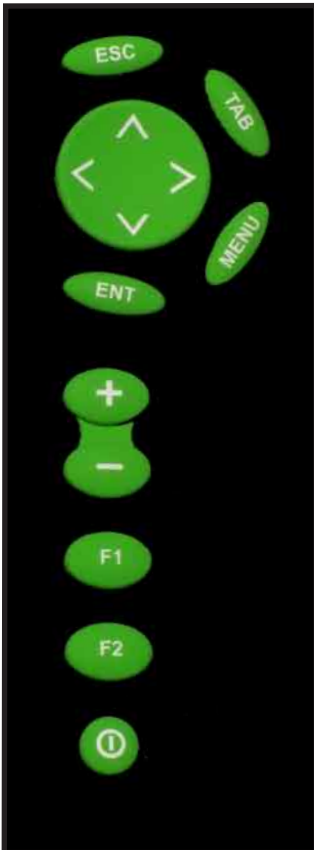
## 1.2 Flight Pro basics

Flight Pro uses GPS information to guide your aircraft, assist product placement and record data.

Work is allocated to a customer and divided in ‘**blocks**’, which are then divided into ‘**flightlines**’ that the Flight Pro unit directs you to fly.

### 1.2.1 Keypad

The Flight Pro head unit is operated by a keypad on the unit’s righthand side.



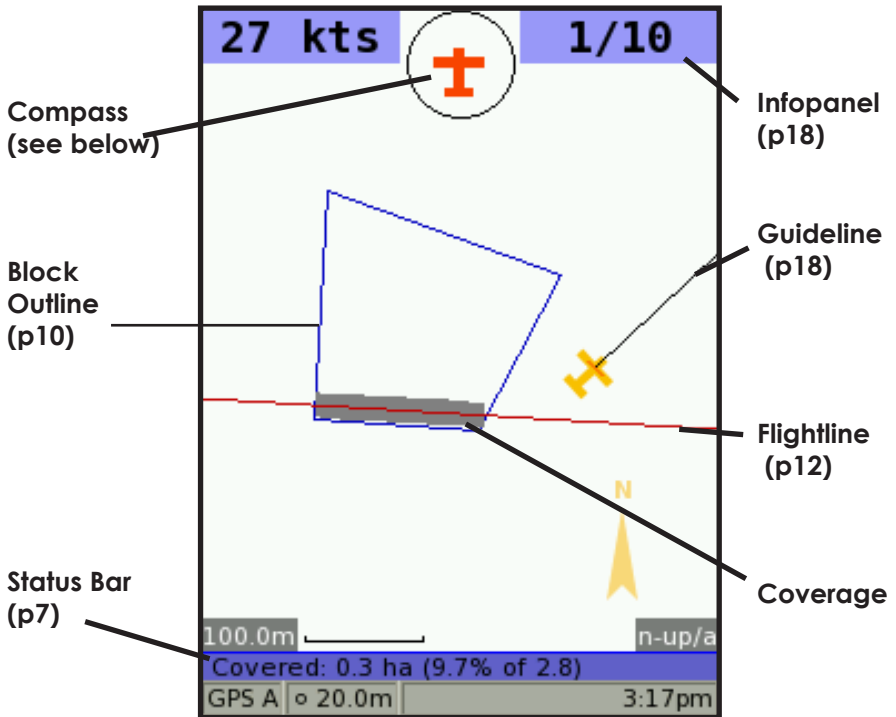
<b>ESC</b>	Exits screen or dialogue box
<b>PAGE/TAB*</b>	Cycles through available options on menu screens.
<b>MENU</b>	Accesses <b>Menu screen</b> when on Flight screen (see next page)
<b>ENT</b>	Selects/activates menu item
<b>ROCKER PAD</b>	Navigates between menu items; Shifts viewpoint on <b>Flight screen</b>
<b>+/-</b>	Zooms view in & out on <b>Flight screen</b>
<b>F1</b>	Can be set to one of a number of menu shortcut options, e.g. 'Closest Line'. See <b>Section 6.1</b>
<b>F2</b>	As with ' <b>F1</b> ' (above); When dialogue box open for data entry, toggles on-screen keyboard on & off
<b>POWER</b>	Turns unit on & off

**\* Note:** Units have **Page OR Tab** key. In this manual **Tab** refers to both.

## 1.2.2 Flight screen

The Flight screen (fig 1.2.2a) shows your current block, including your aircraft position, block outline, flightline, and coverage.

fig 1.2.2a Flight screen (first flightline logged)



Press  to zoom in & out

Press  to shift view and/or position of aircraft on screen

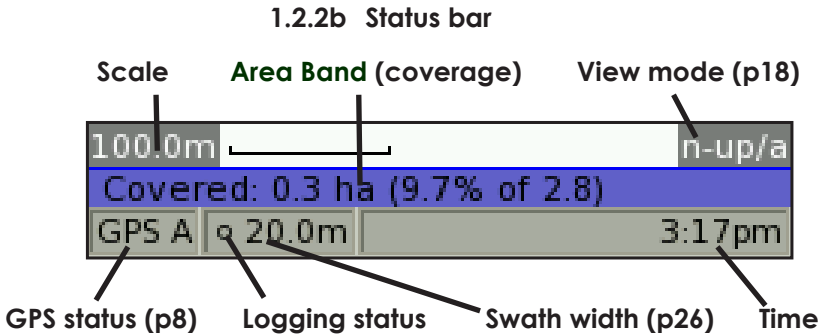
At top your **Compass** directs you towards the start of your next flightline. The compass is green when logging is on, red when not (fig 1.2.2a).



fig 1.2.2a  
Compass with logging  
active/inactive



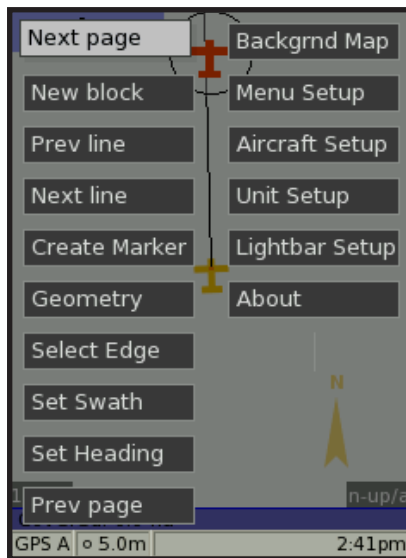
At bottom your **Status bar** (fig 1.2.2b) provides a variety of information:



### 1.2.3 Menu screen

Press **MENU** to access Menu screen. This displays a range of commands that control various Flight Pro functions. Configure this screen to suit your aircraft and flying style (see **6.0 Menu Setup**).

**fig 1.2.3**  
**Menu screen**



## 1.2.4 Satellite screen

Press **TAB** twice to access Satellite screen. This displays location and signal strength for GPS satellites (fig 1.2.4).

The crosshair shows satellite positions (the centre of the crosshair is directly overhead, while the edge of the circle represents the horizon).

The bar graph shows signal strengths. The figure labelled “PDOP” gives an indication of the current position accuracy. Also displayed are the Lat & Long and date/time.

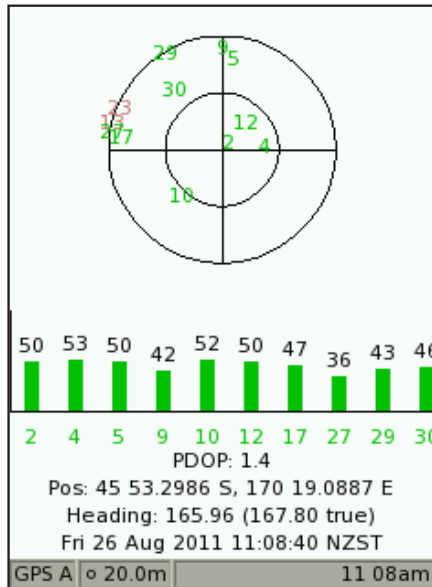


fig 1.2.4  
Satellite  
screen

# 2.0 Checklist

Before flying with your Flight Pro unit, ensure that you have completed the following:

1. Set up a menu (p22)
2. Selected a map projection (p21)
3. Configured GPS antenna offset (p30)
4. Set units of measurement (p20)
5. Set swath width (p30)
6. Configured your Lightbar (p14)
7. Connected remote & logon switches (p55)

## Optional:

- Set background geometry (p32)

# 3.0 Quickstart

To start a **New Block** there are **2** steps:

1. **Outline** Create an *optional* boundary to guide your flying.
2. **AB line** Set a bearing for all flightlines within a block.

**Warning:** Ensure you have completed the **Checklist (2.0)**

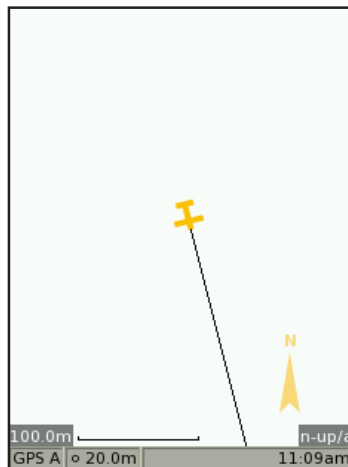
**Note:** We strongly recommend wiring 3 remote switches as per **Section 12.4**. These can be used in place of the keypad for many functions.

## 3.1 Creating an Outline

An outline establishes your block area and allows the lightbar ‘traffic lights’ to warn when to turn spreading on and off. You may also provide your own outline via USB (See **Section 8.0 Maps**). To fly **without** an outline, press **ESC** and go to Step 3.2.

3.1.1 When turned on default screen is **Flight screen** (fig 3.1.1).

Press **MENU**

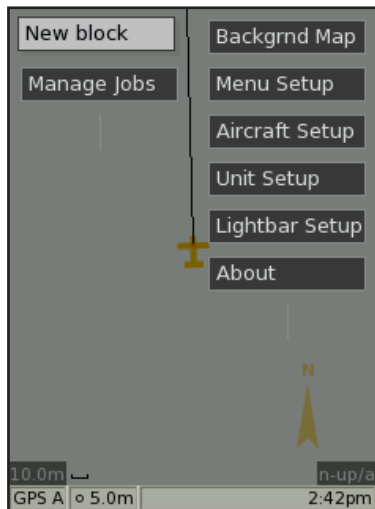


**fig 3.1.1**  
**Flight screen**

3.1.2 On **Menu screen** (fig 3.1.2) highlight ‘**New Block**’ and press



fig 3.1.2  
Menu  
screen



3.1.3 Use  to highlight ‘**Add point**’ on Flight screen


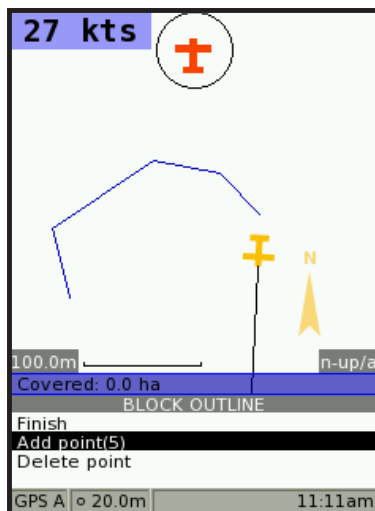


3.1.4 Now fly the boundary of your block, pressing  at each corner to mark block’s outline (fig 3.1.3)

fig 3.1.3  
Flying an  
outline



3.1.5 Remove unwanted points by highlighting ‘**Delete Point**’ and pressing .


3.1.6 When all the points of your block are marked (one boundary remains to be flown) highlight ‘**Finish**’ and press . The unit will complete the outline and automatically set an AB line to the first edge you flew.



