



Fugro Intersite B.V.

StarPack

SPM Software Version 6.01.05

User Manual

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Dated: August 2008

AMENDMENT RECORD SHEET

Revision	Date	Reason for change	Revised by	Authorised
2.0	08 July 08	Post beta development	J Rowles	A Koome
2.1	10 July 08	Minor updates/changes	J Rowles	A Koome
2.2	18 July 08	No longer need to press Esc to Accept all changes. Images, text and document template updated.	J Rowles	A Koome
2.3	07 Aug 08	Changes made to COM Port baud rate and Remote LAN IP addresses are applied without the need to reboot the unit.	J Rowles	A Koome

NOTE: See [Firmware - History](#) for details on changes to the StarPack that have been implemented by Firmware updates and incorporated in this manual.

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Distribution	StarPack Distribution

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1. EXECUTIVE SUMMARY

Although Fugro has taken due care in the preparation of this documentation and the associated software/hardware, no responsibility is accepted for the use or reliability of either. Due to the continuing development nature of these systems, information in this documentation is subject to periodic updates without notice and does not represent a commitment on the part of Fugro.

All data, graphs, video imagery used in the production of this manual are representative and are only provided as examples. Information displayed by your use of the software/hardware may be different.

GETTING TECHNICAL SUPPORT

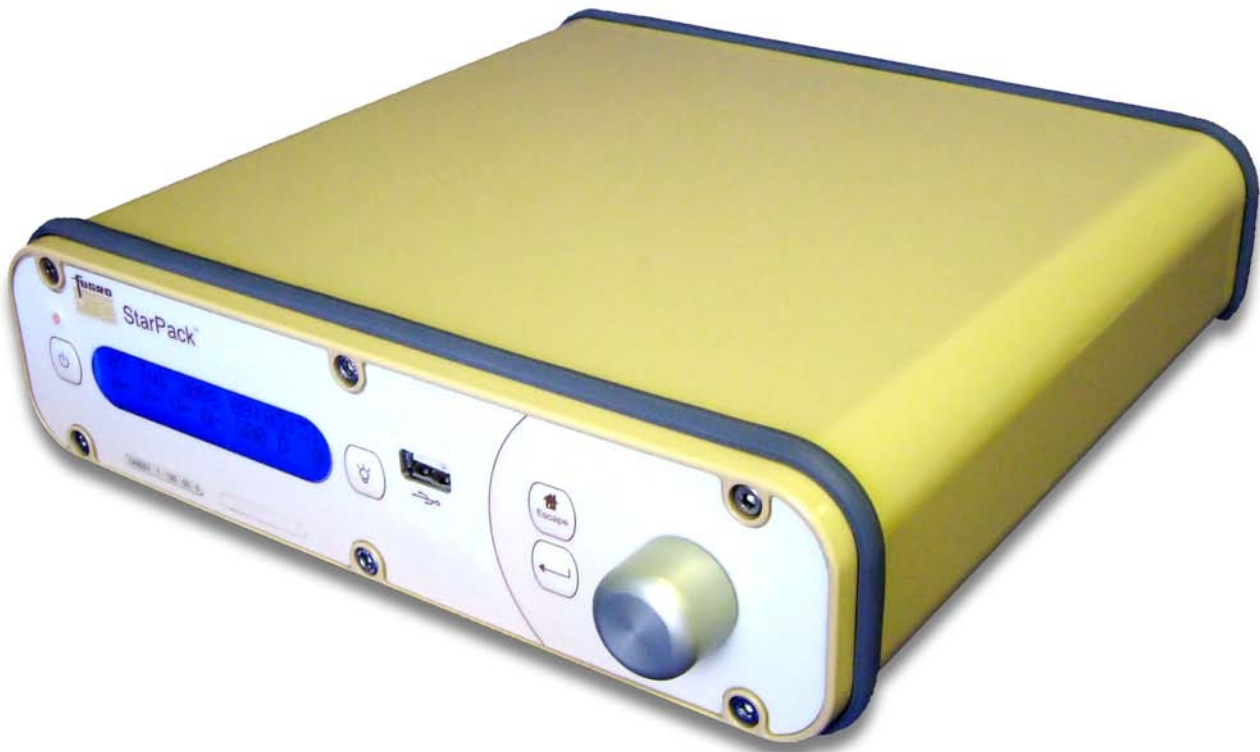
If you have problems that you cannot solve, bugs that you have detected, or new features that are needed to perform things better, please give feedback to the developers, as they cannot fix things if not told about them.

- For situations that are immediately critical, the helpdesk can be contacted by phone.
- For situations that are not critical, write as full a description of the problem, and the occurring situations, with a description of your hardware. Similarly for a feature request - new feature or change of current. Send this information to the address below (email is quicker), and send a copy to your regional manager.

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2. INTRODUCTION



This document assumes that the user has an understanding of GPS hardware installation, so it does not contain warnings and instructions for antenna installation and power connection.

The StarPack is the successor to the Starfix.HP Mobile, a compact receiver comprising of the following:

1. NovateIOEMV GNSS and Demodulator card.
2. Second NovateIOEMV GNSS and Demodulator card (Optional).
3. 4 Gigabyte USB flash memory for storage of raw data.
4. SPM software.
5. Four RS232 Com ports.
6. LAN interface.
7. USB interface for firmware uploads and the download of stored raw data.
8. Front panel display with backlight control.

Connection between NovateIOEMV card and SPM is via internal USB port.

Current limitations of the StarPack:

1. Although the StarPack has been designed so that two NovateIOEMV cards can fitted, the second card can currently only be used for Starfix.Heading purposes. Only for the first NovateIOEMV card will you be able to select an Uplink Satellite. The SPM Menu does not allow you to select an Uplink channel for the second NovateIOEMV card.
2. Com 3 and Com 4 are currently not functional.

These features will become available in future StarPack releases.

Throughout the StarPack menu we have tried to use GNSS wherever GPS would have been used. This is to indicate that we expect the StarPack to be able to process Glonass/Galileo data when it becomes available.

3. INSTALLING AND BOOTING THE STARPACK

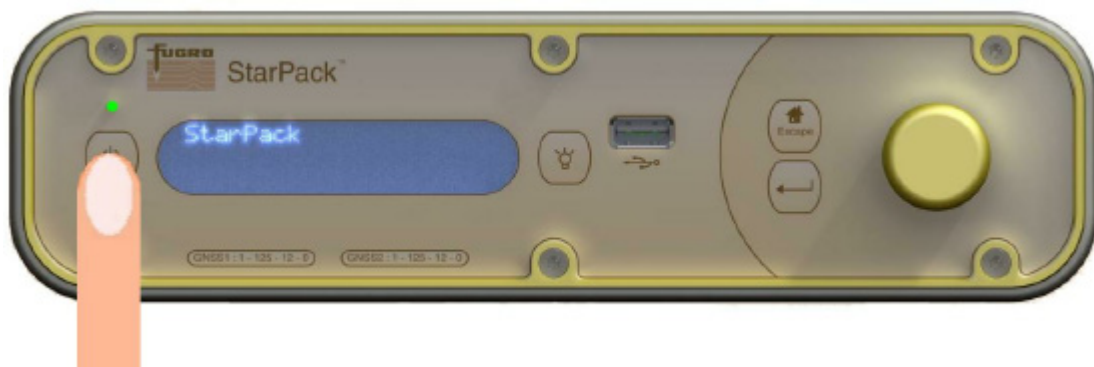
3.1. HARDWARE INSTALLATION


To install the StarPack, place the Alison 941 antenna at an open outside location. Connect the antenna to the StarPack with the antenna cable.

Optionally connect a monitor and keyboard, see item 6. Monitor, Keyboard and SPM Menu.

3.2. SWITCHING ON AND OFF

Connect the power cord.



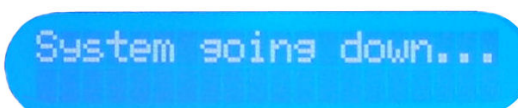
Switch the StarPack ON by pressing the power button:  While the StarPack is booting the LED will flicker. The boot process may take up to 90 seconds, during which the following should be displayed:



Once complete, a screen similar to the following will be displayed:

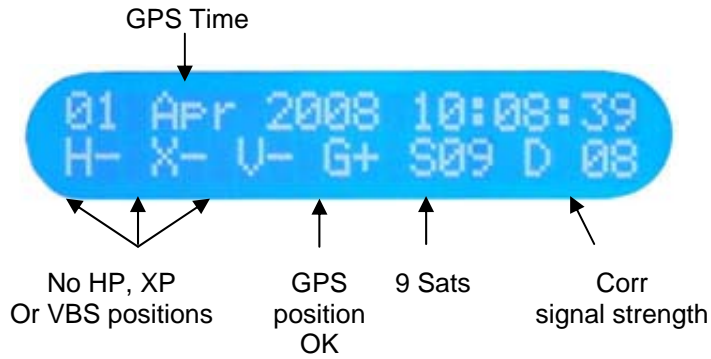


To switch the unit OFF, hold the button for a couple of seconds until the front panel LED starts flashing and the message "System going down..." is displayed.



If the StarPack is switched OFF and the power is still connected, the LED will be red.

3.3. GETTING STARTED

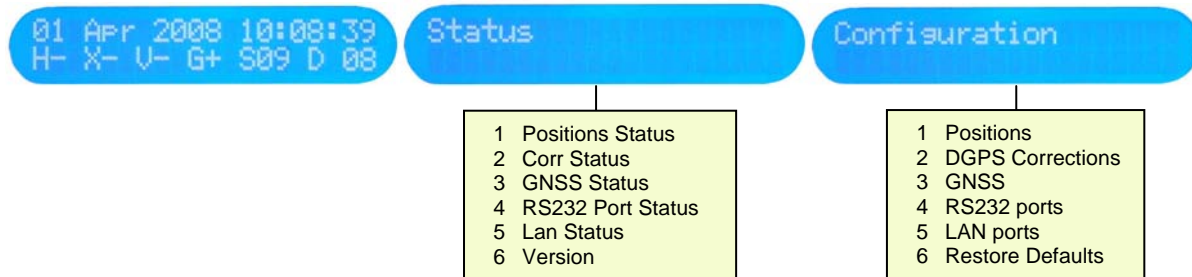


The main menu, example above, indicates that the GPS Position is being received (G+), GPS Time is also displayed. HP, XP and VBS positions are not displayed at this time as a Fugro correction Satellite has not yet been selected to provide corrections.

If the display does not show Date and Time or G+, ensure that your antenna location is suitable for GPS reception and that all cables and connectors are of good quality. If your antenna is in a good location and the cables are good, but the problem persists then refer to item [8. Stations](#).

4. FRONT PANEL

4.1. FRONT PANEL MENU



The front panel menu consists of two main sections: the Status menu and the Configuration menu. For in-depth information regarding the menu structure see item 16. [Front Panel menu structure](#).

At each level rotate the knob to cycle the menu items.

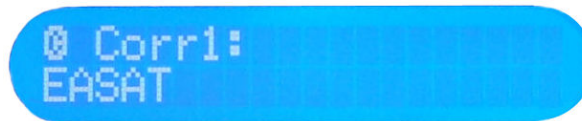
To go forward or down one level, push the knob or press the ENTER button:



To go back or up one level, press the ESCAPE button:





All menu items in the Configuration section are recognizable by the © at the start of the display, e.g.



4.2. FRONT PANEL BUTTONS

Rotate the knob to cycle through the menu system, whenever you want to select a menu item you either push the knob or press the Enter button.

This is indicated in the manual as follows:

- Cycling through the menu
- Push the knob
- Press the Enter  button
- Press the Escape  button



To modify a setting, press the Enter button or push the knob. Rotate the knob until the required setting is displayed and then press the Enter button.

The selection of stations is slightly different; this is described in item 8.1.

