



Saturn Bm Marine
Class 2

Installation Manual

Safety Warnings, Cautions and Warranty

General

To avoid interference, do not run cables parallel to AC wiring, or near fluorescent lights or other high magnetic fields. Interference from this kind of sources causing equipment to be faulty or fail working properly will automatically void warranty conditions.

Access to the interior of the equipment shall be made only by a Nera qualified technician.

The equipment shall be installed by a NERA SatCom approved Installation & Service Agent.

Warranty is not valid until the "Nera Satcom AS Warranty Certificate" (at the back of the Registration and Warranty Certificate booklet enclosed with the equipment) is signed and returned to Nera SatCom.

Grounding

Grounded AC power socket shall be installed near the equipment and shall be easily accessible. Connection to all type of equipment meant for operation of the unit must be done while the unit is powered off.

Cables and connections

Cables must be shielded. The shield must be grounded at both ends. All peripheral equipment must be grounded.

Cable lengths exceeding those specified for the equipment interface and connectors, will automatically void warranty conditions.

– Telephone	150 m	0.5 mm ² min
– ASD	15 m	0.5 mm ² min
– HSD	1.5 m	0.5 mm ² min
– Telex	15 m	0.5 mm ² min

Cable lengths beyond their maximum require special arrangements, cable extenders, short haul modems etc.

Connection of two (2) Telephone Instruments in parallel is not acceptable.

Configuration of incoming calls to more than four (4) Telephone Instruments may defect the equipment. Be aware that ports configured for telefax service can not be used for telephone (voice).

Power supply

Power supply voltage specification: 220 VAC \pm 10%, 50 – 60 Hz.

Operation from 110 VAC is possible with optional transformer.

Operation from 12 – 28 VDC is also possible.

It is strongly recommended that a 24 VDC source of energy is connected to the 220 VAC/28 VDC Power Supply.

Equipment ventilation

To ensure adequate cooling of MCU and Power Supply a 10 cm unobstructed space must be maintained around all sides of the units (except the bottom side).

Ambient temperature range: 0 – 45 °C.

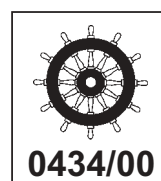
When installed inside rack or locker, the ambient temperature for the MCU shall not exceed 30° C.

Failure to comply with the above rules for installation will automatically void the warranty.

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A MEMBER OF CIRM



SYSTEM

Below Decks Equipment – BDE	4
Above Decks Equipment – ADE	5

PLANNING

Placing the Antenna	6
Designing the Antenna mast	8
Outline dimensions of Antenna radome	9
Physical characteristics of main units	10
Example of BDE Installation	13
Example of Saturn Bm installation	14
Placing the Main Control Unit (MCU)	15
Placing the Distress Alarm and the Message Indicator	15
Placing the telephone(s)	15
Placing the telefax (option)	16
Placing the PC & Printer (telex, option)	16
Placing the DTE Equipment	16
Requirements relating to GMDSS power supply	16
Grounding considerations	17
Recommended location of units	18
Laying cables	19

INSTALLATION

Unpacking	20
Installing the Above Decks Equipment (ADE)	20
Mounting the Main Control Unit (MCU)	21
Display Handset	22
Handset cradle/holder	22
ADE – Connecting the coaxial cable to the Antenna	23
BDE – Connecting the coaxial cable to the MCU	23
Telephones	24
Telephone and/or telefax socket (option)	24
Gyro	25
NMEA-0183 input sources	26
PC (telex)	26
Printer	27
PC (data)	27
Distress Alarm Unit	28
Message Indicator Unit	29
Example of local or near-by installation	30
Example of remote installation	31
Interconnection diagrams for termination/connection boxes	32
Location and grounding of units, example 1	33
Location and grounding of units, example 2	34
Location and grounding of units, example 3	35
Connecting up Below Decks Equipment	36
Connecting up Above Decks Equipment	37

POWER SUPPLY

Power Supply connected to MCU	38
Power Supply connected to telex and printer	39

APPENDIX 1 – 4

Mounting connector type 11N-50-10-4	40
Mounting connector type 11N-50-12-10	41
Mounting connector type 11N-50-23-10	42
Mounting connector type 11N-50-32-2/11N-50-42-2	43

APPENDIX 5

Main items	44
------------------	----

APPENDIX 6

9 pin-to-25 pin RS 232 cable	46
9 pin-to-9 pin RS 232 cable	46
Centronics cable	46

APPENDIX 7

Printer switch settings	47
-------------------------------	----

APPENDIX 8

Reception of L-band Broadcast signals	48
---	----

APPENDIX 9

Activation of "Radio Silence"	49
-------------------------------------	----

APPENDIX 10

Rotary Joint mounting instruction	50
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APPENDIX 11

Azimuth angle map	54
Elevation angle map	54

Below Decks Equipment – BDE

Main Control Unit

The **Saturn Bm Main Control Unit (MCU)** – which constitutes the major electronic part – is designed for wall or desktop installation. The MCU supplies 28 VDC power to the ADE through the coaxial cable. The MCU power requirement is 200 W at 11 - 34 VDC (12 V or 24 VDC nominal): - *standby* 3.5 A, *high power* 6.7 A, *medium power* 6.1 A and *low power* 5.3 A.

Display Handset

The **Display Handset** keypad and built-in display allow dialling and control of the MCU and antenna.

Distress Alarm

The **Distress Alarm Unit** provides remote activation of an alert transmission and indication of incoming distress calls.

Power Supply

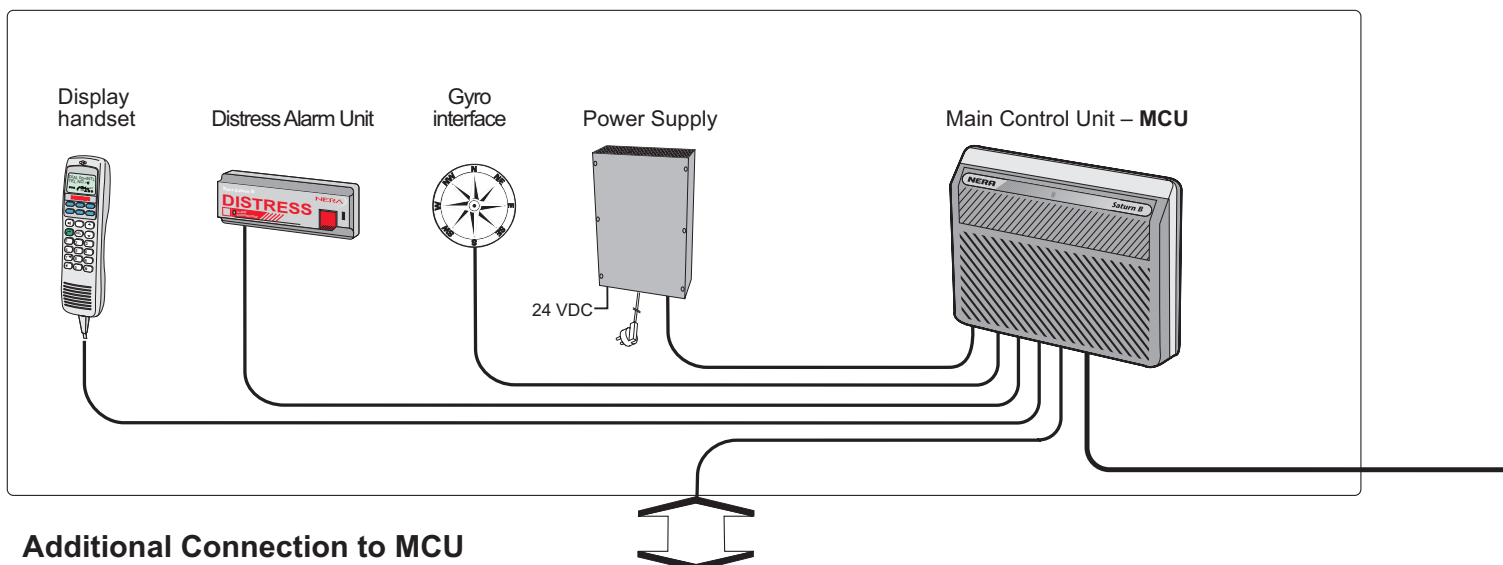
The AC/DC Power Supply is designed for 220 VAC (110 VAC by strapping) and 24 VDC inputs, and provides 28 VDC output.

24 VDC input from battery is recommended to prevent mains drop problems.

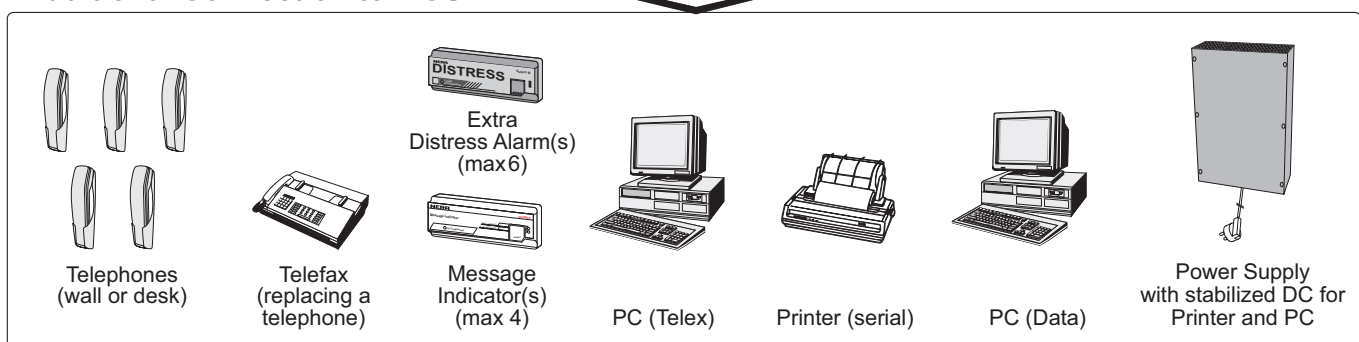
Options

- DTMF telephones (max 5)
- Telefax (replacing one of the DTMF telephones)
- Message Indicator, activated on reception of telex, telefax or data traffic
- PC (Telex)
- PC (Data)
- Serial printer

Standard Connection



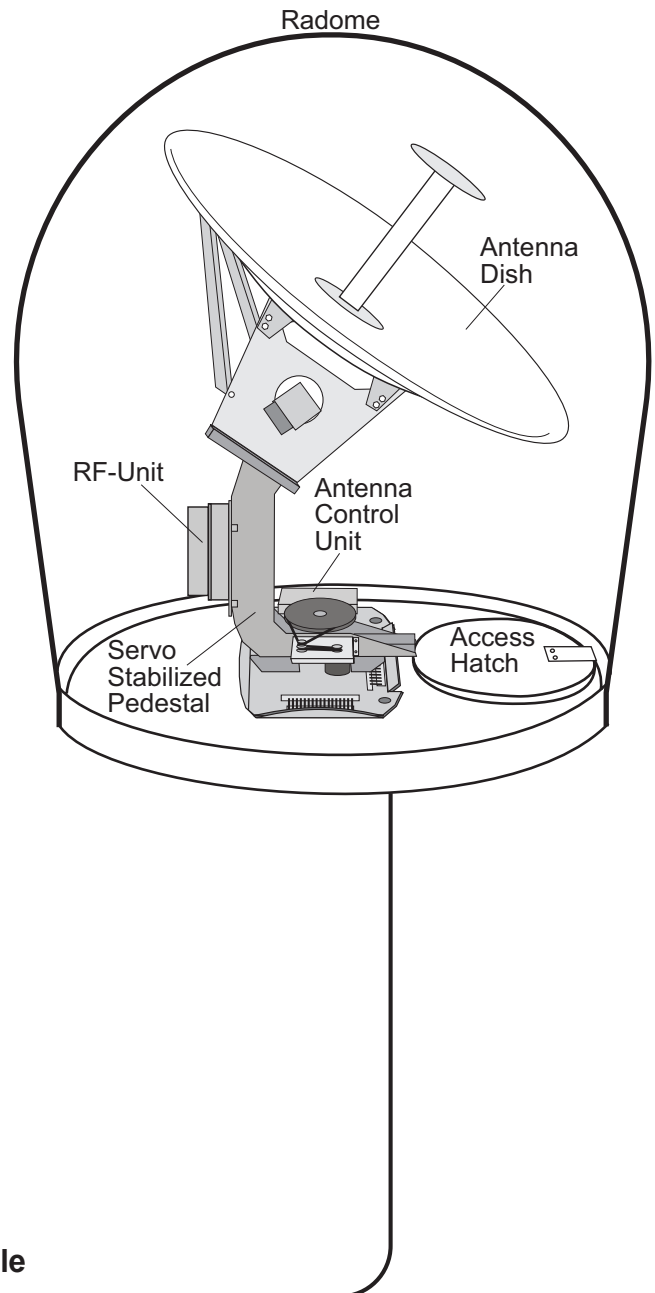
Additional Connection to MCU



Above Decks Equipment – ADE

The Saturn Bm Mk2 Above Decks Equipment consists of:

- *Stabilized Antenna with RF-Unit and Antenna Control Unit (ACU)*
- *Radome*



Placing the Antenna

Avoiding obstructions

For GMDSS installations

If the installation shall comply with GMDSS in accordance with the international standard IEC 61097-10, please note as follows:

It is desirable that the antenna be sited in such a position that no obstacle likely to significantly degrade the performance of the equipment appears in any azimuth down to an *elevation angle of -5 degrees*.

The siting of the antenna needs careful consideration, taking into account the adverse effect of high levels of vibration which may be introduced by the use of a tall mast and the need to minimise shadow sectors. Objects, especially those within 10 m of the radome which cause a shadow sector of more than 6 degrees, are likely to significantly degrade the performance of the equipment.

For non-GMDSS installations

The antenna has a beamwidth of 10 degrees and ideally requires a free line of sight in all directions above an *elevation angle of +5 degrees*.

Any obstruction will cause blind sectors, resulting in signal degradation or even loss of communication with the satellite.

Degradation of the satellite signal can only be completely avoided by placing the antenna higher than any obstructions. This is often not feasible and a compromise must be made to reduce the number of blind sectors and cost of installation.

The degree of signal degradation depends on the size of the obstructions; the distance to them must therefore be considered.

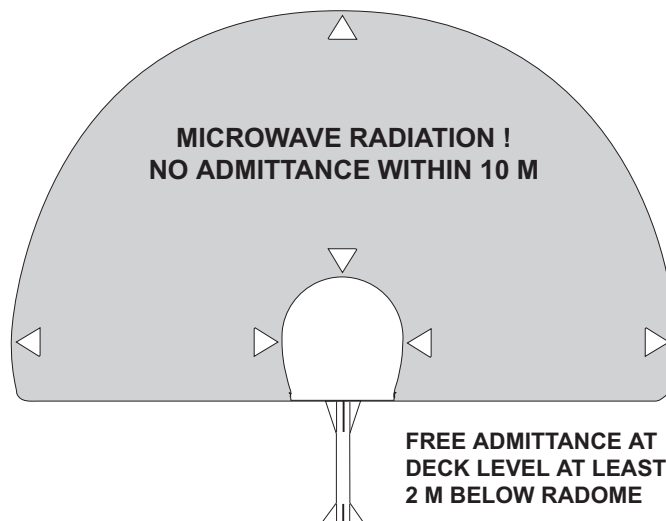
Preferably, all obstructions within 3 m of the antenna should be avoided. Obstructions less than 15 cm in diameter can be ignored beyond this distance.

Radiation precautions

Passengers should not be admitted in areas closer than 5 m from the antenna.

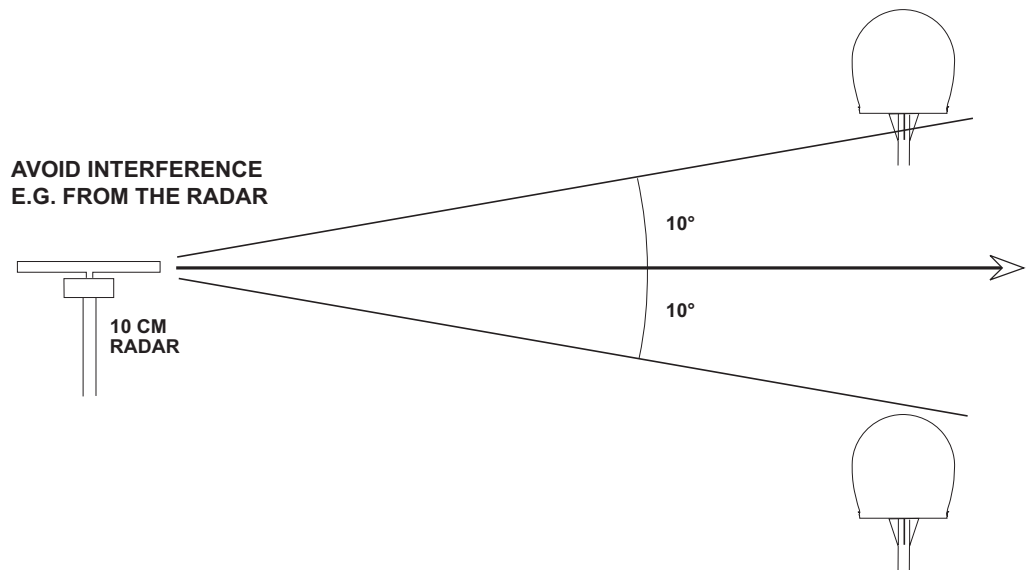
However, no restrictions are required when the antenna radome is installed at least 2 m above the highest point accessible to passengers.

Authorized personnel should not be near the antenna for periods of more than 1 hour per day without switching off the RF transmitter.



Avoiding interference

Do not locate the antenna close to interfering signal sources, or in such a position that the source (e.g. radar-antenna) radiates directly into the Saturn antenna.



The Above Decks Equipment (ADE) should be separated as far as possible from other transmitters, and preferably by at least 5 m from the antenna of other communication or navigation equipment, such as the antenna of the satellite navigator, the VHF antenna or radar equipment.

Compass safe distance

For installation on British or Norwegian vessels, the antenna should be located at a distance of at least 1.0 metres from the magnetic steering compass. Be aware that requirements may vary from one country to another.

Other precautions

Do not place the antenna close to the funnel, as smoke deposits will then eventually degrade antenna performance.

Regardless of the location chosen for the antenna, it should point forward in parallel with the ship's longitudinal axis when in the middle of its azimuth range, which will correspond to zero degrees on the azimuth indicator. The forward direction is indicated on the antenna radome with a heading mark

The antenna should be installed so that severe vibration and shock are avoided.

If installed on top of a signal and radar mast, the mast must be supported by stays.

The coaxial cable runs out from the antenna foot in the direction of the heading mark.

Designing the Antenna mast

The mast must be designed to carry the weight of the antenna unit, approximately 90 kg. It must be able to withstand wind forces of up to 120 knots on the radome as well as the onboard vibration levels. The radome is 1.445 m high and has a maximum diameter of 1.42 m.

The top end of the mast should be fitted with a flange with holes matching the bolts extending from the bottom of the radome. See figure below. The flange must not be so large as to interfere with the hatch at the bottom of the antenna unit. The holes through the mast flange must be positioned symmetrically about the ship's longitudinal axis.

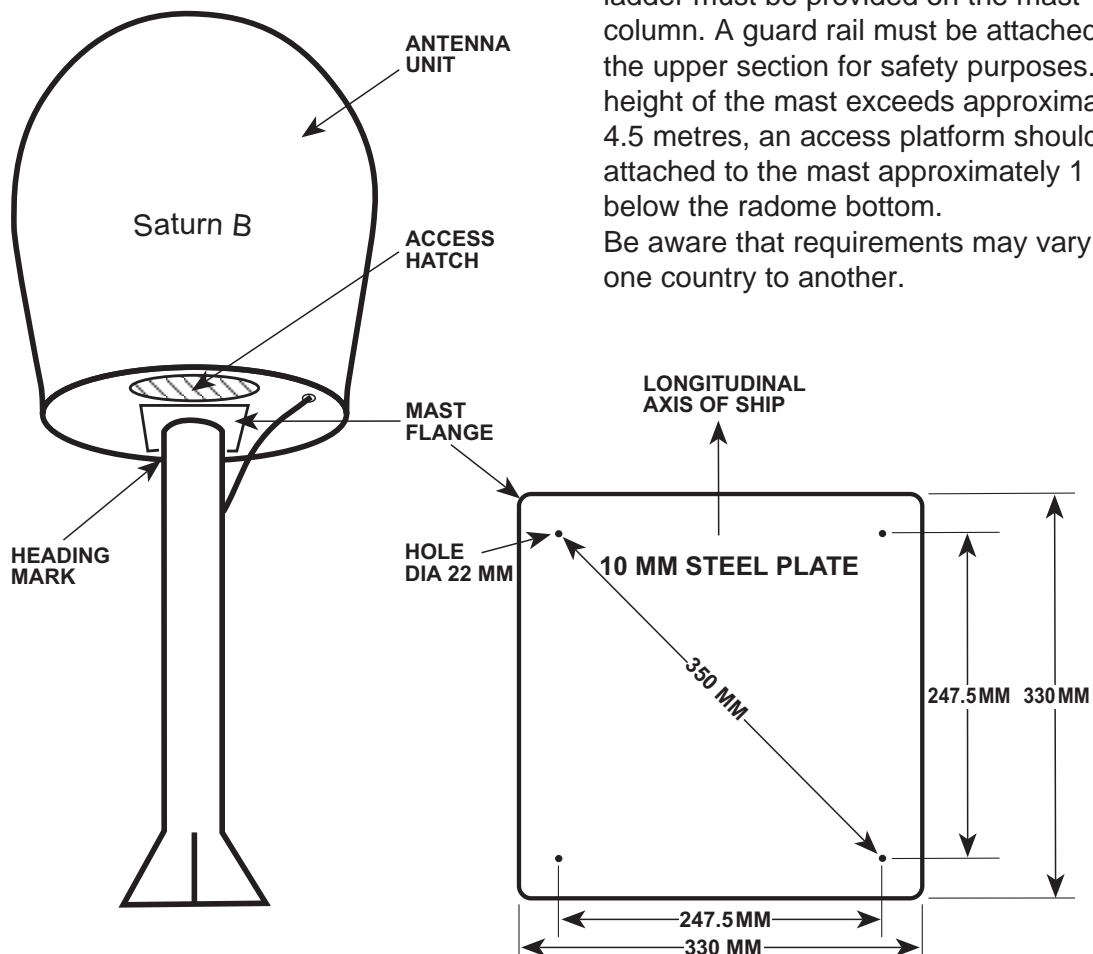
A **HEADING** mark on the radome indicates the forward direction of the antenna.