3.1.7 Press .

## 3.2 Setting an AB Line


Your **AB Line** provides an orientation for all flightlines inside a block – it is a baseline. When flying with an outline Flight Pro sets an automatic AB Line. You may use this (select ‘**Use existing**’) or create your own. If flying without an outline, you must set your own AB Line.

**Note** These instructions use ‘**Back 2 Back**’ as their example guidance pattern. For instructions on setting AB lines in other guidance patterns see **Section 8.0**.

3.2.1 On Menu screen highlight ‘**Back 2 Back**’ and press .

3.2.2 If flying with an outline and you wish to use the default AB Line, press  to highlight ‘**Use Existing**’ and press .

3.2.3 If you wish to create an AB line with a different orientation, either use the **Select Edge** menu option (see 9.1.2), or fly along the physical block boundary you want to use and set a new orientation as follows:

a) Highlight ‘**Mark A**’ and press , then press it again to ‘**Mark B**’ when appropriate (fig 3.2.1a)

b) **OR** commence logging – the unit will treat your first logged line as your AB Line.

3.2.4 Your AB Line is now set (fig. 3.2.1b).

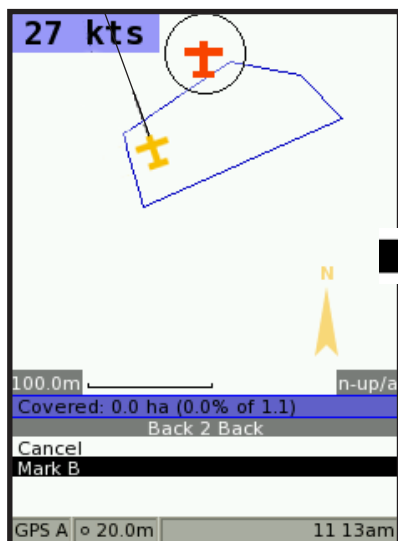


fig 3.2.1a  
Setting AB Line  
(with outline)

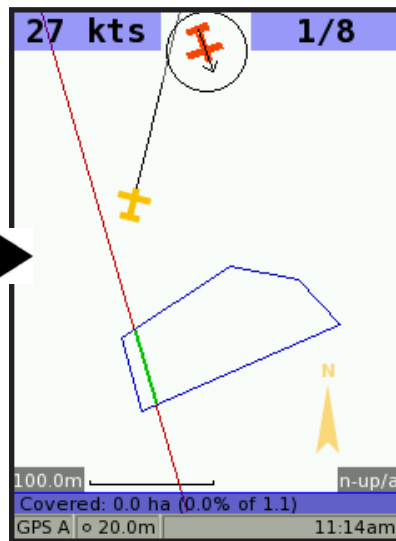


fig 3.2.1b  
AB Line set  
(with outline)

## 3.3 Flying a block

3.3.1 Once you have flown your first line, press **MENU**

3.3.2 On Menu screen highlight 'Next Line' to advance to next flightline and press **ENT**.

3.3.3 Press **ESC** to return to Flight screen.

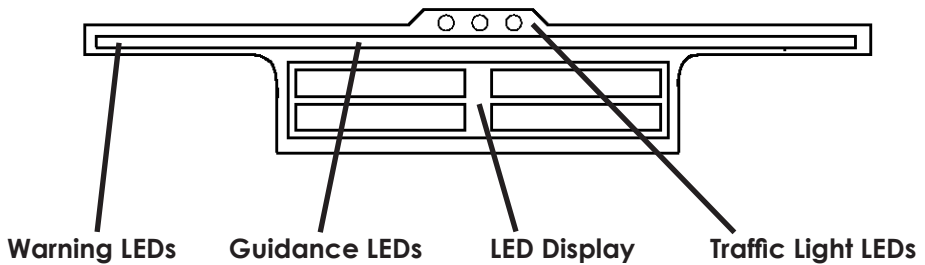
3.3.4 Commence flying your next line.

**Note** These instructions assume all actions are performed via keypad. If remote switches have been wired per installation instructions in **Section 12.0**, then pressing appropriate switch achieves same result as using keypad and/or menu options. For instructions on assigning functions to cyclic switches see **Menu Setup 6.0**.

# 4.0 Lightbar Setup

The lightbar is attached to the head unit and is the primary means of guidance (fig 4.0).

fig 4.0 Lightbar



## 4.1 Configuring the Lightbar

The lightbar can be configured to suit your aircraft and style of flying.

To access the **Lightbar Setup** screen (fig 4.1), highlight 'Lightbar Setup' on the Menu screen and press **ENT**.

To navigate between sections of the Lightbar Setup screen, press **TAB**.

To save any changes highlight 'OK' at the bottom of the screen and press **ENT**.

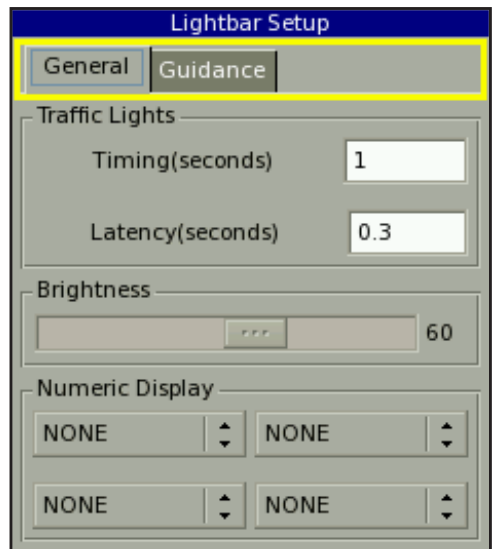


fig 4.1 Lightbar setup screen

## 4.1.1 General



### Traffic Lights

When using a block outline, the traffic light LEDs indicate whether or not the current section of your current flight line has been covered.




The **green** LED is lit if the current position has not been covered.

The **red** LED is lit if your position is already covered, or outside a block outline, or inside a void zone.

The **orange** LED provides a warning of change of state from red to green, or vice versa. The default for this interval is one second and may be altered to suit your preference.

**Timing** To alter the number of seconds the orange traffic light is lit highlight **'Timing'** on the Lightbar Setup screen. Press  to bring up the on-screen keyboard and enter a new value. Press  again to dismiss keyboard.

**Latency** The LED traffic lights operate slightly in advance of your aircraft, to compensate for reaction time, delays in equipment, or individual preference. For example, the default value is 0.3 seconds, causing the indicator traffic lights to change 0.3 seconds before product application needs to start. Alter this value as you would 'Timing' above.



**HINT:** When a box for entering numbers is available, press  to access a submenu that enables **Cursor Mode** by pressing . This lets you alter number values up and down using .

### Brightness

Lightbar brightness may be adjusted by highlighting **'Brightness'** on the Lightbar Setup screen and using  to increase or decrease.

## Numeric Display

The digital LED display is set by default to show the number of the currently selected flight line at top left, and current ground speed at top right. The four numeric displays may be configured to show any of the information below.





Highlight the desired display box, then press . Use  to select one of the following options from the dropdown menu:




- 1) **Start of line (SOL)**
- 2) **End of line (EOL)**
- 3) **Line number**
- 4) **Ground speed (knots)**
- 5) **Offline distance (meters/ft)**
- 6) **Offline angle (degrees L/R)**
- 7) **PDOP**
- 8) **Current Bearing**
- 9) **Next Bearing**
- 10) **Change bearing**
- 11) **AGL minimum (requires laser or radar altimeter to be connected)**
- 12) **AGL maximum**
- 13) **AGL average**

### 4.1.2 Guidance LEDs

The guidance LEDs represent your distance from the current line. When you are aligned with a flight line, the LEDs in the centre of the lightbar light up green. As you move off course, the three LEDs will shift along the bar in the opposite direction and turn orange. Maintain a straight travel path by “chasing” the LEDs along the bar.

The distance represented by the LED’s movement (set by default to one meter per LED) may be configured to suit your aircraft:

- 1) On the Lightbar Setup screen highlight '**General/Guidance**' at top. Press  to the right. You will access Lightbar Setup '**Guidance**' screen.
- 2) Use  to highlight an LED display, then pressing  to bring up the on-screen keyboard and enter a new value.
- 3) When new values are configured, highlight '**OK**' press 

**HINT:** When a box for entering numbers is available, press  to access a submenu that enables **Cursor Mode** by pressing  This lets you alter number values up and down using 

## Warning LEDs

The LEDs at each end of the guidance bar serve as warnings – if GPS reception is not available, one orange LED at each end is lit. If you are over a void zone, two LEDs will be lit.

# 5.0 Unit Setup

To customise the look, operation and GPS settings of your Flight Pro unit, highlight 'Unit Setup' on the Menu screen and press **ENT**. Use **↻** when first on Unit Setup screen to switch between 'View', 'General' & 'Locale' menus (**fig 5.0**). Use **TAB** to navigate screen. When done, highlight 'OK' and press **ENT**.

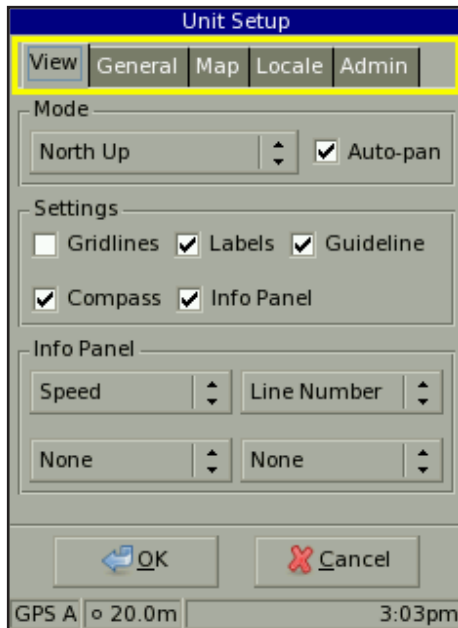


fig 5.0 Unit Setup screen

# 5.1 View

Configure the behaviour of your Flight screen.

## 5.1.1 Mode

The Flight screen has three possible view orientations:

- North Up** North will always point towards the top of the screen.
- Track Up** Centers map on your current position and rotates so that your current heading points towards the top of the screen
- Line Up** Your current flightline will run vertically through the screen (the map will flip depending on your current heading)
- Autopan** Tick this box if you want the screen to pan across every time you move off the visible portion of the display.

## 5.1.2 Settings

The four ‘**Settings**’ tick-boxes configure the appearance of your Flight Screen:

- Gridlines** Overlays a grid onto the Flight screen or removes it.
- Labels** Toggles onscreen labels on and off.
- Guideline** Toggles the line extending from the nose of your aircraft on and off.
- Compass** Toggles your Flight screen compass on and off.
- Info Panel** Toggles Info Panel displays on and off.

### 5.1.3 Info Panel

The Flight screen InfoPanel displays can be configured in the same way as the Lightbar. Up to four boxes can be set to display choices from the information below:

<b>Speed</b>	Ground speed (knots)
<b>Line Number</b>	Current flight line number
<b>Offline Distance</b>	Distance (m/ft) from your current flightline
<b>PDOP</b>	Current PDOP reading
<b>Num. Satellites</b>	Gives current number of satellites
<b>AGL minimum</b>	Minimum AGL distance (requires laser or radar altimeter to be connected)
<b>AGL maximum</b>	Maximum AGL distance
<b>AGL average</b>	Average AGL distance

## 5.2 General

Configure your units of measurement, screen brightness or toggle your automatic flightline guidance.

