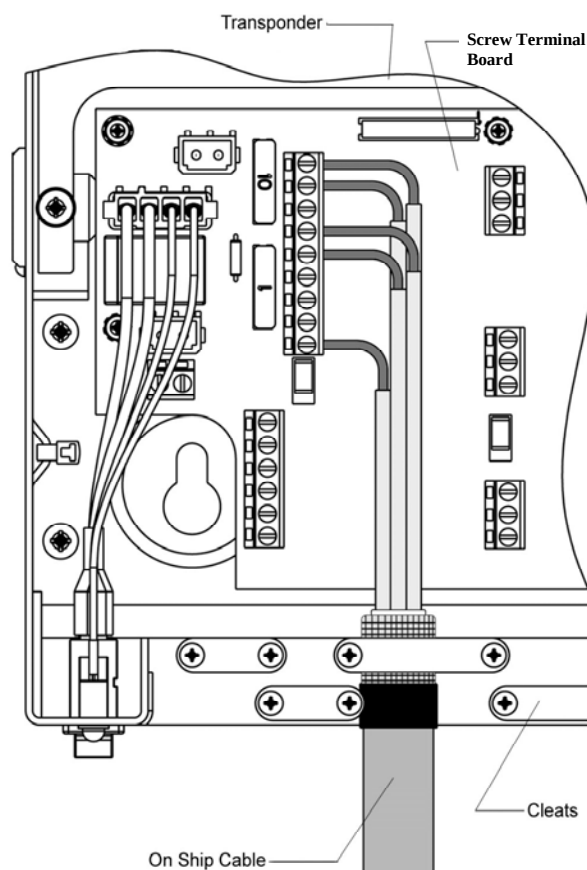


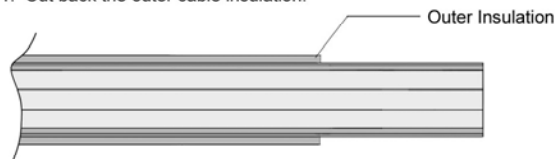
Installation Manual

UAIS Transponder System

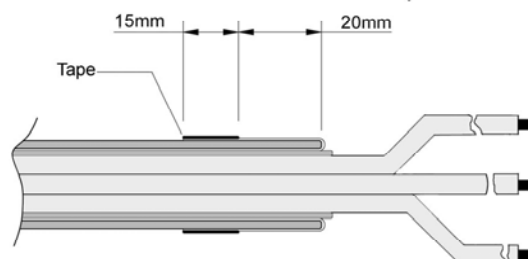
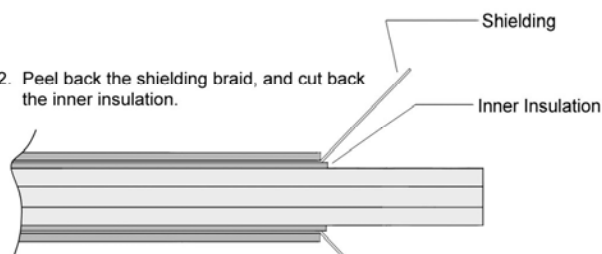
Method of connecting screens at the transponder



1. Cut back the outer cable insulation.



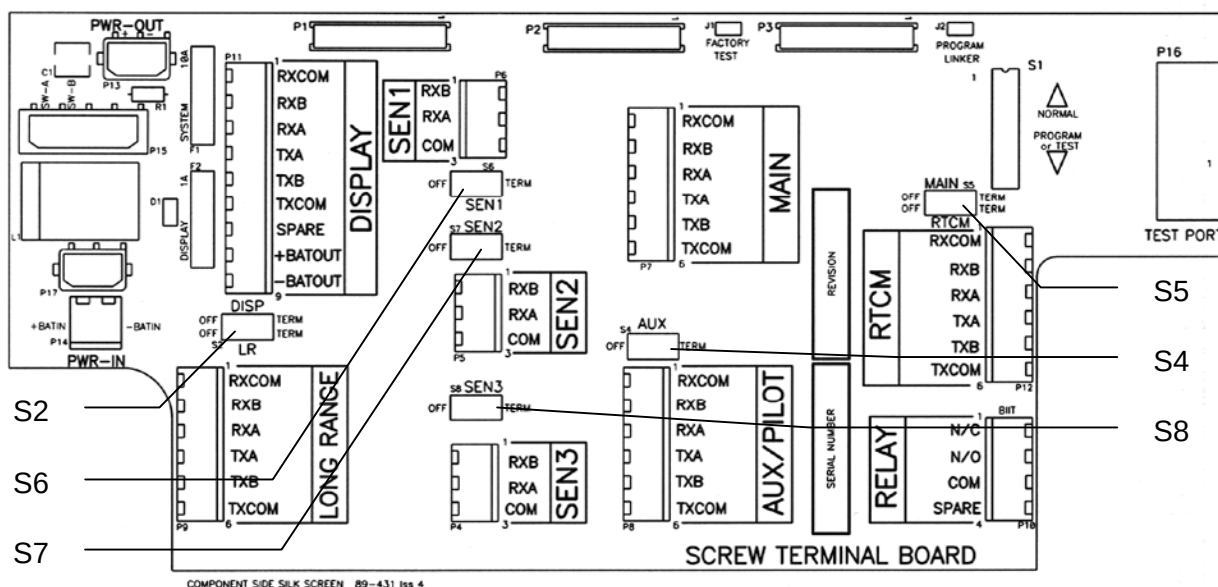
2. Peel back the shielding braid, and cut back the inner insulation.



3. Fold back the shielding braid with the drain wire, and hold in place using tape.

Test and program connections

⚠ WARNING: Do not interfere with switch S1 or the links "Factory Test" and "Program Linker". These are specialised functions for use by factory technicians only. For the same reason, make no connection to Test Port.



Power supply

Connected to the ship's 24V DC emergency power source through a 2-pole switched fused supply to allow isolation for servicing. The power requirements are 24V DC +30% -10%, 3.5A maximum.

Standby power requirement	21 W; 0.9 Amp at 24V DC
Peak power requirement	75 W; 3.5 Amp at 24V DC

Required conductor area as a function of cable length

Power cable length	Required conductor area
0 – 10 metres	0.75 mm ²
10 – 20 metres	1.5 mm ²
20 – 40 metres	3.0 mm ²

Isolation between the power supply connections and any other connection to the transponder is 1kV minimum.

The DC power source should comply with IMO guidelines for the class of vessel concerned. National authorities and classification societies may have their own power supply requirements that should also be considered.

If the available supply is AC, a converter, P/N 89-029, is available as an option.

DISP port - Display VDU

The DISP port connects the VDU Display unit with the Transponder. This port is vital to the functionality of the transponder and the VDU and must be connected. To prevent any malfunction of this port it is not possible to change the configuration.

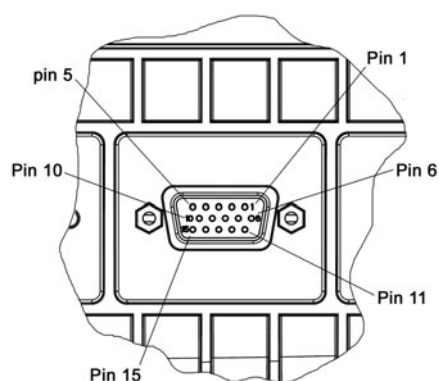
Display cable:

Four twisted pairs, screened, PVC sheathed.

Cable length to display	Required conductor area
0 – 100 metres	0.8 mm ² each wire
100 metres +	1.5 mm ² each wire

The connection between the Screw terminal board and the VDU unit is given below, showing the rear of the VDU and the 15-pin connector, and the pin identification of the connector.

Transponder	VDU pin
Rx common	2
Rx B	1
Rx A	6
Tx A	12
Tx B	13
Tx common	8
+ Bat out	3
- Bat out	4



The twisted pairs are assigned as (Rx A/B), (Tx A/B), (common pair) and (battery pair)

The DISPLAY port can be connected to a Personal Computer, but two precautions are necessary: special software is required to display the received information, and usually it is necessary to convert the RS 422 signal from the transponder to a RS-232 signal in order to interface to the PC.

SEN 1, 2, 3 ports - Sensors

The Sensor input port can be configured to receive data from the Gyro, the GNSS used for navigation and the LOG. Each of the three sensor (SEN1, SEN2 and SEN3) ports can be independently configured to receive information from one of these sensors. Alternatively ALL sensor information can be received via ONE of the sensor ports.

The sensor ports require configuration before use; this is described in the Operation Manual.

The AIS must be connected to:

- The GNSS unit used for navigation
- The gyrocompass providing heading information

If available the following information can be connected to the AIS:

- Rate-Of-Turn (ROT)
- Speed over ground from Bottom referenced log

Recommended cable for connection of Sensors:

Single twisted pair, shielded, PVC sheathed.

Cable length to display	Required dimension
0 – 100 metres	0.8 mm ² each wire

Sensor wire connection

The twisted pair shall be assigned as RxA and RxB

SEN Ports necessary sentences:

The basic requirements are:

IEC 61162-2 standard

ITU-T V.11 electrical properties

Speed can be configured from 1200 - 38400 bits/sec

Data bits 8, Stop bits 1, Parity none

All required as well as optional sentences are listed in the table; ensure that the connected sensor transmits at least the required sentences (as given by IEC 61162):

Sensor	Data	IEC 61162-2 sentence format	
		Required	Optional
GNSS	Reference datum	DTM	
	Positioning system	GNS, GLL	GGA, RMC
	Time of position		
	Latitude/longitude		
	Position accuracy		
	Speed over ground (SOG)	VBW	VTG, OSD, RMC
	Course over ground (COG)	RMC	VTG, OSD
GYRO	RAIM indicator	GBS	
	Route plan	RTE, WPL	
	Heading	HDT	OSD
LOG	Rate of turn (ROT)	ROT	
	Speed over ground (SOG)	VBW	

	Course over ground (COG)	
--	-----------------------------	--

Main and AUX high speed input/output ports

The Transponder has two high-speed communication ports. The ports are identical, the same information is input and output on these ports. All information received and transmitted on the VHF link will be reflected as correct IEC 61162 sentences. All error messages will also be transmitted.

The Main port will primarily be used to connect external equipment such as ECDIS and ARPA or another navigation information display system.

The AUX port will primarily be used for connection to the "pilot plug" - a connector installed on the bridge near the pilot operation position so that the pilot can connect a Personal Pilot Unit, which is normally a laptop computer with the pilot's navigational software installed.

MAIN port

Three twisted pairs, shielded, PVC sheathed.

Cable length to display	Required dimension
0 – 100 metres	0.8 mm ² each wire

Main port wire connection

The twisted pairs shall be assigned as (RxA/RxB), (TxA/TxB) and (RxCom/TxCom).

AUX port, Pilot plug

Three twisted pairs, shielded, PVC sheathed.

Cable length to display	Required dimension
0 – 100 metres	0.8 mm ² each wire

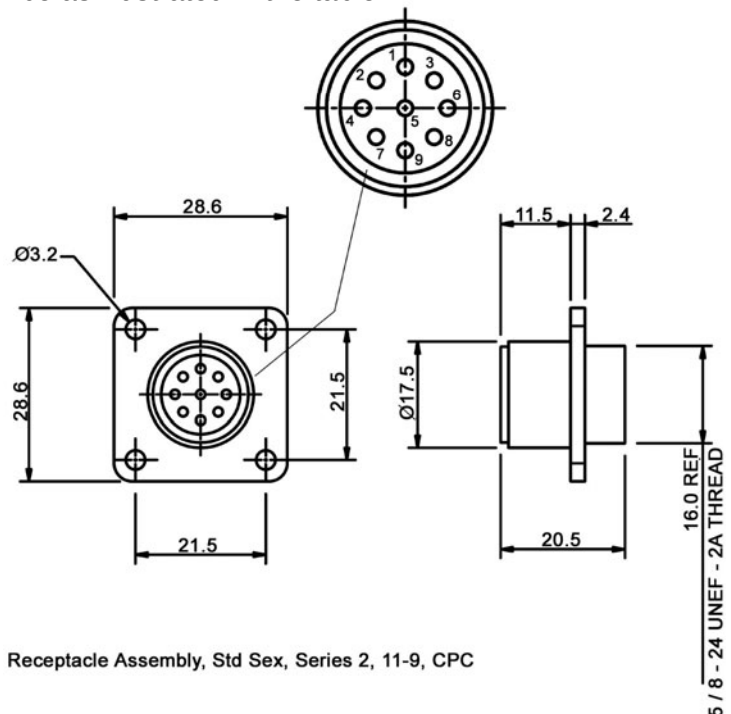
AUX/Pilot port wire connection

The twisted pairs shall be assigned as (RxA/RxB), (TxA/TxB) and (RxCom/TxCom)

In the IMO installation guide for AIS transponders, the Pilot plug is recommended to be:

- AMP/Receptacle (Square Flanged), Shell size 11, 9 pin Std. Sex 206486-1/2 or equivalent and the termination shall be as illustrated in the table.

Transponder	Pilot Plug
1 RxCOM	No Connection
2 RxB	Pin 6
3 RxA	Pin 5
4 TxA	Pin 1
5 TxB	Pin 4
6 TxCOM	No Connection



LRF port, Long Range Function

The AIS Long-Range Function requires a compatible long-range communication system e.g. Inmarsat-C. If this is available, a connection to the Inmarsat-C system can be made. It is required that the Inmarsat-C input/output port can be interfaced using IEC 61162-2 and understand the long-range sentences as required by IEC 61993.

Recommended cable for connection of LRF-port:

Three twisted pairs, shielded, PVC sheathed.

Cable length to display	Required dimension
0 – 100 metres	0.8 mm ² each wire

LRF port wire connection

The twisted pairs shall be assigned as (RxA/RxB), (TxA/TxB) and (RxCom/TxCom)

RTCM port, Differential GNSS correction input/output port

The RTCM-port is the input/output port for differential correction. The UAIS Transponder can receive differential correction in two ways:

- The RTCM port can be connected to a DGNSS unit. The DGNSS unit will then provide differential correction to the AIS Transponder through the RTCM port.
- Through message 17 transmitted from a base station. The RTCM port will then work as an output port, which can supply differential correction in RTCM format to other units.

Recommended cable for connection of RTCM-port:

Three twisted pairs, shielded, PVC sheathed.

Cable length to display	Required dimension
0 – 100 metres	0.8 mm ² each wire

RTCM port wire connection

The twisted pairs shall be assigned as (RxA/RxB), (TxA/TxB) and (RxCom/TxCom)

BIIT, Built In Integrity Test relay function

The AIS requires that an alarm output (relay) be connected to an audible alarm device or to the ships alarm system, if available.

If any failure or malfunction is detected that will significantly reduce integrity or stop operation of the AIS, an alarm is initiated. In this case:

- An alarm message is displayed on the VDU
- The alarm BIIT relay shall be activated
- An appropriate alarm message is output via the presentation interface (Main and AUX-ports) and repeated every 30 seconds.

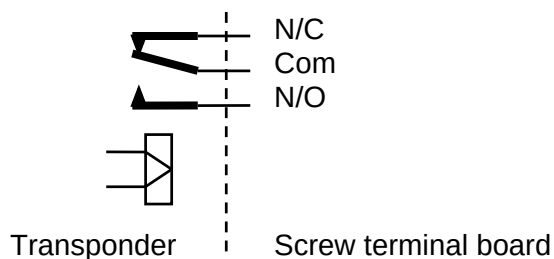
The UAIS transponder provides a relay connection, which can be selected as normal closed or normal open contacts.

Recommended cable for connection of BIIT relay:

One twisted pair, shielded, PVC sheathed. The required cable dimension is dependent on the current necessary to activate the alarm indicator.

Built in alarm (BIIT) relay ratings:

Absolute maximum ratings	
Maximum switching current in contacts	0.25 Amp
Maximum carry current	1.20 Amp
Maximum switching voltage	175 V (d.c. or a.c. peak)



Completion of Installation

The foregoing provides the information necessary to perform the installation. Other useful information is contained in the sections following.

The Pre-Installation Inspection Record (Section 8) should have been completed before installation commenced.

It is most important that the installed system is not switched on at this stage. The inspection procedures given in the Operation Manual must be completed before power is applied.

The Warranty and Acceptance Record can only be completed after the system is configured, as detailed in the Operation Manual.

5 - Specification

General Data:		
Power consumption:	75W peak 21W average	
Power supply:	24 VDC –10% +30%	
Default frequencies:	AIS1 (CH87B)	161.975 MHz
	AIS2 (CH88B)	162.025 MHz
	DSC (CH70)	156.525 MHz
Operating temperature:	-15°C to +55°C	
Storage temperature:	-20°C to +70°C	
Environmental:	IEC 60945 Protected Environment (Antennas: Exposed Environment)	
Transponder size/weight	308 x 416 x 93 mm, 7kg	
VDU size/weight	219 x 151 x 76 mm, 1kg	
GPS size/weight	Ø 115mm x 76mm, 0.25kg	
GNSS receiver:	Used for TDMA timing. Optionally used for navigational information.	
GNSS antenna:	Patch antenna with built-in 30dB pre-amplifier	
GLONAS receiver	Optional Glonass version available	
DSC Transmitter:		
Power output:	12.5 W or 2.0 W	
Frequency range:	156.025 – 162.025 MHz	
Antenna impedance:	50 Ω	
TDMA Receivers:		
Sensitivity:	(PER) < 10% at –107 dBm (25kHz)	
Frequency range:	156.025 – 162.025 MHz	
Channel spacing:	12.5 or 25 kHz	
Modulation:	GMSK	
Data rate:	9,600 bits/s	
Frequency stability:	< ± 1ppm	
DSC Receiver:		
Sensitivity:	BER <10 ⁻⁴ at 107 dBm	
Frequency range:	155.3 – 162.5 MHz	
Channel spacing	25kHz	
Modulation	1300Hz/2100Hz - FSK	
Frequency stability	< ± 1ppm	
Serial inputs/outputs:		
SENS1/2/3	IEC61162-1/2 (input only)	
DISPLAY, LONG RANGE, MAIN, AUX/PILOT, RTCM	IEC61162-1/2 (input & output)	

Technical Information

RS-422 interfaces

The Transponder has seven RS-422 interfaces which are all available on the Screw Terminal board:

- **3 sensor data input ports SEN1, SEN2 and SEN3**
- **2 Bi-directional input/output ports MAIN and AUX/Pilot**
- **1 Bi-directional input/output port RTCM**
- **1 Bi-directional input/output port LR (Long Range)**

All communication interfaces are compatible with IEC-61993-2 standards.

