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RadaScan Installation Instructions

RadaScan Sensor, PN 20-0067-0 Rev A

Before starting an installation, please note the following important points:

- All servicing / installation to be undertaken ONLY by qualified service personnel. There are no user serviceable parts inside the unit.
- Do NOT plug in, turn on or attempt to operate an obviously damaged unit.
- Replace fuses ONLY with the same type and rating as marked on the label adjacent to the fuse holder.
- The equipment accepts the input 100-240Vac / 50-60Hz / 2.8 – 1.2A, as marked on the equipment. Ensure that the supply voltage available at the installation site meets the voltage range marking, as provided on the equipment.

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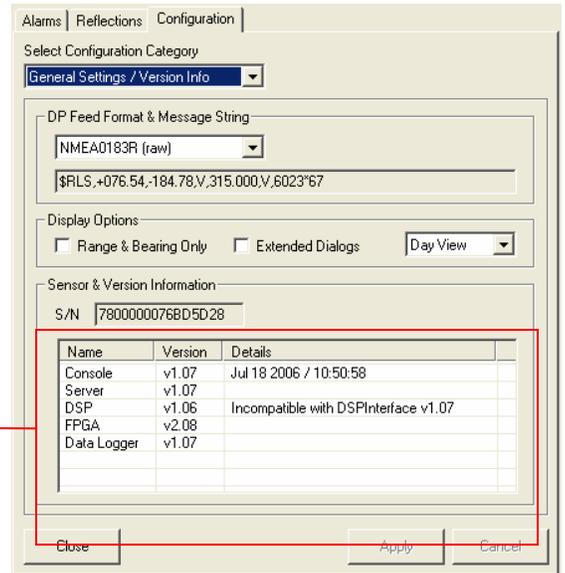
Serial numbers and software versions

Component Part Numbers and individual Serial Numbers are assigned to each component of Radascan. These can be found on product labels affixed to each unit. These numbers identify the hardware configuration and product revision and will be requested by Guidance Navigation in the event of an application service or support call to the company.

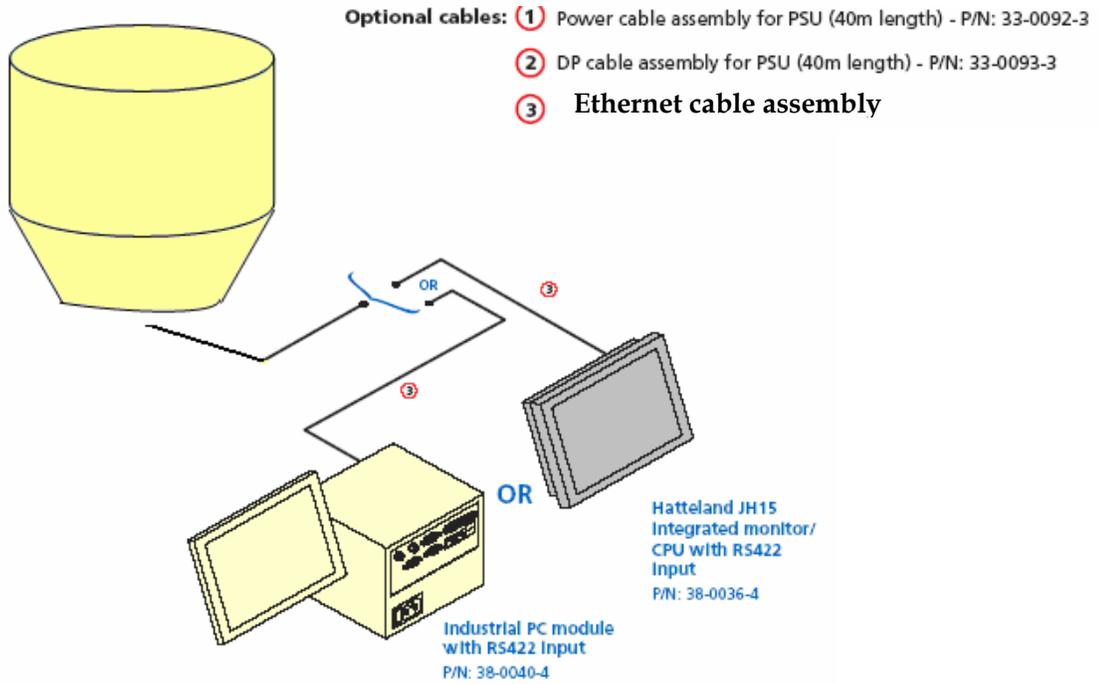
Software version information

The *Configuration* page tab within the Property sheet provides version information about every software component within the Console application and the Radascan Sensor.