<b>Units</b>	Metric or U.S. Imperial
<b>Brightness</b>	Adjusts screen brightness
<b>Guidance</b>	When this box is ticked, the Flight screen will automatically shift the current flightline to the one closest line to your aircraft.

**Note:** The unit will not alter your flightline when logging is on.





## 5.3 Locale

Configure the language, time, & GPS settings of your Flight Pro unit.

**Language** Allows you to select a language for your Flight Pro unit

**Time Zone** Allows you to set the current time zone.

**Projection** The head unit uses map projections internally (rather than WGS-84). Each projection is valid for a small portion of the Earth's surface, so a projection must be chosen for your region from the list on screen.

If you are selecting a projection by UTM zone, highlight '**Projection**', then press  to highlight '**UTM**'. Press  to highlight the zone number, then press  to select the correct UTM number for your region from the dropdown menu. Then highlight '**OK**' and press .

After a brief pause, the head unit will change to using the newly selected time zone and map projection. Map projections can be changed at any time.

**Hint:** If you have a GPS fix, set the projection to NZ Map Grid. This will clear the unit, and when it starts up again, repeat the process described above. Select UTM. It will have automatically defaulted to your present position.

**Warning:** Changing the Map Projection will delete all data on the Head Unit. To ensure your data is kept, export all job information as WGS-84 projection to a USB key before changing the Map Projection. If you are more than 2 UTM zones from your selected projection the TracMap unit will not provide guidance.

## 5.4 Admin


When exporting data from your Flight Pro unit, all exported data bears a unique ID stamp. The ID is factory set. Do not change your unit's ID without consulting TracMap or your TracMap retailer.


# 6.0 Menu Setup

Before using Flight Pro, you must configure a menu to suit your aircraft and style of flying. Your menu is how you control the Flight Pro unit when flying a block.

**Note** These instructions assume all actions are performed via keypad. If remote switches have been wired per installation instructions (**Section 12.0**), then pressing appropriate switch achieves same result as using keypad and/or menu options. For instructions on assigning cyclic switches see **6.1**.

## Configuring Menus

On the Menu screen highlight ‘**Menu Setup**’ and press . You will access the **Configure Menu** screen (fig 6.1).

The Configure Menu screen is divided in to ‘**Menu**’ and ‘**Shortcuts**’ pages. Use  to move between pages when ‘**Menu/Shortcuts**’ tab is highlighted.

‘**Shortcuts**’ page assigns functions to remote switches and some head unit buttons.

‘**Menu**’ page configures the functions available to you on the Menu Screen while flying.

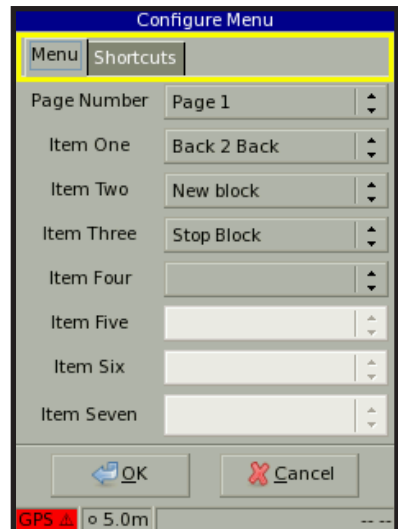


fig 6.1  
Configure  
Menu screen

## 6.1 Shortcuts setup

Before flying, you can assign functions to your remote switches (if installed – see 12.0) and your ‘F1’ and ‘F2’ head unit buttons.

- 1) Press **TAB** to select a switch/button to assign a function, e.g. ‘Switch 3’.
- 2) Use **UP** to select a menu function from dropdown options. e.g. ‘Next Line’ (for complete list, see 6.2-3)
- 3) Repeat for remaining switch/buttons.
- 4) Use **TAB** to select ‘OK’ and press **ENT**.

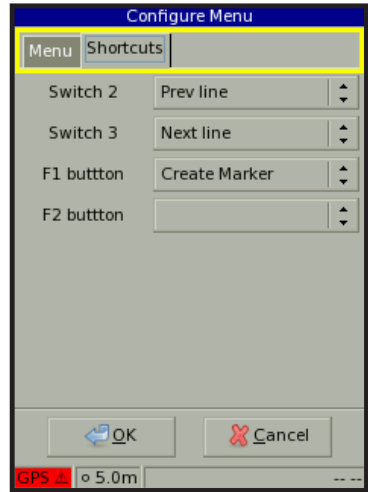


fig 6.1 2  
Configure Menu  
‘Shortcuts’ screen



## 6.2 Menu setup

Access the Configure Menu screen (fig 6.1) and configure your menu as for ‘Shortcuts’, including any of the items listed below. Your menu may have up to 4 pages.

### Selecting a guidance pattern

Your first menu command should be your main guidance pattern.

Set page to ‘Page 1’, then use **TAB** to move to the ‘Menu One’ option (default is ‘Back 2 Back’) and press **ENT**.

Select one of the following guidance patterns from the dropdown menu using  and press  :

### Back 2 Back

Allows you to fly your flightlines in direct sequence (fig 6.2.1 a)



fig 6.2.1a Back 2 Back  = AB Line

### RT ABC

Uses your **AB** and **C lines** to automatically create a racetrack to suit your aircraft (fig 6.2.1 b)



Fig 6.2.1b RT ABC  = AB + C Lines

## RT Squeeze

Uses your **AB** and **C lines** to create a racetrack that guides you from the outer flightlines into the center of the block (fig 6.2.1 c)

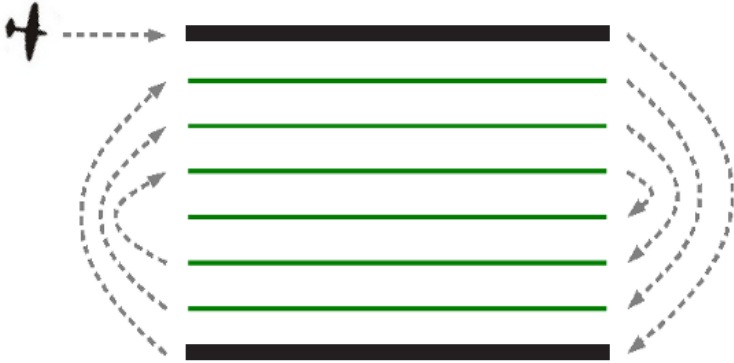


Fig 6.2.1c RT Squeeze

 = AB + C Lines

## RT Half Field

Uses your **AB** and **C lines** to create a racetrack the width of the field e.g. If your block has 30 flight lines, you are directed to fly them 1, 30, 15, 29, 15, 28 etc. (fig.6.2.1 d).

**Note** This option only works when there is no outline created



Fig 6.2.1d RT Half Field

 = AB + C Lines

## RT C Pivot

This pattern automatically creates a racetrack with your **AB line** as its mid-line and your **C line** as the outermost flightline (fig 6.2.1 e).

**Note** This option only works when there is no outline created

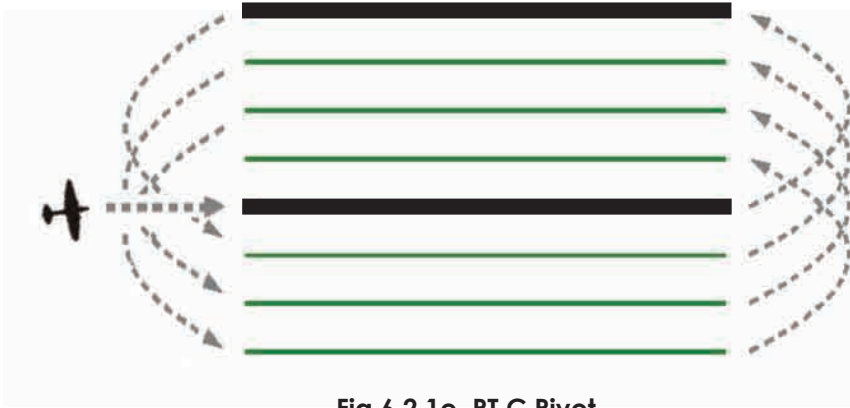


Fig 6.2.1e RT C Pivot

█ = AB + C Lines

## RT Lines

Allows you to set the **total** number of lines for your racetrack.

Once you have set an **AB Line** (or use existing), a dialogue box will prompt you to select '**Number of lines**'. Press **F2** to bring up onscreen keyboard and enter a value, e.g. 20 to create a racetrack with 20 lines flown: 1, 11, 2, 12, 3, 13, etc.

This pattern may be used with or without an outline.

## RT Tracks

Automatically divides your block into a chosen number of racetracks. Once you have set an AB Line (or use existing), a dialogue box will prompt you to select '**Number of tracks**'. Press **F2** to bring up onscreen keyboard and enter a value, e.g. 2 would divide a block of 20 lines into two RT ABC racetracks of 10 lines each.

This pattern requires an outline.

## Menu commands

The following options are available to you on the Menu screen while flying a block, if added to your menu configuration. Add them to your menu as in **6.2**.

### Next Line

Advances you to the next flightline. If operating **Back 2 Back**, your next line is to the right of your AB line e.g. if you create an AB line when flying from East to West, then selecting next line will move the flightline to the North. If you do not have cyclic switches wired to your Flight Pro unit, you must add this command to your menu.

### Prev Line

Advances flightline in opposite direction to 'Next Line'. If you **do not** have cyclic switches wired to your Flight Pro unit, you **must** add this command to your menu.

### New Block

Commences a new block. If you are already flying a block, this command also ends current block, and saves all information.

### Stop Block

Ends the current block, and saves all information.

### Geometry

Allows you to access current block geometry directly: outlines, void zones, lines & markers (waypoints) which make up the background map.

### Select Edge

Allows you to manually select your first AB Line when flying with an outline (see **9.1.2**).

### Closest Line

Selects the closest available flightline as your current line.

## Set Heading

Allows you to manually set the bearing (0–360) of your AB Line when flying with an outline (see 9.1.2).

## Line History

Shows previously defined flight lines. Allows you to toggle through all lines that have been previously defined for this block using ‘**Next Line**’ and ‘**Previous Line**’. Select Finish to make it your current flight line.

## Set Swath

Allows you to alter your swath width while in flight (see 7.2).

## Create Marker

Allows you to create GPS markers while in flight (see 8.0)

## Multi-AB-std



Allows you to fly up to six AB lines when flying multiple blocks at the same time (see 9.1.1d). Flightlines will be flown Back 2 Back, advancing in the same direction (left to right).

## Multi-AB-alt

Allows you to fly up to six AB lines when flying multiple blocks at the same time (see 9.1.1d). Flightlines will be flown Back 2 Back, with even AB lines advancing flightlines in one direction, and odd AB lines in the opposite direction.

# Importing/Exporting a Menu

Flight Pro allows you to export your menu configuration to a USB stick. You may then import it every time you fly – to automatically configure your menu.

To export a menu to USB, press  on the Configure Menu screen, select ‘**Export**’ and press . Use file browser to select a location to export to. Menu will be exported as .txt file.

To import a menu, press **MENU** on the Configure Menu screen, select **Import** and press **ENT**. Use file browser to select file.

## Shifting/Deleting Menu Options

To change the location of menu options, the simplest method is to clear all menu options and start again. Press **MENU**, select **Clear Menu** and press **ENT**.