UAIS Interface Port Specification

Port	Format		O/P Sentence	I/P Sentence
Main	RS 422 IEC 61993-2	STD Sentence	!AIVDO, !AIVDM, !AIABK, !AIACA, \$AITXT, \$AIALR, \$AISSD, \$AIVSD	\$xxSSD; \$xxVSD; \$xxACA; !xxABM; !xxBBM; !xxACK; !xxAIR; !xxVDO; \$xxAIQ,ACA; \$xxAIQ,HRST; \$xxAIQ,SSD; \$xxAIQ,VSD
		Unused Fields	None	None
		Proprietary	None	None
Aux/Pilot	RS 422 IEC 61993-2	STD Sentence	Same as Main port	Same as Main port
		Unused Fields	None	None
		Proprietary	None	None
Long Range	RS 422 IEC 61993-2	STD Sentence	!AILRF, !AILR1, !AILR2, !AILR3	!xxLRI, !xxLRF
		Unused Fields	None	None
		Proprietary	None	None
RTCM	RTCM PAPER 11-98/SC104-STD (or compatible)	STD Sentence	Binary stream as defined in RTCM specification	Binary stream as defined in RTCM specification
		Unused Fields	None	None
		Proprietary	None	None
Sensor 1	RS 422 IEC 61162-1/2	STD Sentence	N/A	DTM, GBS, GGA, GLL, GNS, HDT, OSD, RMC, ROT, RTE, VBW, VTG, WPL
		Unused Fields	None	None
		Proprietary	None	None
Sensor 2	RS 422 IEC 61162-1/2	STD Sentence	N/A	DTM, GBS, GGA, GLL, GNS, HDT, OSD, RMC, ROT, RTE, VBW, VTG, WPL
		Unused Fields	None	None
		Proprietary	None	None
Sensor 3	RS 422 IEC 61162-1/2	STD Sentence	N/A	DTM, GBS, GGA, GLL, GNS, HDT, OSD, RMC, ROT, RTE, VBW, VTG, WPL
		Unused Fields	None	None
		Proprietary	None	None

Termination

Termination resistors are required at each end of the RS-422 connection. The effect of the termination is to increase the input loading of that port, as seen by the talker. The figures quoted assume that the line is correctly terminated, and allow for that extra loading.

Output drive capability

Each talker output has a capability of driving a minimum of 12 listeners on a terminated cable.

Input loading

Each receiver presents a load of approximately 12kohm to the line. Line termination resistors are 120 ohms.

Isolation

The interface isolation is 1kV minimum throughout.

Interpretation of IEC 61162-1 sentences

GPS and Sensor Input Sentences

DTM Datum Reference

If local code is other than **WGS84**, then the external position source is ignored.

Field	Comment
Local Datum Code	interpret If it's WGS84 or not
Local Datum Subdivision Code	Ignored
Lat Offset (2 fields)	Ignored
Long Offset (2 fields)	Ignored
Altitude Offset	Ignored
Reference Datum Code	Ignored

GBS - GNSS Satellite Fault Detection

If this sentence is received, the RAIM flag will be set to TRUE. It must be repeated at least once every 10 seconds.

Field	Comment
UTC Time of GGA or GNS	Checks if this field isn't empty
Expected Error In latitude	Checks if this field isn't empty
Expected Error in longitude	ignored
Expected error in altitude	Ignored
ID number of most likely failed satellite	Ignored
Probability of missed detection	Ignored
Estimate of bias in meters	Ignored
Standard Deviation of bias estimate	ignored

GGA - Global Positioning System Fix Data

Field	Comment
UTC Of Position	used
Latitude (2 fields)	Used
Longitude (2 fields)	Used
GPS Quality Indicator	Used,
	1,3-> Position with Low Accuracy
	2,4,5 -> Position with High Accuracy
	6 -> Dead Reckoning with Low Accuracy
	7 -> Manual mode with low accuracy
	OTHER -> No Position
Number of Satellites in use	ignored
Horizontal Dilution of precision (HDOP)	ignored
Altitude re: main sea level (2 fields)	ignored
Geoidal Separation (2 fields)	Ignored
Age of Diff Data	Ignored
Diff Reference Station	Ignored

GLL - Geographic Position - Latitude / Longitude

Field	Comment
Latitude (2 fields)	Used
Longitude (2 fields)	Used
UTC of Position	used
Status	Used A-> Allows look on Mode indicator or Position with Low Accuracy if Mode indicator is empty or has strange value V-> Disallows using the sentence
Mode Indicator	A -> Position with Low Accuracy D -> Position with High Accuracy E -> Dead Reckoning Mode with Low Accuracy M -> Manual Mode with Low Accuracy Empty or OTHER.> using Status only

GNS - GNSS Fix Data

If the Mode Indicator is a NULL field, the sentence is ignored.

Field	Comment
UTC of Position	used
Latitude (2 fields)	Used
Longitude (2 fields)	Used
Mode Indicator	A, P> Position with low accuracy D, R, F -> Position with high Accuracy E -> Dead Reckoning Mode with Low accuracy M -> Manual Mode with low accuracy OTHER -> No Position
Tot Number of Satellites in Use	Ignored
HDOP	Ignored
Antenna Altitude	Used in aircraft mode else Ignored
Geoidal Separation	Ignored
Age Of Diff Data	Ignored
Diff Reference Station ID	Ignored

HDT - Heading, True

The use of this sentence is talker identifier dependent.

Field	Comment
Heading	Used If Valid indicator is T
Valid Indicator	Used

OSD- Own Ship Data

Field	Comment
Heading, Degrees TRUE	Used if heading status is 'A'
Heading Status	Used
Vessel Course	Used as COG if reference is B,R or P
Course Reference	Used
Vessel Speed	Used as SOG if reference is B,R or P
Speed Reference	Used
Vessel Set	Ignored
Vessel Drift	ignored
Speed Units	Used to convert SOG to knots

RMC - Recommended Minimum Specific GNSS Data

Field	Comment
UTC of Position Fix	Used
Status	Used as in GLL
Latitude (2 fields)	Used
Longitude (2 fields)	Used
SOG, knots	Used
COG, degrees	Used
Date	Ignored
Magnetic Variation (2 fields)	ignored
Mode Indicator	Used as in GLL

ROT - Rate Of Turn

The rate of turn value is only used if the talker identifier is TI.

Otherwise the value is only used to determine the direction, i.e. "Moving Right" or "Moving Left".

Field	Comment
Rate of turn	Used when status is A. The value is rounded to the closest integer.
Status	Used

VBW - Dual Ground / Water Speed

The current position source must be external GPS, and heading must be available for the transponder to accept this sentence.

Field	Comment
Longitudinal Water Speed	Ignored
Transverse Water Speed	Ignored
Status: Water Speed	Ignored
Longitudinal Ground Speed	Used if Status is set to A
Transverse Ground Speed	Used if Status is set to A
Status: Ground Speed	Used
Stern Transverse Water Speed	Ignored
Status Stern Water Speed	Ignored
Stern Transverse Ground Speed	Ignored
Status Stern Ground Speed	ignored

VTG - Course Over Ground and Ground Speed

Field	Comment
COG, degrees True (2 fields)	Used
COG, degrees Magnetic (2 fields)	ignored
SOG, knots (2 fields)	Used
SOG, km/h (2 fields)	Ignored
Mode Indicator	Used

AIS Specific Input Sentences

ABM - Addressed Binary and safety-related Message

Field	Comment
Total Number of Sentences	Used if in interval 1 ..9, otherwise the sentence is ignored
Sentence Number	Used if in interval 1. .total sentences, otherwise the sentence is ignored
Sequential Message Identifier	Used if in Interval 0..3, otherwise the sentence is ignored
MMSI of Destination	Used
AIS Channel	Used
Message Id	Used If 6 or 12, otherwise the sentence is ignored
Encapsulated Data	Used
Number of filled bits	Used

ACA - MS Regional Channel Assignment Message

The zone created of this sentence must be accepted by the channel management rules (size of zone, distance to own position, valid channel number etc). If the zone isn't accepted, the zone will be ignored

Field	Comment
Sequence Number	Ignored
NE Latitude (2 fields)	Used
NE Longitude (2 fields)	Used
SW Latitude (2 fields)	Used
SW Longitude (2 fields)	Used
Transitional Zone Size	Used
Channel A	Used
Channel A Bandwidth	Used
Channel B	Used
Channel B Bandwidth	Used
Tx/Rx Mode	Used
Power Level	Used
In Use Flag	Ignored
Time of In Use Change	Ignored

ACK - Acknowledge Alarm

Field	Comment
ID of the alarm source	Used

AIQ - Query Sentence

Field	Comment
Approved sentence formatter of data being requested	It's possible to query the following sentences: ACA, SSD, VSD,HRST

AIR - AIS Interrogation Request

This sentence may be used to perform a "UTC Request". It is always sent on both Channel A and Channel B, for the reason that this is a multiple addressed sentence.

Field	Comment
MMSI 1	Used, may be NULL
Message Id 1.1	Used, may be NULL
Message Sub Section	ignored
Message Id 1.2	Used, may be NULL
Message Sub Section	Ignored
MMSI 2	Used, may be NULL
Message Id 2.1	Used, may be NULL
Message Sub Section	ignored

BBM - Broadcast Binary Message

Field	Comment
Total Number of Sentences	Used if in interval 1..9, otherwise rejected
Sentence Number	Used if In interval 1...[total number of sentences], otherwise rejected.
Sequential Message Identifier	Used If in interval 0..9, otherwise rejected
AIS Channel	Used
Message Id	Used if 8 or 14
Encapsulated Data	Used
Number of filled bits	Used

SSD - Ship Static Data

Field	Comment
Call Sign	Used, may be NULL
Name	Used, may be NULL
Pos Ref A	Used to change position reference for the position source in use. May be NULL.
Pos Ref B	Used to change position reference for the position source in use. May be NULL.
Pos Ref C	Used to change position reference for the position source in use. May be NULL.
Pos Ref D	Used to change position reference for the position source in use. May be NULL.
DTE	Used
Source Identifier	Ignored

VSD - Voyage Static Data

Field	Comment
Type Of Ship And Cargo	Used
Maximum Present Draught	Used
Persons On-Board	Used
Destination	Used
Est. UTC of arrival	Used
Est. Day of arrival	Used
Est. Month of arrival	Used
Navigational Status	Used
Regional Application Flags	Ignored

6 - Serial interface communications protocols

As previously stated, the Transponder has seven RS-422 interfaces which are all available on the Screw Terminal board:

- **3 sensor data input ports SEN1, SEN2 and SEN3**
- **2 Bi-directional input/output ports MAIN and AUX/Pilot**
- **1 Bi-directional input/output port RTCM**
- **1 Bi-directional input/output port LR (Long Range)**

Sensor data interface

The Sensor data input ports receive navigational data in NMEA-0183 format from the connected sensors. The connected sensors can be a GNSS unit used for navigation, a gyrocompass and a bottom track log. These data are processed in the UAIS unit and transmitted as dynamic data. The data received by other stations over the VHF link form an image of the sensor data. It is therefore vital that the sensor data are correct and that the port is correctly configured.

The sensor ports of the UAIS Transponder understand the following IEC 61162 sentences. The priority order of listing is left to right:

Latitude & Longitude: GNS, RMC, GGA, GLL
Speed Over Ground: VBW, RMC, VTG, OSD
Course Over Ground: RMC, VBW, VTG, OSD
Heading: HDT, OSD
Rate Of Turn: ROT, calculated from heading (HDT, OSD).

Navigational data must be received via the sensor ports within certain intervals; the maximum intervals are listed in the table below. If NMEA sentences containing identical information arrive at the sensor input ports, the UAIS Transponder will choose the information with the highest priority level.

The built-in GNSS unit will under normal conditions only be used for TDMA slot timing. However if no data are received from the external sensors, the built-in GNSS unit can be set to take over automatically and supply navigational information for the VHF data link transmission. The changeover between internal GNSS information use and external sensor information use happens automatically, information received from the external sensors has priority and will always be used when available.

List of messages received from sensors

Data type	Max update interval [s]	NMEA application	Default parameter value
Date	3	RMC	Year 2000, month. 0, day 0
UTC	3	GNS, RMC, GGA, GLL	24:60:60
Lat, Lon	3	GNS, RMC, GGA, GLL	91°00'00" nl, 181°00'00" wl
Datum	30	DTM	Not defined
SOG, COG	3	RMC, VBW, OSD	102.3, 360°
Altitude	3	GNS	4095
Heading	10	HDT	511
Turn rate	10	ROT	-128
RAIM	10	GBS	Ok

Route plans with positions are transmitted in RTE (Routes) and WPL (Waypoint location) sentences. There is no update interval for these data, therefore the last updated Route plan will be kept in memory until data are updated or the power is switched off, as the data are not kept in the permanent memory.

The UAIS Transponder will only accept the RTE sentence if the “w” attribute is in its 4th field (current Route plan). WPL sentences can be sent before or after the RTE sentence. The Transponder supports memory space for 22 Route plan positions; inactive positions are gradually removed from memory and replaced with new data.

Main and AUX port reception and transmission of UAIS data

Specific UAIS Transponder functions are available via the Main and AUX ports. The ports are identical and will transmit all received VDL (VHF Data Link) messages as well as Transponder error messages. A request for information may be sent from equipment connected to the Main and AUX ports, either a request for information or a request for the Transponder to carry out a specific task. The communication protocol is text, but in non-readable sentences which contain compressed binary data.

The Transponder Main/AUX input port can accept requests:

- **To send a short text message or a small binary data array to a specified address (MMSI) or as a broadcast message**
- **To send a static or voyage information request to a specified address (MMSI)**
- **To change AIS radio frequencies and/or parameters of access to AIS channels (radiating power, frequency band etc.)**

The Transponder Main/AUX input port can accept:

- **Static and voyage related data**
- **Navigation or dynamic data, similar to sensors data interface**
- **Error situation message acknowledgement.**

The Transponder Main/AUX output port can transmit:

- **Notifications about every VHF message received and transmitted via AIS channels with the VHF message included;**
- **Acknowledgement of requests from other stations;**

7 - Warranty Registration & Acceptance Record

IMPORTANT! To validate product warranty, please fax a completed copy of this form to: -
McMurdo Customer Services on +44 23 9262 3824

Vessel Data			
Vessel Name		Flag State	
Owner / Company		Radio Call Sign	
On-Board Contact Name		Telephone Number(s)	Office:
			GSM:
Superintendent's Name		Telephone Number(s)	Office:
			GSM:

Installers Data		
Company Name		Stamp:
Technician's Name		
Address Line 1		
Address Line 2		
City / Town		
Province / State		
Post / Zip Code		
Country		

Scope Of Supply				
Part No.	Description	Serial No.	QTY	Location
89-051-001A	Transponder			
89-052-001A	VDU			
89-021-001A	GPS Antenna			
89-020-001A	VHF Antenna			
903-01	Mast Bracket			
903-02	Mast/Bulkhead Bkt.			
89-028	Gyro Interface Unit			
89-029	AC/DC Converter			
89-038	Installation Kit			
89-362	GPS Antenna Adapter			

This is an acceptance record of the installation and commissioning of the UAIS on-board the above-mentioned vessel. 24-months Warranty is valid on signing this form.

