Installation manual

Simrad ITI
Trawl instrumentation system

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SIMRAD
A KONGSBERG Company

SIMRAD ITI
Trawl instrumentation system

P2257E

Note

Simrad AS makes every effort to ensure that the information contained within this document is correct. However, our equipment is continuously being improved and updated, so we cannot assume liability for any errors which may occur.

Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.

Simrad AS disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

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LIST OF CONTENTS

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DRAWINGS AND DIAGRAMS

The drawings and diagrams listed below are included in section 6.

Document revisions

Rev	Written by		Checked by		Approved by	
	Date	Sign	Date	Sign	Date	Sign
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Rev	Action/Changes/References
C	Manual reformatted, and updated to suit new software version.

To assist us in making improvements to the product and to this manual, Simrad Subsea would welcome comments and constructive criticism. Please send all such, in writing, to:

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Version 1: Manual updated, drawings added.
Version C: Manual updated to include new transducer sections. "Debugging" section added, appendices changed, more drawings added.

GENERAL INFORMATION

CONTENTS:

1 INTRODUCTION

1.1 GENERAL

This manual describes the installation of the ITI system units in the vessel, including the installation of the vessel transducer when a fixed installation is required. It also defines the equipment responsibility and provides instructions for unpacking and storage. The installation of the vertical shaft hull unit and its associated equipment is covered in a separate manual. Refer to that manual for the installation instructions.

A method for protecting the fixed transducer against ice can be found in Section 2 of this manual, as can mounting instructions for the trawl door sensor adapters. These instructions include a brief description of the communication principles and give details of how the alignment of the spread sensors will influence the system performance. As trawl doors come in many different shapes and sizes, it is vital that the installation engineer knows the exact orientation of the doors during towing so that the sensors can be correctly aligned.

All the net-mounted sensors must be fitted correctly. The procedure is given in Section 2. It must be emphasized that the overall performance of the system will depend very much on the sensors being correctly mounted to the net, though the operator will learn this through experience very quickly.

All possible types of interface from external equipment to the ITI system are described in the Appendices in Section 4.

1.2 SYSTEM UNITS

The SIMRAD ITI system consists of the following units:

- ITI Control and Display Unit CF2-108591
- ITI Transceiver Unit ITI-108741
- Interface cable set (Transceiver/monitor) KIT-109768
- ITI Triple transducer (fixed hull-mounted) KSV-049983
  Refer to "System options" for other configurations.
- Sensors, including:
  - Temperature ITI-110114
  - Depth ITI-110113
  - Temp/Depth ITI-109184
  - Height ITI-110115
  - Spread 1 communication ITI-110116

- Spread 1 remote ITI-110117
- Spread 2 communication ITI-110118
- Spread 2 remote ITI-110119
- Catch I ITI-110120
- Catch II ITI-110121
- Catch III ITI-110122

• Spread sensor adapter (all door type) ITI-108675
• Sensor charger (fast): 230 Vac LAD-109376
115 Vac LAD-109377

1.3 SYSTEM OPTIONS

Options available include:

• ITI Vertical shaft hull unit ITI-107245
• Slave display units CF2-108591
• Split-beam transducer element with mounting frame KSV-109486
(for both single and dual installations)
• Transducer adapter (for both single and dual installations) .. ITI-109510
• Spare transducer elements (without mounting frame) KSV-109487
• Interface cable for slave display units 380-109268
• Step-up transformer (115 to 230 Vac, 750 VA) 221-063336
• Key-pad (replaces joystick) ITI-109435

1.4 INSTALLATION PROCEDURES

Installation of the system includes as follows:

1. Installation planning (Section 1).
   - Location of the display, transceiver, transducer (hull unit if applicable), and cable routes.
2. Installation of the transducer/hull unit (Section 2).
3. Installation of the CF 140 control and display unit (Section 2).
4. Installation of the transceiver unit (Section 2).
5. Installation of the battery charger (Section 2).
6. Mounting sensors on the net (Section 2).
7. Installing the trawl door adapters (Section 2).

The installation procedures for the various system units are described in Section 2 of this manual. General details for each unit are also provided, including tool requirements, personnel requirements and the approximate time an experienced installation team should use on the task assuming all goes well. "Un-foreseen circumstances" will obviously effect these times. Refer to the mechanical drawings, the cable plan and main inter-connection diagrams located at the back of the manual.

1.5 TOOL KITS

1.5.1 Mechanical tool kit

A standard mechanical tool kit will be required to perform most of the installation tasks. This tool kit should contain the following tools:

- Standard screwdrivers in various sizes
- Phillips screwdrivers in various sizes
- Pozidrive screwdrivers in various sizes
- Allen keys in metric sizes
- Flat nosed and lap jointed pliers
- Snipe-nosed pliers
- Open ended and ring spanners in metric sizes
- Adjustable spanners
- Socket set
- Ratchet wrench
- Plastic hammer
- Metal hammer
- Centre punch
- Power drill and selection of drill bits
- Metric tap and die set
- Selection of flat, triangular, half-round and rat-tail files in various sizes and grades
- Tape measure
- "T" square
- Scribe
- Knife

The following expendable items are recommended:

- Adhesive tape in various colours
- Small box of grease
- Ball of string/cord
- Selection of washers and shims in various sizes

1.5.2 Electrical tool kit

A standard electrical tool kit will be required in addition to the mechanical tool kit given in paragraph 1.5.1 to perform the cable installation tasks. This tool kit should contain the following tools:

- Insulated flat-blade screwdrivers in various sizes
- Insulated Phillips screwdrivers in various sizes
- Insulated wire cutters

- Insulated snipe-nosed pliers
- Soldering iron and roll of solder
- Crimping tool

The following expendable items are recommended:

- Cable clips in various sizes
- Adhesive tape in various colours
- Selection of cable crimp terminations in various sizes
- Selection of cable numbering tags in various sizes
- Wire straps

2 SUPPLY CONDITIONS

2.1 EQUIPMENT RESPONSIBILITY

Upon receipt of the equipment, the installation shipyard automatically becomes fully responsible for the equipment unless otherwise stated in the contract. This responsibility covers the storage period before installation, the actual installation, commissioning, and the period between the completion of the commissioning and the acceptance of the equipment by the end user (normally the owner of the vessel into which the equipment is to be installed).

2.2 TRANSPORTATION, RECEIPT, UNPACKING AND STORAGE

2.2.1 Unpacking, lifting and handling

There are no special precautions to be taken when receiving the equipment. Normal precautions for handling, transportation and storage of fragile electronic equipment must be undertaken. The units must be handled with care.

2.2.2 Inspection

On receiving the equipment, the ship-yard must ensure that the delivery is complete. Check that all units have been received by comparing the tag numbers, registration numbers and serial numbers with the packing lists.

Inspect each container for physical damage. If the inspection on receipt reveals indications of crushing, dropping, immersion in water or any other form of damage, the receiving shipyard should request a representative from the carrier to be present at the shipyard during unpacking.

During unpacking, the equipment should be inspected for physical damage, i.e. broken controls, and indicators, dents, scratches etc.

If any of the equipment is found to be damaged, the shipyard should notify both Simrad and the carrier so that Simrad can arrange for replacement or repair of the damaged parts.

2.2.3 Storage

2.2.3.1 Pre-installation

All equipment should be stored in its original transportation crates until the shipyard/company is ready to install it. Once unpacked, it must be kept in a dry, non condensing atmosphere, free from corrosive agents, within the temperature and humidity ranges as detailed in the technical specifications. In addition, the equipment must be covered to protect it from dust and other forms of contamination.

The units must be installed in their intended operating positions as soon as possible after unpacking.

If a unit is later removed from its operating position, it must be stored and transported in its original packing material and/or crate.

Sensor units should be recharged at two-month intervals when in extended storage.

2.2.3.2 After use

If units are removed from the vessel and placed into storage, they must be properly cleaned and prepared before packing. All units which have been exposed to sea-water/spray/salt-atmosphere, must be thoroughly cleaned before storage. Sealed units must be removed from their operational positions, washed in fresh water and dried.

All surfaces must be inspected for signs of corrosion, eg. flaking/bubbling paint, stains etc. Damaged or suspect areas must be cleaned, prepared and repainted using the correct paints.

All unprotected parts made of a material likely to corrode must be cleaned of dust and stains and coated with a corrosion resistant material.

Electronics cabinets must be cleaned EXTERNALLY using detergent and water (care must be taken to ensure water does not enter the unit), then properly dried. A vacuum cleaner should be used to remove internal dust.

When the system is to be stored for an extended period, (exceeding three months), the sensor units should be recharged at two-month intervals. This will extend the battery life.

All units must be stored and transported in their original packing material and/or crate using the procedure below:

1. The units must be humidity-protected with a sealed plastic bag at least 0.15 mm thick.

2. Humidity absorbing material (DYDGRAIL) should be placed inside this sealed bag.

3. To protect displays, joysticks, etc. blocks of polyurethane foam (ISOPOR) should be cut to fit.

4. The unit and protection must then be placed in a second sealed plastic bag.

5. The sealed units must then be placed in their original cases, or other cases of a suitable size.

6. The units must be kept in a fixed position inside the box by foam packing.

2.2.4 Temperature protection

All units that need temperature protection must be packed as electronic units, and the box must be lined on all walls, bottom and top with 5 cm thick polyurethane foam (ISOPOR).

This type of package must be marked:

MUST NOT BE TRANSPORTED OR STORED IN TEMPERATURES BELOW -5 DEGREES CELSIUS.

2.3 INSTALLATION, SUPERVISION AND COMMISSIONING

2.3.1 Electrical and mechanical installation

Unless otherwise stated, the installation shipyard is responsible for the installation of the total system. In addition, the shipyard is also responsible for providing and connecting all cables other than special cables supplied with the equipment, and where applicable, base-frames which must be manufactured in accordance with the drawings provided in the following sections of this manual.

The actual installation and cable laying must comply with the vessel's classification rules and the recommendations given in this manual.

During the installation period the shipyard will be held responsible for all damage to the equipment. Therefore, the equipment should be covered in such a way that it is protected from dust, paint spray/splashes and welding/cutting sparks. Precautions should be taken to ensure that no part of the equipment is used as a work platform, or for any other purpose for which it was not designed.

Any damage incurred during the installation period, even with a Simrad representative present, is the installation shipyard's responsibility unless it can be proven that the damage was due to production or material defect of the equipment delivered by Simrad, or irresponsibility by Simrad personnel.

2.3.2 Pre-commissioning and customer acceptance test

The Simrad personnel must have access to "non-specialist" equipment and tools, and necessary power for the whole period of installation, commissioning and testing.

If required during the installation period, the shipyard must provide, free of charge, assistance necessary for the rapid and efficient completion of tasks, even for work done outside normal working hours. This requirement includes assistance from sub-contractors when applicable. Excessive waiting time resulting from delays caused by the shipyard will be charged to the shipyard/customer.

2.4 PROJECT MANAGEMENT

2.4.1 Installation schedule

The Simrad installation period (after shipyard-installation) is normally divided into three consecutive phases:

- Initial Start-Up, Dockside Testing and Pre-commissioning.
- Commissioning (Sea Trials) in operational condition.
- Sea Acceptance Test (SAT) in operational condition.

2.4.2 Installation performed by Simrad Subsea A/S

Simrad Subsea A/S will assist during the installation if specified in the contract or requested by the installation shipyard or customer. Before any installation work by Simrad Subsea A/S can begin, all cables (at least those which are in any way connected with the system) must be run and connected to their respective terminations. These cables will then be checked by the Simrad engineers before they are used.

Depending upon the availability of electrical power either from the generators on board or from ashore, the equipment related to the system and the various parts of the system will be tested during the Setting To Work (STW) period. This requires that interfaces to equipment delivered by other subcontractors are ready for integration testing.

During this period delays may occur if any of the equipment related to the system is not available for testing as and when it is required by Simrad Subsea A/S. During sea trials, the vessel must be entirely at Simrad's disposal even though Simrad cannot be held responsible for expenses relating to the running costs of the vessel.

After completion of the commissioning, the equipment should be officially handed over to the end user and the appropriate documents signed in accordance with the contract. All defects or deviations from the contract must be specified in detail in these documents. It should be noted that if such defects or deviations are not specified, they cannot be used by any of the parties concerned as valid reason for not signing the documents.

2.4.3 Guarantee period

The guarantee period for the system (as specified in the contract) begins as soon as acceptance documents have been signed.

3 POWER AND ENVIRONMENTAL REQUIREMENTS

3.1 POWER REQUIREMENTS

The power supplies to the Simrad equipment are to be kept within 90% and 110% of the installation's nominal voltage. The maximum transient voltage variations which may occur on the main switchboard's bus-bars (except under fault conditions) are not to exceed -15% to +20% of the nominal voltage.

- *Refer to the Technical Specifications chapter for further details.*

3.2 ENVIRONMENTAL REQUIREMENTS

3.2.1 Vibrations

The bulkhead-mounted units are normally delivered without vibration damping devices. However, if the vibration velocity amplitude at the equipment's mounting location is expected to exceed 10 mm/s in the range 5-50 Hz, constantly during operational life, special precautions are to be taken.

3.2.2 Temperature, humidity and corrosion

Unless otherwise specified all the equipment should be kept in an operational environment, with the room temperature within the limits +5°C to +55°C, with room humidity less than 90% (non condensing) and in a dust-free atmosphere.

4 CABLING

4.1 CABLE TRAYS

All permanently installed cables associated with the system must be supported and protected at all times using cable trays or conduits. These trays/conduits must be firmly secured to the bulkhead or deckhead. The only exception to this rule is during the final short distance (max. ½ meter) as the cable runs into the cabinet/unit.

Wherever possible, the cable trays/conduits must be:

- Straight, accessible and placed so as to avoid possible contamination by condensation and dripping moisture.
- Remote from sources of heat, and should be protected against physical damage. Suitable shields must be provided where cables are installed in the vicinity of heat sources.
- Where a service requires duplicate supply lines, the cables should follow separate paths whenever possible.
- Cables having insulation materials with different maximum-rated conductor temperatures should not be bunched together (i.e. in a common clip, gland, conduit or duct). When this is impractical, the cables must be carefully bunched such that the maximum temperature expected is within the specifications of the lowest-rated cable.
- Cables with protective coverings which may damage other cables should not be bunched together with vulnerable cables.
- Cables having a copper sheath or braiding must be installed in such a way that galvanic corrosion by contact with other metals is prevented.
- Signal cables must not be installed in the same cable tray as high-power cables.

4.2 RADIO FREQUENCY INTERFERENCE PROTECTION

All cables that are to be permanently installed within 9 m (30 ft) of any source of Radio Frequency Interference such as a transmitter aerial system or radio cabin, must, unless shielded by a metal deck or bulkhead, be adequately screened by sheathing, braiding or other suitable material. In such a situation flexible cables should be screened wherever practicable.

It is important that cables, other than those supplying services to the equipment installed in a radio room, are not installed through a radio room. Cables which must pass through a radio room must be screened by a continuous metal conduit or trunking which must be bonded to the screening of the radio room at its point of entry and exit.

4.3 PHYSICAL PROTECTION

- Cables exposed to the risk of physical damage must be enclosed in a steel conduit or protected by a metal casing unless the cable's covering (e.g. armour or sheath) is sufficient to protect it from the damage risk.

- Cables exposed to an exceptional risk of mechanical damage (for example in holds, storage-spaces and cargo-spaces) must be protected by a suitable casing or conduit, even when armoured, if the cable covering does not guarantee sufficient protection for the cables.

- Metallic materials used for the physical protection of cables must be adequately protected against corrosion.

4.4 GROUNDING OF PROTECTIVE METALLIC COVERINGS

- All metallic cable coverings (armour, lead sheath etc.) must be electrically connected to the vessel's hull at both ends except in the case of final sub-circuits where they should be connected at the supply end only.

- Grounding connections must be made using a conductor which has a cross-sectional area related to the current rating of the cable, or with a metal clamp which grips the metallic covering of the cable and is bonded to the hull of the vessel. These cable coverings may also be earthed by means of glands specially intended for this purpose and designed to ensure a good earth connection. The glands used must be firmly attached to, and in good electrical contact with, a metal structure earthed in accordance with these recommendations.

- Electrical continuity must be ensured along the entire length of all cable coverings, particularly at joints and tappings.

- In no case should the lead-sheathing of cables be used as the only means of earthing cables or units.

- Metallic casings, pipes and conduits must be grounded, and when fitted with joints these must be mechanically and electrically earthed.

4.5 CABLE CONNECTIONS

- All cable connections required to be made are shown on the applicable cable diagrams.

- Where the cable diagram shows cable connections outside an equipment box outline, the connections are to be made to a plug or socket which suits the plug or socket on that particular item of equipment.

- Where two cables are connected in series via a junction box or terminal block, the screens of both cables must be connected together but not earthed.

4.6 CABLE TERMINATIONS

Care must be taken to ensure that the correct terminations are used for all cable conductors, especially those that are to be connected to terminal blocks. In this case, crimped sleeve-terminations must be fitted to prevent the conductor core from fraying and making a bad connection with the terminal block. It is also of the utmost importance that where crimped terminations are used, the correct size of crimp and crimping tool are used. In addition, each cable conductor must have a minimum of 15 cm slack (service loop) left before its termination is fitted.

4.7 CABLE INSTALLATION GUIDELINES

All cable connections must be made in accordance with the guidelines laid down by the vessel's Classification Society.

If no such guidelines exist, Simrad recommends that the DnV Report *No.80-P008 "Guidelines for Installation and Proposal for Test of Equipment"* be used as a guide.

5 TECHNICAL SPECIFICATIONS

5.1 SYSTEM MAIN UNITS

- Control and display unit.
- Transceiver unit.
- Vessel transducer (See transducer alternatives).
- Sensors.
- Battery charger.

- Vertical hull unit with triple transducer (Option).

5.2 UNIT DIMENSIONS AND WEIGHTS (PACKED)

Unit	Ref. No.	Dimensions	Container	Volume (m^3)	Weight (kg)
14" display unit	CF2-108591	58 x 50 x 43	Cardboard box	0.12	36
Transceiver unit	ITI-108741	58 x 50 x 43	Cardboard box	0.12	31
Triple transducer	KSV-049983	58 x 50 x 43	Cardboard box	0.12	46
Temp. sensor	ITI-110114	34 x 34 x 20	Cardboard box	0.023	10
Depth sensor	ITI-110113	34 x 34 x 20	Cardboard box	0.023	10
Height sensor	ITI-110115	34 x 34 x 20	Cardboard box	0.023	10
Catch sensor I II III	ITI-110120 ITI-110121 ITI-110122	34 x 34 x 20 34 x 34 x 20 34 x 34 x 20	Cardboard box Cardboard box Cardboard box	0.023 0.023 0.023	10 10 10
Temp/Depth sensor	ITI-109184	34 x 34 x 20	Cardboard box	0.023	10
Spread 1 Comm Remote	ITI-110116 ITI-110117	46.5 x 30 x 20 46.5 x 30 x 20	Cardboard box Cardboard box	0.028 0.028	7 7
Spread 2 Comm Remote	ITI-110118 ITI-110119	46.5 x 30 x 20 46.5 x 30 x 20	Cardboard box Cardboard box	0.028 0.028	7 7
Battery charger 230 V 115 V	LAD-109376 LAD-109377	30 x 22 x 15 30 x 22 x 15	Cardboard box Cardboard box	0.01 0.01	2 2
Single transducer w/ mounting frame	KSV-109486	47 x 46 x 29	Cardboard box	0.07	13
Adapter for single transducer	ITI-109510	31 x 23 x 16	Cardboard box	0.015	4
Single td. without mounting frame	KSV-109487	47 x 46 x 29	Cardboard box	0.07	12
Spread sensor adapter	ITI-108675	55 x 41 x 32	Cardboard box	0.072	31

5.3 SYSTEM FEATURES

Trawl positioning ..... Horizontal distance, slant range, bearing
Positional accuracy ..... Horizontal range: typical ± 5 m
Slant range: typical ± 5 m
Bearing: typical ± 1°
Sensor information ..... Height from head-rope to bottom
Height from head-rope to foot-rope
Temperature
Depth
Spread distance between trawl doors/trawl wings (two sets)
Catch indication (max three catch sensors)
Range scales ..... Ranges up to 4000 m.
The range depends on transducer installation, ambient noise level, temperature gradients and sensor alignment
Interrogation ..... Rate selected separately for each sensor
Frequency ..... Unique frequency for each sensor
Identification ..... No sensor code or vessel code necessary
Operation ..... Joystick in conjunction with screen menu

5.4 UNIT INFORMATION

5.4.1 The control and display unit

Dimensions:
- Height ..... 354.5 mm
- Width ..... 410 mm
- Depth ..... 455 mm

Weight ..... 27 kg
Display type ..... 14" high resolution colour monitor
(8 colours, active screen 680 x 512 pixels)
Operation ..... Joystick
Power supply ..... 115/230 Vac ±15%, 50/60 Hz
(115 Vac requires a step-up transformer)
Power consumption ..... 90 W
Temperature:
- Storage ..... -20° to +60°C
- Operational ..... 0° to +50°C

Humidity:
- Storage ..... 10% to 90%
- Operational ..... 30% to 80%

5.4.2 The transceiver unit

Dimensions:
- Height ..... 400 mm
- Width ..... 400 mm
- Depth ..... 300 mm

Weight ..... 26 kg
Power supply (see note below) ..... 115/230 Vac ±15%, 50/60 Hz
Power consumption ..... 87 W
Temperature:
- Storage ..... -20° to +60°C
- Operational ..... 0° to +50°C

Humidity:
- Storage ..... 10% to 90%
- Operational ..... 30% to 80%

Data I/O:
- Gyro ..... Stepper/synchro types
- Log ..... Pulse, analogue or Simrad NL doppler log
- Serial lines ..... Four NMEA 0183 serial lines for:
  Simrad omni. sonars (SR 240/SD 570)
  Echo-sounders with NMEA 0183 format
  Track plotters/winch control systems/data logger
  Navigation equipment
- Option ..... Ethernet

PCBs ..... CPB286 (processor board)
Interface and Display controller
Transceiver board
ITIP (ITI Power supply)

Note

If a standard ITI display is installed, the power supply to the transceiver unit will be taken from the display. In that case, one need only consider the supply to the display. If a different type of computer display is to be used, the transceiver must then be powered directly from the vessel's supply system. When the vessel's supply is 115 Vac, two methods exist for powering the transceiver unit:

1. *A step-up transformer can be used to increase the supply voltage to 230 Vac.*
2. *The Power Supply board in the transceiver unit can be modified using straps to accept 115 Vac.*

5.5 TRANSDUCER ALTERNATIVES

5.5.1 Triple transducer installation

Three single transducers mounted in one housing.

Weight	35 kg. (including cables)
Depth rating	20 m
Transducer type	Ceramic triple split beam transducer
Transducer housing	Tin-bronze, DIN 1705 G-CuSn10
Transducer element	Replaceable under water
Transducer cables	2 off, each 12 mm ∅, length 20 m
Vertical beam tilt	-20° (standard) or -10°
Beam width	40°(each beam)
Vertical coverage	-10° tilt ⇒ 30° (surface to -30°) -20° tilt ⇒ 40° (surface to -40°)
Horizontal coverage	100° (±50° around the stern)
Frequency	27 to 33 kHz
Beam overlap	10°
Transducer impedance	60Ω

5.5.2 Dual transducer installation

Two single transducers, one on each side of the keel.

