mcmurdo
SAFETY FOR PROFESSIONALS

mcmurdo

31-Dec-00
19:45:11
Summary mode: Time order - last 72 hours

Select
ALARM
MODE

IE55 14:24 27-May 490 0.0%
ISSUED BY THE MET OFFICE AT 1000 UTC ON TUESDAY
11 MAY 2010
IV74 13:48 27-May 490 0.0%
IV74
DATE/TIME: 11/05/2010 1200
EA26 13:46 27-May 490 9.3%
071243*UTC MAY*10
AVURNAV BREST 1*7/10
EA78 13:42 27-May 518 0.0%
WZ 457
ENGLAND, EAST COAST. THAMES ESTUARY APPROACHES.
EA11 13:41 27-May 490 0.0%
261240 UTC APR 10
IROISE
EA79 13:41 27-May 518 0.0%
WZ 460
DOVER STRAIT TSS, NORTH-EAST BOUND LANE, 1.

Sort by
STATION
IDENT

Show
LAST
4 HOURS

View
FULL
MESSAGE

ENTER

SMARTFIND GMDSS NAVTEX

SMARTFIND
GMDSS NAVTEX
Service Manual

Table of Contents

1. INTRODUCTION

NAVTEX is a method of transmitting navigational warnings and weather forecasts from designated coast radio stations. All English language transmissions are made on 518 kHz. Each station is allocated several time 'slots' during the day, when it is permitted to transmit; these are normally at four hourly intervals. The only exceptions to this are gale warnings and search and rescue messages, which may be transmitted at any time. Subject to IMO approval, additional local language transmissions may be made on 490 kHz and on 4209.5 kHz.

Reception of NAVTEX is normally limited to an area of 200 - 300 miles radius around each transmitting station, although greater ranges are possible at night.

The SMARTFIND NAVTEX has been designed to the latest European and International specifications to provide up to date weather and marine safety information to commercial vessels. It meets IMO requirements under GMDSS: IMO MSC.148 (77) and IEC 61097-6 (Ed 2.0).

Installation is straight forward. Connect the SMARTFIND NAVTEX to a 12 or 24 volt DC supply and connect a suitable antenna. Switch it on, and it will start displaying and storing NAVTEX messages without further manual intervention. Note that if there are only a couple of NAVTEX stations within range it may be several hours before the first message is received.

If you are within a sea area where you are able to receive messages from multiple NAVTEX stations (particularly at night), you may be quickly overwhelmed with information. It can therefore be set up to display only those stations and message categories you want to receive and which are applicable to the sea area in which you are sailing.

Normally, routine messages are repeated at four hourly intervals. Provided that the SMARTFIND NAVTEX is left running, repeated messages are not displayed more than once. Each message is retained for three days (72 hours) after its last reception before being automatically deleted, unless the message has been marked as locked.

The SMARTFIND NAVTEX can be installed with either the bulkhead-mounting bracket or the flush panel mounting kit provided with the product.

The SMARTFIND NAVTEX contains 3 receiver channels, tuned to 490 kHz, 518 kHz and 4209.5 kHz. The SMARTFIND NAVTEX will receive on all 3 frequencies simultaneously in those parts of the world where transmissions are available.

The SMARTFIND NAVTEX is capable of being connected to an Integrated Bridge System (IBS), transferring NAVTEX messages to other navigational aids if required. Note that the IBS must be compliant with the serial port requirements of IEC61097-6 (Ed 2.0).

The SMARTFIND NAVTEX will accept UTC time & date information from the IBS port if available. UTC time & date will be used to timestamp received NAVTEX messages.

Note: The USB port on the back of the unit is not operational.

1.1. Scope

This manual provides the instructions to enable routine and emergency servicing of the NAVTEX equipment listed below. This manual represents the original equipment manufacturer's (OEM) service documentation applicable to these products.

1.2. Applicability

This manual applies to the following NAVTEX equipment:

i   McMurdo SMARTFIND NAVTEX Part number 93-001-001A

1.3. Product History

10/07/2010 – Entered production.
06/04/2011 - 93-721Z issue 2, routine software update released as V12.25.

1.4. Servicing equipment

The following tools and equipment are required to carry out the servicing detailed in this procedure.

Equipment:
Active antenna (93-062A or 93-63A or equivalent)
Bench power supply, 12-24V @ 2 Amps minimum
RS232/USB to RS422 converter and cable (93-058A) to connect to a PC.
Multimeter

Handtools:
Calibrated torque driver (40-50cNm) with attachments:
5mm A/F socket
Small cross-headed screwdriver (No.1 Pozidrive)

Optional
PC with NMEA send/receive program or GPS data
Navtex message sender (Futronic GMDSS testbox or PC – see 3.2)

1.5. Safety notices

Please read the following information for your safety:

This product has been assessed as presenting negligible hazard in a sealed serviceable state.

Safety analysis

The following table summarises the nature of the hazard which may be present when the unit is opened or serviced; each hazard is discussed at greater length in the detailed sections.

Hazard cause	Hazard identification	Precautions
High Voltage	Risk of shock	Handle appropriately, avoid contact

General precautions for chemical agents (adhesives, greases, IPA)

Observe all safety precautions relevant to the country of operation. As a general rule, protective overalls, gloves and goggles should be worn when handling chemical agents, but different countries may have additional requirements which must be observed.

Ensure that all chemical agents are handled in accordance with the manufacturer's instructions, and that suitable protective clothing is worn.

Make sure that the working area is well ventilated, and that chemical substances are not left exposed. Observe good hygiene practices; do not eat, drink or smoke when handling chemicals.

Read the manufacturer's instructions before using any chemical agent.
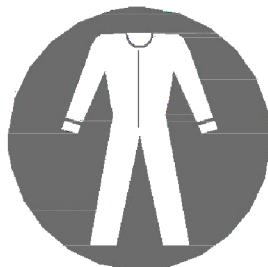
Wear goggles   Wear overalls   Wash hands   Wear gloves

1.6. Anti-static precautions

The electronics section of the SMARTFIND NAVTEX is sensitive to electrostatic discharge (ESD) which can cause immediate or hidden long term damage. It is important that the PCB is only handled under suitable anti-static conditions.

Ideally, a fully grounded workstation, which has conductive surfaces to avoid the build up of static charge, should be used.

As a minimum, the operator must be connected to a good earth point through a resistance of 1MOhm. This is usually achieved by wearing a suitable wrist strap.

2. ASSESSMENT

2.1. Maintenance tasks

Service providers are reminded that it is their responsibility to ensure that the procedures herein are followed, that only McMurdo Ltd approved parts are fitted, and that good practice is observed.

The functions which can be performed by service providers are:

i   Routine testing
i   Software updating
i   System set up
i   Fault diagnosis
i   Repair

2.2. Routine testing

The SMARTFIND NAVTEX has automatic Built In Test Equipment (BITE). BITE runs all the time in the back ground and monitors for correct operation of the receiver sub systems including the monitoring of antenna supply current. In the event of an error being detected;

i   A fault indication icon may be displayed on screen
i   Front panel LED may flash (according to menu set up option)
i   Buzzer may sound (according to menu set up option)
i   Detail of the alarm event is displayed under the Alarm mode, current alarms page.
i   Alarm events are sent over the data interface output port(s) using the ALR sentence format.

Whatever the reason for the return the SMARTFIND NAVTEX **must** be subjected to a full assessment before any other action is taken. The agent has the responsibility to ensure the SMARTFIND NAVTEX is completely serviceable and is fit for its purpose.

Included in the user handbook are full details of:
i   Installation
i   Set-up
i   Operation
Therefore these items are not repeated in this manual.

2.3. Assessment

Every SMARTFIND NAVTEX returned for servicing must be fully assessed to determine its operational status.

Assessment form

The assessment form, shown on the next page, is an essential tool in performing diagnosis. It may be used to support customer billing and must accompany any warranty return to the manufacturer.

SMARTFIND NAVTEX ASSESSMENT	Ref		Date	

Customer	Address

Type	Serial No
Antenna type:	Vessel name:

Customer comments

Return to Customer?		Warranty claim	**YES/NO**

INSPECTION/DIAGNOSIS

Items Returned

Main unit ☐

Antenna/bracket ☐

Power cable ☐

Manual ☐

Item Condition

Software version:_____

DIAGNOSIS

FUNCTIONAL TEST

ATE (in factory only)	**Burn-in**	**Functional Test**

Comments

New Parts Fitted

RF PCB ☐

Keypad ☐

LCD ☐

Display PCB ☐

Gasket ☐

Backbox ☐

PCB Serial no's:

Conclusions

Assessed by	Signed	Date	
			Pass Fail

3. MAINTENANCE PROCEDURES

3.1. Inspection

The SMARTFIND NAVTEX should be inspected prior to any servicing/repair work.
The following should be inspected:

- i Case – ensure no cracks in the plastic or other damage
- i Screen – inspect display for damage and condition
- i Rear connectors – ensure pins are straight and connectors are in good condition
- i Key pad - check operation