Note: The order of the following information is that in which it appears on the VDU

General Set-up										
MMSI (Maritime Mobile Service Identity)										
IMO (International Maritime Organisation)	I	M	O							
RAIM Present (Automatically Selected)	Yes					No				
Set-up password (Max. 8 Characters)										
Addressed message filter (Automatically Selected)	On					Off				
Media analyser mode (Automatically Selected)	On					Off				
Max. repeating message 6, 12	4 (default)									
Transmission w/o sync	Yes					No				
Enable deleting regions	Yes					No				

Extra Set-up		
Internal GNSS position	Enabled	Disabled
Distance Internal GNSS to Bow	Metres	
Distance Internal GNSS to Stern	Metres	
Distance Internal GNSS to Port side	Metres	
Distance Internal GNSS to Starboard	Metres	
Out position to MAIN & AUX	Yes	No

Alarm Signals		
Tx malfunction	On (default)	Off
Antenna VSWR exceeds limit	On (default)	Off
Rx channel A malfunction	On (default)	Off
Rx channel B malfunction	On (default)	Off
Rx channel DSC malfunction	On (default)	Off
General failure	On (default)	Off
VDU connection lost	On (default)	Off
External EPFS lost	On (default)	Off
No sensor position in use	On (default)	Off
No valid SOG information	On (default)	Off
No valid COG information	On (default)	Off
Heading lost / invalid	On (default)	Off
No valid ROT information	On (default)	Off
No TDMA synchronisation	On (default)	Off
Tx Amplifier malfunction	On (default)	Off
No own reports mode	On (default)	Off

RS-422 Set-up												
Port	General		Baud rate					Parity			Stop bits	
Main	On	Off	1200	2400	4800	9600	38400	None	Odd	Even	1	2
Aux	On	Off	1200	2400	4800	9600	38400	None	Odd	Even	1	2
LR	On	Off	1200	2400	4800	9600	38400	None	Odd	Even	1	2
RTCM	On	Off	1200	2400	4800	9600	38400	None	Odd	Even	1	2
Sen 1	On	Off	1200	2400	4800	9600	38400	None	Odd	Even	1	2
Sen 2	On	Off	1200	2400	4800	9600	38400	None	Odd	Even	1	2
Sen 3	On	Off	1200	2400	4800	9600	38400	None	Odd	Even	1	2

DNSS Broadcasting Set-up				
Ref. Station 0 ID				
Latitude				
Longitude				
Ref. Station 1 ID				
Latitude				
Longitude				
Transmission	Disable	On Channel 1	On Channel 2	Alternate Channels

Installer's Signature	Owners Representative's Signature	Commissioning Date
Installer's Name	Owners Representative's Name	

8 - Pre-Installation Inspection Record

1. Vessel Data (<i>Tick appropriately</i>)			
Vessel Name		IMO Number	
Flag State		MMSI Number	
Owner / Company		Radio Call Sign	
On-Board Contact		Telephone Number(s)	Office:
Name & Position			GSM:
Shore-based Contact		Telephone Number(s)	Office:
Name & Position			GSM:
Type of Vessel		Gross Tonnage	gt
L.O.A	m	Beam	m
Comments:			

2. Installation (<i>Tick appropriately</i>)				
Ship's Emergency Power Source & Location Cable length to Transponder = m Optional AC to DC Converter (89-029) Required		12VDC	24VDC	110VAC
			50Hz	60Hz
UAIS Transponder Proposed Location				
UAIS Display Proposed Location 4 Twisted Pair + Drain Cable length to Transponder m				
UAIS GNSS Antenna Proposed Location RG58 Cable length to Transponder = m Optional Antenna Adapter (89-362) Required				
UAIS VHF Antenna Proposed Location RG214 Cable length to Transponder = m Optional VHF Antenna (89-020-001) Required Optional Antenna Mast Mount (903-01) Required Optional Antenna Mast/Bulkhead Mount (903-02) Required				
UAIS Pilot Plug* Proposed Location Cable length to Transponder = m				
Ship's Ground Connection Location Cable length to Transponder = m				
Ship's Alarm Panel Location Cable length to Transponder = m				
* If a Pilot Plug is fitted, a mains power supply for a PC should be made available nearby Optional Installation Kit (89-038) Required				
Comments:				

Bridge Layout Drawing: *Position of all parts & interface pick-off points*

3. Heading Sensor(s)* (<i>Tick appropriately</i>)		
Source	Option A	Option B
Manufacturer		
Model		
Type	GyroCompass GNSS Compass Fluxgate Compass Transmitting Magnetic Compass	GyroCompass GNSS Compass Fluxgate Compass Transmitting Magnetic Compass
Output NMEA Message <i>IEC 61162-2 RS422</i>	Required:- HDT ROT** Optional:- OSD	Required:- HDT ROT** Optional:- OSD
If no NMEA Optional Gyro Interface Unit (89-028) Required	Synchro Reference Voltage = Phase Voltage = Frequency = Ratio - 90:1 180:1 360:1	Synchro Reference Voltage = Phase Voltage = Frequency = Ratio - 90:1 180:1 360:1
	Stepper Positive Step Negative Step Step Voltage = Ratio - 90:1 180:1 360:1	Stepper Positive Step Negative Step Step Voltage = Ratio - 90:1 180:1 360:1
Location		
Cable length to Transponder	m	m
* Heading information is a mandatory sensor input to the UAIS. A converter will be needed if the ship's compass has no IEC61162 output. ** If a rate-of-turn indicator is available and it includes an IEC61162 output it should be connected to the UAIS		
Comments:		

4. Position Sensor(s)* (Tick appropriately)						
Source	Option A				Option B	
Manufacturer						
Model						
Type	GPS	GLONASS	Differential		GPS	GLONASS Differential
Output NMEA Message IEC 61162-2 RS422	Required:- DTM GNS GLL RMC GBS RTE WPL Optional:- GGA				Required:- DTM GNS GLL RMC GBS RTE WPL Optional:- GGA	
Location						
Cable length to Transponder						
Antenna Location	External Position Source GNSS Antenna		UAIS Internal Position Source GNSS Antenna		Dimension Limits	
A = Distance to Bow	m		m		0- 511m	
B = Distance to Stern	m		m		0 - 511m	
C = Dist. to Port-Side	m		m		0 - 63m	
D = Dist. to Starboard	m		m		0 - 63m	
* Position information is a mandatory sensor input to the UAIS. Comments: 						

5. Speed Sensor(s)* (Tick appropriately)		
Source	Option A	Option B
Manufacturer		
Model		
Type	Bottom Track Log	Bottom Track Log
Output NMEA Message IEC 611622-2 RS422	Required:- VBW	Required:- VBW
Location		
Cable length to Transponder	m	m
* If a Bottom Track Log is available and it includes an IEC61162 output it should be connected to the UAIS. Comments: 		

6. ARPA / ATA RADAR(s) (<i>Tick appropriately</i>)		
Source	Option A	Option B
Manufacturer		
Model		
Type		
In/Output NMEA Message <i>IEC 61162-2 RS422</i>		
Location		
Cable length to Transponder	m	m
Comments:		

7. ECDIS / ECS(s) (<i>Tick appropriately</i>)		
Source	Option A	Option B
Manufacturer		
Model		
Type		
In/Output NMEA Message <i>IEC 61162-2 RS422</i>		
Location		
Cable length to Transponder	m	m
Comments:		

8. Notes
Include comments relative to installation: Cable routing, Deck glands to be opened, Hot work required, Interfacing, Mounting, Earthing, etc...

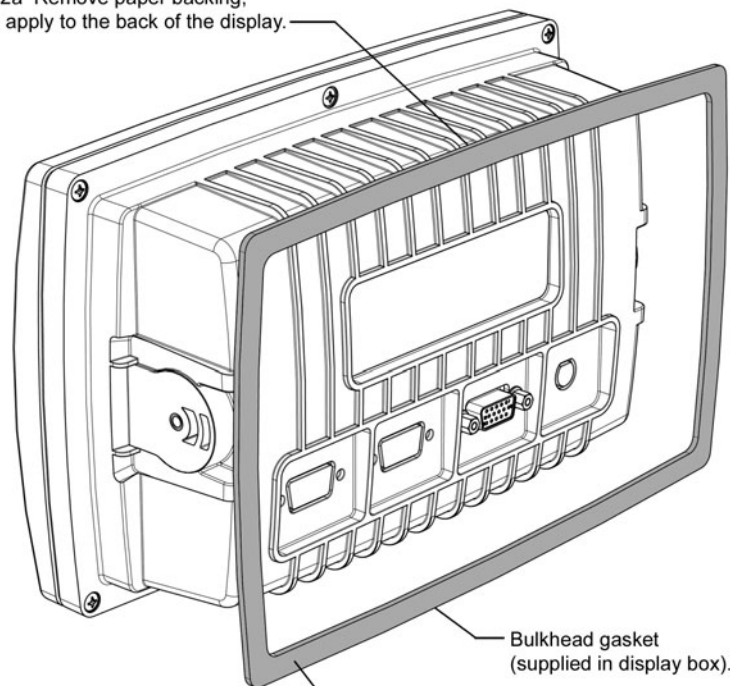
9 - Glossary

4S	Ship-to-Ship & Ship-to-Shore
AIS	Automatic Identification System
ALM	Alarm
ANT	Antenna
ARPA	Automatic Radar Plotting Aid
ATA	Automatic Tracking Aid
AtoN	Aid to Navigation
AUTO	Automatic
AUX	Auxiliary
BAT	Battery
BIIT	Built-In Integrity Test
BRG	Bearing
BRILL	Display Brilliance
CG	Coast Guard
CH	Channel
CHG	Change
CLR	Clear
CNCL	Cancel
CNS	Communication, Navigation & Surveillance
COG	Course Over Ground
CONTR	Contrast
CPA	Closest Point of Approach
CPU	Central Processing Unit
CSE	Course
DEL	Delete
DEST	Destination
DG	Dangerous Goods
DGLONASS	Differential GLONASS
DGNSS	Differential GNSS
DGPS	Differential GPS
DISP	Display
DIST	Distance
DSC	Digital Selective Calling
DTE	Data Terminal Equipment
ECDIS	Electronic Chart Display and Information System
ECS	Electronic Chart System
EGNOS	European Geo-stationary Navigational Overlay System
ENC	Electronic Navigation Chart
ENT	Enter
EPA	Electronic Plotting Aid
EPFS	Electronic Position Fixing System
EPIRB	Electronic Position Indicating Radio Beacon
ERR	Error
ETA	Estimated Time of Arrival
EXT	External
FCC	Federal Communications Commission
FREQ	Frequency
GLO or GLONASS	Global Orbiting Navigation Satellite System
GMDSS	Global Maritime Distress and Safety System
GND	Ground
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GYRO	Gyro Compass
HDG	Heading
HS	Hazardous Substances
HSC	High Speed Craft
I/O	Input / Output
IBS	Integrated Bridge System
ID	Identification
IEC	International Electrotechnical Commission
IMO	International Maritime Organisation
IN	Input
INFO	Information
INS	Integrated Navigation System
ITU-R	International Telecommunications Union – Radiocommunications Bureaux

KN	Knots
L/L	Latitude / Longitude
LAT	Latitude
LOn	Longitude
LOST TGT	Lost Target
M	Metres
MAG	Magnetic
MAN	Manual
MED	Marine Equipment Directive
MF/HF	Medium Frequency/High Frequency
MID	Maritime Identification Digit
MIN	Minimum
MKD	Minimum Keyboard and Display
MMSI	Maritime Mobile Service Identity
MOB	Man Overboard
MP	Marine Pollutant
NAV	Navigation
NM	Nautical Mile
NUC	Not Under Command
OOW	Officer Of the Watch
OS	Own Ship
OUT	Output
POSN	Position
PPU	Portable Pilot Unit
PWR	Power
RAIM	Receiver Autonomous Integrity Monitoring
RNG	Range
RORO	Roll On, Roll Off
ROT	Rate Of Turn
RR	Range Rings
RTCM	Radio Technical Commission for Maritime services
RTE	Route
Rx	Receive / Receiver
SAR	Search And Rescue
SEL	Select
SOG	Speed Over Ground
SPD	Speed
SPEC	Specification
STBD	Starboard
STBY	Standby
STW	Speed Through Water
TCPA	Time to Closest Point of Approach
TDMA	Time Division Multiple Access
TGT	Target
TPR	Transponder
TRK	Track
TSS	Traffic Separation Scheme
TTG	Time To Go
Tx	Transmit / Transmitter
Tx/Rx	Transceiver
UAIS	Universal Automatic Identification System
UHF	Ultra High Frequency
UTC	Universal Time Co-ordinate
VDU	Visual Display Unit
VHF	Very High Frequency
VOY	Voyage
VSWR	Virtual Standing Wave Ratio
VTS	Vessel Traffic Systems
WAAS	Wide Area Augmentation System
WCV	Waypoint Closure Velocity
WGS	World Geodetic System
WIG	Wing In Ground
WPT	Waypoint

2.

Fig 2a Remove paper backing,
and apply to the back of the display.



Bulkhead gasket
(supplied in display box).

Fig 2b Remove second paper backing.

3.

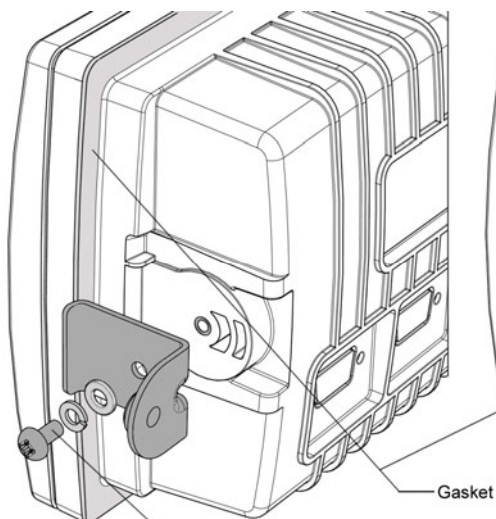


Fig 3a Fix the mounting brackets
with the screws provided.

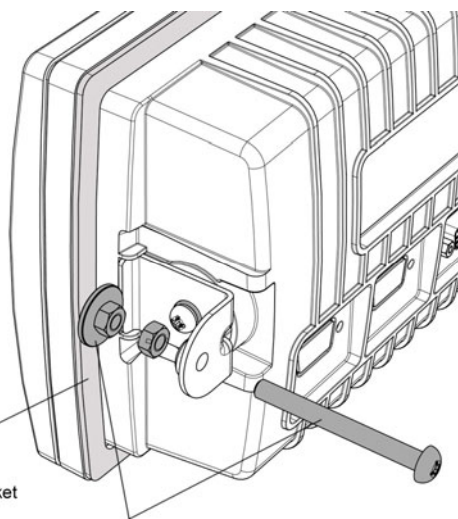


Fig 3b Fix the supplied bolting clamps.

Refer to previous page for illustration of
fitted clamping screw

External illumination

The VDU does not require external illumination during operation, as it has an internal backlight; the use of on-screen keys ensures that all controls are visible in the screen backlight.

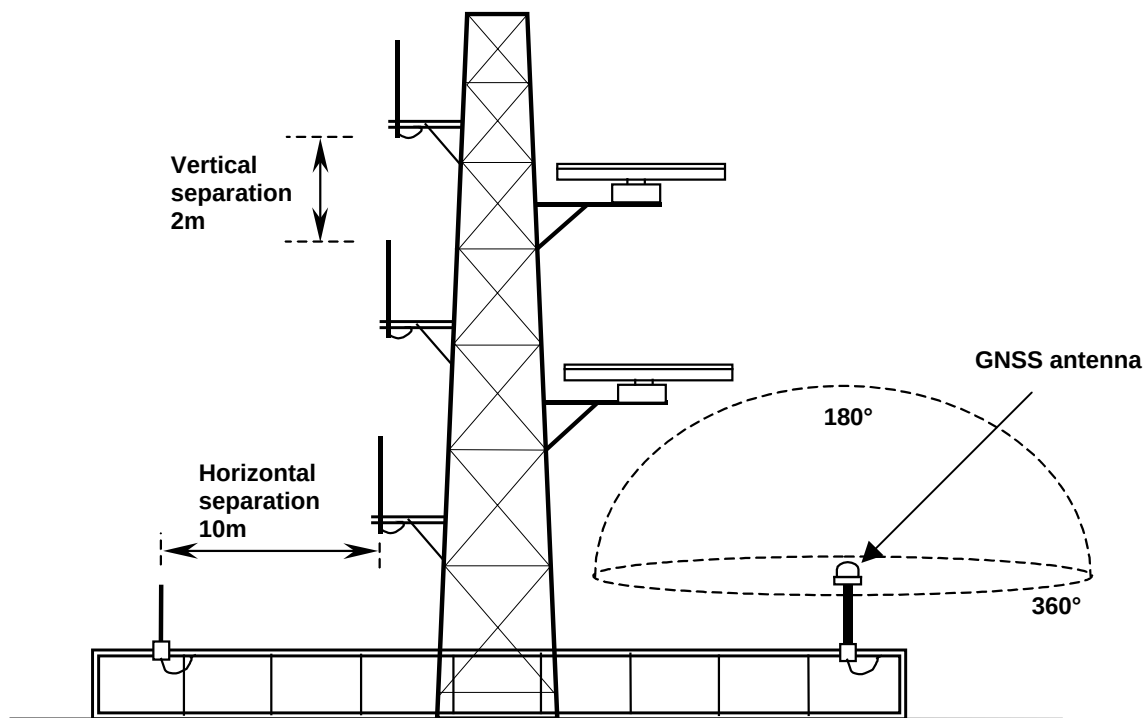
However, it is recommended that some form of illumination, possibly temporary, is provided during installation and maintenance.

Antenna units

The UAIS Transponder has to be connected to two antennas: a VHF antenna and a GNSS antenna.

Antenna mounting position

In accordance with IMO guidelines, antennas should be mounted in positions which, as far as possible, minimise interaction between them. The sketch summarises the recommendations:



VHF antenna

The VHF antenna is an important part of the receiver and transmitter system; the reception range is heavily dependent on the antenna installation. The VHF antenna must be installed as high as possible and free of shadow effects from the ship superstructure; effective installation will maximise the range of the system. The antenna must also be mounted so as to achieve the safety standards detailed on Page 3 of the Preface.

WARNING: The antenna must have sufficient bandwidth to suit the UAIS system, as otherwise the high VSWR produced may cause the transponder to shut down. It is recommended to use an omni-directional vertical polarised VHF antenna with a gain of 3 – 5 dBi, and a bandwidth sufficient to maintain VSWR <1.5 over the frequency range 156 – 163MHz. A suitable antenna is available from McMurdo as an option, part number 89-020-001.