Weight	2 x 4 kg (including 30 cm cable + connector)
Depth rating	20 m
Transducer type	2 single ceramic split beam transducers
Transducer element	Replaceable under water
Transducer cables	2 off, each 12 mm ∅, length 20 m
Vertical beam tilt	-20° (standard) or -10°
Beam width	40°(each beam)
Vertical coverage	-10° tilt ⇒ 30° (surface to -30°) -20° tilt ⇒ 40° (surface to -40°)
Horizontal coverage	70° (±35° around the stern)
Frequency	27 to 33 kHz
Beam overlap	10°
Transducer impedance	60Ω

5.5.3 Single transducer installation

Weight ..... 4 kg (including 30 cm cable + connector)
Depth rating ..... 20 m
Transducer type ..... Ceramic split beam transducer
Transducer element ..... Replaceable under water
Transducer cables ..... 1 off, 12 mm ∅, length 20 m
Vertical beam tilt ..... -20° (standard) or -10°
Beam width ..... 40°
Vertical coverage ..... -10° tilt ⇒ 30° (surface to -30°)
-20° tilt ⇒ 40° (surface to -40°)
Horizontal coverage ..... 40° (±20°)
Frequency ..... 27 to 33 kHz
Transducer impedance 60Ω

5.6 SENSORS

5.6.1 Common data

Weight in air
Temp/Depth, Height, Temp, Depth, Catch ..... 9.0 kg
Spread ..... 5.5 kg
Weight in water
Temp/Depth, Height, Temp, Depth, Catch ..... 3.0 kg
Spread ..... 2.5 kg
Depth rating ..... 2000 m
Housing ..... Moulded durotong housing
Communication ..... Frequency: - 27 to 33 kHz
Beam width: - Transducer at 30 kHz: approx. 50°
Transmission power: - 20 W
Electronics ..... Changeable/repairable
Battery ..... Fast charge: NiCad, 10.8 V, capacity 1700mAh
Battery life (assume 15 sec. interrogation rate):
Temp/Depth, Temp, Depth, Catch, Spread ..... Approx. 80 hrs
Height ..... Approx. 40 hrs
Charging time ..... Approx. 3 hrs
Water switch ..... Seawater detector for automatic ON/OFF switching

5.6.2 Height sensor

Information	Distance from head-rope to foot-rope Distance from head-rope to bottom
Range	100 m - head-rope to foot-rope 100 m - head-rope to bottom
Accuracy	± 10 cm
Display read-out	0.1 unit
Units selectable	meters, fathoms, feet
Position	Centre of head-rope

5.6.3 Depth sensor

Information	Depth below surface
Depth range	0 - 2000 m
Accuracy	0 - 2000 m - 0.1% of full scale = ± 2 m
Display readout	0.1 unit
Units selectable	meters, fathoms, feet
Position	Centre of head-rope

5.6.4 Temperature sensor

Information	Temperature at head-rope
Temp. range	-5°C to +30°C (23°F to 86°F)
Temp. accuracy	± 0.2°C (± 0.4°F)
Display readout	0.1°C/F
Units selectable	Celsius, Fahrenheit
Position	Centre of head-rope

5.6.5 Temp/Depth combination sensor

Combination of Temperature and Depth sensors

Information	Temperature and depth at head-rope
Position	Centre of head-rope

Same specifications as the Temp. and Depth sensors.

5.6.6 Spread 1 sensor set

Information	Spread distance between doors
Spread range	0-300 m
Spread accuracy	± 35 cm
Display readout	0.1 unit
Units selectable	meters, fathoms, feet
Position	Fitted in special trawl door adapters

5.6.7 Spread 2 sensor set

Information	Distance across trawl wings
Spread range	0-300 m
Spread accuracy	± 35 cm
Display readout	0.1 unit
Units selectable	meters, fathoms, feet
Position	Fitted on inside of trawl net or onto wires

5.6.8 Catch sensor

Information	Catch feeler strap activated or not activated
Number of sensors	Max 3 (Catch I,Catch II,Catch III)
Display readout	Activated → red square
	Not activated → green square
	No contact → black square
Position	Upper surface of cod-end

5.7 SENSOR CHARGER

Fast charger	230 Vac ±15% supply
	115 Vac on request
Charging current (max. 3 hours)	450 mA
Built in charging control	Switched down by voltage level sensor, or
	timed voltage reduction after 3 hours
Maintenance current	100 mA
Minimum charging temp.	+15°C (59°F)
Lamp codes:	Red LED ON = normal charging
	Green LED ON = reduced charging
	LED OFF = no power / not charging

Note

The fast charger has a built-in regulator which reduces the charging current from the full current to the maintenance current when the battery voltage reaches a predefined level. The unit also contains a timer which will reduce the current to the maintenance level after 3 hours. These are safety precautions which are required for fast recharging of NiCad batteries.

The fast charger must not be used to recharge ITI sensors with a red label as this will damage the sensor's internal electronics. Do not use the fast charger to recharge any other type of sensor or equipment. Ensure the sensor has a blue label marked "FAST CHARGER" before attempting to recharge it using the fast charger. Read the charging instructions before attempting to use the battery charger.

INSTALLATION PROCEDURES

CONTENTS:

1 INSTALLING THE TRANSDUCER UNIT

1.1 GENERAL GUIDELINES

Refer to the transducer installation drawings at the back of the manual.

The installation should be carried out according to arrangement drawings which have been designed for the vessel. As no two installations will be identical, it is recommended that specific drawings be prepared by the ship-yard for each installation.

The transducer unit is the communications "aerial" between the ITI system electronics units in the vessel and the sensors mounted on the trawl net. There are several alternative types of installation. Two versions of a triple-beam transducer unit are available; The fixed installation, and the vertical shaft hull unit. Various combinations of individual transducer elements can also be mounted separately on the vessel's hull for installations where a single unit is impractical. The transducers can be adjusted to a tilt of -10° or -20° as required to ensure the best possible view of the sensors on the net at different trawling depths.

The retractable hull unit is available if required. This unit enables the transducer to be lowered 1.2 meters below the hull to give it a better view of the sensors on the net. It can also be retracted up into the vessel's hull for protection when not required for use.

1.2 TRANSDUCER ALTERNATIVES

Four alternative transducer installation arrangements can be used with the ITI system. These are shown in Figure 1. The alternatives are:

- Single transducer - Fixed hull installation.
- Dual transducer - Fixed hull installation.
- Triple transducer - Fixed hull installation.
- Triple transducer - Vertical shaft hull unit installation with hoist/lower mechanism.

The single transducer can be mounted on either side of the vessel's keel.

The dual transducer installation comprises two single transducers, one mounted on either side of the keel.

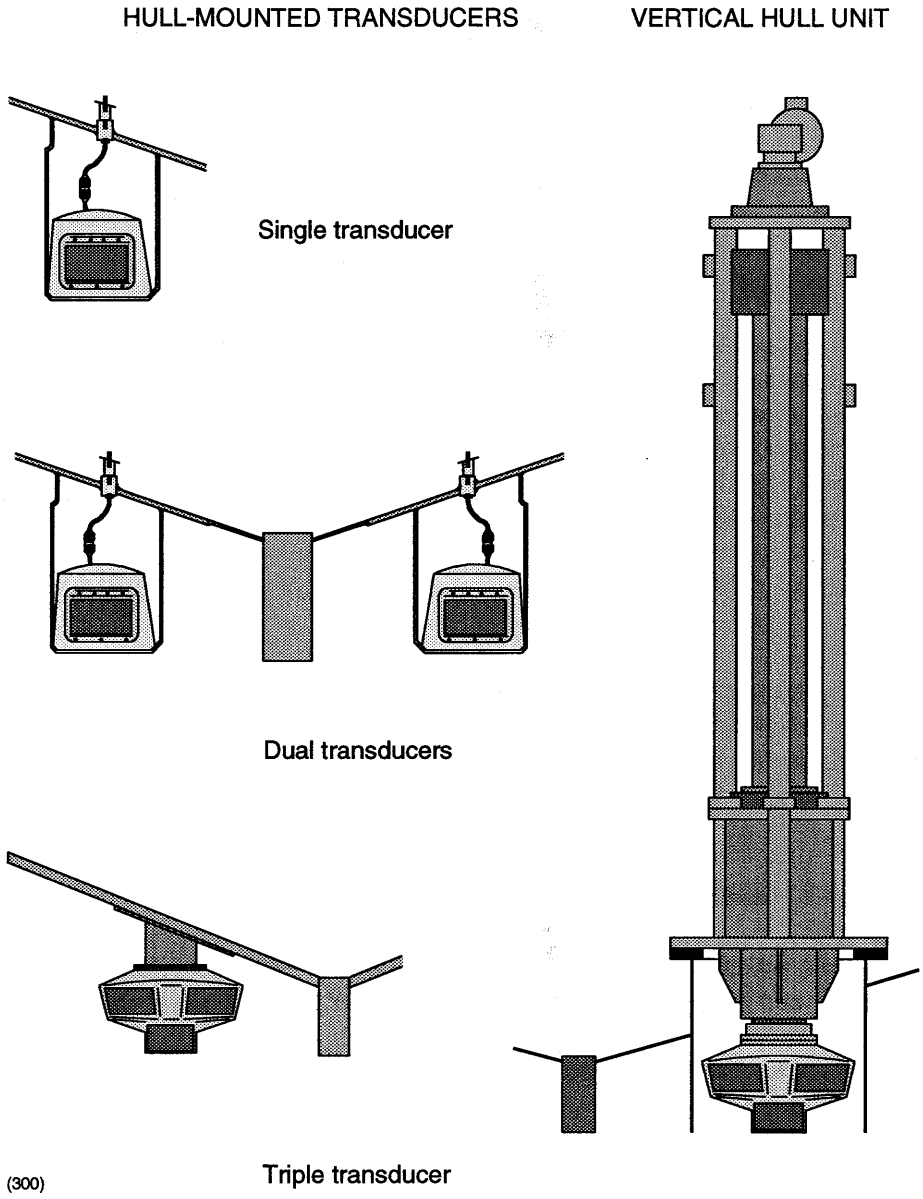


Figure 1 The ITI transducer mounting alternatives

The triple transducer can be mounted on either side of the keel.

The installation of the vertical shaft hull unit is covered in a separate manual which will be supplied with the unit.

The transducers can be mounted with one of two tilt angles; -20° is the standard installation, while -10° is only used when specifically requested by the customer.

Each transducer produces a conical beam, with a beam width of 40° in both the vertical and horizontal planes. When more than on transducer is used, the beams overlap by 10° in the horizontal plane.

The triple transducer therefore has three beams, giving a total coverage of 100° (±50°) in the horizontal plane.

The dual transducer arrangement comprises two single transducers, providing two beams, giving a total beam width of 70° in the horizontal plane.

The single transducer has just one beam, providing a coverage of 40°.

Figure 2 shows the vertical and horizontal beam coverage diagrams for the various transducer arrangements.

The centre-line of the total beam will normally be aft along the fore-and-aft centre-line of the vessel. However for pair trawlers it may be more practical to orientate the beam to port or starboard of the vessel's centre-line. When the transducer is installed at an angle to the vessel's centre-line, this offset angle must be entered into the ITI program via the menu. The setting will be remembered by the system, so is only required once.

1.3 TRANSDUCER LOCATION

The location of the transducer(s) should be selected after careful examination of the local hydro-acoustic noise conditions and possible environmental disturbances.

There may be many objects protruding from the hull, for example the keel, sonar and echo-sounder transducers, zinc anodes, transducer ice protection vanes etc. All such objects will generate flow noise which could interfere with the ITI communications. The ITI transducer should therefore be located as far as possible from any noise source.

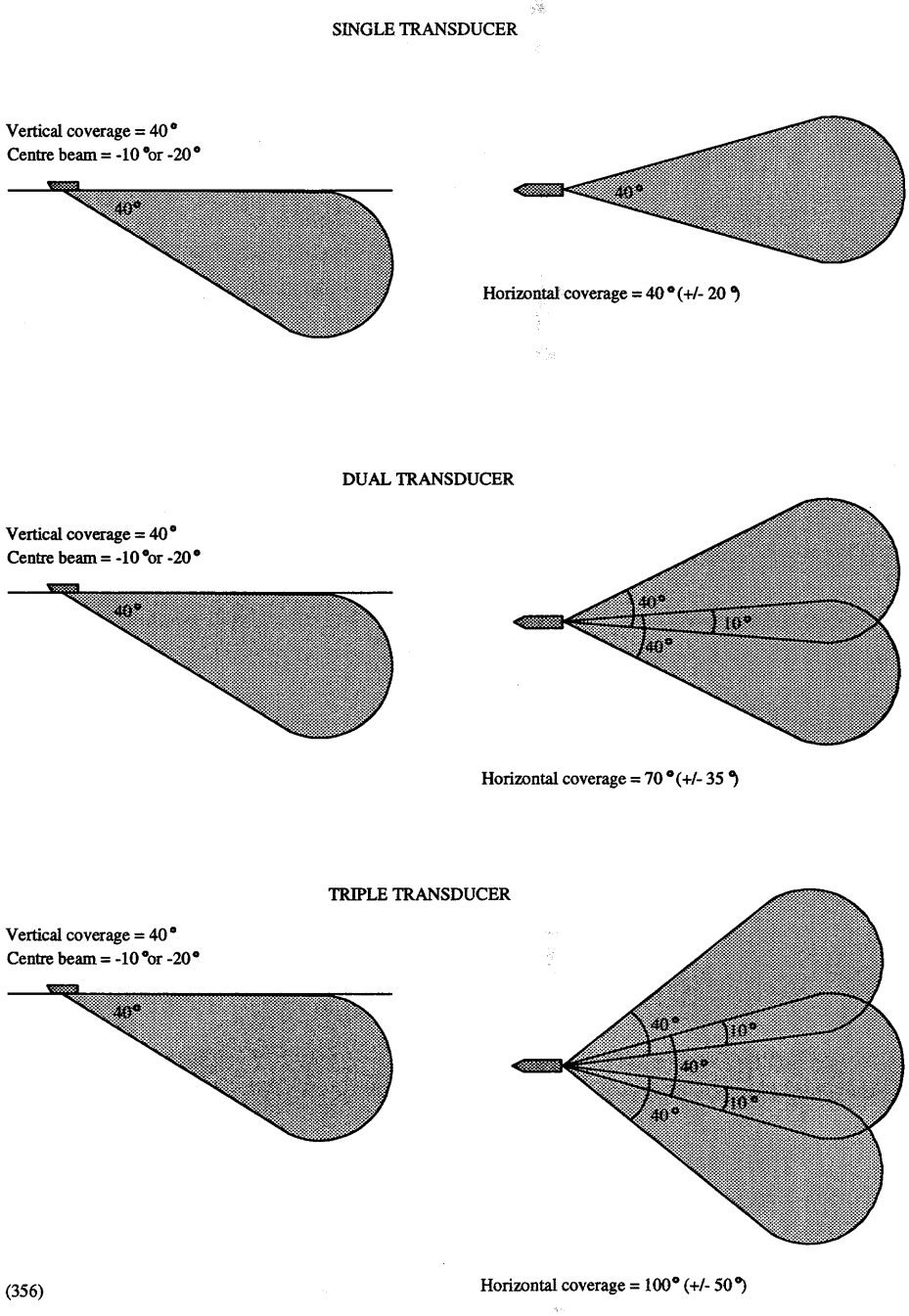


Figure 2 Beam coverage diagrams for the hull-mounted transducers

On fishing vessels, the dominant noise source is usually the propeller. The transducer must therefore be located as far as possible from the propeller, under the fore part of the vessel. On small vessels, if a single or triple transducer is to be fitted, it should also be located on that side of the keel where the propeller blades move upwards when the vessel is moving forwards. To reduce as much as possible, noise caused by air bubbles around the transducer, the unit should not be located too close to the bow. It should preferably be located approximately 1/3 of the ship's length from the fore perpendicular.

On smaller vessels where the physical size makes it impossible to have a distance of more than 20 meters between the propeller and the transducer, the transducer should be located in an area where it is shadowed from the propeller by part of the hull. Avoid if at all possible a direct acoustic path between the propeller and the transducer. Refer to Figure 3.

Some of the guidelines and recommendations given above will conflict with each other. Each installation will therefore need careful analysis to find the best compromise.

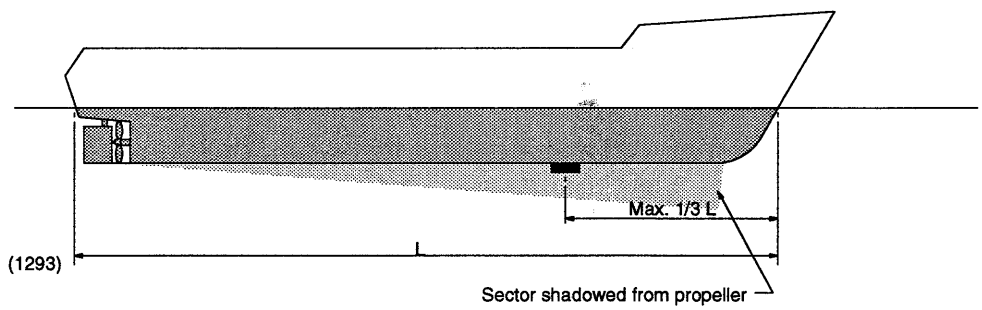


Figure 3 Transducer location

1.4 HULL REINFORCEMENTS

Reinforcements must be made where the installation causes weakening of the hull construction. It is recommended that reinforcing/doubling plates be welded onto the hull in the area of the installation. The strength of the welding between the transducer unit, the rope guards and the hull reinforcing plates must not exceed that of the welding between the reinforcing plates and the hull. The reinforcements required must be calculated and the necessary parts designed by the installing ship-yard.

1.5 SINGLE TRANSDUCER INSTALLATION

Vertical tilt ..... Standard -20° (-10° if requested by the customer)
Horizontal rotation ..... Standard 180° (aft). Can be aimed from 130° to 230° if required

Ensure the transducer has a clear view under the keel of the vessel.

Refer to the drawings at the back of the manual.

1.6 DUAL TRANSDUCER INSTALLATION

The dual transducer installation comprises two single transducers, one mounted on each side of the vessel's keel.

Vertical tilt ..... Standard -20° (-10° if requested by the customer)
Horizontal rotation ..... Port transducer: 195° (standard)
Starboard transducer: 165° (standard)
Each transducer can be rotated from 130° to 230° to aim the beams as required. Note that the two beams must always overlap by 10° ±1°, implying that the two transducers must be rotated as a pair.

Ensure the transducers have a clear view under the keel of the vessel.

Refer to the drawings at the back of the manual.

1.7 TRIPLE TRANSDUCER INSTALLATION

The triple transducer will normally be mounted on a tubular steel stem which is long enough to provide it with a clear view under the keel of the vessel.

Vertical tilt ..... Standard -20° (-10° if requested by the customer)
Horizontal rotation ..... 180° (standard)
The unit can be rotated from 130° to 230° to aim the beam as required

Ensure the transducer has a clear view under the keel of the vessel.

Refer to the drawings at the back of the manual.

1.8 INSTALLATION ACCURACY

The angular orientation of the transducer(s) is very important for the overall system accuracy, and must therefore be as exact as possible. This implies that the welding of the mounting bracket(s) to the hull should be made with the utmost precision, preferably with tolerances of less than ±1°. There are three mounting angles to take into account:

- Roll angle: The transducer mounting bracket(s) must be horizontal in the athwartships direction when the ship is floating normally.
- Pitch angle: The transducer mounting bracket(s) must be horizontal in the fore-and-aft direction when the ship is floating normally.
- Azimuth angle: The transducer(s) will normally be orientated such that it faces exactly aft, though offsets can be incorporated as stated in paragraphs 1.5 to 1.7.

1.9 TRANSDUCER PROTECTION

The transducer itself must not be mounted till all structural work and welding in the area is completed. If there is any chance of damage being caused by welding or other work during the installation period, the transducer must be protected with heat resistant material.

The unit should also have rope deflection plates installed fore and aft. These will lend some protection to the transducer, and help to prevent the transducer being fouled in the event of the vessel passing over a wire or line.

1.10 TRANSDUCER CABLE INSTALLATION

1.10.1 Introduction

The cables delivered with the system have a standard length of 20 m. The lengths delivered with single transducer elements are fitted with a male connector at one end for connection to the transducer. If the distance between the transceiver and the transducer exceeds 20 meters, extension cables should be connected onto the transducer cables using a junction box (not supplied by Simrad).

Note

Care must be taken not to connect the signal ground or cable screen to the vessel's ground in the junction box.

The transducer elements are delivered with a 40 cm. length of cable terminating in a female connector. The connector mates with that on the 20 m length, allowing the transducer elements to be mounted after all the structural work and cable laying has been completed.

The triple transducer cables are slightly different. Two 20 m lengths of cable are delivered, moulded into the top of the transducer housing. The cables are terminated inside the housing with male connectors identical to those used on the single transducer cables. The three transducer elements can therefore be removed from the housing for protection during the installation, or can be replaced individually in the event of damage/failure at a later date.

1.10.2 Cable glands

The transducer cables pass into the ship through cable-glands. These, and all necessary seals are part of the Simrad delivery.

In some vessels, problems may arise in finding a suitable location for the installation of the cable gland(s) which does not conflict with existing water tanks, concrete ballast etc. One solution is to run the transducer cable(s) in a steel conduit aft outside the hull till a suitable entry point is reached. The cable gland(s) can then be fitted in the normal way.

For additional safety, a steel tube (internal diameter 50mm) should be welded onto the top of the cable gland such that the upper extremity of the tube is above the water line. The cables can then come up through the tube, passing out into the vessel through the top. This arrangement will prevent water from leaking into the vessel should the cable gland seals fail.

Note

The two triple-transducer cables are named LEFT CABLE and RIGHT CABLE, and are marked with red and green labels respectively at the cable ends to simplify identification during installation. The cables used for a dual transducer installation will not be marked before delivery, so should be marked before the installation commences to ensure they are connected correctly. It is very important that the two cables are not mixed up during connection.

The cables enter the Transceiver Unit through the cable glands marked TD-L and TD-R (Transducer Left and Transducer Right). The signal wires must be connected inside the cabinet to the plug P4 on the transceiver circuit board.

1.10.3 Cable connection to transceiver unit

Personnel

Personnel qualifications ..... Trained electrical worker
Minimum number of personnel required 1
Task time ..... Approx 1 hour (not including cable-running)

Tools required

Standard electrical tool kit

1.10.4 Connection procedure

Refer to the interconnection drawings at the back of the manual.

The cables should be laid in conduit or secured to cable trays working from the cable pipe to the transceiver unit.

1. Feed the ends of the cables up through the glands into the transceiver cabinet.

2. Measure the length of cable required inside the cabinet, add approximately 10 cm to allow for later maintenance etc. then cut off the remainder.

3. Put a 5 cm length of "heat-shrink" over the end of the cable, and slide it 15 - 20 cm up the cable so it is out of the way.

4. Remove approximately 10 cm of the cable's outer insulation.

5. Comb out the cable screen, twist it into a strand, then cover it with a length of heat-shrink insulating sleeve. Push the sleeve tight against the cable insulation, and leave a 1 cm of the end of the screen bare to be connected into the terminal. Seal the heat-shrink onto the twisted sleeve strand using a hot-air blower

6. Slide the 5 cm length of heat-shrink back towards the end of the cable till half of it overlaps the end of the cable insulation, then seal it onto the cable.

7. Strip 1 cm of the insulation from the ends of each of the four wires then connect the wires and screen into the terminal block as shown in the wiring diagrams.

It is essential that the signal wires are connected into the correct terminals in connector P4, otherwise the split-beam transducer will not function correctly and will not be able to produce the angle measurements.

Note

The cables must have enough slack to allow maintenance and adjustments to be carried out on the transducer and cable connections.

1.11 TRANSDUCER SURFACE PROTECTION

Maintenance and replacement costs can be dramatically reduced if those parts of the transducer installation that are open to the sea or exposed to the air are protected correctly.

Any new metal, welds or original metal which has been affected by the installation (by cutting, welding etc.) must be thoroughly cleaned and repainted. Use polyester primer, under coat and top coat, then finish with the same anti-fouling paint as is used for the rest of the ship's hull.

Note

Care must be exercised when painting the transducer face

Simrad recommend that the transducer faces be painted with anti-fouling paint to reduce weed/crustacea growth. The anti-fouling paint must be carefully selected so that the polyurethane compound (PRC) transducer faces are not damaged. The manufacturers recommend the following:

JOTUN SEAMATE HB66
JOTUN RACING
JOTUN NONSTOP

1.12 ICE PROTECTION

On vessels which intend to work in cold waters, steel fins and protection plates should be welded around the transducer to protect the unit from ice. "Standard" arrangements for the triple transducer can be found in the drawings at the back of the manual, and similar plans can be used for the single units. Detailed drawings must be designed specifically for each vessel by the installation dockyard.

1.13 LOCATION MARKING

On completion of the installation, the position of the transducer should be marked on the vessel's hull above the water line to avoid damaging the unit when the vessel is put into dry dock.