5. NOVATELOEMV CARD

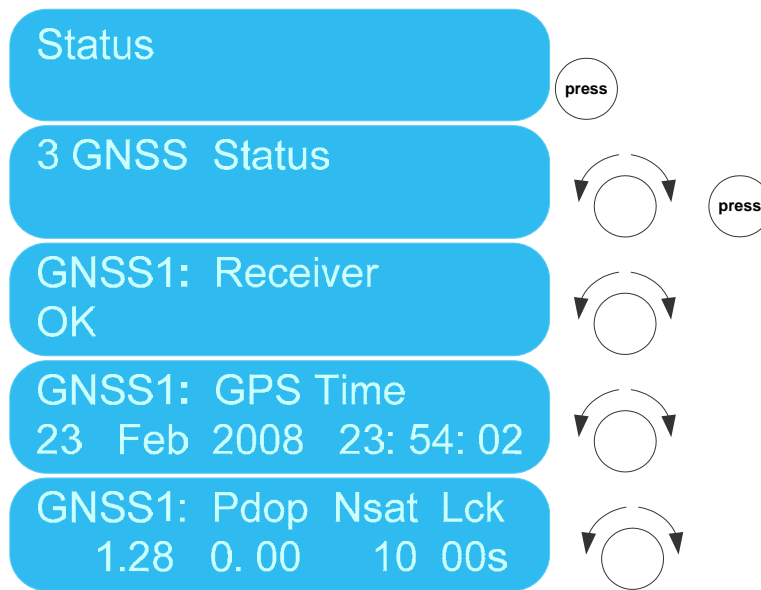
After delivery and switching on the StarPack your first check should be to verify that the SPM software has synchronised with the NovateIOEMV card correctly.

The SPM software and NovateIOEMV card communicate via a USB connection.

5.1. CHECK SPM AND NOVATELOEMV CARD SYNCRONISATION

Check that the NovateIOEMV Card has initialised and that GNSS working.

1. On the front panel go to Status >3 GNSS Status > and scroll through the displays:



Currently Pdop and Lck are not implemented on the front screen so both will display 0.

Alternatively, if you have a keyboard and monitor connected to the unit, you can check the status as detailed below (items ringed in yellow):

1. In the “Devices” section, ensure that USB1 is showing receiving (Rx) bytes.
2. In the “Satellites” section, ensure that there are GPS satellites allocated.
3. In the “Demodulator” section, ensure that the Demodulator type is set to Novatel and that you have a valid license (EXP/Days left and Services).

POSITIONS		skyfix.XP [2]		14 Feb 2008	
10:12:02	starfix.HP/XP [1]	SPM			
	NO POSITION				NO POSITION
STATIONS					
		H	L	D	
1.Leidschendam	LH 521	10	10		0km 5.Toulouse LDH 431 H8 L8 D8 972km
2.Aberdeen	LDGH 571	11	10		705km 6.Vienna LH 480 H7 L7 972km
3.Rogaland	L H 580	10	10		759km 7.Torshavn LDH 620 11 11 1292km
4.Shannon	LH 530	12	12		907km 8.Trondheim LDGH 632 10 10 1309km
SATELLITES					
PRN: 3 16 18 19 21 22 27					PRN: 3 16 18 19 21 22 27
E1v:80 24 38 61 13 55 9					Azm:17 18 6 29 6 11 29
SN1:52 44 49 51 43 51 38					LK1:56s56s56s56s50s56s48s
SN2:50 41 45 51 40 49 23					LK2:56s56s56s56s45s56s30s
DEVICES					
COM1:None	115200 Rx:0				Tx:0
COM2:GNSS2	115200 Rx:0				Tx:0
COM3:None	9600 Rx:0				Tx:0
					COM4:None 9600 Rx:0 Tx:0
					USB1:GNSS1 460800 Rx:1182 Tx:0
					USB4:None 400000 Rx:0 Tx:0
DEMODULATOR					
Type: Novatel	Uplink: None	521: HL	431: HLD	371: HL	410: HL
S/N : 0	Freq :1535152500	571: HL	480: HL	352: HL	700: HL
EXP : 10 Jan 2009	Actual:1535152441	580: HL	620: HL	690: HL	780: HL
Services : LPGHX	Qual. : 0	530: HL	632: HL	500: HL	280: HL

6. MONITOR, KEYBOARD AND SPM MENU

It is not required that you connect a Monitor and Keyboard to the StarPack; however, access to additional status information is available with a monitor and keyboard fitted.

During item 9.4 accessing SPM (Mux) via LAN, we will discuss how you can use IOWIN and SPMRemote.exe (SPMMon) program to access the same information.

6.1. CONNECT A MONITOR AND KEYBOARD.

1. Plug the monitor / keyboard adaptor, supplied, in the back of the StarPack.
2. Connect a monitor and keyboard to the adaptor.
3. Press the space bar on the keyboard to activate. There is a screen saver built in, pressing the space bar will restore the screen.

POSITIONS													
10:03:43 starfix.HP/XP [1]				SPM				skyfix.XP [2]				14 Feb 2008	
52°05'46.871"N 0.04 N8 F0.2 D1.8 09s				52°05'46.869"N 0.03 N8 F0.1 D1.8 15s									
4°24'21.911"E 0.03 R 1 L 18h				4°24'21.919"E 0.03 R 1 L 18h									
+57.86 0.07 H1-6:X				+57.80 0.06 X									
STATIONS													
1. Leidschendam LH 521			H	L	D	0km 5. Toulouse LDH 431			H	L	D	972km	
2. Aberdeen LDGH 571			11	11		705km 6. Vienna LH 480			HS	L9		972km	
3. Rogaland L H 580			11	11		759km 7. Torshavn LDH 620			11	11		1292km	
4. Shannon LH 530			11	11		907km 8. Trondheim LDGH 632			10	11		1309km	
SATELLITES													
PRN: 3 8 15 16 18 19 21 22				PRN: 3 8 15 16 18 19 21 22									
Elv:83 13 8 28 40 57 16 53				Azim:19 32 2 18 6 29 6 12									
SN1:52 36 39 47 49 51 46 51				LK1:03h31s06m04h02h02h05h01h									
SN2:50 32 35 40 46 50 37 49				LK2:03h30s06m04h02h02h05h01h									
DEVICES													
COM1:None 115200 Rx:0			Tx:116			COM4:None 9600 Rx:0			Tx:0				
COM2:GNSS2 115200 Rx:0			Tx:301			USB1:GNSS1 460800 Rx:1309			Tx:0				
COM3:None 9600 Rx:0			Tx:0			USB4:None 460800 Rx:0			Tx:0				
DEMODULATOR													
Type: Novatel		Uplink:		EASAT 521:HL		431:HLD		371:HLD		410:HLD			
S/N : 0		Freq :1535152500		571:HL		480:HL		352:HLD		700:HL			
Days left: 169		Actual:1535152442		580:HL		620:HL		690:HL		780:HL			
Services : LPGHX		Qual. : 41.33		530:HL		632:HL		500:HL		280:HLD			

6.2. FRONT PANEL MENU AND SPM MENU

The User Interface (UI) via Monitor or SPMRemote utilizes the same SPM menu structure as for the HP Mobile, except with the additional information for LAN access/connections, dual GNSS Card and other add-ons.

The front panel UI has a revised menu structure and you are advised to use the front panel for setting up the StarPack.

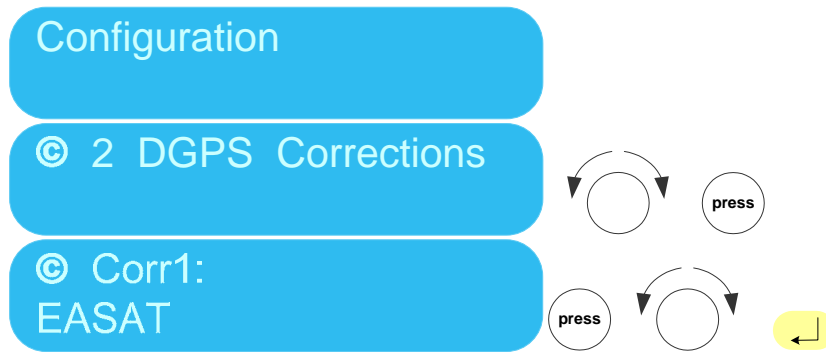
The SPM also displays those settings that have been automatically configured, which the front panel display does not. Status displays (F1 to F6) within the SPM are for reviewing the performance of the StarPack as opposed to the status display on the front panel.

7. CORRECTION SATELLITES

On initial startup the StarPack will need to be configured for your location with the correct Fugro Corrections satellite selected.

7.1. SELECT CORRECTION SATELLITE

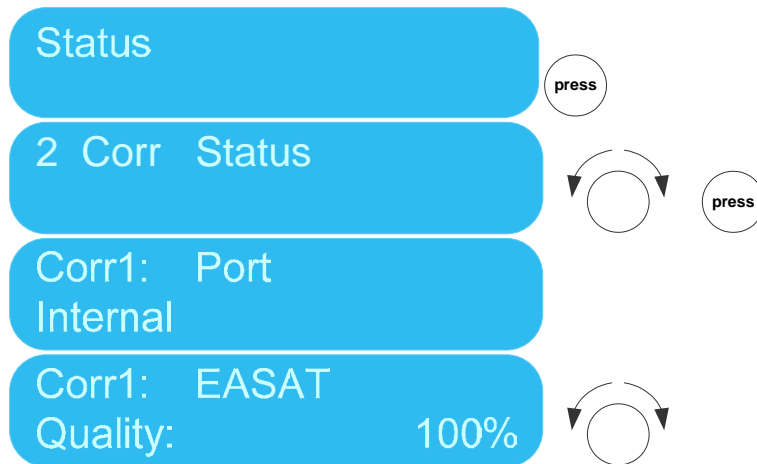
1. With the combined GPS / Demodulator antenna connected go to the Configuration -> DGPS Corrections -> Corr1: Satellite menu.



7.2. VERIFY SATELLITE CORRECTION RECEPTION

Verify that the corrections are received:

1. You can use the F1 screen on the monitor in the "Demodulator" section.
2. Alternatively go to the Status Menu on the front panel.



8. STATIONS

The SPM software works with a station list. The station list is a list of all stations on the uplink channel of Corr1. Only the stations in the station list are available for selection from the Positions menu for both HP and VBS.

The stations are sorted on distance from current location using your standalone GPS position.

8.1. STATIONS USED IN HP AND VBS SOLUTION

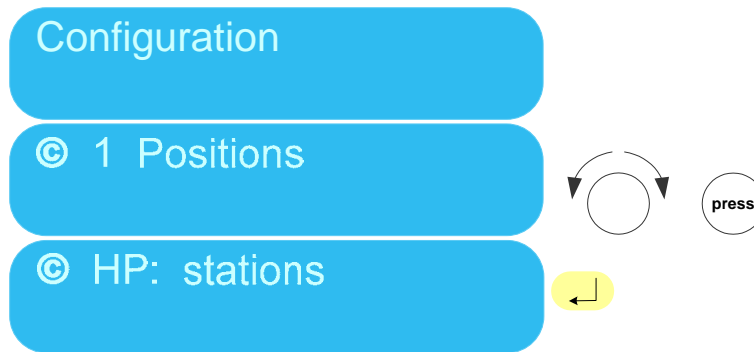
The following procedure describes the station selection for HP; the same can be applied for VBS.

1. To create a station list:

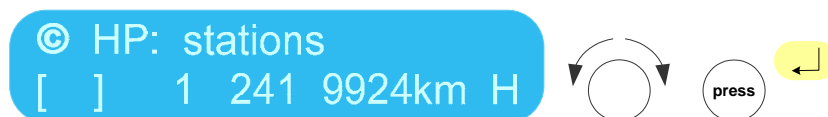


Please note that selecting this menu item will stop/start the SPM program and cause a reset.

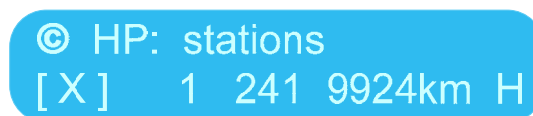
2. Select stations for HP:



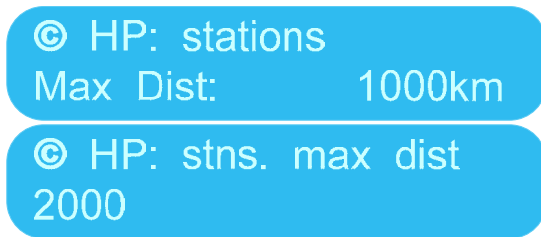
After pressing Enter, a list is presented showing stations that broadcast HP corrections. Rotate the knob to cycle through the list.



When you push the knob an X will appear in the brackets to indicate that the station is selected for use. Pushing the knob again will de-select the station. Press the Enter button to accept your selection.