NOTE: *If necessary to disalign heading mark, (because of hatch accessibility), the antenna inside the radome has to be aligned towards ship's heading. This must be done before fixed to the antenna mast. (Pedestal coax outlet = Pedestal heading mark. (See Installation: "[Connecting up Above Decks Equipment](#)").*

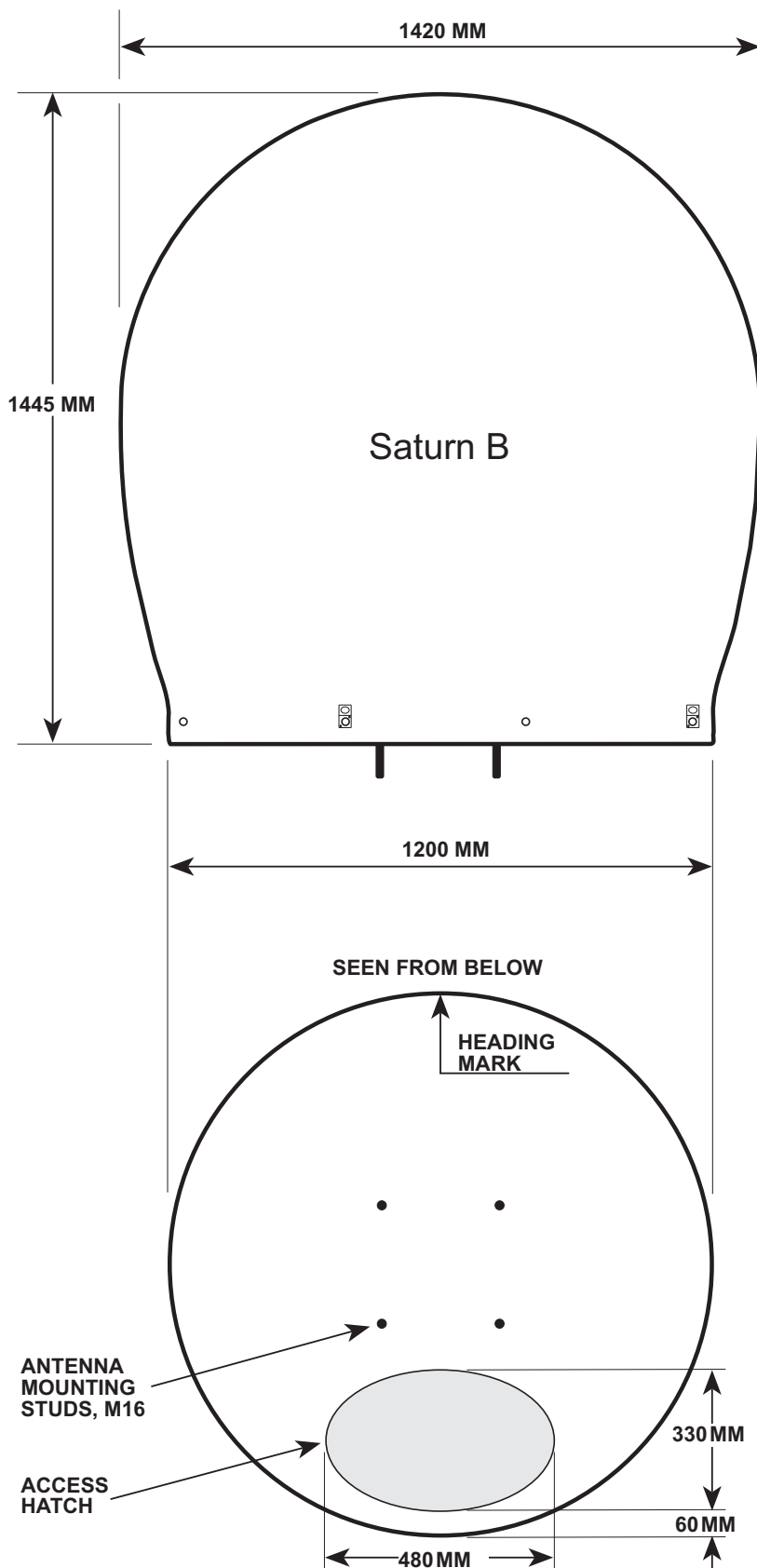
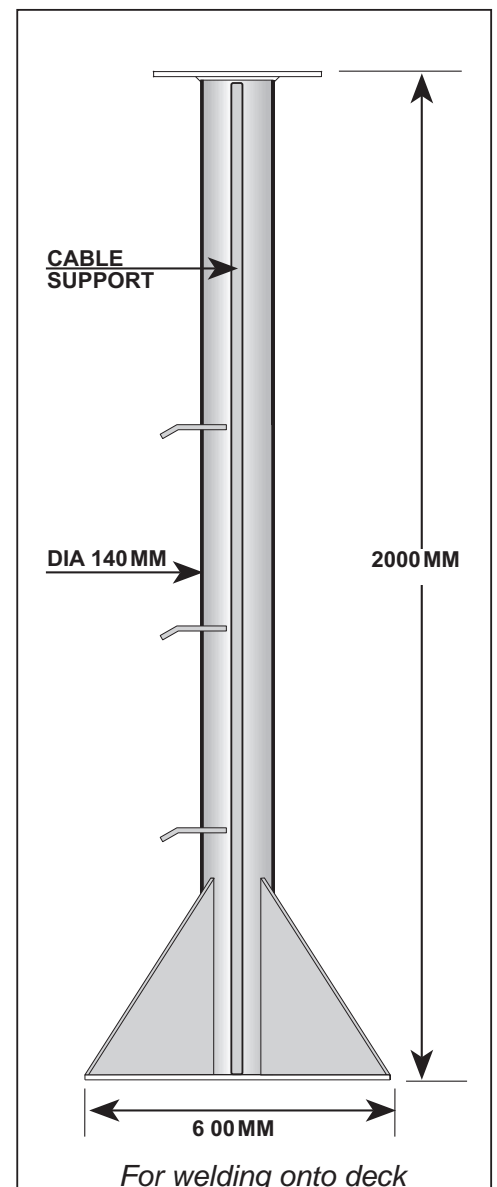
NOTE: *On ships with excessive vibration the mast must be supported by stays or other adequate means.*

If the height of the mast makes it necessary to climb up to the antenna unit, a ladder must be provided on the mast column. A guard rail must be attached to the upper section for safety purposes. If the height of the mast exceeds approximately 4.5 metres, an access platform should be attached to the mast approximately 1 metre below the radome bottom.

Be aware that requirements may vary from one country to another.



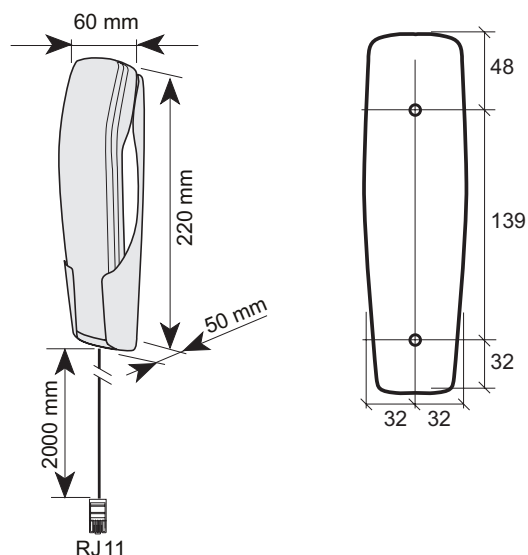
Antenna Unit mounted on mast

Outline dimensions of Antenna radome*Optional steel Antenna mast, R906569*

Physical characteristics of main units

Telephone (wall)

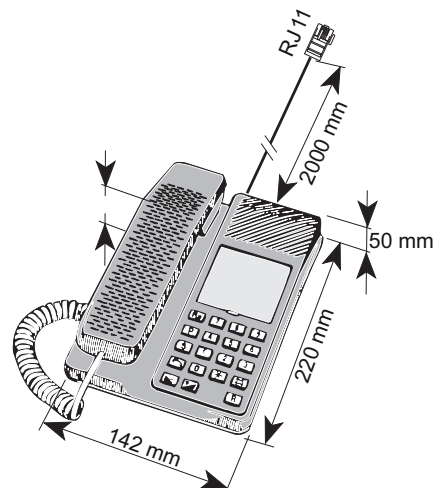
DBAR 104 001/888



Weight: 0.3 kg

Telephone (desk)

DBAR 201 010/496



Weight: 0.7 kg

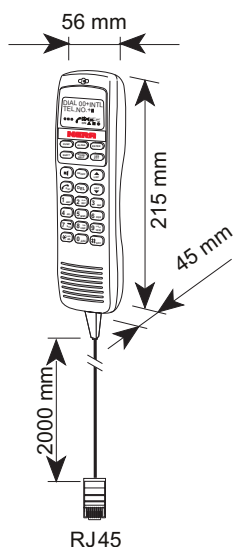
Display Handset

QDGS 911 903

Extension cable

3m: QRPM911 111-3000

10m: QRPM911 111-10000

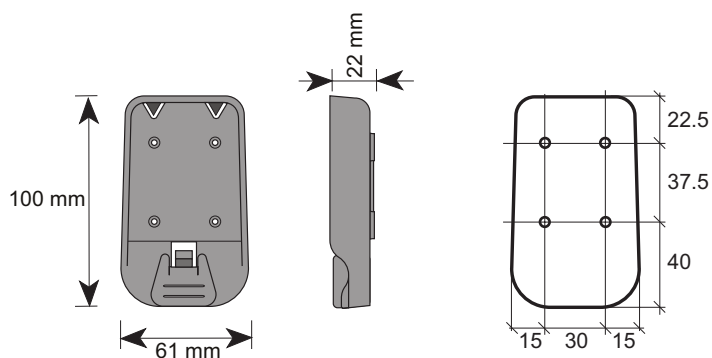


Weight: 0.3 kg

Handset cradle/holder

QSXA 911 394

(for Display Handset)

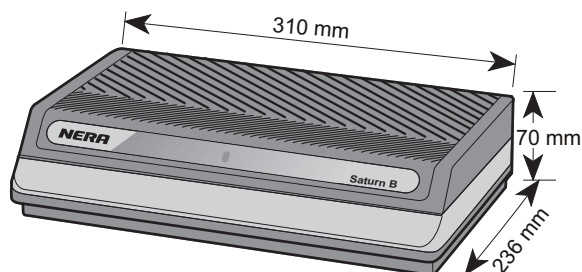


Weight: 0.06 kg

Physical characteristics of main units

Main Control Unit (MCU)

QUFC 911 901-2

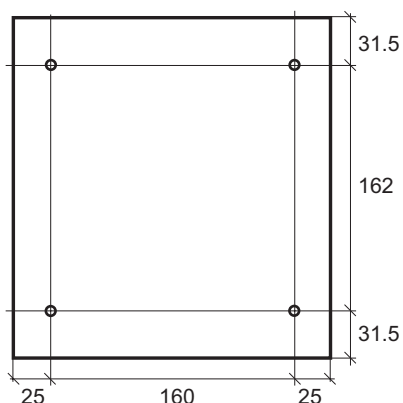
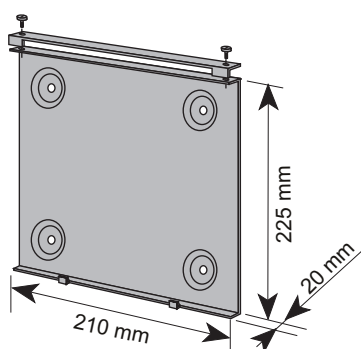


Weight: 4 kg

Mounting bracket for MCU

QSA 911 9004

(part of MCU)



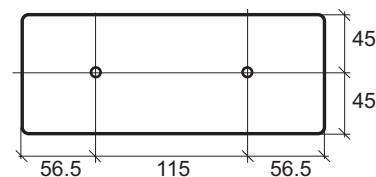
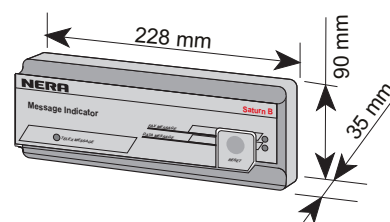
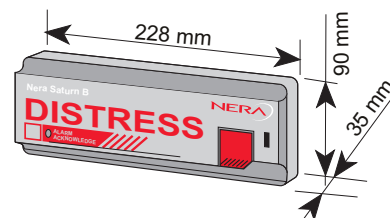
Weight: 0.6 kg

Distress Alarm Unit

QUFC 911 910/2

Message Indicator Unit

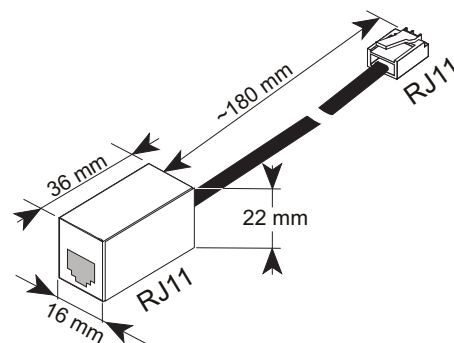
QUFC 911 910-3



Weight: 0.3 kg

Telefax adapter

QRPM 911 032

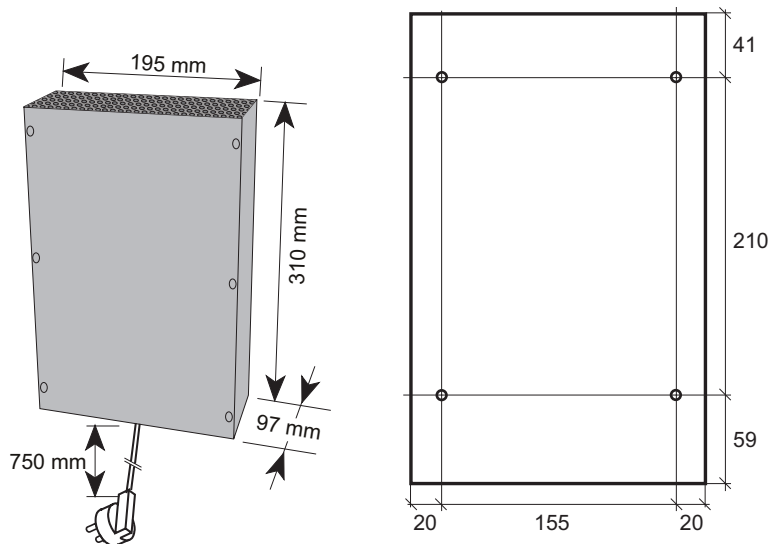


Weight: 0.015 kg

Physical characteristics of main units

Power Supply

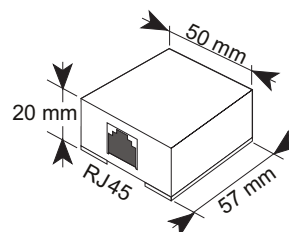
QUFC 911 903-2B



Weight: 4.1 kg

Telephone/telefax wall socket

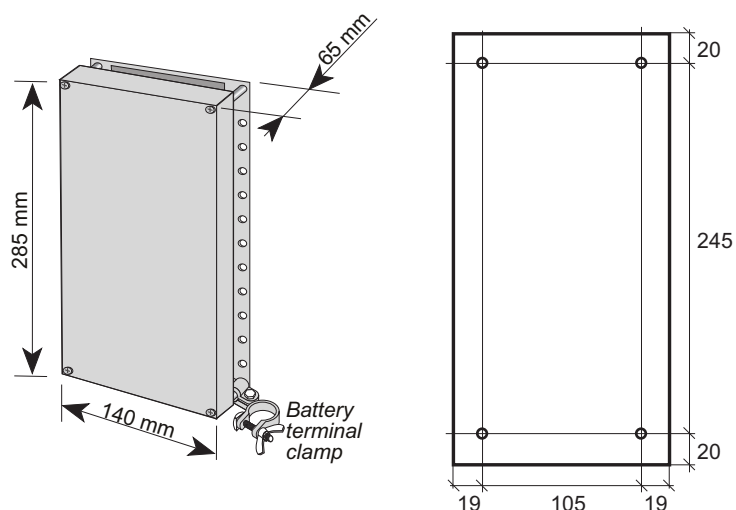
R 906 676/1



Weight: 0.04 kg

Termination Box

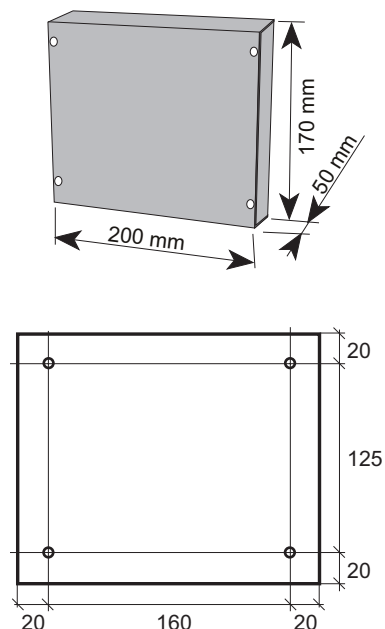
QUFC 911 948



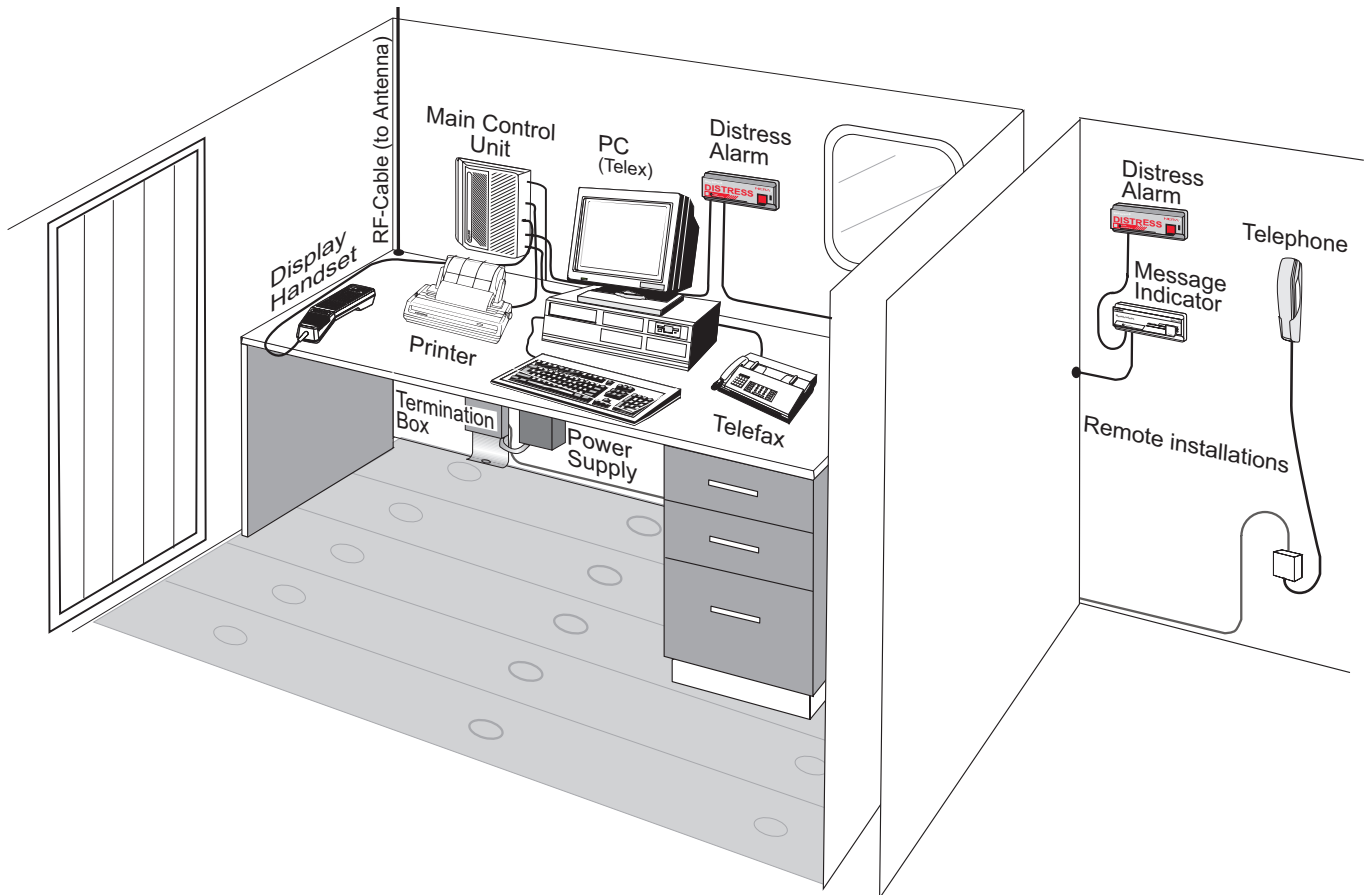
Weight w/terminal clamp: 0.81 kg

Connection Box

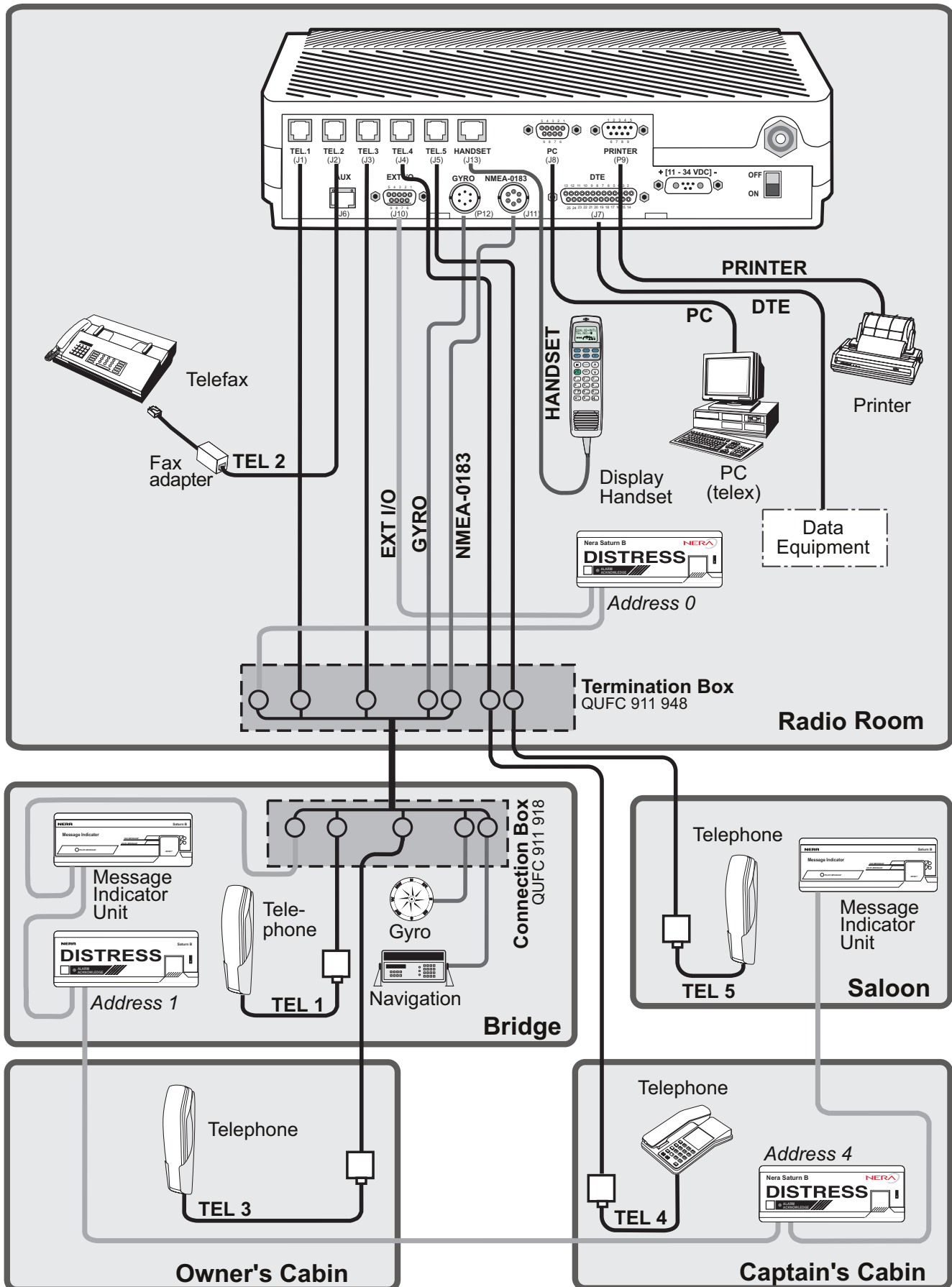
QUFC 911 918



Weight: 0.6 kg

Example of BDE installation

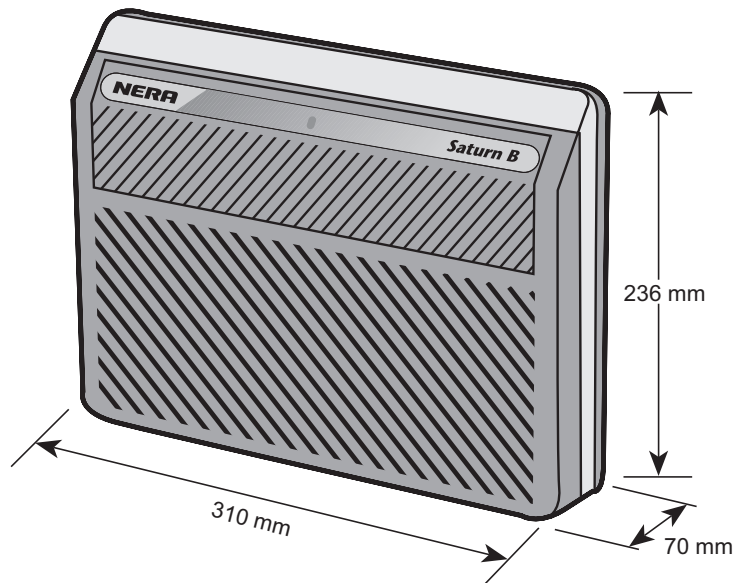
Example of Saturn Bm installation with Display Handset, telefax, 4 telephones, 3 Distress Alarm units, 2 Message Indicator units, PC (telex), printer and data equipment.