2 INSTALLING THE CONTROL AND DISPLAY UNIT

2.1 LOCATION

Care must be taken to ensure the selected position is suitable to mount the Display. The unit should be located in a compartment where it is near at hand for the operator, e.g. on the bridge or in the operations room. Ensure the area is dry, and free from excessive dust and vibration. If the unit can be positioned such that the screen will be shaded from natural and artificial light, the operator's visual contact with the information presented will be made considerably easier.

All communications between the display and the Transceiver Unit are routed through an interface cable. This includes a 230V power cable, a cable for the video picture signals and cable for the joystick control signals. The connection sockets are on a panel on the rear of the display. The video picture may be retransmitted from the display unit to a "Slave" monitor positioned elsewhere in the vessel by using an interface cable connected into the ports on the rear of the unit.

When mounting the unit, ensure it is positioned far enough away from the bulkhead to allow easy access to the cable connection panels and switches.

2.2 INSTALLATION

2.2.1 General

The display may be mounted on a table, in a rack, in a panel, or hanging from the bulkhead or deckhead. It should be noted that the unit weighs approximately 25 kg, and this weight must be considered when deciding how to mount it.

If the unit is to be mounted on a bulkhead, the display screen will face vertically upwards. In this case it is recommended that the users manufacture a screen cover from perspex or a similar material to protect the screen from falling objects, spilt liquids etc.

To mount the unit on a table or hanging from the bulkhead or deckhead, four mounting holes are required. If bolts are to be used, these must have a diameter of 10.5 mm. If wood screws are to be used, pilot holes should be drilled approximately 2 mm Ø.

Refer to Figure 4 and Figure 5 for unit dimensions and hole positions. Note that neither figure is to scale.

It is recommended that the screen and attached electronics are removed from the cabinet before attempting to mount the unit. This will considerably lighten the cabinet and make the job of mounting it much simpler.

2.2.2 Requirements for fitting

Personnel

Personnel qualifications . . . . . Trained mechanical/electrical worker
Minimum number of personnel required 2

Tools required

Standard mechanical tool kit
Standard electrical tool kit

2.2.3 Mounting on a table top, bulkhead or deck-head

To mount the unit on a table top, a bulkhead or a deckhead, the two side panels must be removed from the unit and secured in position. The cabinet must then be bolted back onto the side panels, and the screen replaced into the cabinet.

1. Remove the four bolts locking the display to the frame. Use an Allen key, access is made through the four holes in the handles. Refer to Figure 6 for an illustration. Carefully remove the display, and place it in a safe and stable position.

2. Unscrew the two side panels. Each are mounted with three bolts. Use a standard screwdriver. Refer to Figure 7.

3. The side panels may be mounted on any suitable surface, or hanging from the bulkhead or deckhead. Mount the two side-panels using pre-drilled mounting holes. (Refer to Figure 5). Use 10.5 mm bolts and nuts, or wood screws if required. (Do not use wood screws if mounting on the bulkhead or deckhead. Drill only pilot holes if wood screws are to be used).

4. Remount the empty display cabinet between the side panels, and insert and secure the display.

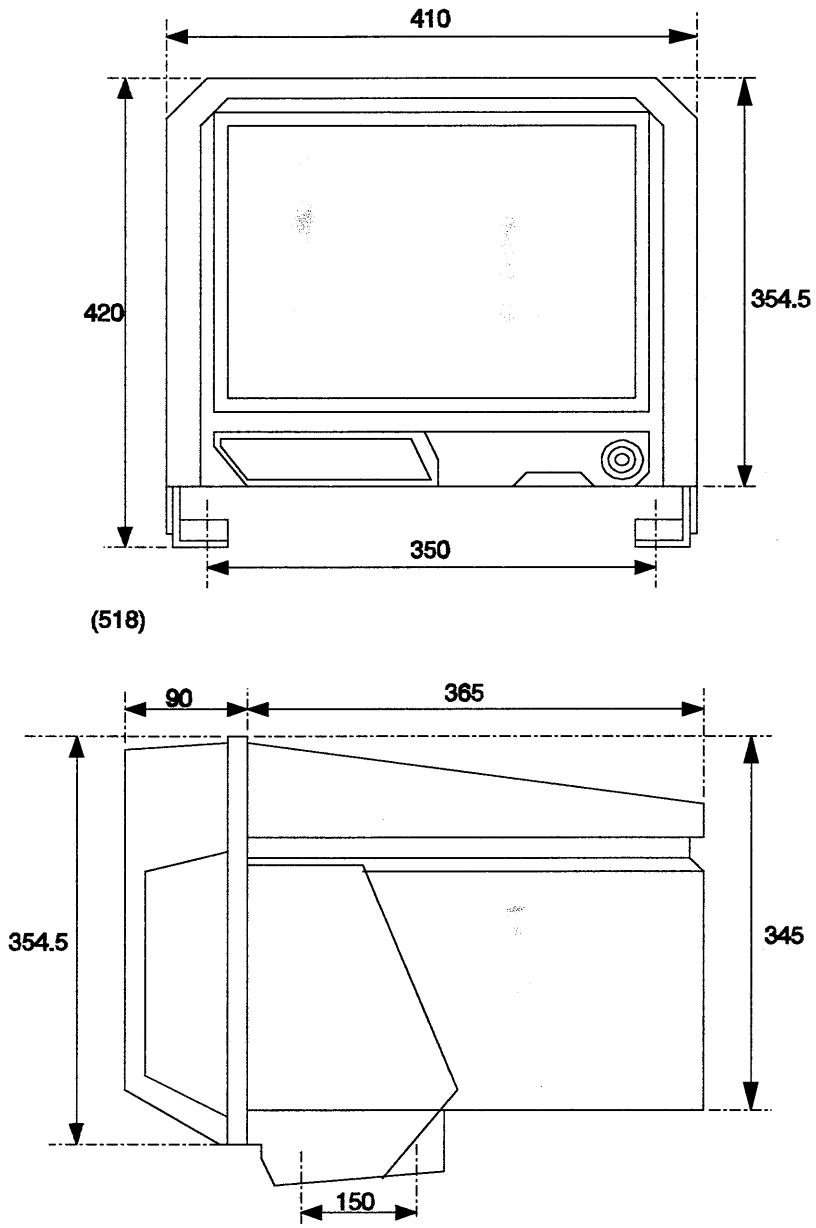


Figure 4 The CF 140 outline dimensions

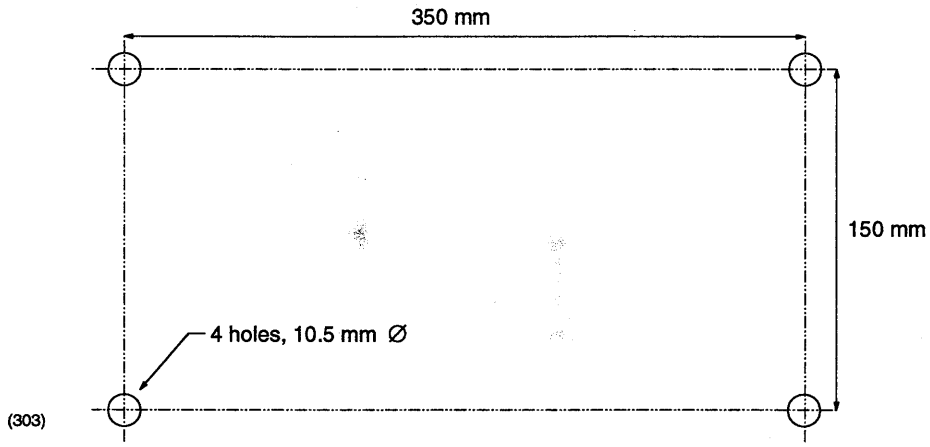


Figure 5 The CF 140 Table-top mounting holes location

This diagram is not to scale.

2.2.4 Rack installation

1. Remove the four bolts locking the display to the frame. Use an Allen key, access is made through the four holes in the handles. Refer to Figure 6 for an illustration. Carefully remove the display, and place it in a safe and stable position.

2. Using a standard screwdriver, remove the two side panels. Each is secured with three bolts. Refer to Figure 7. In this case the side panels will not be used.

3. The rack installation kit (Order no. 099-056087) contains all the necessary parts to install the display into a 19" rack frame. Mount the rack side panels as shown in Figure 8. Bolts and nuts are included in the kit.

4. Mount the cabinet into the rack, and insert and secure the display.

Refer to the Test and Alignment procedures in Section 3 of this manual and carry out the checks listed **BEFORE** attempting to power up and use the system.

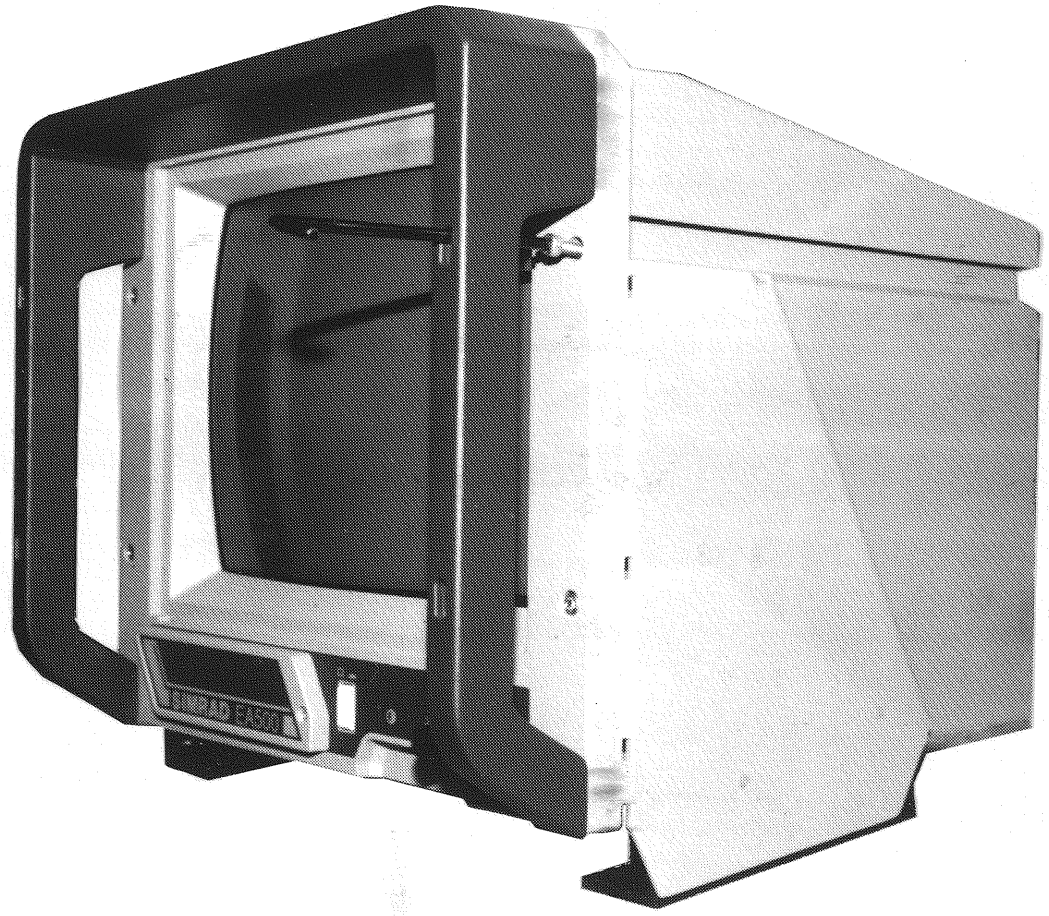


Figure 6 The CF140 - Removing the screen bolts

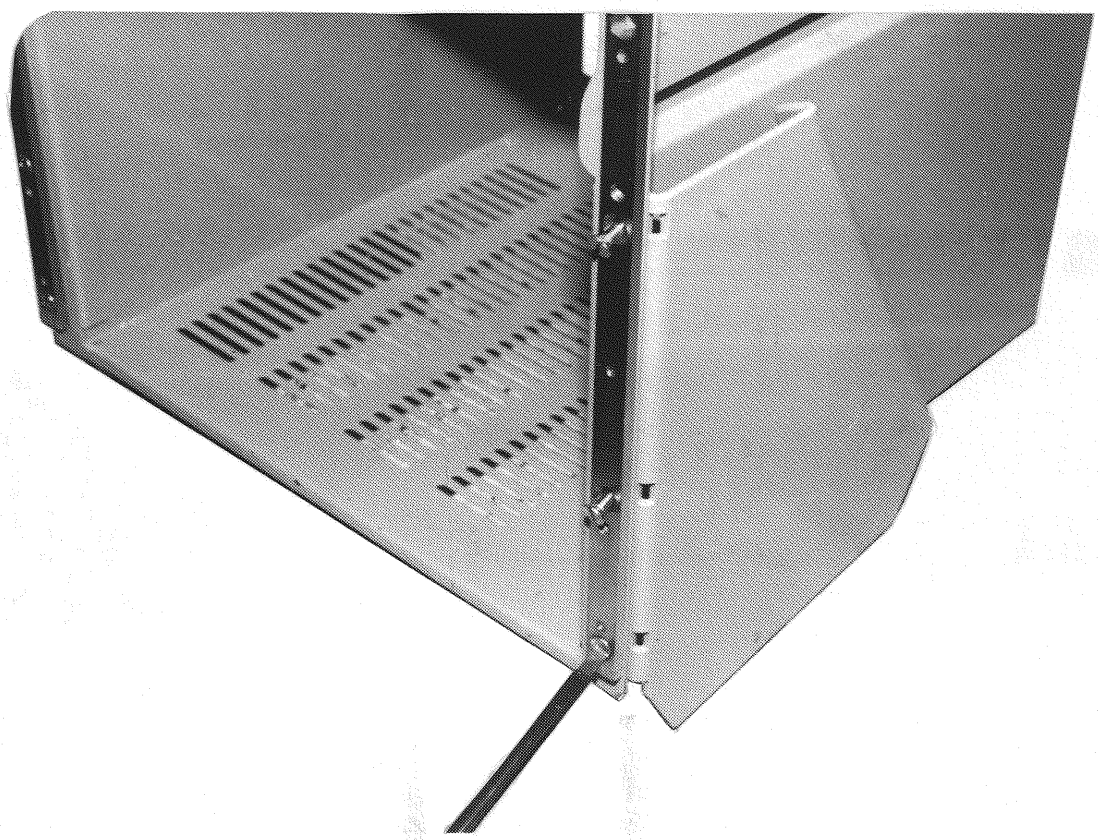


Figure 7 Removing the side panels

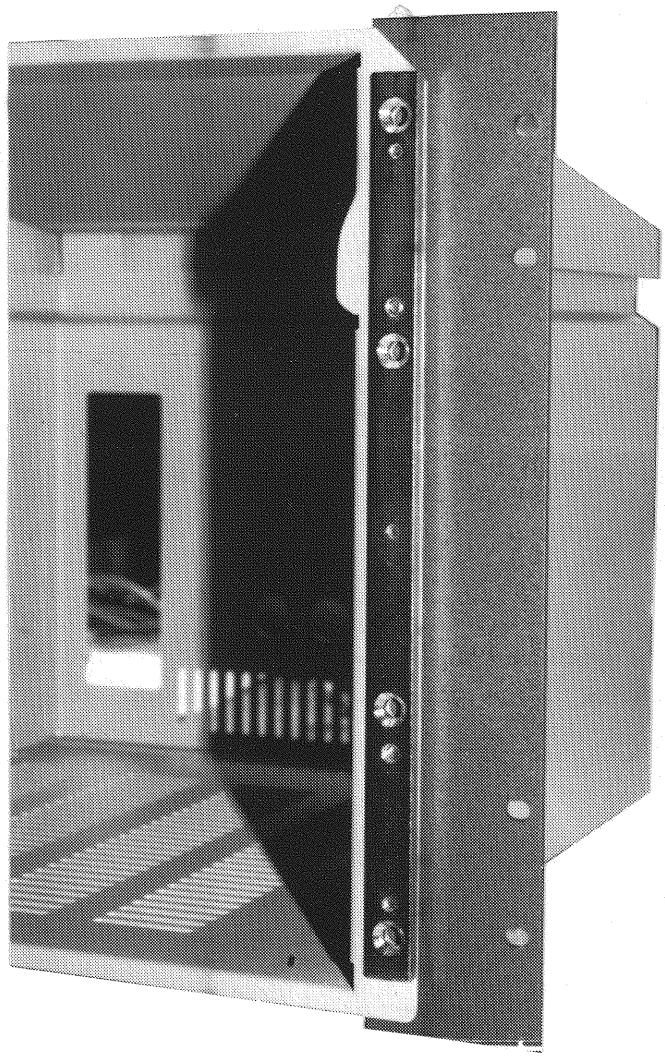


Figure 8 Mounting the rack side panels

2.2.5 Panel mounting

1. A suitable opening must be pre-cut in the panel, to the following size:

   Width: 355 mm
   Height: 335 mm

   Drill a minimum of four holes to secure the cabinet.

2. Remove the four bolts locking the display to the frame. Use an Allen key, access is made through the four holes in the handles. Refer to Figure 6 and for an illustration.

3. Carefully remove the display, and place it in a safe and stable position.

4. Remove the two side panels. Each is secured with three bolts. Use a standard screwdriver. Refer to Figure 7. The side panels will not be used.

5. Insert and secure the display.

Refer to the Test and Alignment procedures in Section 3 of this manual and carry out the checks listed **BEFORE** attempting to power up and use the system.

2.3 CABLE CONNECTIONS

2.3.1 Introduction

All connections to and from the display unit are made on the connection panels located on the back of the cabinet.

The connections to and from the display will include the following cables:

- 230V Mains Lead in ..... From mains power supply
- 230V Mains Lead out ..... To Transceiver Unit
- Video in ..... From Transceiver Unit
- Joystick Command ..... To Transceiver Unit

Powering the Transceiver Unit from the display enables both units to be powered up simultaneously using only the ON/OFF switch positioned in the centre of the display control panel.

If a slave display is to be used, then two more cables will be required:

- Video out . . . . . To Slave monitor
- Joystick Command . . . . . From Slave monitor

2.3.2 The power connections

The power connection sockets are positioned to the lower left of the rear panel of the display cabinet. Two connectors are available:

- Power In (black socket)
- Power Out (white socket)

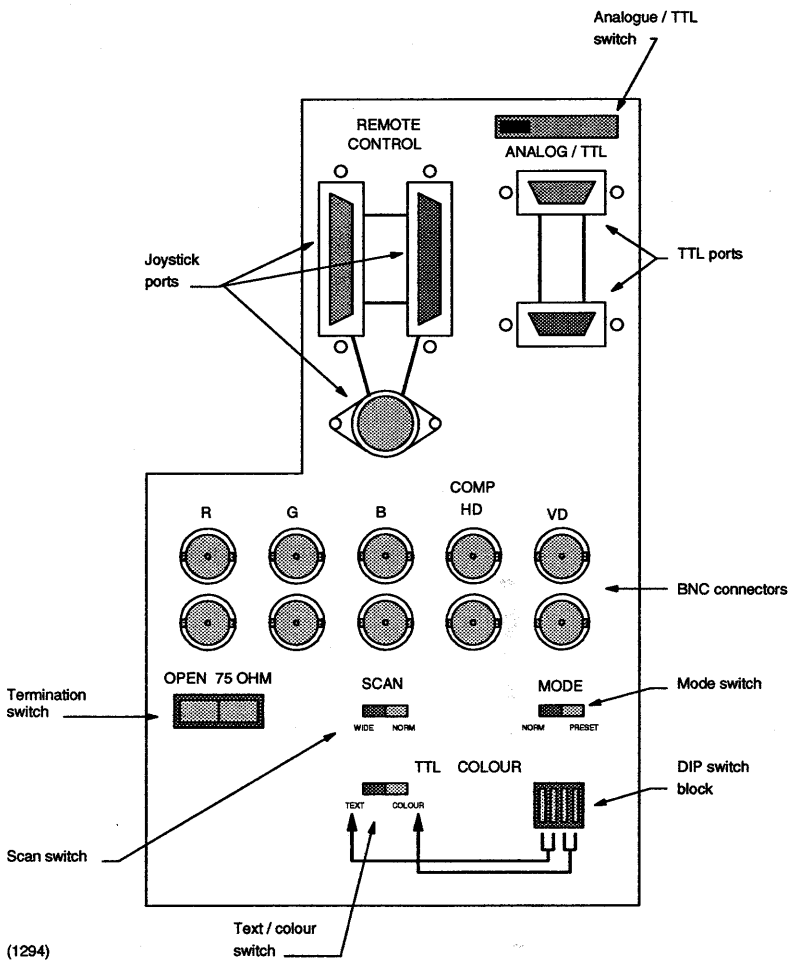


Figure 9 The signal connection panel

2.3.3 The signal connections

The signal cable connection panel is located towards on the rear panel of the display cabinet. Four "D" connection ports, a multipin DIL socket and ten BNC sockets are available for use:

2.3.3.1 The remote control ports

The remote control connection ports enable the joystick signals to be passed from the monitor to the Transceiver Unit. The ports include a male and a female 25-pin "D" connector and a 5-pin round DIL connector. They are connected in parallel so all may be used for either input or output applications. (An input would come from a slave monitor).

2.3.3.2 The TTL ports

Two TTL ports are provided to allow interconnection of the video signals from the Transceiver Unit, and to a slave monitor if required. One male and one female connector are available. They are 15 pin "D" connectors, connected in parallel so either may be used for input or output applications.

2.3.3.3 The BNC sockets

A total of ten BNC sockets are provided. These are not used in the ITI system.

2.3.4 Procedure

1. Lay the cables out along their designated routes, ensuring that the requirements described in Section 1 of this manual are followed.

2. Connect the cables into the panels at the back of the unit ensuring that all connections are made securely.

3. If a "slave" display unit is to be installed, connect the cables in parallel with those to the master unit using the sockets provided.

Each cable is marked with a number that corresponds to the cable plan. The drawing describes the cables and identifies the correct locations for the connections.

Refer to the Test and Alignment procedures in Section 3 of this manual and carry out the checks listed **BEFORE** attempting to power up and use the system.

3 INSTALLING THE TRANSCEIVER UNIT

3.1 LOCATION

The Transceiver Unit contains all of the electronic circuitry for the ITI system. It should be mounted in the close vicinity of the Control and Display Unit; the interface cable between the two units has a standard length of 5 meters.

The cabinet is of welded steel plate construction. It must be installed in a compartment that is dry, and with a minimum of dust and vibration. It should be mounted at least 20 cm. clear of the deck to enable the cables to be connected, and to prevent ingress of water when the deck is washed etc. The selected compartment should be cool to prevent the electronics overheating, and accessible to allow maintenance to be carried out when necessary.

3.2 INSTALLATION

3.2.1 General

The cabinet must be bolted to a strong bulkhead, using four 8 mm ∅ bolts and nuts, (or four wood screws of a similar strength if mounting on a wooden bulkhead) through the holes in the securing lugs on the back corners of the cabinet. Refer to Figure 10 for the hole positions. An alternative would be to weld studs to the bulkhead in the appropriate positions and secure the unit using nuts and washers.

The cabinet with internal electronics weighs approximately 28 kg. and this weight must be taken into consideration when deciding on the installation position and screw size.

The holes in the lugs have been shaped to allow the installation engineer to pre-position the four bolts/screws and then hang the unit on them. It is recommended that normal washers be used between the bolt/screw heads and the unit securing lugs, and that shake-proof washers are used between the nuts and the bulkhead to prevent the nuts from vibrating loose.

Remember to connect the unit's ground screw to the vessel's ground with an earthing strap.

Installation diagrams and drawings are to be found at the back of the manual.

3.2.2 Requirements for fitting

Personnel

Personnel qualifications ..... Trained mechanical/electrical worker
Minimum number of personnel required 2
Task time ..... Approx 1 hour

Tools required

Standard mechanical tool kit

3.2.3 Procedure

1. Select the position in which the unit is to be mounted ensuring that the constraints given above are taken into consideration.

2. Measure and mark the positions of the required securing bolts/screws.

3. Check the other side of the bulkhead to ensure nothing will be damaged when the holes are drilled, and that it will be possible to position and tighten the nuts.

4. Drill the required holes (pilot holes for wood screws) or weld into position the required studs.

5. If bolts are to be used, thread a suitable washer onto each then locate them into the holes. Place shake-proof washers onto the ends on the other side of the bulkhead, then loosely thread nuts onto the bolts.