GNSS antenna

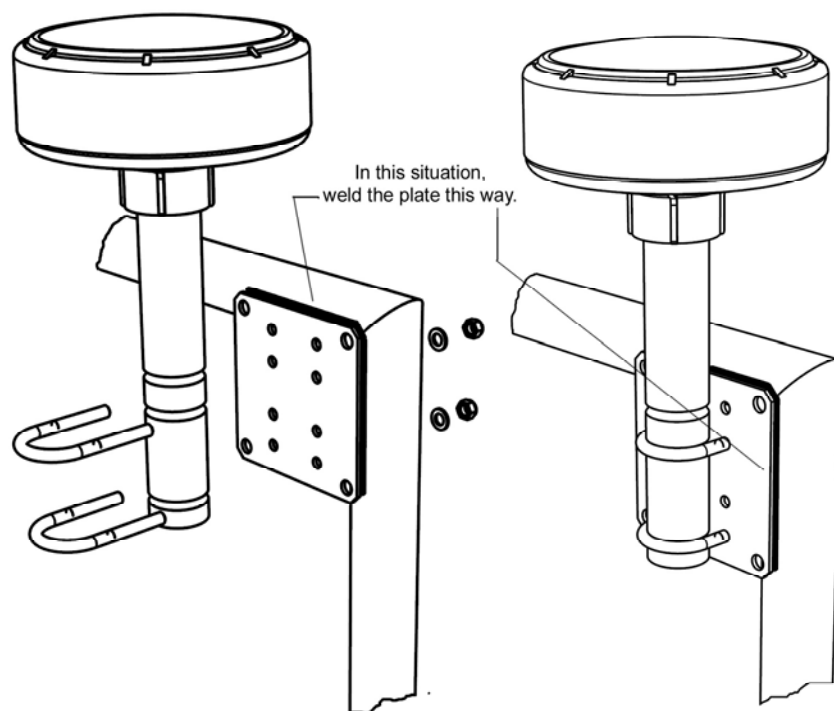
The Transponder package contains a GNSS antenna and a mounting bracket. The mounting bracket is designed for welding to the ship's superstructure.

Installation of the GNSS antenna is critical for the performance of the GNSS, which is used for timing of the transmitted time slots and for the supply of navigational information should the main navigational GNSS fail.

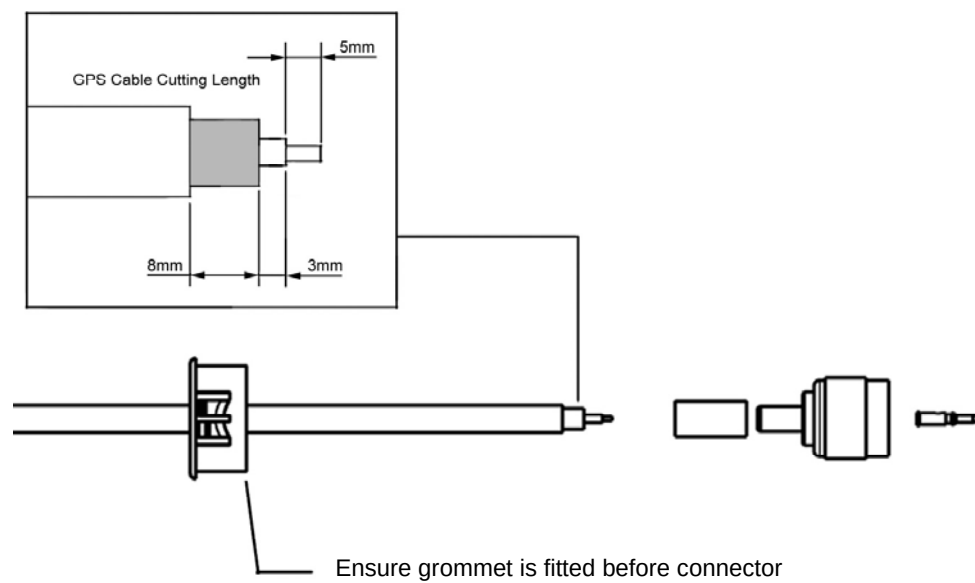
1. The GNSS antenna must be mounted in an elevated position and free of shadow effect from the ship's superstructure
2. The GNSS antenna must have a free view through 360 degrees with a vertical angle of 5 to 90 degrees above the horizon.

-

Weld on plate mounting of the GNSS antenna

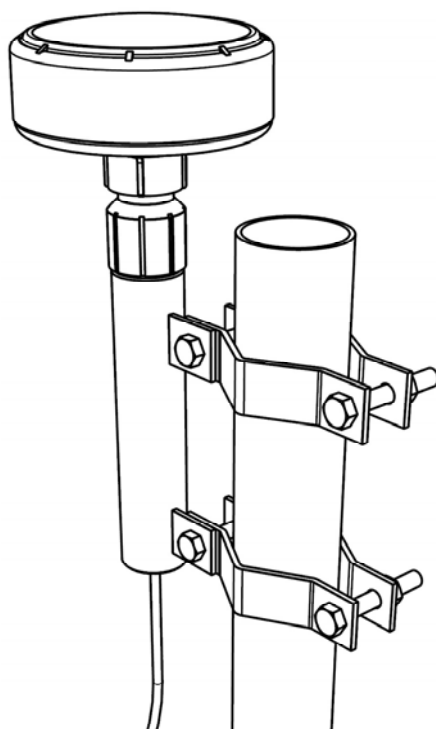


Cable Preparation

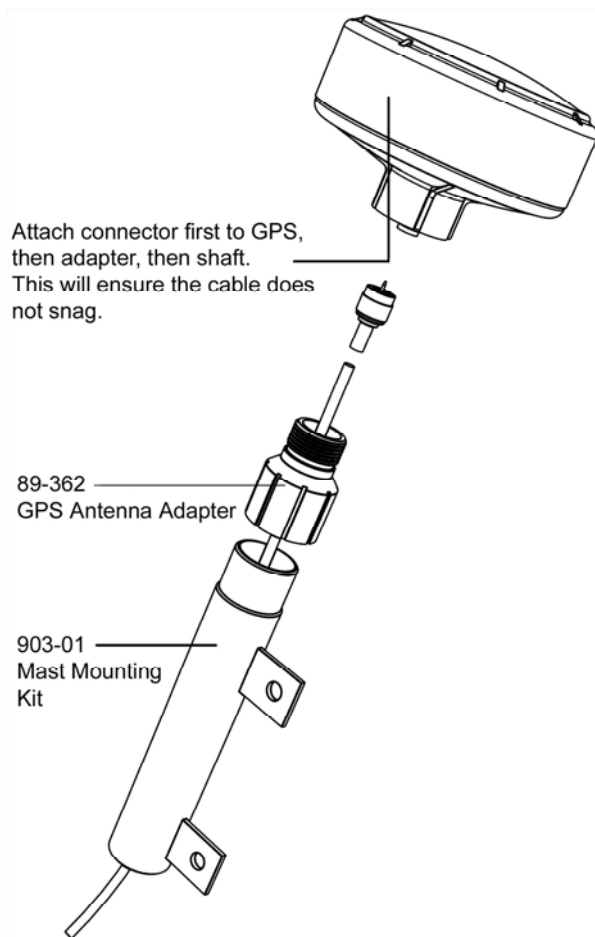


Mast assembly for GNSS antenna

Note: The GPS Antenna Adapter, P/N 89-362, is required to mount a GPS antenna on the Antenna Bracket 903-01. VHF antennas mount directly on the bracket.



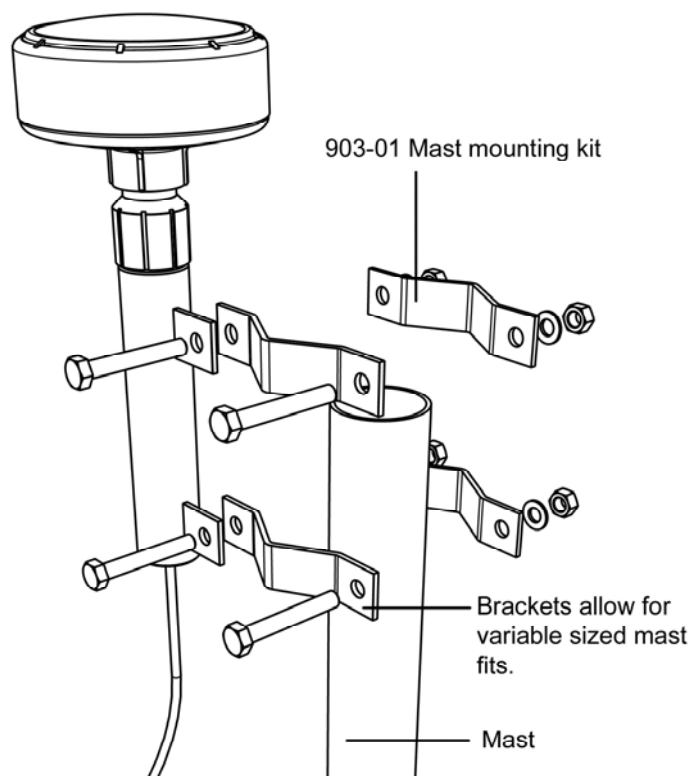
GPS and 903-01 fully assembled on a 2" mast.



Attach connector first to GPS, then adapter, then shaft. This will ensure the cable does not snag.

89-362
GPS Antenna Adapter

903-01
Mast Mounting
Kit



903-01 Mast mounting kit

Brackets allow for
variable sized mast
fits.

Mast

4 - Electrical connections

This installation guide takes into account the IMO “Guidelines for installation of Shipborne Automatic Identification System”. However both the IMO publication and these instructions must be taken as guidance only; individual circumstances must take precedence.

This guide is concerned only with the installation of the UAIS transponder unit and does not cover the installation of any peripheral equipment connected to the transponder. For proper installation and connection of peripheral equipment to the transponder refer to the installation manual for these products.

Connection	Must connect	Optional
24.0 VDC power supply	Yes	
GNSS antenna	Yes	
VHF antenna	Yes	
Display system (VDU)	Yes	
Pilot plug		Yes
Alarm Relay	Yes (if available)	
ECDIS (Main port)		Yes
ARPA (Main port)		Yes
Long range function		Yes
RTCM, differential GNSS info.		Yes
Position	Yes	
Heading	Yes	
Rate of turn		Yes
Speed and Course		Yes

Installation kit (optional)

This installation kit comprises the following:

Item	Quantity
Power Cable, 2.5mm 2-core flex	20m
VHF antenna cable, RG214 Coax	30m
GPS antenna cable, RG58 Coax	30m
Signal cable, 0.5mm 4 twist pair + drain	60m
Cable tie	200
Cable marker	20
Crimp tool	1
Tape, self-amalgamating	2 reels

Signal cable connections for UAIS Transponder

As shown in the table above, the UAIS Transponder must be or may be connected to different types of peripheral units; these can be divided in three groups:

- Coax connection to the antennas
- signal cable connection to the sensors (GNSS, Gyro, Log)
- signal cable connections to the five-input/output ports (Main, AUX/Pilot, long-range, RTCM, Display)

Connecting the three types of interfaces is described in detail in the following chapters.

The signal connections are all connected via a serial RS422 type interface; baud rates are from 1200 to 38400.

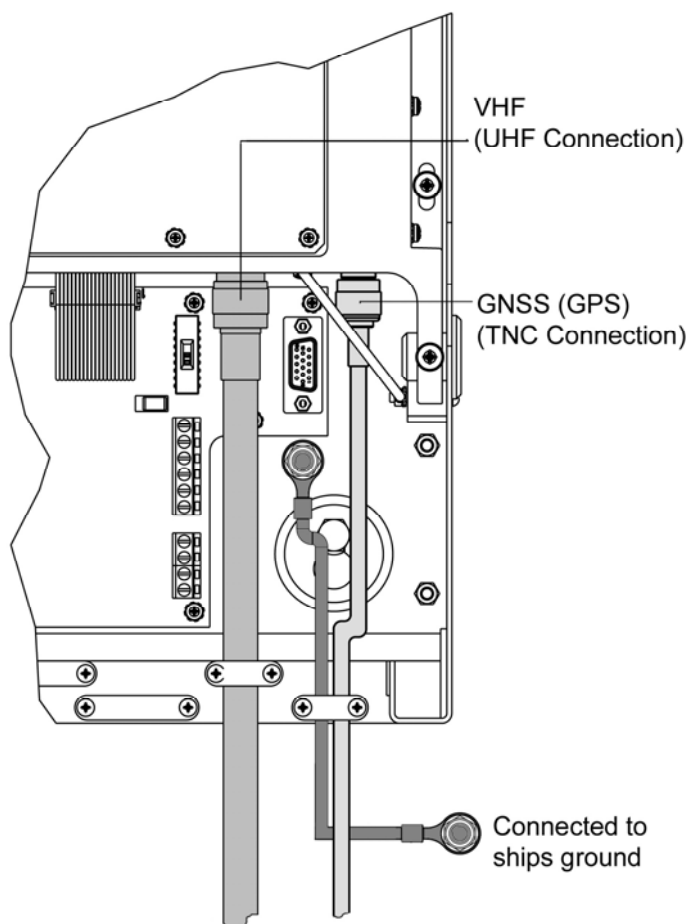
In some cases, particularly in retrofit installations, it may not be possible to connect the UAIS directly to the required sensor, because some sensors do not provide the IEC 61162-2 (NMEA) sentences required by the UAIS unit. In such cases a protocol converter is required between the sensor and the UAIS unit. Converters are available from different manufacturers, either as direct

protocol converters or frequently as repeater instruments for the sensor. A Gyro Interface Unit, P/N 89-028, is available from McMurdo as an optional extra.

VHF and GNSS (GPS) antenna cable connections

The VHF and the GNSS antenna cables are connected directly to the transponder through a UHF and a TNC plug respectively.

The coax cable plugs must be attached directly to the cables; the outer insulation must not be connected in the cable cleat but in the coax plug as illustrated below.



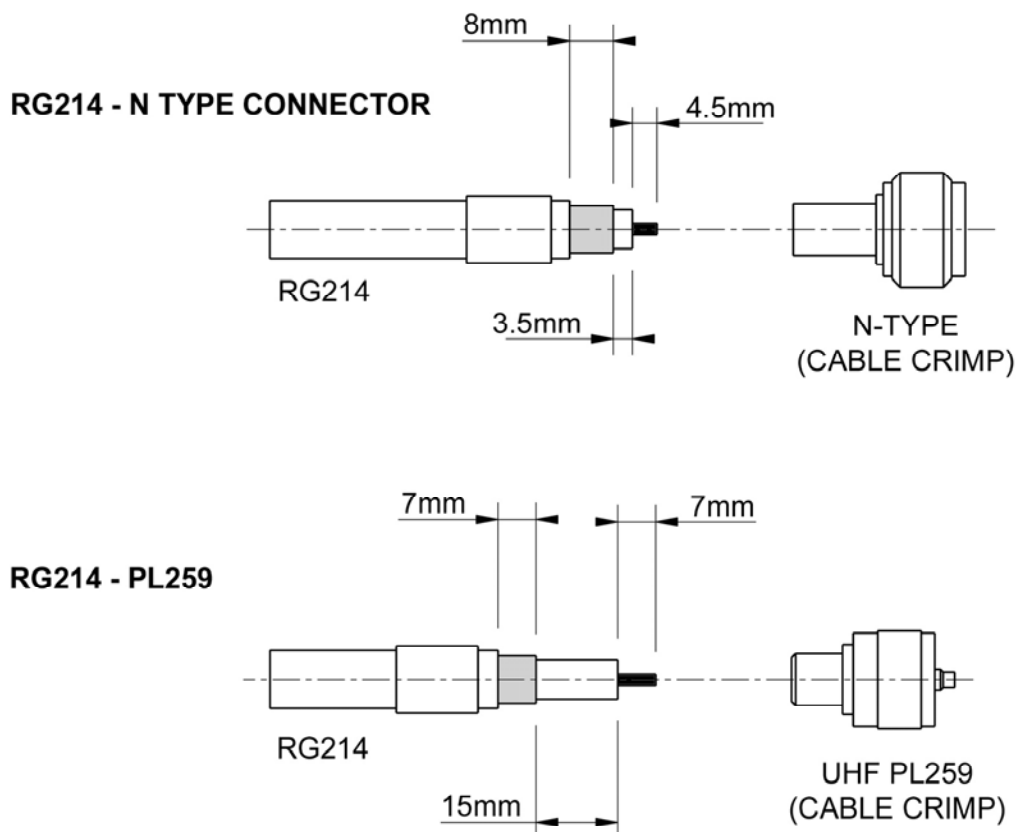
VHF antenna

The VHF antenna is an important part of the receiver and transmitter system; the reception range is heavily dependent on the antenna installation. It is recommended to use an omni-directional vertical polarised VHF antenna with a gain of 3 – 5 dB. The VHF antenna must be installed as high as possible and free of shadow effects from the ship superstructure; effective installation will maximise the range of the system.

In accordance with the IMO guidelines, an exclusion zone is defined around a VHF antenna; other antennas must be mounted outside this zone.

To make sure that the transmitted and received VHF signal is not interfering with Radar signals, other VHF transmission or power lines it is important that the connection between the VHF antenna and the transponder is of a high quality double shielded coax cable. It is recommended to use a RG214 cable and PL259 or N-type connectors.

If the cable has to be longer than 40 metres, it is recommended to use a cable with lower loss; a 40 metre RG214 coax cable has a signal attenuation of 3 dB at 150MHz, thus the signal strength is reduced to half its value due to cable attenuation.



GNSS (GPS) antenna

The GNSS (GPS) antenna has to have a clear view of the sky, the objective is to see the horizon freely through 360 degrees with a vertical view of 5 to 90 degrees above the horizon. As the received GNSS signal is very sensitive to noise and interference generated by other onboard transmitters ensure that the GNSS antenna is placed as far away as possible from Radar, Inmarsat and Iridium transmitters. Ensure the GNSS antenna is free from direct view of the Radar and the Inmarsat beam.