Software component
Version Information



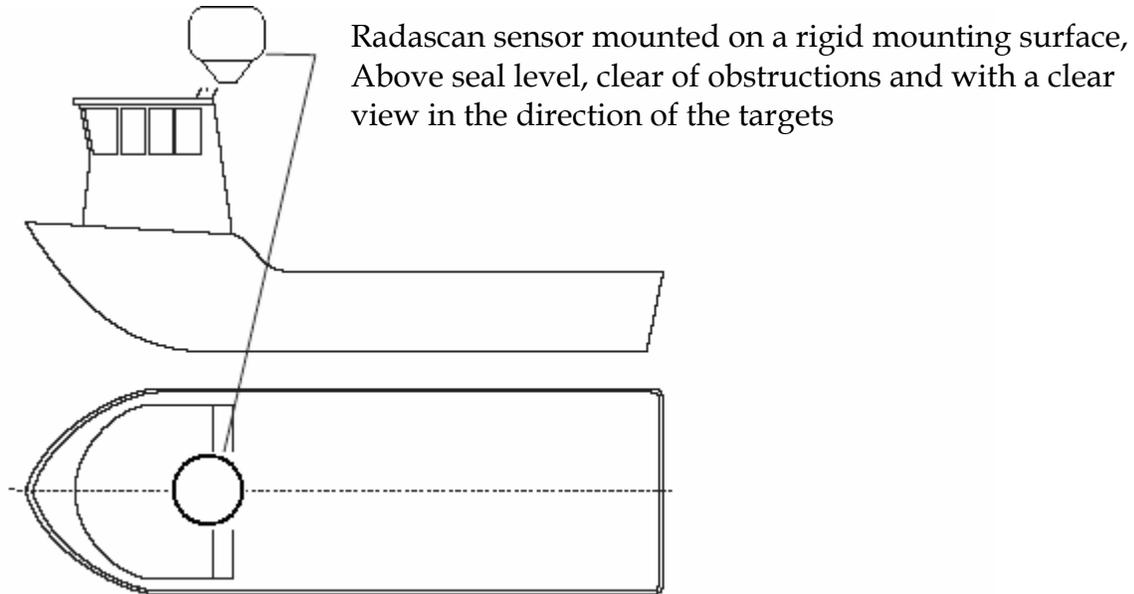
Radascan Components



Mechanical Installation

Where to install Radascan

The Radascan system is designed for permanent or semi-permanent installation at a suitable location on the installation vessel.



The Radascan sensor should be firmly bolted to a flat horizontal surface at the suitable location

The mounting surface must have the following characteristics:

- be rigid and able to support the sensor weight of 75Kg.
- be capable of receiving the 4 fixing bolts used to secure the sensor.
- be well above sea level to prevent the swamping or immersion of the sensor.
- afford an adequate view in the expected direction of retro-reflective targets.
- be clear of likely omissions from exhausts or other particulate sources to prevent the need for overly frequent cleaning of the sensor

Typical installation for a platform supply vessel is above the wheelhouse looking over the back deck area. Installation may benefit from the use of a custom fabricated mounting plate located outside the rear guard-rail

How to install the Radascan System

Unpacking the Radascan System

The whole Radascan system is supplied and shipped in a custom-built crate, Use the following procedure to unpack and prepare the Radascan System.

To unpack the Radascan System

1. Position the Radascan crate on a level surface, close to the area where the sensor will be installed.
2. Remove the top panel and then the side panels from the crate.
3. Remove the securing bolts (M12) from the base of the Radascan system.

Mounting the Radascan Sensor

To be specified

Cable Installation

The Radascan system is supplied without cables that are necessary to connect the sensor to the DP system or to the PC control console. These must be supplied and fitted as required for a particular vessel installation by the installer. The installer must provide power to the Radascan sensor.

Cable Specification

Signal wiring to the DP and Control Console should be constructed of standard armored and shielded data cable with a minimum of 5 cores and suitable for external marine applications including UV and chemical resistance.

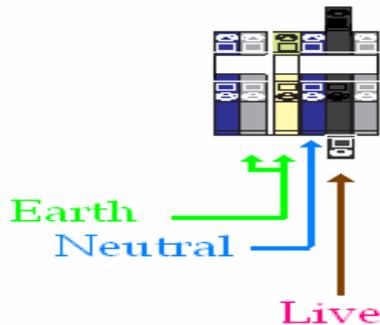
The power cable should be of external marine standard 3 core armored construction rated to 6 amps.

For Ethernet connection cable to the User console (and optional Ethernet link to the DP system), Guidance Navigation recommend LEONI LI9Y(ST)C11Y 4x2x0.15 GN, whilst for connectors: PHOENIX CONTACT Variosub RJ45 Quickcon CAT5e.

Connecting the power cables

Remove the hatch by unscrewing the M4 x 16mm socket screws and remove one of the screw heads from the three cable glands and feed the cable through the water-proof gland.

You will need to strip 10 mm from the each of the three cores and connect each of the core into the respective connection as specified below:



Console and DP Feed connections

Console Connection

You will require a shielded Ethernet cable, remove one of the screw heads from the M20 glands mounted on the hatch and feed the Ethernet cable through it.

You will see a metal box in front of you with the LED display mounted on it, the Console Ethernet connector is located on the right hand side of this metal. Each connection is labeled appropriately.