Alternatively, highlight the menu choice you wish to shift, and replace it with a blank. This returns it to the list of available choices for placement elsewhere.

# 7.0 Aircraft Setup

Before flying, ensure you have configured the Flight Pro unit to work correctly with your aircraft.

On the Menu screen, highlight ‘**Aircraft Setup**’ and press **ENT**

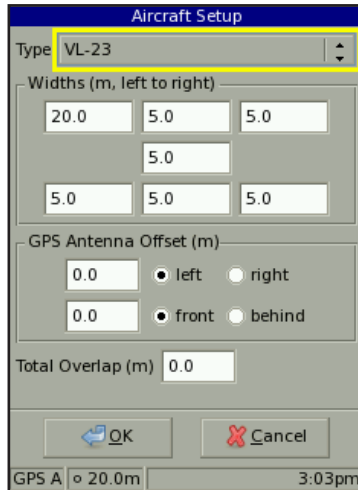


fig 7.0  
**Aircraft Setup**  
screen

## 7.1 Type

Flight Pro is set by default to single boom operation. If you are using multi-booms with a VL-23 controller, press **TAB** to highlight ‘**Type**’ and use **↔** to select ‘**VL-23**’

## 7.2 Spread Width


If using a **single boom** press **TAB** to highlight ‘**Spread Width**’ then press **F2** to bring up the onscreen keyboard and enter a value (in meters) then press **ENT**.


If using **multi-booms**, enter values for each boom section as above. Use **TAB** to move between sections.

**Hint:** If you have remote switches connected, you can cycle widths up and down by pressing ‘**Switch 2**’ and ‘**Switch 3**’

## 7.3 GPS Antenna Offset

This is the distance between the GPS antenna and the centre line of the logging (in metres if using metric, or feet if U.S imperial – see **Section 5.0**). The position reported by the GPS will be shifted by this amount left/right and forward/backwards. Enter values as in **7.2** above.

Select ‘**left**’ or ‘**right**’ to identify the side of the aircraft the GPS antenna is located on, using .

Select ‘**front**’ or ‘**behind**’ to identify whether the GPS antenna is located forward or backward of the logging center line, using .

## 7.4 Total Overlap

Set your logging overlap in meters. If you require a gap between your logging, set a negative value in this field.

When completed, highlight ‘**OK**’ and press .

# 8.0 Maps

Flight Pro allows you to provide your own GPS map information or ‘geometry’. This includes ‘**Outlines**’ and other geometry, such as ‘**Lines**’ and ‘**Markers**’. The unit accepts both .KML (Google Earth) and .SHP files.

## Background Maps



This function lets you introduce GIS information (‘geometry’) that will be available to all blocks flown and all customers.

To access Background Geometry screen, highlight ‘**Backgrnd Map**’ on Menu screen () and press .

## GIS items

There are three types of GIS geometry:

- Outline** Polygons which when used as ‘**Block**’ geometry (see **10.3.2**) become block outlines. When used in ‘**Customer**’ or ‘**Background**’ maps, these provide general situational awareness. For instructions on using outlines for lightbar guidance, see **Section 10.3**.
- Line** Non-block information, e.g. roads, transmission lines
- Marker** Also known as ‘**waypoints**’. Can be used to navigate to using ‘**Fly to**’ function (see **10.3.2**), or used to mark hazards, towns, airfields and any other POI.

Use  to shift between tab sections. To toggle visibility of whole section check/uncheck tick box (at top of screen) by pressing .

## Importing geometry

To import GPS items:

1. The geometry of each section must be imported individually. Select from **'Outline'**, **'Line'** or **'Marker'** tabs on the Background Geometry screen. Press **MENU**.
2. Select **'Import'**, then **'USB'**. Use the file browser (fig 8.2) to select desired file (ensure you have correct file type under **'Format'** at bottom – .SHP or .KML). Press **ENT**. This will open a browser box showing all shapes within the file.
3. Highlight list using **TAB** (fig 8.3) then press **MENU**. Select desired GIS items to import by highlighting **'Select'**, then **'All'** or **'None'** or **'Multi-select'** using **⬇** (see **'Hint'** in 9.2.5). All items are selected by default.
4. You may set properties (**'colour'**, **'visible'**, **'filled'**) for GIS geometry overall, or alter individually once imported – see below. You may also choose the name used for each shape under **'Attribute'**.

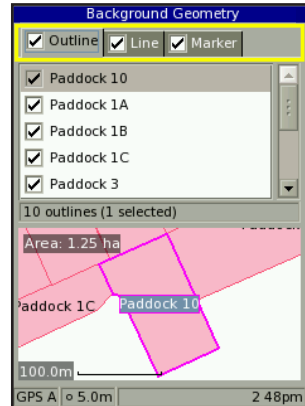


fig 8.1 Background Geometry 'Outlines' page

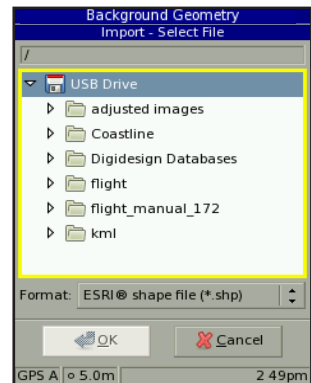


fig 8.2 File browser

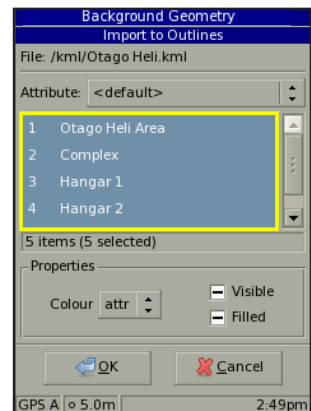


fig 8.3 Import GPS items ('All' selected)

## Exporting Background Geometry

As above, but perform Step 3 **before** Step 2. Then press **MENU** and select 'Export USB'. Use file browser to select location for export.

## Properties

To adjust the properties of geometry items (e.g. turn visibility off, or change a fill colour) select from 'Outline', 'Line' or 'Marker' tabs using **MENU**. Under that section, highlight desired geometry item using **TAB** and press **MENU**.

Select 'Properties' and press **ENT**. Select from 'Name', 'Colour', and 'Filled', and press **ENT** to toggle or select.

When finished, highlight 'Okay', press **ENT**.

## Options

Flight Pro allows you to prevent the unit drawing geometry when zoomed out too far to be useful. Press **MENU** under 'Outline', 'Line' or 'Marker' tabs, and select 'Options'. Check 'Enable' box to turn limiting on by pressing **ENT**, and enter object size limit (in meters) with onscreen keyboard.

Check 'Thick Lines' box to increase visibility of geometry lines on Flight screen.

## Create Marker

You can also create GPS markers as you fly. To do this, ensure your menu (or a shortcut key) is configured to include 'Create Marker' (see 6.2). Select this option on your menu and press **ENT**.

Choose the marker's name, colour, symbol and visibility (fig 8.4). Also select whether the marker will appear on all backgrounds; on this customer; or only on this specific block (see dropdown menu at bottom of screen).

Highlight 'OK' and press **ENT**.

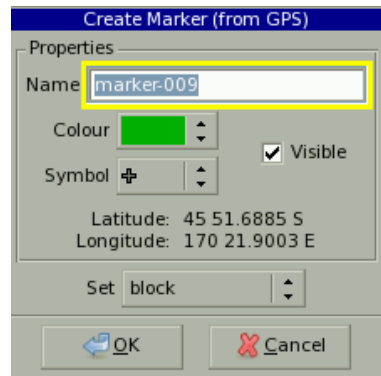


fig 8.4 Create marker dialogue box

# 9.0 AB Lines

Your **AB Line** sets the orientation for all flightlines within a block. AB lines work with or without an outline. For instructions on creating an outline, see **3.0 Quickstart**.






## 9.1 Setting an AB Line

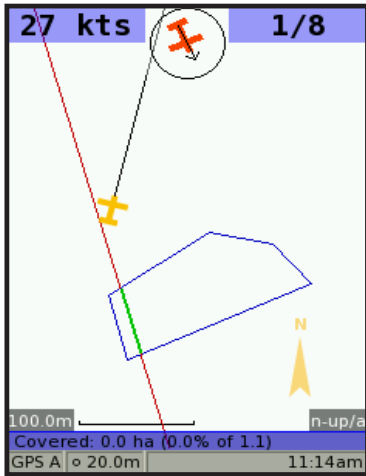
You can set an AB Line by **flying** it, or you can set it **manually** (if using a block outline) via your menu.

### 9.1.1 Flying an AB Line

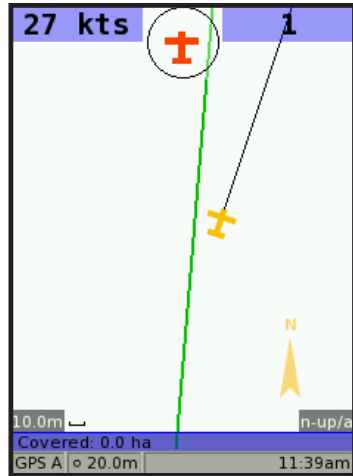
How you create an AB line depends on your guidance pattern (see **6.1 Selecting a guidance pattern**).

#### a) Back 2 Back

- 1 Start a new block (with or without outline) and press .
- 2 On Menu screen highlight '**Back 2 Back**' and press .
- 3 If using a block outline, Flight Pro sets a default AB Line. To use default AB line press  to highlight '**Use Existing**' and then .
- 4 a) To create a **new** AB Line, select an edge of the outline to be your AB Line.  
b) If flying **without** an outline, select a boundary of the block you intend to fly.
- 5 While flying this edge:
  - a) Highlight '**Mark A**' and press , then press it again to '**Mark B**' at the end of the edge (fig 9.1.1a).



**fig 9.1.1a**  
**AB Line with outline**



**fig 9.1.1b**  
**AB Line without outline**

b) **OR** commence spreading. The unit will treat your first completed line as your AB Line (fig 9.1.1b).

- 5 Your AB Line is now set.
- 6 Log your AB Line (unless you marked it by logging), then press **MENU**. Highlight 'Next Line' or 'Prev Line' and press **ENT**, then **ESC** to return to Flight screen.
- 7 Commence logging your next line.

**Note 1** If you are flying without an outline, these instructions are the same, except there is no limit to the number of times you can press 'Next Line'

## b) RT ABC & RT Pivot

These guidance patterns automatically create a racetrack to suit your aircraft (see **6.1 Selecting a guidance pattern**). They require an AB and a C line:

- 1 As with **Back 2 Back** (above), use default AB Line or mark points **A** & **B** to create your own AB line.

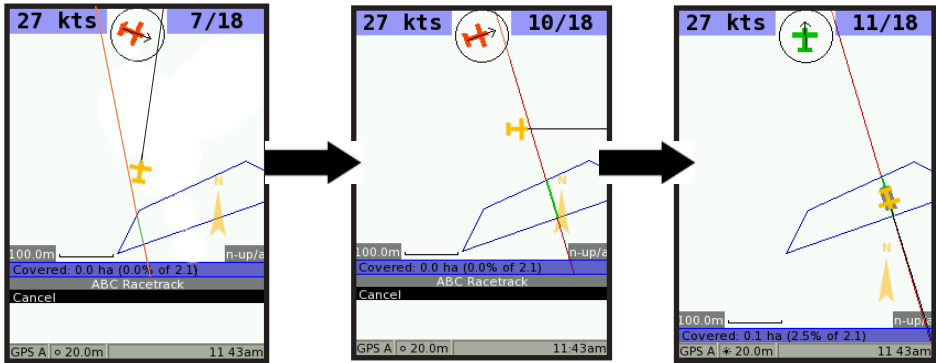







fig 9.1.2 RT ABC Setting a C line

- 2 As you turn across the block, the Flight Pro unit will continually update your closest flightline. Select an appropriate flightline.
- 3 a) Use  to highlight 'Mark C' and then press , OR:  
b) Log on (and off) while flying second flightline (fig. 9.1.3).
- 4 The unit will create a racetrack using your C line as its mid-line (RT ABC) or outermost flightline (RT Pivot).
- 5 Press . Highlight 'Next Line' and press , then  to return to Flight screen.
- 6 Commence logging your next flightline.