   If wood screws are to be used, locate them into the pilot holes and screw them most of the way in, leaving enough space behind the head to hang the unit.

6. Hang the Transceiver Unit onto the bolts/screws, then tighten the nuts/screws. If studs are to be used, hang the unit on the studs then place shake-proof washers over the studs. Thread nuts onto the studs, then tighten them.

Refer to the Test and Alignment procedures in Section 3 of this manual and carry out the checks listed **BEFORE** attempting to power up and use the system.

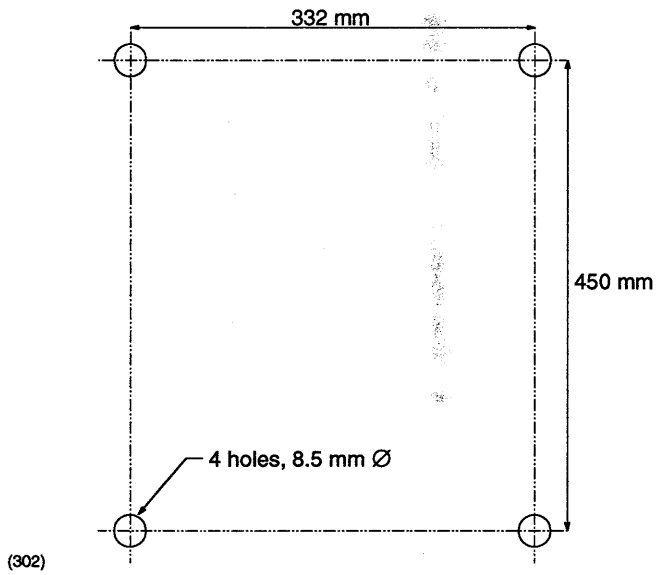


Figure 10 Transceiver Unit hole positions

This diagram is not to scale

3.3 CABLE CONNECTIONS

3.3.1 Introduction

All power and signal cable connections to the Transceiver Unit are made on a connection panel located to the rear of the base plate of the unit.

Refer to Figure 11 for the layout of the connection panel.

The panel contains eight assorted "Delta" sockets, and four cable glands. From the left, the sockets are as follows:

- Socket B ..... 9 pin "D" socket, serial port B
- Socket C ..... 9 pin "D" socket, serial port C
- Socket A ..... 9 pin "D" socket, serial port A
- Socket D ..... 25 pin "D" socket, serial port D
- ETHERNET ..... For Ethernet communication line
- REMOTE CONTROL 25 pin "D" socket, used for joystick command input
- CENTRONIX ..... 25 pin "D" socket, used for printer interface
- MONITOR .... 9 pin "D" socket, used for video signal output to display

The cable glands are designated from the left, as follows:

- TD-L . . . . . Gland for Left transducer elements cable
- TD-R . . . . . Gland for Right transducer elements cable
- Unmarked . . . . . Gland for 230 Vac mains power cable from display unit
- Unmarked . . . . . Gland for gyro-compass and log signal cable

Sockets A,B,C and D are connected, via ribbon cable, directly to the central processor board, CPB286. The other four sockets are wired to the Backplane. The cables from the gyro-compass and log systems are wired into terminals on the backplane, while the mains power lead is plugged directly into the front of the power supply. The transducer cables are connected to the front of the transceiver board.

Refer to the applicable wiring diagrams for the unit internal wiring.

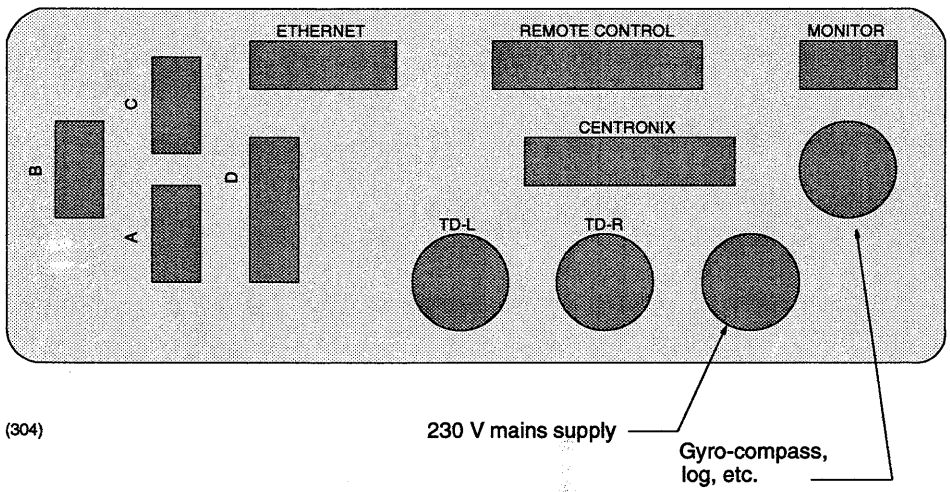


Figure 11 The Transceiver Unit connection panel

3.3.2 Cabling procedure

1. Lay the cables out along their designated routes, ensuring that the requirements described in Section 1 of this manual are followed.

2. Connect the cables as described in the wiring diagram ensuring that all connections are made firmly.

Each cable is marked with a number that corresponds to the cable plan. The Plan describes the cables and identifies the correct locations for the connections.

Refer to the Test and Alignment procedures in Section 3 of this manual and carry out the checks listed **BEFORE** attempting to power up and use the system.

3.3.3 Grounding the unit

The transceiver unit must be grounded to the vessel's ground using a earthing strap. This should be bolted to the cabinet using the lower screw holding the pcb rack in place. Thread the strap through the hole in the left side of the base of the cabinet, then secure it firmly to the vessel's ground. Shake-proof washers should be used at both ends to ensure a good contact is made.

3.4 MODIFYING THE POWER BOARD FOR 115 V SUPPLY

The power to the ITI transceiver unit will normally be fed from the control and display unit. The standard control and display unit requires 230 Vac as its power supply, so a set-up transformer must be used if only 115 Vac is available. The transceiver unit power supply board can be modified to accept 115 Vac supply. Refer to the circuit diagram to be found at the back of this manual, and to the procedure below:

- Open the transceiver cabinet door and remove the mains supply plug from the front of the power supply board (if connected).
- Loosen the four screws which hold the power supply board in place.
- Pull out the board, and locate plug J1.
- Remove the link between pins 2 and 3.
- Insert new links between pins 1 and 3, and between pins 2 and 4.
- Carefully replace the board back into its slot and fasten the four screws. Replace the mains supply plug into the front of the board (if it was previously connected).

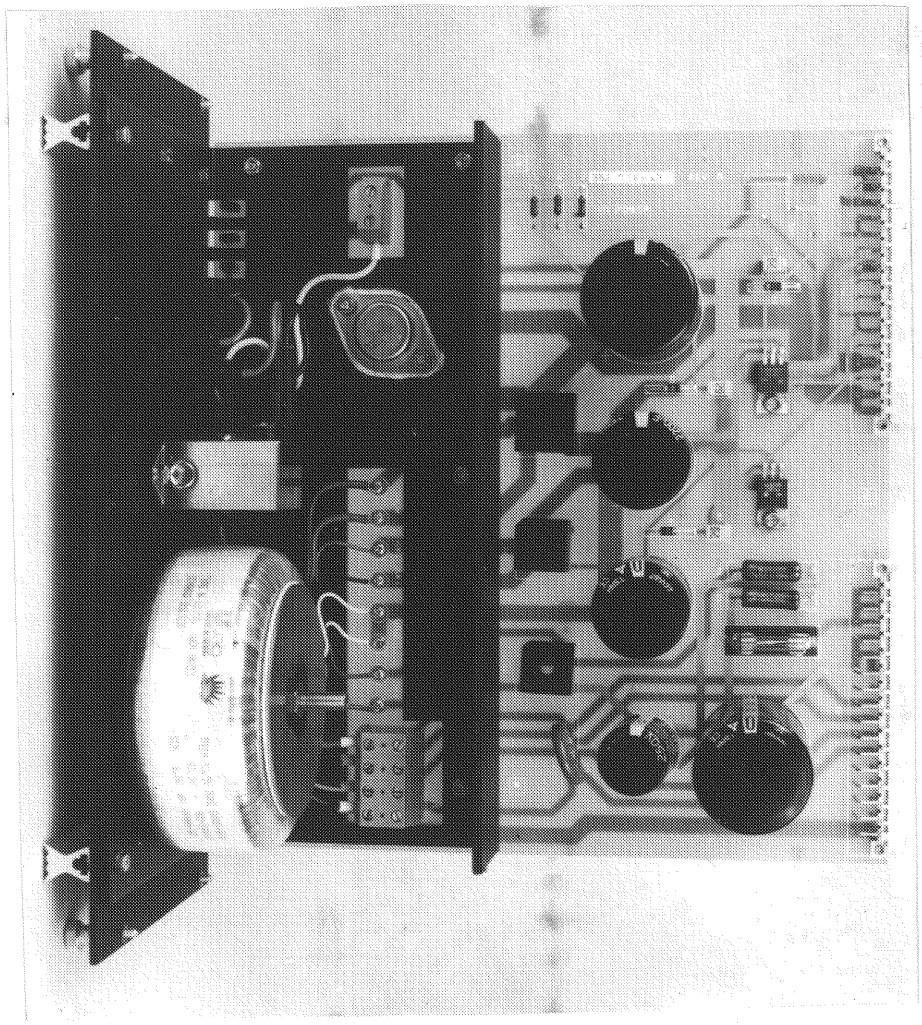


Figure 12 ITI power supply board - component side

3.5 MODIFYING THE VIDEO INTERFACE FOR ANALOGUE SIGNALS

3.5.1 Introduction

The standard ITI video interface is based on digital RGB signals (TTL levels). The standard monitor delivered with the ITI system is a 14-inch multisync. monitor which can handle a wide range of horizontal sync. frequencies (15-35.5KHz). The video signals generated by a standard ITI system are as follows:

RGB:	TTL - level
Resolution:	680 x 512 pixels
Vert.sync:	45Hz negative pulse
Hor.sync:	24.5 kHz negative pulse

In cases where the standard ITI monitor is replaced by a VGA monitor, the ITI video interface will require modification. This is mainly because a VGA monitor requires analogue RGB video signals, though some VGA monitors can be rather critical about the vertical and horizontal synchronization frequencies. There are two possible ways to accommodate the latter; refer to paragraph 3.5.4 for details on increasing the synchronization frequencies.

Analogue video monitors have different ways of configuring the sync. signals. The ITI system can be modified in one of two ways:

- Analogue RGB with composite sync. on green.
- Analogue RGB with separate digital sync. signals (TTL levels).

Note

The synchronization signals generated by the ITI transceiver are always negative-going pulses.

The commercial VGA video standard uses a video resolution of 640 x 480 pixels (H x V). However, even when the ITI system is modified to support analogue video output signals, the picture resolution will still be 680 x 512 and some VGA monitors will not be able to display 680 x 512 pixels as required. Check that the monitor can handle the picture resolution supported by the ITI system, and also check the synchronization frequency tolerances.

Note

Simrad recommend that a multisync monitor is used with the ITI system.

3.5.2 Composite sync. on green

Follow the procedure outlined below to implement analogue RGB video signals with sync. on green.

- Signal level: 0.7 Vp-p (video), 0.3 Vp-p sync.

- Changes on the Interface & Display Controller circuit board (IDC786):

  - Remove IC44 (74HC374) from its socket.
  - Install the colour palette RAM (Bt453, Simrad reg.no. 244-075665) in socket IC31.
  - Insert jumper S2 and S3

- Changes on the Backplane pcb:

  - Remove jumpers S4 and S6 (cut wire in printed circuit board, component side)
  - Insert jumpers S1, S2, S3 and S5.
  - The 9-pin monitor plug has the following configuration after modification:

    pin 1 - Red
    pin 2 - Green
    pin 3 - Blue
    pin 4,5 - NC
    pin 6,7,8,9 - GND

3.5.3 Separate sync. (TTL)

Follow the procedure outlined below to implement analogue RGB video signals with separate digital sync. signals (H-sync. & V-sync.).

- Changes on the Interface & Display Controller pcb (IDC786):

  - Remove IC44 (74HC374) from socket and replace it with jumpers between: pin14 and pin15, pin16 and pin17, pin 2 and pin 10.
  - Install the colour palette RAM (Bt453) in socket IC31.
  - Insert jumper S3.
  - Remove jumper S2.

- Changes on the backplane pcb:

  - Remove jumper S4 and S6 (cut wire in printed circuit board, component side)
  - Insert jumpers S1, S2, S3 and S5.
  - The pin configuration of the 9-pin monitor plug will be:

    pin 1 - Red.
    pin 2 - Green.
    pin 3 - Blue.
    pin 4, 5 - NC.
    pin 6,7 - GND.
    pin 8 - H-sync.
    pin 9 - V-sync.

3.5.4 Changing the ITI sync. frequencies

Some VGA monitors may require accurate vertical and horizontal synchronization frequencies. To accommodate this, there are two ways of increasing the sync. frequencies:

1 Change the crystal oscillator, Y2 (Interface & Display pcb) to 50MHz. This will give the maximum input clock frequency allowed for the display processor (82786) which is 25MHz.
  - Insert jumpers S1 and S5 on Interface & Display board.
  - Remove jumper S6 on Interface & Display board.

2 Install an extra crystal oscillator, Y3 (on the Interface & Display pcb) of 25 MHz.
  - Insert jumper S6.
  - Remove jumpers S1 and S5.

Note

The two alternatives above describes two ways of increasing the input clock frequency to the display processor from 20MHz to 25MHz. The H-sync and V-sync. will be 29.45 kHz and 57 Hz respectively with the 25 MHz clock. In both cases it is advisable to test and adjust the specific monitor to achieve the best results.

Simrad delivers monitor cables with open ends to enable termination to different monitor plugs. (See drawings at the end of the book).

4 INSTALLING THE BATTERY CHARGER

4.1 LOCATION

For safety reasons, the battery charger must be permanently mounted in a compartment where the temperature remains between 15°C and 45C° (59F° - 113°F).

The charger is equipped with a 2 m. length of mains cable, with the plug fitted. The cable holding the battery clamps is 80 cm. long. To simplify the battery charging operation, shaped beds could be made to hold the sensors during the operation.

4.2 PROCEDURE

1. Select the position in which the charger is to be mounted, maximum 75 cm. from the bench/rack on which the sensor will be positioned during the charging operation.

2. Measure and mark the positions of the screw holes.

3. Drill the required holes.

Four 13 mm. long screws are supplied with the charger (self-tapping, slot head).

5 MOUNTING THE SENSORS ON THE NET

5.1 POSITIONING THE UNITS

For the ITI system to function properly and to reduce the risk of losing the sensors, the sensors must be mounted on the net correctly.

The HEIGHT, DEPTH, TEMPERATURE and COMBI. sensors should be mounted close to the centre point of the head rope. The best method will normally be to secure the sensor directly on top of the head-rope, though if the head-rope or net floats are liable to obstruct the communications transducers then the sensors must be positioned further back.

The CATCH sensors must be mounted on the top of the trawl cod-end to ensure they have a clear view of the vessel transducer. They should be positioned at appropriate intervals to provide the best information to the operator.

The SPREAD sensors must be fitted into the attachment units in the trawl doors.

Note

In all cases, the sensor units' communication transducers must have a clear view of the vessel's transducer, and in the case of the SPREAD sensors, of each other. The HEIGHT sensor's measurement transducer must also have an un-obstructed view downwards.

5.2 SECURING THE UNITS

5.2.1 "Standard" sensors

The set of attachment components includes four rubber straps, four safety chains, four 5mm connecting links, and eight "D" shackles. The rubber straps will allow the net to stretch without applying too much tension to the sensor securing lugs. The chains have two main purposes:

- To ensure the sensors remain correctly positioned on the net.
- To prevent loss of the units should the rubber straps be torn.

1. After careful consideration of the net shape and orientation under water, both when empty and full, select the locations for the various sensors.

2. Place a sensor on the net, then secure it into position with the rubber straps and shackles provided.

3. Once the sensor is fastened in the correct position, attach the safety chains. These must either be shackled to the head-rope and then to the front lugs on the sensor (if possible in the case of height, depth and temperature sensors)(refer to Figure 13), or passed through and under the net and shackled to the appropriate pairs of lugs on the sensor (refer to Figure 14).

4. After the sensors have been secured, check that the chains will not put any load on the net when the net is full of fish. This may be ascertained by stretching the net in the area of the sensors in the same directions as it would be stretched under normal operating conditions. If the safety chains are too tight when the sensors are mounted, the securing lugs may be torn off or the net damaged, and the sensor lost.

The attachment components, especially the rubber straps, will deteriorate with use. Replacement sets of attachment components may be ordered from the manufacturers, part number **099-107556**.

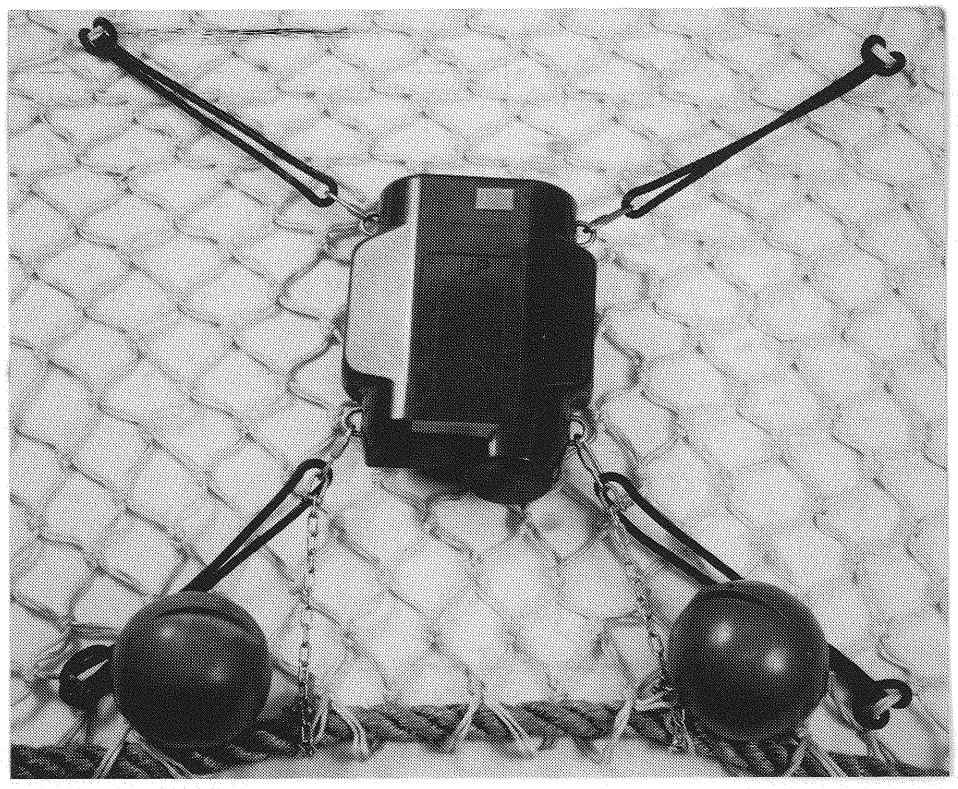


Figure 13 Securing the sensors (A)

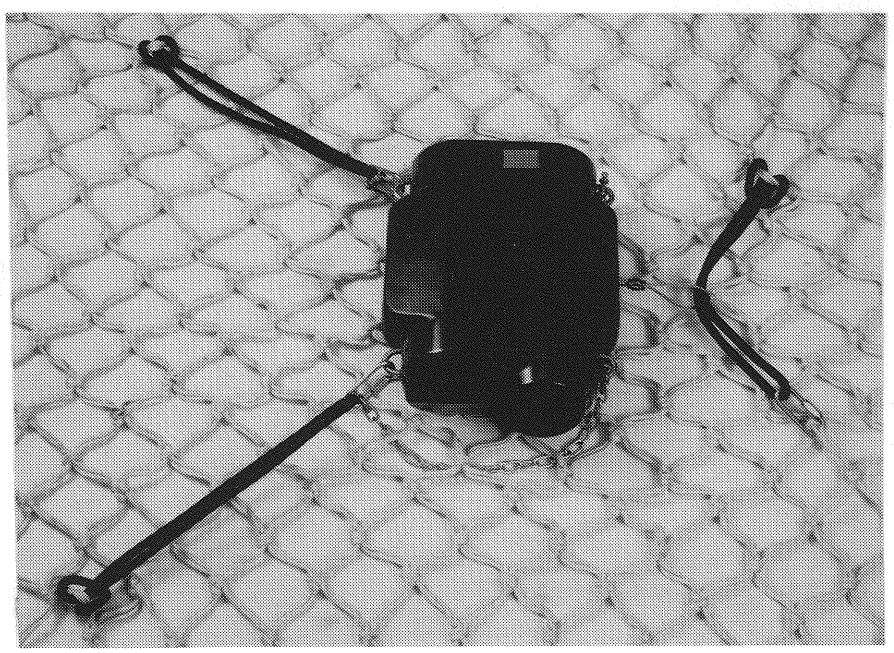


Figure 14 Securing the sensors (B)

5.2.2 The spread sensors

The spread sensors fit into special adaptor units which are welded into the trawl doors. The Spread Communication and Spread Remote units can fitted into either trawl door, though it is recommended to use the starboard door for the communication sensor. (If the operator selects the spread sensor as the position sensor, the system will always draw the dimension line to the starboard trawl door). Tracks within the door adapters ensure the sensors must be orientated correctly before they can be mounted. The sensors must be pushed firmly home into the appropriate adaptor, then the securing clamp must be tightened.

Refer to Figure 15 for the spread sensor trawl door adapters.

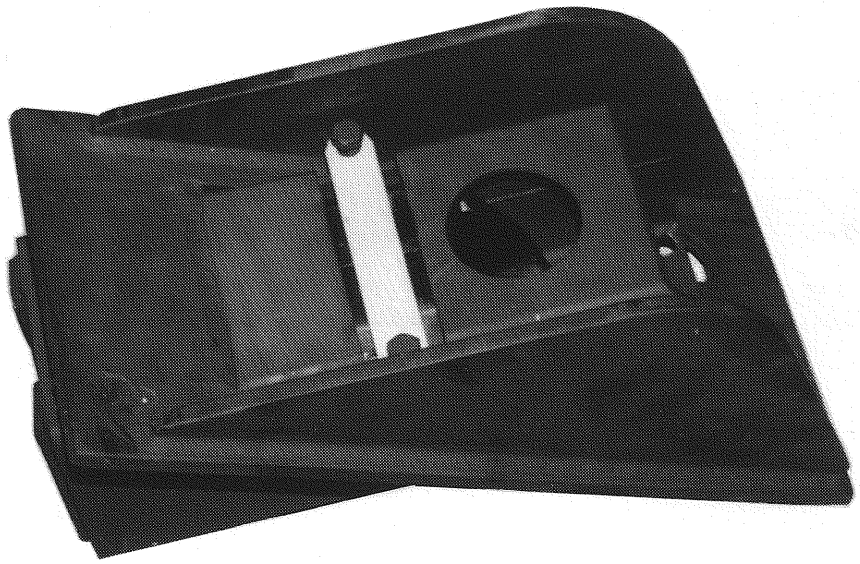


Figure 15 The spread sensor mounting adaptor

The units must be removed from the adapters to recharge the sensor batteries. They can then be recharged in the same way as the other sensors.

5.3 CATCH SENSOR SENSITIVITY

The sensitivity of the catch feeler-strap will depend on the number of meshes of the net between which the rubber straps of the sensors are fastened. If a sensor is required to be more sensitive, i.e. activate earlier, then the rubber straps must be secured to meshes further apart around the cod-end.