SMARTFIND GMDSS NAVTEX Operation

When powered, the SMARTFIND GMDSS NAVTEX will begin boot up. The start up page will be displayed which shows the company address and telephone numbers **(7),** the company name **(8),** and the current installed firmware release **(9).**
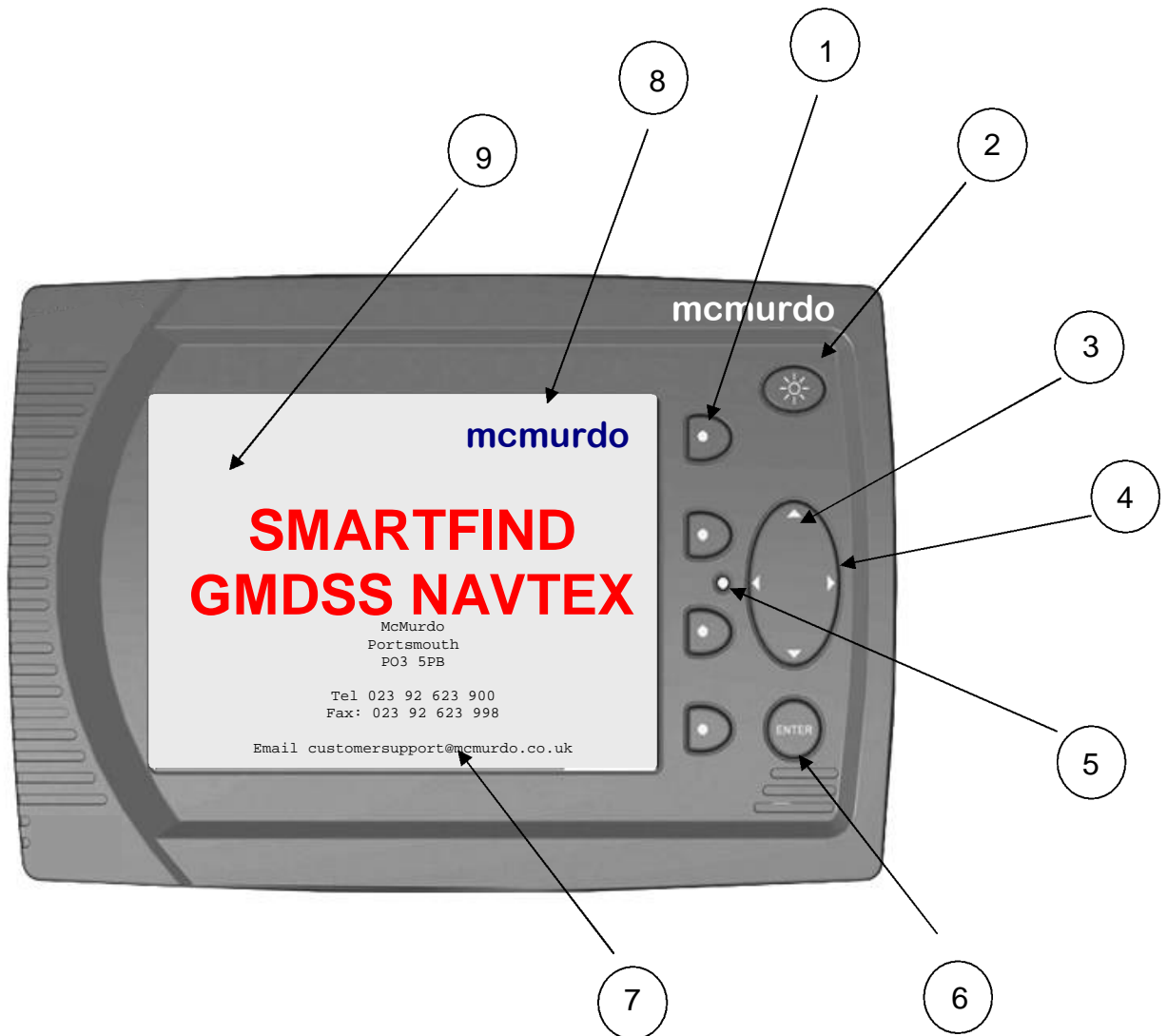
1. **4 Soft keys.** Used to select various menus and options. The function of each is displayed on the screen next to the key.

2. **Display key**. Press and release to control the back light. Press and hold to control the contrast and brightness of the display. Also used to switch between day and night mode.

3. **Cursor ke**y (Up/Down) used to navigate the display and to control brightness when the display key pressed.

4. **Cursor key** (Left/Right) used to navigate the display and to control contrast when the display key pressed.

5. **SMARTFIND GMDSS NAVTEX Status LED**. Indicates unit is booting up, Alarm activation, messages etc…

6. **Enter Key**. Used to confirm data entries, Acknowledge incoming messages, Press and hold to enter engineering service mode. You will be prompted for a password which is SERVICE. Use the cursor key pad to move around the onscreen keyboard.

3.2. Functional test

It is recommended that the unit is set up with an active antenna and tested to ensure that messages are received on all channels and decoded correctly.

Alternatively a PC can be set up with a signal generator to test the receivers.
Please see the following page.

An external GPS and printer used to test the two data communications ports (COM1 & COM2).

The following should be checked:

i   Check receiver operates OK on all 3 channels
i   Check basic controls
i   Check LCD contrast and brightness – ensure LCD temp does not exceed +70C (back light life rating is 20,000 hours continuous operation).
i   Check time and date (note that there is no back up battery in the SMARTFIND NAVTEX, therefore the time and date will be incorrect after a power cycle)
i   Ensure data ports COM1 & COM2 operate correctly

The following section shows an example of a test setup which can be used to simulate NAVTEX messages (example is for 518kHz).
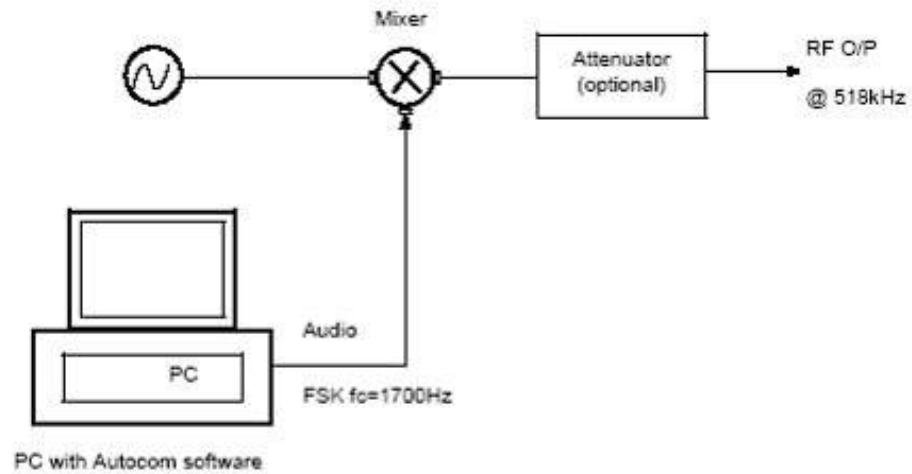
Caution: 12VDC is present on antenna connector whenever antenna power is "enabled" in the setup menu. Care should therefore be taken when connecting to external test equipment that can be damaged by DC voltage across its input. If in any doubt, set antenna power to "disabled" before making the connection.

NAVTEX SIGNAL GENERATION

1/

Signal generator as local
oscillator @ 516.3 kHz, -7dBm

Mixer - (Minicircuits ZP10514/ SBL1 etc.)

Mixer

Attenuator
(optional)

RF O/P

@ 518kHz

PC

Audio

FSK fc=1700Hz

PC with Autocom software
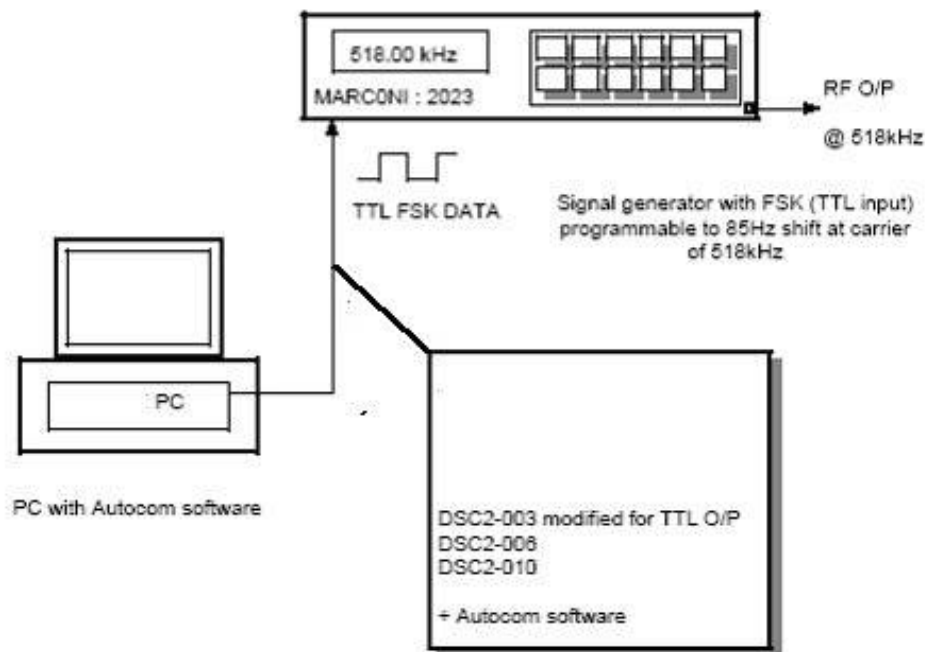
2/

Preferred method, allows full use of Signal Generator.

- This is similar to the internal factory test method.

518.00 kHz

MARC0NI : 2023

RF O/P

@ 518kHz

TTL FSK DATA

Signal generator with FSK (TTL input)
programmable to 85Hz shift at carrier
of 518kHz

PC

PC with Autocom software

DSC2-003 modified for TTL O/P
DSC2-006
DSC2-010

+ Autocom software

3.3. Disassembly

Warning: the backlight for the display is powered by 250V AC.

Observe Anti-static precautions, a clean room environment is recommended when opening the case especially when replacing the LCD screen. Isolate the equipment by disconnecting all outside connectors.