**Note** RT C Pivot option only works when there is no outline created

### c) RT Squeeze & RT Half Field

These guidance patterns require an AB and a C Line (for descriptions, see **6.1 Selecting a guidance pattern**).

- 1 As with **Back 2 Back** (above), use default AB Line or mark points **A** & **B** to create your own AB line
- 2 Create a **C line** by logging the line furthest from your AB line i.e. the block's opposite boundary.

3 Press **MENU**. Highlight 'Next Line' and press **ENT**, then **ESC** to return to Flight screen.

5 Commence logging your next line.

**Note** RT Half Field only operates when not using a block outline.

## d) Multi-AB-std & Multi-AB-alt

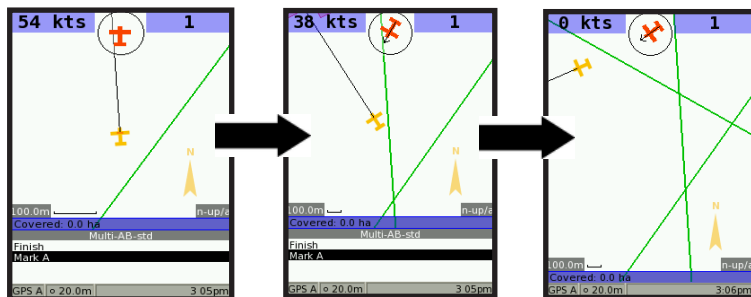
Allows you to set up to six AB lines when flying multiple fields at once. This pattern only operates **without** an outline.

**Multi-AB-std:** Flightlines will be flown **Back 2 Back** and will advance in the same direction (left to right).

**Multi-AB-alt:** Flightlines will be flown **Back 2 Back** with even flightlines advancing in one direction, odd in the opposite direction.

- 1 Start a new block and press **MENU**. On Menu screen highlight 'Multi-AB-std' and press **ENT**.
- 2 Select a boundary of the block you intend to fly. Fly this edge:
  - a) Highlight 'Mark A' and press **ENT**, then press it again to 'Mark B' at the end of the edge.
  - b) **OR** commence spreading. The unit will treat your completed line as your first AB Line.
- 3 Repeat Step 2) up to five times, then highlight 'Finish' and press **ENT**.

fig 9.1.3  
Setting  
AB lines in  
Multi-AB-std



- 4 Select 'Next Line' or 'Previous Line' to move the flightlines for each field across simultaneously. As you fly each field, the lightbar will automatically shift to the next AB line.

## 9.1.2 Setting an AB Line 'manually'

If you are using block outlines, Flight Pro allows you to set an AB Line manually. There are two ways to set a manual flightline:

**Note** You cannot set AB Lines manually for **RT Half Field** or **RT Pivot**, as these patterns do not use block outlines.

### Select Edge

- 1 Configure your menu screen (see **6.0 Menu Setup**) to include the 'Select Edge' menu option. Highlight this option on the Menu screen and press **ENT**

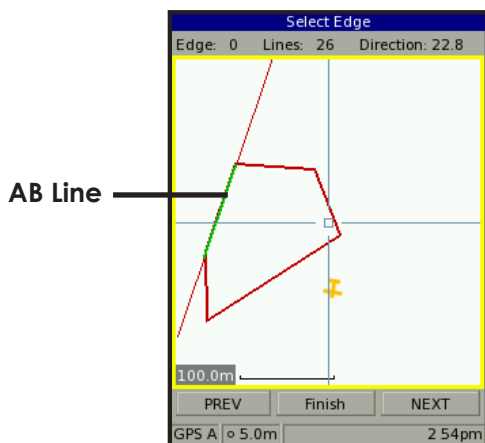


fig 9.1.2  
Select Edge

- 2 On the Select edge screen (fig 9.1.2) either:
  - a) Use **←→** to shift the crosshairs onto your selected edge, or:
  - b) Use **TAB** to highlight 'NEXT' or 'PREV' and press **ENT** to select your AB Line.

- 3 Highlight '**Finish**', press **ENT** to return to the Flight screen.
- 4 a) If flying **Back 2 Back**, proceed from **9.1.1 a), Step 5**.
  - b) **RT ABC** and **RT Squeeze** require an AB line *and* a C line. On the Flight screen, use **↶** to highlight '**Use existing**' and press **ENT**
  - c) Create a C line as for **9.1.1 b) & c), Step 2** onwards.

## Set Heading

- 1 Configure your menu (see **6.0 Menu Setup**) to include the '**Set Heading**' option. Highlight this option on the Menu screen and press **ENT**
- 2 When the '**Set Line Heading**' dialogue box appears, press **F2** to bring up onscreen keyboard.

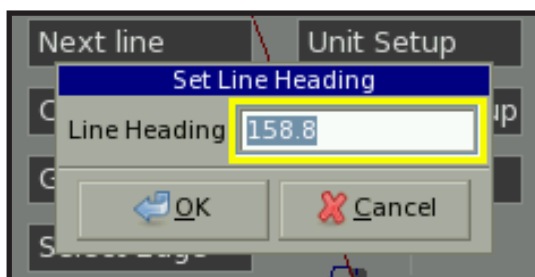


fig 9.1.3 Set Line Heading

- 3 Use **↶** to select a value (0–360) and press **ENT**. The AB Line will align to the left-most point of your outline.
- 4 Press **F2** then **ENT** to return to the Flight screen.
- 5 Proceed as from **Step 4** above.

**Note:** Available only with block outline.

# 10 Managing Jobs

To view a previous block or resume one, highlight 'Manage Jobs' on your Menu screen and press **ENT**. If you are currently flying a block, you will need to enter 'Stop block' first.

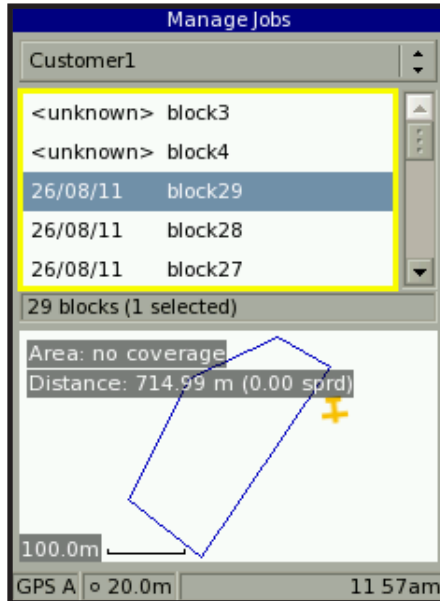


fig 10.1 Manage Jobs screen

## 10.1 Customers

Flight Pro saves new blocks under the current customer (fig 10.1).

### 10.1.1 Viewing a customer

On the Manage Jobs screen, highlight 'Customer1' and press **ENT** to cycle through customers.

## 10.1.2 Creating a new customer

On the Manage Jobs screen press **MENU**. Select 'Create', from the dropdown menu, then 'Customer', by pressing **ENT**.

You may accept a default name for the customer, or press **F2** to bring up onscreen keyboard and enter new name. When done, press **F2** then highlight 'OK' and press **ENT**.

To alter existing customer's name, select customer you wish to rename (see 10.1.1), and press **MENU**. Select 'Details', then 'Customer' by pressing **ENT**. Use **TAB** to highlight 'Name'. Enter new name as above. This screen also provides general customer details.

## 10.1.3 Deleting a customer

Having selected the customer you wish to delete (see 10.1.1), press **MENU** and select 'Delete', then 'Customer' from the dropdown menu and press **ENT**. When prompted, select 'OK'.

# 10.2 Blocks

The Manage Jobs screen is where you can find information on all the blocks you have flown.

## 10.2.1 Viewing a block

When you have selected a customer, press **TAB** to highlight the blocks flown for that customer. Use **↻** to cycle through the list of blocks flown. A preview of the selected block will appear in the lower half of the screen.


## 10.2.2 Resuming a block


To resume flying a block, select a block as in 10.2.1.

Press **MENU**, select 'Resume' and press **ENT**. You will return to the Flight screen of the selected block.

If there is no geometry or previous spreading in the block you will see the 'Create Outline' menu.

### 10.2.3 Previewing a block

The bottom half of the Manage Jobs screen shows a view of the currently selected block. You may alter the way blocks are viewed by pressing  and selecting 'Preview', then:


**Maximise** Fits the current block to the whole screen. Press  to restore Manage Jobs screen.

**Fit coverage** Zooms to fit existing coverage to the view screen.







**Fit geometry** Fits block outline (if using) to view screen

When preview image is highlighted, use  and  to adjust view.

### 10.2.4 Block information

To access information about a flown block, select a block (see 10.2.1). Press  and select 'Details', then 'Block'. The Block Details screen provides the following options:


#### Description

**Name** To name a block, use  to highlight 'Name' and press  to bring up on-screen keyboard. Use  and  to select characters. When done press , highlight 'OK' and press .

**Order #** Add an order number to your block details, as with 'Name' above.

**Comment** Add comments about the selected block into this field, as with 'Name' above.

#### Summary

On the Block Details main screen, highlight 'Description/Summary' and press  to access 'Summary'.

This screen provides you with a time signature, actual coverage area (plus coverage including overlap) and distance traveled (plus distance spread).

## 10.2.5 Deleting a block

To delete a block, select the block you wish to delete as in **10.2.1**. Press **MENU**. Select 'Delete', then 'Block'. Select 'OK' when prompted.

**Hint:** To select several blocks simultaneously, press **MENU** and select 'Select', then check the 'Multi-select' box by pressing **ENT**. Highlight desired blocks by pressing **F1**.

## 10.2.6 Finding a block

Having selected a customer, press **MENU** and select 'Find'. Press **F2** to bring up onscreen keyboard and enter a block name.

# 10.3 Geometry

Flight Pro lets you import .KML (Google Earth) and .SHP file geometry into:

- 1) **Background Map** – shows for all customers & blocks (see **8.0**)
- 2) **Customers** – shows for all blocks under a customer
- 3) **Blocks** – affects single blocks and provides guidance via the lightbar.

## 10.3.1 Customer geometry

Customer geometry does not provide guidance for flying – it is background information. You may also use it to assist with selecting items from complex SHP files for treatment as an individual block.







To view customer geometry press **MENU** and select 'Geometry' then 'Customer'. Customer geometry is split into:

- Outline** Block outline information
- Line** Non-block information, e.g. roads
- Marker** 'Fly-to' markers and other POI's (see **10.3.2**)

Use **F3** to shift between these tabs. To toggle visibility of these sections check/uncheck the tab box at top of screen by pressing **ENT**.