3. Check that the following two settings are as you prefer: Max Distance and Use XP Corrections?

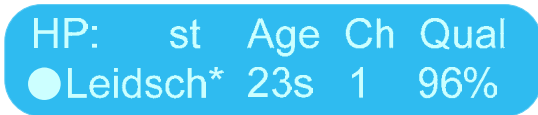
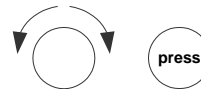
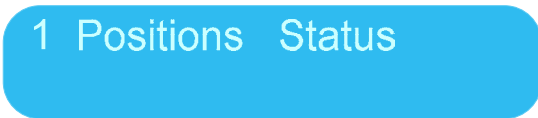


Please note that any changes made here will result in the unit rebooting.

8.2. VERIFY HP CALCULATION RECEIVES STATION CORRECTIONS

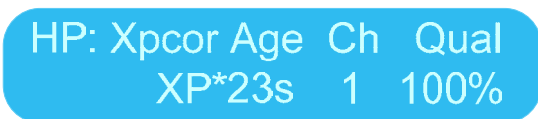
Verify that HP is using the stations:

1. You can use the F1 screen on the monitor in the “Stations” section.
2. Alternatively go to the Status Menu on the front panel.



This menu item indicates per station

- * indicates it is used
- Ch shows the Correction channel that this station is from.
- Qual indicates the Quality of this Correction channel.



Note: this menu item is not yet implemented in SPM 6.00.01. XP 00s, Ch 0 and Qual 0% will be displayed

9. LAN ACCESS

Currently LAN access is available for:

- Outputting Positions and Heading in all available formats.
- Outputting HPQC messages.
- Outputting RTCM Corrections.
- Connection to SPMRemote.exe via IOWIN.
- Relay of Corrections or Raw GNSS.
- Reading in Corrections from other sources.
- Reading in GNSS from another receiver for Heading.

There are 32 LAN ports available. The first 19 ports are preconfigured for use. They are configured to use the Base UDP Port concept. That means that the UDP port that is used is a fixed increment from the Base Port as set by the user. If the Base Port is x then LAN 5 uses UDP Port x+5.

The default Base UDP Port is a number dependent on the StarPack serial number, the formula is $10000 + \text{serial_number} * 100$. For example for StarPack serial number 0035, the Base Port is 13500. This is so that multiple StarPacks won't broadcast on the same UDP Ports. The serial number can be found on the sticker on the side of the StarPack, it is in red letters.

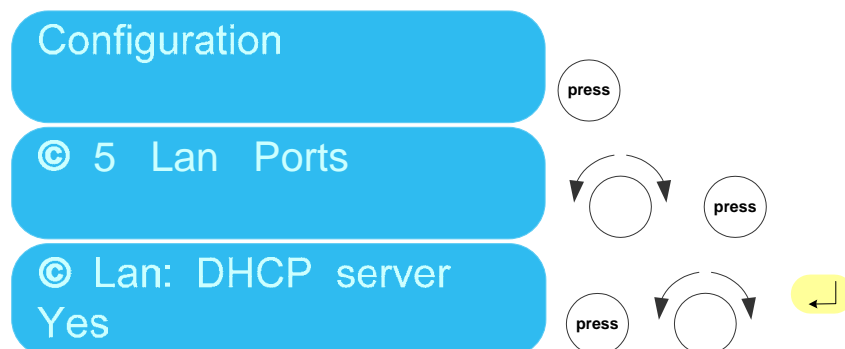
All pre-configured Output LAN Ports are by default set to "broadcast". This is so that the user will always be able to receive the data without having to modify the StarPack configuration; alternatively the user can set a specific IP address that the output should be available to.

Note: This means that any and all computers in your network will be able to receive StarPack data.

Apart from the 19 pre-configured LAN Ports, there are 12 user configurable LAN Ports.

9.1. SETUP LAN ACCESS

1. Connect StarPack to computer network using a LAN network cable.
2. On the front panel go to Configuration -> 5 LAN ports > Lan: DHCP Server.



3. Select **Yes** to DHCP server if you have a Domain Server on your network and you wish the server to assign an IP Address to the StarPack. Select **No**, if you wish to assign an IP Address manually.

- 4. If you opted to use a DHCP server, then the server should assign an IP address at next boot, providing that the StarPack is connected to the network. Go to the next menu item Lan: My IP and check that IP Address and Subnet Mask have been assigned.

© Lan: My IP- assigned
192. 168. 001. 001

© Lan: Subnet Mask
255. 255. 000. 000- asd

- 5. If you selected **NO** you will need to configure the IP address and Subnet Mask.

Configuration

© 5 Lan Ports

© Lan: DHCP Server
No

© Lan: My IP

Cursor will flash at first location

© Lan: My IP
█

Press, then rotate the knob to set value

© Lan: My IP
192. █

Press knob again to proceed to set next value.

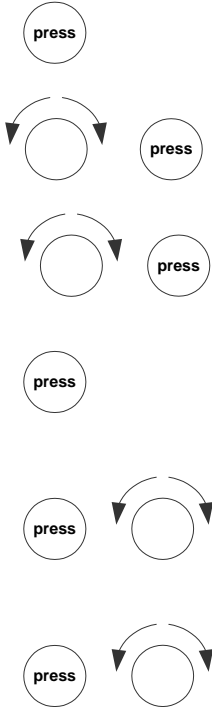
Repeat for all 4 locations then press Enter.

OK

A preset range of values are available for setting the Subnet Mask.

- 6. Set the base port. The default base port number is 10000 +serial_number*100. For example for StarPack serial number 0035, the Base Port is 13500.

© Lan: Base Port
13500



9.2. LAN CHANNELS

There are 32 LAN channels available using UDP with LAN 1 through to LAN 19 preconfigured as detailed below:

```
Lan1 HP Position: output format
Lan2 XP Position: output format
Lan3 VBS Position: output format
Lan4 HDG Heading: output format
Lan5 GPS Position: output format
Lan6 Raw GPS1
Lan7 Raw GPS2
Lan8 HPQC
Lan9 RTCM
Lan10 Corr1 relay
Lan11 Corr2 relay
Lan12 Corr3 relay
Lan13 Corr4 relay
Lan14 SPM (Mux)
Lan15 Corr2 : input from external demod
Lan16 Corr3 : input from external demod
Lan17 Corr4 : input from external demod
Lan18 GPS Ext2 : input from external GNSS
Lan19 GPS Relay for Heading: UDP Port
```

The concept of a base port is used to set the UDP port for each of these channels e.g. if the base port is 13500, then the UDP Port of LAN 1 is 13501, for LAN 2 is 13502 etc.

All pre-configured Output LAN Ports are set to "broadcast" on IP 255.255.255.255 this means that any and all computers in your network can receive data without you having to change any settings in the StarPack. A specific "broadcast" IP address can be configured manually where required.

Special cases are LAN 1 to 5 and LAN 19, which require additional options:

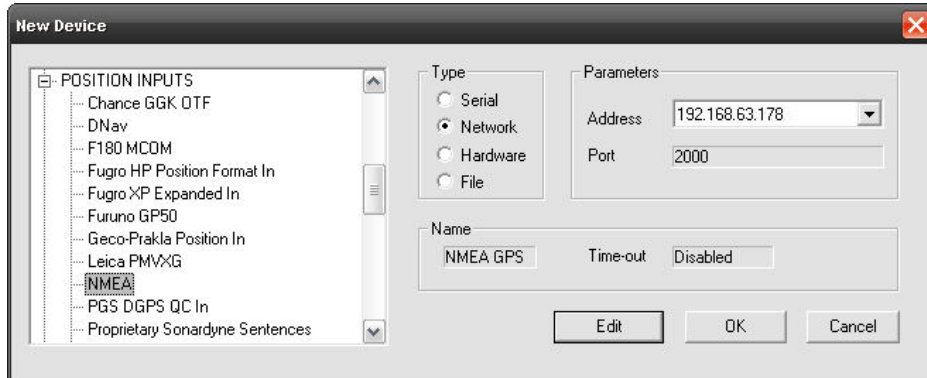
LAN1 to 5 the user can select output format (NMEA, HP_Monitor, etc.); the default is NMEA.

LAN 19 is an 'input channel', meaning that it receives data; the UDP port can be manually configured.

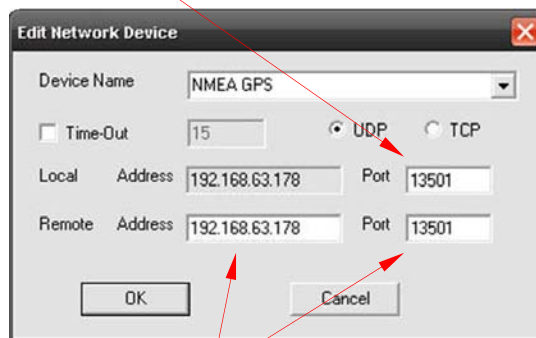
The most likely source of the external data is another HP.

9.3. ACCESSING HP POSITIONS NMEA VIA LAN

1. From a PC on the network start Starfix.IOWIN. From the Menu select Device, New, expand POSITION INPUTS and select NMEA, ensure Type "Network" is selected.



2. Click the Edit button.
3. Ensure that the Local Port is 13501 (i.e. Base Port plus 1).



The values in the fields Remote Address and Port are not relevant.

9.4. ACCESSING SPM (MUX) VIA LAN

SPMRemote is known as SPM (Mux) in the StarPack.

Although traditional Mux access is still available, LAN access via SPMRemote is preferred as it provides the same capabilities but is an easier environment to work in.

Mux Channel 4 (14) is pre-configured to contain Demodulator data from Internal Demodulator and Channel 6 (16) is pre-configured to contain GNSS data. Relay of incoming data is OFF by default.

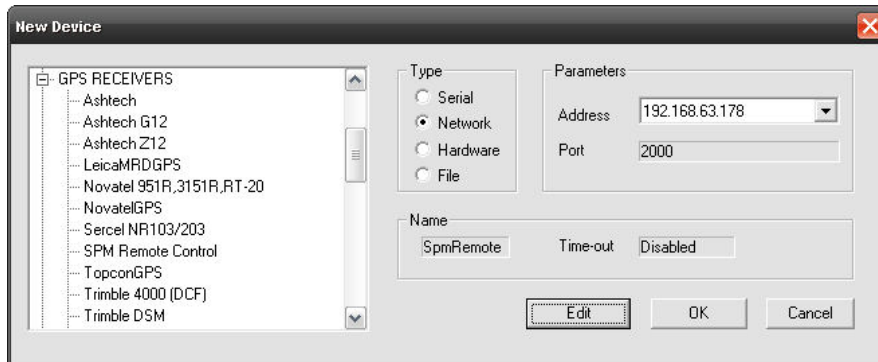
The SPM LAN connection is two-directional: sending and receiving. The LAN settings in the StarPack are set to 'broadcast' by default.

Prior to starting SPMRemote you will have to specify the IP address of the StarPack in IOWIN. On starting SPMRemote, the StarPack will automatically change its broadcast address to be compatible with the IP address of the PC that is communicating with.

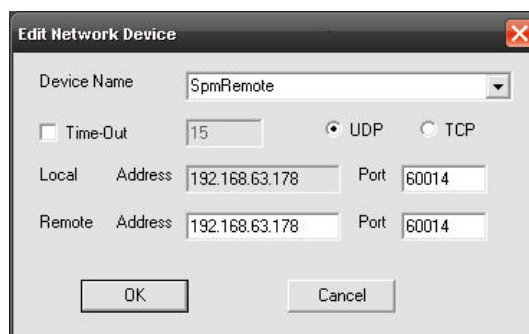
9.5. ACCESSING THE STARPACK VIA LAN

Note: For Firmware prior to version 6.01.00, see item [9.5.1. Workaround for SpmMux \(Lan14\) incorrect default setting.](#)

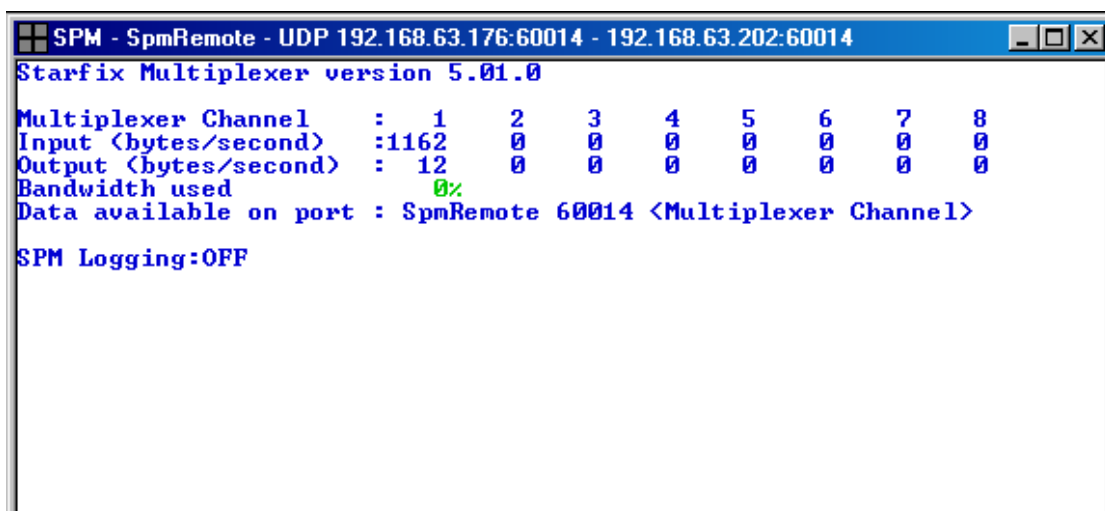
1. From a PC on the network start Starfix.IOWIN. From the Menu select Device, New, expand GPS RECEIVERS and select SPM Remote Control, ensure Type "Network" is selected.