Back Box removal

1. Remove the 6 off self tapping screws
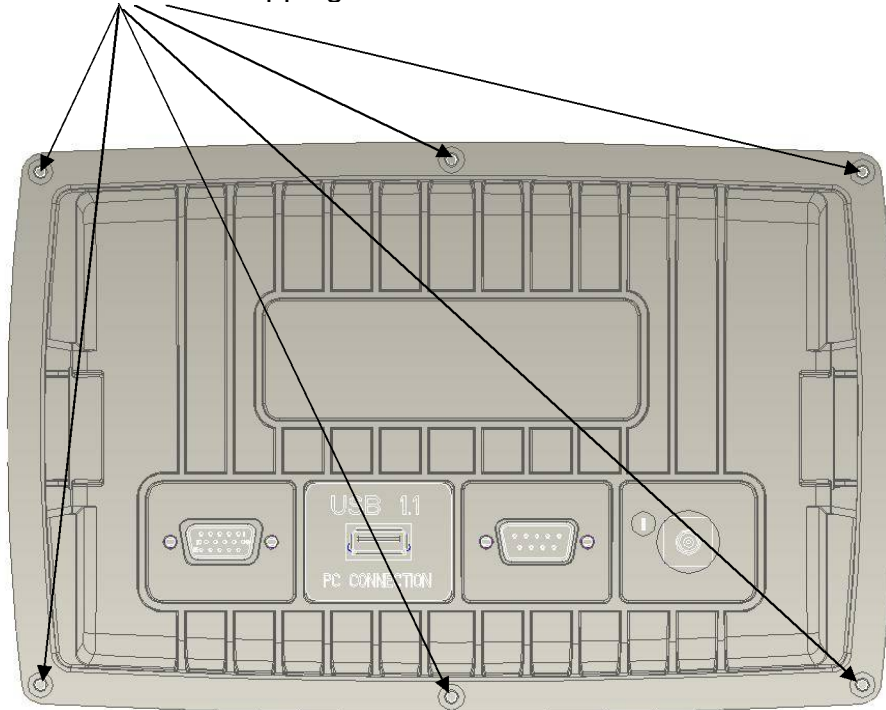
2. Lift off the back box and disconnect the ribbon cable.
3. Care should be taken not to damage the seal. This normally is retained in the groove in the rear case

RF PCB Removal

1. Remove the 4 off connector clamps (see above) using 5mm socket or nut runner.

Connector clamps
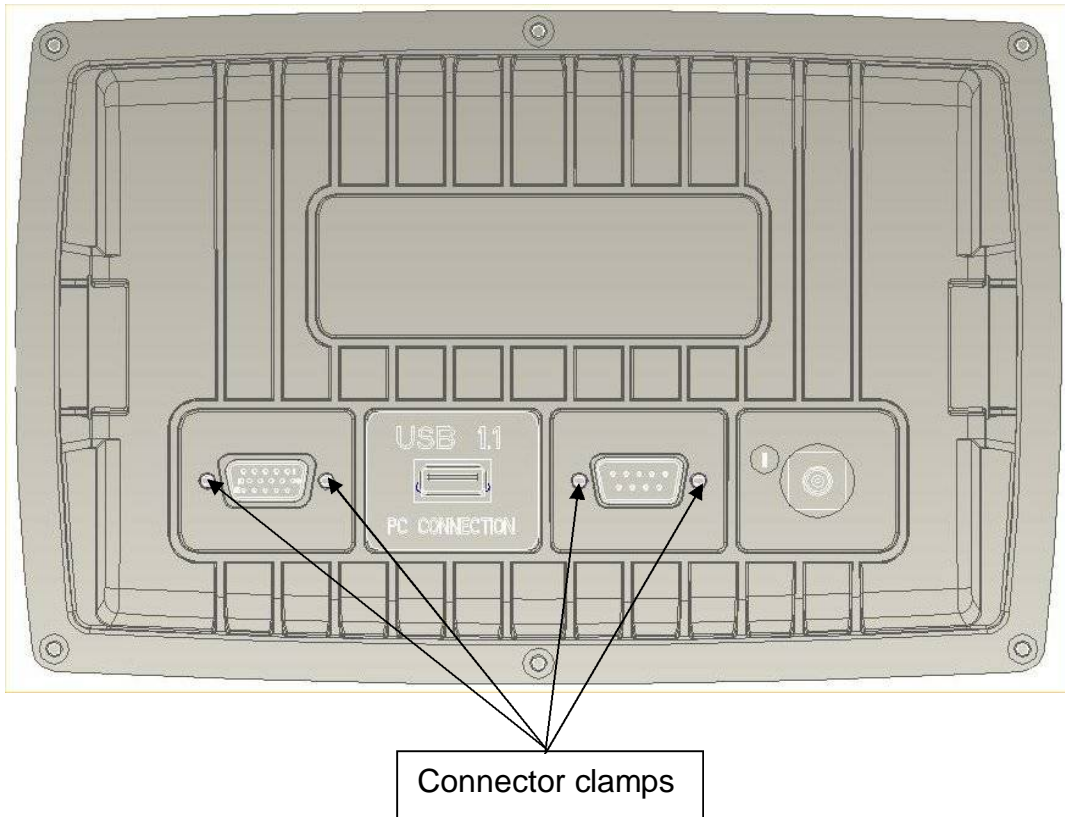
2. Remove the 3 off screws from the PCB. Note that one screw may be secured into a pillar and so will be of a different type.
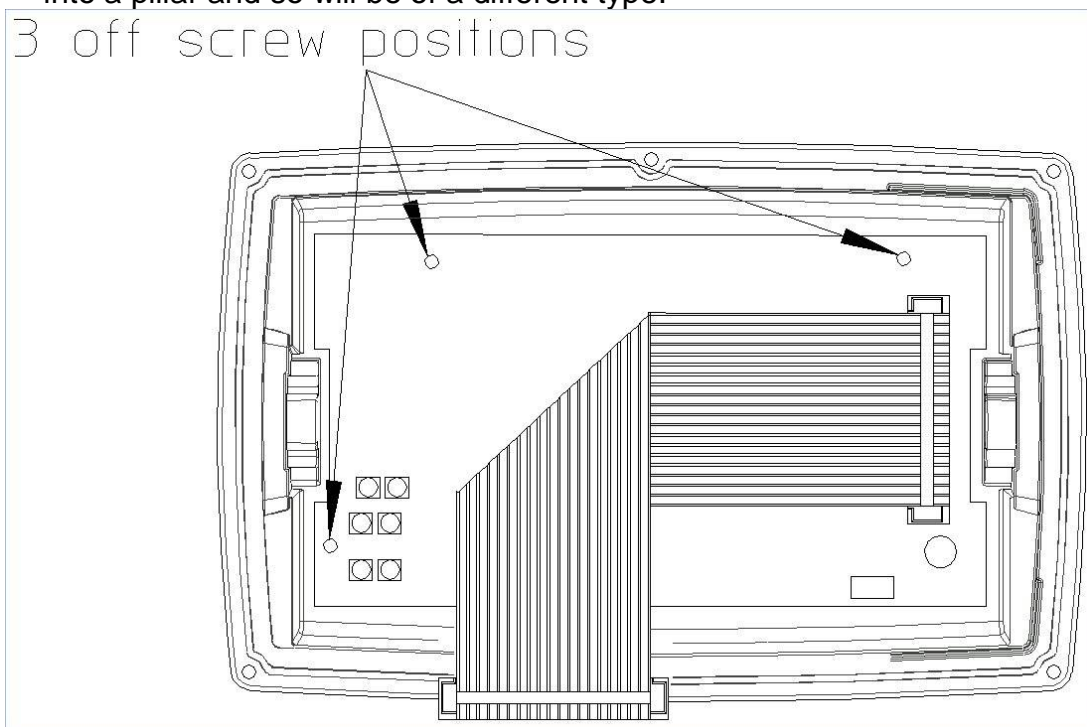
Display PCB removal

1. Unplug the white backlight power supply cable leading to the display.
    Warning: Handle with care, there is 250V AC on this cable when equipment is powered up and it may still carry a small residual charge.
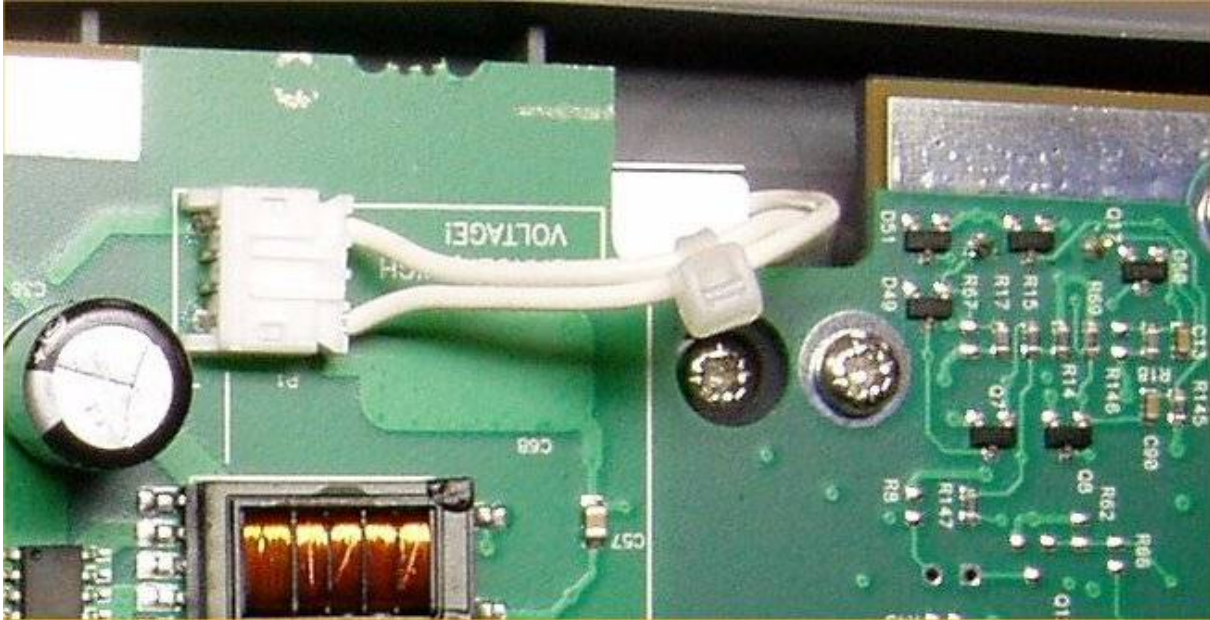
2. Remove the silver tape link. It is recommended that this is not reused.