## Importing customer geometry

To import a geometry file to all blocks under a selected customer:

1. Select from **‘Outline’**, **‘Line’** or **‘Marker’** on the Customer Geometry screen (fig 10.1) using  (the geometry of each section must be imported individually) and press .
2. Select **‘Import’**, then **‘USB’**. Use the file browser (fig 10.2) to select desired file (ensure you have correct file type under **‘Format’** at bottom: .SHP or .KML). Press .
3. Highlight list using  then press . Select desired GIS items to import (fig 10.3) by highlighting **‘Select’**, then **‘All’** or **‘None’** or **‘Multi-select’** using  (see **‘Hint’** in 10.2.5). All items are selected by default.
4. You may set properties (**‘colour’**, **‘visible’**, **‘filled’**) for GIS geometry overall, or alter individually once imported – see below. You may also set individual component names under **‘Attribute’**.

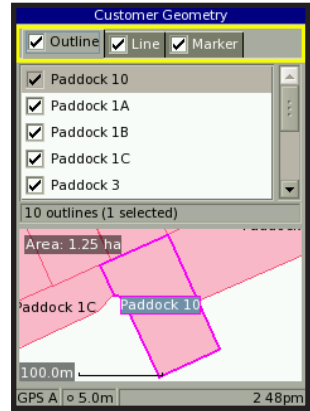


fig 10.1 Customer Geometry screen

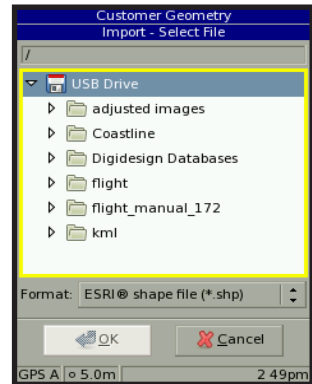


fig 10.2 File browser screen

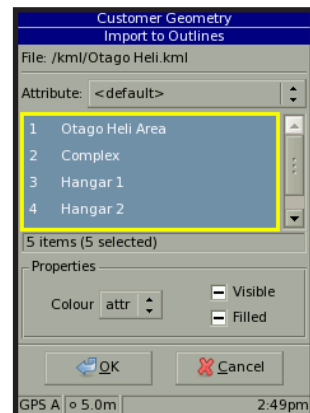


fig 10.2 Import to outlines

## Exporting customer geometry

As above, but perform Step 3 **before** Step 2. Then press **MENU** and select **‘Export USB’**. Use file browser to select location for export. Press **MENU** to create a new sub-directory.

## Properties

To adjust the properties of geometry items (e.g. visibility or colour) select from **‘Outline’**, **‘Line’** or **‘Marker’** using **↔**. Under that tab, highlight desired geometry item using **TAB** and press **MENU**. Select **‘Properties’** and press **ENT**. Select from **‘Name’**, **‘Colour’**, and **‘Filled’**, and press **ENT** to toggle or select. When finished, highlight **‘Okay’**, press **ENT**.

## Options

Flight Pro allows you to prevent the unit drawing geometry when zoomed out too far. Press **MENU** under **‘Outline’**, **‘Line’** or **‘Marker’** tabs, and select **‘Options’**. Check **‘Enable’** box to turn limiting on by pressing **ENT**, and enter object size limit (in meters) with onscreen keyboard.

Checking **‘Thick Lines’** box increases visibility of geometry on Flight screen.

## 10.3.2 Block geometry

Block geometry provides guidance for your flying via the lightbar. Outlines operate as in 3.1. As with customers, block geometry is arranged into **‘Outline’**, **‘Void’**, **‘Line’** & **‘Marker’** (see 10.3.1).

**‘Void’** – These are **‘No logging’** zones. Your lightbar will direct you to avoid spreading in them.

Use **↔** to shift between item tabs. To toggle visibility of shapes, highlight tab and press **ENT** to tick/untick box.

## Importing block geometry

Select block on Manage Jobs screen – highlight desired block, press **MENU** then **‘Geometry’** and **‘Block’**.

On Block Geometry screen, press **MENU**, select **‘Import’**, then either **‘USB’** or **‘Customer’**. This is similar to importing to Customer ( as in

10.2), except you are able to see a preview of each .shp on screen, and select individual items from the preview list. In this way, you can choose individual polygons from a complex multi-polygon SHP file.

## Exporting block geometry

As above, but perform Step 3 **before** Step 2. Then press **MENU** and select 'Export USB'. Use file browser to select location for export.

## Properties

To adjust characteristics of geometry items (e.g. visibility) select 'Outline', 'Line' or 'Marker' tabs. Highlight desired geometry item using **TAB** and press **MENU**. Select 'Properties' and press **ENT**.

Use **TAB** to select from 'Name', 'Colour', and 'Filled', and press **ENT** to toggle or select. When finished, highlight 'Okay', press **ENT**.

**Note** 'Void' properties also includes the 'Active' check-box, allowing you to turn void zones on and off.

## Markers (Waypoints)

Flight Pro allows you to set a 'Fly to' bearing when using geometry. To use this function, ensure markers have been imported under the 'Marker' tab on Block Geometry screen (see above).





Select a marker on the item panel, press **MENU** and select 'Fly to'. Your lightbar will now show distance and bearing. Your flightscreen will show a pink guideline.





To create a marker while flying, see 8.0.

# 10.4 Exporting Data

You are able to save details of current customers (and specific blocks) onto a USB storage device.

1. Connect USB device to connector.
2. On Manage Jobs screen select block (see 10.2.1) or press **MENU** and choose 'Select', then 'All' to select all blocks from that

customer. To export a selection of blocks, select ‘**Multi-select**’, then press  to return to Manage Jobs screen. Use  to highlight blocks flow. Using  highlight blocks you wish to export, pressing  to select each block.

3. Press  and select ‘**Export USB**’
4. Select ‘**Block selection**’ or ‘**Customer**’
5. On file browser screen, (Figure 10.3) use  to navigate to the folder on the device where you wish to store the information.
6. The Coordinates option selects whether the shape files created will contain coordinates in WGS-84 or the currently selected map projection. Change between the two by pressing .
7. Select ‘**OK**’ and press .

A folder will be created for each blocks, containing the following files:

- A block outline shape file as a polygon
- Coverage log for each application (log) as polylines
- Secondary log containing markers (waypoints) showing travel between coverage (secondary)
- A text file containing a summary of the block (summary.txt)
- A compressed file of all the blocks data (raw) used for transferring data between TracMap units.
- A compressed job file (tmo.tm\_raw) used for uploading to ‘**Your maps**’ on the TracMap website.

Exported jobs or blocks can be:

- Used to generate a coverage map on a PC
- Uploaded to TracMap internet mapping system
- Uploaded to a TracMap Flight Pro head unit

**Note** While exporting an entire job the lightbar LED’s may flash, depending on the number of blocks in the job. This will cause no harm to any data.

# 11 Troubleshooting

This section describes problems that may be encountered and possible solutions.

## Menu option not working

Some menu options are only designed to work in conjunction with certain functions, e.g. outlines, etc. Check the relevant section of the manual for information about the limitations of certain menu options.

## No GPS fix

This may be caused either by poor satellite reception, or by a faulty data connection. To determine the cause, first move the receiver to a location with a clear view of the sky. Press to access Satellite screen.

If the screen resembles Figure 10.1(a) and there are no satellite numbers shown, then the most likely cause is an incorrectly wired or configured GPS. Refer to Section D and check wiring.

fig 11.1a  
No satellites

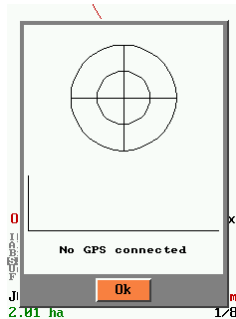
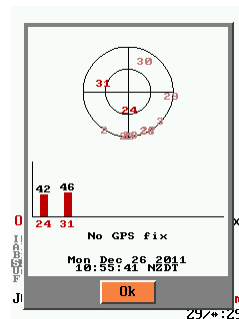


fig 11.1b  
Poor reception



If the screen looks more like Figure 10.1(b), then the GPS is wired correctly, but the GPS reception is poor. Make sure the antenna is located in a suitable position, as per the manufacturers recommendations, and that it has a clear view of the sky. It may require somewhere between 30 and 60 seconds for the receiver to acquire its first fix after powering on.

For the TracMap TMR-200 receiver, the antenna must be located externally, and clear of the rotor arc when installed on a helicopter.

## PDOP Values

Position Dilution of Precision (PDOP) describes the geometric strength of satellite configuration on GPS accuracy. When visible GPS satellites are close together in the sky, the geometry is said to be weak and the DOP value is high; when far apart, the geometry is strong and the DOP value is low. Thus a low DOP value represents a better GPS positional accuracy due to the wider angular separation between the satellites used to calculate a GPS unit's position. The table below shows the meaning of DOP values.

DOP	Rating	Description
1	Ideal	The highest possible confidence level to be used for applications demanding the highest possible precision at all times
2-3	Excellent	At this confidence level, positional measurements are considered accurate enough to meet all but the most sensitive applications
4-6	Good	Represents a level that marks the minimum appropriate for making business decisions. Positional measurements could be used to make reliable inroute navigation suggestions to user
7-8	Moderate	Positional measurements could be used for calculations, but the fix quality could still be improved. A more open view of the sky is recommended
9-20	Fair	Represents a low confidence level. Positional measurements should be discarded or used only to indicate a very rough estimate of the current location
21-50	Poor	At this level, measurements are inaccurate by as much as 300 metres with a 6 meter accurate device ( $50 \text{ DOP} * 6\text{m}$ ) and should be discarded

**table 11 PDOP values**

## Logging or digital inputs not working

Check the connections listed in Appendix D. There must be a voltage of over 3 V for the signal to be detected.

If you are confident there is no wiring fault, then it is possible a protective fuse in the TracMap unit may have blown, which will require a return to factory. This can occur if there is insufficient spike protection in the wiring installation, and a voltage spike in excess of 200V has been created. This can often occur with worn solenoids (see **Section 12.1**)

## Lightbar not working

This problem is often caused because lightbar model setting is incorrect. Check this in the Preferences dialog (see **Section 4.0** for more information). If the lightbar is still not working after changing the model, check the wiring on the lightbar cable. The lightbar will begin to flash if it has not received data from the head unit within 2 seconds.

## Guidance LEDs move erratically

If the position of the guidance LEDs rapidly jumps back and forth, it may be due to poor satellite reception. First, check this by referring to the satellite page (see **Overview**). Setting the lightbar LED interval (**Section 4.1**) too low may also cause the LEDs to jump around. Since consecutive positions reported by an autonomous GPS can vary significantly (sometimes up to 2 metres), it's best not to set the interval much smaller than 1 m.

## The USB drive is not ready

While attempting to export data, you may see this message on the screen. When USB flash drives are plugged in to TracMap head unit, they typically require about 5 to 10 seconds to “settle” before they can be used. Wait a few seconds (without removing the USB drive) and then try again.

If the problem persists, it may be that you are using a non-standard USB flash drive. This would normally only be a problem for very old models of USB drive (with capacities of 512 MB or less).

## **Unit performing slower than usual**

Delete all unwanted blocks. As the unit reaches storage capacity performance decreases.

## **Cannot see block outline on screen**

Check the **Unit Setup** screen (**Section 5.0**) to see what your **View** mode is set to. If ‘**Autopan**’ or ‘**Track Up**’, these modes center the aircraft on the Flight screen.

## **Unable to create flightline**

Check that you are not trying to create a flightline outside the block outline (if a block outline exists). Also check that the block outline has not been created with only one or two points present. The easiest way to check this is to start again.