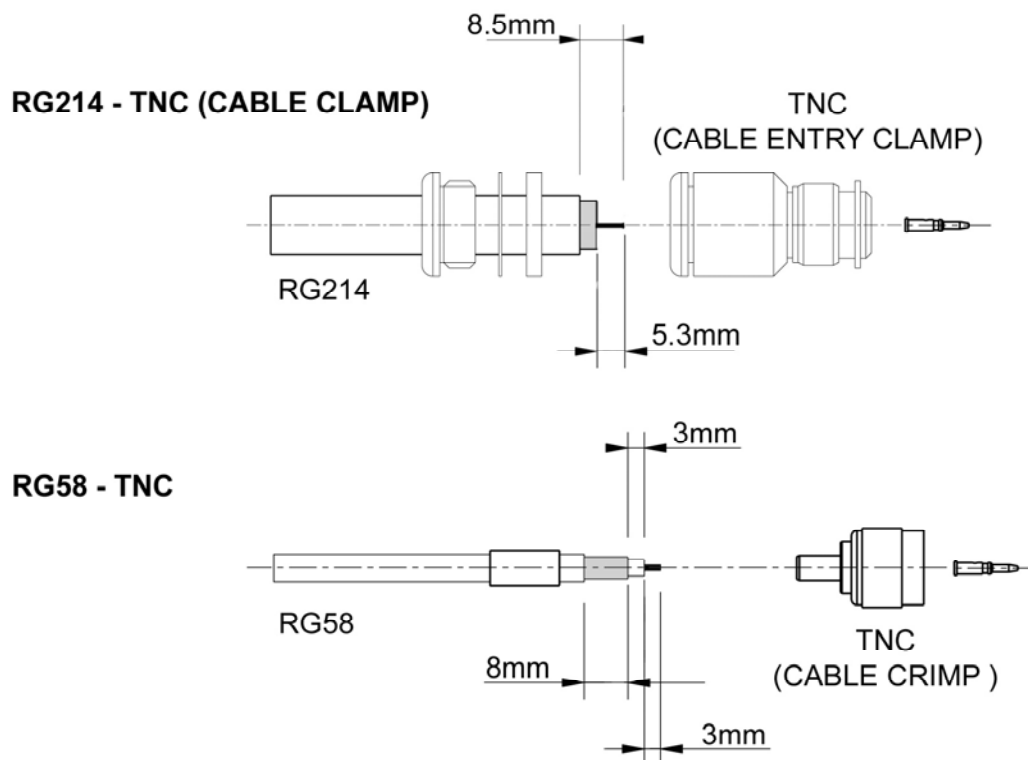
It is also important that the MF/HF and other VHF transmitter antennas are kept as far away as possible from the GNSS antenna. It is good practice never to install a GNSS antenna within a radius of 5 meters from these antennas.

The GNSS operates in the ultra high frequency band (1.575 GHz). The signal attenuation in cables is therefore substantial and has to be taken into account when the coax cable between the antenna and the UAIS unit is chosen. To compensate for this signal attenuation the supplied GPS antenna includes a pre-amplifier with a gain of 36 dB.

The optimum combination of coax cable and GPS antenna gain will have a resulting installation gain (pre-amplifier–cable attenuation) within 0 to 10 dB. The table below shows examples of coax cables.

Cable description	Attenuation / 100metre	Maximum cable length
RG 58	70 dB @ 1.5GHz	40 metres
RG214	37 dB	90 metres

Connectors used must be TNC throughout.



Screw terminal board

The UAIS Transponder has a build in screw terminal board which makes it very easy during installation to connect cables to the power sources, to sensors, to the VDU and to other display units through the Main and AUX ports.

Refer to the wiring diagram, attached as an appendix, for details of connections to the screw terminal board.

Fuse values

The main system fuse (10 amp) is located on the screw terminal board. A separate fuse (1 amp) on the screw terminal board protects the VDU. Both power supplies are reverse polarity protected.

Fuse description	Fuse value	Part No.
Main system fuse	10.0 Amp	99-077
VDU system fuse	1.0 Amp	99-076

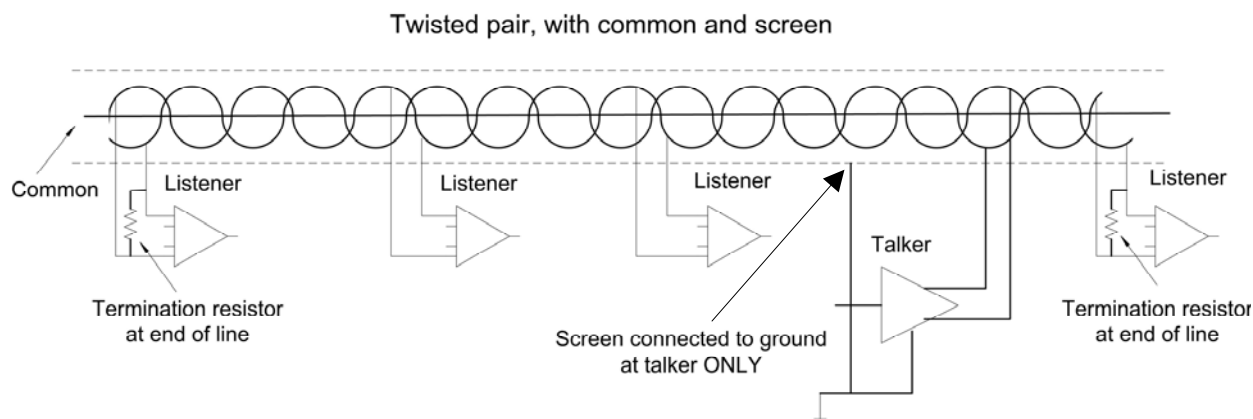
Signal line termination

Signal lines may need termination by a resistor across the inputs. These resistors are incorporated on the screw terminal board and can be switched in or out by the switches S2, S4, S5, S6, S7, S8. The switches are identified on the Screw Terminal Board diagram on Page 6.

Note:

1. Each switch is a double unit
2. S2 and S5 each control two signals individually
3. S4, S6, S7 and S8 – both switches should be moved together
4. S3 has been deleted

Whether termination at the terminal board is required depends on how the other units are connected, and whether any of these other units provides termination for the signal line. The following sketch shows the principle:



There is only one talker per twisted pair; there can be several listeners. The requirement is that terminations must be provided by the devices at the ends of the line, regardless of whether they are listeners or the talker, and that no other device should provide a termination.

A terminal is provided for the common connection at each port on the screw terminal board; particular care should be taken to ensure that the cable screen is connected to ground only at the talker.

Do not connect the cable shield to ship's ground at both ends of the cable as this may cause ground loops and interference to the signals.

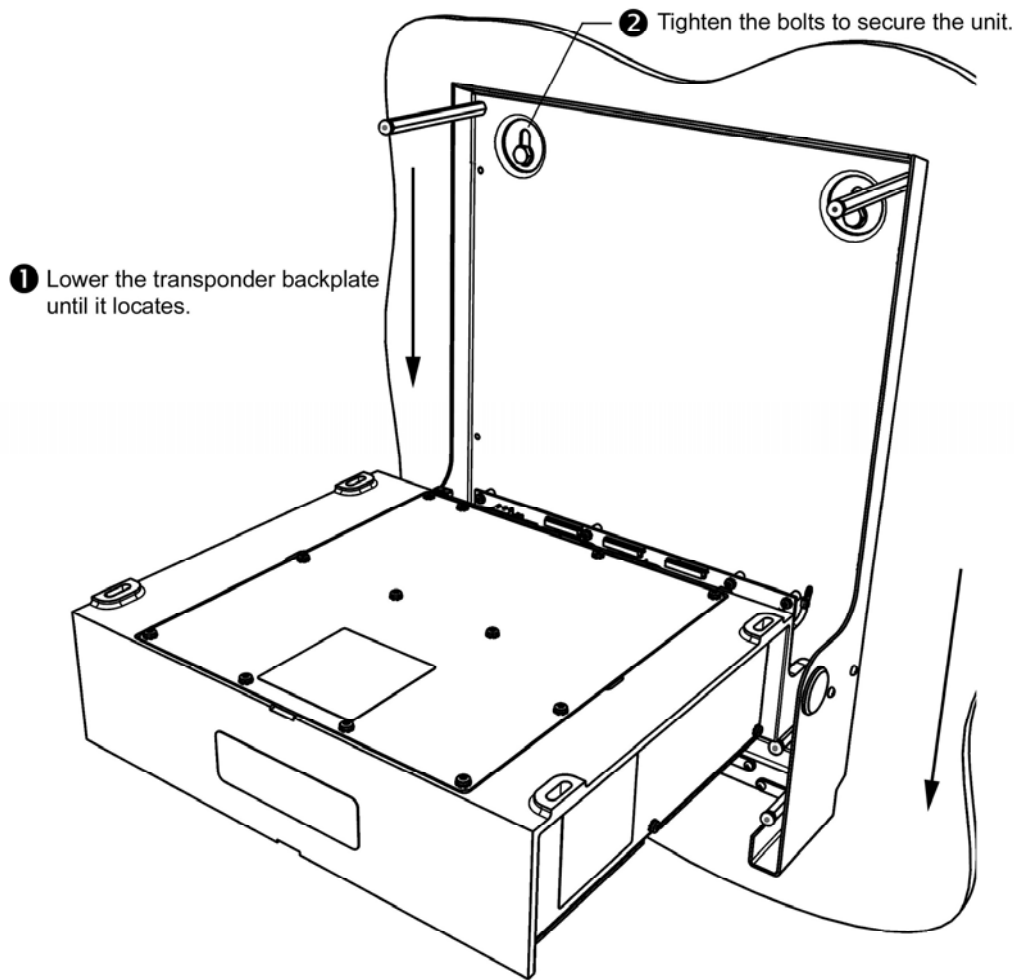
Note: For clarity, the sketch shows the devices connected to the twisted pair by spurs; in practice, the twisted pair is looped through each device in turn.

It is good practice to use screened cables in all ship cable installations. In the transponder unit the screen from some cable entries should be connected to ground at the entry to the transponder unit, as shown in the table. The technique of connecting the screen is illustrated below.

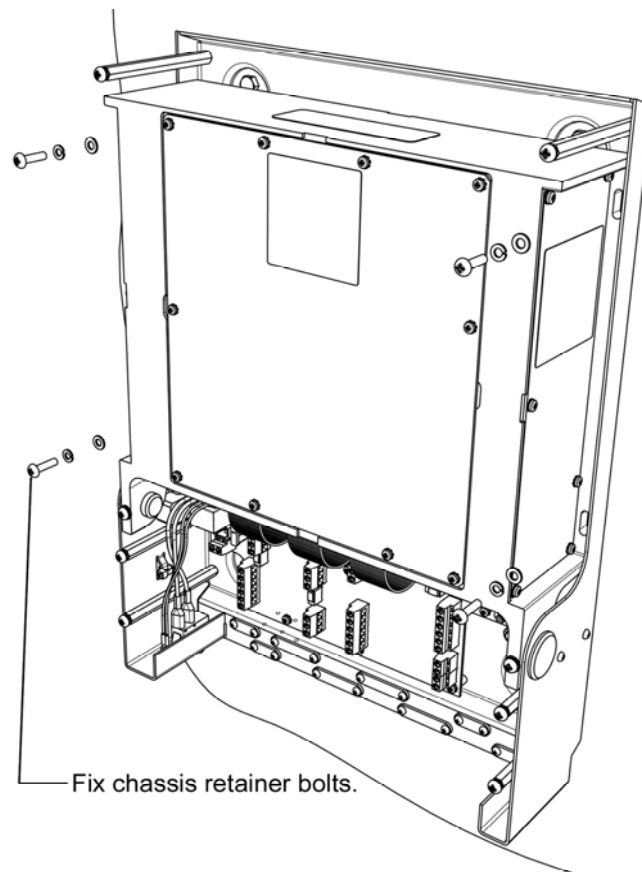
	Switch	Lines terminated by resistor	Connect screen at transponder
S2 (brown)	DISP	Display (VDU) port	YES
S2 (red)	LR	Long Range port	PREFERRED
S4	AUX	Auxiliary or Pilot port	PREFERRED
S5 (brown)	MAIN	Main port	PREFERRED
S5 (red)	RTCM	RTCM port for differential correction	PREFERRED
S6	SEN 1	Sensor 1 port	NO
S7	SEN 2	Sensor 2 port	NO
S8	SEN 3	Sensor 3 port	NO

PREFERRED means that the screen may be connected either at the remote device or at the transponder; if no other considerations apply, connection at the transponder is recommended.

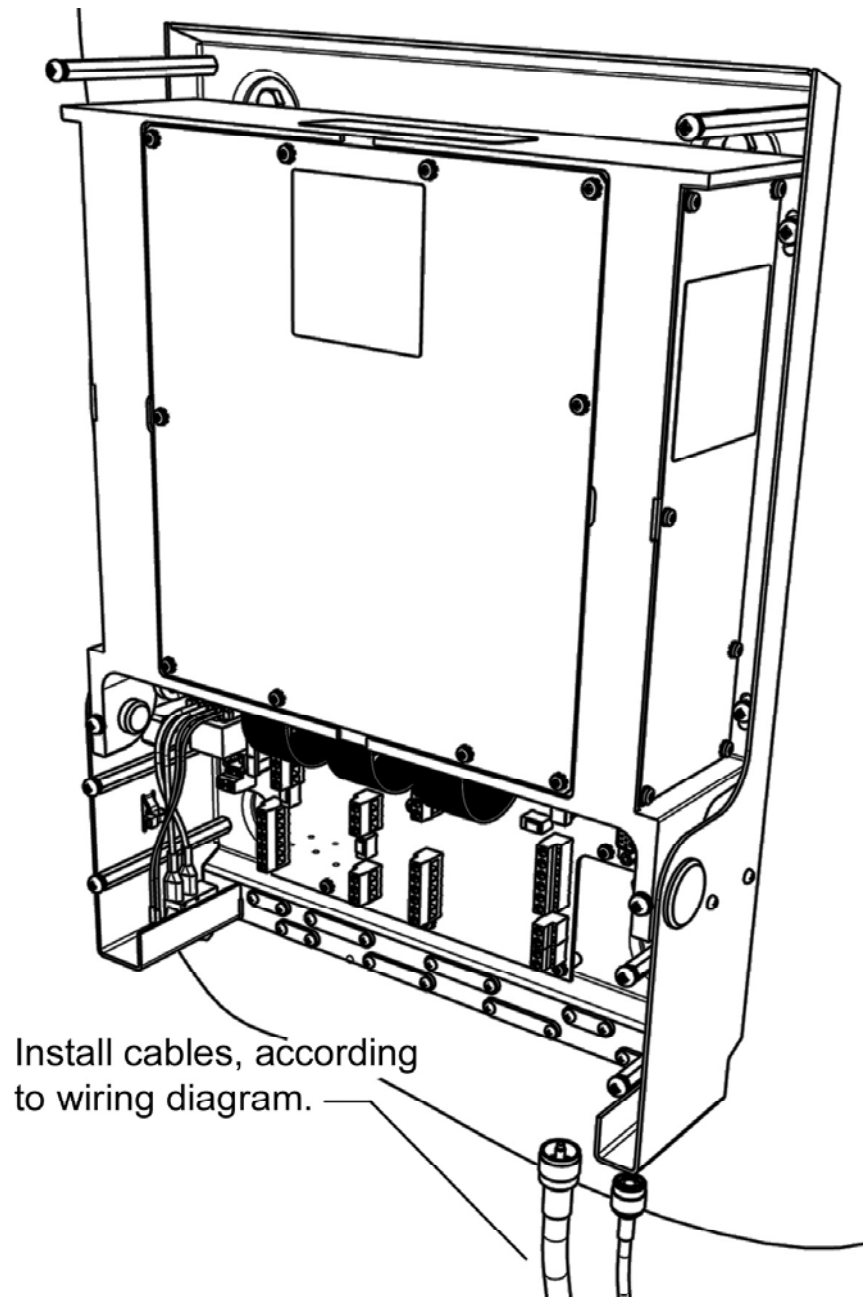
4.



5.