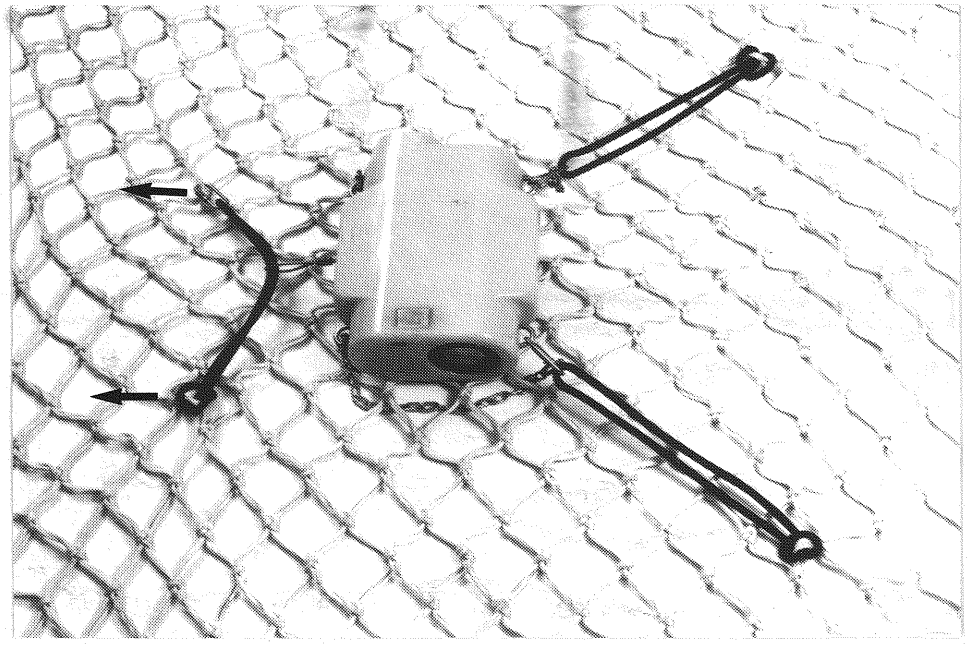


Figure 16 Catch sensor sensitivity

5.4 RECHARGING BATTERIES

If the operator wishes to re-charge the sensors without removing them from the net, then the safety chains must be secured to the correct pairs of lugs. Ensure that the chains pass across the width of the sensor unit, and not along its length or diagonally. The sensor unit securing lugs are all marked with + and - signs, and the chains must be attached + to + and - to - or they will short-circuit the battery charger.

Note

Simrad recommends that the sensors are always removed from the net and recharged at room temperature. For reasons of safety, do not attempt to recharge sensors in ambient temperatures below 15°C (59°F). The batteries will also accept more charge at room temperature.

6 SENSOR MOUNTING PLATES

6.1 INTRODUCTION

Up to now, the most common method of securing the sensors to the net has been to use rubber straps and security chains. Over time the rubber straps will deteriorate, and fastening the sensors with straps and chains is a time-consuming business. To simplify the mounting and removal operations, Simrad has therefore designed a sensor mounting plate. The plate has a locking mechanism that holds the sensor securely in position on the net while allowing easy removal for recharging.

6.2 FASTENING THE PLATE TO THE NET

The plate must be securely fastened to the net using ropes. The plate can be fastened to any position on the net, though for best stability it should be attached to the head-rope.

6.3 INSERTING AND REMOVING THE SENSOR

The sensor can easily be inserted into the locking mechanism:

- Slide the front lugs of the sensor into the guides, then press the sensor down at the back. A click will be heard as the lock snaps onto the sensor.

Release the sensor by pressing the bar which is located towards the rear of the plate.

Once the sensor has been correctly mounted onto the plate, a security wire should be attached between one of the sensor lugs and the head-rope/net.

Refer to the drawings at the back of the manual.

7 INSTALLING THE TRAWL DOOR ADAPTERS

7.1 GENERAL

Many different types of trawl door exist, designed for different types of vessel and different types of fishing. But whichever type or shape of door is used on the vessel, the guidelines given here will ensure the best performance.

If the installation engineers are not completely sure of the doors' attitudes when under tow, contact the designers/manufacturers of the doors for information.

7.2 MOUNTING GUIDELINES

- The trawl door adapters are identical - there is no difference between the port and starboard adapters.

- Gather as much information about the attitude of the doors when in the water. The vertical angle ϕ_V and the horizontal angle ϕ_H are both very important. Refer to the appropriate drawings in the back of the manual.

- Two main angles must be considered:

  - The horizontal angle ϕ_H - the communication transducer must point towards the towing vessel. Try to keep the centre-line of the sensor to within ±10° of the line-of-sight to the vessel. The angle between the sensor centre-line and the adapter base-plate is 30° - adjust the angle of the base-plate with respect to the door to achieve the required angles.

  - The vertical angle ϕ_V - the angle between the sensor centre-line and the sea surface. Deep-water fishing requires a larger vertical angle than when fishing close to the surface. To calculate the most suitable angle, find the ratio between the wire length and the trawling depth when operating normally, then determine the slant angle of the towing wire.

- Filler plates may be required to obtain the correct sensor orientation after the adapters have been installed.

- For bottom trawling, the sensor adapter should always be welded to the upper part of the trawl door.

Refer to the drawings in the back of the manual.

8 EXTERNAL INTERFACES

The external interfaces include all connections too and from equipment that is not part of the standard ITI installation. Detailed descriptions of the connection procedures for all types of external equipment which can be interfaced to the ITI system can be found in the appendices. Appendix 1 pays particular attention to serial lines and Ethernet. All the telegrams that the ITI system can handle are described. The pin assignments for each port are shown, and the link settings required for different configurations are described.

INSTALLATION CHECK AND SYSTEM TEST

CONTENTS:

1 INTRODUCTION

1.1 GENERAL INFORMATION

After the installation has been performed and before the system is brought into operation for the first time, a series of tests and alignment procedures must be carried out to confirm a correct installation. This section of the manual contains the instructions and procedures required to ensure the system is installed correctly, is correctly set up and is safe to switch on and use.

The majority of these checks will be performed by the installation engineers, though in some cases Simrad engineers must be present. Simrad engineers will in all cases perform the "Setting to work" procedures unless it is specifically written in the contract to the contrary. Prior to commencing those procedures, the engineers will perform those checks they deem necessary. Where they have not been present during the test procedures they will require to see the certificates which state the tests have been carried out successfully.

Some of the tests can be carried out on individual units once that particular unit has been installed, though in general the procedures should be completed in the order in which they are listed in this manual. In the interests of safety and to avoid possibly disastrous mistakes, it is recommended to set aside a period of time at the end of the installation phase specifically for the test and alignment procedures. The entire set of procedures can then be performed in sequence to ensure the complete system is comprehensively checked.

In all cases the step-by-step instructions must be followed if the tests are to be trustworthy.

1.2 TEST CERTIFICATION

Once the testing engineer has performed or witnessed the performance of a test or part of a test, he should sign on the dotted line under each check/test to certify that the unit or system has passed that particular part of the procedure.

IF THE TESTING ENGINEER IS NOT SATISFIED WITH THE STANDARD OF ANY PART OF THE INSTALLATION, HE MUST CONTACT THE PERSONNEL WHO PERFORMED THE INSTALLATION TO HAVE THE WORK RECTIFIED AND BROUGHT UP TO THE REQUIRED STANDARDS.

1.3 CHECK LISTS

To assist the installation personnel, three check lists have been included. These check-lists are located at the end of this section of the manual, and apply as follows:

- Check-list 1 applies to the system units. It is for use during the initial inspection period, after the installation has been completed but before power is switched on to the system.

- Check-list 2 applies to the external interfaces. It contains spaces for the test engineer to add information about the external equipment interfaced to the ITI system. As much detail as possible should be added to provide a useful reference for the maintenance engineer later in the system's life.

- Check-list 3 must be used when switching power on to the system for the first time, when starting up the system and when the system is being functionally tested.

Copies of the check-lists should be filed for future reference by the company responsible for the installation. These can then be used to assist with fault diagnosis if a problem develops in the system at a later date.

1.4 SAFETY RULES

The ITI units use high voltages which can be lethal. Read and understand the safety precautions and first-aid procedures on the pink pages at the front of the manual before commencing work.

2 VISUAL INSPECTION OF UNITS AND CABLES

2.1 GENERAL

After the installation has been carried out, all the system units must be visually checked to ensure they have been installed correctly. The testing engineer must satisfy himself that the units have been mounted in the correct locations, correctly orientated (eg. the right way up) and are correctly secured to the bulkhead/deck mounting brackets.

All cabling between units should be checked according to the cable diagrams.

Caution

These checks must be completed before any power is switched on to the system.

2.2 INSPECTION OF THE CONTROL AND DISPLAY UNIT

Check-list 1, Point 1.

Perform a close visual inspection of the unit.

1. Check that the unit is installed in the correct location, and is suitably orientated to enable easy operation.

Location correct .....

2. Check that the structure to which the display unit is fastened is substantial enough to hold the unit securely under all conditions. Remember that in bad weather the vessel can heave considerably, and the stress on the supporting structure will be significantly increased for the duration of the vertical accelerations. If the display is secured to a table or shelf, check that it is bolted or welded securely to the deck and/or bulkhead.

Supporting structure correct .....

3. Check that the bolts, screws or studs holding the display unit are of the correct size. Check that the correct flat and shake-proof washers have been used. Check that the nuts are tight.

Bolts, nuts, washers etc. correct .....

4. Check that all welds/brackets have been painted with the correct preservation medium to prevent corrosion.

Paint-work correct .....

Check that the unit is not damaged, and that the paint-work is clean.

Control and Display Unit mechanical installation correct .....

Write the Control and Display Unit's serial number into the space provided in Check-list 1 point 1, and sign the section to certify that the unit has been inspected.

2.3 INSPECTION OF THE TRANSCEIVER UNIT

Check-list 1, Point 2.

Perform a close visual inspection of the unit.

1. Check that the unit is installed in the correct location, and is suitably orientated to enable easy maintenance. Ensure that the door can be fully opened, and that access to the interior of the cabinet is not impaired.

Location correct .....

2. Check that the bulkhead structure to which the unit is fastened is substantial enough to hold the unit securely under all conditions. Remember that in bad weather the vessel can heave considerably, and the stress on the supporting structure will be significantly increased for the duration of the vertical accelerations.

Supporting structure correct .....

3. Check that the bolts, screws or studs holding the unit are of the correct size. Check that the correct flat and shake-proof washers have been used. Check that the nuts are tight.

Bolts, nuts, washers etc. correct .....

4. Check that all welds/brackets have been painted with the correct preservation medium to prevent corrosion. Check that the unit is not damaged and the paint-work is clean.

Paint-work correct .....

5. Check that the cabinet is securely connected to the ship's ground with an earthing strap manufactured of braided copper wire or some other suitable flexible connection. The strap must be in addition to any incidental electrical contact made by the mounting lugs on the back of the unit. Check using an ohm-meter that the resistance between the cabinet and the ship's ground is approximately zero Ω.

Earthing strap correct (see also Check-list 1, point 3) .....

Write the Transceiver Unit's serial number into the space provided in Check-list 1 point 2, and sign the section to certify that the unit has been inspected.

2.4 INSPECTION OF THE TRANSDUCER ARRANGEMENT

Check-list 1, points 3, 4, 5, 6, 7 and 8.

Caution

The test engineer must understand that the correct installation of certain parts of the hull unit/transducer is critical to the safety of the vessel.

Note

Installation and checking of the vertical shaft hull unit is covered in a separate manual.

1. Check-list 1, Point 3.

   Write down the type of transducer installation fitted in the vessel (triple, dual or single transducer).

2. Check-list 1, Point 4.

   Write down the transducer orientation. If the transducer(s) has been given an off-set angle, this angle must be entered into the system software during start-up.

3. Check-list 1, point 5.

   Referring to the constraints given in section 2 of this manual, check that the unit is installed in the correct location. Ensure that it has a clear view astern of the vessel throughout the entire beam coverage area, and that there are no obstructions which could cause "blind arcs" in the system.

Location correct .....
Distance to propeller .....
Distance between transducer and keel .....

4. Check-list 1, point 6.

   Check that welding is satisfactory, and that the correct materials have been used. The hull plating to which the unit is fastened should be reinforced, as should struts/ribs etc. in the area. Check that all bolts, nut and washers holding the unit are of the correct size and type. Check that all are correctly tightened.

Welds/materials/reinforcing, bolts, nuts, washers etc. correct . . . . . .

5. Check-list 1, point 7.

   Check that all welds and exposed metal have been painted with the correct preservation medium to prevent corrosion. Check that the transducer faces have been painted with an anti-fouling paint to reduce weed/crustacea growth.

Paint-work correct . . . . . .

6. Check-list 1, point 8.

   Check that the cable gland(s) are tight and make a firm seal around the cable(s).

Cable gland(s) correct . . . . . .

7. Check-list 1, point 9.

   Check that the transducer cables have been correctly connected to plug P4 inside the transceiver cabinet. It is important that the right and left elements of the transducers are connected to the correct terminals.

   Note

   Triple transducer: The cable containing all the left signal wires has a red label, the right signal cable has a green label.

   Dual transducers: The cables are not delivered with labels. Ensure that the cables are labelled during the installation to avoid confusion during connection.

Cable screens: If the transducer cables must be extended, a junction box should be used. Check that the cable screens ***do not*** *come into contact with the ship's ground. Disconnect plug P4 and using and ohm-meter measure the resistance between the various wires and ship's ground.*

7. Check-list 1, point 10.

   Perform an inspection of the cabling between the control and display unit and the transceiver unit (i.e. the main power cable and the three interface cables). Ensure the securing screws on the D-connectors are correctly fastened.

Cabling correct .....

If everything is correct, complete check-list 1 by filling out point 11.

Caution

These checks must be completed before any power is switched on to the system.

3 EXTERNAL EQUIPMENT

3.1 GENERAL

The checks in this chapter refer to Check-list 2.

Interfaces from external equipment should be inspected. Ensure that the correct serial port is used, and that the D-connectors are properly tightened. It is important for future reference that the types and serial numbers of the external equipment are written into the check-list. Detailed information about the external interface connections may be found in the appendices. Note that only equipment supplied by Simrad is described.

3.2 THE CHECKS

1. Echo-sounder interface. Check-list 2, Point 1.

   If the vessel's echo-sounder is connected into the ITI system, check the interface cable connections between the echo-sounder and serial port A on the ITI transceiver unit plug panel. Interfacing of the following Simrad echo-sounders is described in the appendices: EQ 100, EQ 50, ES 380 series, ES 500.

   Write the echo-sounder's type and serial number into the check-list to certify that the check has been performed.

Echo-sounder interface correct .....

2. SR 240 Sonar interface. Check-list 2, Point 2.

   Is an SR 240 Sonar fitted in the vessel? If so, check the interface cable connections between plug P5 on the SR 240 and Serial Port B on the transceiver unit plug panel. Refer to Appendix 6 for connector pin details and signal descriptions. Write the unit's serial number into the space provided in the check-list, and complete the section to certify that the check has been performed.

SR 240 fitted, interface correct .....

3. Gyro-compass interface. Check-list 2, Point 3.

   Check the type of gyro-compass fitted in the vessel. Check the gyro-compass interface cable connections between the gyro-repeater and Plug J12 on the ITI transceiver unit backplane. Check that the DIL Switch S11 on the Display & Interface board is set correctly. Refer to the appendices for details. Write the gyro-compass unit's type and serial number into the space provided in the check-list, and complete the section to certify that the check has been performed.

Gyro-compass fitted, interface correct .....

4. Log interface. Check-list 2, Point 4.

   Check the type of log fitted in the vessel. Check the interface cable connections between the log equipment and Plug J11 or J12 on the transceiver unit backplane. Ensure the DIL switch on the PCB interface is set correctly. Refer to the appendices for connector pin details and signal descriptions. Refer to drawing no. 824-049055. Write the log unit's type and serial number into the space provided in the check-list, and sign the section to certify that the check has been performed.

Log fitted, interface correct .....

5. Navigator interface. Check-list 2, Point 5.

   Check the Navigator Interface cable connections between the Navigation equipment output plug and the 25 pin "D" Connector Port (Port D) on the Transceiver board in the transceiver unit. Refer to drawing no. 824-049055. Refer to the appendices for connector pin details and signal descriptions. Write the navigation system's type and the unit's serial number into the space provided in the check-list, and sign the section to certify that the check has been performed.

Log fitted, interface correct .....

4 POWER UP AND SYSTEM TEST

4.1 INTRODUCTION.

Prior to turning in the system for the first time, the main supply voltages must be checked. The measured values must correspond to the specified supply requirements. Severe damage to the equipment will result if the wrong supply voltages and frequencies are applied to the units.

Work through the procedure below. While doing so, complete and sign check-list 3 which is located at the end of this section of the manual.

Refer to chapters 5.2 and 5.3 for information on accessing the Test menu.

4.2 START-UP / UNIT AND INTERFACE TESTS

1. Mains Voltage Check: Check-list 3, Point 1.

   Before switching on the mains power in the display unit, use a voltmeter to check the supply voltage at the input terminals. Ensure this is within the specifications. (230 Vac ± 15%). If all is satisfactory, switch on the system. If the main supply is not correct, check that the fuse panel supplying the ITI system is itself supplied with the correct voltage and frequency.

   Note

   If the mains supply voltage is 115 Vac, a step-up transformer must be fitted to increase the supply voltage to 230 Vac. (Simrad can deliver the required transformer on request).

Display unit supply voltage correct .....

2. Display Picture Check. Check-list 3, Point 2.

   When the system is first switched on, the display should present the NORMAL mode picture and the main menu. Select the TACTICAL mode. Check that the picture is centred on the display and that the plot is a correct circle. If adjustments are required, remove the cover plate from the front panel and adjust the picture using the appropriate controls. Replace the cover plate on completion. Adjust the screen for optimum brightness and contrast using the controls located next to the joystick.

Screen set up correctly .....

3. Program version. Check-list 3, Point 3.

   Select the STATUS mode and read the software version from the top line in the picture. Write the software version into the space provided in check-list 3, point 3.

4. Log Test. Check-list 3, Point 4.

   Enter the MANUAL INPUT menu, and set the log value to 0. Run the external log in its test mode. (Refer to the log equipment manuals). Compare the speed value from the external log and the speed value displayed on the NORMAL mode picture.

Log interface correct .....

5. Echo-sounder Interface Test. Check-list 3, Point 5.

   If an echo-sounder system is interfaced to the ITI, turn on the echo-sounder and note the current depth of water. On the ITI system NORMAL mode, enter the MANUAL INPUT menu and set the log value to 5 knots. The colour scale for the bottom hardness should now be displayed in the lower part of the NORMAL picture. The bottom line, input from the echo-sounder, should be displayed underneath the vessel with the correct depth value.

   If the hardness colour scale or the bottom line with depth value is missing, check the interface.

Echo-sounder interface correct .....

6. Sonar Interface Test: Check-list 3, Point 6.

   To gain access to the test menu in the ITI system, press the menu joystick to the left and keep it in that position during start-up. Then, make the following settings in the menu to set up the simulated data output:

- Go to ACTIVE SENSORS. Set all sensors to 1:1, set CATCH AVAIL to 1&2&3.
- Go to MANUAL INPUT. Set LOG to 4 KNOTS.
- Go to SYSTEM SETUP. Set SERIAL OUT to SONAR 5S.
- Go to MODE, then to TEST. Set SIMULATE to ON.
- Set MODE to NORMAL.

A simulated trawl will now be displayed on the ITI screen.

To set up the SR 240:

When starting up the SR 240, the ITI must be selected as an option in the sonar's CONSTANTS menu. This is performed in the following way:

- Go to CONSTANTS, then to OPTIONS. Set TRAWLSYST to ITI.

  Then TRAWL 1, 2 or 3 must be selected in the menu.

- Go to CONSTANTS. Set GEAR to TRAWL 1, 2 or 3.

  Now, the trawl data from the ITI should be displayed in the sub-menu for the selected trawl (1, 2 or 3).

  When the trawl symbol is selected with the GEAR SYMBOL button, the activated trawl data should be shown on the SR 240 display in accordance with the read-outs from the ITI.

  Check that the information from the SR 240 is transmitted to the ITI by setting a marker on the SR 240 display. Select the TACTICAL mode on the ITI and check that the marker (a white circle) is transferred to the ITI display. Ensure that the ITI system's range setting is correct so that the sonar's target marker is shown inside the circle.

Once the test is completed, go to the ACTIVE SENSORS sub-menu and set all the sensors to OFF. Remember to set the LOG menu back to 0.0 knots for external speed input.

Sonar interface correct .....

7. Gyro Test. Check-list 3, point 7.

Enter the MANUAL INPUT menu. Set the gyro value to the gyro-compass course. Run the gyro-compass in its test mode (if possible), and check that the course displayed by the ITI system follows that of the compass. If the compass has no test mode, start it in its normal mode and check that the ITI system follows it as it is warming up and settling (approx. 1 hour). The gyro course is displayed by the ITI on the top line in the NORMAL mode picture.

Gyro-compass interface correct .....

8. Navigation Equipment Test. Check-list 3, Point 8.

Switch on the vessel's navigation system, and note the vessel's current position. Select the NORMAL mode on the ITI system. The vessel's position should be displayed in the upper part of the screen. If the position data does not appear or is different from that displayed by the navigation system, refer to the Navigation Equipment Manuals to ensure the correct communication format is set up (NMEA 0183, RS232). If the navigation system has more than one serial output port, check that the correct port is activated.

Navigation equipment interface correct .....

9. Transmission pulse test. Check-list 3, Point 9.

Equipment required: Oscilloscope. The transducer cables must be connected to the transmitter during the measurements.

The transceiver board has only one transmitter. The transmitter output is connected by relay switching to one transducer beam at a time. Each beam has a right and a left transducer element. The transmission pulse is transmitted on the **right** transducer element in one beam.

The three figures below show the transducer connections to plug P4 inside the transceiver cabinet for the three transducer configurations.

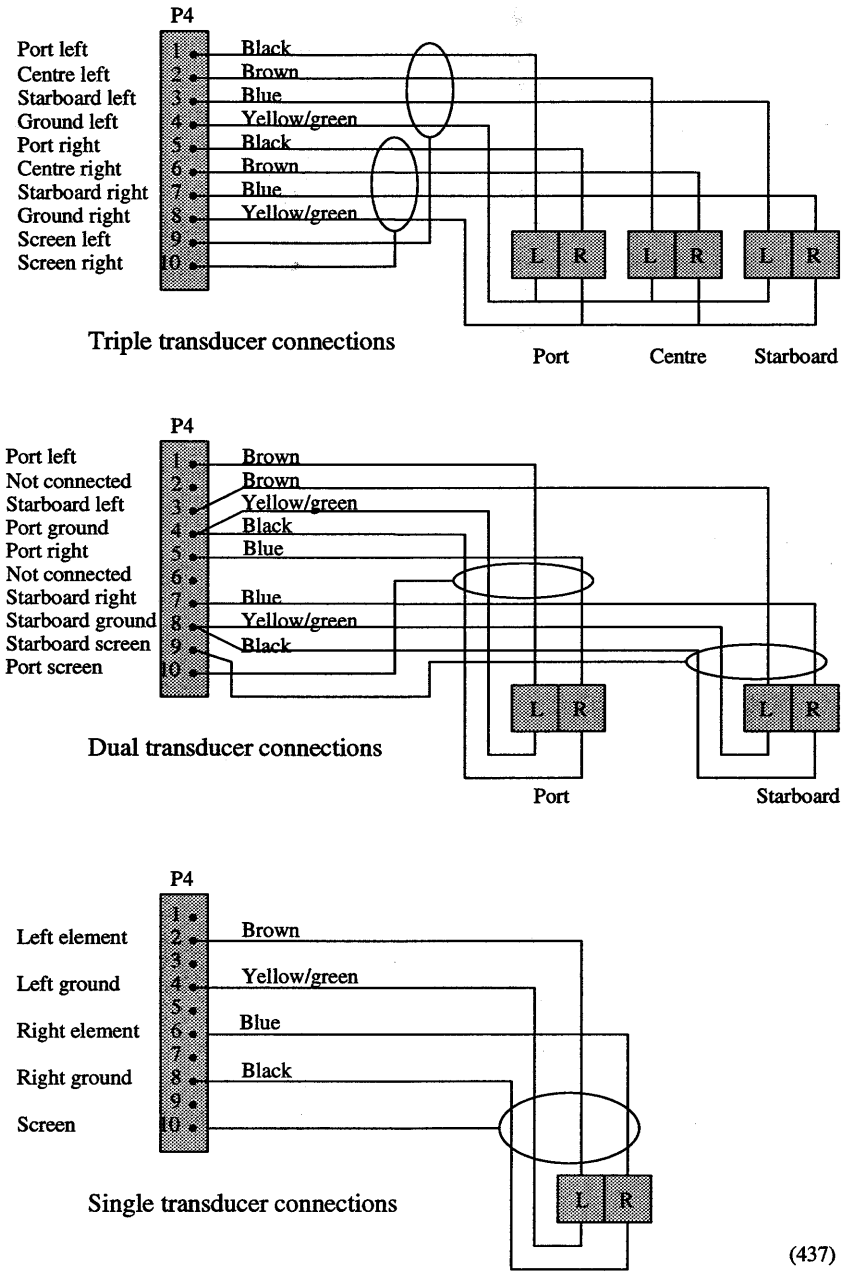


Figure 1 The transducer connections

a. Select MODE, then go to the TEST sub-menu. Refer to the description of the test menu in Chapter 5.

b. Select MODE from the TEST sub-menu, then select LOOP.

c. Select BEAM from the TEST sub-menu, then select the first beam to be checked (Port, Centre or Starboard). The SENSOR sub-menu is set to HEIGHT (default). Do not change this setting.

d. Select TEST from the TEST sub-menu, then select "4: SENSOR".