DP Feed Connection

The Radascan system has two types of connection which will allow you to connect to your DP feed system. The DP Feed type is output through an Ethernet connector, this can be found on the right hand side of metal box with the LED display mounted on it. And secondly a D type (9 pin) connector with the following pin references:

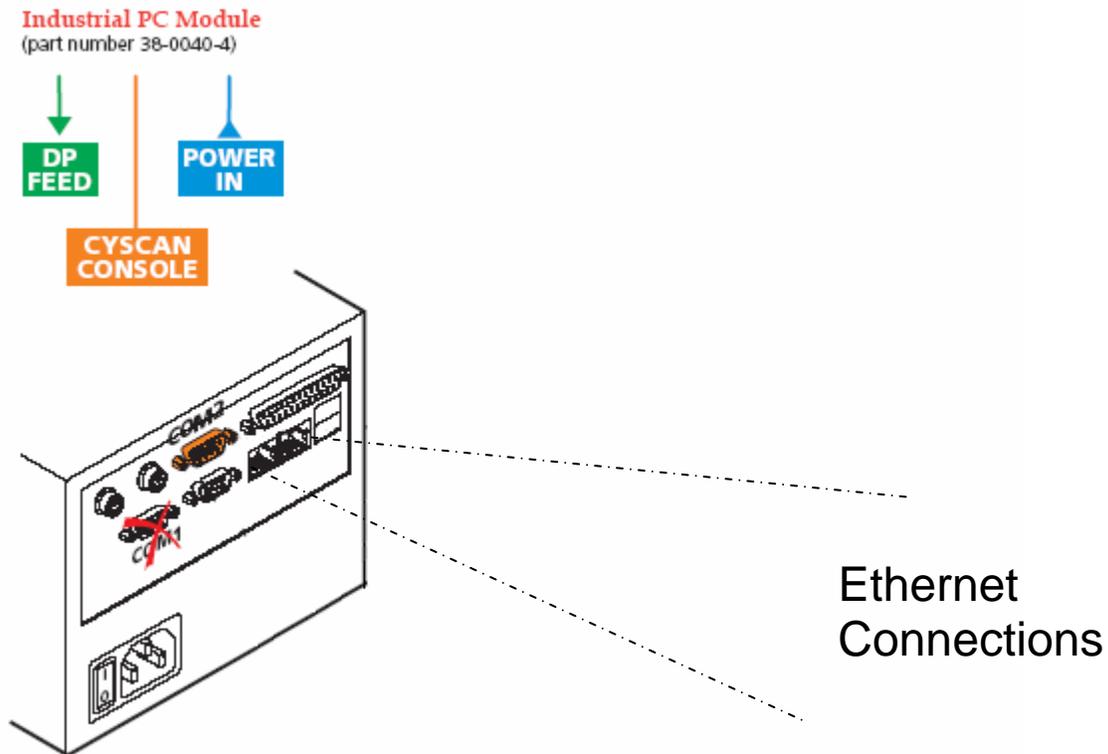
Pin	Connection
1	TX-
3	TX+
5	Signal Ground

The D Type connector can be found above the Console Ethernet connector.

Make sure that the shield of the cable is mechanically clamped to the D-Type metal housing. Plug DP feed cable in to 9 way socket on the side of the breakout housing.

Radascan Console Computer options

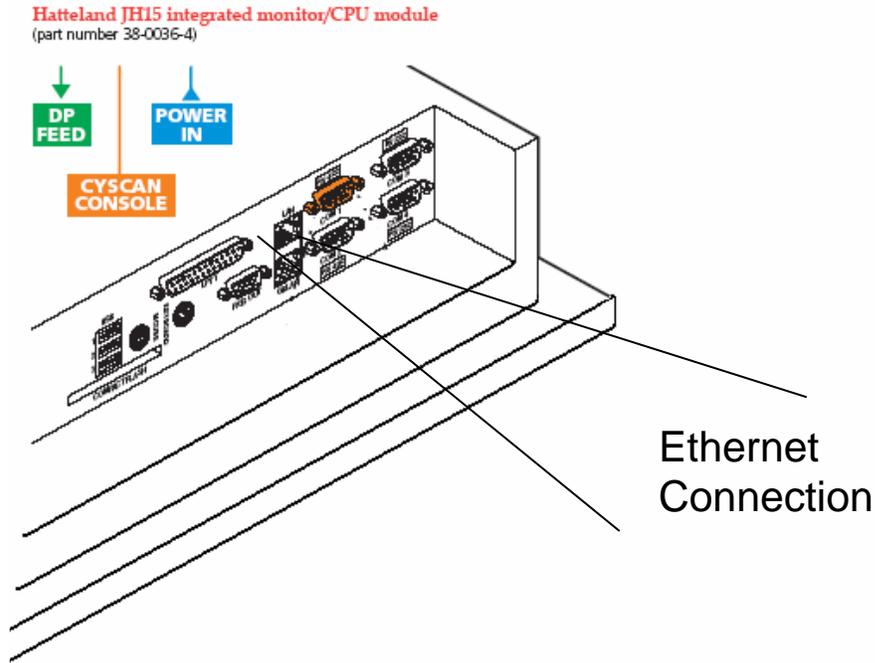
The Radascan system is available with three different optional configurations of PC hardware to run the Control Console application. The wiring connections for each of these are shown here. Use the one that is appropriate to your PC hardware configuration.



Console Computer Notes

- Use only the Ethernet connections
- Set either of the two Ethernet connections as the Console Communications
- Remove the keyboard after setup and use the on-screen keyboard

Hatteland JH15 integrated monitor/CPU module (part number 38-0036-4)



Console computer notes:

- Set the Console Communications port to either Ethernet connection
- Remove the keyboard after set up and use the on screen keyboard

Radascan Console set-up

Once the full Radascan system has been installed on the vessel, a number of tasks need to be performed to ensure accurate operation. These are:

- [Location offsets](#) – these define the exact position of the sensor on the vessel,
- [Vessel name](#) – identifies the vessel and is included in all reports created by the Radascan system,
- [Log file creation](#) – create and collect a log file to confirm the correct installation and operation of the Radascan system.