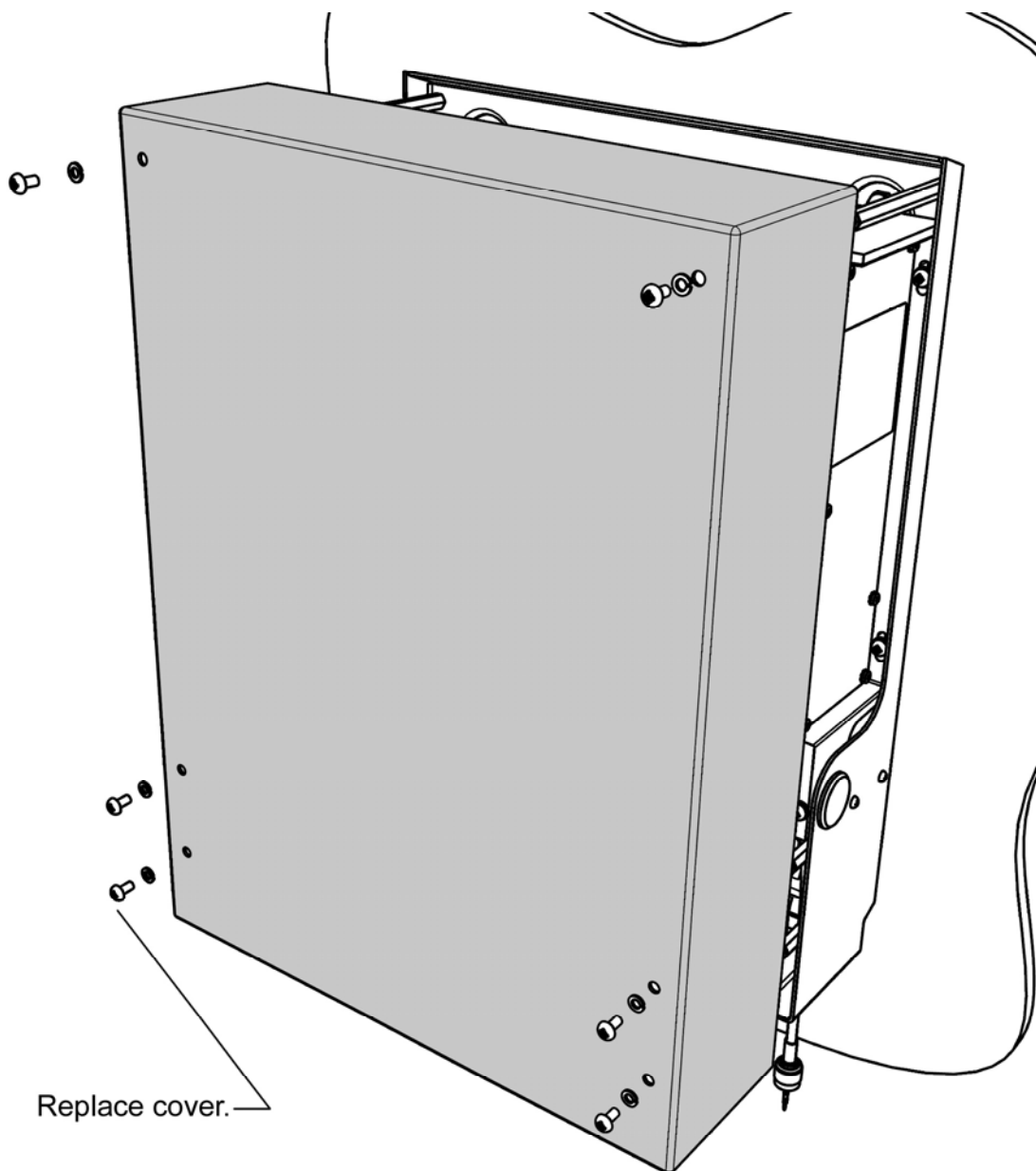


6.



Refer to the fold-out wiring diagram at the rear of the manual for cable details.

7.



Insert all cover screws loosely, then tighten to complete assembly.

External illumination

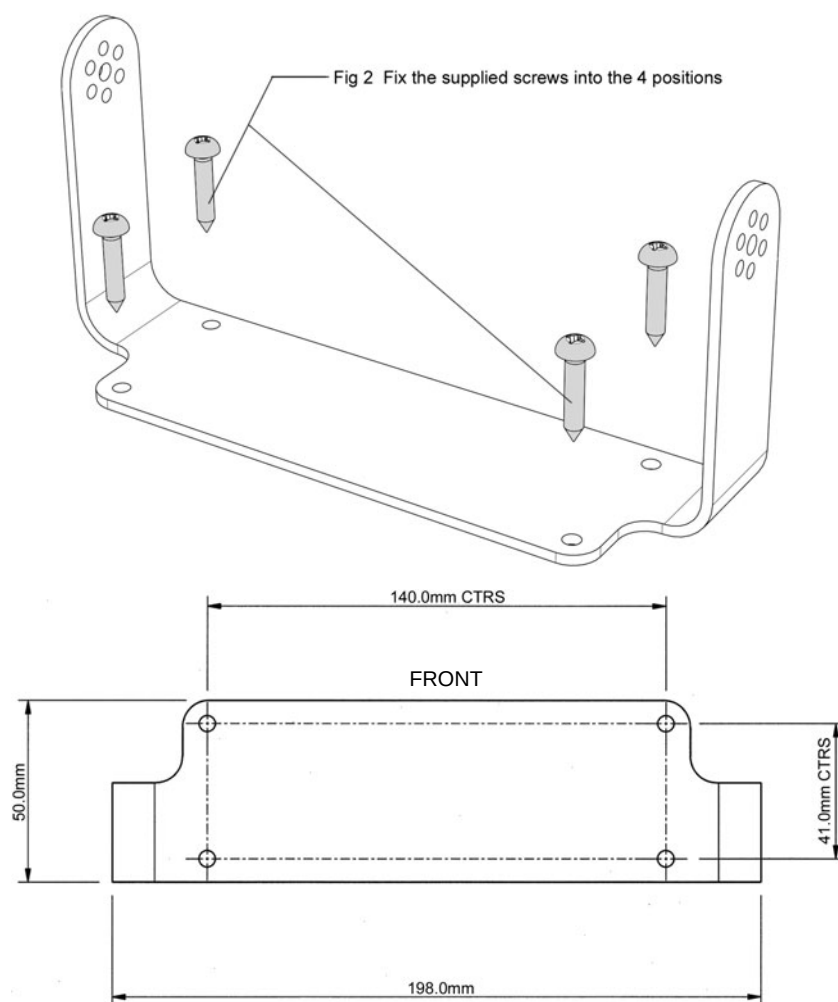
The transponder does not require external illumination during operation. However, some form of illumination should be provided while installing or maintaining the transponder; this could be portable or temporary.

UAIS VDU (Display)

UAIS VDU trunnion assembly

The VDU can be either trunnion mounted or flush mounted.

1.



Drilling drawing

Select hole size to suit method of fixing mountings – clear or tapped holes.

2.

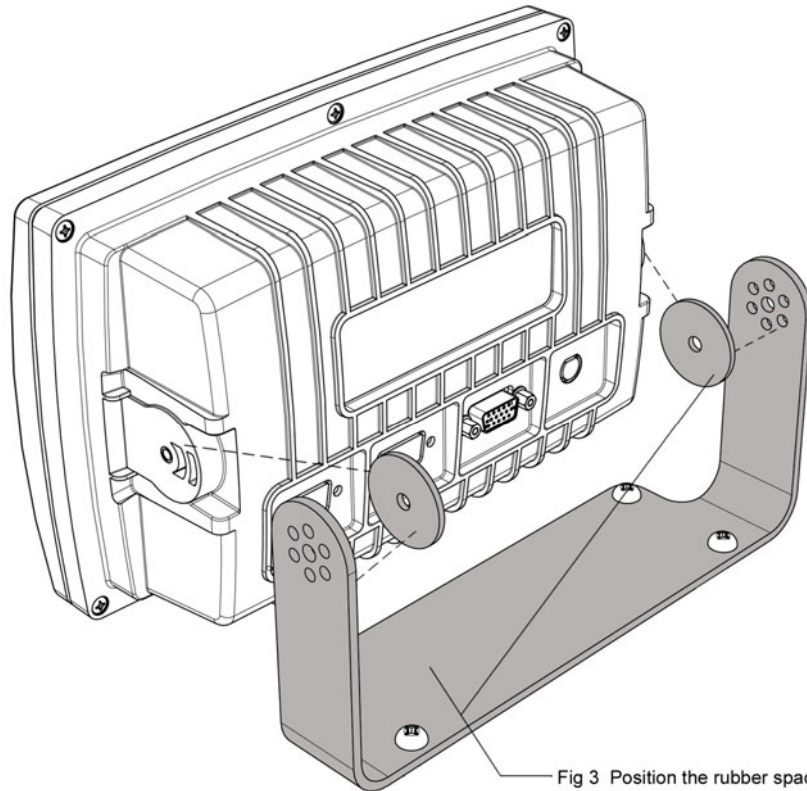


Fig 3 Position the rubber spacers inbetween the bracket and display.

3.

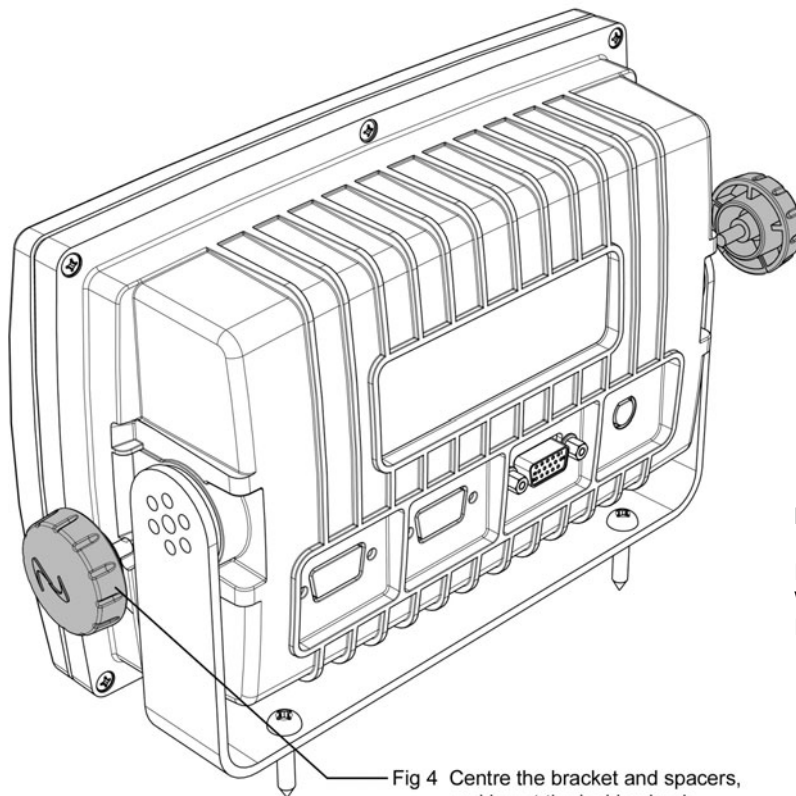


Fig 4 Centre the bracket and spacers, and insert the locking knob.

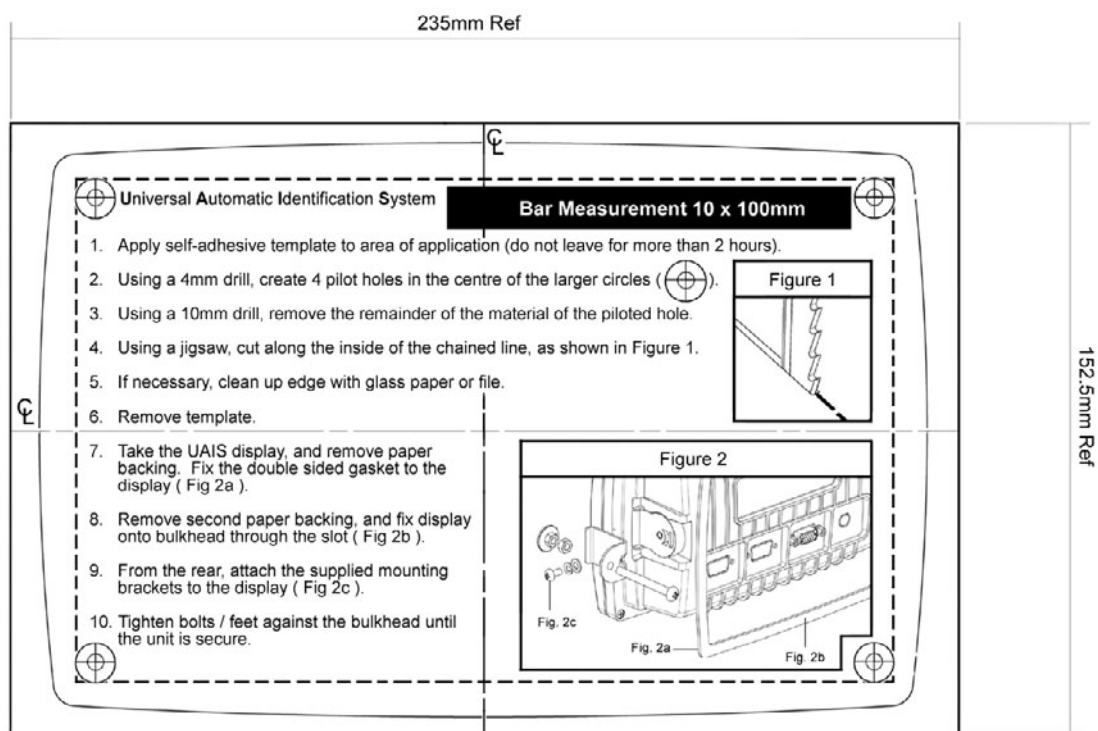
Mounted dimensions:

Height: 150mm
Width: 270mm
Depth: 120mm
(over connector)

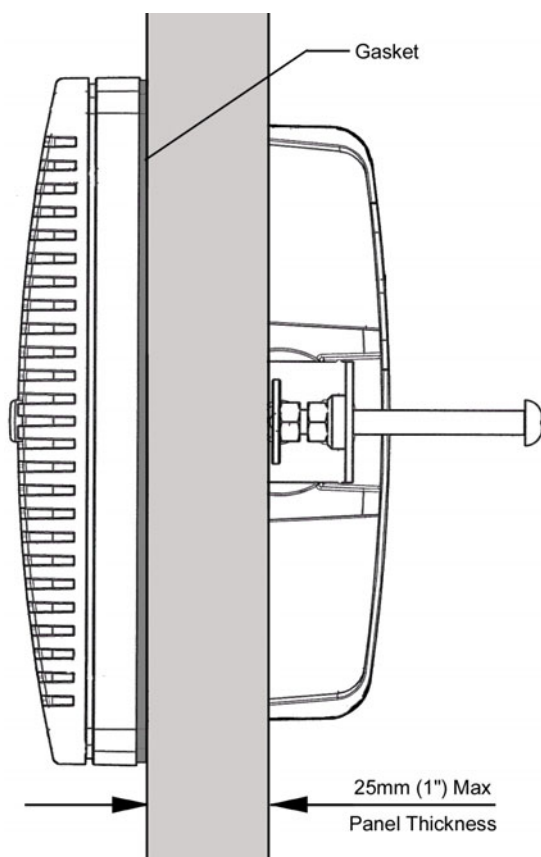
UAIS VDU flush mount assembly

A cutting template is supplied with the flush mounting kit. This template carries full fitting instructions.

Template (reduced size)



1.



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P - Preface

Applicability of this manual

This manual is valid for all hardware and software issues of the equipment described, and is kept current by update of the appropriate section(s).

When updates are posted, any incompatibility with earlier issues of hardware and/or software will be highlighted here.

Section update record

Section	Issue	Date	Comment
Preface	5	06/10/03	
1	4	06/10/03	
2	5	06/10/03	
3	4	06/10/03	
4	5	06/10/03	
5	5	06/10/03	
6	4	06/10/03	
7	4	06/10/03	
8	4	06/10/03	
9	4	06/10/03	

Disclaimer

Information contained in this manual is supplied in good faith, but is liable to change without notice. McMurdo Limited disclaims any liability for consequences arising from omissions or inaccuracies in the manuals and documentation provided with this product.

IMPORTANT: Please take time to read this manual carefully and to understand its contents fully, so that you can install your Transceiver correctly.

Once installed please read the Operation Manual fully to make sure you understand how to use your new UAIS.

Installing the UAIS Transponder System Safely

Installation

⚠ WARNING: Do not connect the UAIS transponder system to a mains (line) AC electrical supply, as an electric shock or fire hazard could result.

⚠ CAUTION: Do not connect the Transponder to a DC supply exceeding 32V or reverse the supply polarity. Damage to the transceiver can result.

⚠ CAUTION: Do not bypass the built in fuses

⚠ CAUTION: The Transponder system is designed for operation in the temperature range -15°C to +55°C. Do not install (or use) the transponder system in environments which exceed this range.

⚠ CAUTION: The UAIS Transponder is not water-resistant. Consequently, the Transponder must be installed in a dry place and must be protected from direct contact with water.

⚠ WARNING: Do not install the Transponder system in a position where;

- a) the controls of your vessel may be obstructed.
- b) it may obstruct your normal movement around your vessel.
- c) it may cause bodily injury.
- d) it cannot be easily accessed in an emergency.

Use

⚠ WARNING: Certain parts of the Transponder chassis can become hot during extended periods of operation, notably the rear panel. Avoid touching these areas when the Transponder is operating.

⚠ WARNING: Do not dismount the cover of the Transponder before the power is switched off. Do not touch the antenna connections when the Transponder is operating and do not touch the antenna whip (mast) or connecting cable when the Transponder is in operation, for RF exposure and electrical safety reasons. Refer to Radio Frequency Exposure Warning.

⚠ WARNING: Unauthorised opening of the Transponder system will invalidate the warranty.

Maintenance

⚠ CAUTION: Avoid using chemical solvents to clean the Transponder system as some solvents can damage the case material.

NOTE: Apart from the fuses located on the Screw Terminal Board, the Transponder system contains no user serviceable parts. Return to your Service Agent for repair if replacing the fuses fails to make the equipment servicable.

Radio Frequency Exposure Warning

To meet the current requirements for Radio Frequency Exposure it is necessary to install the antenna mast correctly and operate the equipment according to the instructions.

The assumptions used in this assessment are: full transmit power is used, a good antenna is used (assumed to be a 6dBi-gain omni-directional type).

Where no suitable structure exists to achieve a 3 metre vertical separation then the antenna base must be mounted at least 1 metre above the head of any person within range and all persons must stay outside the 3-metre safety radius.

Failure to adhere to these limits could expose persons within the 3 metre radius to RF radiation in excess of the MPE / SAR limits.

⚠ WARNING: The antenna mast must be mounted at a minimum distance (vertical separation) of 3 metres from the head of any person standing on deck to meet international safety directives on Maximum Permissible Exposure (MPE) / Specific Absorption Rate (SAR).

⚠ WARNING: Do not transmit when persons are closer than 3 metres to the antenna. If any person (e.g. the operator) must be closer, then a grounded RF shield should be interposed between that person and the antenna.