2. Click the Edit button.



3. For SPM (Mux), the Remote Address in the IOWIN configuration is relevant – as opposed to the example above of NMEA output through LAN. Choose the IP Address of the StarPack under Remote Address. The Port is Base Port plus 14 (if Base Port is 60000, then UDP Port is 60014 – 13500 then 13514 etc), both for Local and Remote.



4. You may see some numbers immediately, but also you may see them only after you have started the SPMRemote program.
5. Use Right Mouse click -> Configure to start the SPMRemote program and then select the SPMRemote instance as per the IOWIN name.

POSITIONS																	
10:03:43 starfix.HP/XP [1]				SPM				skyfix.XP [2]				14 Feb 2008					
52°05'46.871"N				0.04 N8 F0.2 D1.8 09s				52°05'46.869"N				0.03 N8 F0.1 D1.8 15s					
4°24'21.911"E				0.03 R 1 L 18h				4°24'21.919"E				0.03 R 1 L 18h					
+57.86				0.07 H1-6:X				+57.80				0.06 X					
STATIONS																	
1.Leidschendam			LH 521			0km 5.Toulouse			LDH 431			972km					
2.Aberdeen			LDGH 571			705km 6.Vienna			LH 480			972km					
3.Rogaland			L H 580			759km 7.Torshavn			LDH 620			1292km					
4.Shannon			LH 530			907km 8.Trondheim			LDGH 632			1309km					
SATELLITES																	
PRN: 3 8 15 16 18 19 21 22						PRN: 3 8 15 16 18 19 21 22											
Elv:83 13 8 28 40 57 16 53						Azm:19 32 2 18 6 29 6 12											
SN1:52 36 39 47 49 51 46 51						LK1:03h31s06m04h02h02h05h01h											
SN2:50 32 35 40 46 50 37 49						LK2:03h30s06m04h02h02h05h01h											
DEVICES																	
COM1:None				115200 Rx:0				Tx:116				COM4:None					
COM2:GNSS2				115200 Rx:0				Tx:301				USB1:GNSS1					
COM3:None				9600 Rx:0				Tx:0				460800 Rx:1309					
												Tx:0					
												460800 Rx:0					
												Tx:0					
DEMODULATOR																	
Type: Novatel			Uplink: EASAT			521:HL			431:HLD			371:HLD			410:HLD		
S/N : 0			Freq :1535152500			571:HL			480:HL			352:HLD			700:HL		
Days left: 169			Actual:1535152442			580:HL			620:HL			690:HL			780:HL		
Services : LPGHX			Qual. : 41.33			530:HL			632:HL			500:HL			280:HLD		

- After you have started the SPMRemote program, the StarPack receives the IP Address of the PC and will update the remote address for LAN 14.

Note: For Firmware prior to version 6.01.00, see item [9.5.1. Workaround for SpmMux \(Lan14\) incorrect default setting](#).

Lan14 SPM MuxOut
192. 168. 63. 178

This IP address should not be changed manually!

The same menu is available as:

SPM Main Menu	
LAN PORT SETTINGS MENU	
LAN Port.	: 14 of 32
Local Port.	: 60014
Mode.	: Dynamic
Remote Address.	: 192.168.63.176
Remote Port	: 60014
Input Type	= Mux
Multiplexer	= Mux1
LAN Port Summary.	>>

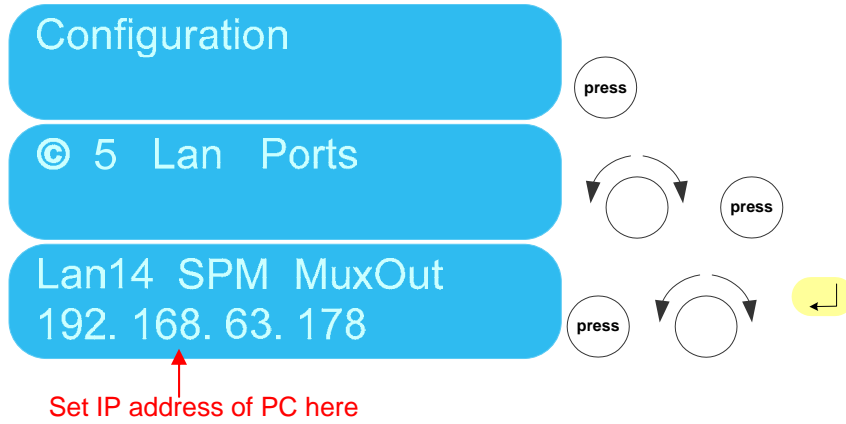
Notice the setting 'Mode : Dynamic', this indicates two way traffic.

9.5.1. Workaround for SpmMux (Lan14) incorrect default setting

This workaround applies to StarPack units with Firmware versions prior to 6.01.00 only.

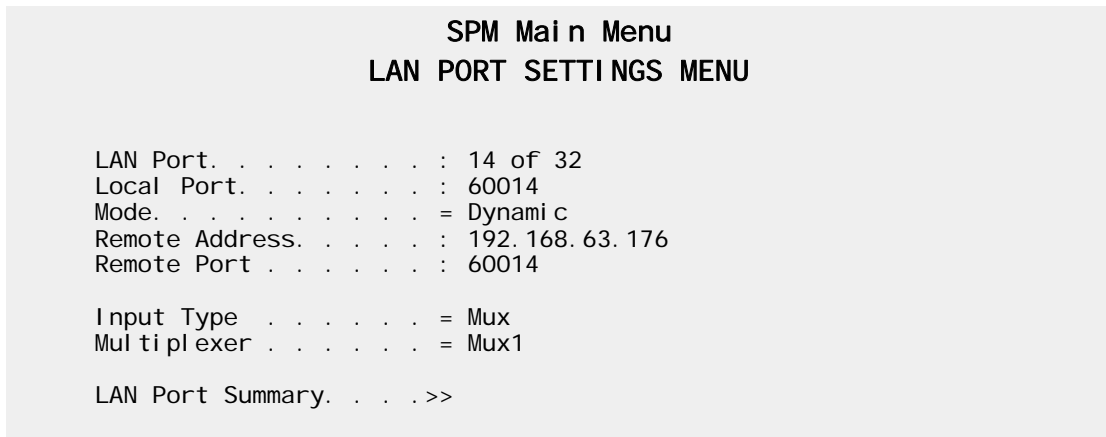
There are two workarounds available.

The easiest workaround is that the IP address of the PC is entered in the SPM front panel.



Alternative workaround is to make a change the SPM Menu using a monitor and keyboard.

1. Connect monitor and keyboard. See item [6.1. Connect a Monitor and Keyboard](#) for details.
2. Access the SPM Menu by pressing Enter on the keyboard.
3. Go to Lan Ports
4. Go to Lan 14. You can do this by pressing Page Down until Lan 14 appears.



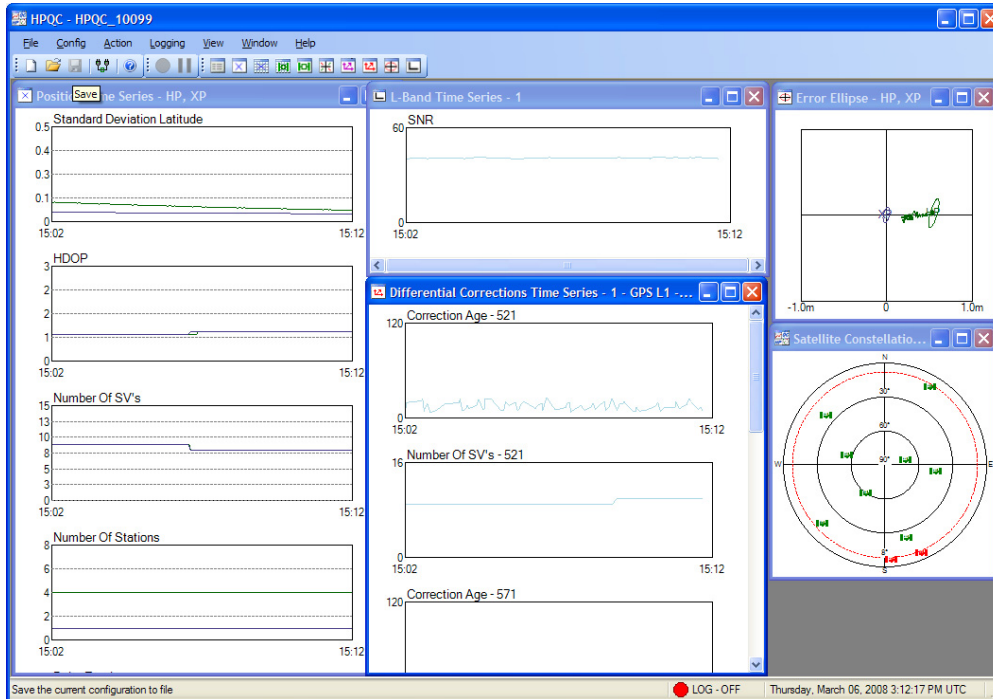
5. Change the Mode from Static to Dynamic.
6. Then press F1 to accept this change.
7. Stop and start the SPM software. This is easiest done using the On/Off button, but can also be done in the SPM Menu -> Stop Program.

Notice the setting **Mode = Dynamic**, this indicates two way traffic between the StarPack and a PC with the IP address detailed in **Remote Address** running SPM Remote Control. From Firmware version 6.01.00 the **Mode = Dynamic** has been hardwired and cannot be changes by the user.

Lan Port Summary is currently not available.

9.6. HPQC VIA LAN

HPQC is a QC program for monitoring the performance of the StarPack and HP solution, supporting both TCP/IP LAN and RS232.



10. RS232 PORTS

Com 1 and Com 2 are RS232 ports on the internal PC. Com 3 and Com 4 are RS232 ports via the NovatelOEMV card. Com 3 is NovatelOEMV Port A and Com 4 is NovatelOEMV Port B. If one NovatelOEMV card inside, then Com 4 is NovatelOEMV Port B.

Com 3 and Com 4 are currently not available from the SPM menu in the StarPack.



11. RAW GPS

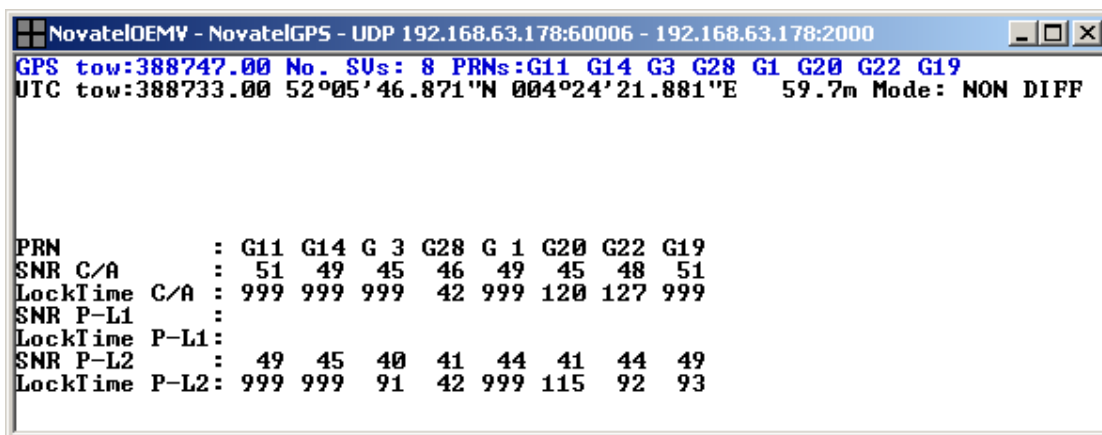
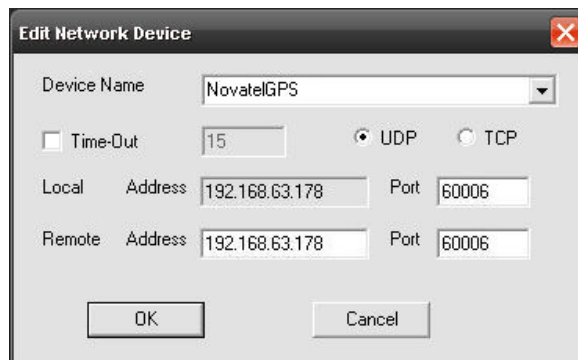
Raw Novatel GNSS data is available both via LAN and RS232 ports. However, this data is not directly from the Novatel card, but rather via SPM. It is therefore not possible to use external software to send commands to the GNSS card via Com 1 or Com 2, see item 11.2 GPS Commands, e.g. Request Ephemeris.