## **Error exporting data**

One or more files within the export are compromised. The export will proceed, but some files may not be usable.

## **Spread percentage is incorrect**

If you have overlapping GPS geometry, the Flight Pro unit will record coverage for both. Check your geometry overlaps.

## **Unable to import geometry**

Check which tab you have active (Outline, Void, Line or Marker). If the file you are trying to import does not have information for that particular tab, you cannot import it. Check that you have the correct tab selected.

## **No VL-23 information**

Check your wiring connections, then restart unit.

# 12.0 Installation

## 12.1 Head Unit

The head unit can be attached to a suitable mounting bracket by four M4 mounting screws supplied as part of your instruction kit. Connections are needed for the power supply, lightbar, GPS receiver, USB (optional) and digital inputs. Currently there are 2 types of Tracmap Flight cables: TMW-1001 and the TMW-1002. Install overlays using TMW-1001 and TMW-1002 Flight cables (figs 12.1 and 12.2). The main difference between TMW-1001 and TMW-1002 is the lightbar connection.

**Note** If your log on switch is connected to an inductive device such as a solenoid or relay, when it is switched off, a back EMF is generated by the collapsing magnetic field around the inductor. This back EMF can attain a surprisingly high voltage that may damage the Tracmap head unit's electronics. The solution is to place a diode across the Cannon 10 pin connector Pins D and K, such that the diode is in reverse bias when the coil is energized. When the coil is de-energized the back EMF then has a closed path and high voltages are not generated. See Figure 12.4.

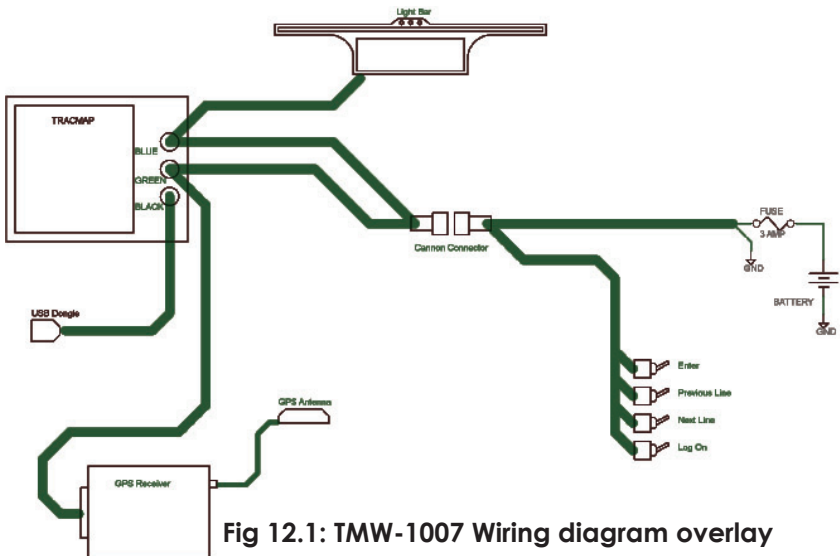
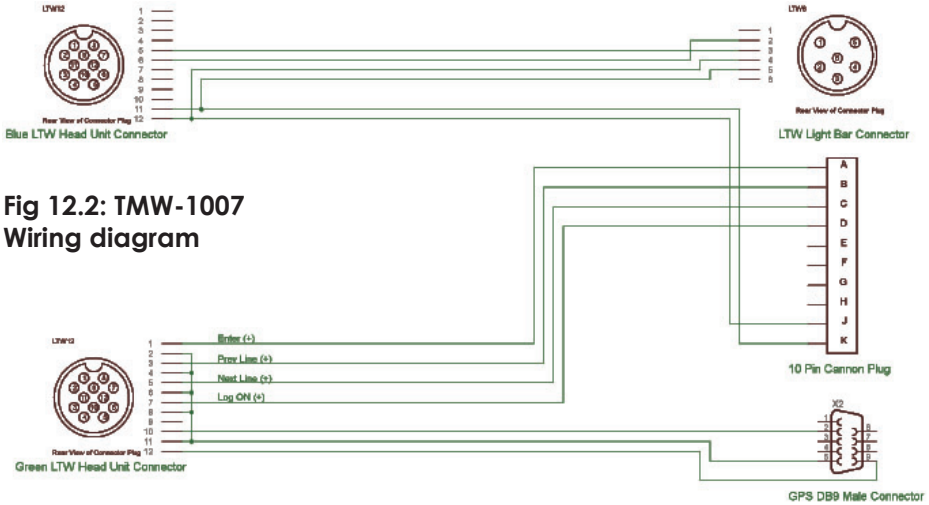


Fig 12.1: TMW-1007 Wiring diagram overlay



**Fig 12.2: TMW-1007  
Wiring diagram**

## 12.2 Lightbar

The lightbar can be mounted using RAM mounting kit supplied. Alternatively, users may carefully dismantle the lightbar and attach a custom made bracket in place of the attached ball on the back of the lightbar.

**Note** TracMap accepts no responsibility for accidental damage resulting from dismantling the lightbar case to remove the RAM mounting ball.

## 12.3 GPS

FlightPro connects to any GPS providing the baud rates and GPS sentences listed in Appendix A. If installing the TracMap TMR-100 GPS receiver, attach the GPS antenna by an SMA-type connector. For higher precision TracMap TMR-200 GPS receiver, the antenna must be fixed to the outside of the aircraft and, for helicopters with more than 2 blades, fitted outside of the blade arc.

**Note** If using the TMR-200 receiver a wire must be cut to stop the TracMap Head unit attempting to autodetect the baud rate as this interferes with the GPS signal. Cut the wire connected to Pin3 of the DB9 connector. Unscrew the connector and remove the case. Once the wires are exposed cut the centre wire in the top row and screw the connector back together.

## 12.4 Remote Switches

This manual provides instructions for operating the Flight Pro system using the head unit keypad. However, it is strongly recommended that you connect **three** remote switches to control the Flight Pro system via your stick (see fig 12.3).

The remote switches function in 3 ways:

On **Flight screen**:

<b>Switch 1/Enter</b>	<b>Menu Screen</b>
<b>Switch 2</b>	Whatever has been set under ' <b>Shortcuts</b> ' ( <b>Section 6.1</b> ), typically ' <b>Prev Line</b> '.
<b>Switch 3</b>	Whatever has been set under ' <b>Shortcuts</b> ' ( <b>Section 6.1</b> ), typically ' <b>Next Line</b> '.

On **Flight screen** - with action box at bottom (eg **Block Outline**):

<b>Switch 1/Enter</b>	<b>Activates 1st option (e.g. Cancel)</b>
<b>Switch 2</b>	<b>Activates 2nd option (e.g. add point)</b>
<b>Switch 3</b>	<b>Activates 3rd option (e.g. delete point)</b>

On **Menu Screen**:

<b>Switch 1/Enter</b>	<b>Selects highlighted action</b>
<b>Switch 2</b>	<b>Scrolls down menu list</b>
<b>Switch 3</b>	<b>Scrolls up menu list</b>

## 12.5 Connections Wiring

Figures 12.3 and 12.5 show the connections from the 10 Pin Cannon connector to the aircraft. The digital inputs are used to detect whether the logging switch is on and to control the menus. These inputs require a voltage of at least 3V to activate and can be pulled to 12 volts or 24 volts dc. Normally these are wired to the aircraft's cyclic or joystick switches. The digital input connections are described in detail in Appendix B.

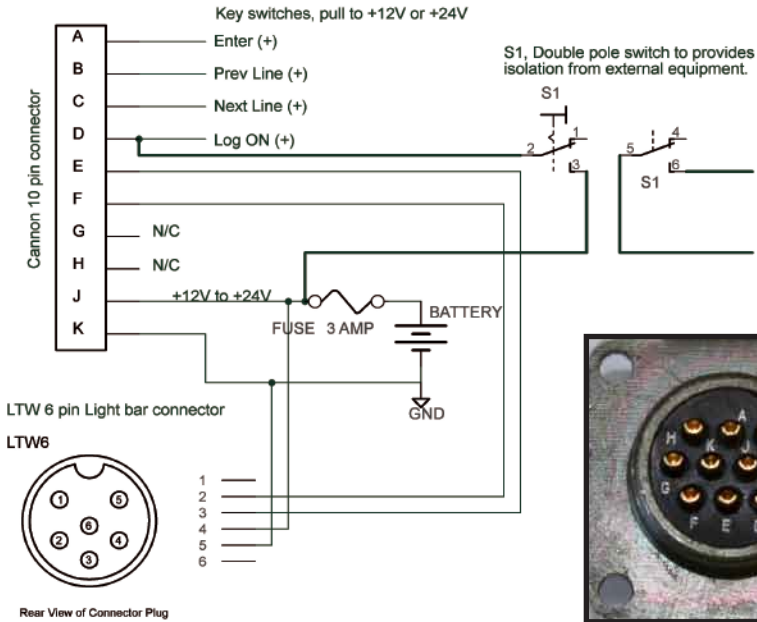


Fig 12.3: Aircraft wiring diagram with double pole switch

Fig 12.5: Cannon connector

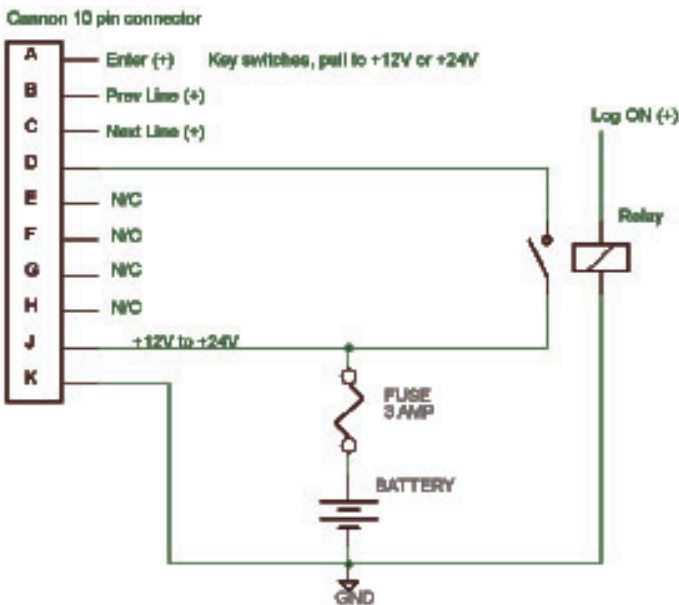


Fig 12.4: Aircraft wiring diagram with relay

# Appendix A

## Technical specifications

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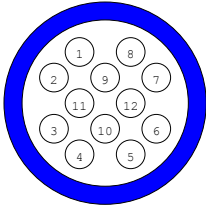
Operating voltage	8 - 32 V
Operating current	270 - 900 mA
Power consumption	7.3 - 13.8 W
GPS baud rates	9600, 19200, 38400, 57600, 115200
GPS sentences	RMC GSA GSV
GPS supply voltage	5 V
GPS supply current	500 mA max
Digital input threshold	3 V

---

# Appendix B

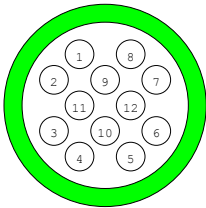
## Tracmap Head Unit Connections

Viewed from the back, the unit has three connectors which are numbered from top to bottom (fig B.1). The functions of each connector are:



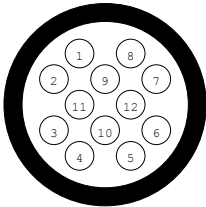
### Connector 1

Powers the lightbar.