Placing the Main Control Unit (MCU)

The Main Control Unit should be placed in a ventilated area. To ensure adequate cooling of the MCU a 10 cm unobstructed space must be maintained around all sides of the unit. See also "[Recommended location of units](#)". Ambient temperature range 0° - 45° C.

The MCU is manufactured as a cabinet for wall or desktop installation with dimensions as shown. The cabinet is equipped with a mounting plate. Four holes through the mounting plate allows the unit to be secured to the wall.



Placing the Distress Alarm Unit and the Message Indicator Unit (option)

Up to six (6) Distress Alarm Units and four (4) Message Indicator Units may be connected in series.

The units may be installed anywhere onboard the vessel, but near a dedicated Telephone or PC Telex.

Max cable length: 100 m, 4x0.5 mm².



Placing the telephone(s)

Additional two-wire telephones can be installed anywhere onboard the vessel. Five separate telephone ports are available on the MCU.

Max. cable length 150 m, 0.5 mm² min.



Placing the telefax (option)

TEL2 is configured for telefax as default.
However, any of the telephone ports can be configured for telefax.

Max. cable length 150 m, 0.5 mm² min.

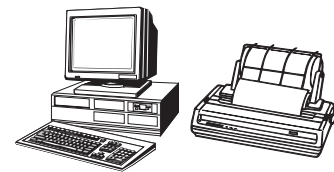
For connection directly to the MCU, use telephone cable with grounding tail, and employ fax adapter.



Placing the PC telex & serial printer (if equipped)

The PC Telex and Printer must be installed close to the Main Control Unit.

Max. cable length 15 m, 0.5 mm² min.



Placing the DTE equipment connected to the DTE port

The equipment must be installed as close as possible to the Main Control Unit.

Max. cable length 15 m, 0.5 mm² min. for ASD
1.5 m, 0.5 mm² min. for HSD



Requirements relating to GMDSS power supply

The ship earth station shall normally be powered from the ship's main source of electrical energy. In addition, it shall be possible to operate the ship earth station and all equipment necessary for its normal functioning, including the antenna tracking system, from an alternative source of energy.

Changing from one source of supply to another or any interruption up 60 secs of the supply of electrical energy shall not render the equipment inoperative or require the equipment to be manually re-initialized.

If provision is made for operating the equipment from more than one source of electrical energy, arrangements for rapidly changing from one source to the other shall be provided but not necessarily incorporated in the equipment.

Grounding considerations

A successful installation of a maritime satellite terminal must take into account the noisy environment in which the equipment shall operate.

Electrical noise

The electrical environment on board a ship is usually quite noisy. Powerful electrical installations cause voltage variations and transients, as well as low and high frequency noise. Radio and radar equipment radiate radio frequency signals which frequently impregnate cables on board with unwanted interference.

Ground plane

Most ships have a steel hull. One should think that the steel construction of the ship would constitute a good ground plane. This is often not quite true. Rust, other forms of corrosion, paint and grease, often prevent a good ground connection. A consequence of this is that high energy power distribution on board a ship can cause significant ground potential differences.

Antenna unit

Adequate grounding of the Antenna Unit depends on the fastening bolts making good contact with the top flange of the mast. This is obtained by removing paint and using enclosed toothed washers and nuts.

Antenna cable

The antenna coaxial cable normally has a solid or meshed metal screen which must be terminated to ground both at the antenna pedestal and at the MCU. The length of the cable can often be more than 40 metres. If the ground potential level at the two points differ, the current passing through the screen of the coaxial cable can be quite strong. The antenna cable screen constitutes a heavy gauge wire, which is capable of conducting large amounts of current.

If the ground lead from the MCU to the ship's ground is of lighter gauge, the MCU will be raised to a different ground potential.

Nera recommends that the antenna cable screen be clamped to ground at the ship's deck in such a way that the screen passes through the grounded clamp before the coaxial cable is terminated locally. This will confine any noise current caused by potential difference to the cable screen. This method is far superior to grounding the shield using "pig tail" ground jumpers. This principle of using shielded cables where the shields are clamped to ground should be employed as far as possible to all cables connected to the Saturn satellite terminal.

Below Decks Equipment

The MCU must be provided with a good electrical connection to the ship's hull for grounding. This is obtained by using *Termination Box QUFC 911 948* as a common grounding point for MCU, external Power Supply and Antenna Cable. (See *Installation: "Location and grounding of units: Example 1, Example 2 and Example 3"*.) Length of copper foil/3 cm should not exceed 30 cm. Length of copper foil/10 cm should not exceed 300 cm. The foil/10 cm should be connected to ship's hull (deck or roof) by hard-soldering (or screws) to steel.

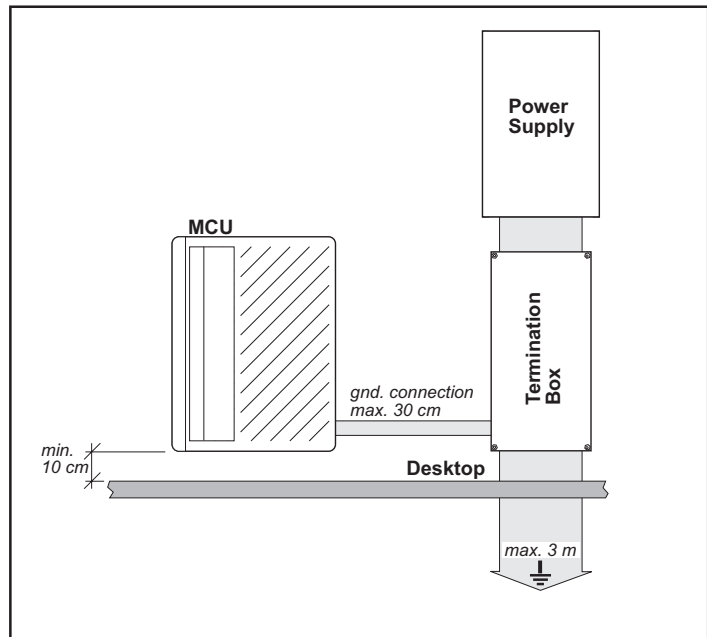
Mains power/ground

Mains ground is secured to the common grounding point through the external Power Supply. It is therefore important to use the same mains branch for additional equipment connected to the MCU (Fax, PC, Printer etc.).

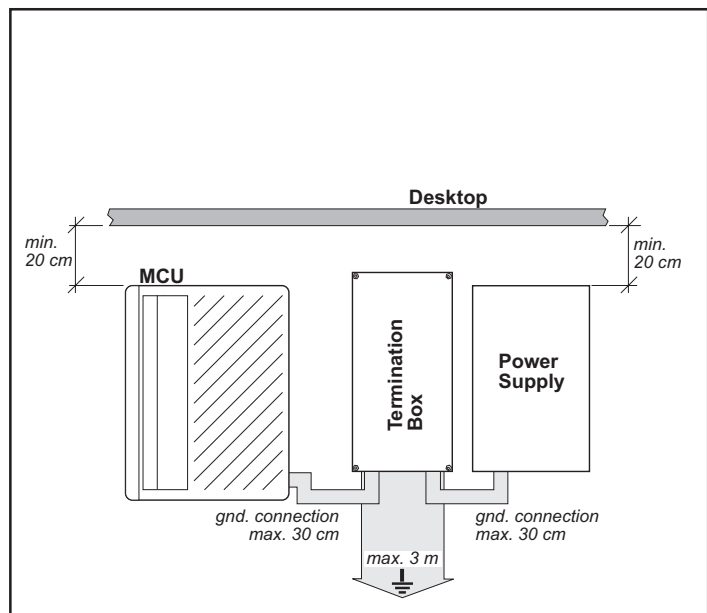
Recommended location of units

Location of Below Decks Units for best possible grounding

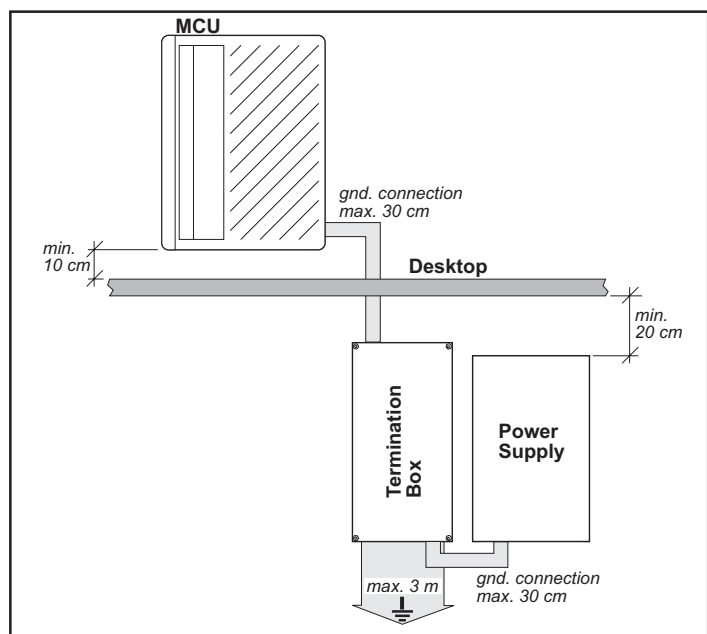
Example 1
see also INSTALLATION:
"Location and grounding of units, example 1".



Example 2
see also INSTALLATION:
"Location and grounding of units, example 2".



Example 3
see also INSTALLATION:
"Location and grounding of units, example 3".



Laying cables

General

The coaxial cable for connection between the MCU and the Antenna Unit should, if possible, be laid before the equipment arrives. Make sure sufficient length of cable is ordered.

Where exposed to mechanical wear (on deck, through bulkheads etc.), the cable should be protected by steel pipes. Standard procedures should otherwise be followed for cabling in ship installations.

Special attention to existing safety regulations is required if the cable passes through zones where there may be flammable or explosive gases. Use suitable gasproof cable glands or bushings.

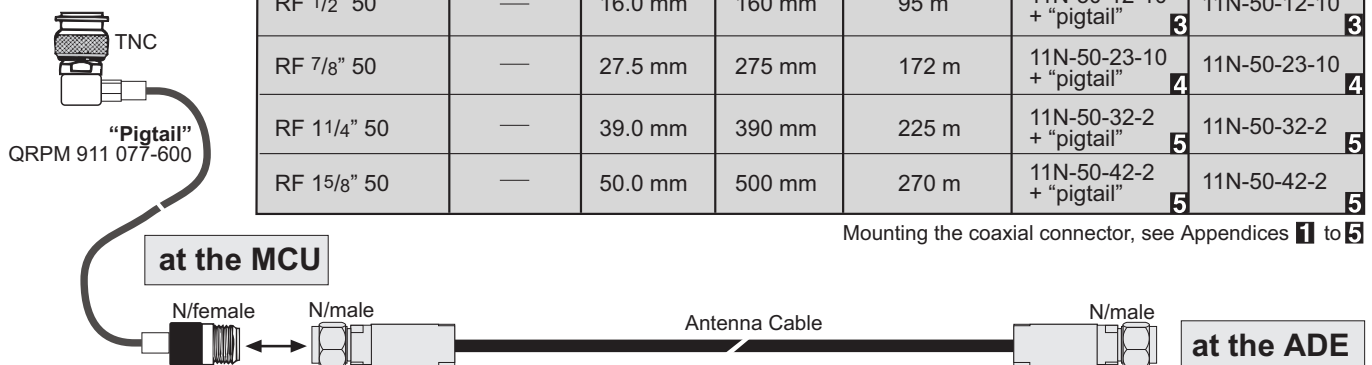
Double screen 50 Ω coaxial cable must be used. The maximum length of the coaxial cable is limited by the DC and RF loss through the cable:

Maximum DC loss: R loop 0.6 ohm
Maximum RF attenuation at 1525-1660 MHz: < 10 dB

The table below lists suitable double screened coaxial cables between MCU and ADE:

Antenna cable	Reference	Diameter	Bending radius	max. length for 10dB/0.6	Suitable coaxial connectors	
					at the MCU	at the ADE
RG214	MIL-C-17	10.8 mm	108 mm	25 m	11N-50-7-5 + "pigtail" 1	11N-50-7-5 1
S 10172 B-11 (QTZC 502 012)	—	12.9 mm	129 mm	75 m	11N-50-10-4 + "pigtail" 2	11N-50-10-4 2
RF 1/2" 50	—	16.0 mm	160 mm	95 m	11N-50-12-10 + "pigtail" 3	11N-50-12-10 3
RF 7/8" 50	—	27.5 mm	275 mm	172 m	11N-50-23-10 + "pigtail" 4	11N-50-23-10 4
RF 1 1/4" 50	—	39.0 mm	390 mm	225 m	11N-50-32-2 + "pigtail" 5	11N-50-32-2 5
RF 1 5/8" 50	—	50.0 mm	500 mm	270 m	11N-50-42-2 + "pigtail" 5	11N-50-42-2 5

Mounting the coaxial connector, see Appendices **1** to **5**



At the Antenna Unit

A free end of approximately 1.5 m of the antenna cable above the radome bottom should be provided for connection to the coaxial connector in accordance with the installation instructions in "[Connecting up Above Decks Equipment](#)".

At the Main Control Unit

The coaxial cable from the Antenna Unit should be given a free end of approximately 0.5 m at the Termination Box location.

Distress Alarm Unit/ Message Indicator Unit

The prepared Distress Alarm / Message Indicator cable (2 m) with plug can be connected directly to a locally installed unit, or to the Termination Box for remote installation of unit(s). Provide remote cable with free ends of 0.5 m at both ends.

Telephone and/or telefax

Choose the position for the required wall sockets and lay the cables leaving a free end of 0.5 m. Also allow a free end of 0.5 m at the Termination Box.

At the gyro

The gyro cable is terminated at the Termination Box. Allow a free end of 0.5 m. The amount of free cable required at the gyro depends on type to be installed.

Unpacking

Open all boxes supplied and check the contents with the enclosed packing list. Inspect units and parts for possible transport damage.

Installing the Above Decks Equipment (ADE)

Preparations

The ADE heading is marked on the radome. As assembled at the factory, the access hatch is at the aft end. The horizontal orientation of the antenna inside the radome can be adjusted at the factory prior to dispatch, if so specified. The heading of the pedestal itself is where the coaxial cable runs out of the post.

Installation on the antenna mast

The ADE is furnished with lifting lugs attached to four of the eight bolts on the radome, see figure below.

Attach straps or slings to the lifting lugs and hook them on to the crane hook. (Note! Straps are not part of the delivery).

Remove the straps fastening the radome to the transport pallet. Carefully start lifting the ADE.

WARNING!

Personnel must not pass underneath the ADE during hoisting operations.

Place the neoprene gasket on top of the steel flange, or preferably threaded onto the radome bolts. Manoeuvre the ADE into position directly above the mast flange before lowering it almost down to the flange.

WARNING!

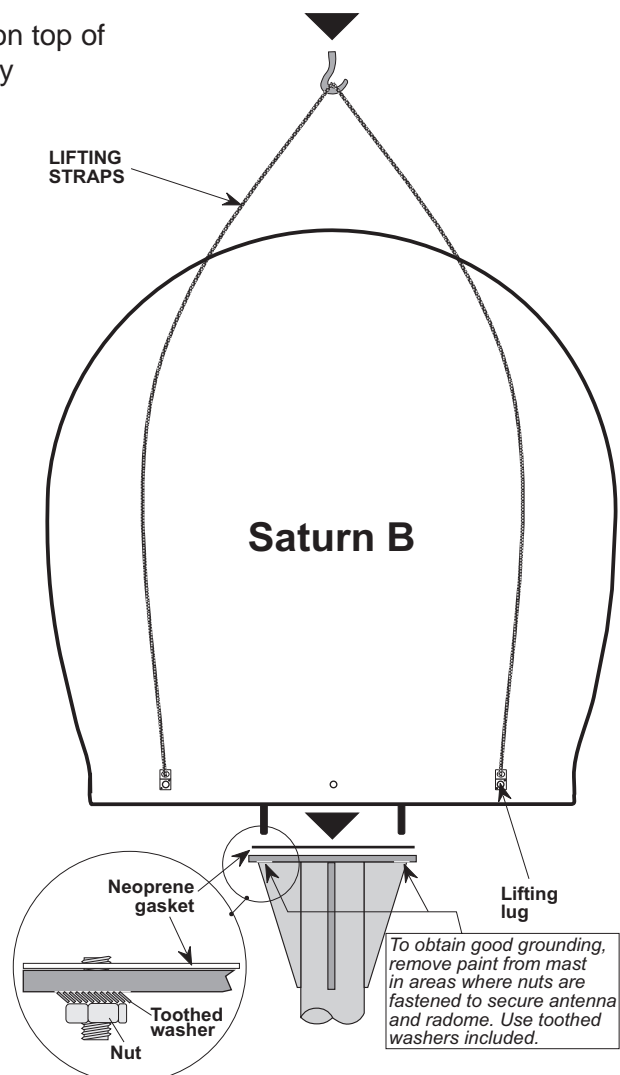
Watch your hands!

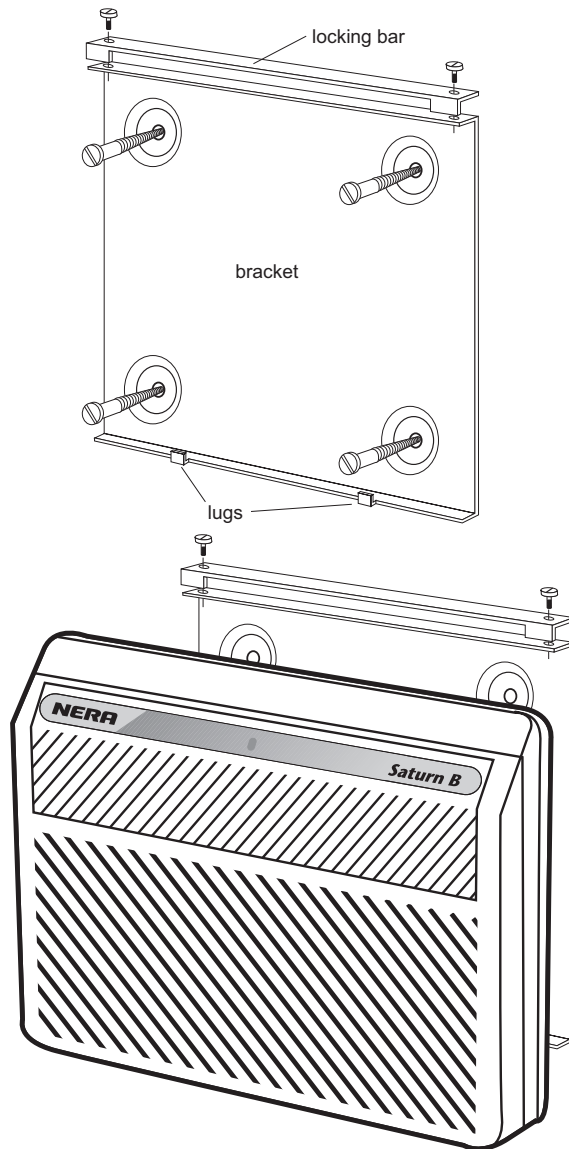
Install the ADE with the heading mark pointing forward.

Align the bolts extending down from the bottom with the holes through the mast flange, and lower the unit gently until it rests on the mast.

Secure the ADE to the mast flange using the enclosed toothed washers and nuts. Tighten the nuts applying a torque of 100 Nm.

Finally, remove the lifting straps and the straps retaining the antenna platform inside radome during transport.



Mounting the Main Control Unit (MCU)

Attach the bracket to the wall with four 6 mm wood screws or tapping screws.

Release locking bar.

Hook rear part of MCU base onto bracket. Be sure that the lugs enter the slots in the base.

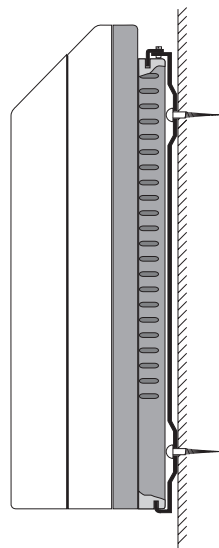
Press the MCU toward bracket and replace locking bar. Lugs on locking bar should enter slots in front of MCU base.

Tighten screws.

Attach label

NERA

Saturn B



Correctly mounted MCU.

NOTE!

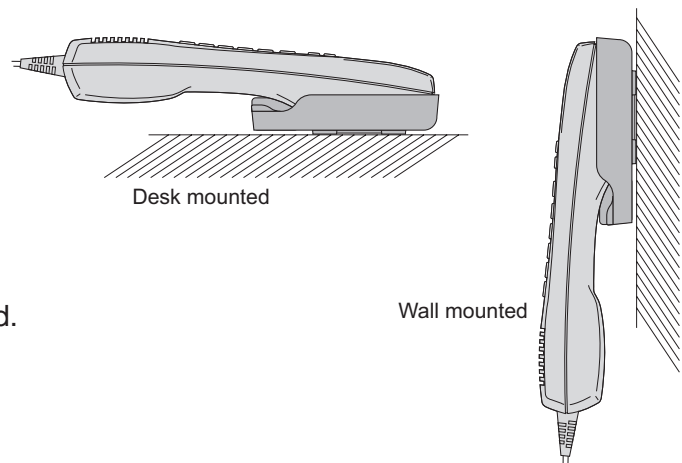
Secure the MCU on its bracket even when desk mounted. (Although desk mounting is not recommended.)

Display Handset

The Display Handset plugs into the **HANDSET** (J13) socket located on the rear panel of the MCU.
Note! It is not recommended to extend the handset cable with more than 6 m.