11.1. ACCESSING RAW GPS

1. Verify the settings in the StarPack:



2. From a PC on the network start Starfix.IOWIN. From the Menu select Device, New, expand GPS RECEIVERS and select NovatelGPS, ensure Type "Network" is selected.
3. Click on the Edit button and ensure that the Local Port is 60006 (if Base Port is 60000).



Note: During development testing we have occasionally observed the following message appearing for the NovatelGPS driver in Starfix.IOWIN: "An existing connection was forcibly closed by remote host". The error is under investigation, but doesn't appear to cause lost data.

11.2. GPS COMMANDS, E.G. REQUEST EPHEMERIS

Ephemeris is requested via the SPM Menu:

```
SPM Main Menu
GNSS Receiver

GNSS Model Type . . . . . : Novatel OEMV
GNSS Instance . . . . . : GNSS1

Commands . . . . . : More Commands
Command. . . . . : Request Ephemeris
```

Ephemeris cannot be requested via Starfix.MRDGPS or the Configuration menu for the Novatel driver.

12. ACCESSING EXTERNAL DEMODULATORS

12.1. THE CORRECTION CHANNELS.

Corrections from external demodulators (e.g. 4100 receivers) can be accessed via RS232 or via the LAN:

- from an external demodulator interface via the RS232 Ports (maximum 4 channels) or
- from an external demodulator interface via the LAN (maximum 3 channels, LAN 15, 16 or 17).

The SPM can handle a maximum of 4 channels; these 4 channels are called Corr1, Corr2, Corr3 and Corr4.

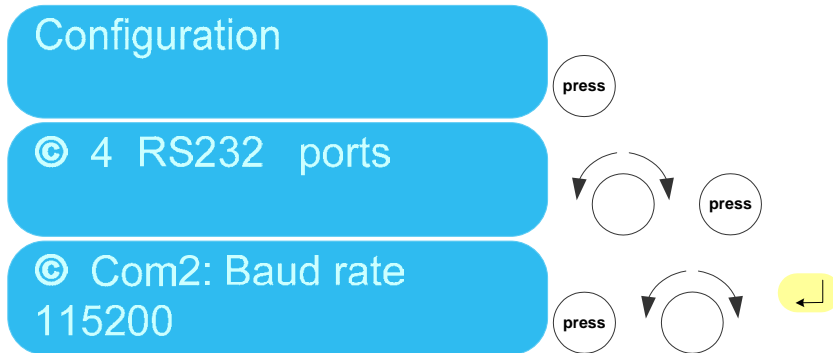
Corr1 is always assigned to the internal demodulator of the primary Novate!OEMV card. If a second Novate!OEMV card is installed, then this card will be assigned to Corr2 automatically, and only Corr3 and Corr4 are free to receive corrections via RS232 or LAN ports. If no second Novate!OEMV card is installed then Corr2 will also be free to receive corrections via RS232 or LAN.

As a user you can configure the menu such that the corrections are being received either via RS232 or LAN or both, but you have to assign a Corr channel to each instance. The Status menu it will display each Corr channel and what interface it is using.

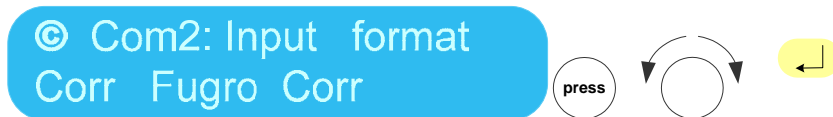
The StarPack can handle two formats: RTCM or "Fugro". Fugro format is the format from the Starfix network, also called SuperCompressed in Starfix.IOWIN.

12.2. ACCESSING EXTERNAL DEMODULATOR VIA RS232 PORT.

1. Connect a cable between the Demodulator and Com2 of the StarPack.
2. Set the baud rate of Com1 or Com2 in the StarPack.



3. Set format of the Corrections: this can either be RTCM or "Fugro".



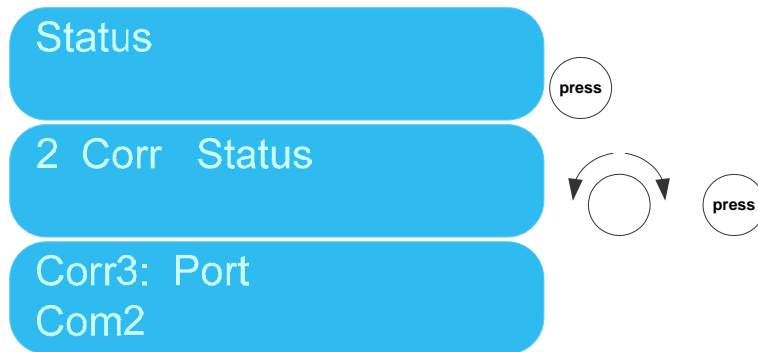
4. Set the Channel that this Correction information should be channelled through.



12.3. CHECK CHANNELS CORR1 TO CORR4

You can verify the following:

1. The interface being used by each Corr channel: Com port or LAN port?
2. The Status of each Station and which Corr channel is being used.
3. The quality of the Corr channel: %.



13. LOGGING

The following Logging facilities are available:

1. Continuous logging of raw data on the internal USB Flash card.
2. Logging of data by SPMRemote.

13.1. CONTINUOUS LOGGING TO USB FLASH CARD

```

POSITIONS
07:54:23 Starfix.HP/XP [1] Haha, Sonja Skyfix.XP [2] 21 Feb 2008
52°05'46.865"N 0.07 M11 F0.4 D1.4 17s 52°05'46.860"N 0.05 M11 F0.0 D1.4 19s
4°24'21.909"E 0.12 R 1 L 16h 4°24'21.917"E 0.08 R 1 C 21m
+58.68 0.20 H1-6:X +57.54 0.11 X

H L D STATIONS H L D
1.Leidschendam LH 521 11 11 0km 5.Toulouse LDH 431 11 11 972km
2.Aberdeen LDGH 571 10 10 705km 6.Vienna LH 480 10 10 972km
3.Rogaland L H 580 12 12 759km 7.Torshavn LDH 620 10 10 1292km
4.Shannon LH 530 10 10 907km 8.Trondheim LDGH 632 12 12 1309km

SAATELLITES
PRN: 3 6 16 18 19 21 22 24 25 27 29 PRN: 3 6 16 18 19 21 22 24 25 27 29
Elv:45 42 72 33 16 58 13 19 19 10 8 Azm:28 9 22 11 27 7 15 5 31 33 9
SN1:51 49 51 49 45 51 46 46 45 38 44 LK1:92m04h02h70m23m03h14m04h21m09m05h
SN2:46 47 51 41 42 50 40 39 38 35 36 LK2:91m04h02h70m23m03h14m04h21m09m05h

DEVICES
COM1:DGPS2 115200 Rx:100 Tx:1188 COM4:None 9600 Rx:0 Tx:0
COM2:None 115200 Rx:154 Tx:0 USB1:GNSS1 460800 Rx:1188 Tx:0
COM3:None 115200 Rx:0 Tx:313 USB4:None 460800 Rx:0 Tx:0
0553:spm/log/raw/spm31012.spm 12744Kb

DEMULATOR
Type: Novatel Uplink: AORE_ 521:HL 431:HL 371:HL 410:HL
S/N : 790496 Freq :1535090000 571:HL 480:HL 352:HL 700:HL
EXP : 06 Jan 2009 Actual:1535090592 580:HL 620:HL 690:HL 780:HL
Services : LPGHX Qual. : 0.00 530:HL 632:HL 500:HL 280:HL
    
```

By default you will find that Logging is switched on, this is the continuous logging to the internal USB Flash card.

Leave Logging On!

The data will start to overwrite itself from the beginning onwards, once the flash card is full. The continuous logging has been switched on for situations where the performance of the StarPack position solutions needs to be investigated, e.g. situations where the HP calculation would not calculate for unknown reasons.

To download the files, please contact Fugro Intersite B.V. at for directions.

The Logging menu is only accessible when enabling the Hidden Menus; see item 17.1.1 The Hidden menus (F8-H).

13.2. LOGGING SPM DATA THROUGH SPM REMOTE PROGRAM

See item 9.4 accessing SPM (Mux) via LAN.

14. SECOND GPS FOR HEADING

The StarPack units are supplied with either one or two NovatelOEMV cards. If your unit has only one card fitted then using the StarPack for Heading you will need a GPS receiver of the type AshtechZ12, Topcon or Novatel. These GPS receivers should be connected via Com1, Com2 or LAN.

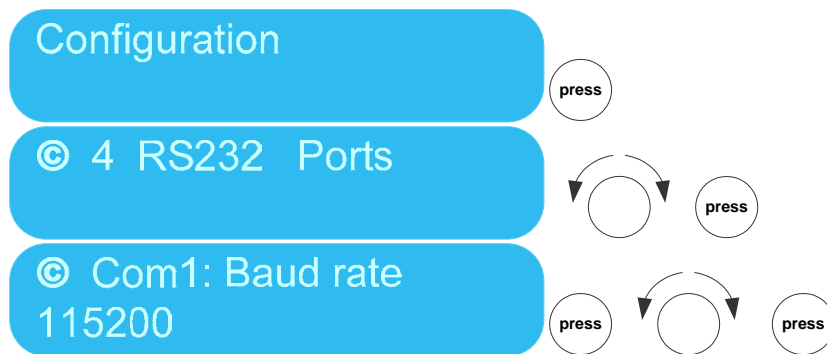
Item 14.1 details the method used for configuring the GPS Heading using a StarPack and an external GPS, e.g. an HP Mobile, connection via RS232.

Item 14.2 details the method used for configuring the GPS Heading using two StarPacks, connection via LAN

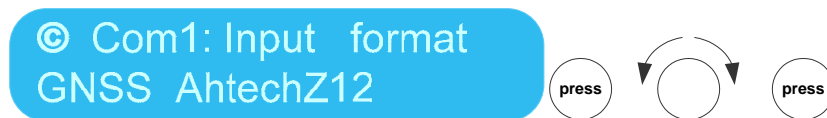
Please note that any changes made here will result in the unit rebooting.

14.1. ACCESSING EXTERNAL GPS FOR HEADING VIA RS232

1. Connect a cable between the GPS receiver and Com1 or Com2 of the StarPack.
2. Set the baud rate of Com1 or Com2 in the StarPack.

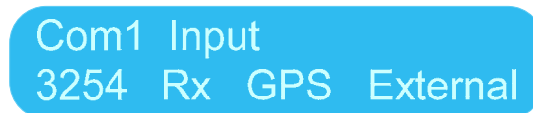


3. Set the type of GPS Receiver.



Important note: If the option GNSS AshtechZ12 (or GNSS Novatel, or GNSS Topcon) does not appear, then that means that the second GNSS channel, GNSS2, is in use elsewhere, most likely Lan18. Go to Lan18 and select "Type: None". This will free up GNSS2 channel and make it available for Com port use.

4. Check that the data is being received in the Status menu: Status -> RS232 Ports -> Com1 Rx.



5. Check that the Heading is correctly displayed in the Status menu: Status -> 1 Positions -> HDG.



14.2. ACCESSING EXTERNAL STARPACK FOR HEADING VIA LAN

When you have two StarPacks with single Novatel cards fitted you can use the LAN connection from both units to perform GPS Heading. GPS Heading can be done with a single StarPack providing it has two Novatel cards fitted.