3. Release the lock and disconnect the ribbon connector. Slide clamp as indicated below

4. Remove the 11 OFF self tapping screws.
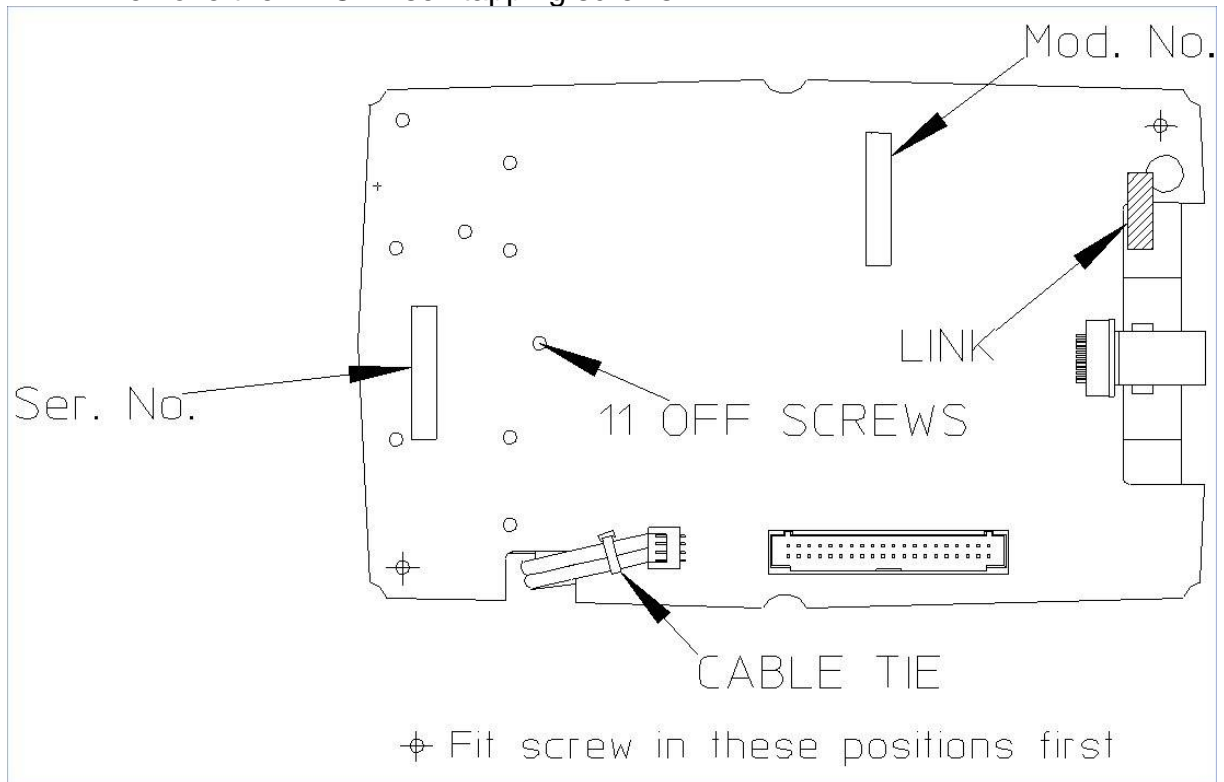
<u>Removal of LCD Screen</u>

NOTE: This should only be done in clean room conditions – any dust present may be attracted to the screen and will show up when next powered up.

1. Follow previous instructions to remove back box and display PCB.
2. Remove the keypad – this lifts out. Pull carefully from top and bottom – take care not to tear the keypad.
3. Remove the 4 off screws and washers retaining the display.
4. The display can now be lifted out. If the LCD is being re-used cover the screen immediately to protect from dust or place in a anti-static bag.

The fascia/window assembly is supplied complete – if it is damaged please order a replacement assembly.

3.4. Reassembly
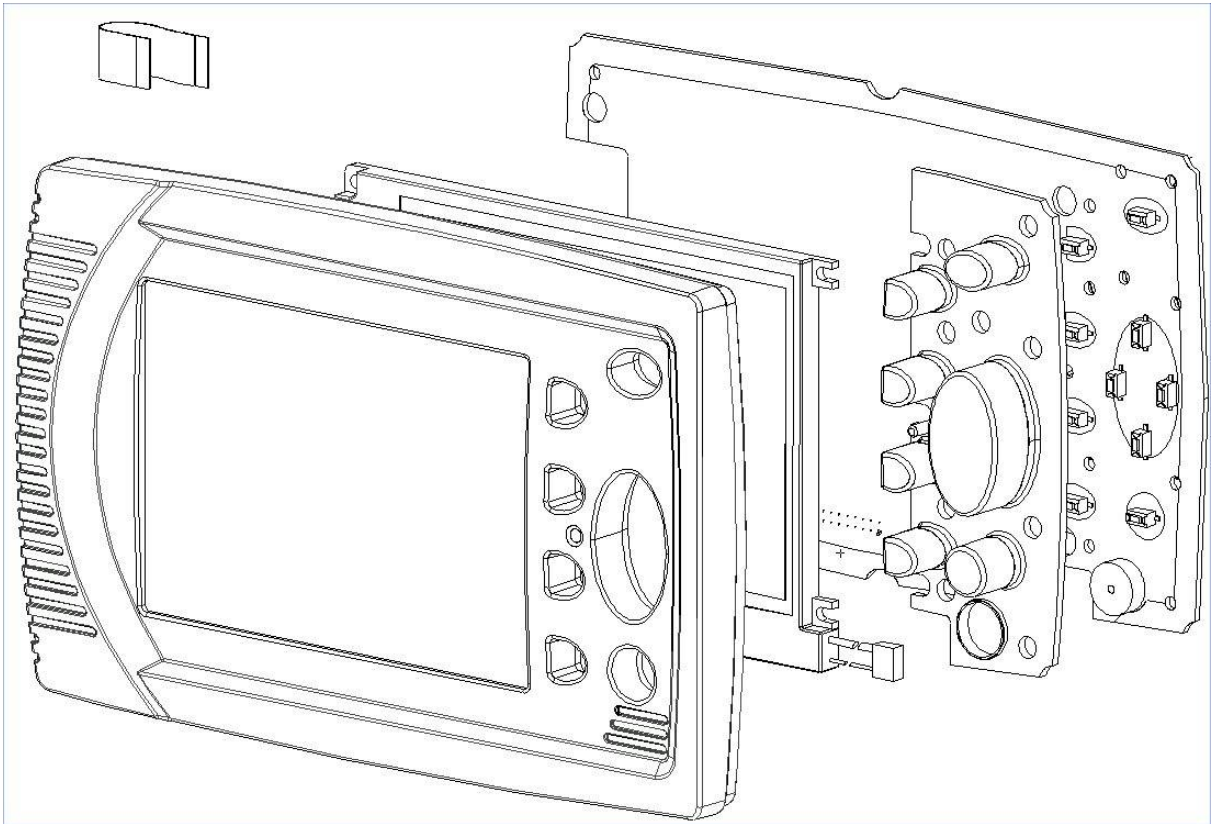
Reassemble fascia/display

1. If fitting new fascia/window remove protective film from inside of screen before fitting LCD.
2. Fit ribbon cable to display. Ensure that the insulated side is away from the PCB.
3. Remove film from LCD and place LCD on to fascia.
4. Secure 4 off screws and washers to 50cNm.
5. Fit the keypad and press home securely. Ensure that the top of the pillars are level with the top of the keypad.