Rules of Operation

Licensing

IMPORTANT: In most countries the operation of the UAIS Transponder is a part of the radio regulations and therefore the ship must possess a current VHF radio telephone licence which lists the UAIS system, and the equipment must be registered (Call Sign and MMSI number). Please contact the relevant authority in your country for more information.

Refer to the UAIS Transponder Operation Manual for the full operating procedure.

Good Practice

The installer is expected to be familiar with IMO SN/Circ.227 *Guidelines for the Installation of a Shipborne Automatic Identification System*, and to comply with these recommendations. The document contains detailed information which supplements the instructions in this manual.

1 - Introduction

It is recommended that the vessel should be surveyed prior to commencing any installation work to determine the suitability of the existing on-board sensors. Section 8 of this Manual contains a 'Pre-Installation Inspection' form to assist this process.

Installation of the UAIS Transponder has been designed to be as easy as possible and requires few tools. However as the UAIS equipment forms a vital part of the ship's navigational equipment the installation must be performed with great care and with attention to detail.

The UAIS is considered part of the ship's radio station and is surveyed together with the radio installation. Surveys on Convention ships should be carried out in accordance with the rules laid down in IMO Res. A 746(18) *Survey Guidelines under the harmonised system of survey and certification* and Protocol of 1988 relating to the International Convention for the Safety of Life at Sea 1974

For the AIS installation the following drawings shall be submitted for the survey:

- Antenna layout for the VHF and the GNSS antenna installation (prepared by the installer)
- AIS Arrangement drawing (included in this manual)
- Block diagram showing the interconnection to other units (included in this manual)

It is also necessary to complete an installation report, which shall be kept on board.

About this manual

This manual provides step-by-step guidance through the installation of the UAIS Transponder system. Please read the manual carefully and make sure to follow the instructions.

In this manual only the installation of the UAIS stand-alone configuration will be described. If the UAIS unit is to be connected to other display devices, refer to the manual for that display. However the setup must always be performed with the display unit. Other display units will be additional to the IMO required installation.

The procedures required for installation can be summarised:

1. Obtain a copy of the UAIS Pre-installation Inspection form; check that it is filled in with all the data necessary for the installation. If the form has not been filled in, it is advisable to do it at this stage, as this is a good way to make sure that all information is available for the installation.
2. The available UAIS Transponder system building blocks are listed in section 1.2. Before starting the installation ensure that everything needed for the installation is to hand.
3. Locate the places to install the different units. The templates and the drilling instructions are provided in this manual.
4. Connect the units and the sensors as shown in this manual.
5. **DO NOT SWITCH ON THE SYSTEM AT THIS STAGE.** It is most important to read the Operation Manual, which contains the commissioning information, before power is applied.

The Warranty Registration & Acceptance Record, Section 7 at the rear of this manual, must be completed and signed when the system has been commissioned and accepted.

UAIS building blocks

VDU Transponder/display system **89-001-001**

Transponder Only 89-051-001

VDU Display Only 89-052-001

GPS antenna assembly 89-021-001

Transponder **89-051-001**

Transponder unit, packed with accessories:

2off PL 239 male plug for VHF antenna interface

2off TNC male for GNSS antenna interface

4off M6 x 40mm machine screws for bulkhead mounting

Installation manual

Optional: The Transponder unit can be delivered with a combined GLONAS/GPS receiver

VDU Display system (MKD) **89-052-001**

Display unit, packed with accessories:

15 pin D-sub connector

Trunnion Mounting Bracket

4off No10 x 25mm self-tapping screws for mounting Trunnion Bracket

Flush mounting kit, including seal

Cutting template for flush mounting

Operation manual

GPS antenna assembly **89-021-001**

GPS antenna unit, packed with accessories:

Mounting pole and mounting plate

2 off 'U'-bolts for mounting pole and plate

Options

MT-1 Transponder 89-051-001

MT-1 VDU 89-052-001

MT-1 GPS antenna 89-021-001

VHF Antenna 89-020-001

S/S Stand-off bracket for VHF antenna 903-01

S/S Stand-off/Bulkhead bracket for VHF antenna 903-02

GPS Antenna Adapter 89-362

Gyro interface unit 89-028

AC/DC converter 89-029

Installation kit 89-038

Installation kit consists of:

2mm 2 core flex power cable 20m

RG214 Coax VHF antenna cable 30m

RG58 Coax GPS antenna cable 30m

0.5mm 4-twisted pair signal cable 60m

Cable tie 200

Cable marker 20

Crimp tool 1

Self amalgamating tape 2

2 - UAIS Transponder System

System overview

Universal Automatic Identification System (UAIS) is a maritime VHF-based transponder system that provides high-speed automated communication from ship-to-ship and ship-to-shore, of vessel, voyage and safety related data. This UAIS transponder and touch screen VDU display system is the latest in state-of-the-art technology and is designed to meet the latest IMO SOLAS requirements.

The UAIS transponder transmits the ship's navigational data to other vessels, and also to shore based VTS systems utilising various marine VHF channels. UAIS is primarily designed as a ship-borne mobile station and consists of an integral GNSS engine used for timing, one VHF transmitter, three VHF receivers and a computer unit. Interfacing to external GNSS used for navigation, a VHF antenna, a gyrocompass, and an optional ECDIS or ARPA display system is made easy by the built-in screw terminal board and the intuitive operating menu system on the touch-screen display unit.

The VDU is designed to fulfil the minimum SOLAS requirements for system set-up and display of the received target information (Minimum Keyboard and Display – MKD). However the large touch screen LCD display also gives the user easy access to the menu system that controls the system, and displays the received targets on a graphical, radar-like display.

Note: SOLAS requirements specify this equipment as Minimum Keyboard and Display (MKD). Because all keyboard functions are implemented through the touch screen, it is more logical to use the term VDU (Visual Display Unit); this terminology is used throughout this manual.

Compliance

This UAIS is designed to comply with current international standards and is approved in accordance with the high standards of the European Marine Equipment Directive.

Compliances:

- MSC.74(69)
- ITU-R M.1371-1 1998
- EN 60945 4th edition, 2002; IEC 61993-2, 1st edition, 2001; IEC 61162-1, 2nd edition, 2000; IEC 61162-2, 1st edition 1998; IEC 61108
- ETS 300 113

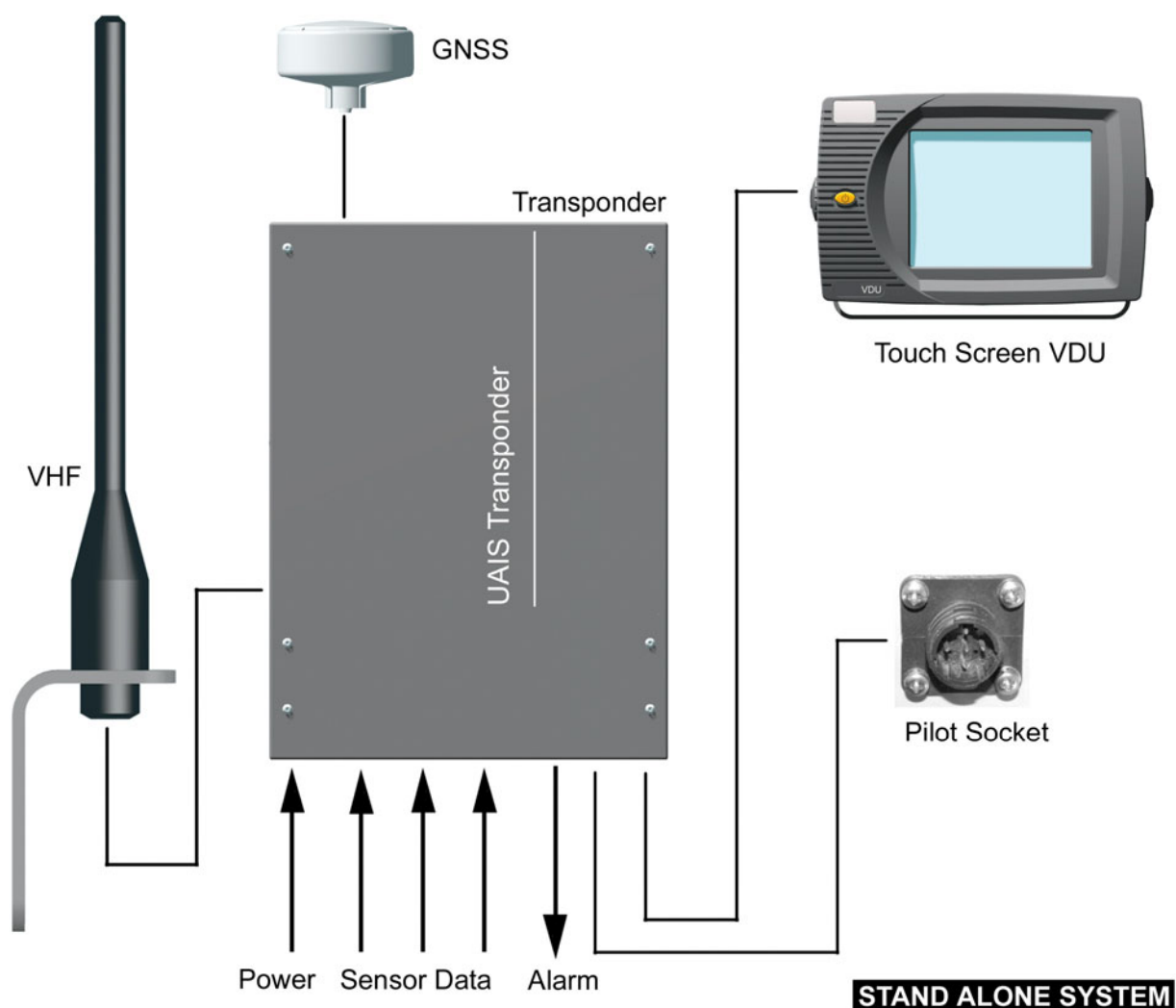
System Configuration

The UAIS system can be installed either as part of an existing bridge installation, or as an integrated part of a new bridge layout.

The main three configurations are:

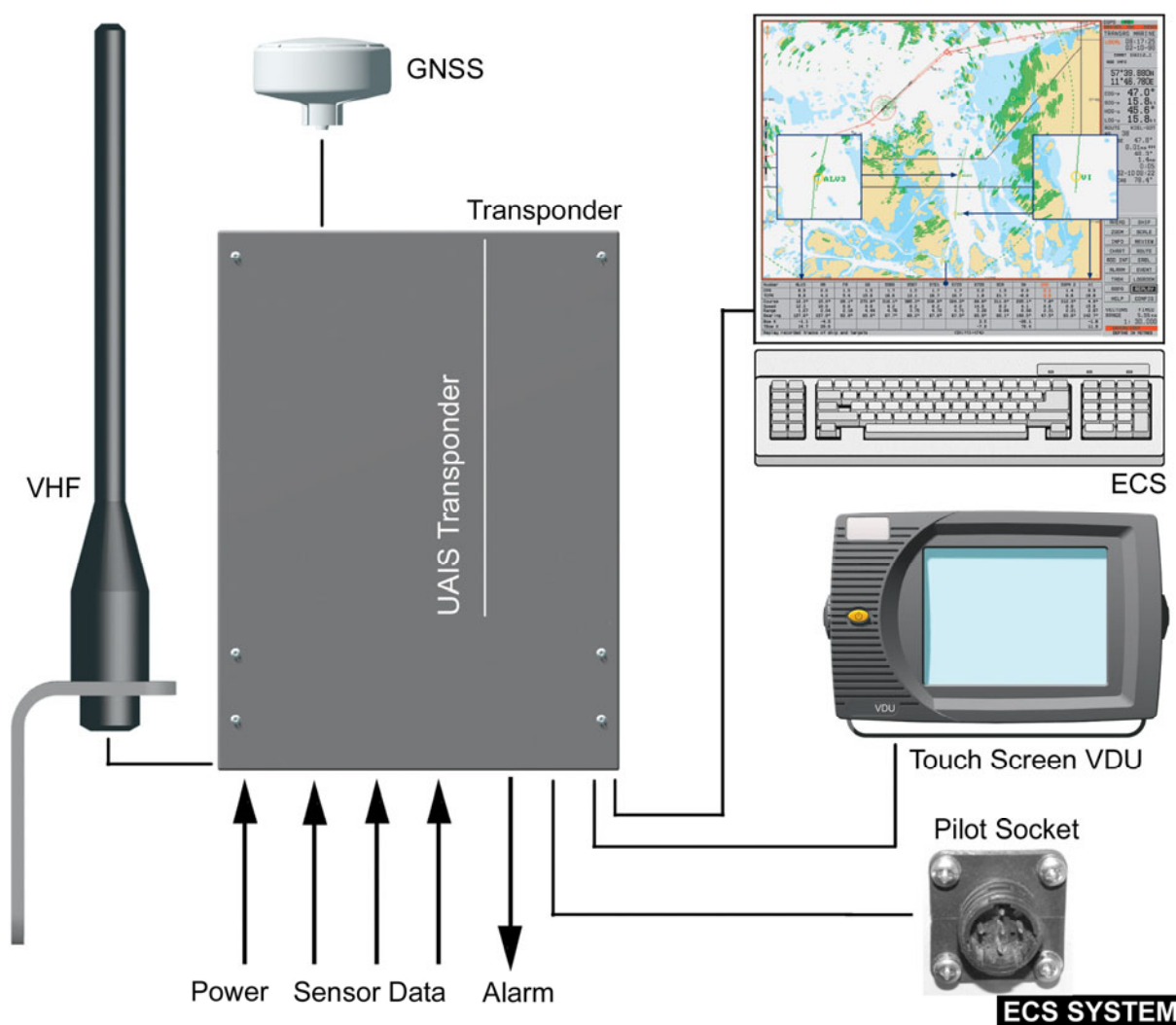
- 1 a stand-alone system
- 2 a system connected to an ECS
- 3 a system integrated into the bridge ARPA and ECDIS displays.

The stand-alone installation as illustrated below meets the SOLAS requirement for an AIS installation. This installation uses the minimum display (VDU) as the main display for setting up of own ship's information and for display of the received navigational information.



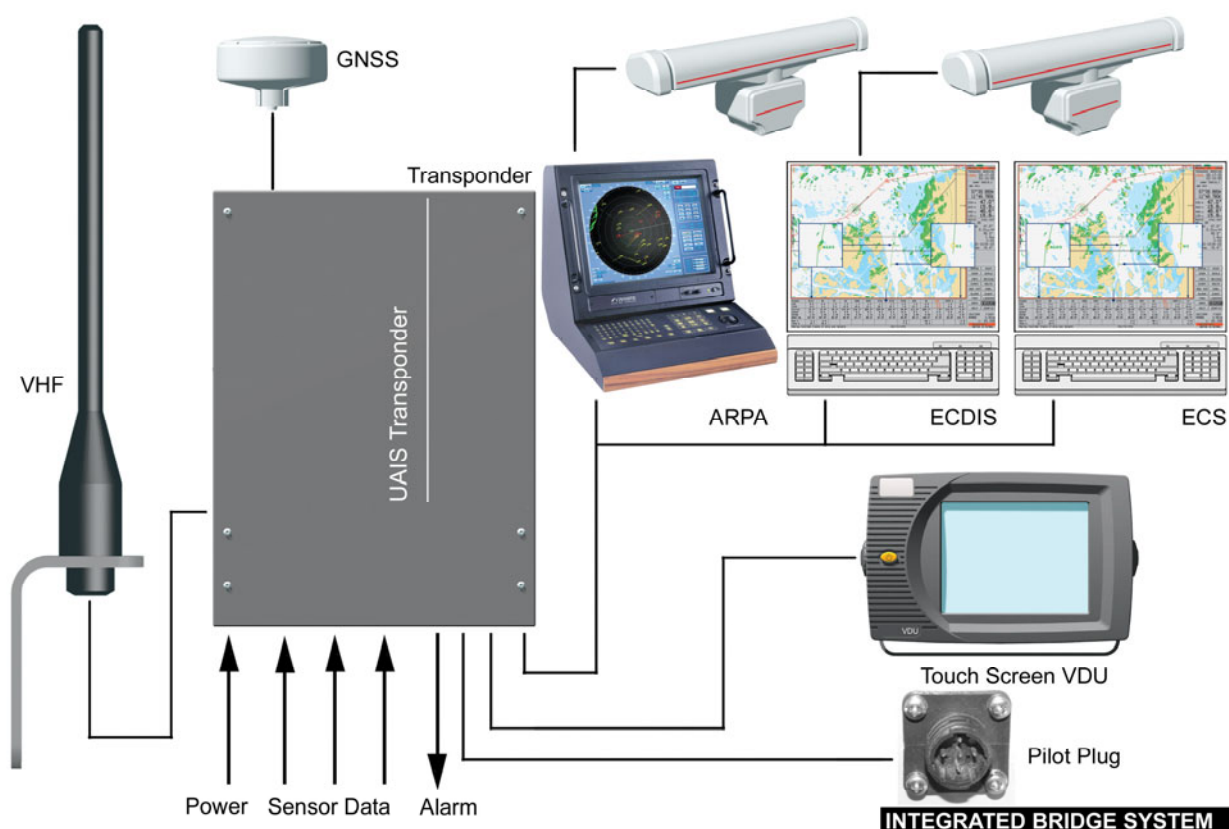
The VDU provides the received navigational information in a graphical mode making it very easy to achieve a situation overview.

In the **Electronic Chart System (ECS)** installation the stand-alone installation and an ECS display have been integrated. This installation meets the SOLAS requirements for an AIS installation. The VDU will mainly be used for input of own ship's information and a compatible ECS capable of decoding the NMEA standard implemented for UAIS will display the received navigational information as AIS targets. This of course will greatly enhance the use of the received target information, as the targets now will be displayed in the environment used for navigation of the ship.