This procedure is for when 2 StarPacks are used, for this exercise StarPack1 and StarPack2.

1. Install two StarPacks and connect both to a network.
2. Check the Base Ports of the two StarPacks. They should not be the same.
3. In this example the Base Port of StarPack1 is 60000 and that of StarPack2 it is 40000.
4. On StarPack2 go to the Configuration settings of LAN 19. Read the settings, this configures the sending of the GPS data.

© Lan19 GNSSExt Outp
IP: Broadcast

© Lan19 GNSSExt Outp
UDP Port: 40019

5. On StarPack1 go to the Configuration settings of LAN18 ensure GNSS Type is set to Novatel.

© Lan18 GNSSExt Inpt
GNSS Type: Novatel

Important note: If the option GNSS Type: Novatel does not appear, then that means that the second GNSS channel, GNSS2, is in use elsewhere. Most likely this is a Com port. Go to the Com ports and deselect any GNSS Input. This will free up GNSS2 channel and make it available for Lan port use.

6. On StarPack1, manually set the UDP Port to match the UDP Port of LAN19 of StarPack2.

© Lan18 GNSSExt Inpt
UDP Port: 40019

7. Verify that StarPack1 is receiving data on LAN18.

Lan18 GPS for Heading
3254 Rx Novatel

6. On StarPack1 check that the Heading is displayed in the Status menu: Status -> 1 Positions -> HDG.

```

HDG: OK
msg: xxxxxxxx

HDG:      Sd      Ratio
      0.23      1.01

HDG: Heading Distance
      120.23° 131.01m
  
```

The same menus are also available on the Monitor.

On StarPack2:

```

                SPM Main Menu
          LAN PORT SETTINGS MENU

LAN Port. . . . . : 19 of 32
Local Port. . . . . : 40019
Mode. . . . . : Static
Remote Address. . . . . : 255.255.255.255
Remote Port . . . . . : 40019

Output Type . . . . . = GNSS
GNSS Output . . . . . = GNSS1

LAN Port Summary. . . . >>
  
```

On StarPack1:

```

                SPM Main Menu
          LAN PORT SETTINGS MENU

LAN Port. . . . . : 18 of 32
Local Port. . . . . : 40019
Mode. . . . . : Static
Remote Address. . . . . : 255.255.255.255
Remote Port . . . . . : 40019

Input Type . . . . . = GNSS
GNSS . . . . . = GNSS2

LAN Port Summary. . . . >>
  
```

Note that on StarPack1 the incoming GPS data is assigned to GNSS2 channel.

Remember: GNSS1 is the internal channel, GNSS2 is either the second internal Novatel card or an external GPS connection, as detailed in item 14.2.

14.3. ONLY ONE GNSS CHANNEL FOR THREE INTERFACING OPTIONS

Please be aware that there is only one free GNSS channel available for interfacing. There are two GNSS channels: GNSS1 and GNSS2. GNSS1 is always in use for the first internal Novatel Card. This leaves GNSS2 available for a second internal Novatel card, or External GNSS via Lan18 or a Com port. If GNSS 2 is already in 'use' (at least configured to be in use), then it cannot be used elsewhere.

This is the most confusing part of this configuration. If the channel is already in use, then the options to interface won't appear elsewhere, and this means you will have to free up the channel before you can interface.

These are the locations where GNSS2 can be in use:

- Com1, 2, 3 or 4
- Lan 18
- Assigned to second internal Novatel card. This can be checked in the F1 display:

POSITIONS															
11:52:49 Starfix.HP/XP [1] StarPack Skyfix.XP [2] 23 Jun 2008															
52°05'46.544"N			0.04 N10 F0.1 D1.7 13s			52°05'46.549"N			0.03 N10 F0.0 D1.7 13s						
4°24'21.835"E			0.03 R 0 L 02h			4°24'21.835"E			0.02 R 0 L 02h						
+58.20			0.06 X			+58.06			0.05 X						
POSITIONS															
11:52:49 Starfix.UBS [3] Starfix.HDG [4] 23 Jun 2008															
52°05'46.566"N			1.78 N8 F0.6 D2.6 13s			Heading : 177.73deg			Sd : 1477.42d						
4°24'21.820"E			0.45 D			Dist_0-C: +0.00m			Ratio: 2966283						
+59.95			1.89 L1-4												
STATIONS															
1.Leidschendam LH 521				2.Aberdeen LDGH 571				5.Toulouse LDH 431				8.Trondheim LDGH 632			
3.Rogaland L H 580				4.Shannon LH 530				6.Vienna LH 480				7.Torshavn LDH 620			
H L D				H L D				H L D				H L D			
10 10				12 12				11 11 11				10 10 10 10			
0km				705km				759km				972km			
SATELLITES															
PRN: 7 8 10 13 15 21 24 25 26 27 28						PRN: 7 8 10 13 15 21 24 25 26 27 28									
Elv:34 72 68 8 25 10 26 15 38 43 27						Azm: 5 7 22 9 28 33 28 5 28 6 14									
SN1:48 51 51 42 45 34 45 44 49 48 49						LK1:02h02h02h02h47m05s75m02h68m02h48m									
SN2:47 51 50 33 43 0 32 39 45 47 45						LK2:02h02h02h02h47m00s75m02h68m02h48m									
PORTS															
COM1:None 115200 Rx:0 Tx:0				COM2:None 115200 Rx:0 Tx:0				COM3:None 9600 Rx:0 Tx:0				COM4:None 9600 Rx:0 Tx:0			
COM5:None 115200 Rx:0 Tx:0				COM6:None 115200 Rx:0 Tx:0				USB1:GNSS1 460800 Rx:5826 Tx:0				USB2:GNSS2 460800 Rx:5394 Tx:0			
0057:spm/log/raw/spm62311.spm 37747KB															

To free the GNSS channels:

- To free GNSS Channels in use in Com ports: go to Configurations->RS232 Ports -> Com port Input Format and de-select any GNSS Input
- To free GNSS Channels in use in Lan 18: go to Configurations->Lan Ports ->Lan 18 and select there "Type: None".

The GNSS2 channel assigned to an internal card cannot be freed up.

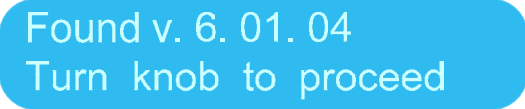
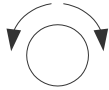
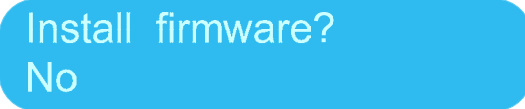

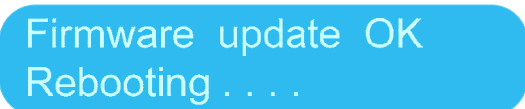
15. FIRMWARE UPLOAD PROCEDURE

The firmware upload procedure works via the external USB connection on the front panel.

It is only possible to upgrade the firmware; an older version of the firmware cannot be installed.

After you plug in the USB stick a message will appear as detailed a "2" below. The message will disappear after 40 seconds. You must unplug and re-plug the USB stick to get the message again.

The SPM software will continue to run while message appears; only when you have confirmed that you want to install the firmware will the SPM be stopped.

- 1 The firmware should be placed on your USB stick in a directory called StarPack.
- 2  After plugging in the USB stick a message appears after approximately 10 seconds.
- 3  After this you rotate the knob one click clockwise.
- 4  The following message appears.
- 5  Press the Enter button to confirm.
- 6  At this moment SPM will be stopped.
While firmware is uploaded following message appears:
After uploading the SPM will reboot.

The following messages may also appear:

Old firmware on USB
Nothing to do

Firmware has been found, but the file name of the firmware file indicates that this is a version older than the existing.

SPM continues to run while this message appears.

The program cannot find any firmware on the USB.

No firmware on USB
Nothing to do

Check section above for criteria of location and file name conventions of firmware file.

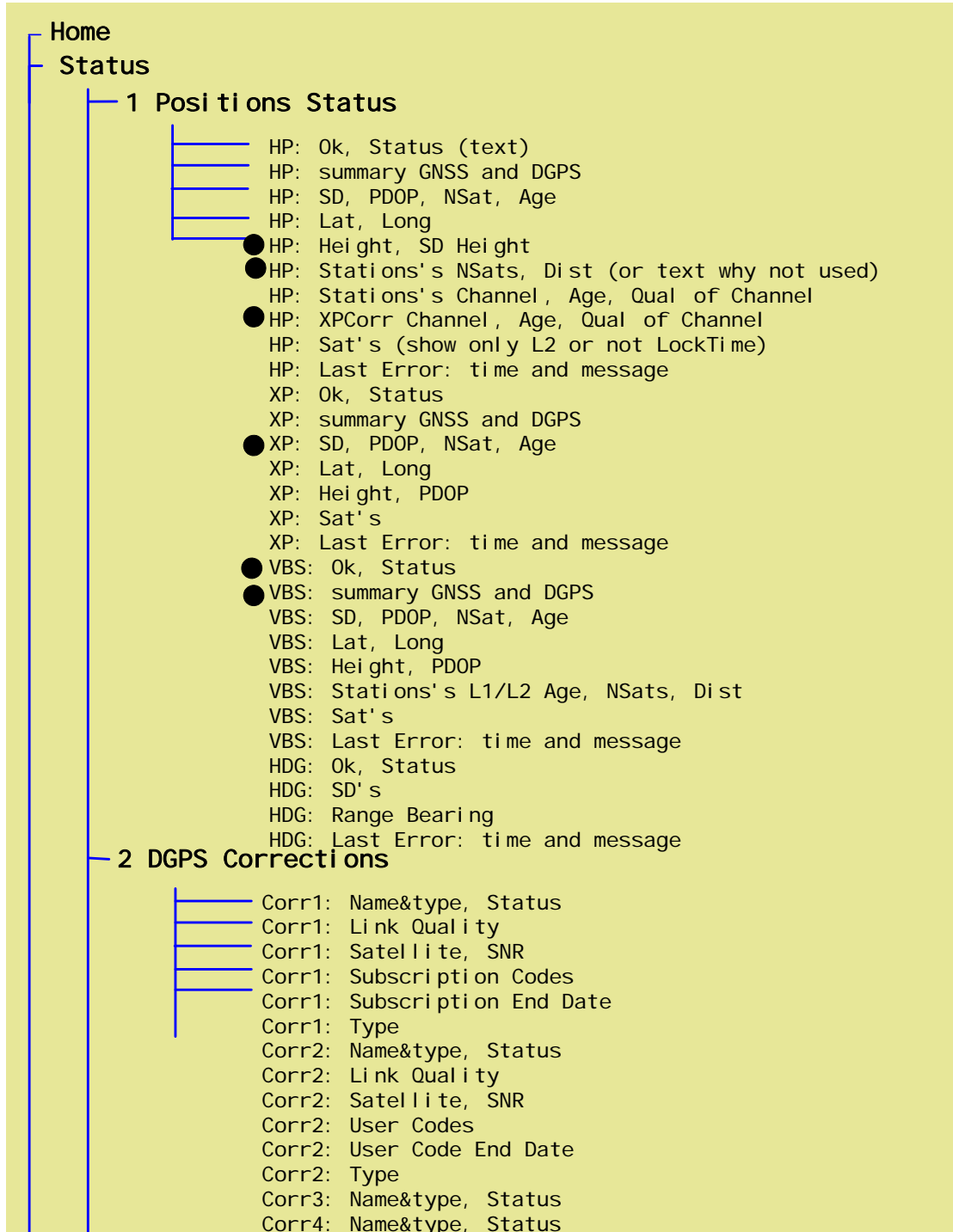
SPM continues to run while this message appears.

NOTE: See [Firmware - History](#) for details on changes to the StarPack that have been implemented by Firmware updates and incorporated in this manual.

16. FRONT PANEL MENU STRUCTURE

The front panel menu separates out in two parts: Status and Configuration.

There is a maximum of three levels. Within a level rotate the knob to go through the items. To go a level deeper press the Enter button or press the knob. To go up a level press the Escape button.