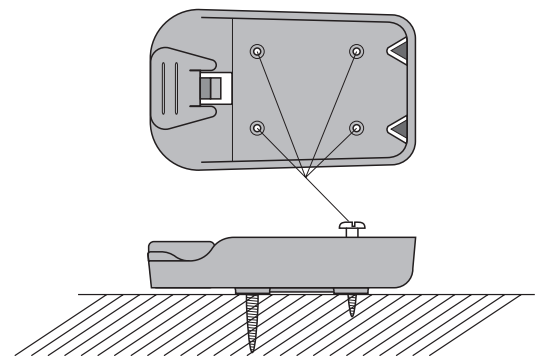


Handset holder

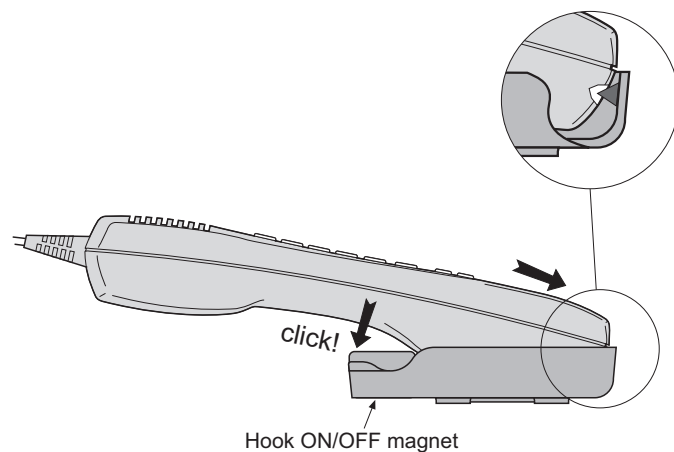


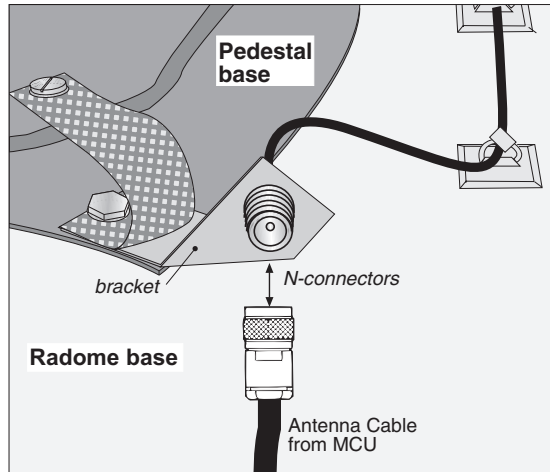
The handset may be desk mounted or wall mounted.

Attach the holder to the wall or desktop with four 4 mm wood screws or tapping screws.



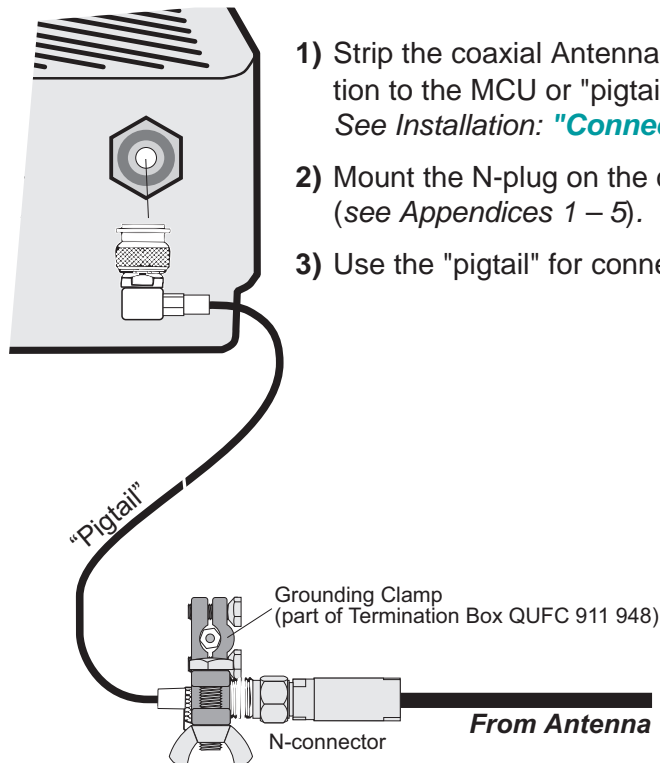
Place the Handset on the holder as shown.



ADE**Connecting the coaxial cable to the Antenna**

- 1) Strip the cable leaving a free end of approximately 1 metre, ensuring adequate slack for connection to the radome coaxial socket as shown in *Installation: "Connecting up Above Decks Equipment"*.
- 2) Mount the N-type connector to the coaxial cable in accordance with the instructions (see *Appendices 1 – 5*).
- 3) Connect the RF plug to the Antenna Unit coaxial connector as shown in fig.

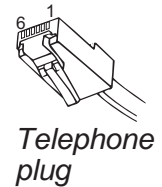
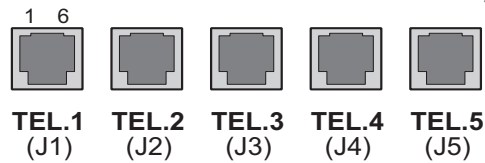
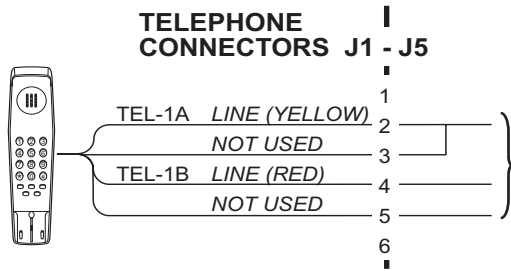
The minimum bending radius of the coaxial cable is 10 cable diameters.

BDE**Connecting the coaxial cable to the MCU**

- 1) Strip the coaxial Antenna Cable leaving sufficient slack for connection to the MCU or "pigtail".
See *Installation: "Connecting Up Below Decks Equipment"*.
- 2) Mount the N-plug on the cable in accordance with the instructions (see *Appendices 1 – 5*).
- 3) Use the "pigtail" for connection of the Antenna Cable to the MCU.

Telephones

The telephones are connected to the **TEL 1 to TEL 5** (J1 to J5) outlets located on the rear panel of the MCU. See *diagrams for pin configuration*.
Max. extension length: 150 m, min. 0.5 mm²

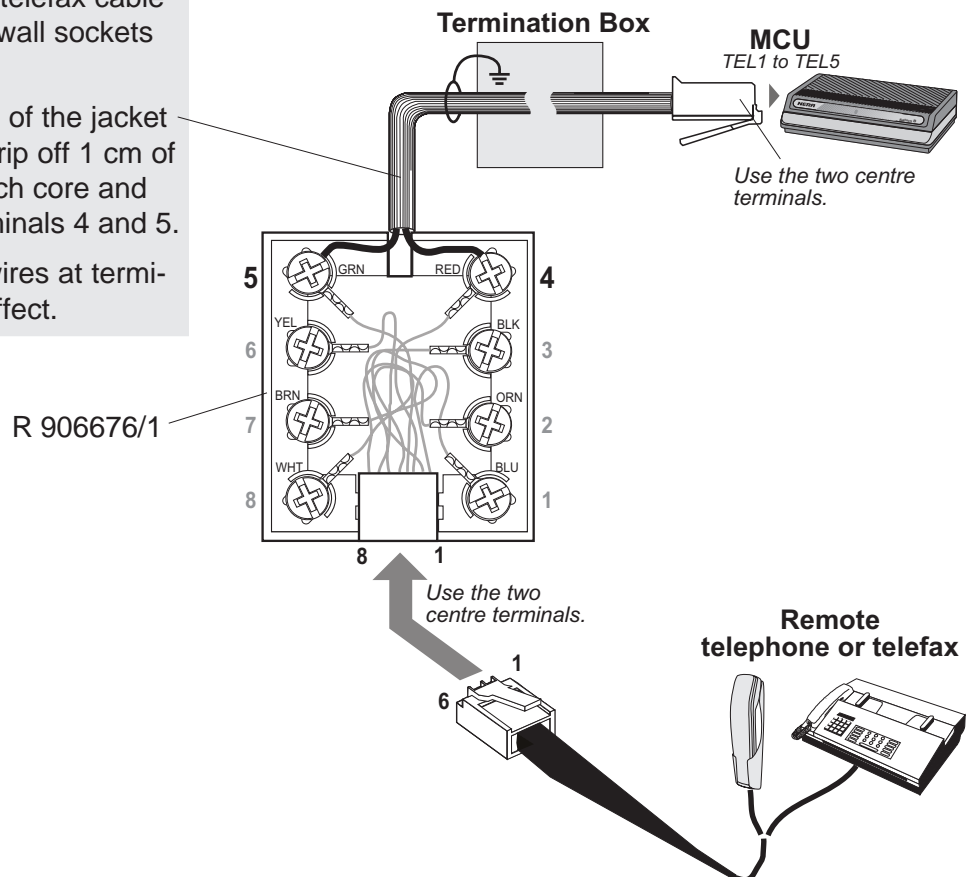


Telephone and/or telefax wall socket (option)

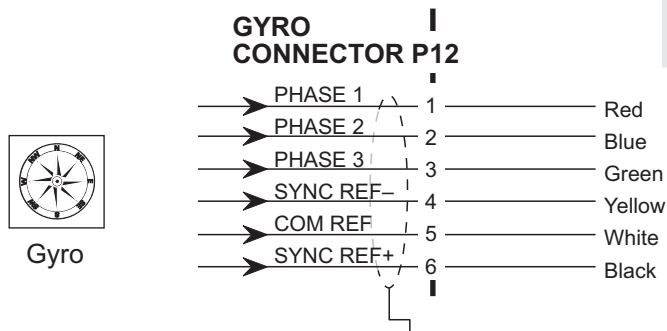
The telephone and/or telefax cable can be terminated in wall sockets as shown.

Remove approx. 3 cm of the jacket from the cable end, strip off 1 cm of the insulation from each core and connect to centre terminals 4 and 5.

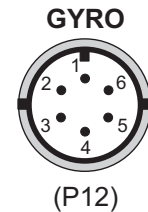
Interchanging of the wires at terminals 4 and 5 has no effect.



Gyro



The gyro is connected to the **GYRO** (P12) outlet located on the rear panel of the MCU. See diagram for pin configuration.



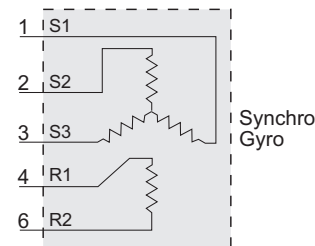
Chassis connector as seen from the rear of the MCU.

Recommended list of gyros
(other types of gyros may also be used).

REF	SYNCHRO GYRO TYPE	INPUT SIGNALS		RATIO
		R1 - R2	S1 - S2 - S3	
1	ANSCHUTZ NO.2, 3, 4, 5	50/60V AC	20/26V AC	360X
2	ARMA-BROWN	26V AC 115V AC 115V AC	11.8V AC 90V AC 90V AC	360X 180X
3	BROWN AOIP	115V AC	90V AC	180X
4	HOKUSHIN D-3 C-1 JR., D-1, CMZ-101 CMZ-103, IPS-2, IPS-3	110V AC 115V AC 115V AC	90V AC 90V AC 90V AC	360X 360X 360X
5	KURS4	110V AC	48V AC	
6	MICROTECNICA MB-12, MK-2	115V AC	90V AC	360X
7	PLATH NO. 55, C-1A, C-2 NO. C-14 NAVIGAT II, III, VII, VIII	50/60V AC 50/60V AC 50V +/-10%	22V AC 68V AC 68V AC	360X 360X 360X
8	SEA HAWK	115V AC	90V AC	
9	SIRIUS	110V AC	90V AC	
10	SPERRY MK-18, MK-19, MK-23 MK-27, MK-227	115V AC 115V AC	90V AC 90V AC	360X 360X
11	TOKIO KEIKI TG 2000	115V AC	90V AC	90X
12	USN	115V AC	90V AC	360X

Synchro gyro:

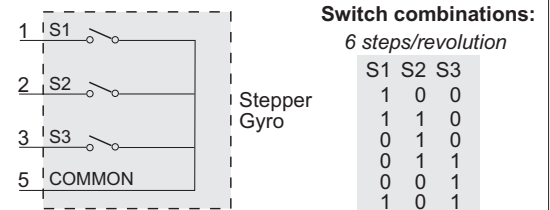
10 - 125V rms sinusoidal
50 - 400Hz



Stepper gyro:

5 - 150V rectified sine, 120 - 400Hz
or DC, 72 transitions per sec.

Signals may be positive or negative
referred to COM (return).



REF	STEPPER GYRO TYPE	INPUT SIGNALS		RATIO
		R2	S1 - S2 - S3	
1	ANSCHUTZ		35V DC	
2	ARMA-BROWN MK-1, MK-10 SERIE 1351, MOD-4 1		35V 35V 50V DC	180X 180X
3	ROBERTSON SKR-80		35V DC	180X
4	SPERRY MK-2 SR-120 SR-130, MK-14 MK-20 MK-37* MK-227		35V 35V DC 70V DC 35V DC 35V AC 35V	180X 180X 180X 180X 180X
5	TOKIO KEIKI ES-16, ES-17		70V DC	
6	TOKIO KEIKI 6000			

*3ea 1kohm pullup resistors required between common and each phase.

See Operator's Manual >
Chapter 3. Configuration: Compass Type

NMEA-0183 input sources (complies with IEC 61162-1)

The NMEA 0183 input is a 4 – 15 V current loop interface located on the rear panel of the MCU.

Data input format:

Baud rate 4800
Data bits 8 (D7=0), parity none
Stop bit 1

The Navigator input on pins 5 & 6 recognizes the following sentences:

Position:	Speed:	Course:
RMC	RMC	RMC
GGA	VTG	VTG
GLL		HDT
		HDG

The Heading input on pins 1 & 2 recognizes the following sentences:

HDT and HDG

The HDT syntax is: **\$—HDT,xxx.x,T*hh<CR><LF>**

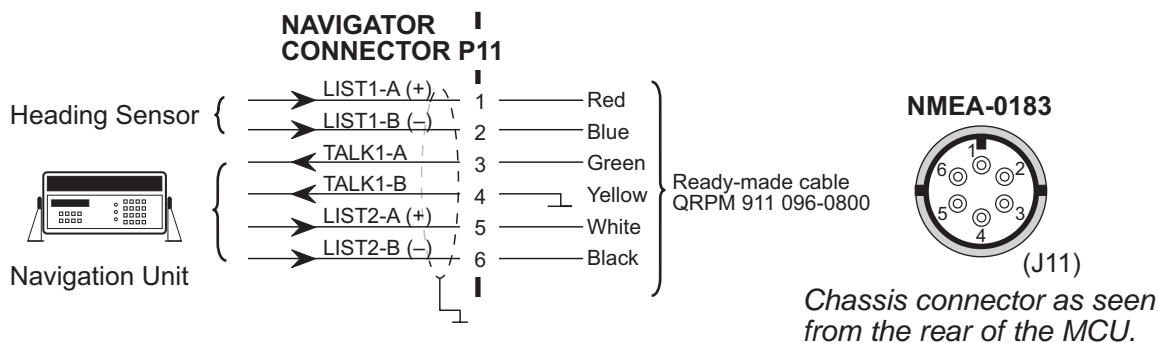
where **\$--** = start of sentence and Talker ID

xxx.x = heading in degrees

T = true

hh = check sum (can be omitted)

<CR><LF> = carriage return & line feed



For GPS with RS-232 the following connection can be used:

MCU	9-pin RS-232
5	3 TXD
6	5 GND

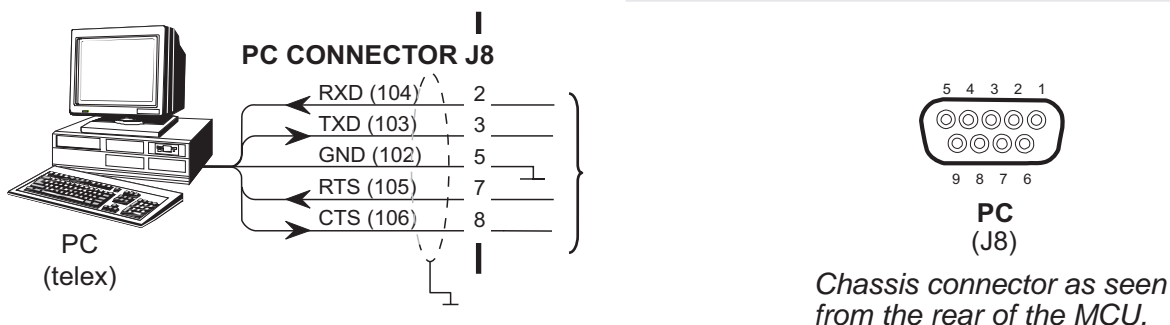
Note! The distance between the MCU and the NMEA source should not exceed 15 m.

PC (telex)

The PC (Telex) is connected to the **PC (J8)** outlet located on the rear panel of the MCU.

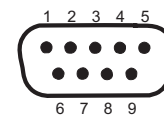
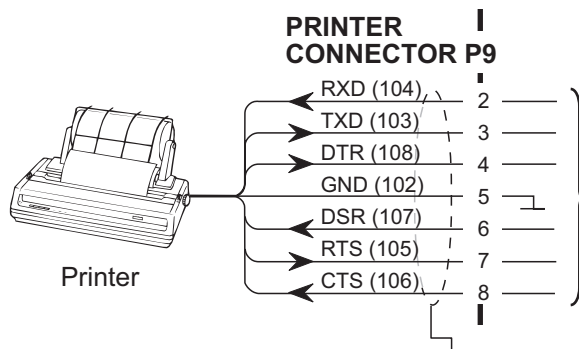
See diagram for pin configuration.

Max. extension length: 15 m, min. 0.5 mm².



Printer

The printer is connected to the **PRINTER** (P9) outlet located on the rear panel of the MCU.
See *diagram for pin configuration*.
Max. extension length: 15 m, min. 0.5 mm².



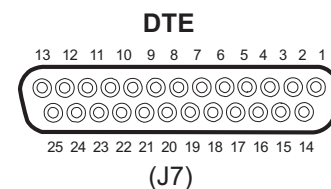
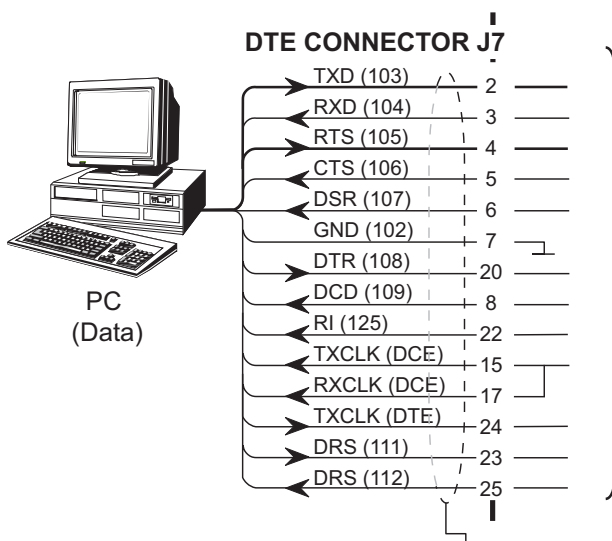
**PRINTER
(P9)**

Chassis connector as seen from the rear of the MCU.

Communication format: 4800 b/sec., 1 start bit, 8 data bits, 1 stop bit, no parity

PC (data)

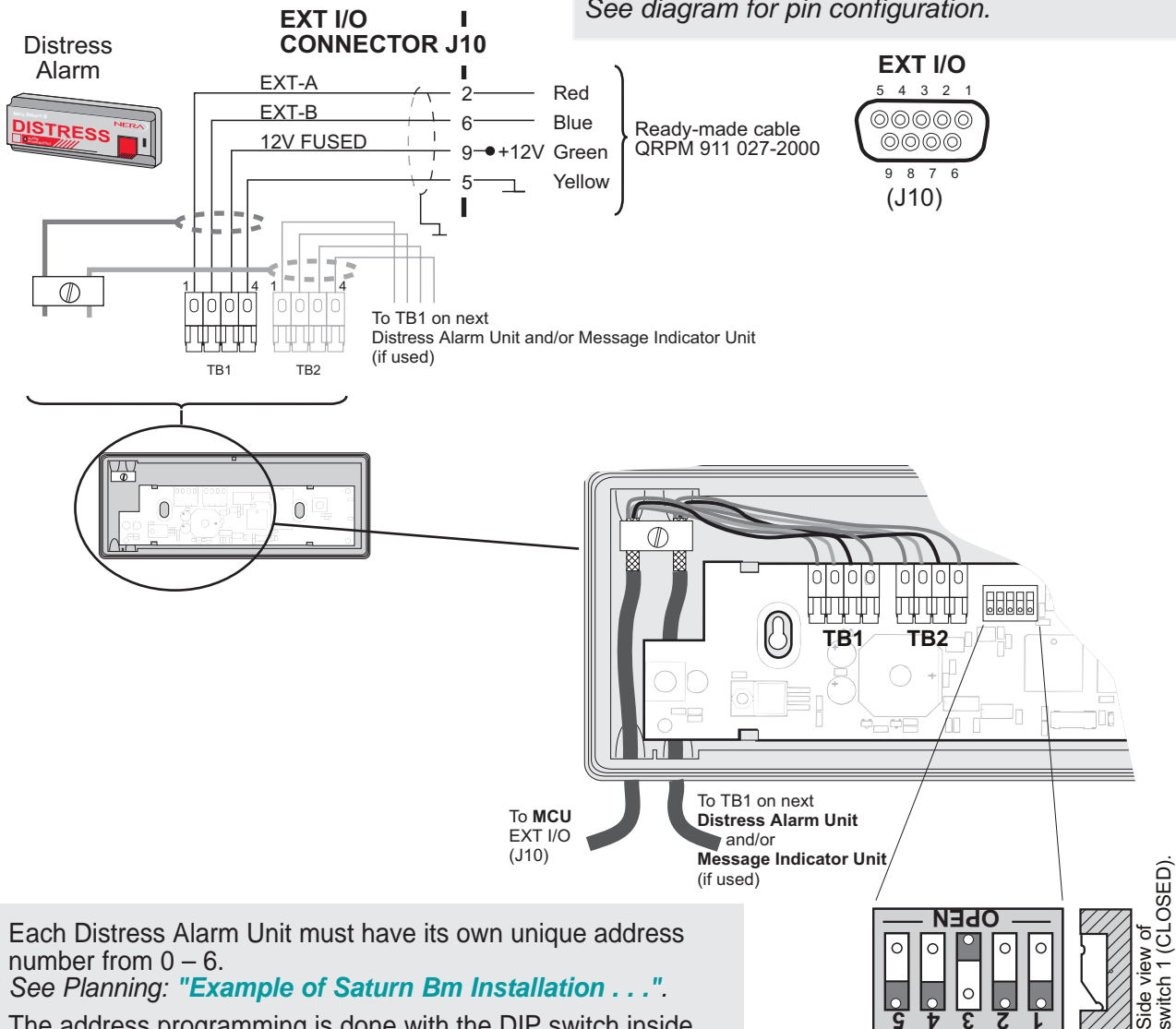
The PC (Data) is connected to the **DTE** (J7) outlet located on the rear panel of the MCU.
See *diagram for pin configuration*.
Max. extension length, ASD: 15 m, min. 0.5 mm².
HSD: 1.5 m, min. 0.5 mm².



Chassis connector as seen from the rear of the MCU.

Distress Alarm Unit

The Distress Alarm Unit is connected to the **EXT I/O** (J10) outlet located on the rear panel of the MCU. See diagram for pin configuration.



Each Distress Alarm Unit must have its own unique address number from 0 – 6.

See Planning: **"Example of Saturn Bm Installation . . ."**.

The address programming is done with the DIP switch inside the Distress Alarm Unit(s) according to the table below.