   The system will start interrogating the Height sensor by transmitting a pulse and waiting for a sensor to reply. As there will be no reply from a sensor, a new transmission pulse will be transmitted approximately every ten seconds.

e. Use the oscilloscope to measure the transmission pulse.

   Measure one beam at a time (only the right transducer element of each pair is used for transmissions). To change the beam, enter the TEST sub-menu at BEAM and select the desired beam.

Connect the oscilloscope as follows:

Port beam: Probe to P4 Pin 5. ground to P4 Pin 10

Centre beam: Probe to P4 Pin 6, ground to P4 Pin 10

Starboard beam: Probe to P4 Pin 7, ground to P4 Pin 10

The transmission pulse should be > 100 V p-p (typically 120 V p-p). The pulse length should be 5 ms, and it should have a frequency of 30.34 kHz (period = 32.95 µs).

If a triple transducer is installed, run the test for all three beams. A dual transducer installation has only the port and starboard beams, while a single transducer has only the centre beam.

If the transmission pulse is out of specifications with the transducer connected, replace the appropriate transducer element with a dummy load (a 60 Ω, 1 W resistor) and repeat the test. If the pulse is still wrong, the transceiver board should be replaced. If the transmission pulse meets the specifications when fed into the dummy load, but not when fed into the transducer, then the transducer should be checked. A procedure for checking the vessel transducer is given in the "De-bugging" chapter.

4.3 SYSTEM TEST IN HARBOUR

Check-list 3, Point 10.

The system should now be tested by placing a sensor into the water.

Note

For installations with a vertical shaft hull unit, ensure that the Hull Unit check-list has been completed (Refer to the hull unit manual). Ensure also that there is enough water under the vessel to enable the hull unit to be lowered safely. There must be a minimum of 2.0 meters of water under the vessel's keel.

To achieve stable communication between the ITI system and the test sensor, the sensor must be positioned within the vessel transducer's acoustic beam, and stable in the water. The best way to achieve this is to follow the procedure outlined below.

This test ensures that the system will interrogate a sensor in the water. The test menu is used to select the beam and to set the gain to a specific value. Refer to chapter 5 for a description of the TEST menu.

1. Select a sensor and ensure the battery is fully charged. Fasten ropes to the two securing lugs on one side of the unit and lower it into the water astern of the vessel. It should be positioned at a distance of at least 10 meters behind the vessel's transducer, at a depth of approximately three meters below the vessel's keel. Ensure the ropes are the same length to keep the sensor level in the water. The free ends of the ropes should be fastened to structures at least three meters apart at the surface to ensure the sensor transducer cannot turn away from the vessel's transducer.

   Note

   It is vital that the line of sight between the vessel's transducer and the sensor is clear of any obstructions.

2. Enter the TEST mode, then select the TEST sub-menu (refer to paragraph 5.1).

3. Select AUTOGAIN in the TEST sub-menu (Level 4), then select OFF.

4. Select BEAM in the TEST sub-menu (Level 4) then select the appropriate beam (the beam that is pointing towards the sensor in the water).

5. Select NOISE in the TEST sub-menu and switch it OFF.

6. Select MODE in the TEST sub-menu (Level 4) and set it to LOG.

7. Press the joystick to the left. The TEST sub-menu will disappear and the system will return to level 3 in the main menu.

8. Select the ACTIVE SENSORS sub-menu and press the joystick to the left. Select the sensor which is to be tested. Set the interrogation sequence to 1:1.

9. Select RATE, and set MAX. interrogation rate. The system should now have begun to interrogate the specified sensor.

10. Select MODE, then select TEST mode.

The TEST mode is also called the TEST PAGE, and will display the sensor data in columns. Remain in the test page to see the results of the interrogation.

The replies and data from the sensors will be displayed on the screen in nine columns, as described below. In this example, the Temperature, Height, Catch, Spread and Depth sensors have been activated, and it is assumed that a dual transducer is used.

SENSOR	TIME	SR	B	TD	ENV.	DATA	COMMENTS
Temp.	21.57.48	1152	196	P	3.3	11.0	
Height	21.57.58	1150	196	P	3.5	16.2 78.0	
Catch	21.58.08	1225	194	P	3.4	ON	
Spread	21.58.19	1060	190	P	3.5	126.8	
Temp.	21.58.28						Timeout pulse 1
Height	21.58.38	1151	195	P	3.4	16.0 79.1	
Catch	21.58.48	1225	193	P	3.5	ON	
Spread	21.58.58	1062	190	P	3.5	125.7	
Temp.	21.59.08	1150	195	P	3.6	11.1	
Depth	21.59.18			S	3.0	-38 13 62	Start shot
Depth	21.59.27			P	3.4	-64 -16 35	Searching
Depth	21.59.37			S	2.9	-34 17 65	Searching
Height	21.59.47	1151	194	P	3.5	16.3 80.2	
Catch	21.59.37	1224	191	P	3.5	ON	
Spread	21.59.47	1062	189	P	3.4	125.0	
Temp.	21.59.57	1149	194	P	3.5	11.0	
Depth	21.00.07	1150	194	P	3.4	354.6	

Where:

- The SENSOR column states which sensor has been interrogated.
- TIME gives the time of the interrogation.
- SR indicates the Slant Range or distance to the sensor in meters.
- The B column gives the Bearing to the sensor, measured relative to the vessel's bow.
- TD is the Transducer beam currently in use (P = Port, C = Centre and S = Starboard).
- ENV is the ENVelope of the received signal. When AUTOGAIN is on, the gain will automatically adjust until the envelope is stable at 3.5. In shallow water (in harbour) AUTOGAIN should be set to OFF because the signal level will vary considerably. The envelope can vary between 0.0 and 5.0.
- DATA is the actual information received from the sensor. In the example the temperature is 11.0°C. The Height sensor will display two values; The first being the distance to the foot-rope, the second being the distance to the sea bed.
- COMMENTS will contain any messages generated by the system. These may be as follows:

  - No message = Reply from sensor accepted.
  - Timeout Pulse 1 = Pulse 1 from sensor missing.
  - Timeout Pulse 2 = Pulse 2 from sensor missing.
  - Timeout Pulse 3 = Pulse 3 from sensor missing. (Only height sensor and Temp/Depth combination sensor).
  - Start shot = First interrogation after a new sensor is activated.
  - Searching = Searching through the beams. (Only when BEAM is set to AUTO in the TEST menu).
  - Rejected pulse = A reply pulse was received from the sensor, but the pulse quality was too bad for the system to accept it. Could be caused by noise.
  - Outside window = Sensor reply is found outside tracking window.

11. If no sensor reply is displayed on the screen, and only the "Timeout Pulse 1" message comes up, go to the TEST sub-menu and adjust the gain. The gain can be adjusted manually when AUTOGAIN is OFF by going to the TEST menu and selecting GAIN. The gain can then be set from 0 to 255. (0 = maximum gain, 255 = minimum gain). The gain should be set such that the system displays an envelope value of 3.5.

The test is useful for testing all the sensors.

Check the replies displayed on the screen, and note the following points:

a. Is the slant range correct ?

b. Is the bearing correct ?

c. Is it possible to adjust the gain until the envelope is approximately 3.5 ? If not, check the alignment of the sensor with the vessel's transducer. Is the line of sight between sensor and vessel's transducer free ?

d. Does data make sense ?

If possible, run the test in all the transducer beams. (The sensor will need to be moved to the appropriate beam).

Complete check-list 3, Point 10 on completion.

4.4 SEA TRIALS

Check-list 3, Point 11.

If at all possible, the installation engineer should join the vessel for the sea trials. This would enable the engineer to witness the system in operation in a realistic working environment, and access the effectiveness and accuracy of the installation with particular regard to the positioning of the various units. This experience would be useful in future installations.

Complete check-list 3, Point 11 on completion.

5 THE TEST MENU

5.1 INTRODUCTION

A test menu is available in the ITI system. This menu is not for use by the operator, only the maintenance or installation engineers. The test menu is used in the system test procedures.

There are two possible ways of activating the test menu:

1. While holding the joystick to the right, switch on the power to the system and continue holding the joystick to the right till the picture appears on the screen.

Or

2. Switch off power to the system at the Control and Display unit.

   Open the Transceiver Unit and remove the Interface and Display Controller circuit board.

   Find DIL switch S10 on the board, and set Bit 6 of that switch to ON.

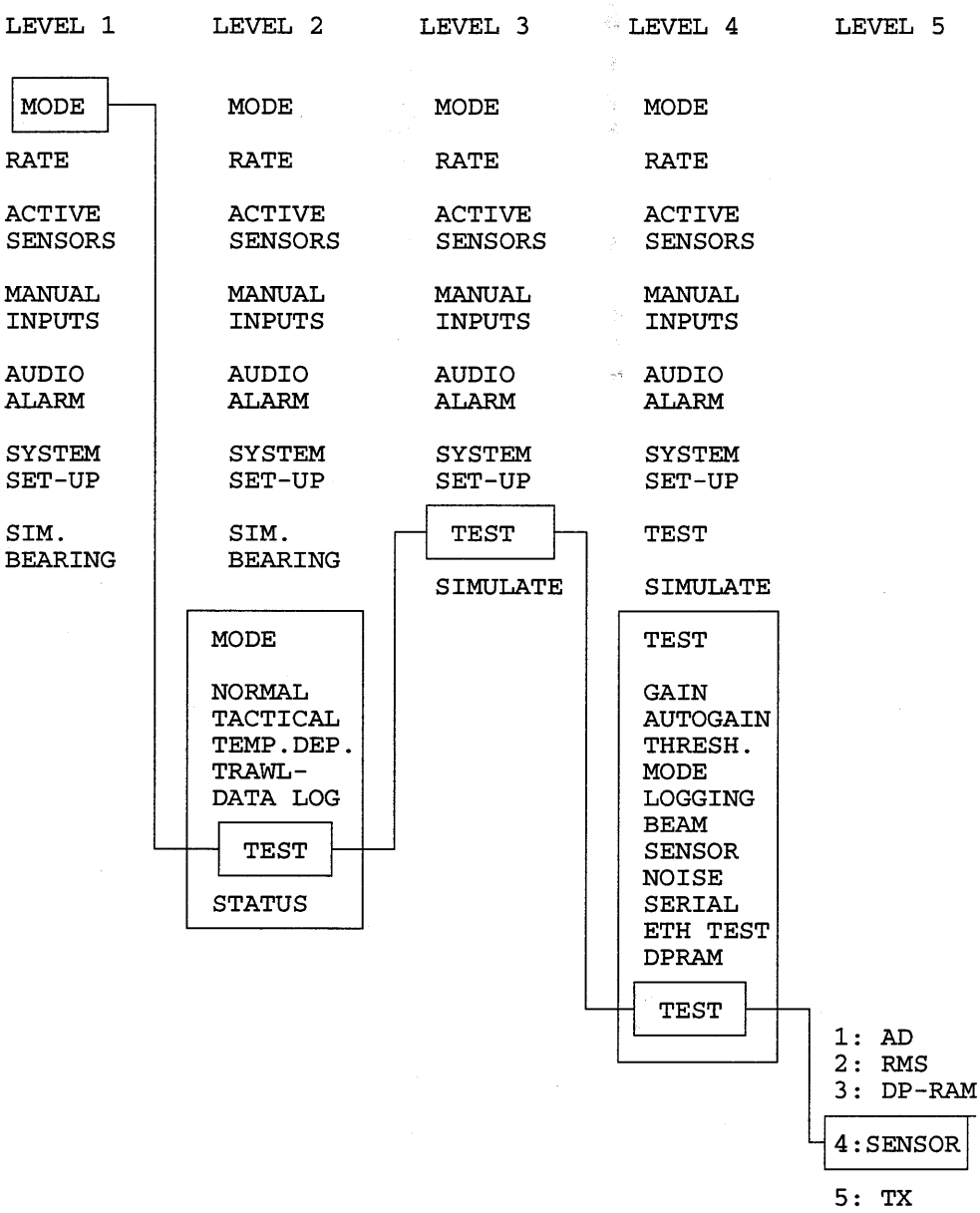
   Replace the circuit board into the Transceiver Unit and close the cabinet. Switch power back onto the system. The test menu will now be available in the menu system.

   The test menu can be accessed by using the joystick in the normal manner.

Note

The switch must be re-set to OFF once the engineer has completed the work.

5.2 TEST MENU SYSTEM - TREE STRUCTURE.



5.3 ACCESSING THE TEST MENU

1. Start with the system in the NORMAL mode. Select MODE - Level 2 will be displayed and the MODE sub-menu will appear.

2. Go to the TEST parameter inside the frame and select it. Level 3 will be displayed. There is no sub-menu at Level 3.

3. Move the cursor down to the TEST command, and select it. Level 4 will be displayed. Level 4 has a sub-menu called TEST.

Via the sub-menu of Level 4, access is gained to all the test menus. By selecting one of these menus, the system will go to level 5 where various alternatives can be selected.

More than one of the test menus may have to be selected to run a specific test.

Some of the test menus will not be used in a normal running-in system test. More details on using the test menu are given in the actual test procedures. A short description of each item in Level 4 of the TEST sub-menu is given below:

Menu	*Description:*
GAIN	Gain can be set manually - set value from 0 to 255. (0 = max. gain, 255 = min. gain) NB, The Autogain must be set to OFF.
AUTOGAIN	Select between ON and OFF - ON is default. The manual gain setting will only work when AUTOGAIN is set to OFF.
THRESHOLD	Set trigger level for the receiver - default = 80. The default value is used in normal operation. The threshold value can be set between 0 and 255, though the manufacturers recommend that it is not changed.

MODE — Three alternatives will be displayed when entering this menu:

ONCE - Run test one time.

LOOP - Run test forever (looping).

STOP - Stop test when running in loop.

LOG - is default and must be set when testing is completed for normal system operation.

LOGGING — Select between ON or OFF - default is OFF. When ON is selected, the Centronix Printer port is activated and a hard copy of the sensor information can be printed out.

BEAM — Select one beam - default is AUTO. When one beam is selected (port, centre or starboard) only this beam is active during transmitting and receiving. It is recommended that the system be locked to one beam while testing in harbour, though it must be reset to AUTO on completion.

SENSOR — Select one of all possible sensors.

NOISE — ON = default. Under normal operation false interrupts will be counted. Gain will be reduced until no false interrupts occur and a maximum gain limit is found. OFF = This function can be excluded. ON = Find a maximum gain value that will give no false interrupts.

SERIAL — Five alternatives will be displayed. Select one of these to display the last telegram received on the respective serial line. The telegram will be displayed in the lower part of the screen in both ASCII and Hex.

None - No serial input.

Nav (D) - Display data from serial port D. (Navigation data).

Echo (A) - Display data from serial port A. (Echo-sounder data).

Aux (B) - Display data from serial port B. (Aux. data).

Sonar (C) - Display data from serial port C. (Sonar data).

For further details, refer to chapter 2 in "De-bugging the system".

DP RAM — Select a number from 0 to 7. Used together with SENSOR test, the number determines from where in the received pulse data is collected. This sub-menu is used only when testing the system in the factory and is not used in any procedure in this manual.

ETH TEST — This is a self test of the Ethernet interface. When set to ON, the Ethernet test will run continuously. A test reply code will be displayed in the lower part of the screen. The reply codes are:

0	=	Passed all tests.
1	=	Self-test of Ethernet controller (82 586) failed.
2	=	Internal loop-back failed (82 586).
3	=	Ethernet serial interface failed.
4	=	Transceiver loop-back failed.

TEST — Select 1 of 5 possible test programs:

1: AD	=	Display A/D Converter values.
2: RMS	=	Calculate noise out of A/D Converter.
3: DP RAM	=	Run dual Port RAM test, transceiver board.
4: SENSOR	=	Start, interrogation of selected sensor.
5: TX	=	Send transmit pulse.

6 CHECK-LIST 1

Complete the check-list where appropriate.

CHECK-LIST 1 - UNIT INSTALLATION AND CABLING			
CHECK POINT	**TEST/DESCRIPTION**	**COMMENTS**	**DATE/SIGN**
1	Control and Display Unit CDU ser.no:		
2	Transceiver Unit TRU ser.no:		
3	Type of transducer installation		
4	Transducer orientation Triple . . . . . . Dual port side . . . . . . Dual stbd. side . . . . . . Single		
5	Transducer location, blind- arcs etc. . . . . . Dist. to prop . . . . . . Dist. to keel		
6	Welds, reinforcing, bolts, nuts washers etc.		
7	Transducer paint-work correct		
8	Cable glands correct		
9	Transducer cables correct		
10	CDU/TRU cabling correct		
11	Inspection correct		

NOTES:

VESSEL:_____ PLACE:_____

INSTALLATION CHECK PERFORMED BY:

COMPANY:_____ DATE:_____ NAME:_____

7 CHECK-LIST 2

Complete the check-list where appropriate.

CHECK-LIST 2 - CONNECTION OF EXTERNAL EQUIPMENT			
CHECK POINT	**TEST/DESCRIPTION**	**COMMENTS**	**DATE/SIGN**
1	Echo-Sounder Type: . . . . . . Serial no:		
2	Sonar Type: . . . . . . Serial no:		
3	Gyro-compass Type: . . . . . . Serial no:		
4	Log Type: . . . . . . Serial no:		
5	Navigation equipment Type: . . . . . . Serial no:		
NOTES:			

VESSEL:_____ PLACE:_____

INSTALLATION CHECK PERFORMED BY:

COMPANY:_____ DATE:_____ NAME:_____

8 CHECK-LIST 3

CHECK-LIST 3 - ITI START-UP / SYSTEM TEST			
CHECK POINT	**TEST / DESCRIPTION**	**COMMENTS**	**DATE/SIGN**
1	Display mains supply voltage correct		
2	Screen setup correct		
3	Software version:		
4	Log test		
5	Echo-sounder test		
6	Sonar test		
7	Gyro-compass test		
8	Navigation equipment test		
9	Transmission pulse test		
10	System test in harbour		
11	Sea trials		

NOTES:

VESSEL:_____ PLACE:_____

START UP/SYSTEM TESTS PERFORMED BY:

COMPANY:_____ DATE:_____ NAME:_____

DE-BUGGING THE SYSTEM

CONTENTS:

1 FUNCTIONAL TEST OF ITI TRANSDUCER

1.1 INTRODUCTION

If problems with the system are encountered, this test can be performed to check that the vessel's ITI transducer(s) is functioning correctly. The test must be performed when the vessel is afloat, though the ITI system will be out of operation for the duration of the test.

1.2 TEST PROCEDURE

1 Disconnect the transducer cables from the transceiver board in the transceiver unit. Connect a 60 Ω, 5 W resistor in series with the transducer as shown in Figure 1. Connect the signal generator and the oscilloscope as shown.

2 Set the signal generator to provide an output of 30 kHz, and adjust the amplitude such that channel 1 on the oscilloscope reads 10 V p-p.

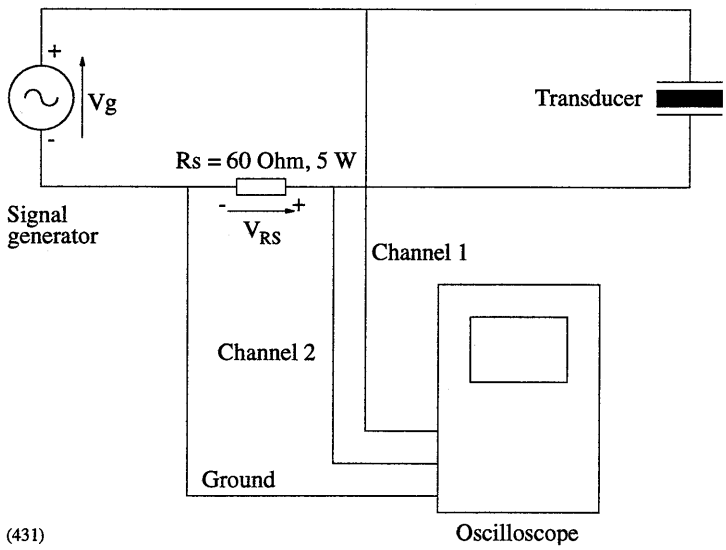
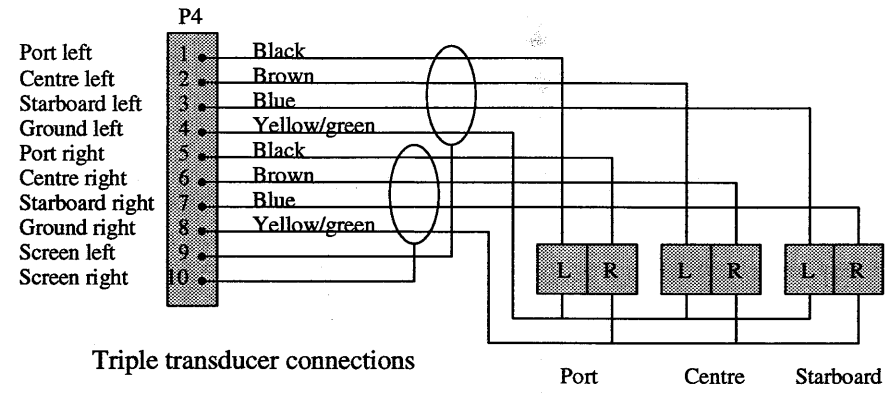
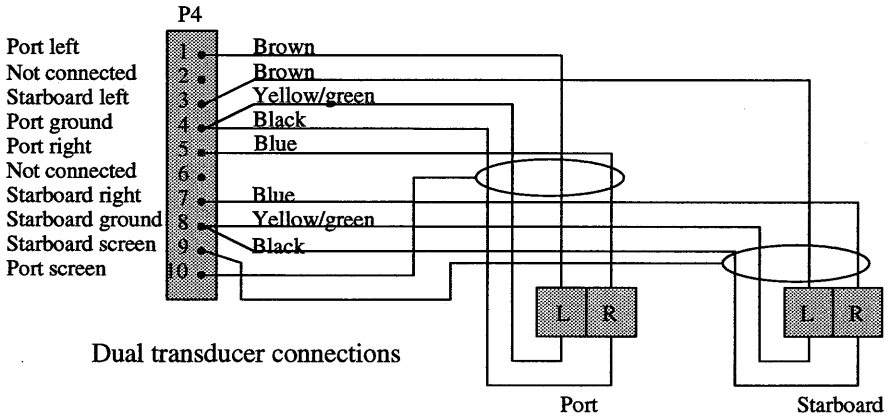


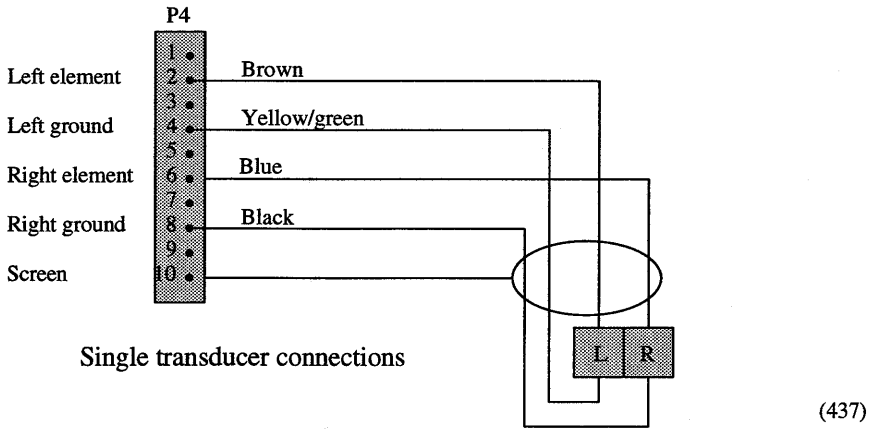
Figure 1 Test set-up for ITI vessel transducer



Triple transducer connections



Dual transducer connections



Single transducer connections

(437)

Figure 2 The transducer cable connections

3 *Transducer impedance test*

Read the amplitude of the voltage dropped across the resistor RS (V_{RS}) on channel 2. With the input voltage at 10 V, V_{RS} must be:

$$4 \leq V_{RS} \leq 6 \text{ V p-p}$$

4 *Phase test*

Read the phase difference between the wave-forms displayed by channel 1 (V_g) and channel 2 (V_{RS}) on the oscilloscope. The total phase difference between the two wave-forms should be less than 20°.