Integrating the AIS into an **integrated bridge system (IBS)** will display the received AIS target information on a compatible ARPA or ECDIS giving the navigator the optimum use of the received navigational information. The target information is then displayed in a way that makes it easy for the navigator to see course, speed, rate and direction of turn of other approaching vessels.

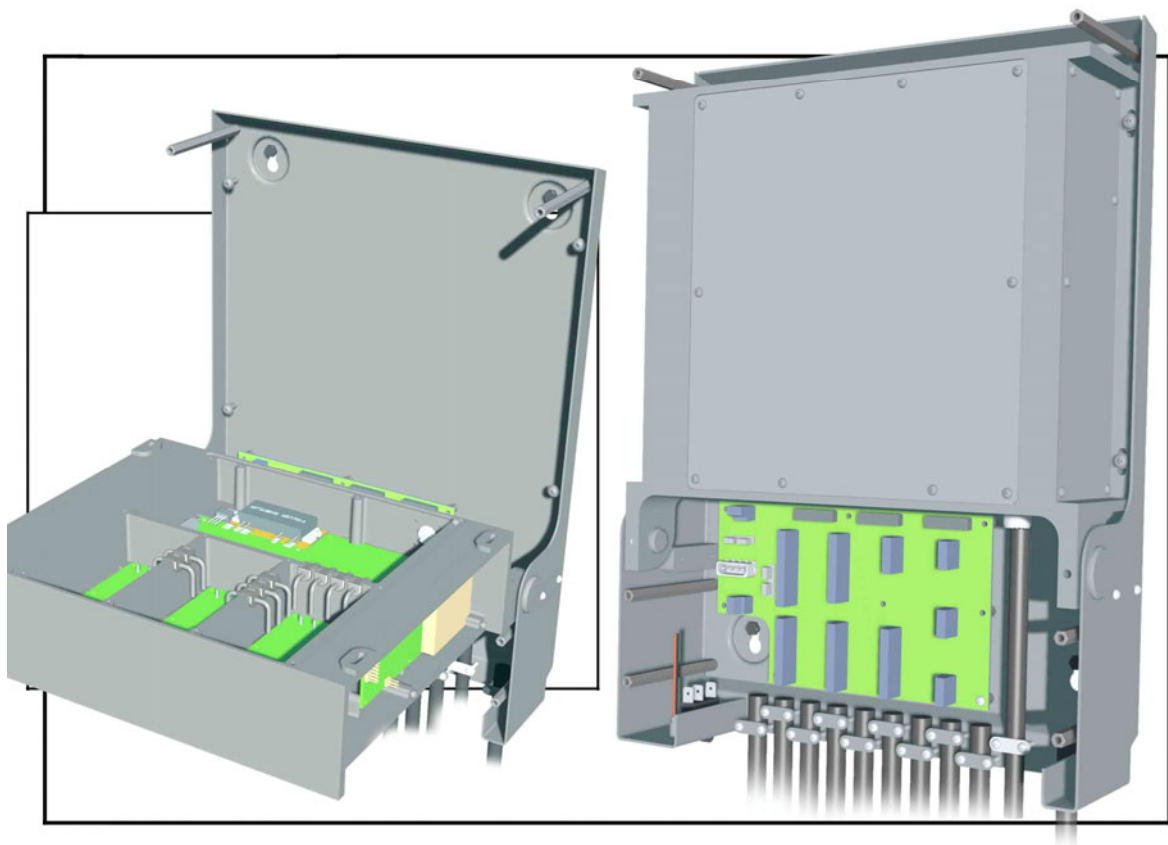
If the ARPA or ECDIS equipment is approved for use together with the AIS transponder the VDU may not be required in the installation. However in many cases it will be necessary to install the VDU to meet the SOLAS requirements. In these installations the VDU will be used to load the transponder with own ship data and the ARPA or ECDIS equipment will be used to display the received target information.



Transponder

The Transponder consists of a backplate to which a Screw Terminal Board, the Transponder module and the cover are attached. The Transponder is connected to the Screw Terminal Board via ribbon cables, making the Transponder easily to disconnect without the need to disturb the interface cables. This feature makes it very easy to interchange Transponders, keeping repair time to a minimum.

Installation of the Transponder is made as easy as possible, as interface cables can be connected directly to the built in Screw Terminal Board. The keyholes in the back plate make it simple to attach the Transponder to a bulkhead.



Display

The display unit (VDU) can be tabletop or bulkhead mounted. The necessary brackets for mounting are included and are very easy to use. A single cable connects the VDU to the Transponder unit.

Note: SOLAS requirements specify this equipment as Minimum Keyboard and Display (MKD). Because all keyboard functions are implemented through the touch screen, it is more logical to use the term VDU (Visual Display Unit); this terminology is used throughout this manual.



3 - Mechanical Mounting options and guidelines

Location

The Transponder unit may be mounted in any convenient location. However, it is classed as protected equipment and thus should be located inside in a dry environment. Normally the transponder is located in the Radio Room. The transponder compass safe distance is 2.3m.

The VDU (MKD) should be available to the mariner at the position from which the ship is normally operated. The VDU compass safe distance is 0.6m.

The Pilot Plug should be installed on the bridge near the pilot's operating position.

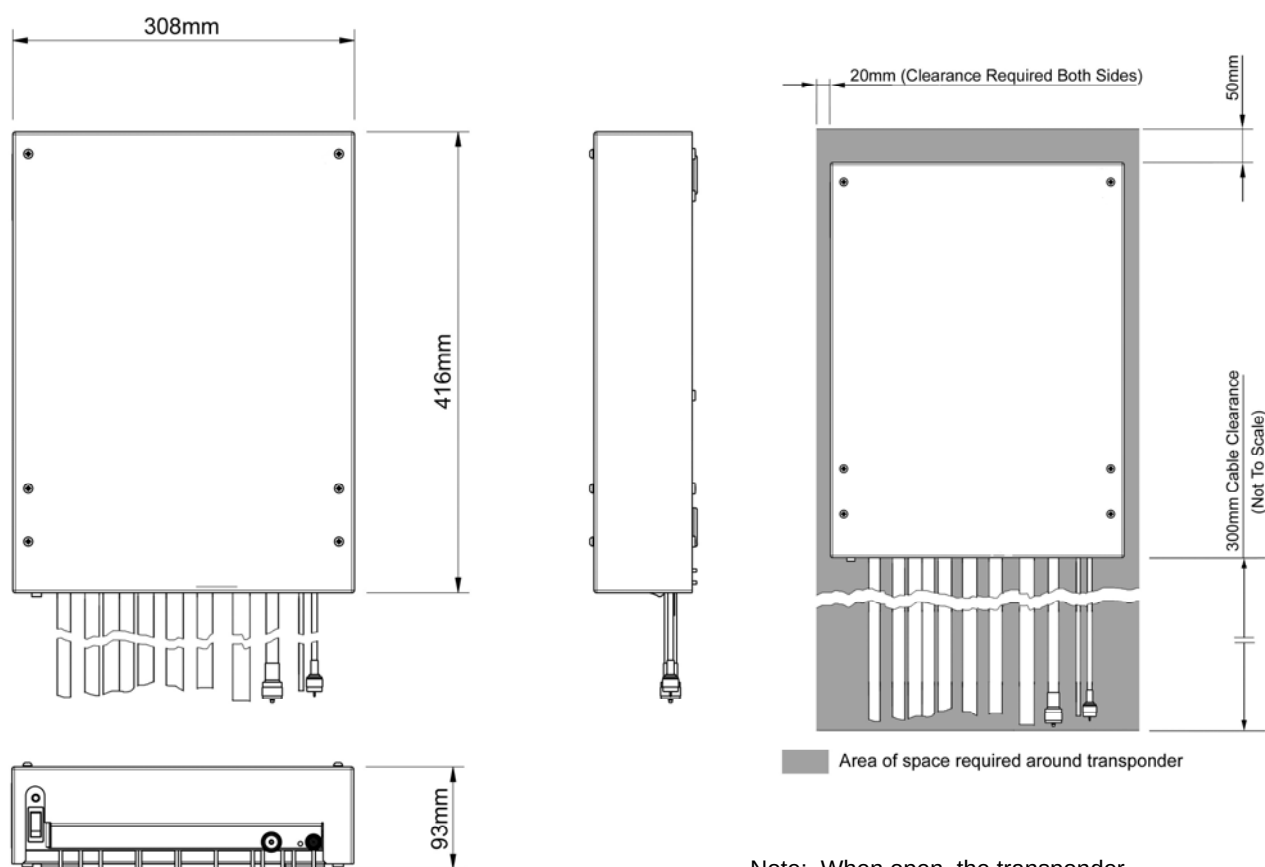
Special considerations apply to antennas. These are outlined in the appropriate section; for detailed advice, see the IMO Guidelines.

UAIS Transponder unit

The Transponder is attached to the bulkhead by four M6 screws. Keyhole slots in the Transponder allow the screws to be inserted in the bulkhead, then the Transponder to be mounted on the screws and to be self-supporting while the screws are tightened.

It is recommended to leave at least 300 mm free space below the Transponder to allow for connection cables, as shown below right.

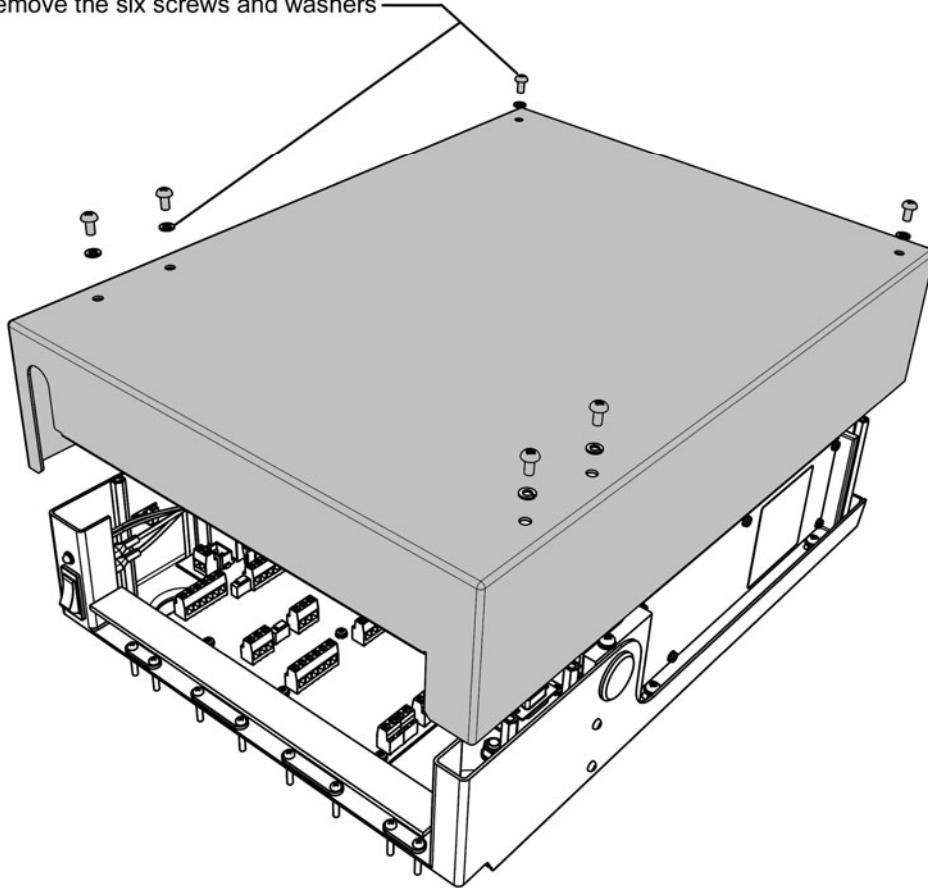
Transponder main dimensions



Note: When open, the transponder chassis projects 350mm from the mounting surface

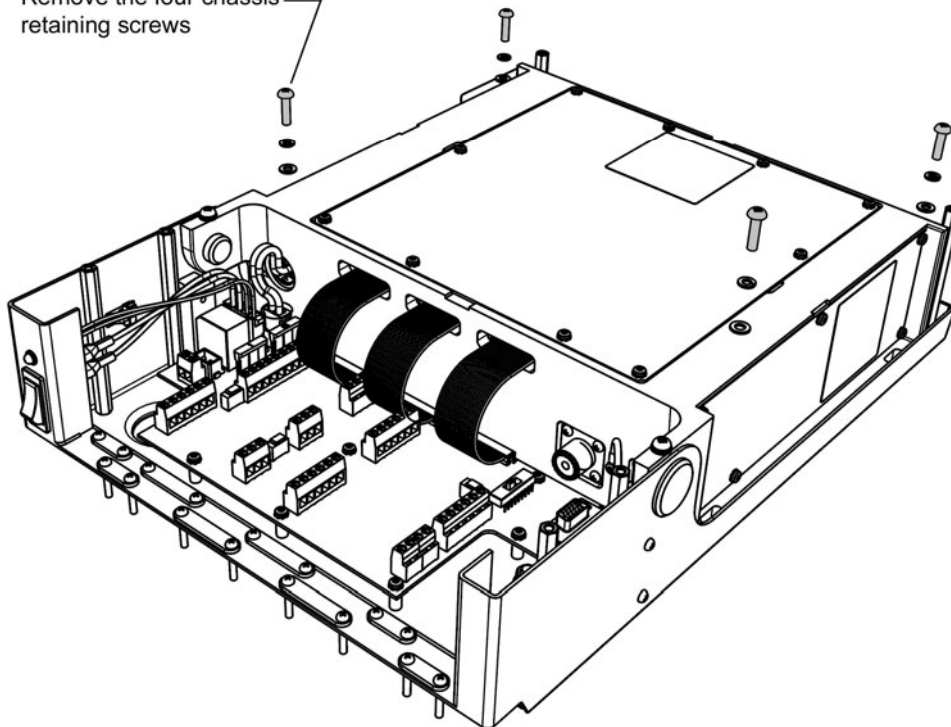
1.

Remove the six screws and washers

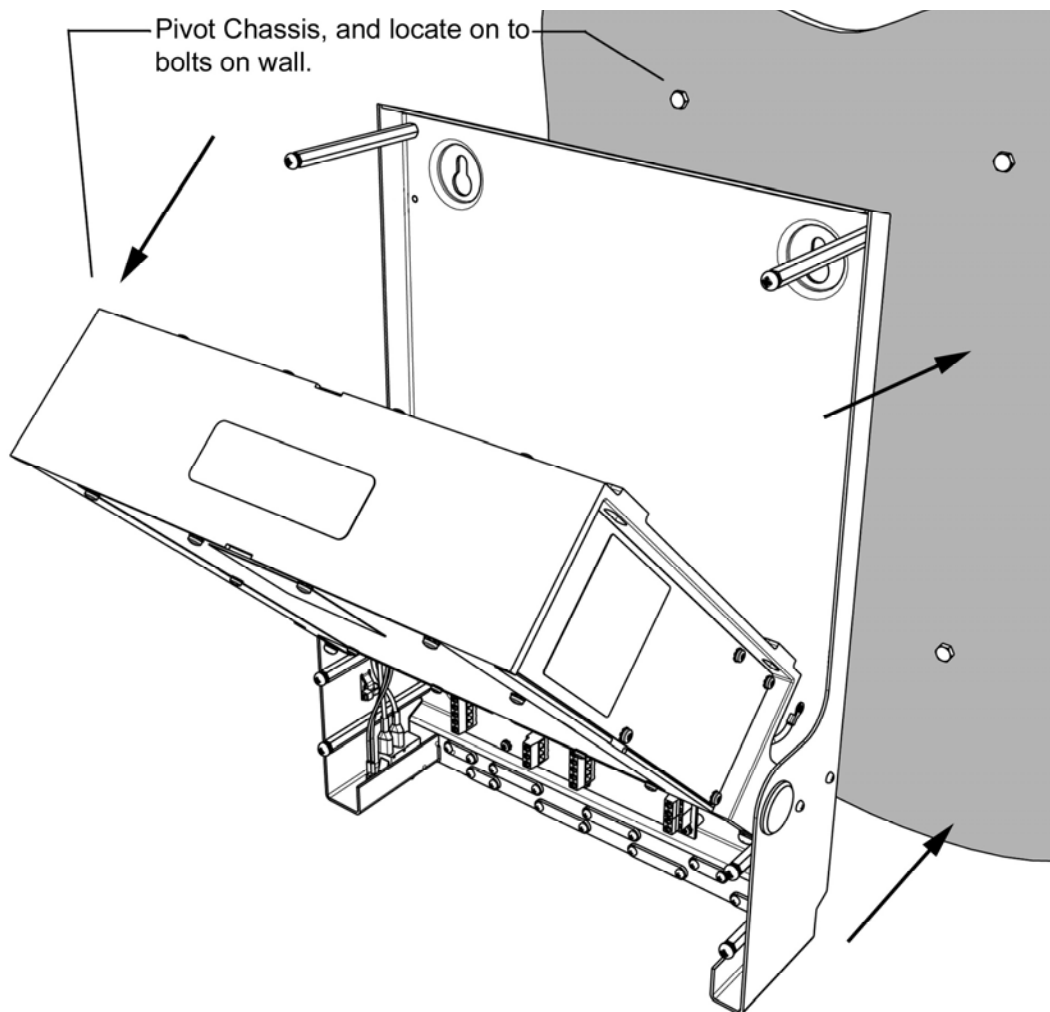


2.

Remove the four chassis retaining screws



3.



Drilling drawing

Select hole size to suit method of fixing mountings – clear or tapped holes.