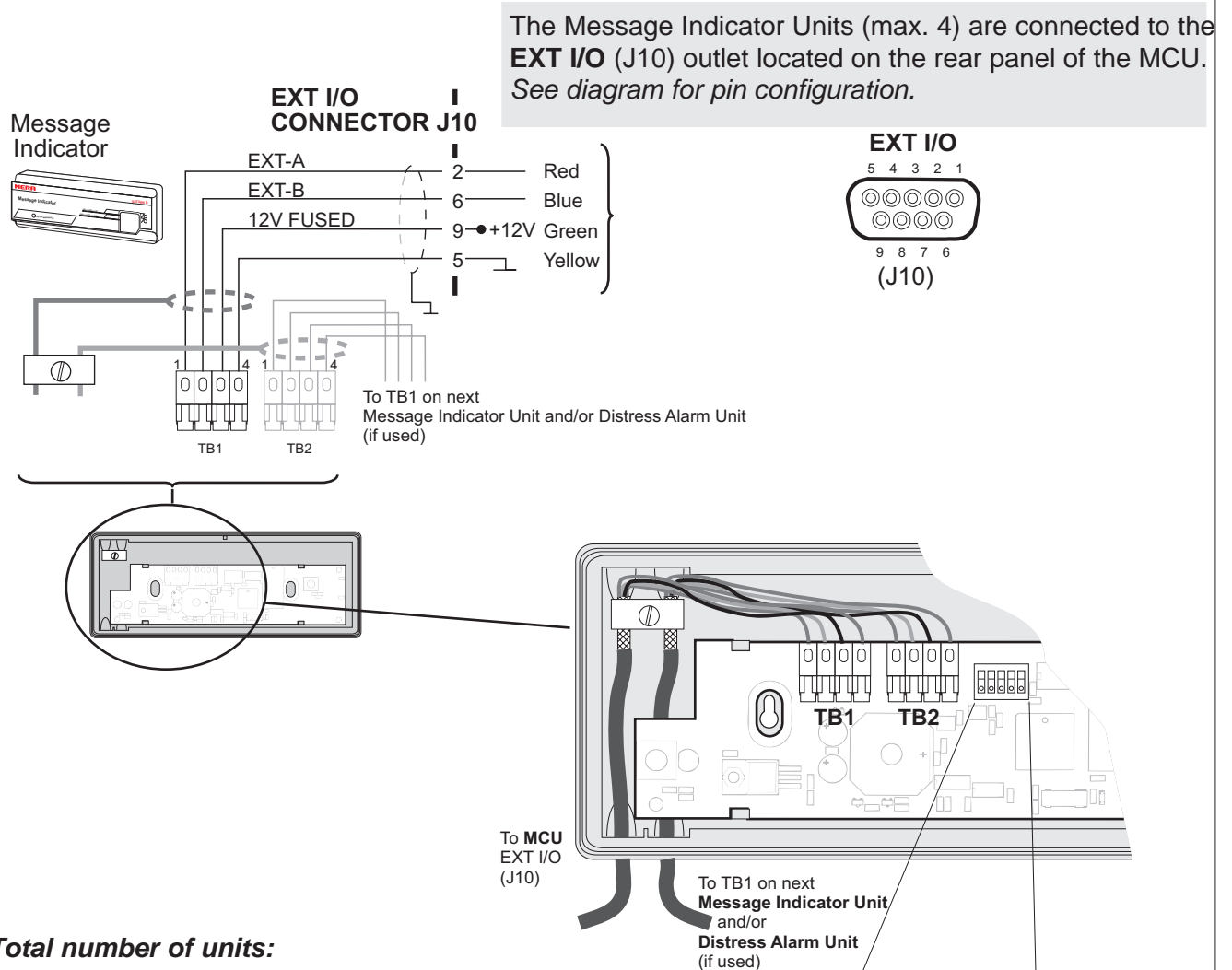
For corresponding programming of the MCU, see "Configuring Ports" in the *Saturn Bm Operator's Manual*.

If telex is installed, see also "Configuring Telex Port" in the *Saturn B Telex Operator's Manual*.

MCU connectors	HANDSET	TEL 1	TEL 2 ^{*)}	TEL 3	TEL 4	TEL 5
	Address 0	Address 1	Address 2	Address 3	Address 4	Address 5
Addressing						

^{*)} Normally configured for Fax, no Distress.

Message Indicator Unit



Total number of units:

Message Indicator and Distress Alarm

- max 11

Message Indicator

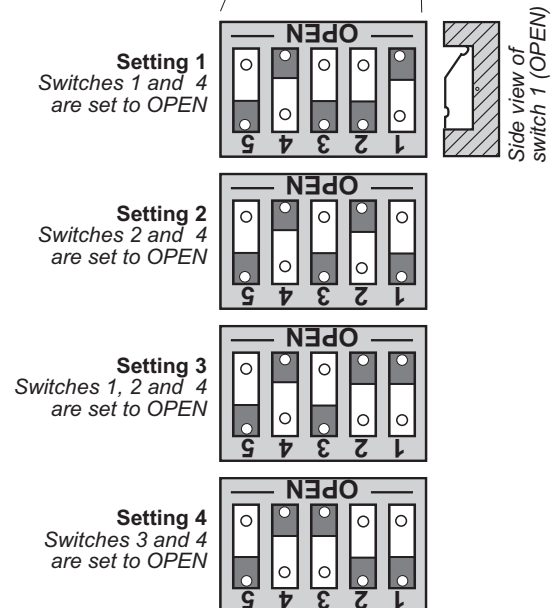
- max 4

Each Message Indicator Unit must have its own unique switch setting.

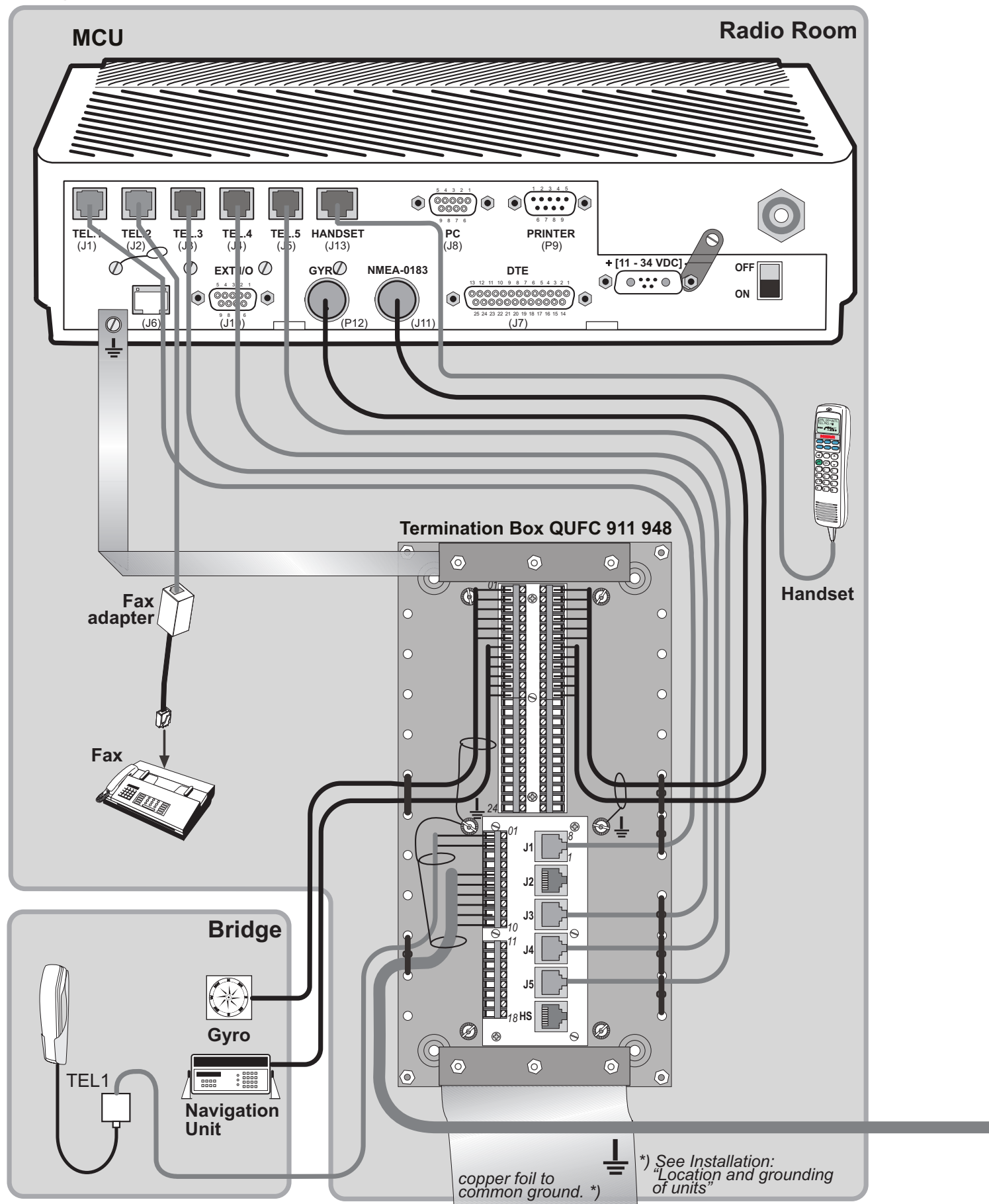
The setting is done with the DIP switch inside the Message Indicator Unit as shown in the figure. No other combinations are allowed.

For corresponding programming of the MCU, see "Various Configurations" in the Saturn Bm Operator's Manual.

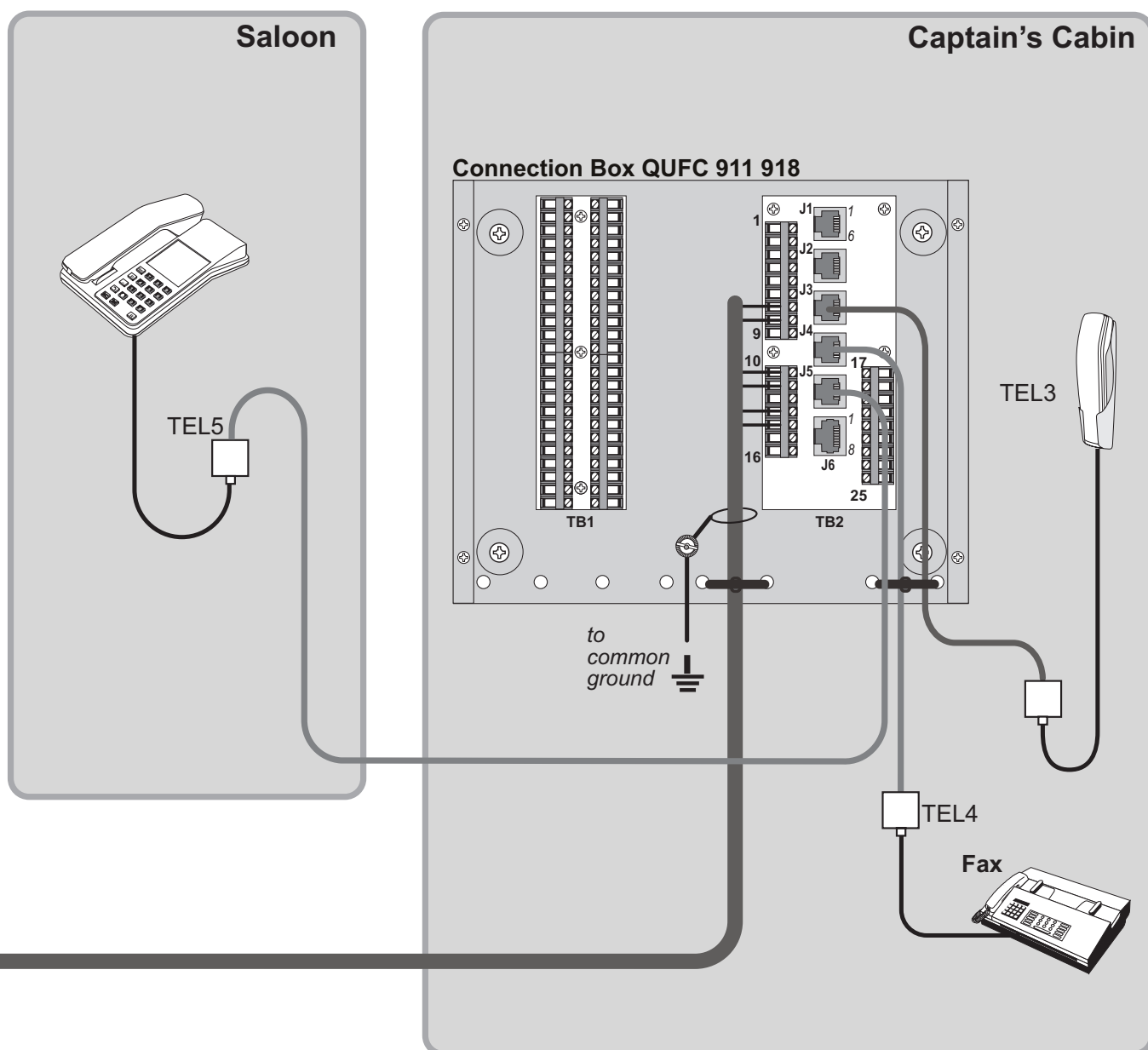
See Planning: **"Example of Saturn Bm Installation . . ."**.



Example of local or near-by installation of telephone, fax, gyro and Navigation Unit.

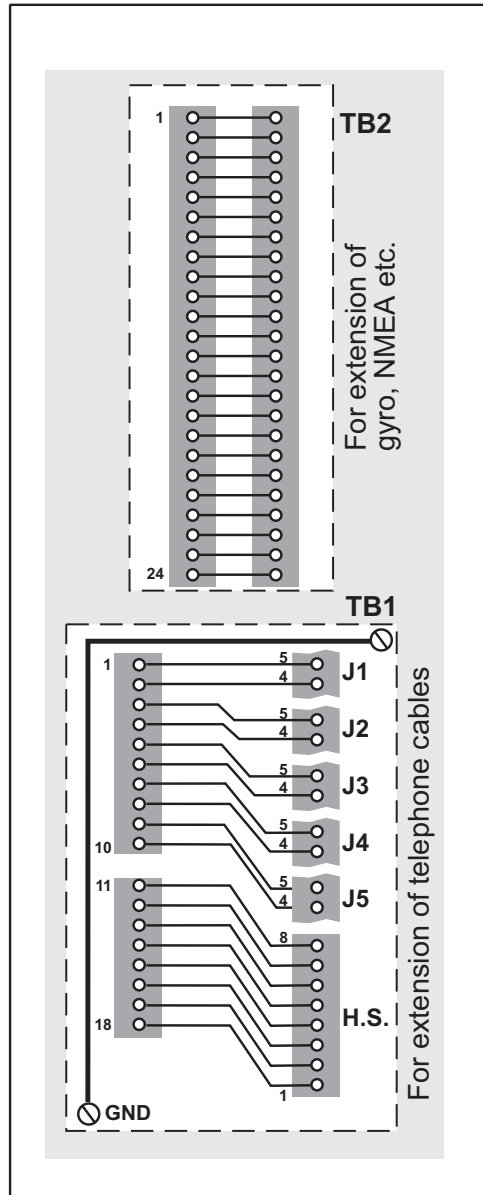


Example of remote installation of
telephones and fax.