Phase difference = 360 x Δt x f

where Δt = time difference, f = frequency

At a frequency of 30 kHz, a phase difference of 20° will give a time difference of 1.85 µs between the two wave-forms.

2 SERIAL LINE TEST FROM THE MENU

2.1 INTRODUCTION

The in-coming messages on the serial ports can be checked by entering the SERIAL sub-menu on the TEST page. Each serial port (A, B, C and D) has an internal ring buffer of 256 bytes through which the in-coming messages are fed. When the SERIAL test is started, the test program reads the message as it is passed through the selected ring buffer as displays it and the ASCII translation on the screen.

2.2 RESULTS

When the SERIAL test is started, two lines of text will be written in the lower part of the display screen. The upper line will contain 60 characters (the first 60 characters to be read as they pass through the ring buffer) and the lower line will comprise the ASCII code translation for the first 20 characters of the upper line.

2.2.1 Example 1

If the NMEA 0183 telegram "$SDDBT" has been received on port A as an input from the echo-sounder, the following text string may be displayed in the upper line:

,M,,<CR><LF>$SDDBT,,,414.6,M,,<CR><LF>$SDDBT,,,414.....etc.

The telegram, being of less than 60 characters, will be repeated, and the telegram may start at any point.

The ASCII text displayed in the lower line will then read:

2C 4D 2C 2C OD OA 24 53 44 44 42 54 2C 2C 34 31 34 2E 36 2C...etc.

2.2.2 Example 2.

No message is received on serial port A. This may be due to a wrong connection or a fault on the transmitter side. The upper line will in this case be blank, while the lower line will contain a string of zeros as below:

00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Note

The serial line test facility is intended to enable the in-coming telegrams to be checked. If a telegram has been received by the ITI system but the information is not displayed in the operation modes, run this test and check the characters. The ITI system can only receive messages based on the NMEA 0183 standard. All messages acceptable by the ITI system are listed and described in appendix 1. Check the characters contained in the received message against the appropriate message description in the appendix. Note that both carriage return (<cr>) and line feed (<lf>) ***must*** *be present at the end of each telegram.*

3 ETHERNET TEST FROM THE MENU

3.1 INTRODUCTION

The ETH TEST menu on the TEST page can be used to test the Ethernet interface. When this test is set to ON, a continuous test of the Ethernet hardware and interface is performed. Both the Ethernet chip and the transceiver net interface are tested.

Note

ITI with Ethernet is optional.

3.2 RESULTS

The test results are displayed on the screen as a number code (0 to 4) as follows:

Code	Definition
0	All tests passed.
1	Ethernet controller (82 586) self-test failed. Replace display/interface board.
2	Internal loop-back failed (82 586 failed). Replace display/interface board.
3	Ethernet Serial Interface (ESI) loop-back failed. Replace display/interface board.
4	Transceiver loop-back failed. Ethernet transceiver error. Impedance un-matched, or missing transceiver.

When the test is being run, the following line of text should be displayed if all is OK:

ETHERNET TEST : 0

Note

If the Ethernet transceiver has been connected to the net, the test should reply with the code "0". If the transceiver is not connected but the Ethernet hardware is found to contain no errors, the test will display the code "4".

Remember to set the test to OFF on completion of the test. The test ***must*** *be OFF during normal operation of the ITI system.*

APPENDICES

CONTENTS:

APPENDIX 1 - SERIAL LINES AND ETHERNET MESSAGES

1.1 INTRODUCTION

With the rapid development of marine electronic devices, it has become necessary to develop a standardized interface protocol for exchanging data between devices regardless of the device manufacturer. The NMEA 0183 is just such a standard protocol for interfacing electronic marine devices, and it has been implemented in the ITI system.

The most common way of connecting together electronic equipment has, up to today, been by use of serial lines. A serial line is a point to point connection from one unit to another, and requires a lot of cabling as the number of systems interconnected increases.

A much more powerful way of integration is the Ethernet standard. Ethernet is a high speed serial line interface based on a single 50 Ω coax cable that can be extended up to 500 meters. There is no limit to the number of systems that can be hooked up to this one cable, and once they are connected to the Ethernet cable all systems are able to communicate with each other over the same cable.

In the ITI system, four serial lines and an Ethernet interface are available for connection to external equipment.

ETHERNET is a LAN (Local Area Network) standard of the CSMA/CD (Carrier Sense Multiple Access with Collision Detection) type, with 10 Mbits/s signalling capacity. The software required to communicate over ETHERNET is included in the standard ITI system. However, a standard ITI system does not include the hardware required. A dedicated interface/display board containing the ETHERNET hardware must be installed.

The ETHERNET interface incorporated in the ITI system has a UDP/IP/ETHERNET protocol, which is a subset of the TCP/IP family of protocols. Equipment connected to the cable is individually addressed, and multiple connections can coexist on the cable by the use of time-sharing.

Much of today's engineering effort is spent on system integration. It is Simrad's philosophy that in order to reduce integration costs each individual instrument should have certain key elements built into it. Ethernet is a communication standard suitable for the integration of ships electronics. It also has high speed, high functionality and world wide acceptance.

All messages (telegrams), transmitted or received on either serial lines or Ethernet are based on the NMEA 0183 standard protocol. The NMEA 0183 standard actually defines both the telegram format (protocol) and the electrical interface. However, the electrical connection between systems is not so important as long as "talker" and "listeners" have the same electrical interface configuration. For serial line connections, the RS 232C electrical standard is the most used.

1.2 SERIAL LINES

1.2.1 Serial line messages

The ITI system has four serial lines (ports A,B,C,D) that can be connected simultaneously to external equipment. All messages transferred over these serial lines are based on the NMEA 0183 standard. Messages starting with "$" are standard NMEA 0183 parameters, and messages starting with "@" are Simrad defined parameters.

The four serial lines named port A,B,C and D each have a dedicated function in the ITI system. Ports A,B and C have two-way communication (data in/out), while port D only has input data. All four serial lines can receive telegrams without being activated from the menu.

Ports A, B and C must be activated from the menu before any messages can be transmitted out on these three lines. Each serial line has different telegrams (messages) associated with it. Table 1.1 and table 1.2 give an overview of all the input and output telegrams associated with the various serial ports.

1.2.1.1 Transmitted messages

A message (NMEA 0183 telegram) will be transmitted when it's data has been updated. For example the message @IITDS will be sent out after an update of the spread 1 sensor data. Each individual parameter available on serial line B (Aux) can be turned ON or OFF from the menu.

Individual parameters can not be set ON or OFF on serial lines A and C. These two serial lines have been allocated for Echosounder and Sonar interfacing respectively, and all parameters on any of these two lines are either activated or not activated.

No parameters are transmitted out on serial line D.

Table 1.1 shows the different parameters that can be transmitted by ITI when activated in the menu. In addition, all messages received on serial line B can be transferred out on Ethernet. This transfer facility is activated from the command "NMEA TRANSFER". The same command will also send all messages received on Ethernet to serial line B.

1.2.1.2 Received messages

All messages listed in table 1.2 can be received at any time without activating them from the menu. As described above, by setting the "NMEA TRANSFER" command to ON, all messages received on Ethernet will be transmitted out on serial port B, and vis-versa. ("??" means any character will be accepted)

Serial line D Navigator	Serial line A Echosounder	Serial line B Aux	Serial line C Sonar	Ethernet Aux
	$IIDBS	@IITDS	@IITDS	@IITDS
	$IIHFB	@IITS2	@IITS2	@IITS2
		@IIHFB	@IIHFB	@IIHFB
		$IIMTW	$IIMTW	$IIMTW
		@IITFI	@IITFI	@IITFI
		@IITPT	@IITPT	@IITPT
		@IITPC	@IITPR	$IIGLL
		@IITTS		$IIDBS
		$IIGLL		
		$IIVTG		
		$SDDBS		
		$IIDBS		

Table 1.1 Transmitted messages

Serial line D Navigator	Serial line A Echosounder	Serial line B Aux	Serial line C Sonar	Ethernet Aux
$??GLL		$??GLL		
$??VTG		$??VTG		$??VTG
	$SDDBS	$SDDBS		$SDDBS
	$??DBT	$??DBT		$??DBT
		$??HDT	$??HDT	$??HDT
		$??HDM	$??HDM	$??HDM
		$??ZDA	$??ZDA	
		@SSTPP	@SSTPP	@SSTPP
		@TAWWL		@TAWWL
		@TAWWT		@TAWWT

Table 1.2 Received messages

1.2.2 Serial line configurations and pin allocations

Refer to drawing no. 824-108590.

The four serial port connectors are found on the transceiver unit plug panel located in the bottom of the cabinet. The serial lines can be configured electrically as follows:

- Port A can be configured as RS 232 or RS 422.
- Ports B and C are standard RS 232 serial lines only.
- Port D can be configured as RS 232, RS 422 or current loop.

Table 1.3 gives an overview of the different ways of configuring the serial lines electrically, and also the dedicated use of each line.

Port	Possible configurations	ITI port allocation	Format
A	RS 232 RS 422	Echo-sounder	NMEA 0183
B	RS 232	Winch control Track plotter Data logger	NMEA 0183
C	RS 232	Sonar	NMEA 0183
D	RS 232 RS 422 20 mA Current loop	Navigator	NMEA 0183

Table 1.3 Possible serial port configurations and allocations

The referred drawing, located in section 6, is a schematic diagram of the four serial lines. It shows how they are routed between the communication controller located on the processor board and the plug panel in the transceiver unit.

When a serial interface cable is to be connected to ports A or D, ensure that the links on the Control Processor Board (CPB 286) are set according to table 1.4 below:

Link	Link function	ON/OFF	TRU plug
B6 B7 B8	Selects 20 mA CL input serial line A1 Selects RS 422 input at serial line A1 Selects RS 232 input at serial line A1	Only one of these three may be selected at any one time	D 25-pin D connector
B9	Selects 20 mA CL input serial line B1		
B10 B11	Selects RS 422 input at serial line B1 Selects RS 232 input at serial line B1	Only one of these two may be selected at any one time	A 9-pin D connector

Table 1.4 Links required to change interface drives/receivers

Note

There is only one current loop drive/receiver circuit in the system. This interface is available on serial port D on the TRU cabinet. However, internally on the CPB 286 board, the current loop signal from port D can be guided to the input B1 by inserting link B9.

In the ITI system, port D has been allocated for interfacing to a navigation system, thus occupying this connector. However, if an echosounder with a current loop interface is to be connected to ITI the following can be done. Split the cable from port D and connect the current loop signal wires to the echosounder. Port D is then used to interfaces two external serial lines simultaneously. This requires that link B9 is inserted. Link B9 can be inserted together with links B6, B7 or B8, see figure 1.

1.2.3 Serial port pin-assignments

The ITI system is designed to communicate over serial interfaces where control signals are not required.

The following three tables show the pin assignments for all four serial ports (A, B, C and D) available on the ITI transceiver cabinet.

Pin	Name	Description
1	BI 422+	RS 422 input +
2	RX DB1	Receive data RS 232
3	TX DB1	Transmit data RS 232
4	BI 422-	RS 422 input -
5	GND	Signal ground RS 232
6	BO 422-	RS 422 output -
7	RT SB1	Request to send RS 232
8	CT SB1	Clear to send RS 232
9	BO 422+	RS 422 output +

Table 1.5 Pin assignments - serial port A

Pin	Name	Description
1		
2	RX DA2	Receive data RS 232
3	TX DA2	Transmit data RS 232
4		
5	GND	Signal ground RS 232
6		
7	RT SA2	Request to send RS 232
8	CT SA2	Clear to send RS 232
9		

Table 1.6 Pin assignments - ports B and C

Pin	Name	Description
1		
2	TX DA1	Transmit data RS 232
3	RX DA1	Receive data RS 232
4	RT SA1	Request to send RS 232
5	CT SA1	Clear to send RS 232
6		
7	GND	Signal ground RS 232
8		
9	CLO +	Current loop output + 20 mA
10		
11	CLO -	Current loop output - 20 mA
12		
13		
14	AI 422 +	RS 422 input +
15	AI 422 -	RS 422 input -
16	AO 422 -	RS 422 output -
17	AO 422 +	RS 422 output +
18	CLI +	Current loop input + 20 mA
19		
20	DT RA1	Data transmit ready RS 232
21		
22		
23		
24		
25	CLI -	Current loop input - 20 mA

Table 1.6 Pin assignments - serial port D

1.3 ETHERNET

1.3.1 Ethernet messages.

Refer to table 1.1 for messages transmitted on Ethernet.
Refer to table 1.2 for messages received on Ethernet.

The messages to be transmitted out on serial port B or the Ethernet cable must be activated specifically in the "SYSTEM SETUP" menu. For port A or C (echo-sounder and sonar ports) all messages listed in table 1.1 and 1.2 will be activated when that port is set active in the menu.

Nothing needs to be set in the menu in order to receive the messages that are listed in table 1.2 for serial ports A, B, C and D. In addition, all the messages listed in table 1.2 under Ethernet can be received without activating them in the menu.

1.3.2 Ethernet addresses

Equipment connected to the Ethernet cable is individually addressed, and multiple computer-to-computer connections can coexist on the cable simultaneously. Communication with the ITI system is based on UDP/IP/ETHERNET (User Datagram Protocol, member of the TCP/IP protocol suite) blocks, which includes the following address fields:

- Destination (remote) ETHERNET address (6 bytes)
- Destination (remote) IP address (4 bytes)
- Destination (remote) UDP port number (2 bytes)
- Source (local) ETHERNET address (6 bytes)
- Source (local) IP address (4 bytes)
- Source (local) UDP address (2 bytes)

Thus, both destination and source addresses are included in each data block, and a complete address comprises ETHERNET address, IP address and UDP port number. Each device on the network must have a unique address. The ETHERNET and IP address of the ITI, the local address, are entered into the ITI menu. The local UDP port number is set to **10183** in the ITI program and can not be altered from the menu.

By entering "SYSTEM MENU" then selecting "ETHERNET", a list of parameters will be displayed. The first parameter is "ETH.NO" (Local ETHERNET Address), the second parameter is "LOCAL IP ADR" (Local Internet Protocol Address).

The default values which will be used when the ITI system is first switched on are as follows:

- Local **ETHERNET address** (ETH.NO in menu) **04:02:00:0E:15:00** hex.
  The last byte can be changed from 0 to 9 in the menu.
- Local **IP address** (LOCAL IP ADR in menu) **157.237.014.021** dec.
  All bytes may be changed in the menu.
- Local **UDP port** (fixed number) **10183** dec.
- Remote **ETHERNET address** (fixed number) **FF:FF:FF:FF:FF:FF** hex.
- Remote **IP address** (fixed number) **255.255.255.255** dec.
- Remote **UDP port** (fixed number) **10183** dec.

Only the two first parameters listed here need to be set in the menu when installing the Ethernet interface. The operator should not have to change these numbers after installation.

There are three ETHERNET address types:

- Individual (least significant bit of first byte is zero).
- Multicast (least significant bit of first byte is one).
- Broadcast (all bits are one).

Note

*The local ETHERNET address of the ITI **must** be of type **Individual**. The remote addresses in the ITI are of type **Broadcast**, which means that all messages sent out on the ETHERNET cable from the ITI will be received by all devices connected to the same cable.*

1.3.3 Ethernet port pin-assignments

The Ethernet port (15-pin Delta connector, female) located on the plug panel in the transceiver cabinet complies with the IEEE 802.3 standard.

The table below lists the connected signals.

15-pin Delta	Description
1	Screen
2	Collision presence +
3	Transmit +
5	Receive +
6	0 V
9	Collision presence -
10	Transmit -
12	Receive -
13	+15V

Table 1.6 Pin assignments - Ethernet connector

1.4 HARDWARE

A broad range of interface hardware for Ethernet systems is available on the market. Three types of Ethernet cable connections; Fibre-Optic, Coaxial cable and Twisted-Pair are used as the back-bone in a Ethernet environment. To connect the ITI to the Ethernet cable, the minimum configuration required is an Ethernet transceiver unit and a cable between the ITI transceiver and the Ethernet transceiver. A local vendor or expert on Ethernet products should be consulted to assist when configuring the Ethernet environment for a specific installation.

1.5 MESSAGE DESCRIPTIONS

Messages transmitted and received on serial lines or ethernet are all based on the NMEA 0183 standard. All messages start with either "$" or "@". The next two letters indicate which system is transmitting the messages (for ITI, II (Integrated Instrumentation) is used) and the next three letters indicate the type of message. Each message ends with <cr> (Carriage Return) and <lf> (Line Feed).

Below are descriptions of all the parameters (messages) listed in tables 1.1 and 1.2:

$IIVTG,,,x,M,y.y,N,,<cr><lf> **Vessel course and speed**

VTG represents the Vessel Track over the Ground.
x,M is the track bearing, in degrees magnetic.
y.y,N is the speed in knots.

@IITPR,x,M,y,P,z.z,M<cr><lf> **Trawl Position Relative vessel**

TPR represents the Trawl Position Relative to the vessel.
x,M is the horizontal range to the target (0 - 4000m).
y,P is bearing to the target relative to the vessel heading. (Resolution 1°).
z.z,M is the depth of the trawl below the surface (0 - 2000m).
Note that the ITI system measures the depth separately from the range and bearing. If the ITI system knows only the range and bearing, the depth field will be empty.

@IITPT,x,M,y,P,z.z,M<cr><lf> **Trawl Position True vessel**

TPT represents the True Trawl Position relative to the vessel.
x,M is the horizontal range to the target (0 - 4000m).
y,P is the true bearing to the target (i.e. relative to north). (Resolution 1°).
z.z,M is the depth of trawl below the surface (0 - 2000m).

@IITPC,x,M,y,M,z,M<cr><lf> **Trawl Position in Cartesian coordinates**

TPC represents the Trawl Position in Cartesian coordinates.
x is the horizontal distance from vessel centre line. Value is positive if trawl is on starboard side, negative if on port side.
y is the horizontal distance from the transducer to the trawl along the vessel's centre line. The value will normally be positive as the trawl is usually behind the vessel.
z is the depth of the trawl below the surface. the value is normally positive.

$IIGLL,ddmm.hh,N,dddmm.hh,W<cr><lf> **Trawl Position in Latitude and Longitude**

GLL represents the trawl's Geographical Latitude and Longitude.
ddmm.hh,N is the Latitude, Deg.Min.Hundredths N=North, S=South.
dddmm.hh,W is the longitude, Deg.Min.Hundredths,W=West,E=East.

$IIDBS,,,x.x,M,,<cr><lf> **Depth of trawl Below Surface**
DBS represents Depth of the trawl Below the Surface.
x.x is the depth in metres (0 - 2000).
The fields for depth in feet and fathoms are empty.

$IIMTW,-xx.x,C<cr><lf> **Water temperature at the trawl**
MTW represents the Meteorological Temperature in the Water.
xx.x is the water temperature (°C) measured at the trawl. (Sign prefix only if minus). Range from -5°C to +30°C.
C means the value is in °Celsius.

@IIHFB,x.x,M,y.y,M<cr><lf> **Trawl Headrope to Footrope and Bottom**
HFB represents the distances from the Headrope to the Footrope and Bottom.
x.x,M is the distance from headrope to footrope (0 - 100m).
y.y,M is the distance from headrope to bottom (0 - 100m).

@IITDS,x.x,M<cr><lf> **Trawl Door Spread**
TDS represents the Trawl Door Spread distance.
x.x,M is the spread distance in metres (0-300m).

@IITS2,x.x,M<cr><lf> **Trawl Spread 2**
TS2 represents the Trawl Door Spread 2 distance.
x.x,M is the spread distance in metres (0-300m).

@IITFI,x,y,z<cr><lf> **Trawl Filling**
TFI represents Trawl Filling.
x,y,z are the catch 1, 2 and 3 messages (off = 0, on = 1, no answer = 2).

@IIFSP,x,M,y,P,z,M<cr><lf> **Fish Shoal Position relative vessel**
FSP represents Fish Shoal Position.
x,M is the horizontal range (resolution 1 m).
y,P is the bearing relative to the vessel's heading.
z,M is the shoal's depth (resolution 1 m).

@IITTS,x,M,y,P,z,M<cr><lf> **Trawl To Shoal distance**

TTS represents the Trawl To Shoal distance.

x,M is the horizontal distance from the trawl to the shoal in a direction normal to the vessel's centre line. The value will be positive if the shoal is on the starboard side of the trawl, otherwise negative.

y,M is the horizontal distance from the trawl to the shoal the direction of the vessel's centre line. The value will be positive if the shoal is ahead of the trawl, negative if the shoal is behind the trawl.

z,M is the vertical distance from the trawl to the shoal. The value will be positive if the trawl is above the shoal, negative if the trawl is below the shoal. The sign will be shown only if the value is negative.

$SDDBS,x.x,f,y.y,M,z.z,F<cr><lf> **Sounder Depth Below Surface**

SD represents Sounder Depth.

DBS represents Depth of water Below Surface.

x.x is the depth in feet.

y.y is the depth in metres.

z.z is the depth in fathoms.

Only one of the depth values is required.

$??DBT,,,y.y,M,,<cr><lf> **Sounder Depth Below Transducer**

?? means - accept every combination.

DBT represents the Depth of water Below the Transducer.

x.x is the depth in metres.

@SSTPP,x,M,y,P,z,M,nn<cr><lf> **Position of target or marker**

SS represents Receive from Scanning Sonar.

TPP represents Target Position in Polar coordinates.

x,M is the horizontal range to the target.

y,P is the bearing to the target relative to the vessel's heading.

z,M is the target's depth below the surface.

nn is the target identification code: 0 means echo target tracked, 10 means position tracked.

$??GLL,ddmm.hh,N,dddmm.hh,W<cr><lf> **Geographical position**

?? is the code for the type of system used. ?? will be OM if Omega, LC if Loran-C etc.

GLL represents Geographical Latitude, Longitude.

ddmm.hh,N is the latitude position in Deg.Min.Hundredths, N=North, S=South.

dddmm.hh,W is the longitude position, Deg.Min.Hundredths, W=West, E=East.

$??VTG,,,x.x,M,y.y,N,,<cr><lf> Vessel course and speed

?? is the code for the type of system used. ?? will be OM if Omega, LC if Loran-C etc.
VTG is the abbreviation for Vessel Track Ground.
x.x,M is the track bearing, in degrees magnetic.
y.y,N is the speed, with resolution 0.1 knots.

@TAWWL,x,M,y,M<cr><lf> Winch Wire Length

TA is the identification code.
WWL represents Winch Wire Length.
x,M is the wire length to starboard trawl door, resolution 1 m.
y,M is the wire length to the port trawl door, resolution 1 m.

@TAWWT,x.x,T,y.y,T<cr><lf> Winch Wire Tension

TA is the identification code.
WWT represents Winch Wire Tension.
x.x,T is the starboard wire tension, resolution 0.1 ton.
y.y,T is the port wire tension, resolution 0.1 ton.

$??ZDA,hhmmss.ss,dd,MM,yyyy,xx,xx*xx<cr><lf> Time & Date

hh is the hours.
mm is the minutes.
ss is the seconds and parts of seconds.
dd is the day's date.
MM is the month.
yyyy is the year.
xx is the local time zone etc. (not used by ITI).