In addition, other optional settings are available:

- [Bearing offset](#) – optional, used to account for any deviation of the sensor's orientation from the true centre-line of the vessel,
- [Additional shutdown menu features](#) – a range of options, such as upgrading and diagnostics that are available during service access mode.

Each of these operations are discussed in the sections that follow.

Most of these tasks are only available when [Service access mode](#) is invoked.

Entering service access mode

There are many settings within Radascan Console that can seriously affect system operation if they are incorrectly adjusted. For this reason they are concealed until you enter service access mode.

There are two ways to enter service access mode:

- Insert an engineer's USB key into one of the Console computers' USB ports, or
- Obtain a temporary service access code from either Guidance Navigation Limited or an authorized customer service representative.

To obtain and use a temporary service access code

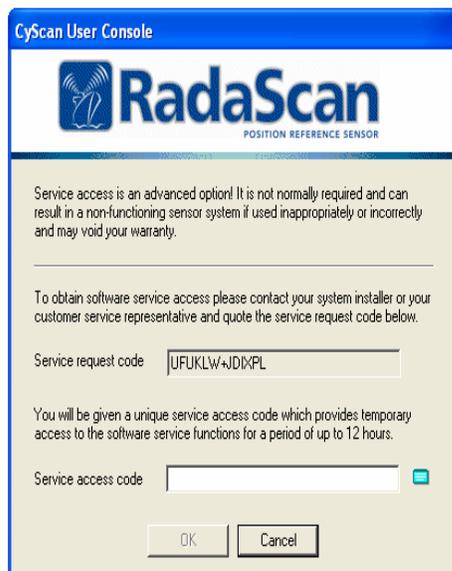
- 1 Within the Radascan Console application, view the *About* page tab within the Property sheet.
- 2 Click the *Service Access* button in the lower right corner of the About page. A dialog will be displayed and will show a Service request code.

Note: The service request code is always constructed as two groups of six capital letters [A-Z] separated by a + sign. There are never any numerals in a service access code.

- 3 Transmit the service access code to Guidance Navigation Limited (support@radascan.co.uk) or an authorized customer service representative. A corresponding Service access code will be supplied to you. This code is non-transferable and will operate only with current Console system for a limited period.
- 4 Enter the received code into the *Service access code* field of the displayed page and click OK. Service access will be granted on this system for a maximum period of 12 hours, however, the mode will be automatically ended after 20 minutes - you need to re-click the *Service Access* button within the *About* page.

Note: The service access code is a 12 digit hexadecimal number [0-9, A-F].

A Service Access USB Key is available to authorized service partners (part number 20-0076-4). This can be obtained from Guidance Navigation Limited. Email radascan@guidance.eu.com



CyScan User Console

RadaScan
POSITION REFERENCE SENSOR

Service access is an advanced option! It is not normally required and can result in a non-functioning sensor system if used inappropriately or incorrectly and may void your warranty.

To obtain software service access please contact your system installer or your customer service representative and quote the service request code below.

Service request code

You will be given a unique service access code which provides temporary access to the software service functions for a period of up to 12 hours.

Service access code

OK Cancel

Location offsets (requires service access)

Location offsets allow you to define exactly where, within the outline of the vessel, the Radascan sensor is positioned. The location offsets are expressed as four values (length and breadth of the vessel, plus a bow offset and a starboard offset) held with the Configuration page tab of the property sheet.

To adjust the location offsets

1 Enter Service Access mode using either an engineer's USB key or a temporary service access code.

2 View the *Configuration* page tab within the Property sheet

3 Click the down arrow of the *Select Configuration Category* box and select the *Vessel Parameters / File Transfer* option.

4 In the *Length* and *Breadth* fields, enter the overall size of the vessel.

5 In the *Bow Offset* and *Starboard Offset* fields, enter the distance of the sensor from the bow and from the starboard side, respectively.

6 Click the Apply button.

The screenshot shows a software window titled "Alarms | Reflections | Configuration". At the top, there is a "Select Configuration Category" dropdown menu with "Vessel Parameters / File Transfer" selected. Below this is a "Vessel Parameters" section containing several input fields:

Name			Default Vessel		
Length		Breadth		Bearing Offset	
130	m	19	m	0	deg
Bow Offset		Starboard Offset			
37	m	9.5	m		