3 GNSS Status

- GNSS1: Receiver Status
- GNSS1: UTC Time / Day
- GNSS1: UTC Date GPS Week
- GNSS1: Lat, Long
- GNSS1: PDOP
- GNSS1: Sat's
- GNSS1: Receiver Type
- GNSS1: Serial Number
- GNSS2: Receiver Status
- GNSS2: UTC Time / Day
- GNSS2: UTC Date GPS Week
- GNSS2: Lat, Long
- GNSS2: PDOP
- GNSS2: Sat's
- GNSS2: Receiver Type
- GNSS2: Serial Number

4 RS232 Port Status

- Port1 In
- Port1 Out format, baud rate
- Port2 In
- Port2 Out
- Port3 In
- Port3 Out
- Port4 In
- Port4 Out

5 Lan Status

- my IP
- BasePort
- Lan1
- Lan2
- Lan3
- Lan4
- Lan5
- Lan6
- Lan7
- Lan8
- Lan9
- Lan10

6 Version

- SPM Version
- DGPS1 Type
- DGPS2 Type
- GNSS1 Type
- GNSS1 Serial No
- GNSS1 Version
- GNSS1 Mode
- GNSS2 Type
- GNSS2 Serial No
- GNSS2 Version
- GNSS2 Mode

Configuration

1 Positions

HP: station1, station2, selection - see trimble mechanism
 HP: Stations max dist
 HP: XP Corr On/Off
 HP: Restore Defaults
 XP:
 XP: Restore Defaults
 VBS: station1, station2, selection
 VBS: Restore Defaults
 HDG:

2 DGPS Corrections

Corr1: Uplink
 Corr1: Uplink Data Rate
 Corr1: Uplink Symbol Rate
 Corr1: Restore Defaults
 Corr2: Show Non-present if not present
 Get new Station List

3 GNSS

GNSS1: Restore Defaults
 GNSS2: Restore Defaults
 Show Non-present if not present

4 RS232 Ports

Com1: Baud Rate
 Com1: Input format
 If Corr, then Com1: Corr Channel (2, 3 or 4)
 Com1: Output Data type (HP, XP, see list under Lan)
 Com1: Output format
 If RTCM:
 RTCM: Virtual Base Station (Yes, No),
 RTCM: Stations selected L1,
 RTCM: Stations selected L2,
 RTCM: iono corr,
 RTCM: tropo corr,
 RTCM: type 15 valid (min),
 RTCM: type 3 valid (sec).
 Com2: Baud Rate
 Com2: Input format (or none)
 Com2: Output Data type
 Com2: Output format
 Com2: NMEA messages
 Com3: Baud Rate
 Com3: Input format (or none)
 Com3: Output Data type (same plus RawGPS or ZDA)
 Com3: Output format
 Com3: NMEA messages
 Com4: Baud Rate
 Com4: Input format (or none)
 Com4: Output Data type (same plus RawGPS or ZDA)
 Com4: Output format
 Com4: NMEA messages
 Restore Defaults

Input formats:
 None
 Corr RTCM,
 Corr Fugro,
 GNSS Novatel,
 GNSS AshtechZ12,
 GNSS Topcon,
 GNSS RTCM
 SPM (Mux)
 (future)

Note: SPM (mux) is input format and claims automatically output format too. Show SPM (Mux) under Input and Output. If selected for either, it is also selected for the other.

Status Menu 1: Positions Status

HP: OK H3X
msg: xxxxxxxxxxxxxxxxxxxx

H3X indicates using HP, 3 stations and XP corrections.

HP: GNSS: Ok, 8 sat
Corr: No HP, XP ok

The HP solution is a combination of GNSS and Corrections. Here the status of both is displayed.

HP: Sd Pdop Nsat Lck
0 23 1.23 10 22h

This screen and the following screens display the quality indicators of the HP solution.

Sd is the combined Sd of Lat and Lon.

HP: 52° 05' 23.856" N
004° 32' 53.184" E

HP: Height SD Height
-23.746 0.13

HP: st Dist N
● Leidsch* 436 12

The star indicates the station is actually used in the HP solution.

Press the knob to cycle through the station list.

HP: st Age Ch Qual
● Leidsch* 23s 1 96%

This screen displays where the correction is coming from: Corr channel and quality of Corr channel.

Alternatively:

HP: XP Corr not
selected for use

The star indicates that the satellite is actually used in the HP solution.

Press the knob to be able to cycle through the satellites.

HP: XPcor Age Ch Qual
* XP 23s 1 96%

There is limited error messaging implemented at the moment.

HP: Sv L2 T2 El Azm
● * 24 48 23m 27 223

HP: Last Err
23 May 10:23:41

HP: Last Err
bl abla

XP: OK X
msg: xxxxxxxxxxxxxxxxxxxx

A repeat of the same screens, for XP position.

X indicates using XP corrections.

XP: GNSS: Ok, 8 sat
DGPS:, XP ok

XP: Sd Pdop Nsat Lck
0 23 1.23 10 22h

XP: 52° 05' 23.856" N
004° 32' 53.184" E

XP: Height SD Height
-23.746 0.13

XP: Xpcor Age Ch Qual
* XP 23s 1 100%

XP: Sv L2 T2 El Azm
● * 24 48 23m 27 223

XP: Last Err
23 May 10:23:41

XP: Last Err
bl abl a

VBS: OK L3D3
msg: xxxxxxxxxxxxxxxxxxxx

VBS: GNSS: Ok, 8 sat
DGPS: L ok, No D

VBS: Sd Pdop Nsat Lck
0 23 1.23 10 22h

VBS: 52° 05' 23.856" N
004° 32' 53.184" E

VBS: Height SD Height
-23.746 0.13

VBS: L1 Dist N
● Leidsch* 436 12

VBS: D Dist N
● Leidsch* 436 12

A repeat of the same screens, for VBS position.

L3D3 indicates that 3 L1 stations and 3 L2 stations are being used.

Lck is lock time since last interruption of valid VBS position update.

VBS: L1 Age Ch Qual
● Leidsch* 23s 1 100%

VBS: D Age Ch Qual
● Leidsch* 23s 1 100%

VBS: Sv L2 T2 EI Azm
● * 24 48 23m 27 223

VBS: Last Err
23 May 10:23:41

VBS: Last Err
bl abl a

HDG: OK
msg: xxxxxxxx

HDG: Sd Ratio
0.23 1.01

HDG: Heading Distance
120.23° 131.01m

HDG: Last Err
23 May 10:23:41

HDG: Last Err
bl abl a

Status Menu 2: Corr Status

Corr 1: Port
Lan 10

If an internal demodulator is fitted then the following information will be displayed:
Corr1 is always internal

Corr1: EASAT
Quality: 94%

Corr1: HP stations
● 241 9600km 13s

Corr1: XP Corrections
● 13s

Corr1: VBS L stations
● 241 9600km 13s

Corr1: VBS D stations
● 241 9600km 13s

Corr1: Frequency
15356734

Corr1: Subscription
Services:

Corr1: Subscription
End Date:

Corr1: Novatel OEMV
Ser. No.

Press the knob to cycle through the station list.

If an external demodulator is used then limited information will be displayed:
Repeat for Corr2, Corr3 and Corr4.

Status Menu 3: GNSS Status

GNSS1: Receiver
OK

GNSS1: GPS Time
23 Feb 2008 23: 54: 02

This is GPS Time.

GNSS1: P dop Nsat Lck
1.28 0.00 10 00s

GNSS1: 52° 05' 23.856" N
004° 32' 53.184" E

GNSS1: L1 T1 EI Azm
● * 24 48 23m 27 223

GNSS1: L2 T2 EI Azm
● * 24 48 23m 27 223

GNSS1: Receiver
Novatel OEMV

GNSS1: Receiver Ser No
23429872-29038

GNSS1: Firmware
2.3

GNSS1: Mode
HE- GD- 3

GNSS1: Receiver
Not present

Ext GNSS for Heading
Com2

Ext GNSS Ext Heading
6234 Rx Novatel

Status Menu 4: RS232 Port Status

Com1 Input
3254 Rx Corr Fugro

These screen displays the bit transmitted (Tx) and received (Rx). Also the type of information is displayed (Corr Fugro, etc.). This information is derived from the setting in the Configuration menu – it not ‘auto-detect’ or something similar.

If the received data is Corr data, then the data should be mapped to a Corr channel, as displayed on the screens below.

Com1 Input Corr
mapped to Corr3

Com1 Output: VBS
253 Tx NMEA

Same for Com2, Com3 and Com4

Status Menu 4: LAN Port Status

Lan: My IP
192.168.63.179

Lan: Subnet Mask
255.255.000.000

Lan 1 HP Output
234 Tx NMEA

Lan 2 XP Output
235 Tx NMEA

Lan 3 VBS Output
233 Tx NMEA

Lan15 Corr 2 Input
233 Rx Corr Fugro

Lan15 Corr 2 Input
From 192.168.63.134

Same for LAN 16 and 17 (Corr3 and Corr4).

Lan18 GPS for Heading
3254 Rx Novatel

Lan18 GPS for Heading
From 192.168.63.167

Lan18 GPS for Heading
From UDP Port 40019

Lan19 GPS for Heading
3254 Tx Novatel

Lan19 GPS for Heading
to: broadcast

Lan19 GPS for Heading
to: UDP Port 60019

Lan20 Config Output
3254 Rx NMEA

Lan20 Config Output
HP Position

Status Menu 5 Version

SPM Version
5.17 23 Dec 2007

Corr1: Novatel OEMV
Ser. No.

Corr2: Novatel OEMV
Ser. No.

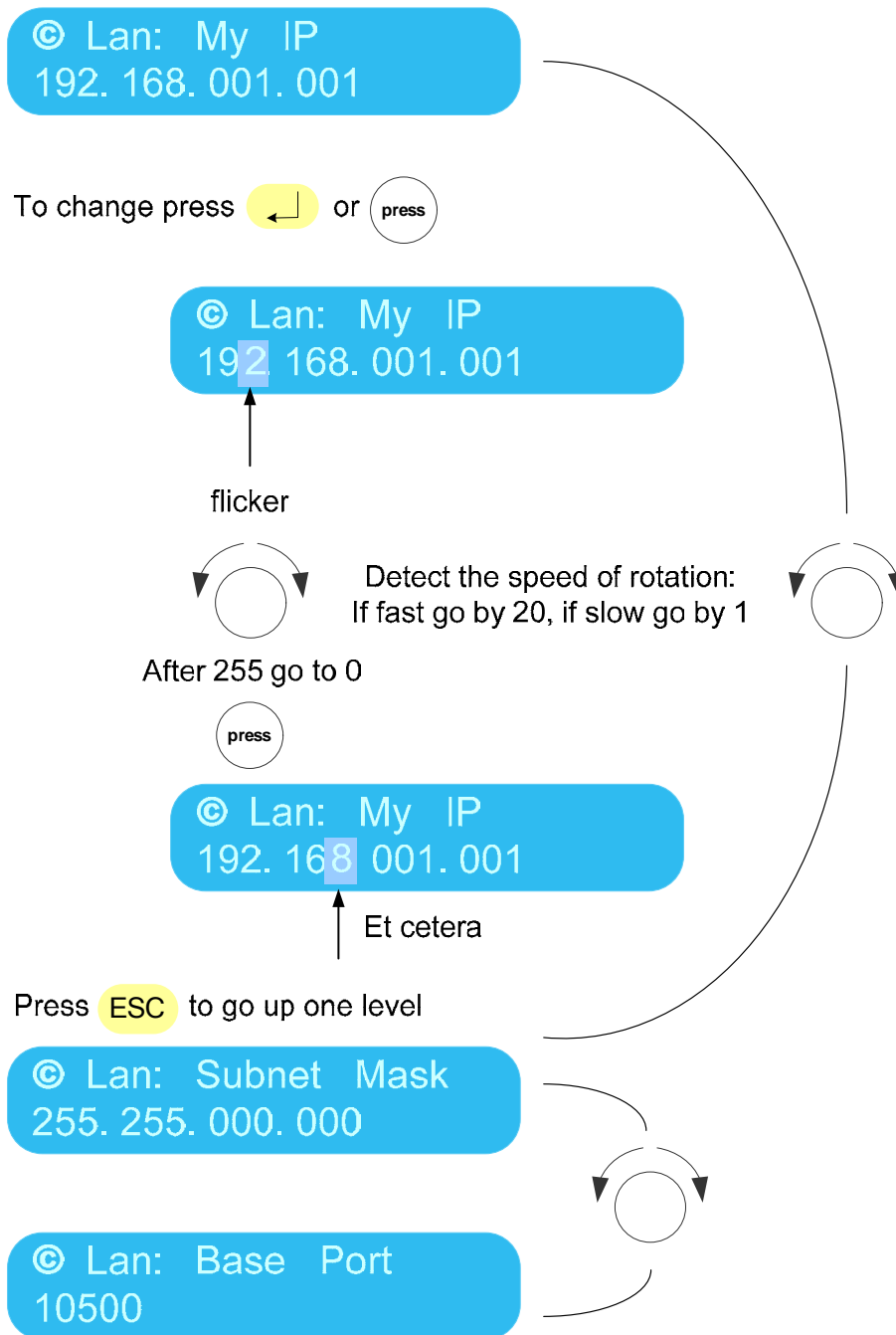
GNSS1: Novatel OEMV
Ser. No.