Refit Display PCB

1. Replace Display PCB on to fascia and reconnect the ribbon connector – ensure the locking mechanism is secure.
2. Reconnect the backlight.
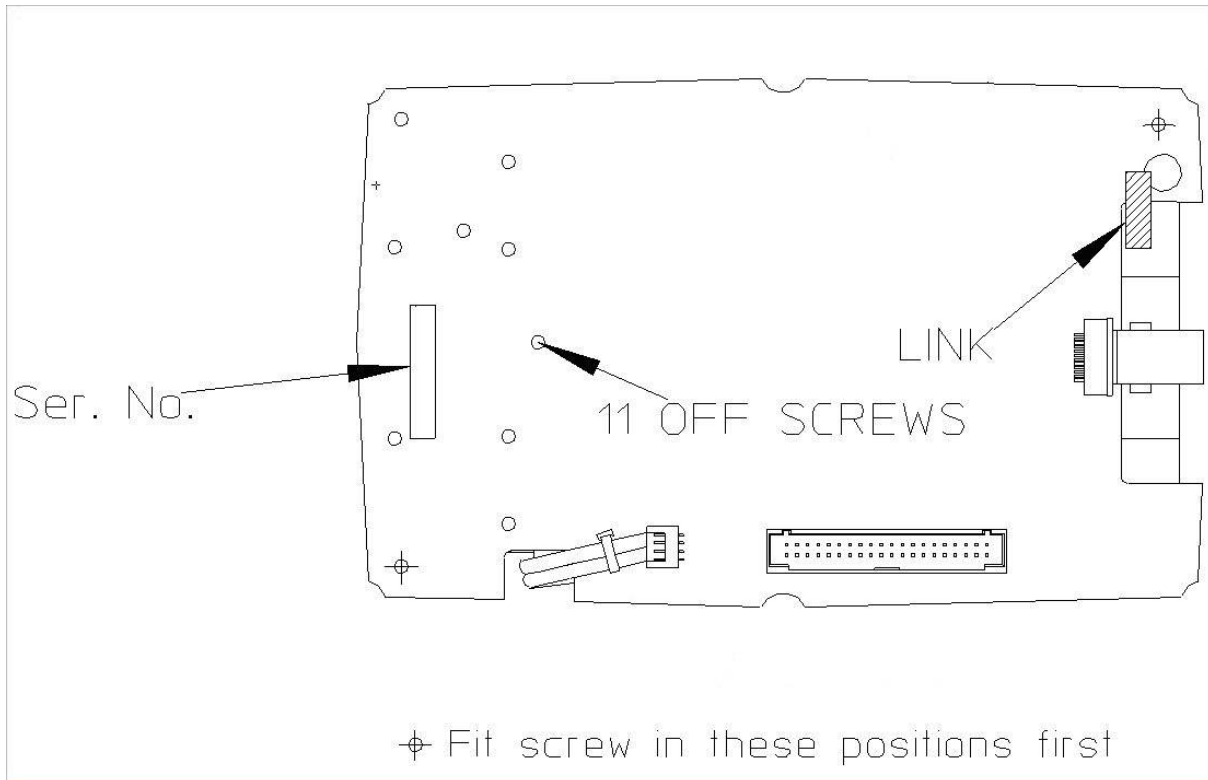
3. Fit the 2 off screws indicated above and tighten all to 50cNm.
4. Fit the remaining 9 off screws to 50cNm.
5. Check that all the keyboard keys operate correctly.
6. Fit link – this provides an earth link and problems with the backlight will occur if not fitted.

Back Box

Ensure that pillar (if fitted) is tight before reassembly.

1. Fit RF PCB into back box and secure 3 off screws to 30cNm.
2. Fit 4 off Connector clamps with screwlock (Loctite) and secure to 30cNm.
3. Refit back box gasket.
4. Reconnect the ribbon cable.
5. Place back box in position, ensure gasket is in position and secure with 6 off screws to 30cNm.

3.5. Leak Testing

The SMARTFIND NAVTEX is not a sealed unit. Therefore there is no requirement to leak test the product. However if the unit is flush mounted then the front fascia is approved to IEC60945-4 for protected equipment.

3.6. Factory Reset

In set up mode there is an option for FACTORY RESET.
This should be used with caution.
This will return all user configurable settings to the factory default – including resetting the two serial port parameters to default settings. It will not reset the receiver PCB DAC settings (see 3.7 below).
It will not delete NAVTEX messages.

3.7. Receiver alignment – checking only

DAC settings are not serviceable in the field because special production test equipment is required to correctly calibrate the receiver alignment. If after review the DAC settings you suspect that they are not correct contact McMurdo Ltd customer service for advice.

Review of DAC settings

The DAC settings are preset at PCB manufacture. The DAC settings are stored in the EEPROM located on the SMARTFIND GMDSS NAVTEX RF PCB. The settings are accessible via the service panel as follows:

➢ Switch on SMARTFIND GMDSS NAVTEX and wait for the start up screen to disappear.
➢ Press and hold the **ENTER** key
➢ Using the soft keys select **VIEW RECEIVER OPTIONS**
➢ Then **VIEW SYSTEM OPTIONS**
➢ Then **RECEIVER SETUP**
➢ You will then be prompted for a password
➢ Press and release the **ENTER** key and enter the word **SERVICE**.
➢ When complete select **DONE** on the keyboard
➢ Then select **VERIFY PASSWORD.**

This will display the service screen which will include the DAC settings.

View the figures for the 518kHz receiver, 490kHz receiver, 4209.5kHz receiver, the AGC reading and the RSSI setting.

The 518, 490 and 4209.5 kHz figures are the settings for the three VCO's. The AGC (Automatic Gain Control) is the figure used to set the bias voltage input to the AGC circuitry and thus control the gain of the LNA located on the RF PCB, RSSI is figure used to calibrate the signal strength indicator bar. Typical figures for these parameters are shown below.

```
518kHz:   141          AGC:        80
```

```
490kHz:    138          RSSI:      017
4209.5kHz 125
```

These are typical figures and may vary plus or minus but should always be around these values.

Note: 140 is the default figure for the three VCO's. If all three receives show 140 as their set value the correct settings may have been lost or overwritten. Contact McMurdo Ltd customer service for further advice.

Note: If the RSSI shows a value of 000, the RSSI will need to be reset and calibrated. Contact McMurdo Ltd customer service for further advice.

3.8. System Restart

The following key sequence allows the SMARTFIND NAVTEX to be rebooted without disconnecting the power:

Press and hold the ENTER and BACKLIGHT keys for three seconds, upon release the unit will restart.

3.9. Software Download

Consult service bulletin list, software up dates may be issued from time to time.

4. ON-SHIP ASSESSMENT
Also refer to APPENDIX 3: SEA TRIAL CHECK LIST

General information regarding optimising NAVTEX Reception
When sailing within a published NAVTEX service area, reception coverage can extend as far as 200 - 300 nautical miles. If the NAVTEX signal has to cross land to any significant extent, attenuation may occur and this can reduce the reception range to as little as 50 miles. Range can increase significantly at night; it can sometimes extend to as much as 1000 miles. Some NAVTEX stations reduce transmitter power at night to avoid overlap of signals into other sea areas.

Background electrical noise in harbor, the presence of high cliffs and the masts of surrounding vessels can all contribute to poorer NAVTEX reception when in harbor rather than at sea.

To ensure the best reception possible the NAVTEX antenna must be located in a zone that is free of other electrical equipment. Take care to avoid locations that are close to wind generators, battery chargers, shore power transformers and any associated electrical power wiring. If there is any doubt regarding the suitability of a proposed location, first make a temporary test installation to confirm that the reception performance meets requirements before committing time and effort to a full antenna installation that may later have to be changed.

System Grounding
It is mandatory to have a grounding connection made to the earth terminal on the rear side of the case. This will lower the signal to noise ratio and increase the sensitivity of the system and hence the range of reception, Ensure that the 1/8" spade terminal ground pin at the SMARTFIND NAVTEX is connected to a good electrical ground. This should be the ship's hull or a specially installed ground plate, or the keel bolts on a non-encapsulated keel or bonded hull skin fitting. Use a minimum cable size of at least 1.5 mm^2. Check the installation guidelines for the antenna type being used to ensure its correct grounding requirements are complied with. Note that connection to an inappropriate or electrically noisy ground point can sometimes give unpredictable results and may even reduce overall reception performance. Consequently, do not make a new ground connection and assume that it will make things better; always check that reception is better before committing to that connection.

Isolating sources of on board interference
The 'Setup mode Receiver options' monitor window can be used to display NAVTEX reception in real time. Use it to prove that the system is receiving correctly.

The information shown on the monitor page is totally independent of normal operation, station and message type selection filters. As soon as live NAVTEX reception is detected, received information will start to flow across the display in real time. Non-printing, transmitter-idle and phasing characters are displayed as well as actual message text.

Select the required NAVTEX channel using the Monitor Source' menu option.

When reception quality is good, the error rate will be low (<4%). The error rate is calculated as an average over a large number of received characters.

Wait until the next scheduled transmission time of a distant NAVTEX station (100 miles or more away). Use the monitor facility (receiver options page) to view received messages as they are received in real time.

1. Turn off all sources of AC power usage, battery chargers, inverters, generators and shore power. Note any improvement to the average reception error rate.
2. Turn back on each source of AC power usage, one at a time, noting any increase in reception errors which may indicate a source of local interference worthy of further investigation.

Reception errors may also be caused by close proximity of DC-powered equipment. In this case repeat the above test but include all DC-powered instruments on board as well.

It is also possible to monitor for locally caused interference using an AM band radio set to 531kHz or SSB set tuned to the appropriate NAVTEX channel. Listen to the general 'on channel noise'. Switch off equipment until the general noise level is reduced and then wait for a transmission to see if there is an improvement in reception.

Evaluating antenna location
When the antenna is situated high up then local interference should be reduced as it will be most distant from local electrical equipment (sources of interference).

A methodical approach when evaluating a proposed sensor site would be to note down the average error rate from each station.

Then make a change to the proposed sensor location, take a new set of percentage error readings and consider the options.

Ideally you need to receive from at least one distant station that is 100 miles or more away or you may find it impossible to get any received error count at all.
As most NAVTEX stations just transmit for a maximum of ten minutes at a time in every four hours, you will have to work quickly.

Alternatively, take your time and make a new set of readings after four hours has elapsed.

5.   FAULT FINDING

5.1. On-ship fault finding

No NAVTEX reception

> Active antenna fitted;
> > Is 12V dc present on the antenna TNC connector socket?
> > NO - check that it is enabled in *Setup mode – Receiver options, "Antenna power enabled".*
> >
> > Active or Passive or wire antenna fitted;
> > Verify antenna integrity, check cable and connecters for damage.

Bad UTC or bad date displayed (with GPS connected)

Note, if no GPS is connected the clock and date will stop on power down and must be reset by the user when next powered up. But if relevant UTC data is detected on the data input at power up it will override the pervious manual UTC and date settings automatically and correct the system clock time and date.

1. Confirm that the GPS is outputting relevant IEC 61162 sentences. SMARTFIND NAVTEX supports IEC 61162 & 61097-6 (NMEA) protocols. Refer to APPENDIX 2: MESSAGE STRUCTURES for detail. The source of UTC used to update the system date and clock can be extracted from various IEC 61162 sentences. Use the Setup Mode – Serial options to select required sentence ZDA,GGA,RMC, or GLL (in order of preference).