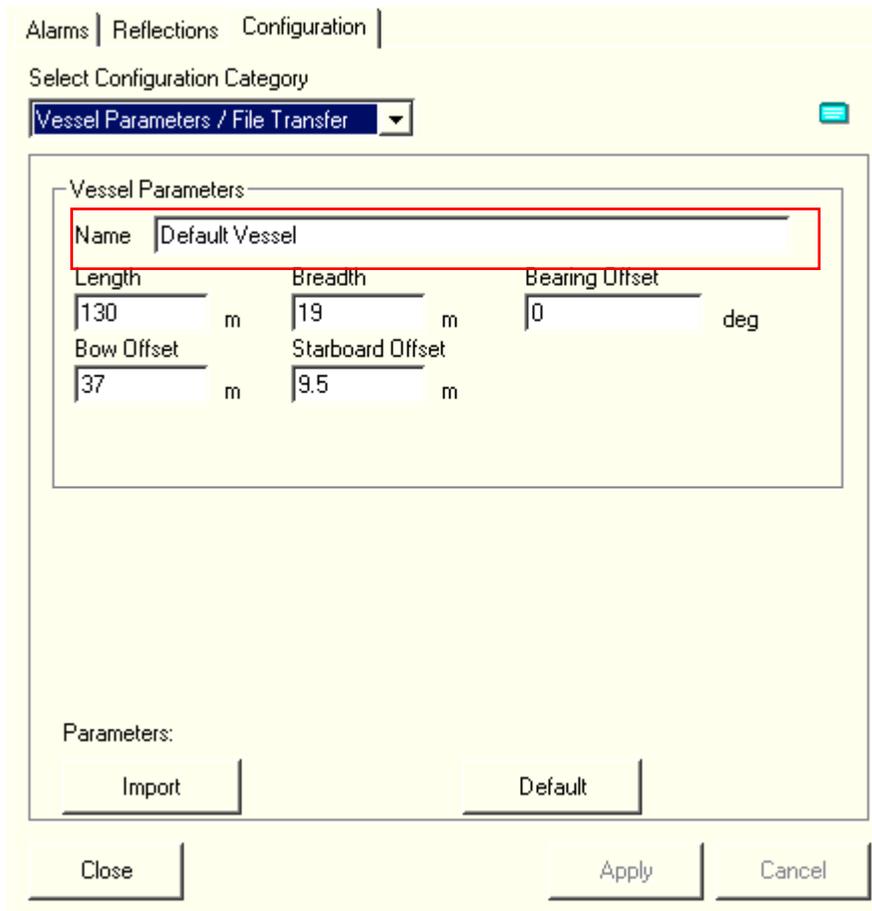
At the bottom of the "Vessel Parameters" section, there are "Parameters:" labels and "Import" and "Default" buttons. At the very bottom of the window, there are "Close", "Apply", and "Cancel" buttons.

Vessel name (requires service access)

The vessel name is displayed within the Radascan Console application and is also written to all activity logs that are produced. The latter is an important reason to enter the vessel name, particularly to avoid confusion between logs sent from different vessels.

To set the vessel name

- 1 Enter Service Access mode using either an engineer's USB key or a temporary service access code.
- 2 View the *Configuration* page tab within the Property sheet.
- 3 Click the down arrow of the *Select Configuration Category* box and select the *Vessel Parameters / File Transfer* option.



The screenshot shows a configuration window with tabs for 'Alarms', 'Reflections', and 'Configuration'. The 'Configuration' tab is active. Below the tabs is a 'Select Configuration Category' dropdown menu set to 'Vessel Parameters / File Transfer'. The main area is titled 'Vessel Parameters' and contains a form with the following fields:

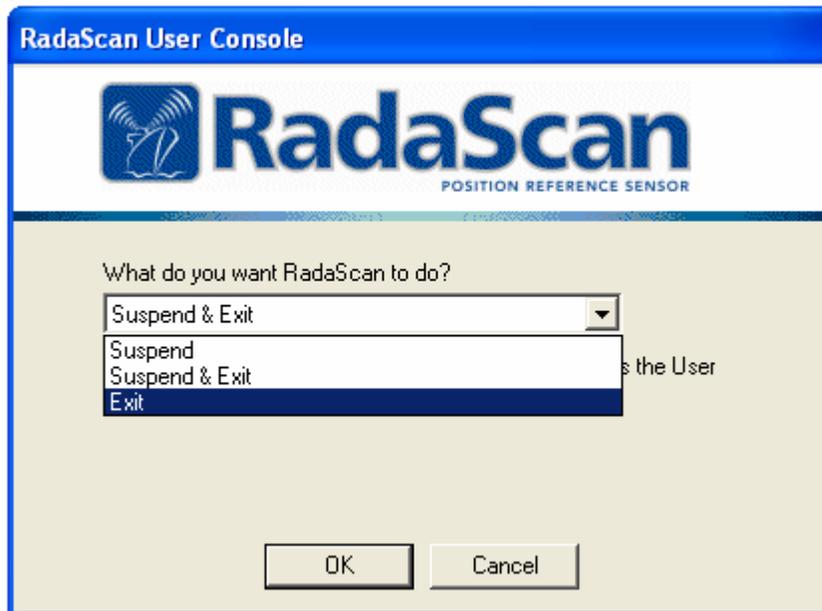
Name			Default Vessel		
Length		Breadth		Bearing Offset	
130	m	19	m	0	deg
Bow Offset		Starboard Offset			
37	m	9.5	m		

At the bottom of the 'Vessel Parameters' section, there are two buttons: 'Import' and 'Default'. Below the entire configuration area are three buttons: 'Close', 'Apply', and 'Cancel'.

- 4 In the *Name* field, enter the vessel name.
- 5 Click the Apply button.