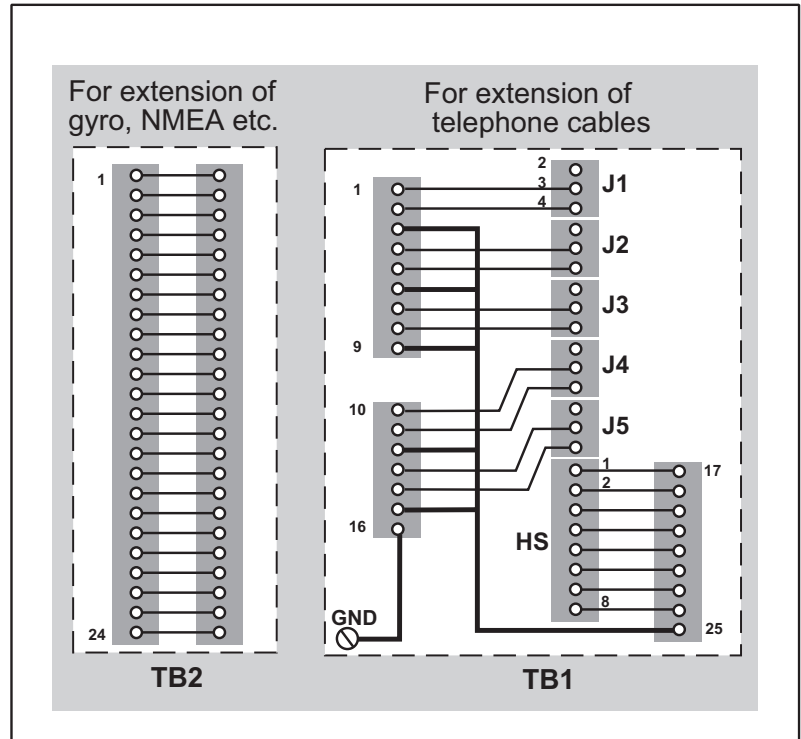


Interconnection diagrams for Termination/Connection boxes

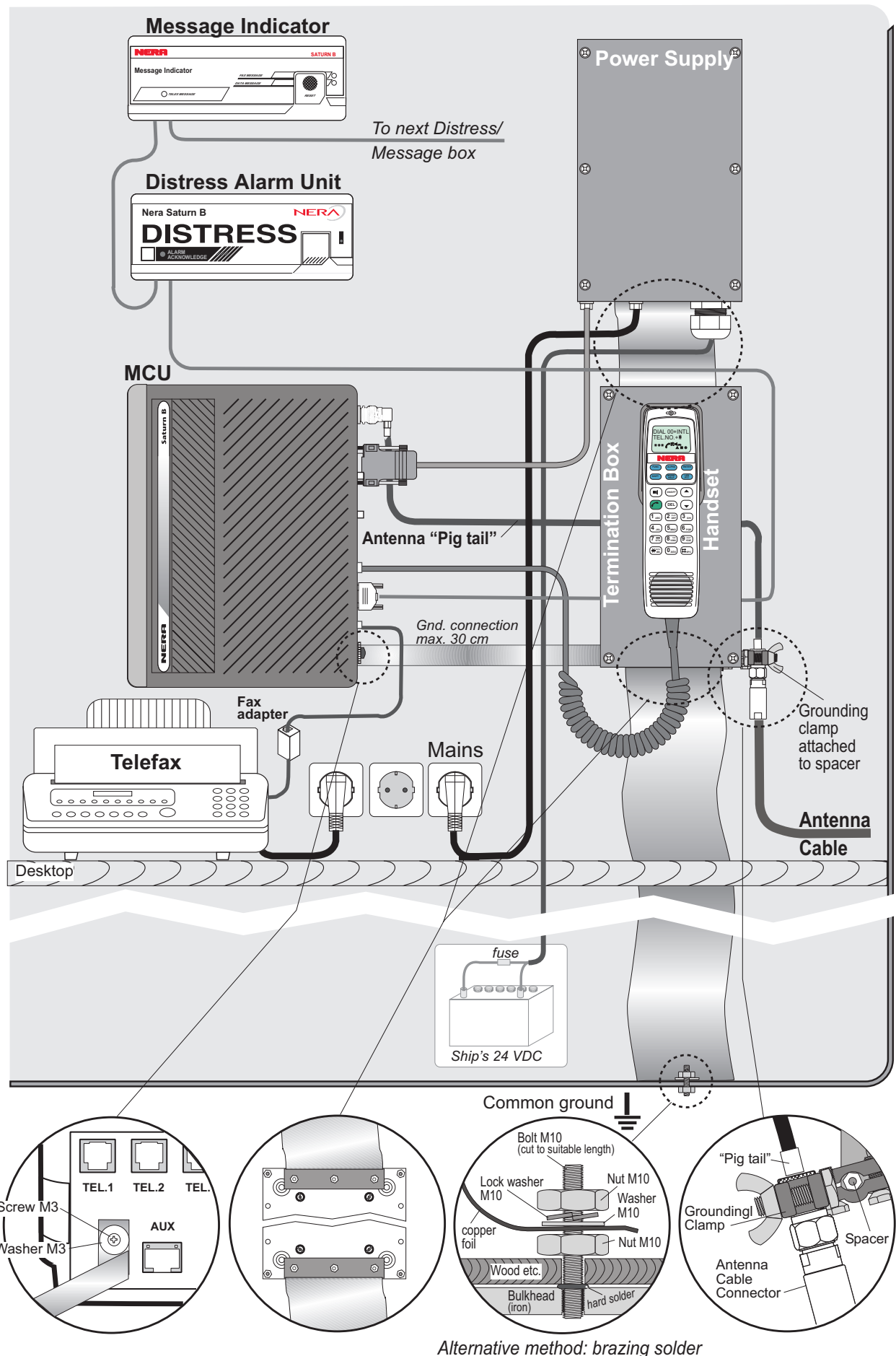
Termination Box
QUFC 911 948



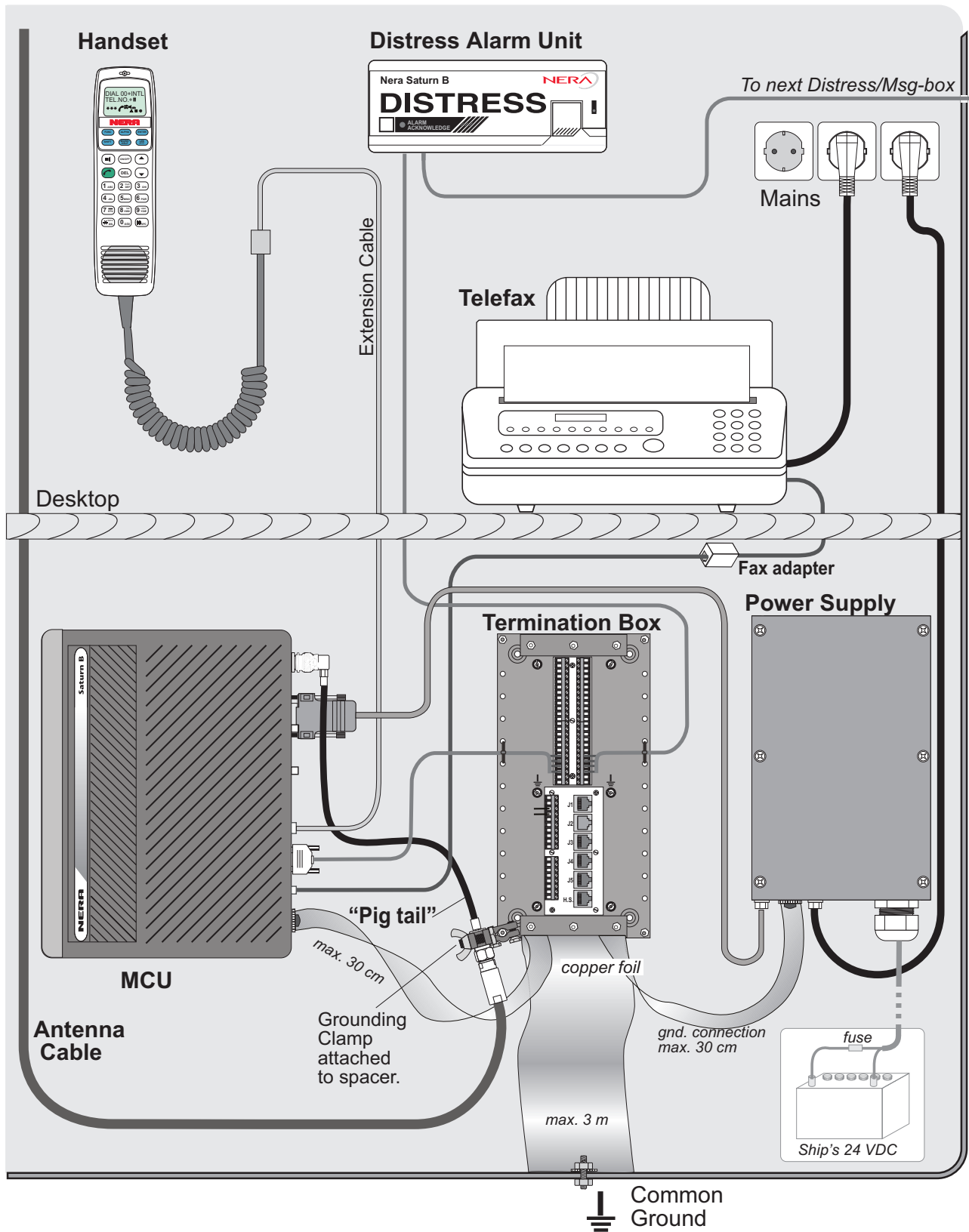
Connection Box
QUFC 911 918



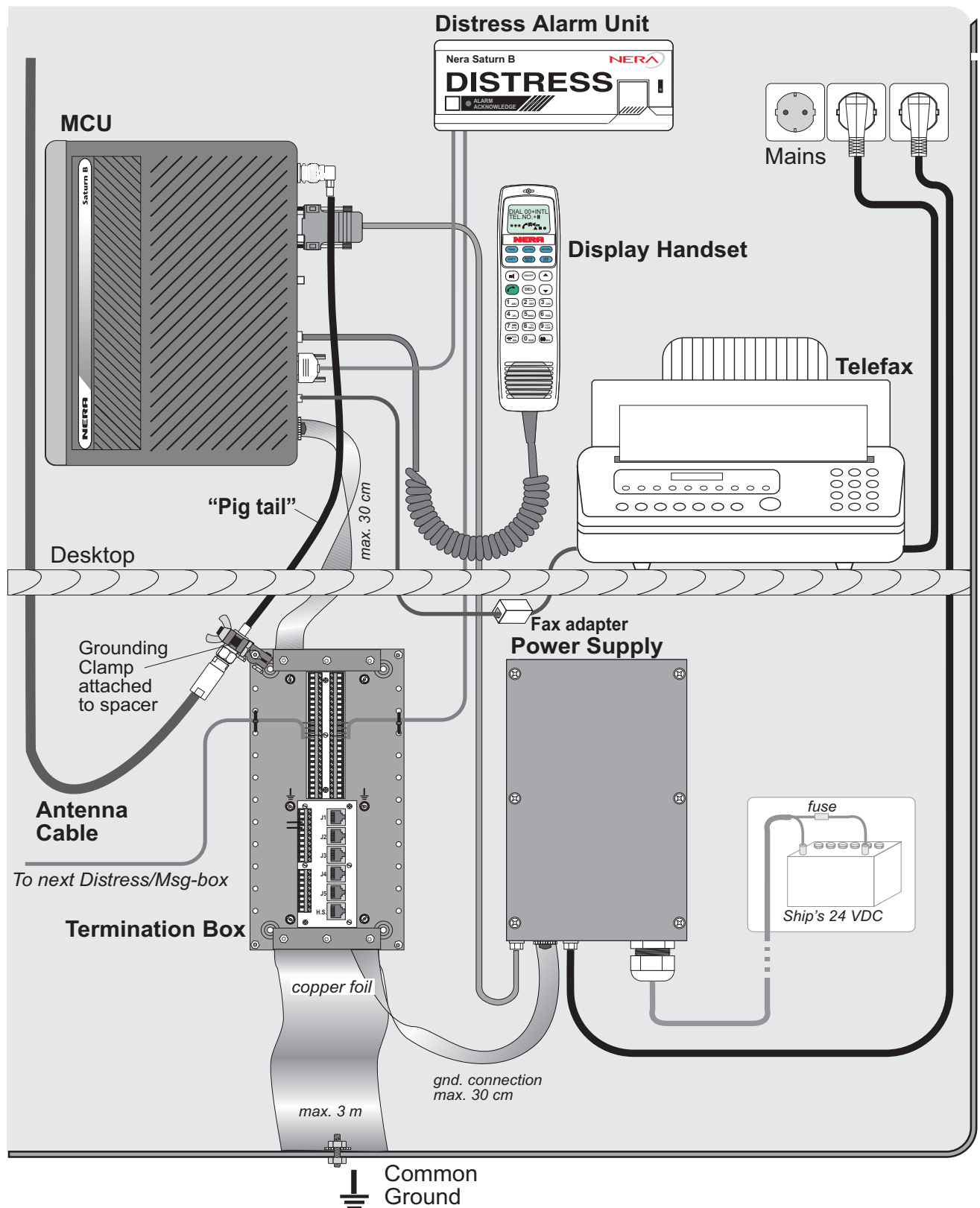
Location and grounding of units, example 1 (see PLANNING)



Location and grounding of units, example 2 (see [PLANNING](#))

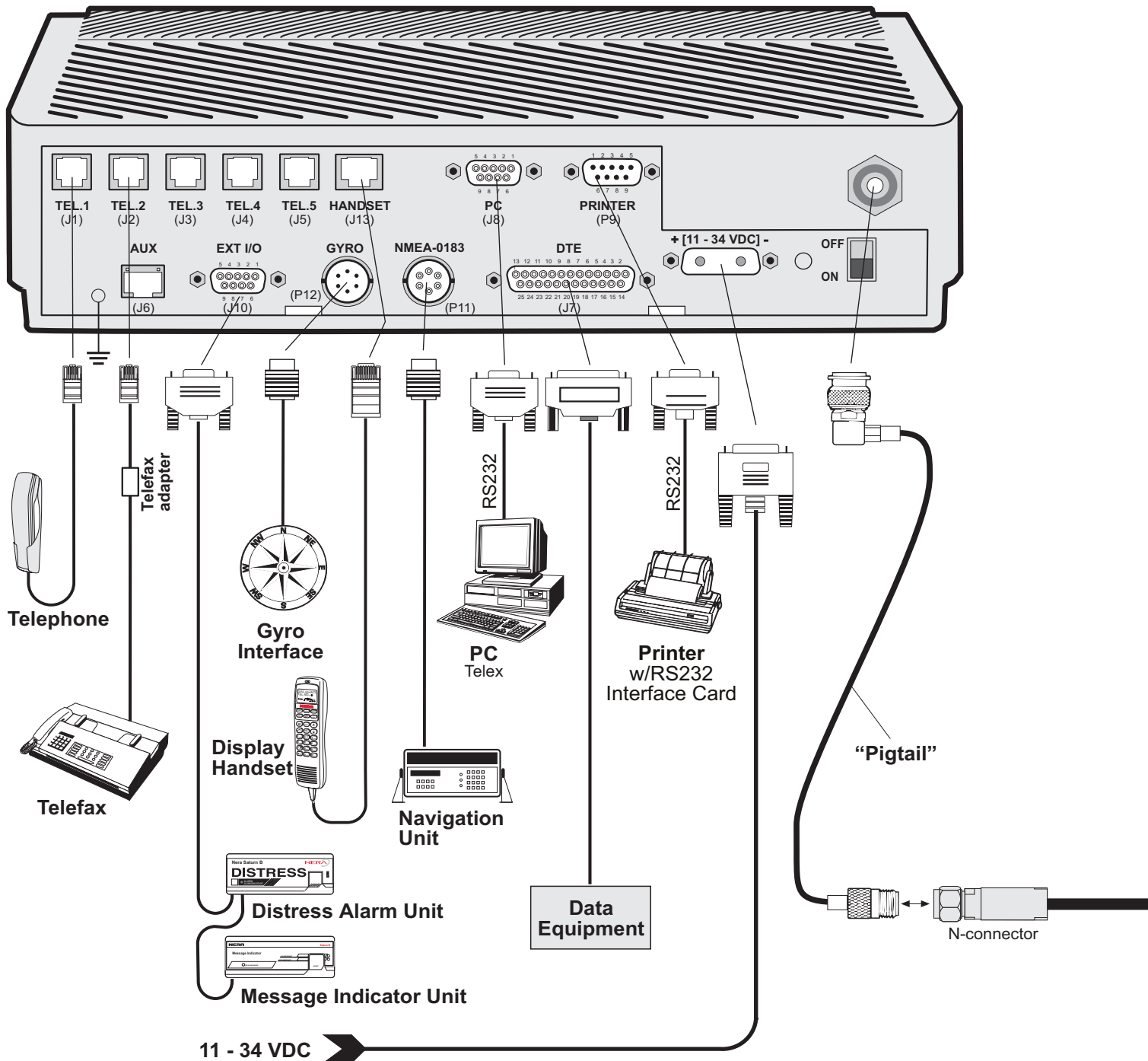


Location and grounding of units, example 3 (see PLANNING)

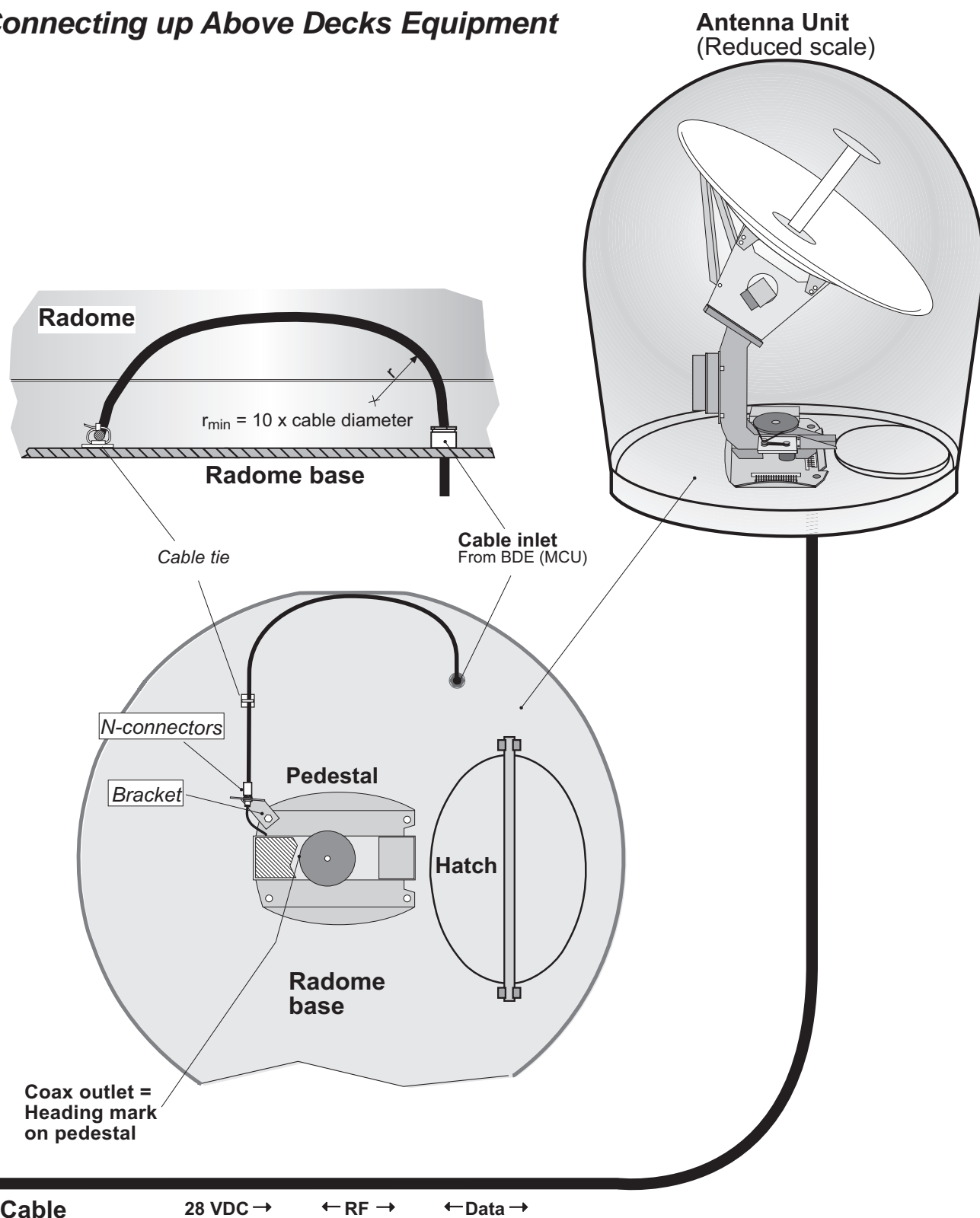


Connecting up Below Decks Equipment

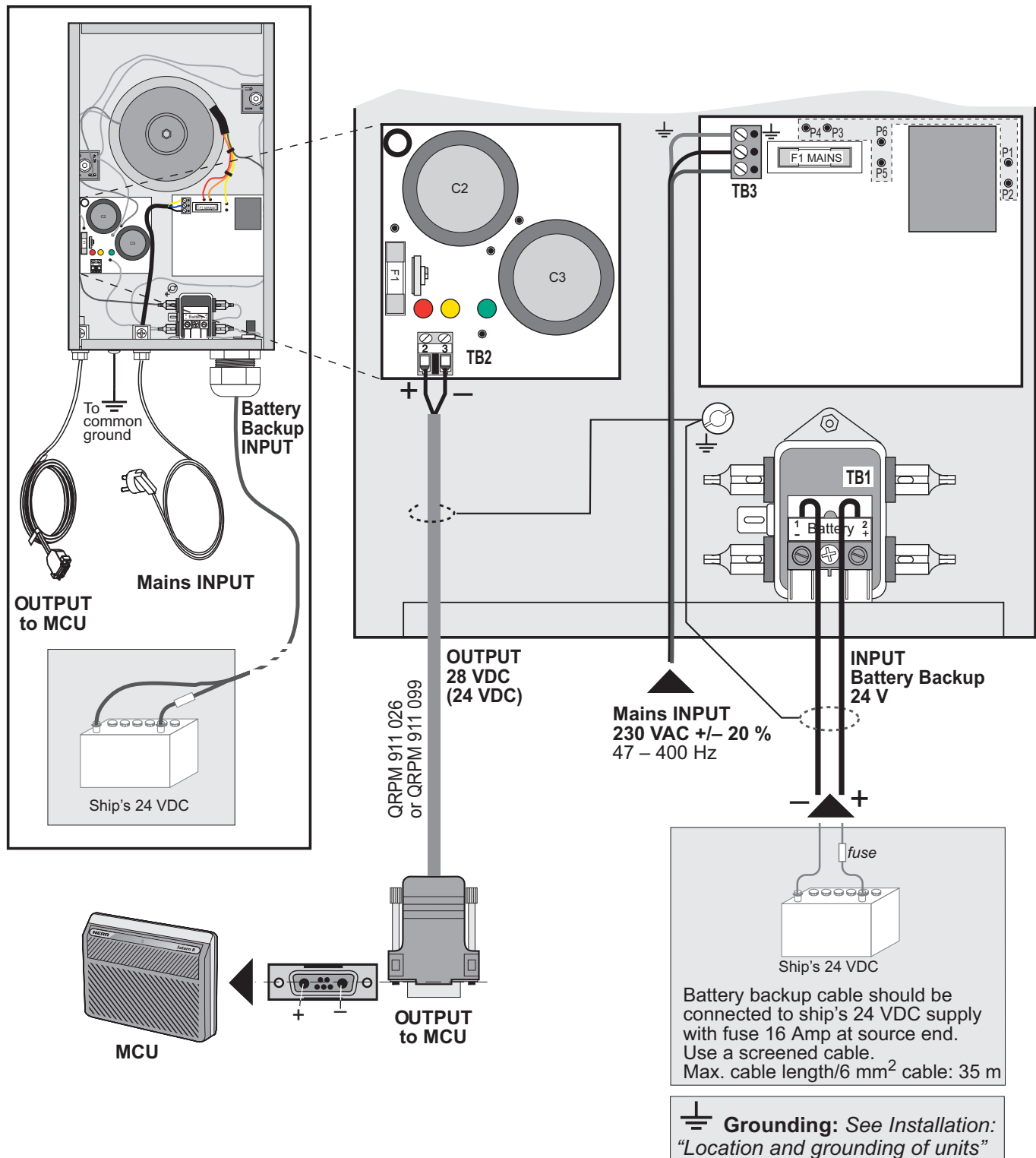
MCU - Main Control Unit



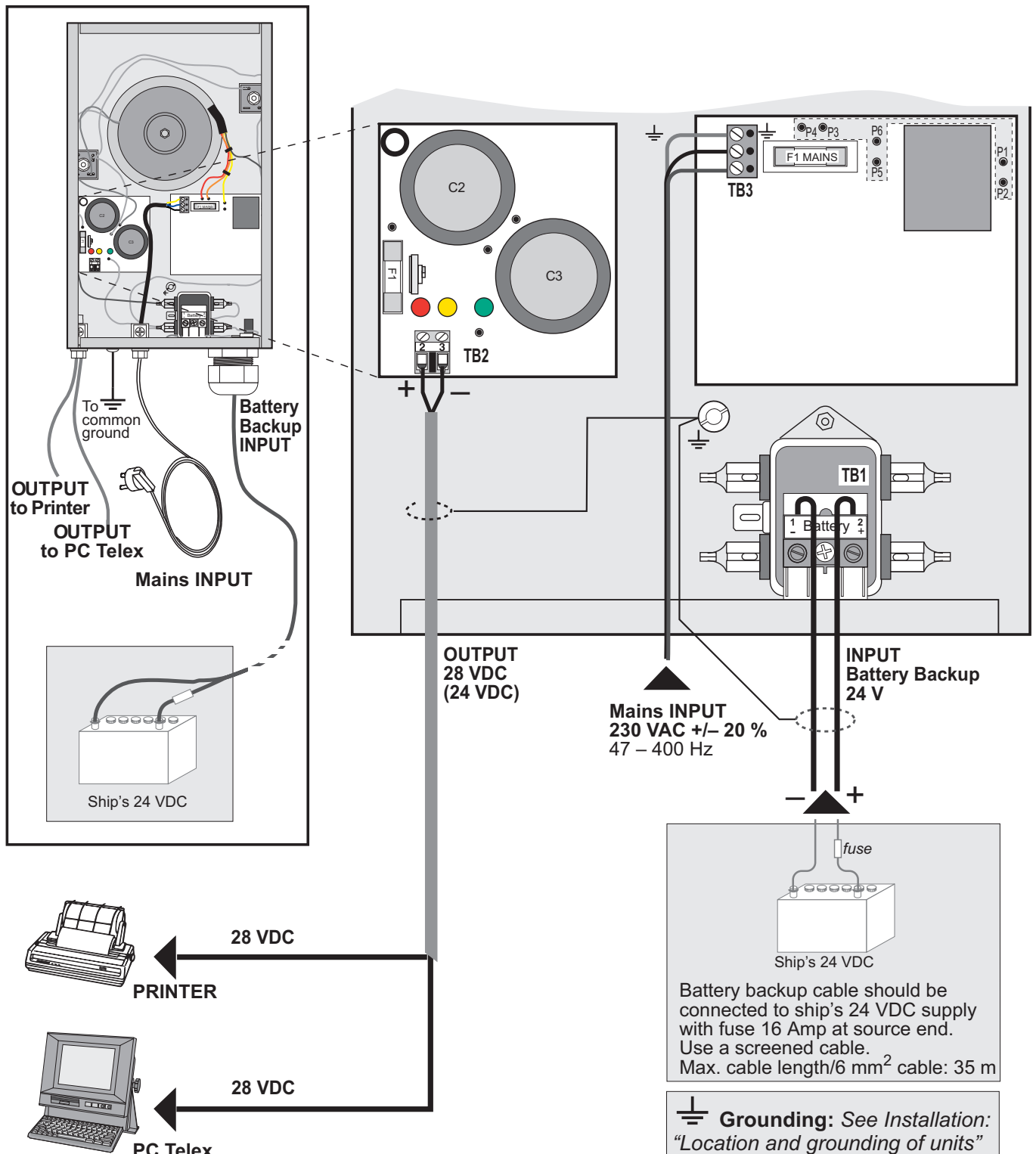
Connecting up Above Decks Equipment



Power Supply Q UFC 911 903-2B for DC supply to MCU only



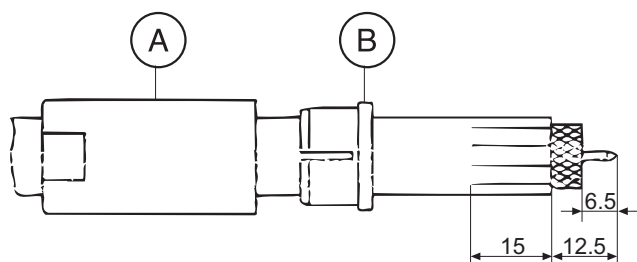
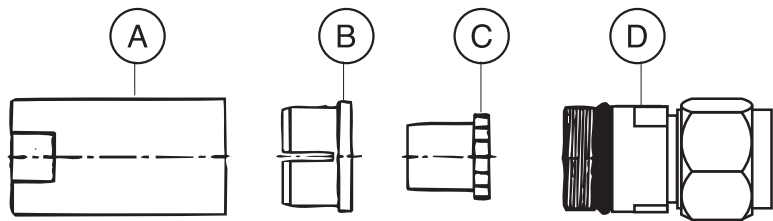
Additional Power Supply QUFC 911 903-2B for PC Telex and Printer operating from DC



Mounting connector type 11N-50-10-4 (for cable S 10172 B-11)

Tools and materials required:

- Stanley blade
- File
- Spanners (18, 20, 22 mm)
- Sand paper (300 or 400)
- Scissors



Slide **body A** and **ring B** over cable.

Prepare **cable** according to figure.

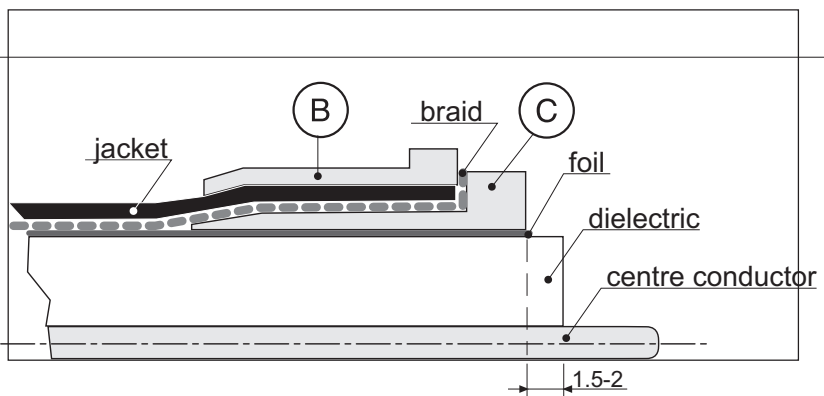
CAUTION: Do not damage **braid**.

Trim edge of **centre conductor** with file.

Cut **jacket** 6-8 times lengthwise 15 mm.

CAREFUL: Do not damage **braid**.

IMPORTANT: Clean **centre conductor** with sand paper. All dielectric remainders must be removed.



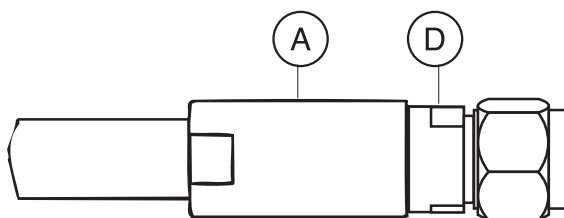
Open **jacket** CAREFULLY and push **sleeve C** between **foil** and **braid**.

Slide **clamp ring B** to **sleeve C**. Observe the distance 1.5-2 mm.

Cut **braid** along **sleeve C**.

Cut **jacket** lengthwise 6-8 times.

Cut off protruding foil to front of **sleeve C**.

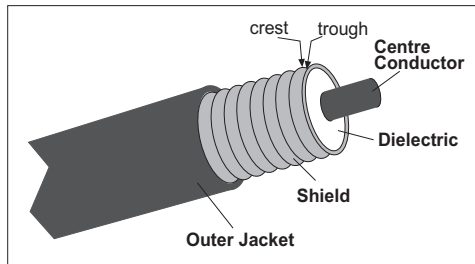


Push **body A** over **clamp ring B**.