2. Check for live serial data in the SMARTFIND NAVTEX Serial Options setup page, serial monitor window. If data can be seen then the interface problem is not likely to be hardware or signal level related issue.

3. Try turning off the 'NMEA Checksums Required' setting (Serial Options setup page).

   Note. it is recommended to re-enable 'NMEA Checksums Required' once fault finding is completed and the reason for the problem is resolved.

5.2. Fault finding in workshop

Strange banding / stripes / artifacts on the LCD
1. Check the flat flexi cable between the LCD and the display PCB - replace if necessary
2. Replace the LCD module.
3. If still faulty replace the display PCB

Does not start up
1. Ensure that backlight has not failed giving the impression that the unit is not starting (use a torch or bright light to view screen).
2. Open case and check for trapped backlight wires.
3. Does the red LED flash? If not check the power supply and then replace the display PCB.

Backlight failed
1. Open case and check for trapped backlight wires.
2. Check for 250VAC on backlight connector, if no replace the display PCB
3. If above does not work then replace the LCD module.

Poor LCD contrast
1. The LCD backlight is rated for 20,000 hours continuous operation, replace the complete display module (with backlight) to restore the contrast. It is recommended that the screen saver feature is left enabled to prolong the backlight service interval.

Testing serial data ports COM1 (15 D), COM2 (9 D)

Use this procedure to verify the correct operation of each communications data port hardware.
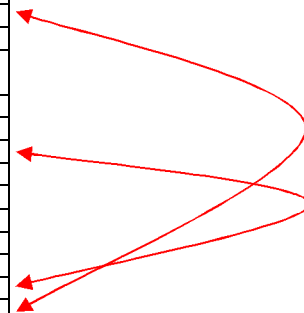
Make a loop back test.
(15 D) COM 1, (normally assigned to GPS or ECDIS)
The connections to the D-Sub 15-pin socket on are given below.
(link TXA to RXA & TXB to RXB)
To quick way to do this is to temporary connect together the following cable cores contained within the power cable provided as standard.

Power, Alarm & IBS port		(2m cable supplied)		
Pin Number	Connection	NAV-7	Cable Colour	Notes
1	IBS_TXA	O/P	WHITE/BLUE	O/P to IBS port
2				
3	+V (12/24 V DC nominal)	I/P	RED/BLUE	Ship's supply +ve
4	-V (0V)	I/P	BLUE/RED	Ship's supply -ve
5				
6	IBS_TXB	O/P	BLUE/WHITE	O/P to IBS port
7				
8	AUX_NC	O/P	ORANGE/WHITE	Alarm Relay NC
9	AUX_NO	O/P	WHITE/BROWN	Alarm Relay NO
10	AUX_COM	O/P	WHITE/GREY	Alarm Relay COM
11				
12	IBS_RXB	I/P	GREEN/WHITE	I/P from IBS port
13	IBS_RXA	I/P	WHITE/GREEN	I/P from IBS port
14				
15				

Make a loop back test plug (9D) COM 2
(normally assigned to printer or PC)
The connections to the D-Sub 9-pin socket on are given below.
(link TXA to RXA & TXB to RXB)
A spare 9 D plug connector should be wired as follows;

NMEA 0183 & printer port		
Pin Number	Connection	Notes
1		
2	SER_TXB	O/P to NMEA 0183 (printer)
3		
4	SER_RXB	I/P from NMEA 0183
5		
6		
7	SER_TXA	O/P to NMEA 0183 (printer)
8	SER_RXA	I/P from NMEA 0183
9		
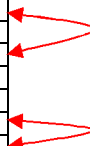
With the loop back connector in place check for serial data being echoed back in the serial monitor window. A regular ALM sentenced should be seen and also any message text sent for printing. When data is correctly echoed in the monitor window it proves that the serial port hardware is sound.

5.3. System Block Diagram

Provided for information only.
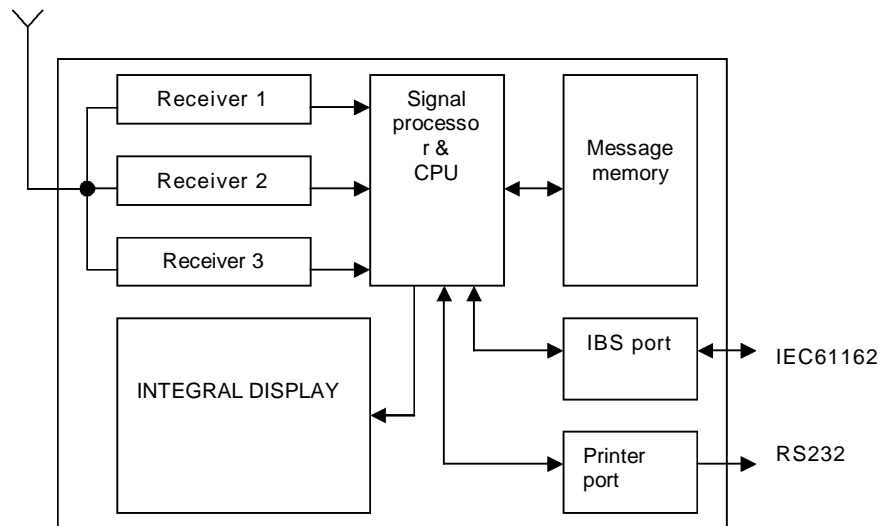
Outline circuit description

The unit runs off a 10.8 to 31.2V DC power input protected by auto resetting fuse. A dc-dc converter provides a number of internal voltage rails used by the LCD, processor and receivers. The processor provides for control of the other sections of the circuitry.

Flash memory provides for program storage, and long term storage of NAVTEX data where required. SDRAM provides for storage of volatile data. At power up an application code is decompressed from FLASH to SDRAM and the code is run from SDRAM.

A buzzer is provided to confirm key presses and sound alarms. A keyboard matrix and two switches are provided for the user controls and link directly to the processor. Green LEDs provided for back lighting of the keyboard. These are of variable brightness. A red LED is provided for status warnings. Data interfaces for communicating with external equipment are provided on the 9 and 15 way rear connectors. A colour STN LCD is driven directly by the processor this has a high voltage CCFL backlight with adjustable brightness.

Active and passive NAVTEX antenna types are supported by a switchable onboard power supply and current monitoring. Three parallel receivers, one to each receive frequency provide simultaneous operation at all times on each NAVTEX frequency.
And employ direct conversion down to base-band to generate the I & Q signal to the demodulation software. A RSSI (Receiver Signal Strength Indicator) signal is derived from the AGC signal as a diagnostics aid.

5.4. Service Bulletins

ISSUE No. 65
06th April 2011
Subject: Release of software version 1.2.25
Reference: 93-721Z Issue 2

Changes made since Issue 1

1. Antenna fault detection featured added, open-circuit and short-circuit will now indicate a system error. A new 'Antenna Alarm' setup menu option can be used to enable or disable this feature if the active antenna type is not compatible due to less than 4 ma current consumption.

2. Message list summary page improvements.
   a/ Message list summary mode can now only be entered from Index mode when the curser is resting on an 'in date' message ID. This stops the message list summary page cursor bar from moving out of view (off the bottom of the screen).
   b/ Will no longer show '1193046' when the message list is empty.

3. Writing of text to the screen has been speeded up resulting in a reduction of screen re-draw flicker.

4. Demonstration mode enabled in receiver setup menu, was previously not functioning even when selected.

Software Update procedure
In order to download the software from a PC into the Smartfind NAVTEX an RS232 or USB to RS422 converter is required. Please contact McMurdo Customer Service if assistance is required with obtaining a suitable converter.
(A recommended converter is available at www.easysync.co.uk)

Download release software and upgrade procedure documents from:

ftp://ftp.mcmurdo.co.uk/pub/Software/

Issued by: Robin George,6th April 2011

For further information please contact:
Tel: +44 (0) 23 9262 3900
Fax: +44 (0) 23 9262 3998,
Email: customerservice@mcmurdo.co.uk

Web: www.mcmurdo.co.uk

To be carried out immediately	☐
To be carried out during normal service	☐
To be carried out if required	■
To be carried out only on PCB repair	☐
For information only	☐

5.5. Software Release Notes

06/04/2011 - 93-721Z issue 2, routine software update released as V12.25.

6. REPAIR PROCEDURES

Repair policy for this product is repair by replacement of major sub-assemblies. Component level diagnosis and repair is not supported. Each PCBs can be inspected for dry joints etc but component replacement is not possible.

The principal repair activity is the replacement of the circuit boards/display.
Full instructions for this can be found in section 3.0 Disassembly and Reassembly.

Other than this, repair is limited to replacing those parts of the SMARTFIND NAVTEX which have suffered mechanical wear and tear.

Spare parts for these purposes are listed in section 7.

7. SPARES

The following items are available as spare parts/accessories:

Part number	Description	Contents
93-050A	Display keypad	
93-051A	Front fascia assembly	Fascia, window seal and clear screen.
93-052A	2m Interface cable (DC power)	
93-053A	Earth cable	
93-054A	LCD Screen	LCD, copper tape, gasket
93-055A	Display Back Box	Back box, label, screws and gasket Serial number and year of manufacture to be advised when ordering
93-056A	Flat flexi cable	16 way flexi cable
93-057A	Display and RF PCB	Tested as a pair
93-058A	USB/RS232 to RS422 converter	Converter and cable to allow software download
93-060A	Deskmount bracket kit	Bracket, locking knobs, screws
93-061A	Bulkhead bracket kit	Flushmount Bracket, gasket and securing kit
93-204	User manual	Available on website

Ancillary items:

Part number	Description
93-062A	ANA1 - Light duty active NAVTEX Antenna with 20m cable and standoff bracket
93-063A	ANA2 - Heavy duty active NAVTEX Antenna with PL socket
93-064A	Type A stand-off mounting bracket for ANA2
93-065A	Type B long reach stand-off mounting bracket for ANA2
93-066A	Type C deck mount bracket for ANA2
93-067A	Antenna cable kit for ANA2, 20m

APPENDIX 1: SPECIFICATION

Please note that the product specification is issued in the user manual for each product. The user manual is delivered with each new product and is also available on our website.
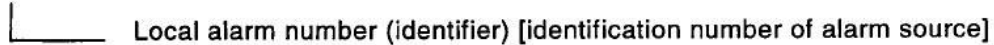
McMurdo reserves the right to change specifications without notice.