Additional shutdown menu features (requires service access)

When service access mode is invoked, the Radascan Console shutdown menu displays an additional Exit option that is concealed during normal user mode:



Initial log file creation

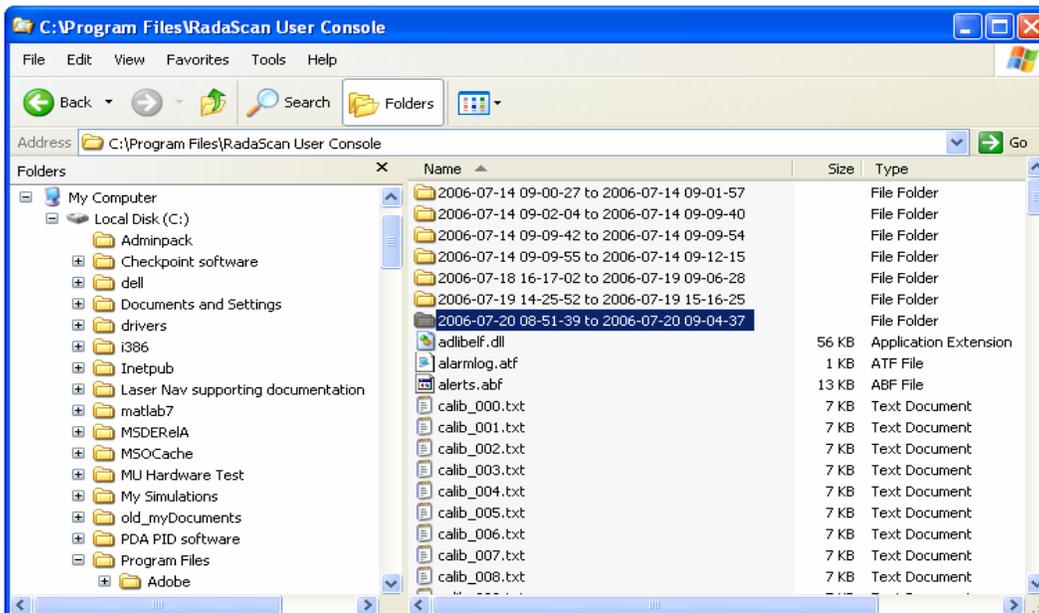
As part of the commissioning process, it is accepted best practice to initiate and store a log file of the Radascan system operation. The completed log file should then be archived and a copy also sent to Guidance Navigation Limited as a base reference for the system.

Normally, the Radascan system creates automatic log files whenever it is navigating. For commissioning and diagnostic purposes, it is possible to force the system to create a log file while it is in standby mode. To provide real data, the system must be able to see one or more reflective targets.

To create and send a log file

- 1 Enter Service Access mode using either an engineer's USB key or a temporary service access code.
- 2 On the Radascan Console keyboard, press Alt + L. Allow the system to run for at least ten minutes with one or more reflective targets in view.
- 3 After a suitable period, press Alt + L to stop the log file session.
- 4 Use the 'Start' button and 'My Computer' to access the Local Disk (C:) folders and filing system. Locate the 'Program Files\Radascan User Console' folder.
- 5 Within the folder, locate the log file whose filename matches the date and time of your session. The name of the folder will include the start and finish dates and times, for example:
05d09m2005y 20h33m03s to 05d09m2005y 20h43m38s
- 6 This folder and its contents should be archived and also transmitted via email to support@radascan.co.uk or posted on diskette back to Guidance Navigation Ltd.

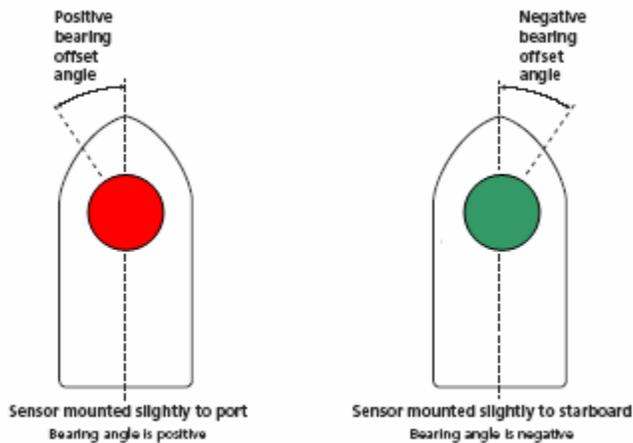
Note: To compress the whole folder prior to transmission by email, you can make use of the folder compression utility with a right mouse click and by choosing 'Send to compressed folder'. Such compressed folders can be also be decompressed with standard tools such as WinZip.



Bearing offset (requires service access)

The Bearing offset allows you to optionally correct any deviation of the Radascan sensor's centre-line from that of the vessel's.

The bearing offset is calculated based on the direction of the Radascan sensor relative to the bow - irrespective of whether the sensor is mounted with its connectors facing the bow or the stern.



To adjust the bearing offset

- 1 Enter Service Access mode using either an engineers thumb key or a temporary service access code.
- 2 View the *Configuration* page tab within the Property sheet.
- 3 Click the down arrow of the *Select Configuration Category* box and select the *Vessel Parameters / File Transfer* option

The screenshot shows the 'Configuration' tab of the Radascan Installer. The 'Select Configuration Category' dropdown is set to 'Vessel Parameters / File Transfer'. The 'Vessel Parameters' section contains the following fields:

Name	Default Vessel		
Length	130 m	Breadth	19 m
Bow Offset	37 m	Starboard Offset	9.5 m
Bearing Offset	0 deg		

At the bottom of the window, there are buttons for 'Close', 'Apply', and 'Cancel'. A 'Parameters:' section contains 'Import' and 'Default' buttons.

4. In the *Bearing Offset* field, enter the exact angle by which the centre-line of the sensor deviates from that of the vessel. If the angle is to port (anti-clockwise), the angle must be positive.
5. Click the Apply button.