Screw **body D** onto **body A** and tighten with spanner. Torque 19 Nm.

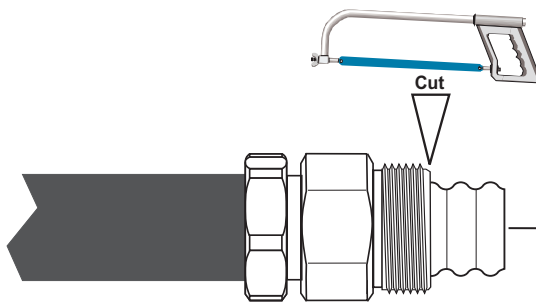
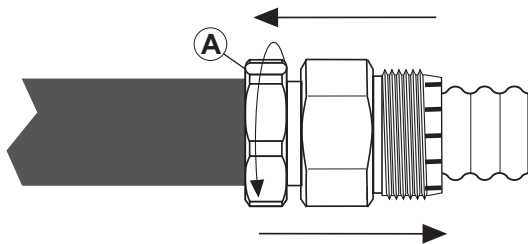
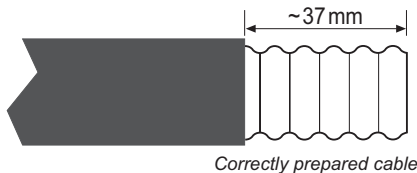


Mounting connector type 11N-50-12-10 (for cable RF 1/2" 50)

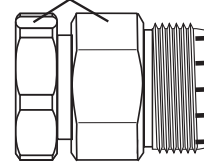


Tools and materials required:

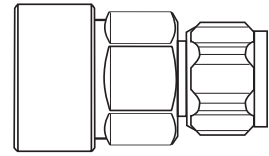
- Spanners, 22 mm and 24 mm
- Metal saw
- Knife
- Screwdriver
- Measure
- Abrasive paper
- File



Do not open



Cable Entry (A)



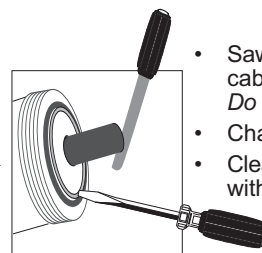
Connector Head (B)

Preparing the cable

- Cut the **Cable** in a trough perpendicularly to the cable axis.
- Remove approx. 37 mm of **Outer Jacket**. **IMPORTANT: Do not damage shield.**

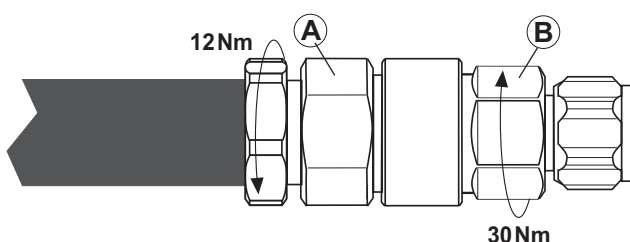
Mounting the connector

- Slide the **Cable Entry (A)** over the cable into the **third trough** in the corrugation. (See figure.)
- Pull the Cable Entry as far as the stop.
- Tighten the back ring of the cable entry manually.
- Verify the correct position of the Cable Entry; if necessary pull forward as far as the stop.



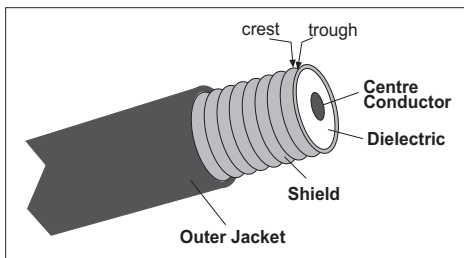
- Saw off the cable carefully along the cable entry as indicated. **Do not damage the centre conductor**
- Chamfer the centre conductor
- Clean the centre conductor carefully with abrasive paper

- Using the screwdriver, press the dielectric away from the outer conductor tube to ensure good contact when entering the connector head.
- Screw the **Cable Entry (A)** and **Connector Head (B)** tightly together with a torque of approx. 30 Nm.
- Tighten the back nut of the **Cable Entry (A)** with a torque of approx. 12 Nm.



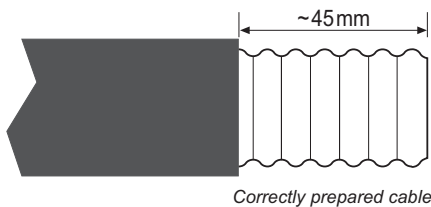
Note! If exposed to extreme environmental conditions, especially icy conditions, the connector pair should be completely covered with a cold shrink tube (e.g. SUHNER 74 Z-0-0337 or selfvulcanizing tape for added protection.

Mounting connector type 11N-50-23-10 (for cable RF 7/8" 50)



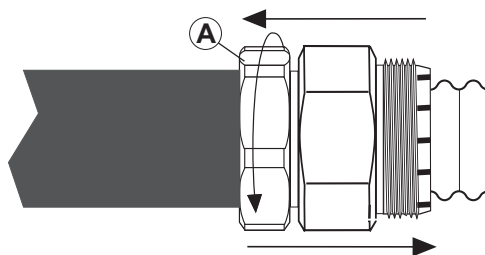
Tools and materials required:

- Spanners, 30mm and 36mm
- Metal saw
- Knife
- Countersink
- Screwdriver
- Measure
- Wire brush



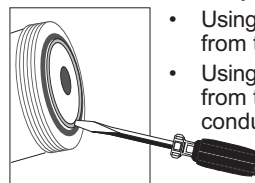
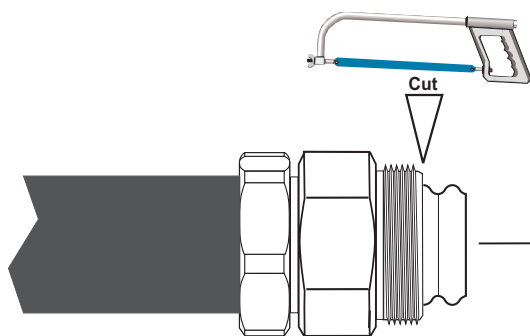
Preparing the cable

- Cut the **Cable** in a trough perpendicularly to the cable axis.
- Remove approx. 45 mm of **Outer Jacket**.
IMPORTANT: Do not damage shield.

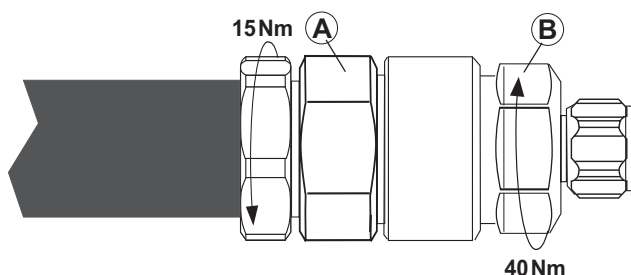


Mounting the connector

- Slide the **Cable Entry (A)** over the cable into the **second trough** in the corrugation. (See figure.)
- Pull the Cable Entry forward as far as the stop.
- Tighten the back ring of the cable entry manually.
- Verify the correct position of the Cable Entry; if necessary pull forward as far as the stop.



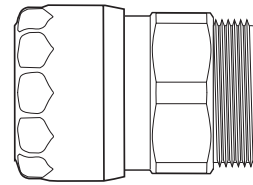
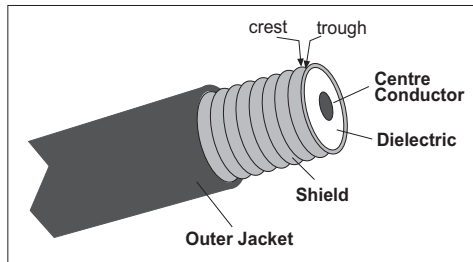
- Saw off the cable flush with the cable entry as indicated.
- Using f.ex. a screwdriver, remove burrs from the centre conductor.
- Using f.ex. a screwdriver, remove burrs from the dielectric and the outer conductor.



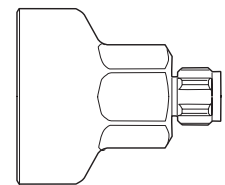
- Using the screwdriver, press the dielectric away from the outer conductor tube to ensure good contact when entering the connector head.
- Screw the **Cable Entry (A)** and **Connector Head (B)** tightly together with a torque of approx. 40 Nm.
- Tighten the back nut of the **Cable Entry (A)** with a torque of approx. 15 Nm.

Note! If exposed to extreme environmental conditions, especially icy conditions, the connector pair should be completely covered with a cold shrink tube (e.g. SUHNER 74 Z-0-0338 or selfvulcanizing tape for added protection.

Mounting connector type 11N-50-32-2/11N-50-42-2 (for cables RF 1 1/4"/15/8" 50)



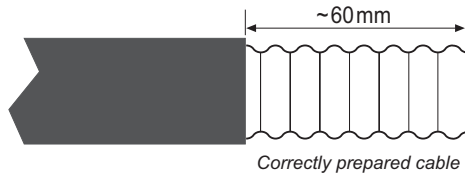
Cable Entry (A)



Connector Head (B)

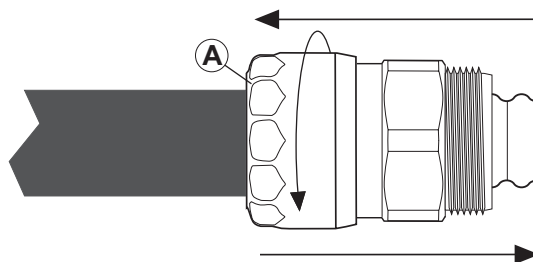
Tools and materials required:

- Metal saw
- Knife
- Stanley blade
- Countersink
- Monkey wrenches (2)
- Screwdriver
- Wire brush
- Measure



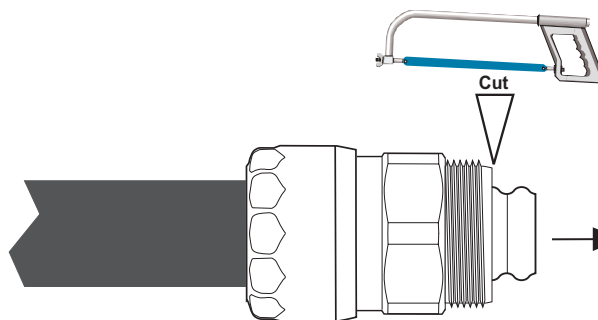
Preparing the cable

- Cut the **Cable** in a trough perpendicularly to the cable axis.
- Remove approx. 60 mm of **Outer Jacket**.
IMPORTANT: Do not damage shield.

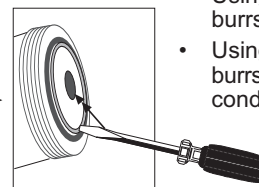


Mounting the connector

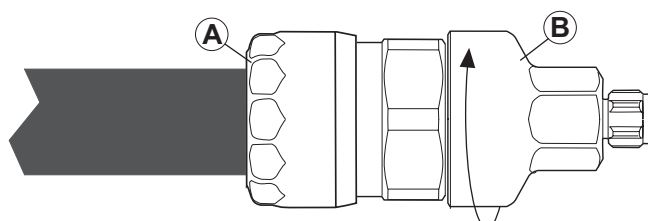
- Slide the **Cable Entry (A)** over the cable into the **second trough** in the corrugation. (See figure.) To verify the correct position of the Cable Entry, pull the cable entry as far as the stop.
- Tighten the back ring of the cable entry manually until the cable entry is fixed on the cable.



- Saw off the cable flush with the cable entry as indicated.



- Using f.ex. a screwdriver, remove burrs from the centre conductor.
- Using f.ex. a screwdriver, remove burrs from the dielectric and the outer conductor.



- Using the screwdriver, press the dielectric away from the outer conductor tube to ensure good contact when entering the connector head.
- Screw the **Cable Entry (A)** and **Connector Head (B)** tightly together with a torque of approx. 60 Nm.

IMPORTANT! Only the connector head should be rotated.

Note! If exposed to extreme environmental conditions, especially icy conditions, the connector pair should be completely covered with a cold shrink tube (e.g. SUHNER 73 Z-0-0339 or selfvulcanizing tape for added protection.

Main items

The list may be changed without notice.

Bm ADE Mk2

Radome for Bm	R 906 565
Pedestal for Bm/Bm Mk2	QSXK 911 951
Antenna dish 3S90/Bm	10AY652A
Antenna feed Bm	QSXK 911 906
Feeder plate	QSXA 911 111
Coax plug	16TNC-50-2-6C
Coax plug	24N-50-2-4C
Cable, PSU - TRX	QRPM 911 024-0500
Cable for fan	QRPM 911 023/0500
Antenna Control Unit B/M	QROF 219 9041
Transceiver Bm/Mm	QUFC 911 931
Transceiver bracket Bm	QSXA 911 362
Cable wind top	QSXQ 911 101
Cable wind bottom	QSXA 911 100
Cable wind fastener	QSXA 911 098
Cable wind washer	QSXA 911 099
Cable wind washer Bm	QSXA 911 339

QUFF 911 09-3

Bm MCU w/accessories

1 pc	MCU for Bm	QUFC 911 901-2
1 pc	Handset	QDGS 911 903
1 pc	Handset holder	QSXA 911 394
1 pc	Termination box	QUFC 911 948
1 pc	Connection box	QUFC 911 918
5 pcs	Telephone cable	QRPM 911 106-0800
1 pc	Gyro cable	QRPM 911 095-0800
1 pc	NMEA cable	QRPM 911 096-0800
1 pc	Distress alarm cable	QRPM 911 027/2000
1 pc	Cable for fax	QRPM 911 033/2000
1 pc	Fax adapter	QRPM 911 032
1 pc	Power supply, 350 W	QUFC 911 903-2B
1 pc	Distress alarm unit	QUFC 911 910/2
15 m	Cable for Distress alarm	TFKR 412 06/8
30 m	Coax cable, S 10172 B-10	QTZC 502 012
1 pc	Cable, "pig-tail"	QRPM 911 077-600
2 pcs	Coax plug	11N-50-10-4
1 pc	Flange gasket	R 906 567
1 pc	Operator's Manual Bm	QLZB 911 020
1 pc	Installation Manual Bm Mk2	QLZB 911 053
1 pc	B/M Enhanced Funct. Manual	QLZB 911 016
1 pc	B Data Manual	QLZB 911 012
1 pc	Radiation hazard label	R 906 527/1
1 pc	B/M Brief Oper. Instr.	QLZB 911 011
1 pc	Activation inst. marine	QLZT 911 009
1 pc	Telephone Distress Call, Bm & Mm	QLZB 911 014
1 pc	Bm inst. check list	QLZB 911 023
1 pc	Registration and Warranty Certificate	100175
1 pc	B SW diskette w/instr.	QPRG 911 0100/B
1 pc	Saturn Bm ADE grounding kit	QSXH 911 9026
1 pc	Mounting kit	QSXK 911 9036

QUAZ 911 903

Main items (cont'd)**Spare Parts for Bm ADE Mk2**

Antenna Control Unit (ACU)	QROF 219 9041
Fan	QBKV 101 001/12
Step motor (Az/El/Cross)	R 906 566/8415
Step motor (Level platform)	MM 111 100
Rate sensor	MM 112 266-2
Fluxgate PCB assy	MM 111 459
Level platform PCB assy (MM 112 442)	MM 151 20-2
PCU PCB assy	MM 113 101
Drive belt (AZ motor drive belt)	108 870-13
Drive belt (AZ drive belt)	108 870-5
Drive belt (Cross bar drive belt)	108 870-25
Drive belt (Cross bar motor drive belt)	108 870-16
Drive belt (EL motor drive belt)	108 870-17
Drive belt (EL drive belt)	108 870-7
Tx/Rx (Transceiver)	QUFC 911 931
Level platform assy belt	109 770-17

Spare Parts for Bm MCU

Main Control Board	QROF 219 9001-2
Power Board	QROF 219 9002
Connection Board	QROF 219 9005
Gyro Board	QROF 219 9003
Complete fan	QSXK 911 959

Other Options

Extra telephone (wall)	DBAR 104 001/888
Extra telephone (desk)	DBAR 201 010/496
Connection box	QUFC 911 918
Message Indicator Unit	QUFC 911 910-3
Telephone/Telefax wall socket	R 906 676/1
Power supply, 350 W	QUFC 911 903-2B
Extension cable for handset, 3 m	QRPM 911 111-3000

Siemens PC Telex incl. *)**QSXK 911 998**

Siemens PC CU	QKDD 911 004
Siemens PC KB	QKDT 911 004
Siemens PC CRT	QKDN 911 004
Printer 220 V ML 280	R 906 670
Serial PCB for ML 280	R 906 670/PCB
Paperholder for ML 280	R 906 670/H
Telex paper	R 905 549
Centronics cable	R 906 618/2
RS232 cable, 9-pin M to 9-pin F	R 906 686
Cable RS232	QRPM 911 010/5000

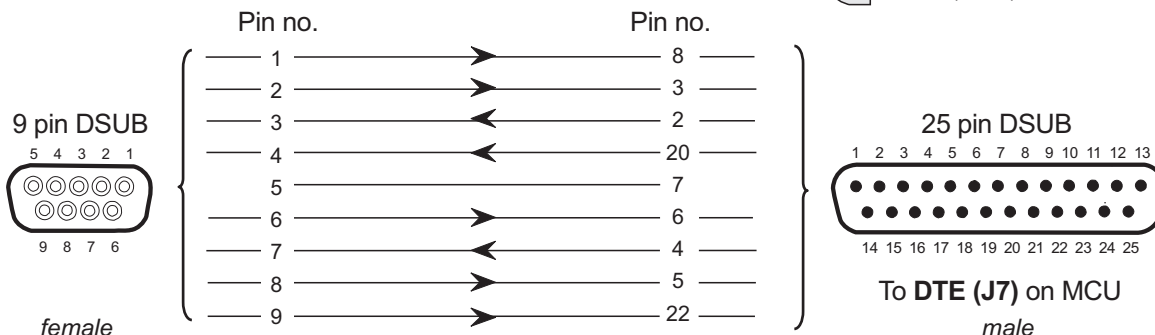
*) Nera SatCom reserves the right to replace any of the specified units and components with equivalent makes/models.

9 pin-to-25 pin RS 232 cable (5 m)

QRPM 911 010/5000

Data equipment    **DTE on MCU**

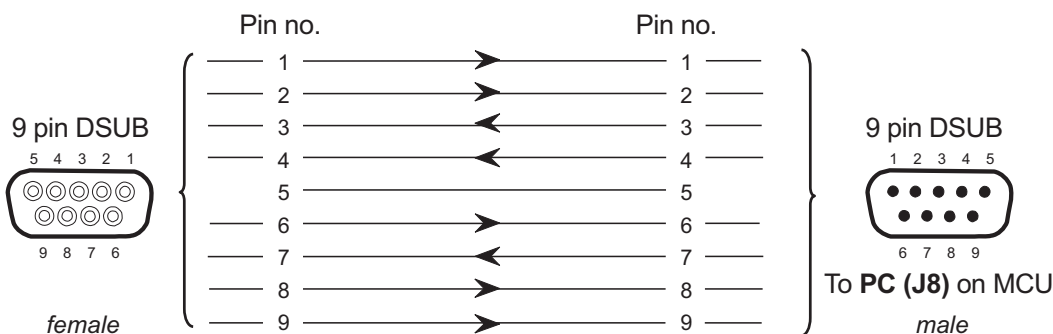
PRINTER on MCU    **Printer (serial)**



9 pin-to-9 pin RS 232 cable (3 m)

R 906 686

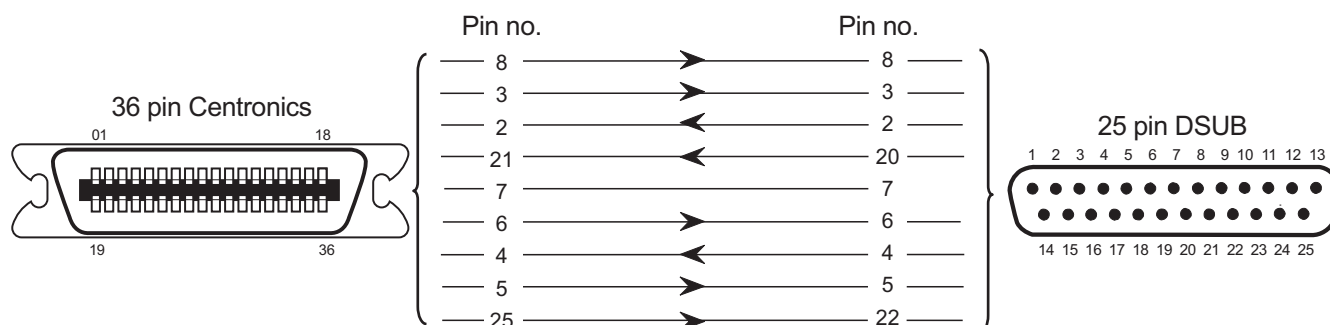
PC Telex    **PC on MCU**



Centronics cable (3 m)

R 906 618/2

Printer    **PC**



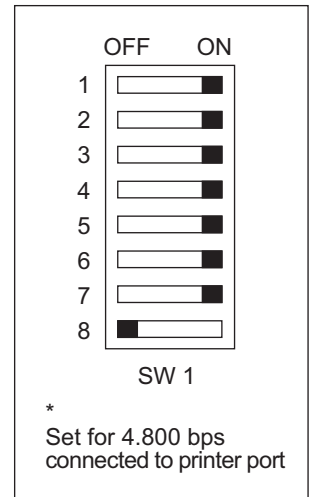
Printer switch settings

Switch bank 1

Switch no.	OFF	ON	FUNCTION
1	Even	Odd *	Parity
2	With	No *	Parity
3	7	8 *	Databits
4	X-on/X-off	Ready/Busy *	Protocol
5	Monitor	Circuit *	Test Select
6	Test	Print *	Mode Select
7	See	Separate	Table
8	See	separate	Table

Switch bank 1

Switch no.	7	8	FUNCTION
Busy Line	On	On	DTR(-9v) Pin 20
Busy Line	On *	Off *	RTS(-9v) Pin 4
Busy Line	Off	On	SSD(-9v) Pin 11
Busy Line	Off	Off	SSD(+9v) Pin 11

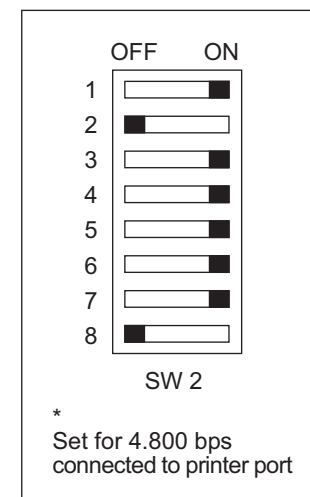


Switch bank 2

Switch no.	OFF	ON	FUNCTION
1	See	Separate	Table
2	See	Separate	Table
3	See	Separate	Table
4	Invalid	Valid *	DSR I/P signal
5	512 Bytes	32 Bytes *	Buffer Threshold
6	1 sec.	200 ms *	Min. Busy Time
7	High when selected	High at Power on *	DTR Signal
8	*		Not Used

Switch bank 2

Switch no.	1	2	3	FUNCTION
19 200	On	On	On	Baud Rate
9 600	Off	On	On	Baud Rate
4 800	On *	Off *	On *	Baud Rate
2 400	Off	Off	On	Baud Rate
1 200	On	On	Off	Baud Rate
600	Off	On	Off	Baud Rate
300	On	Off	Off	Baud Rate
110	Off	Off	Off	Baud Rate



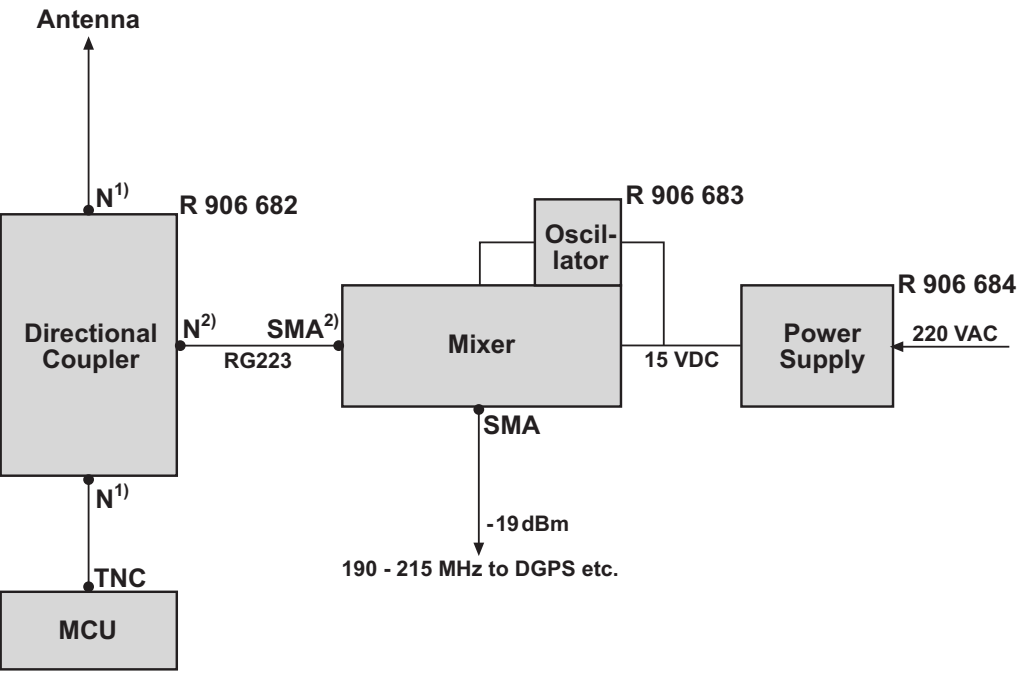
Reception of L-band Broadcast signals

In addition to regular 1.5/1.6 GHz, used for the various Inmarsat systems, the transponders in the satellite also broadcast leased channel info.