### Connector 2

Should be attached to the GPS receiver and/or digital inputs.



### Connector 3

Attaches to USB devices, e.g. memory sticks, keyboards.

## Power supply

The unit will operate on any voltage between 8V and 32V. Power is supplied through the following pins on connector 1:

	<b>Pin</b>	<b>Function</b>
<b>Table B.1:</b> <b>Power supply</b>	11	Ground
	12	Positive supply (8-32 V)

## Lightbar

The Lightbar is connected via an RS-485 interface on connector 1. Power is not available from the head unit and must be supplied separately. The following pins are used:

	<b>Pin</b>	<b>Function</b>
<b>Table B.2: Lightbar pins</b>	5	RS-485 (A/-)
	6	RS-485 (B/+)

## GPS receiver

Connector 2 supplies power to and receives data from the GPS receiver. Power supplied is 5V. Data is received via an RS-232 interface. Any GPS receiver that produces an RMC sentence can be used, provided the baud rate matches one of those supported by the head unit (see Appendix A).

Relevant pins on connector 2 are:

	<b>Pin</b>	<b>Function</b>
<b>Table B.3: GPS pins</b>	9	GPS TxD (data to GPS receiver)
	10	GPS RxD (data from GPS receiver)
	11	Ground
	12	Positive supply to GPS receiver (5V)

## Digital inputs

Digital inputs are used to detect whether the logging is on, and to control menus. Inputs are opto-isolated and require a voltage of at least 3 V to activate. Relevant pins on connector 2 are:

	<b>Pin</b>	<b>Function</b>
<b>Table B.4: Digital input pins</b>	1	Switch 1/Enter (+)
	2	Switch 1/Enter (-)
	3	Switch 2/Next Line (+)
	4	Switch 2/Next Line (-)
	5	Switch 3/Prev Line (+)
	6	Switch 3/Prev Line (-)
	7	Logging (+)
	8	Logging (-)

The menu inputs will activate the first, second and third items on the menu when a pulse is detected on the input. The logging switch is assumed to be on while a voltage is applied to the logging inputs

## **USB**

The supplied USB cable plugs into connector 3 (nearest the base) and allows you to attach memory sticks and keyboards. A USB hub may be attached to this cable if you wish to use a keyboard and memory stick at the same time.

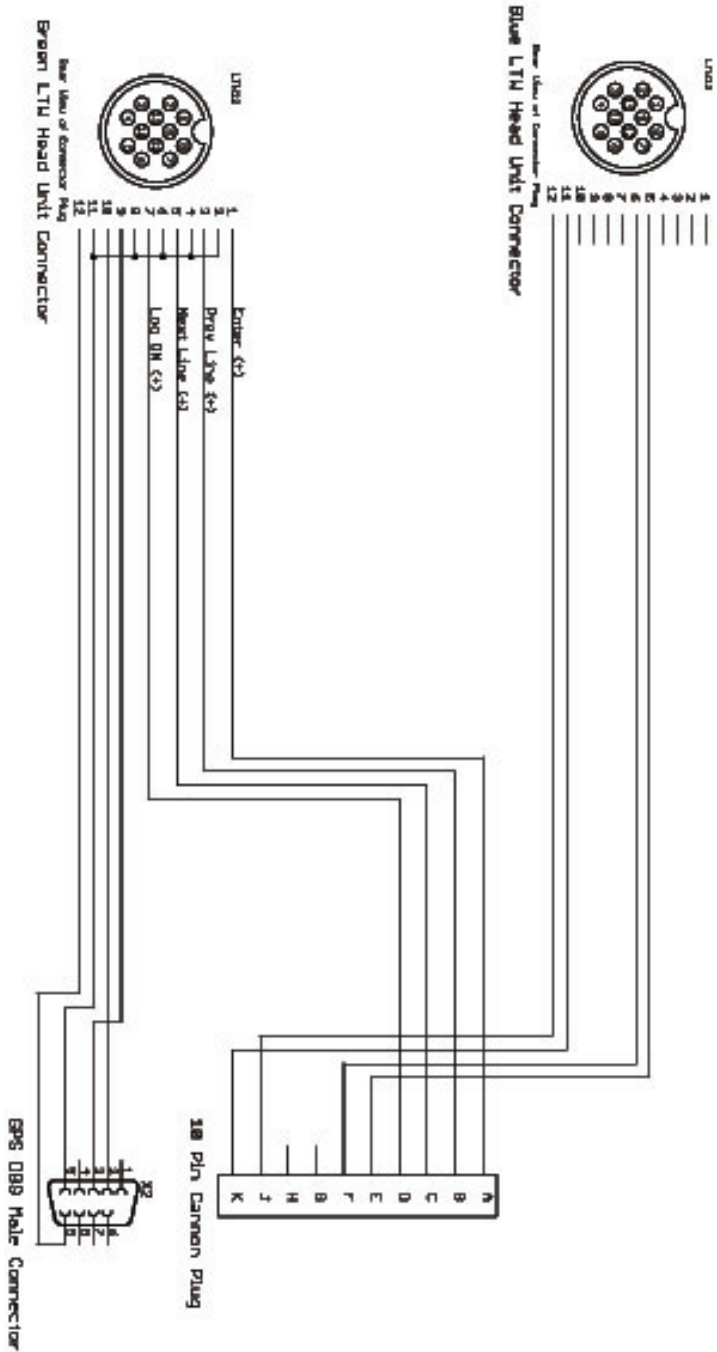


fig B.5 Standard TracMap Wiring Loom part number: TMW-1001

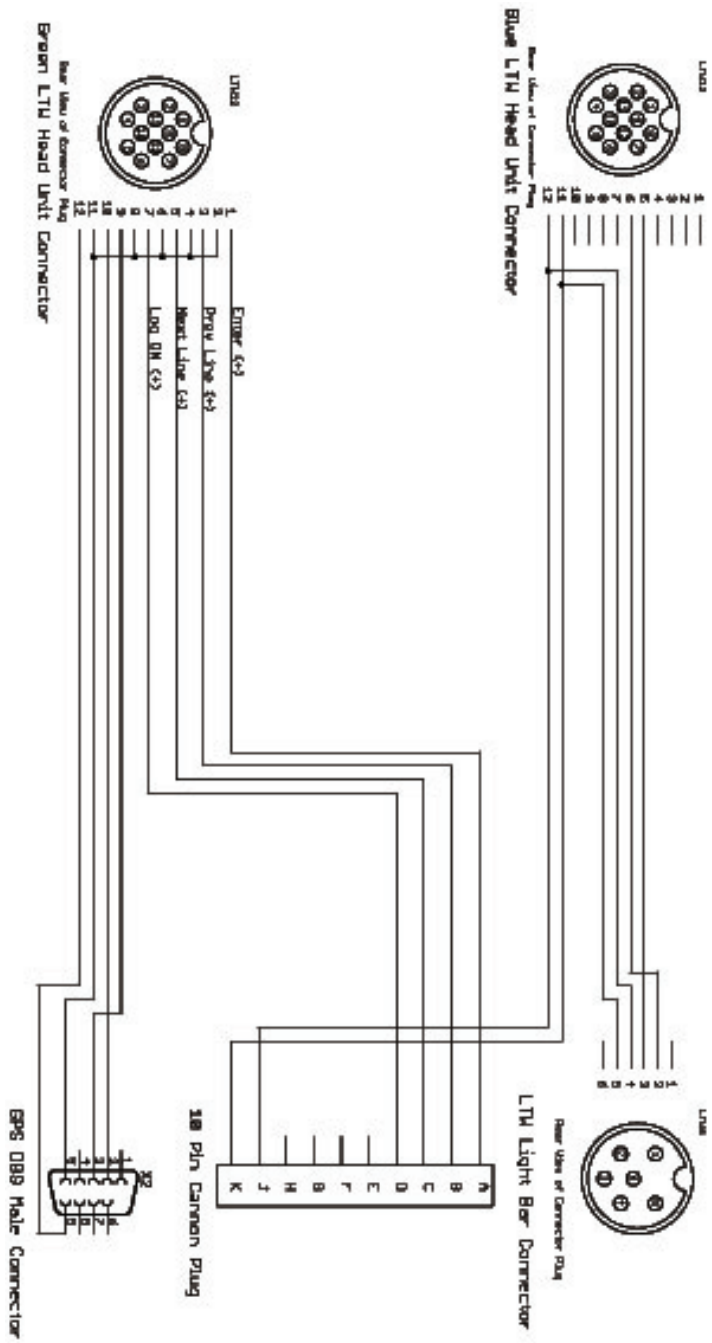
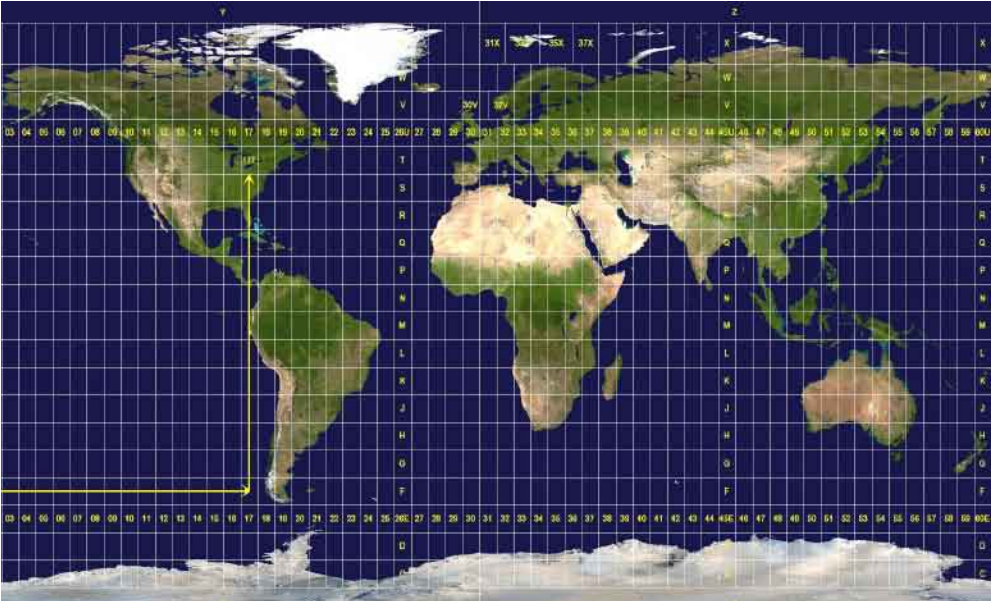


fig B.6 Standard TracMap Wiring Loom part number: TMW-1001

# Appendix C

## Map projections



**Fig C.1 Universal Transverse Mercator (UTM) zones**

Figure C.1 shows the division of the globe into Universal Transverse Mercator (UTM) zones. The north zone includes rows N to X, while the south zone covers rows C to M.

In addition, the head unit also supports the following special map projections:

- New Zealand Map Grid
- New Zealand Transverse Mercator 2000

# Appendix D

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c' for details.
```

The hypothetical commands ‘show w’ and ‘show c’ should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than ‘show w’ and ‘show c’; they could even be mouse-clicks or menu items—whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a “copyright disclaimer” for the program, if necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the
program ‘Gnomovision’ (which makes passes at compilers)
written by James Hacker.
```

```
Signature of Ty Coon, 1 April 1989
```

```
Ty Coon, President of Vice
```

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Library General Public License instead of this License.