Operator training

Aspects of Radascan and its use that should be described to a new user to complete the installation

As part of the commissioning process it is important to ensure that the vessel's DP operation staff are familiar and comfortable with the operation of the Radascan system. As a minimum, the DP operation staff should be shown and practice the following basic aspects of the Radascan Console, so that they are confident in operating the system:

- Start up and shutdown,
- Elements of the User Console display,
- Adjusting the sensor tilt controls,

To assist with DP operator training, an Operator's Guide and an instruction video are supplied with every Radascan system. The Guide is in hardcopy printed form and as a .pdf on an accompanying CD. The video is on a CD and can be played on any PC with disk drive and audio output.

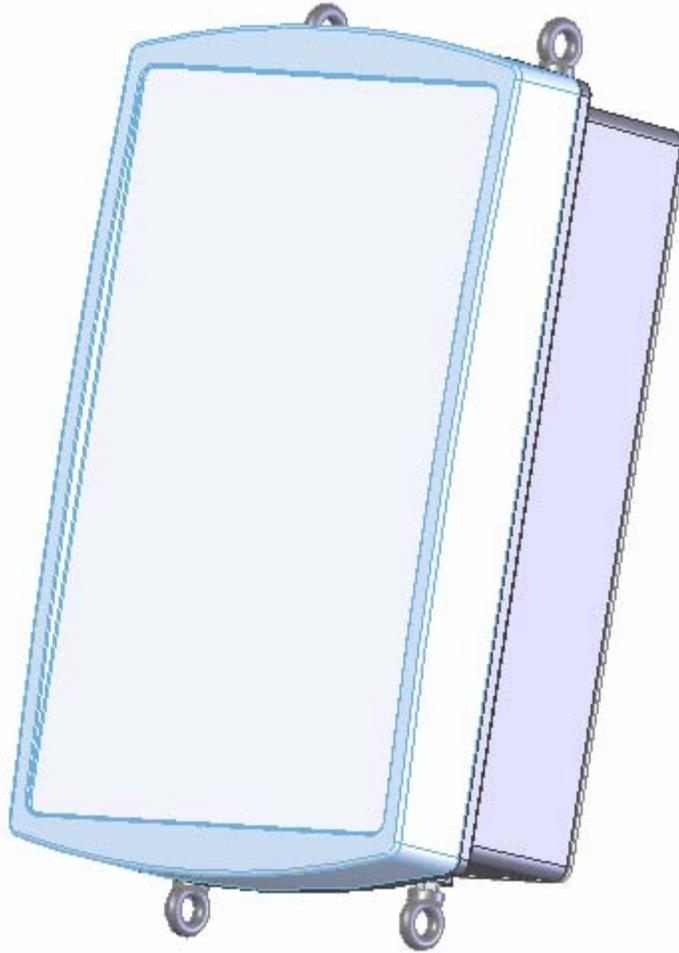
Technical notes

- Technical note 1: [Target Transponder](#)
- Technical note 2: [Target Installation](#)
- Technical note 3: [DP message types](#)
- Technical note 4: [Low temperature operation](#)

TECHNICAL NOTE 1

Target types

The Radascan sensor uses specific transponder targets. These are available from your Radascan agent and are shown below:



TECHNICAL NOTE 2

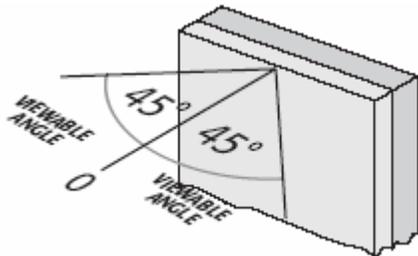
Target installation

Key to the operation of the Radascan system is the correct installation of targets. Please follow the guidelines given below when installing targets on the rig.

Once the targets are installed, their relative positions can be automatically surveyed by the system.

Installation tips

- Targets should be placed in positions where the sensor can see them while the vessel is within the expected working area. Consider vertical position as well as horizontal.
- The sensor beam should not strike a flat target at an angle of more than 45 degrees to the target surface.



- Targets should be positioned with unequal spacing between them – this helps the system to distinguish between specific targets. For example, with a typical mooring distance of 40-80m using three targets, suitable spacings between the targets would be 10m and 20m – giving a total spread of 30m.

TECHNICAL NOTE 3

DP message types

Introduction

The Radascan distinguishes between two operating modes; (a) single target/prism, and (b) multiple target operation which can affect the type of data sent to the DP feed. However, independent of this operation mode different DP feed message types can be selected from a range of formats. The DP message update rate is 1 Hz.

Each format name is followed by the corresponding selection value that can be used in a bitwise combination with other selection values (registry key: **DpFedAllowSelection**) to define which DP feed formats are available for selection by the normal DP operator. Typically this should be set to only a single value corresponding to the DP system the sensor is connected to.

The default DP feed selection value for normal operators is 0x0007 corresponding to the NMEA0183R, NMEA0183P and ASCII17 formats. In engineer mode all formats with selection values below 0x00FF are available.