The design of Saturn B with L-band (1.5/1.6 GHz) signals between ADE and BDE, easily enable insertion of Directional Couplers to pick up broadcast RF signals.

Such signals are Differential GPS (GPS corrections), Maritime Chart Corrections, Radio Broadcasting channels, etc.

The diagram below indicates typical installation for reception of broadcast signals.



Parts list - DGPS kit no. 101285		
1 pc	Differential Coupler	R 906 682
1 pc	Mixer / Oscillator	R 906 683
1 pc	Power Supply Unit	R 906 684
2 pcs	N-connector for RG214 or Ethernet 06223 Note ¹⁾ : (Other coax cable require relevant N-connectors)	11N-50-7-5
1 pc	Coax cable (note ²⁾) consisting of: <ul style="list-style-type: none"> N-connector SMA-connector Coax cable <p>Coax cable with SMA-connector to DGPS equipment is not included!</p>	11N-50-3-4 16SMA-50-3-56c RG223 (max 10 m)

Activation of "Radio Silence"

A "Radio Silence" function may be activated in the Saturn B terminal if the MCU is provided with SW version 4.0 and above.

The function may be opened from the Display Handset through Function 78, which is accessible when in Service level (see Saturn Bm Technical Manual).

"Radio Silence" is specially applicable onboard warships on which, at certain periods, it is required that NO radiation shall take place.

The "Radio Silence" function will not affect the satellite tracking function.

In addition to opening the "Radio Silence" function an external switch must be installed wired to pin no.1 and 2 of the AUX connector on the MCU.

This switch shall have 2 positions (OPEN or CLOSED).

Pin 7 and 8 of the AUX connector may be used for external indication of "Radio Silence".

See below.

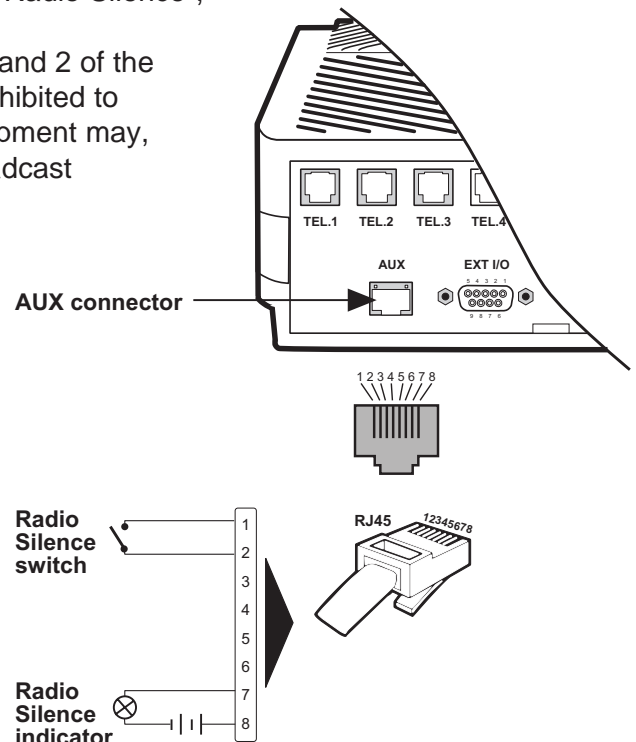
Radio Silence Mode

When the MCU is opened for "Radio Silence", and the switch is CLOSED (connection between pin no.1 and 2 of the AUX. port) the equipment is inhibited to send, even Distress. The equipment may, however, receive simplex broadcast messages.

Shortly after the switch is CLOSED, an internal relay will start to turn the "Radio Silence" indicator ON and OFF for a few seconds followed by steady ON (relay closed), until the the "Radio Silence" switch again is opened.

Normal Operation Mode

When the MCU is opened for "Radio Silence" function with the switch OPEN, (no contact between pin 1 and 2) Saturn Bm operates as normal.



Saturn Bm Rotary Joint mounting instruction

Parts list

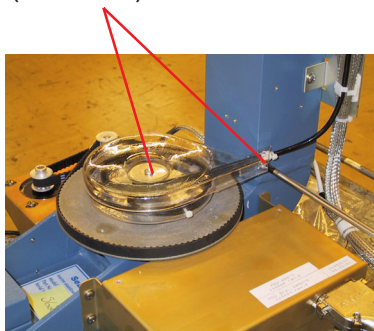
The Saturn Bm Rotary Joint Kit, part no. 101210, includes the following items:

101373	Rotary Joint Unit
QRPM911030-0550	Coaxial Cable, Rotary Joint
101263	Rotary Joint Ring Assembly:
	- Limit Switch Sub-Assembly
	- Home Switch Sub Assembly (ring)
	- Unlimited Azimuth Cable Assembly
101376	PCU PROM for Mk2 non-Wheelmark Antenna
101377	PCU PROM for Mk2 Wheelmark Antenna
101384	Saturn Bm Rotary Joint Mounting Instruction
102583	N Coax Plug type 11N-50-2-5, straight
102580	Mounting screw for Limit Switch Sub-Assembly (2)
102584	Mounting screw for Rotary Joint Unit (4)

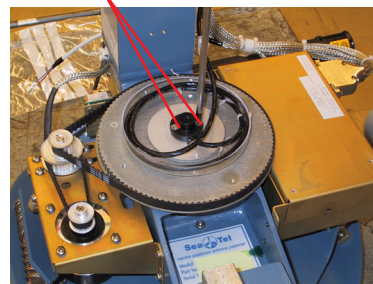
Preparation

Prior to installing the Rotary Joint, dismount the existing coax cable retainer:

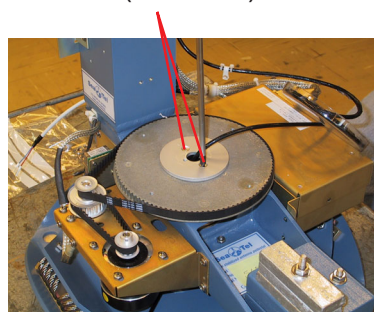
1 Remove the top cover from the cable retainer.
(2 screws)



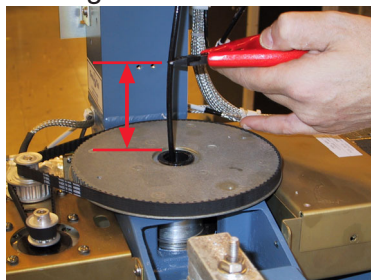
2 Remove the bottom of the cable retainer.
(2 screws)



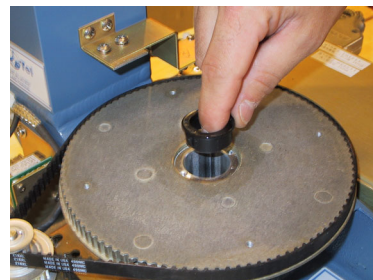
3 Remove the retainer bracket. (2 screws)



4 Tighten the coax cable and cut as indicated before making a coax connection.



5 Remove the plastic bushing.



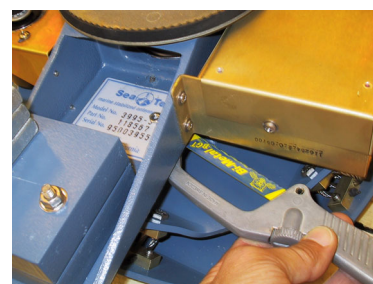
6 Remove the nut attaching one of the end stop screws located at the Azimuth cogwheel.



7 Using a pair of pliers, twist the screw clockwise.



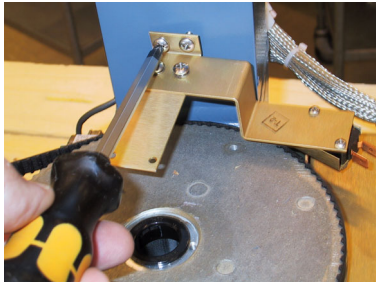
8 Using a saw, cut off the screw head accessible underneath the pedestal.



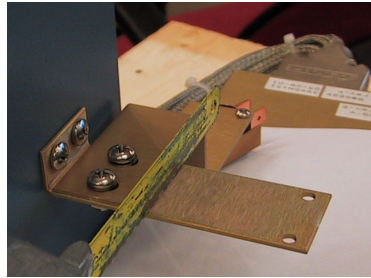
Saturn Bm Rotary Joint mounting instruction (cont'd)

Mounting

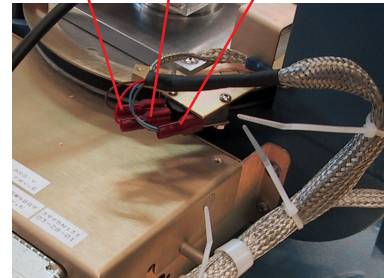
1 Mount the end stop switch.



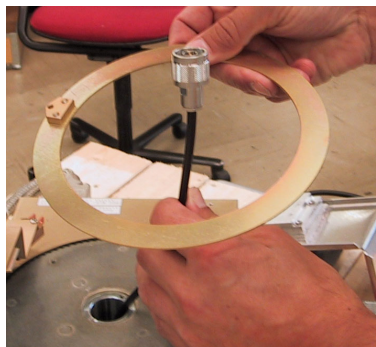
2 Cut the bracket (protect the pedestal with a paper for dust).



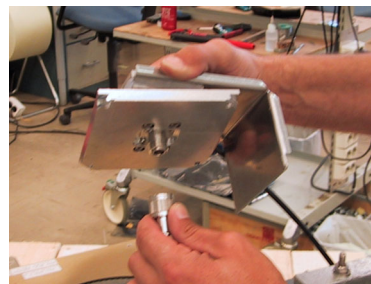
3 Connect the cable.
From left:
brown red blue



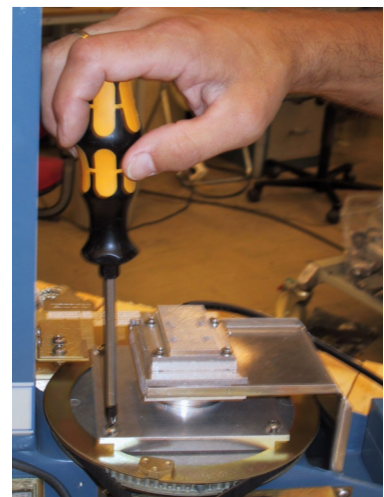
4 Place the cam washer on the cogwheel.



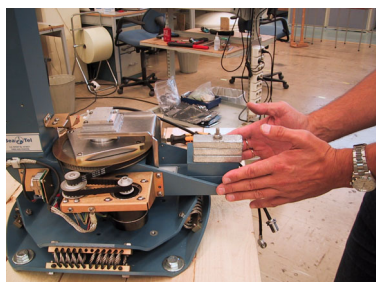
5 Connect the coax cable to the Rotary Joint.



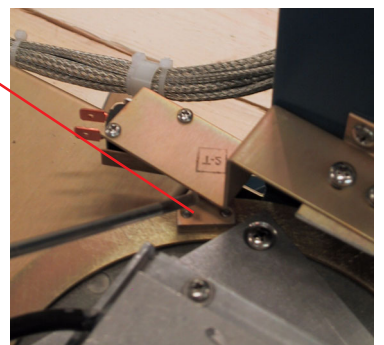
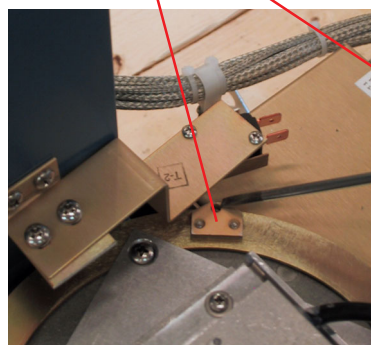
6 Attach the Rotary Joint to the cogwheel, but do not tighten the screws.



7 Point the pedestal in the direction of the "Heading mark" (where the cable emerges from the pedestal).

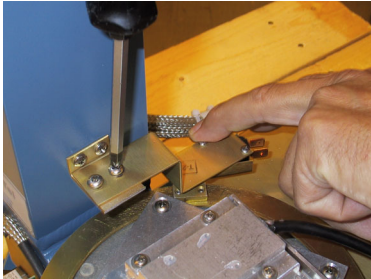


8 Turn the cam washer until the microswitch lies on top of the cam.



Saturn Bm Rotary Joint mounting instruction (cont'd)

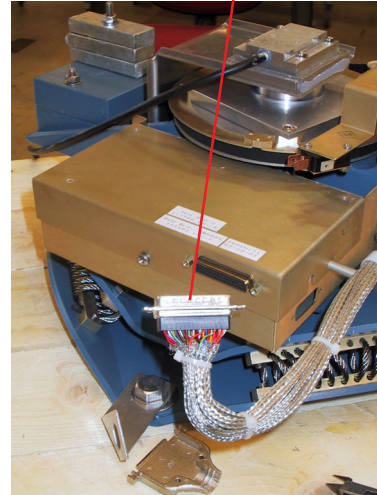
9 Adjust the switch pressure until a click sounds when the cam washer passes the switch.



10 Tighten the screws fastening the Rotary Joint. (4 screws)

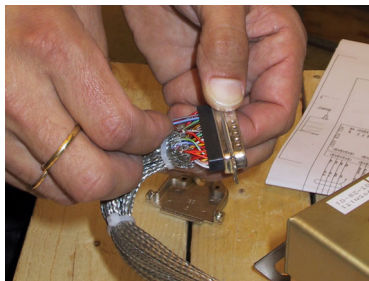
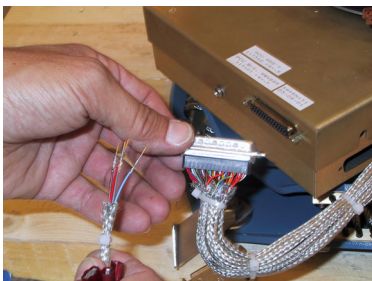


11 Remove the multiconnector cover.



12 Enter the wires from the microswitch into the multiconnector housing:

(+5V) Red to pin 16
(Gnd) Brown to pin 37
(Az.B) Blue to pin 33



13 Secure with cable ties.



Saturn Bm Rotary Joint mounting instruction (cont'd)

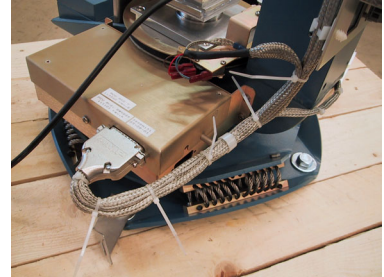
14 Tighten the common cable tie.



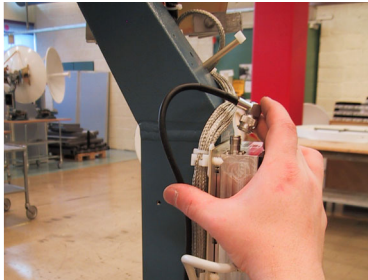
15 Mount the multiconnector cover.



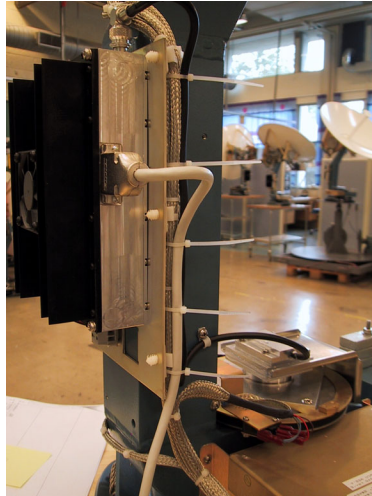
16 Tie the microswitch and the multiconnector cables together.



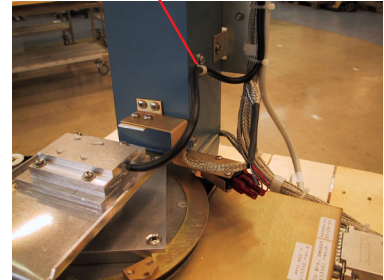
17 Connect the coax cable between the Rotary Joint and the Transceiver.



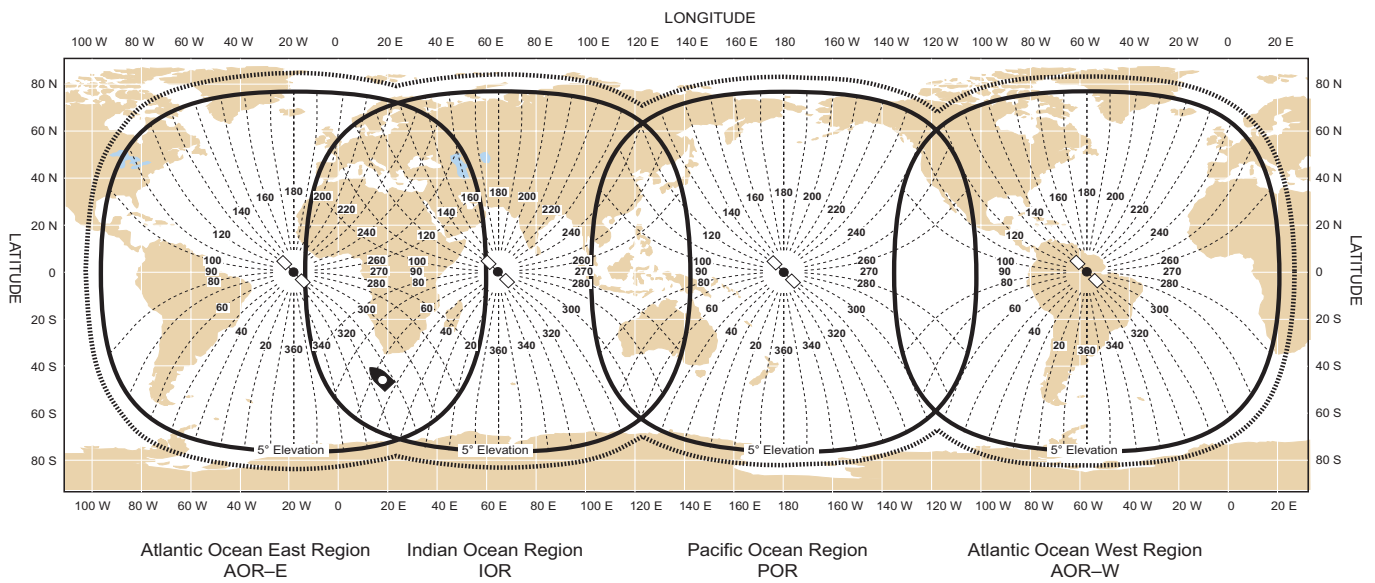
18 Secure with cable ties.



19 Secure the coax cable with clamp.



Azimuth angle map



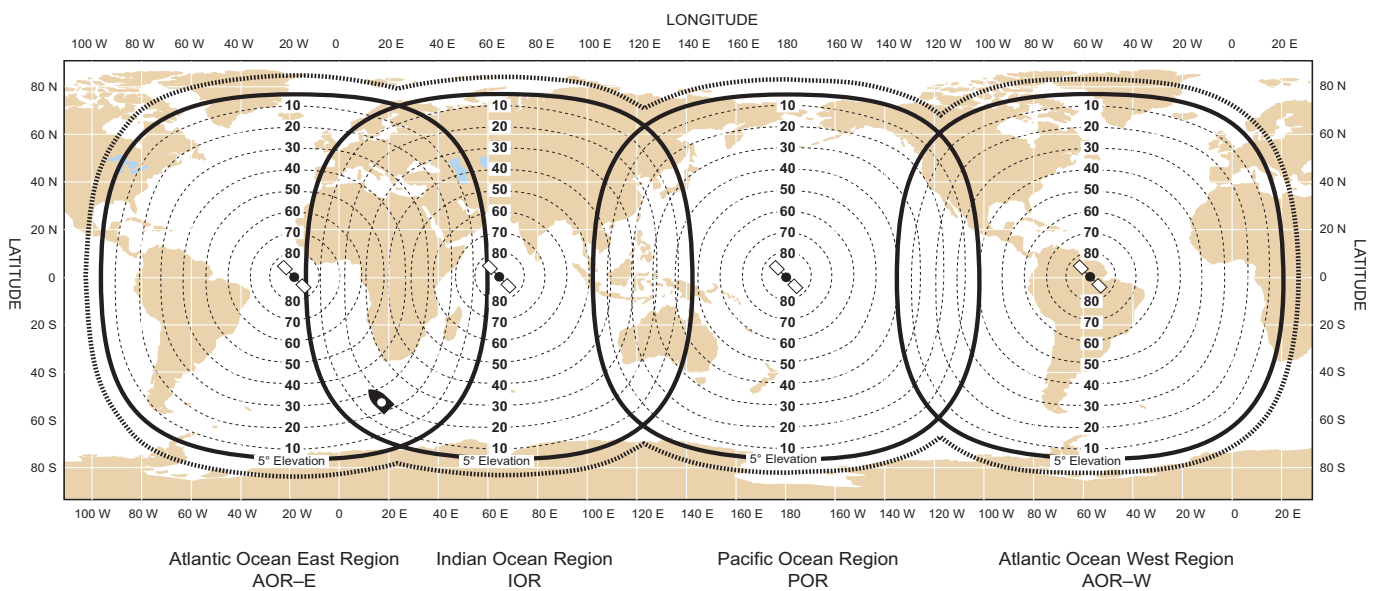
Example:

Azimuth angle for the plotted position

315° for the AOR-E satellite
55° for the IOR satellite

Be careful not to read the wrong angle
in areas where two satellites overlap.

Elevation angle map



Example:

Elevation angle for the plotted position

24° for the AOR-E satellite
17° for the IOR satellite

Be careful not to read the wrong angle
in areas where two satellites overlap.

Nera ASA

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