GNSS1: Novatel OEMV
Version:

GNSS1: Novatel OEMV
Mode:

Same for GNSS2

Configuration menu



Configuration Menu 1 Positions

© HP: stations
 [] 1 241 9924km H

Menu allows you to select stations for use in the HP Calculation. Press Enter to go into Edit mode, press the turn button to select and de-select stations. If selected an X appears, press the Enter button again to accept the changes.

After pressing Enter a list is displayed of stations that broadcast HP corrections. By rotating the knob you can cycle through the list.



When you push the knob an X will appear in the brackets to indicate that the station is selected for use. Pushing the knob again will de-select the station. Press the Enter button to accept your selection.

© HP: stations
 [X] 1 241 9924km H

© HP: stations
 Max Dist: 1000km

© HP: Use XP Corr
 On

© HP: Restore Default

© VBS: L1 Stations
 [] 1 241 9923km L

© VBS: L2 Stations
 [] 1 241 9923km D

Allows you to select stations for use in the VBS Calculation. See above for instructions.

Configuration Menu 2: DGPS Corrections

© Corr 1:
EASAT

© Corr 1: frequency
125603050

© Corr 1: Data Rate
1200

© Corr 1: Symbol Rate
2438

© Corr 1:
Restore Defaults

© Corr 2:
Not present

Select Fugro corrections satellite. When you select a satellite, the frequency, data rate and symbol rate will be updated accordingly.

Indicates status of second NovatelOEMV card, if fitted.

Fugro correction satellite cannot be selected, even if a card is fitted.

If a second NovatelOEMV card is fitted:

© Corr 2: Data Rate
1200

© Corr 2: Symbol Rate
2438

© Corr 2:
Restore Defaults

© Reload stn. list
No

Configuration Menu 3 GNSS

© GNSS1:
Restore Defaults

Configuration Menu 4: RS232 Ports

© Com1: Baudrate
115200

© Com1: Input Format
Corr Fugro Corr

If Corr, then:

© Com1: Input Channel
Corr2

If RTCM then continue with [RTCM Menu](#)

If Position then:

© Com1: Output
HP/XP

© Com1: Output Format
NMEA

If NMEA show [NMEA Selection Menu](#)

Same for Com2.

Com3 is Not Available.

Com4 is Not Available.

© Restore Com Port
Defaults

Configuration Menu 5 LAN Ports

See for more information on the use of LAN Ports see item [9 LAN](#)

© 5 Lan ports

© Lan: DHCP Server
Yes

© Lan: My IP- assignd
192. 168. 001. 001

© Lan: Subnet Mask
255. 255. 000. 000- asdd

Lan: Subnet - assign
255. 255. 000. 000

© Lan: Base Port
60000

© Lan 1 HP Output
Format: NMEA

If NMEA show [NMEA Selection Menu](#)

© Lan 1 HP Output
Broadcast

© Lan 2 XP Output
Format: NMEA

© Lan 2 XP Output
Broadcast

Etc. VBS

© Lan 4 HDG Output
Format: HDG

© Lan 4 HDG Output
Broadcast

Etc. GPS as HP

© Lan 6 Raw GPS1 Out
Broadcast

This is a relay of GNSS1.

© Lan 7 Raw GPS2 Out
Broadcast

This is a relay of GNSS2.

© Lan 8 HPQC Output
Broadcast

© Lan 9 RTMC Output
RTMC Settings

Selecting this menu brings you to the [RTCM Selection menu](#)

© Lan 9 RTMC Output
Broadcast

© Lan10 Corr 1 Relay
Broadcast

© Lan11 Corr 2 Relay
Broadcast

© Lan12 Corr 3 Relay Broadcast

© Lan13 Corr 4 Relay Broadcast

© Lan14 SPM Mux Out Broadcast

© Lan15 Corr Input
Format: Fugro Corr

© Lan15 Corr Input
Channel: None

© Lan16 Corr Input
None

© Lan16 Corr Input
Channel: None

© Lan17 Corr Input
None

© Lan17 Corr Input
Channel: None

© Lan18 GNSSExt Inpt
Use Lan18

If "Use LAN18" then:

© Lan18 GNSSExt Inpt
GNSS Type: Novatel

© Lan18 GNSSExt Inpt
UDP Port: 40019

© Lan19 GNSSExt Outp
Broadcast

© Lan19 GNSSExt Outp
UDP Port: 60019

This is the broadcast intended for use with the SPM Remote Control program in the Starfix Suite, for more information see item [9.4 accessing SPM \(Mux\) via LAN](#).

External corrections can be received via LAN 15, 16 and 17.

A second, external GNSS can be connected for the purpose of Heading (not for anything else). The second GNSS can be connected via LAN 18 (as well as RS232).

Because the external GNSS is most likely another StarPack, the user can deviate from the Base Port concept here for the UDP port and specify a UDP Port.

This is relay of GNSS1 for the purpose of GPS Heading on another StarPack, see item 14.2.

Configurable Ports:

There are only user configurable outputs. All inputs can be defined through the fixed LAN channels or RS232 channels. There are no more free inputs.

© Lan20 Config Outpt
Output: HP

© Lan20 Config Outpt
Format: HP_Monitor

© Lan20 Config Outpt
IP: Broadcast

© Lan20 Config Outpt
UDP Port: 243

Same for LAN 21, 22, 23

© Lan Ports
Restore Defaults

Configuration Menu 6 Restore Defaults

© 6 Restore Defaults

Currently NOT Available

NMEA Selection Menu

© NMEA
[] ZDA

ZDA, GGA, GLL, etc.

- Press Enter to go into edit mode.
- Press the knob to select and de-select NMEA messages.
- Press Enter to accept changes.

RTCM Sub Menu

© RTCM Virtual Base
Yes

17. MONITOR MENU STRUCTURE

17.1. THE MENUS

```

===== SPM Main Menu =====
Di spl ays. . . . . >>
IP Settings . . . . . >>
LAN Ports . . . . . >>
COM Ports . . . . . >>
MUX Channels. . . . . >>

Demodul ator . . . . . >>
GNSS Recei ver . . . . . >>
Stati ons. . . . . >>
Posi ti oni ng . . . . . >>
RTCM Messages . . . . . >>
HPQC Messages . . . . . >>

Backup program . . . >>
Reset program . . . >>
Stop program. . . . >>

```

```

===== SPM Main Menu =====
===== Di spl ays Menu =====

Title system display ..... : StarPack
Number of rows for positions [1-4] ... : 2
Number of rows for stations [0-4] ... : 1

```

```

===== SPM Main Menu =====
===== IP Settings Menu =====

DHCP Server . . . . . = On
My IP Address . . . . . = 192.168.63.134
Subnet Mask . . . . . : 255.255.255.0
Remote Address. . . . . : Broadcast
Local Port . . . . . : 12300
Remote Port . . . . . : 12300
LAN Ports to apply . . . :

```

```

===== SPM Main Menu =====
===== IP Settings Menu =====

DHCP Server . . . . . : Yes
IP Address . . . . . : 192.168.63.134
Remote Address. . . . . : 192.168.63.176
Local Port . . . . . : 10230
Remote Port . . . . . : 10230
Remote Port . . . . . : 12300

```

With the Remote Address one can set the remote address for all LAN ports in one go i.e. the address where all the LAN ports send data to.

Same applies with the Remote Port.

```

                SPM Mai n Menu
          LAN PORT SETTINGS MENU

LAN Port. . . . . : 14 of 32
Local Port. . . . . : 60014
Mode. . . . . : Dynamic
Remote Address. . . . . : 192.168.63.176
Remote Port . . . . . : 60014

Input Type . . . . . = Mux
Multipl exer . . . . . = Mux1

LAN Port Summary. . . . >>

```

Mode: Dynamic is for connections which require a dedicated two-way LAN connection, such as SPM (Mux) for Remote Control. If the LAN connection is for output only, then **Mode: Static** is the most appropriate.

17.1.1.The Hidden menus (F8-H)

Menu structure including Hidden menus from F8-H

```

===== SPM MAIN MENU =====
Displays. . . . . >>
IP Settings . . . . . >>
LAN Ports . . . . . >>
COM Ports . . . . . >>
USB Ports . . . . . >>
MUX Channels. . . . . >>

Demodulator . . . . . >>
GNSS Receiver . . . . . >>
Stations. . . . . >>
Positioning . . . . . >>
RTCM Messages . . . . . >>
HPQC Messages . . . . . >>

Backup program settings . . >>
Reset program . . . . . >>
Stop program. . . . . >>

Log . . . . . >>
Replay. . . . . >>
Options . . . . . >>

FP:Positions. . . . . >>
FP:DGPS . . . . . >>
FP:GNSS . . . . . >>
FP:Defaults . . . . . >>

Platform . . . . . = StarPack

```

Logging menu:

```

                SPM Mai n Menu
          LOG MENU

Logging raw-data . . . . . [off/on] : On
File ID (3 characters) . . . . . : SPM
Directory . . . . . : /home/spm/l og/raw
Ports di sabl ed . . . . . :
Logging objects . . . . . [off/on] : off
Object groups enabl ed . . . . . :

Logging messages . . . . . [off/on] : off
Directory . . . . . : /home/spm/l og/msg
Pages enabled . . . . . : 1, 32

Logging DDS-data . . . . . [off/on] : off
Destinati on . . . . . : File
Port . . . . . :
Free output ports . . . . . :

```

Logging raw-data should always be “On” – DO NOT SWITCH OFF, DO NOT CHANGE DIRECTORIES.

To discover more refer to item [13.1 Continuous logging to USB Flash Card](#).

18. TECHNICAL

18.1. FIRMWARE - HISTORY

Detailed below are the changes implemented by firmware updates:

Firmware	What's Changed
6.01.05	<ul style="list-style-type: none"> Resolves the issue of needing to reboot the StarPack after making changes to COM Port baud rate and Remote LAN IP addresses via the front panel.
6.01.04	<ul style="list-style-type: none"> Removal of the need to press Esc to "Accept" all changes. Resolved HP positions configuration listings.
6.01.03	<ul style="list-style-type: none"> Corrected value assigned to POSXP in HPQC messages output. Support for ISCF, GSCF and new GSS (XP) messages. Accept GPS commands from Multifix or MRDGPS via LAN. Improved handling of DHCP request for acquiring dynamic IP numbers. It always retries to acquire an IP address, also after loss of connection. Solved various connectivity problems for Lan port 14 (Mux channel). Lan 14 is always set in dynamic mode. The other ports are always in static mode. More robust firmware update process. Monitor screen does not turn black anymore (screensaver mode) after a few minutes.
6.00.03	<ul style="list-style-type: none"> Added Almanac file to firmware to ensure smooth startup.
6.00.02	<ul style="list-style-type: none"> Updates to Linux base OS

18.2. SPECIFICATION

GNSS hardware engine (optionally 2 cards):

- Novatel OEMV: 72 channel, triple frequency board that includes L2C,
- GLONASS measurements and hardware support for the future L5 GPS frequency

Corrections:

- Integrated receiver for Starfix differential and state space corrections

Accuracy (95%):

	Horizontal	Vertical
Starfix.VBS	0.5 m	1 m
Starfix.Plus	2 m	2 m
Starfix.HP	0.08 m	0.15 m
SkyFix.XP	0.1 m	0.2 m
Starfix HP/XP	0.1 m	0.2 m

Processor:

- Intel Pentium 3, Embedded Linux
- Data Rate 1Hz, optional 20 Hz

Dimensions:

- Size (W x H x D): 245 x 60 x 195 mm
- Weight: 2 kg

Power:

- Input Voltage: 80 – 250 VAC, 40-60Hz
- Input / Output: 4 RS232 COM ports, 1PPS, LAN, USB

Environmental:

- Operating Temp: -20°C to +50°C
- Storage Temp: -40°C to +85°C
- Humidity: 95% non-condensing