APPENDIX 2: MESSAGE STRUCTURES

ACK – Acknowledge alarm

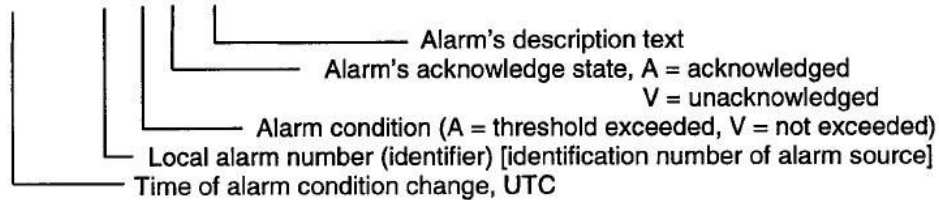Acknowledge device alarm. This sentence is used to acknowledge an alarm condition reported by a device.

$--ACK,xxx*hh<CR><LF>

Local alarm number (identifier) [identification number of alarm source]

ALR – Set alarm state

Local alarm condition and status. This sentence is used to report an alarm condition on a device and its current state of acknowledgement.

$--ALR,hhmmss.ss,xxx,A, A,c--c*hh<CR><LF>

Alarm's description text
Alarm's acknowledge state, A = acknowledged
V = unacknowledged
Alarm condition (A = threshold exceeded, V = not exceeded)
Local alarm number (identifier) [identification number of alarm source]
Time of alarm condition change, UTC

GLL – Geographic position – latitude/longitude

Latitude and longitude of vessel position, time of position fix and status.

$--GLL, llll.ll, a, yyyyy.yy, a, hhmmss.ss, A, a *hh<CR><LF>

Mode indicator (see notes 1 and 2)
Status (see note 2) A = data valid V = data invalid
UTC of position
Longitude, E/W
Latitude, N/S
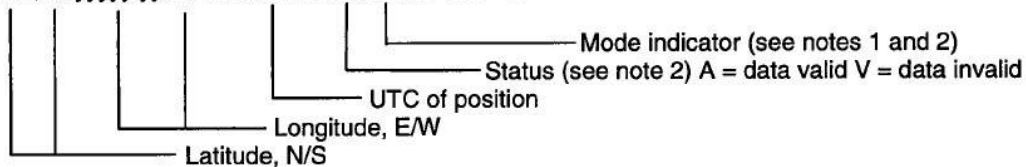
NOTE 1   Positioning system Mode indicator:

A = Autonomous
D = Differential
E = Estimated (dead reckoning)
M = Manual input
S = Simulator
N = Data not valid

NOTE 2   The Mode Indicator field supplements the Status field (field 6). The Status field shall be set to V = invalid for all values of Operating Mode except for A = Autonomous and D = Differential. The positioning system Mode indicator and Status fields shall not be null fields.

C.2   NRM – NAVTEX receiver mask

This command is used to manipulate the configuration masks that control which messages are stored, printed and sent to the INS port of the NAVTEX receiver.

$--NRM,x,x,hhhhhhhh,hhhhhhhh*hh<CR><LF>

             message type mask [4]
             transmitter coverage area mask [3]
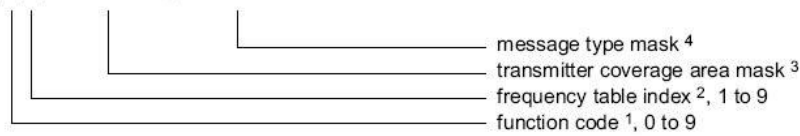   frequency table index [2], 1 to 9
             function code [1], 0 to 9

NOTE 1   The function code is used to further identify the purpose of the sentence. The meaning of the function code is as follows:

    0 – request messages for the given mask
    1 – set/report the storage mask
    2 – set/report the printer mask
    3 – set/report the INS mask
    4 to 9 – reserved for future use

NOTE 2   The frequency indicator identifies the frequency that the NAVTEX message was received on:
    1 = 490 kHz
    2 = 518 kHz
    3 = 4209,5 kHz
    4 through 9 are reserved for future use

NOTE 3   The transmitter coverage area mask is defined as a 32 bit hex field where the least significant bit represents transmitter coverage area 'A', the next bit is 'B' and so on up to bit 25 which is 'Z'. Bits 31 through 26 are reserved for future use and are set to zero. To select a transmitter coverage area, its corresponding bit should be set to one. To deselect a transmitter coverage area its corresponding bit should be set to zero.

NOTE 4   The message type mask is defined as a 32 bit hex field where the least significant bit represents message type 'A', the next bit is 'B' and so on up to bit 25 which is 'Z'. Bits 31 through 26 are reserved for future use and are set to zero. To select a message type its corresponding bit should be set to one. To deselect a message type its corresponding bit should be set to zero.

NRX – NAVTEX received message

The NRX sentence is used to transfer the contents of a received NAVTEX message from the NAVTEX receiver to another device. As the length of a single NAVTEX message may exceed the number of characters permitted in a single NMEA 0183 sentence, many NRX sentences may be required to transfer a single NAVTEX message.

$--NRX,xxx,xxx,xx,aaxx,x,hhmmss.ss,xx,xx,xxxx,x.x,x.x,A,c--c*hh<CR><LF>

message body [7]
status indication [6]
total number of bad characters
total number of characters in this series of NRX sentences [5]
year
month 1-12
day 1-31
UTC of receipt of message
frequency table index 0-9 [4]
NAVTEX message code [3]
sequential message id 00-99 [2]
sentence number 001-999
number of sentences 001-999 [1]
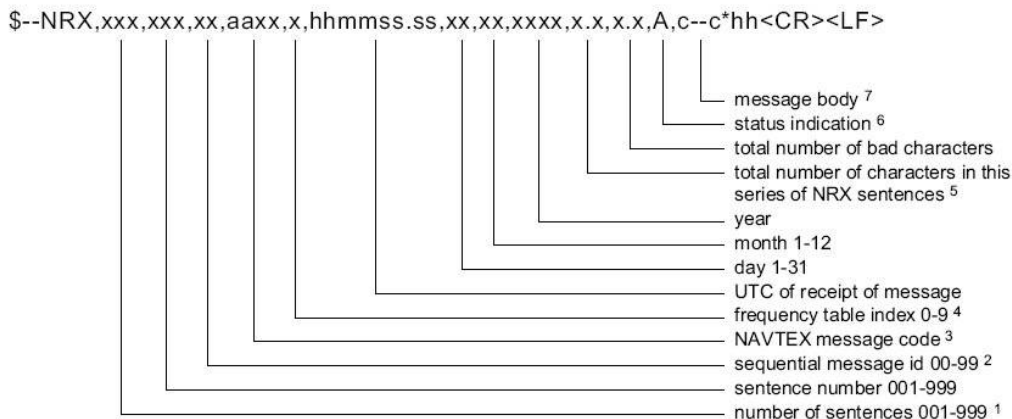
NOTE 1   The total number of sentences required to transfer the NAVTEX message from the NAVTEX radio receiver. The first field specifies the total number of sentences used for a message, minimum value 1. The Sentence Number field identifies the order of this sentence in the message, minimum value 1. All sentences contain the same number of fields.   For efficiency it is recommended that null fields be used in the additional sentences where the data is unchanged from the first sentence (this applies to fields 4 through 12).

NOTE 2   The sequential message identifier provides a unique identifier for each NAVTEX message represented by a group of sentences. Though the message code (field 4) contains a NAVTEX message serial number, there are special cases when the message serial number is set to 00 and has a different meaning or when the same message code can occur more than once. When these conditions occur, the sequential message identifier can be relied upon to uniquely identify this NAVTEX message from other NAVTEX messages with the same message code.

NOTE 3   The NAVTEX message code contains three related entities. The first character identifies the transmitter coverage area and the second character identifies the type of message. Both these characters are as defined in Table I of Recommendation ITU-R M.625-3, combination numbers 1-26. Transmitter identification characters are allocated by the IMO NAVTEX Co-ordinating Panel; these characters and the meanings of the message type characters are described in the NAVTEX manual (IMO publication 951E). The remaining two characters are restricted to numerals with a range of 00 to 99 and represent a serial number for each type of message. The value of 00 is a special case and not considered a serial number. See 4.3.5 for interpretation of special case value of 00.