NMEA0183R Format (0x0001)

A 42 character string:

\$RLS,±AAA.AA,±BBB.BB,S1,XXX.XXX,S2,HHHH*CC<CR><LF>

- \$RLS message header
- AAA.AA resolved raw position in A axis [metres]
- BBB.BB resolved raw position in B axis [metres]
- S1 status of position data in A and B axis, A – available; V – void
- XXX.XXX resolved bearing of vessel with respect to A axis [degrees]
- S2 status of bearing data, A – available; V – void
- HHHH status word in hexadecimal. Up to 16 bits defined by Guidance Navigation in a separate specifications document
- CC computed checksum in hex
- <CR> Carriage return (ASCII 0D hex)
- <LF> Line feed (ASCII 0A hex)

Note: when the reflectors are installed on a fixed platform and their co-ordinates are entered in Northings and Eastings, AAA.AA and BBB.BB will also be in Northings and Eastings and XXX.XXX will be true vessel heading.

NMEA0183P Format (0x0002)

A 42 character string:

\$RLS,±AAA.AA,±BBB.BB,S1,XXX.XXX,S2,HHHH*CC<CR><LF>

- \$RLS message header
- AAA.AA resolved primary position in A axis [metres]
- BBB.BB resolved primary position in B axis [metres]
- S1 status of position data in A and B axis, A – available; V – void
- XXX.XXX resolved bearing of vessel with respect to A axis [degrees]
- S2 status of bearing data, A – available; V – void
- HHHH status word in hexadecimal. Up to 16 bits defined by Guidance Navigation in a separate specifications document

- CC computed checksum in hex
- <CR> Carriage return (ASCII 0D hex)
- <LF> Line feed (ASCII 0A hex)

ASCII17 Format (0x0004)

A 17 character string delimited only by <CR> and <LF> with bearing measured bow clockwise.

CHARACTER INDEX DESCRIPTION FORMAT0-5 Range (metres x 10) nnnnnn6 Space (0x20h) X7-12 Bearing (degrees x 1000) nnnnnn13 Space (0x20h) X14 Status Flag (0 = invalid, 1 = valid) N15 carriage return (0x0Dh) X16

MDL Standard (0x0008)

A 19 character string delimited only by <CR> and <LF> with bearing measured bow clockwise.

CHARACTER INDEX DESCRIPTION FORMAT0-1 ID nn2 Space (0x20h) X3-9 Range (m) nnnn.nn10 Space (0x20h) X11-16 Bearing (degrees) nnn.nn17 carriage return (0x0Dh) X18 line feed (0x0Ah) X

MDL Multi-Target (0x0040)

A 22 character string delimited only by <CR> and <LF> with bearing measured bow clockwise.

CHARACTER INDEX DESCRIPTION FORMAT0-1 ID nn2 Space (0x20h) X3-9 Range (m) nnnn.nn10 Space (0x20h) X11-16 Bearing (degrees) nnn.nn17 Space (0x20h) X18-19 NMEA style checksum in hex CC20 carriage return (0x0Dh) X21 line feed (0x0Ah) X

Nautronix Standard (0x0080)

A 14 character string delimited only by <CR> and <LF> with bearing measured bow clockwise.

CHARACTER INDEX DESCRIPTION FORMAT0-1 ID nn2-6 Bearing (degrees x 100) nnnnn7-11 Range (m x 10) nnnnn12 carriage return (0x0Dh) X13 line feed (0x0Ah) X

Artemis Mk IV (0x0010)

A 17 character string delimited only by <CR> and <LF> with bearing measured bow clockwise.

CHARACTER INDEX DESCRIPTION FORMAT0-5 Range (metres x 10) nnnnnn6 Space (0x20h) X7-12 Bearing (degrees x 1000) nnnnnn13 Space (0x20h) X14 ID (always 1) N15 carriage return (0x0Dh) X16 line feed (0x0Ah) X

Kongsberg Standard (0x0020)

A 9 character string in BCD format.

CHARACTER INDEX DESCRIPTION FORMAT0-2 Bearing (degrees x 100) in BCD ddd3-5 Range (metres x 10) in BCD ddd6 Zero (0x00h) X7 Zero (0x00h) X8 Delimiter (0xFFh) X

Low temperature operation

Introduction

Radascan is a precision electro-mechanical device with hardware components that, of necessity, are mounted in an external position on a vessel's superstructure. It is recognized that industrial marine operations may subject these components to harsh environments, including low temperature.

The standard variant of Radascan is designed to operate within the temperature range -25 to 55°C. A low temperature variant of the hardware complies with the requirements of IEC60068-2-1 and is able to operate for prolonged periods at temperatures down to -25°C provided that certain operating conditions are maintained.

Operating conditions

The following recommendations are made for low temperature use:

- For operation below 5°C the sensor should remain powered and running (i.e. not suspended). However, where this is not possible and it is necessary for the system to be switched on at temperatures below 5°C (and down to -25°C) the sensor will require some time to reach optimum operating condition.
- When the system is not in use (i.e. un-powered or suspended) the sensor should be protected by means of a suitable insulating and protective cover to prevent the external build-up of ice.
- For operation below -25°C additional forced air heating must be provided.
- The external PSU leads are rated for static operation to -40°C but only to -5°C for flexing operation. The leads must therefore be adequately secured to prevent flexing and the system should not be installed or de-installed at temperatures below 0°C.

Technical considerations

- Radascan uses a sophisticated rotating microwave radar range-finder to accurately measure the distance and bearing to retro-reflective targets that are placed at specific locations in the working area. Movement sensors allow a mechanically driven base to compensate for vessel motion due to wave action. The internal mechanism may become disabled if it is allowed to cool in a low temperature environment.