NOTE 4   The frequency indicator identifies the frequency that the NAVTEX message was received on:
    0 = not received over air (eg test messages)
    1 = 490 kHz
    2 = 518 kHz
    3 = 4209,5 kHz
    4 through 9 are reserved for future use

NOTE 5   The total number of characters indicates the expected size of the message body sent in this sequence of NRX sentences. It does not include the additional overhead for reserved characters found in table 1 of this IEC 61162-1.
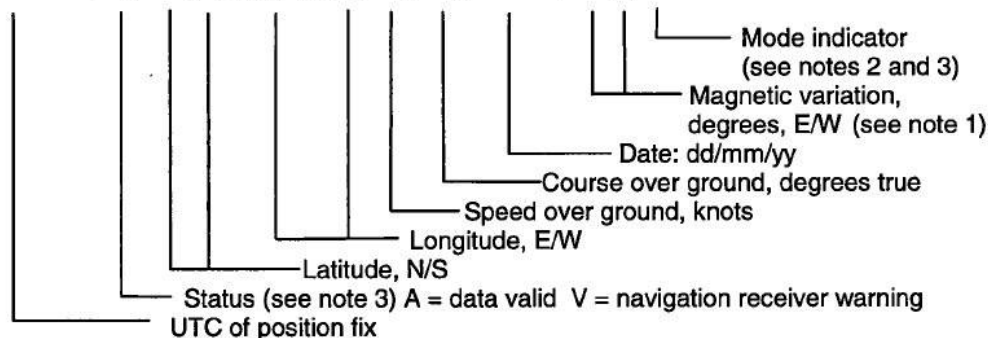
NOTE 6   Status 'A' is used for syntactically correct message reception. Status 'V' is used for syntactically incorrect message reception, e.g. end characters NNNN missing.

NOTE 7   The message body may contain reserved characters as defined in IEC 61162-1.

RMC Recommended minimum specific GNSS data

Time, date, position, course and speed data provided by a GNSS navigation receiver. This sentence is transmitted at intervals not exceeding 2 s and is always accompanied by RMB when a destination waypoint is active. RMC and RMB are the recommended minimum data to be provided by a GNSS receiver. All data fields must be provided, null fields used only when data is temporarily unavailable.

$--RMC, hhmmss.ss, A, llll.ll,a, yyyyy.yy, a, x.x, x.x, xxxxxx, x.x,a, a*hh<CR><LF>

- Mode indicator (see notes 2 and 3)
- Magnetic variation, degrees, E/W (see note 1)
- Date: dd/mm/yy
- Course over ground, degrees true
- Speed over ground, knots
- Longitude, E/W
- Latitude, N/S
- Status (see note 3) A = data valid V = navigation receiver warning
- UTC of position fix

NOTE 1   Easterly variation (E) subtracts from true course. Westerly variation (W) adds to true course.
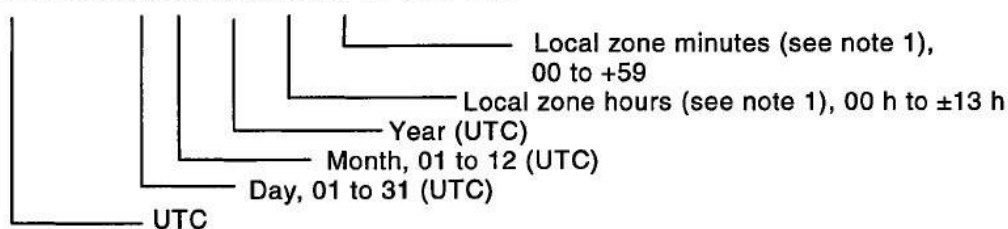
NOTE 2   Positioning system Mode indicator:

A = Autonomous mode
D = Differential mode
E = Estimated (dead reckoning) mode
M = Manual input mode
S = Simulator mode
N = Data not valid

NOTE 3   The positioning system Mode indicator field supplements the positioning system Status field (field No. 2) which shall be set to V = invalid for all values of Mode indicator except for A = Autonomous and D = Differential. The positioning system Mode indicator and Status fields shall not be null fields.

ZDA – Time and date

UTC, day, month, year and local time zone.

$--ZDA, hhmmss.ss, xx, xx, xxxx, xx, xx*hh<CR><LF>

- Local zone minutes (see note 1), 00 to +59
- Local zone hours (see note 1), 00 h to ±13 h
- Year (UTC)
- Month, 01 to 12 (UTC)
- Day, 01 to 31 (UTC)
- UTC

NOTE 1   Local time zone is the magnitude of hours plus the magnitude of minutes added, with the sign of local zone hours, to local time to obtain UTC. Local zone is generally negative for East longitudes with local exceptions near the International Date Line.

Example: At Chatham Is. (New Zealand) at 1230 (noon) local time on June 10, 1995:
$GPZDA,234500,09,06,1995,-12,45*6C<CR><LF>
In the Cook Islands at 1500 local time on June 10, 1995:
$GPZDA,013000,11,06,1995,10,30*4A<CR><LF>

APPENDIX 3: SEA TRIAL CHECK LIST

SMARTFIND GMDSS NAVTEX
Sea Trial Check List

SMARTFIND NAVTEX Installation verification report for Vessel (name);

Completed by;

Position;

Date;

Location (or port);

VESSEL IDENTIFICATION INFORMATION

Name		
Call Sign		
MMSI		
NAVTEX S/N		
Antenna Type		
RX frequencies	*518 kHz*	
supported by	*490 kHz*	
antenna	*4209.5 kHz*	

Introduction and Scope

This Sea Trial Checklist is designed to prove that the GMDSS NAVTEX receiver is working to specification in the installation to be evaluated.

SMARTFIND GMDSS NAVTEX is a shipborne radio receiver designed to receive NAVTEX information, which consists of messages concerning weather and shipping conditions. The messages are transmitted by land-based transmitters on one of three frequencies: 490kHz, 518kHz or 4.2095MHz. Three separate receiver circuits allow for simultaneous reception of each NAVTEX channel.

System Details

Subject	Detail (or strike out)
Date	
Engineer	
Vessel type	
Unit serial number (rear label and in software under 'setup mode' screen).	
Software version (check on boot up screen)	*(0.1.0) Or other*
Antenna type, bracket and cable detail.	*(ANA1) (ANA2) (Active) (passive) (wire) Other;*
PSU (12V / 24V / ac–dc converter etc)	*(AC) (UPS) (DC Reserve Radio Supply)*
IBS connected	*(RS422) (RS232 with converter) Type;*
GNSS NMEA provide by	*GPS / IBS make & type;*
UTC data provided by GNSS	*(None)(ZDA) (GLL) (RMC) (GGA)*
Printer type (option)	*(None) (DPU 414) (other -)*
Installation notes. **Location of main unit;** **Location of antenna** **Approximate cable lengths to;** antenna **/** IBS **/** printer**;** **Safety Grounding point; (green rear wire connected to ships hull); Yes/No** **DC isolator switch location;** **Interfaced optional equipment; (**GNSS) (IBS) (printer) (PC)	

Basic System Set-up

Test instruction	Desired effect	PASS/FAIL
Check that displayed UTC date is correct	*Yes*	
Check that displayed UTC time is correct	*Yes*	
Check Lat Long is correct (GNSS must be connected)	*Yes*	
Check that the antenna type is reported correctly For active antenna set as 'Enabled'	*Enabled = DC voltage applied to antenna connector centre pin*	
Check screen saver status	(Enabled) (de-selected)	
After workshop service		
List the 3 VCO DAC settings	*Ref Osc;* *490;* *518;* *4209.5;*	
List AGC control setting		
List RSSI setting offset		

User Settings

Test instruction	Message categories / station designators excluded	PASS/FAIL
If the user has de-selected any message categories and / or station designators then note them here. Go to Set up mode – Message filters and review status; 518,490,4209.5 *(Note; X = de-selected)*		

System Operation

Test instruction – view received messages	Desired effect	PASS/FAIL
Note down the station designators for all stations received on 490kHz	*Read message text*	
Note down the station designators for all stations received on 518kHz	*Read message text*	
Note down the station designators for all stations received on 4209.5kHz	*Read message text*	
Check that there are no messages displayed that are over 72 hours old (other than any locked messages)	*Review message date*	
Check that there are no repeated messages displayed	*Review message list*	
Ask if any users have experienced any problems with the NAVTEX such as system lock up or loss of expected data, document here …		

Live System Operation 1

Test instruction – Live reception (red LED will normally flash).	Desired effect	PASS/FAIL
If there is a live transmission during the site visit then go to the SETUP MODE, Receiver options page, (NAVTEX) monitor source, select the correct receive channel – (518, 490, 4209.5)	*View data*	
Ensure that the monitor window displays the received characters (if the station is less than 200 miles away then there should be no errors)	*View data*	
Ensure that the RSSI bar operates (in green sector when receiving a station)	*View (3 step level change)*	
Note here any received message IDs on the monitor page – then check that these messages are displayed on the main INDEX display(s) Typical message in monitor window; OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO OOOOOOOOOZCZC AA07 RECEIVER SENSITIVITY CHECK NNNN OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO OOOOOO!"£$%567^&*90GHJ*&^%%$$****~ Stop Note. Each message must start with ZCZC and end with NNNN or it will be rejected and not appear in the message list.	*Review data*	

Live System Operation 2

Test instruction – Serial interface ports	Desired effect	PASS/FAIL
If GNSS (GPS) or IBS is connected. Go to the SETUP MODE, Serial options page, Serial monitor source, select the correct serial, port	*View data*	
IBS port (on 15 way D connector COM1)	*Note connected device type*	
Printer – NMEA port (on 9 way D connector COM 2)	*Note connected device type*	
Verify Baud rate is set correctly for each device connected.	*Baud rates (4800), (38400), (115200)* *Com1 IBS Port;* *Com2 Printer –NMEA Port;*	
Ensure that the monitor window displays serial characters without corruption or errors (check both ports)	*View data*	
Pause monitor to freeze the updating	*Review data*	
Note the displayed message headers and relevant port used. RMC, GLL, ZDA GGA (UTC and position) NRX, NRQ, NMK, ACK, (NAVTEX) ALR (Status alarm)	*Review data and list the valid headers shown;* *IBS Port;*	
	Printer –NMEA Port;	

Notes;

Notes;

McMurdo Limited
Silver Point
Airport Service Road
Portsmouth PO3 5PB
United Kingdom

Phone: +44 (0)23 9262 3900
Fax: +44 (0)23 9262 3998
Email: customerservice@mcmurdo.co.uk
Website: *www.mcmurdo.co.uk*

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