$??HDM,x.x,M*hh<cre><lf> Heading, Magnetic

x.x is the heading in degrees magnetic.

$??HDT,x.x,T*hh<cr><lf> Heading, True

x.x is the heading in degrees relative to true north.

$??HDG,x.x,,,,<cr><lf> Heading, Deviation & Variation
x.x this is the magnetic sensor heading, in degrees.

References

National Marine Electronic Association NMEA 0183.
Standard for interfacing marine electronic devices.
Version 2.0, 1st january 1992.

APPENDIX 2 - ITI - ES 380 ECHO-SOUNDER

2.1 INTRODUCTION

Echo-sounders in the ES 380 series with serial numbers greater then 1000 are fully prepared for interfacing to an ITI system. ES 380 systems with numbers smaller than 1000 are not prepared, and must therefore be modified before they can exchange information with an ITI system. Modification kits are available for all systems in the ES 380 series. These kits are listed in the table below. The modification kits include a 25-pin female D-connector with securing hardware, a new configuration socket and a new set of program PROMs.

Product	Modification kit reg. no.	Software version
ES 380	KIT-108598	329 or newer
ES 380-R	KIT-108599	329R or newer
ES 381-J	KIT-108600	210J or newer
ES 381-R	KIT-108599	329R or newer
ES 400-38	KIT-108601	429 or newer
ES 400-EK	KIT-108601	429 or newer
ES 470-S	KIT-108601	429 or newer
ES 470-F	KIT-108601	429 or newer
ES 700	KIT-108602	729 or newer
ES 700-R	KIT-108603	729R or newer
ES 701	KIT-108602	729 or newer
ES 701-R	KIT-108603	729R or newer
ES 701-J	KIT-108600	210J or newer

Table 2.1 The software versions and registered numbers

2.2 HARDWARE CONNECTIONS BETWEEN SERIAL I/O PLUGS

- Interface cable Three wires 0.5 mm^2 with shield. Connect shield to ship's ground at echo-sounder end.
- Electrical RS 232, ±12 V signal level, 4800 baud.
- Protocol NMEA 0183.

ES - J4 25-pin female D-conn.		ITI - port A 9-pin female D-conn.	
pin		pin	
7	GND	5	GND
2	Receive data.	3	Transmit data
3	Transmit data	2	Receive data

Table 2.2 Hardware connections

Note

If J4 is used for connection to the SR 240 sonar system, make the connection in parallel to the existing connection on J4.

Refer to drawing no. 599-065725 for a description of the ITI transceiver plug panel.

Refer to drawing no. 830-108308 for a description of the ES transceiver plug panel. On this drawing, the plug J4 has the text "Hard-copy printer/ITI/SR240".

2.3 PARTS USED

- Cable Three wires (0.5 mm^2) with shield.
- ITI plug Standard DTE 9-pin male D-connector. Simrad reg.no. 370-095361. Connector housing (including screws) 397-075504
- ES 380 plug Standard DTE 25-pin male D-connector. 25-pin male D-connector, Simrad reg.no. 370-095361. Connector housing 379-084674. Screws reg.no. 397-057963.
- Mod. kit Only for ES 380 systems with serial numbers below 1000. Simrad reg.no. is given in table 2.1. Kit contains program EPROMs, configuration socket, 25-pin female D-connector.

2.4 LINKS

Links to insert in the ES-system ..... None

Links to insert in the ITI system ..... See table 2.3

PCB	Links	Comments
CPB286	B11 inserted B10 not inserted	Select RS 232 configuration on serial port A.

Table 2.3 Links

2.5 ACTIVATING SERIAL LINES

The ES 380 echo-sounder will transmit depth information continuously - no settings need to be performed in the menu.

The ES 380 uses trawl depth information to draw lines on the screen indicating the head-rope and foot-rope. The "trawl position" must be given a start-value before the head-rope and foot-rope will be displayed. Perform the following adjustments in the ES 380 menu:

Go to TRAWL POSITION in the menu. Select the upper marker and adjust it to the correct head-rope depth, then select the lower marker and adjust it to the correct foot-rope depth.

Note

The default values for the head-rope and foot-rope depths are 0 m and 10 m (height of trawl) respectively.

The echo-sounder output port (serial port A) in the ITI system must be enabled. Perform the following adjustments in the ITI menu:

Go to the SYSTEM SETUP sub-menu, then select SERIAL OUT. Select ECHO-SOUNDER , and switch to ON.

2.6 ES 380 SYSTEMS WITH SERIAL NUMBERS LESS THAN 1000

If an SR 240 sonar system is connected to the echo-sounder, the required modifications have already been made.

The modification kit (ordered from Simrad, see table 2.1) should be used as follows:

- Changing the program

  Locate the UMC/85-E processor circuit board in the echo-sounder transceiver unit, and change the EPROMs U08, U11, U15, U24 and U29 (all of them may not be used).

- New configuration socket

  The configuration socket on the processor board, marked SSB on the component side) must be replaced. The new configuration socket has the registration number 248-108280.

- Mounting plug J4

  Refer to the drawing 830-108307. Mount the 25-pin female D-connector from the modification kit into the spare slot J4. Make the following connections to J4 on the inside of the transceiver plug panel (JF-1 is brown):

JF-17 (violet)	to J4-2 (Rx data)
JF-18 (grey)	to J4-3 (Tx data)
J3-7	to J4-7 (Gnd.)

APPENDIX 3 - ITI - EQ 100 INTERFACING

3.1 INTRODUCTION

For EQ 100 systems with serial numbers less than 2000, new software and a strap sock must be installed.

New software: EQ 100: Version V1.10 Release: 90.10.22.

Systems with serial numbers > 2000 are already prepared for interfacing to the ITI system.

Information exchanged between ITI and the EQ-system comprises:

EQ 100 to ITI . . . . . Sounder depth below surface - $SDDBS
ITI to EQ 100 . . . . . Depth of trawl below surface - $IIDBS

3.2 HARDWARE CONNECTIONS BETWEEN SERIAL I/O PLUGS

- Interface cable Shielded, twisted pairs, or three wires with shield, 0.5 mm^2. Shield should be connected to ships ground at the echo-sounder.
- Electrical RS 232, ±12 V signal levels, 4800 baud.
- Protocol NMEA 0183.

EQ 100 - SIO port 1 (left plug labelled P2) 9-pin male D-con.		ITI - port A 9-pin female D-conn.	
pin		pin	
6 & 2	GND	5	GND
3	Receive data	3	Transmit data
5	Transmit data	2	Receive data

Table 3.1 Hardware connections

Note

The plug P1 on the EQ 100 may also be used with the same pin allocations as P2. However trawl depth information from the ITI system can only be received on connector P2.

Refer to drawing no. 599-065725 for a description of the ITI transceiver rear plug panel.

Refer to figures 7.2 and 7.3 in the EQ 100 instruction handbook for a description of the EQ 100 interconnections and the plug position on the EQ 100. Figure 7.3 describes how to mount the 9-pin D-connector to EQ 100 serial I/O port 1. **Serial I/O port 1 is named P2** on the printed circuit board and is positioned to the left. Pins 2 and 6 on connector P2 (EQ 100) must be linked together.

3.3 PARTS USED

- Cable — Three wires with shield, 0.5 mm^2.
- EQ 100 plug — Standard DTE 9-pin, male D-connector, Simrad reg. no. 370-095361.
- ITI plug — Standard DTE 9-pin, male D-connector, Simrad reg. no. 370-095361. Connector housing (inclusive fastening screws), Simrad reg. no. 397-075504.

3.4 LINKS

Links to insert in the EQ 100 system ..... None

Links to insert in the ITI system ..... See table 3.2 below

PCB	Links	Comments
CPB286	B11 inserted B10 not inserted	Select RS 232 configuration on serial port A.

Table 3.2 Links

Switch setting EQ 100 ..... CPU-pcb S1-8 ON = ITI enabled
CPU-pcb S1-7 OFF always

3.5 ACTIVATING SERIAL LINES

3.5.1 EQ 100

To select the format and serial port, start in the main menu, go to INSTALL, then select SIO OUTPUT. Set this to NMEA 0183, then select PLUG P2.

To set the draft (i.e. the depth of the transducer below the surface), select DRAFT from the menu, then use the joystick to alter the value.

To have the trawl/depth information displayed correctly on the EQ 100 screen, a start value must be entered. This value can be entered at any time during trawling. To set the start value, go to INSTALL, then to TRAWL. Select HEAD-ROPE, then using the joystick adjust the depth to the correct value. Then select FOOT-ROPE, and again using the joystick adjust the depth to the correct value.

Note

The head-rope value should be the current depth as given by the ITI system. The foot-rope value should be the height of the trawl.

3.5.2 ITI

To enable the echo-sounder output port (serial port A) start at the main menu and go to SYSTEM SETUP. Then go to SERIAL OUT, select ECHO-SOUNDER and set this to ON.

The depth from the echo-sounder will now be displayed as a bottom contour line underneath the trawl and the vessel in the lower left picture of the NORMAL mode. The depth value will be displayed below the vessel. The bottom line will be given the colour appropriate to the bottom hardness as determined by the EQ 100. In the EQ 100, the trawl depth information is used to draw a red line indicating the trawl head-rope. If the height of the trawl opening is entered into the EQ 100 menu, then a red line will also be drawn to indicate the foot-rope.

3.6 EQ 100 SYSTEMS WITH SER.NOS. BELOW 2000

For EQ 100 systems with serial numbers less than 2000, a new program must be installed and the link socket U12 must be replaced by a new socket. A modification kit containing the two program PROMs and the link socket is available on request, reg.no. KIT-108592. This kit contains the following parts:

- U12 Strap socket reg.no. 248-107595.
- U29 EPROM reg.no. 244-073732.
- U31 EPROM reg.no. 244-073733.

APPENDIX 4 - ITI - EQ 50 INTERFACING

4.1 INTRODUCTION

The ITI system is prepared for interfacing to the Simrad EQ 50 echo-sounder. All EQ 50 versions will also be designed to communicate with the ITI system, and there will be one-way communication from the EQ 50 to the ITI system.

Information sent to ITI by the EQ 50 system comprises:

EQ 50 to ITI . . . . . Sounder depth below transducer - $SDDBT

4.2 HARDWARE CONNECTIONS BETWEEN SERIAL I/O PLUGS

- Interface cable Shielded, twisted pair, or two wires with shield, 0.5 mm^2. Shield should be connected to ships ground at the echo-sounder.
- Electrical RS 232, ±12 V signal level, 4800 baud.
- Protocol NMEA 0183.

EQ 50 - SIO port (terminal strip on rear panel)	ITI - port A 9 pin female D-conn
screw labelled:	
NMEA OUT GND	Pin 5 GND
NMEA OUT Tx	Pin 2 Receive data

Table 4.1 Hardware connections

Refer to drawing no. 599-065725 for a description of the ITI transceiver plug panel.

4.3 PARTS USED

- Cable — Two wires with shield, 0.5 mm^2.
- ITI plug — Standard DTE 9-pin, male D-connector, Simrad reg. no. 370-095361. Connector housing (inclusive fastening screws), Simrad reg. no. 397-075504.

Parts can be delivered by Simrad on request.

4.4 LINKS

Links to insert in the EQ 50 system ..... None

Links to insert in the ITI system ..... See table 4.2 below

PCB	Links	Comments
CPB 286	B11 inserted B10 not inserted	Selects RS 232 configuration on serial port A.

Table 4.2 Links

4.5 ACTIVATING SERIAL LINES

To tell the EQ 50 echo-sounder to send the depth information to the ITI system, the serial line must be activated in the menu. To do this, from the main menu go to CONFIGURATION then to EXT I/F. Select NMEA 0183 ON/OFF.

The depth information provided by the EQ 50 echo-sounder will be displayed on the ITI screen as a red bottom-contour line below the trawl and vessel. The depth value will be displayed below the vessel. Be aware that the depth value given is the depth below the echo-sounder transducer.

APPENDIX 5 - ITI - EK/ES 500 INTERFACING

5.1 INTRODUCTION

The ITI system is prepared for interfacing with Simrad EK 500 and ES 500 echo-sounders. There will be two-way communication between the ITI and echo-sounder systems.

Information exchanged between ITI and the ES 500 comprises:

EK/ES 500 to ITI . . . . . Sounder depth below surface - $SDDBS
ITI to EK/ES 500 . . . . . Depth of trawl below surface - $IIDBS
ITI to EK 500 . . . . . Trawl head-rope to foot-rope - $IIHFB

The EK 500 must have program version V4.0 or newer.
The ES 500 must have program version V1.0 or newer.
The ITI system must have program version V2.12 or newer.

Note

Only the EK 500 system has been prepared to receive the message "HFB" from the ITI system. To transmit the "HFB" message the ITI system must have program version V1.12 or newer, though older versions will transmit the "DBS" telegram on the echo-sounder port.

Refer to the EK 500 installation manual for information on connecting the echo-sounder to the ITI system. Only ES 500 and ITI system hardware connections are described in this appendix.

5.2 HARDWARE CONNECTIONS TO SERIAL I/O PLUGS

ES500 - SIO port 4 9 pin female D-conn.		ITI - port A RS 232 interface 9 pin female D-conn.	
pin		pin	
5	GND	5	GND
2	Receive data	3	Transmit data
3	Transmit data	2	Receive data

Table 5.1 Hardware connections

- Interface cable — Shielded, twisted pairs, or three wires with shield. Shield should be connected to ships ground at the echo-sounder side.
- Electrical — RS 232 asynchronous serial line, ±12 V differential signal level, 4800 baud.
- Protocol — NMEA 0183.

Refer to the EK 500 installation manual for the echo-sounder connections.

5.3 PARTS USED

- Cable — Three wires with shield, 0.5 mm^2.
- ITI plug — Standard DTE 9-pin, male D-connector, Simrad reg. no. 370-095361 (with fastening screws). Connector housing (inclusive fastening screws), Simrad reg. no. 397-075504.
- ES 500 plug — Same as for ITI system.

Parts can be delivered by Simrad on request.

5.4 LINKS

Links to insert on EK 500 master CPU board ..... Refer to manual

Links to insert on ES 500 master CPU board ..... None

Links to insert on ITI control processor board CPB286 ..... See table 5.2

PCB	Links	Comments
CPB286	B11 inserted B10 not inserted	Select RS 232 configuration on serial port A.

Table 5.2 Links

5.5 ACTIVATING SERIAL LINES

5.5.1 EK/ES 500

Refer to the operator manual for information on activating the serial lines.

5.5.2 ITI

The echo-sounder output port (serial port A) must be activated from the screen menu. The incoming telegrams from the echo-sounder will be received continuously without any particular menu settings.

To enable the echo-sounder output port (serial port A) start at the main menu and go to SYSTEM SETUP. Then go to SERIAL OUT, select ECHO-SOUNDER and set this to ON.

APPENDIX 6 - ITI - SONAR SR240 INTERFACING

6.1 INTRODUCTION

The ITI system is prepared for interfacing to the SR 240 series sonars. The SR 240 must be equipped with a program version V5.05 or newer, and the ITI system must have program version V2.01 or newer.

The information exchanged between ITI and the sonar comprises:

ITI to SR 240 ..... Trawl position true vessel - $IITPT
Depth of trawl below surface - $IIDBS
Trawl headrope to footrope and bottom - @IIHFB
Trawl door spread - @IITDS
Trawl filling - @IITFI
Water temperature at trawl - $IIMTW

SR 240 to ITI ..... Position of target or marker - @SSTPP

6.2 HARDWARE CONNECTIONS BETWEEN SERIAL I/O PLUGS

Refer to drawing no. 599-065725 for the ITI transceiver plug panel.

- Interface cable — Three wires 0.5 mm^2 with shield. Connect shield to ship's ground at echo-sounder end.
- Electrical — RS 232, ±12 V, single ended, 4800 baud.
- Protocol — NMEA 0183.

SR 240, P3 (25-pin)		ITI serial port C	
pin		pin	
7	GND	5	GND
2	Receive data	3	Transmit data
3	Transmit data	2	Receive data

Table 6.1 Hardware connections

The interconnection is made to serial port C on the connector panel under the ITI transceiver cabinet and to connector P3 on the SR 240's CPB 286 processor board.

To enable the interface cable to be threaded into the SR 240 Sonar Control Unit, the electronics unit must first be removed. Before disconnecting the cables, note the position of the small BNC plug. The plastic cover at the rear of the bottom frame can be removed to gain access to one of the optional cable glands.

6.3 PARTS USED

- Cable — Three wires with shield, 0.5 mm^2.
- ITI plug — Standard DTE 9-pin, male D-connector, Simrad reg. no. 370-095361 (with fastening screws). Connector housing (inclusive fastening screws), Simrad reg. no. 397-075504.
- SR 240 plug — Standard DTE 25-pin, male D-connector, Simrad reg. no. 370-047778. Connector housing reg. no. 397-084674.

Parts can be delivered by Simrad on request.

6.4 LINKS

Links to insert in the ITI system . . . . . None

Serial port C on the ITI transceiver unit is configured as RS 232 and cannot be changed.

Links to insert in the SR 240 control processor board CPB286:

Links B6, B7 and B8 on the CPB 286 board select one of 20 mA current loop, RS 422 or RS 232 as the input to connector P3. Insert link B8 to select RS 232. Do not insert links B6 and B7.

Note

In the SR 240 system, the CPB 286 board is located next to the power supply board in the Sonar Control Unit. The power supply must first be removed to allow the processor board to be removed.

APPENDIX 7 - ITI - GYRO INTERFACING

7.1 INTRODUCTION

The ITI system is prepared for interfacing to most types of gyro compass systems available on the market. This includes gyros with stepper signal outputs or gyros with synchro signal outputs. The interface & display board is equipped with a course gyro interface for gear ratios 1:360, 1:180, 1:90 and 1:36.

The gyro signal cable is to be connected to the plug J12 (13 pin Phoenix with screw connection) on the backplane. The backplane itself contains some gyro interface circuitry for gyro signal conditioning before the signals are sent via the backplane to the interface board.

7.2 CONFIGURATIONS

7.2.1 Standard

When the system is delivered from the factory the backplane is configured for gyros with stepper signal output and negative reference voltage. (i.e. link S7 on the backplane is connected and the socket S8 mounted with its negative sign (-) towards the ref.point). Refer to drawing 824-049055.

7.2.2 Stepper gyro

For stepper gyros with positive reference voltages, mount the socket S8 with the positive sign (+) towards the reference point. The stepper gyro reference signal shall always be connected to J12 pin-6 (REF~) whether it is positive or negative.

7.2.3 Synchro gyro

Cut link S7 on the backplane. Mount the socket S8 with the negative sign (-) towards the ref.point. The R1 and R2 reference signals from the synchro transmitter must be connected to J12 pin-7 and J12 pin-6 respectively.

7.2.4 Matching resistors

The matching resistors R1, R2, R3 and R4 will not be mounted in the factory. However, a resistor kit will follow the receiver unit. Use the resistor values as shown here for the following gyro output voltages.

25-50 Volt - 3.9 KΩ, 2 Watts
110 Volt - 10.0 KΩ, 2 Watts
220 Volt - 22.0 KΩ, 2 Watts

7.2.5 Switch settings

Switch S11 positioned on the interface & display board must be set according to table 7.1. This switch selects the gyro type. Only switch S11 must be set internally on the interface & display board.

Note

Switch off the power to the transceiver unit before removing the interface & display board. The board is located second from the left.

Gyro		DIL switch S11							
		1	2	3	4	5	6	7	8
Gyro not connected		Off	Off	Off	Off	Off	Off	Off	Off
Synchro 1:360	50/60 Hz	On	Off	On	Off	Off	Off	Off	On
	400 Hz	Off	On	On	Off	Off	Off	Off	On
Synchro 1:180	50/60 Hz	On	Off	On	Off	Off	On	Off	On
	400 Hz	Off	On	On	Off	Off	On	Off	On
Synchro 1:90	50/60 Hz	On	Off	On	Off	On	Off	Off	On
	400 Hz	Off	On	On	Off	On	Off	Off	On
Synchro 1:36	50/60 Hz	On	Off	On	Off	On	On	Off	On
	400 Hz	Off	On	On	Off	On	On	Off	On
Stepper 1:360		Off	Off	Off	On	Off	Off	Off	On
Stepper 1:180		Off	Off	Off	On	Off	On	Off	On
Stepper 1:90		Off	Off	Off	On	On	Off	Off	On
Stepper 1:36		Off	Off	Off	On	On	On	Off	On

Table 7.1 Switch S11 settings for selection of gyro interface

7.3 INTERCONNECTION TO ITI SYSTEM

Use a shielded cable with 5 wires (5 x 0.75 mm^2).

Use one of the spare PG16 cable glands in the plug panel of the ITI transceiver unit for entering the cable into the cabinet. Refer to drawing 599-065725 for plug panel reference. When the front door of the cabinet is opened the J12 plug is seen in the lower left corner of the backplane. The header is soldered to the backplane but the plug with screw connection can be removed for easy interconnection of the five gyro wires. Pin number 1 of J12 is upwards and marked in the print, also the plug is "shape-coded" so cannot be mounted the wrong way.

Table 7.2. below shows the interconnection to the J12 plug.

Stepper gyro			Synchro gyro		
Gyro signals		J12	Gyro signals		J12
S1 (Ø1)	to	pin 13	S1 (Ø1)	to	pin 13
S2 (Ø2)	to	pin 11	S2 (Ø2)	to	pin 11
S3 (Ø3)	to	pin 9	S3 (Ø3)	to	pin 9
Ref (+or-)	to	pin 6	Ref R1	to	pin 7
			Ref R2	to	pin 6

Table 7.2 Plug J12 interconnections

APPENDIX 8 - ITI - LOG INTERFACE

8.1 INTRODUCTION

The ITI system is prepared for interfacing to the following types of log equipment.

- Simrad doppler log (NL-log)
- Pulse log (400,200,100 P/Nm)
- Analogue log

8.2 SWITCH SETTINGS

Switch S10 positioned on the interface & display board must be set according to table 8.1 to select the log type.

Only switch S10 must be set internally on the interface & display board.

Note

Switch off the power to the transceiver unit before removing the interface & display board.

Log type	DIL switch S10		
	1	2	3
Log not connected	Off	Off	Off
Pulse log 100 P/Nm	On	Off	Off
Pulse log 200 P/Nm	Off	On	Off
Pulse log 400 P/Nm	On	On	Off
Analogue log	Off	Off	On
NL-LOG	On	Off	Off

Table 8.1 S10 switch settings for selection of log type

8.3 SIMRAD DOPPLER LOG (NL-LOG)

The log signal cable should enter the ITI cabinet through one of the spare PG16 cable glands in the plug panel. Refer to drawing 599-065725 for plug panel reference.

The NL-log has two alternative signal output configurations:

8.3.1 Pulse log with relay output contacts

This is the most common way of interfacing to the NL-log. The NL-log has four pairs of relay contact outputs. Two of these outputs are standard 200 P/Nm and two more can be selected by links. The wires are connected inside the NL-log to terminal strip E 101. Use one of the spare PG16 cable glands in the bottom of the NL-cabinet to enter the cable.

For interfacing to the ITI the two wire cable should be connected to plug J11 positioned on the ITI backplane. The J11 plug has screw connections and the connection should be via a wire strap or simply a stripped, tinned wire, which is inserted under the head of the screws. Use a shielded two wire cable (2 X 0.5 mm^2) or twisted pair. If a shielded cable is used the shield should be connected to ships ground at the log.

NL-Log (200 P/NM) Terminal strip E 101		ITI Backplane plug J11
E 101 - 45 E 101 - 46		J11 pin 12 J11 pin 13
E 101 - 43 E 101 - 44		J11 pin 12 J11 pin 13
Link dependent outputs, links inserted on PCB 4 (FEEDBACK) 382-038795.		
Link in B inserted	E 101 - 41 E 101 - 42	J11 pin 12 J11 pin 13
Link in C inserted	E 101 - 39 E 101 - 40	J11 pin 12 J11 pin 13

Table 8.2 Alternative interconnections for pulse log

8.3.2 Serial line with differential output signals

This alternative NL-log interface can only be used if an extra pcb is installed. This optional circuit board, called "OPTION 1 & 2 (PCB 5, 382-031599) has two 5 V differential output ports available.

The line drivers used for the NL-log output signals are 75114 dual differential line drivers (maximum of four, 40 mA output current).

The two serial ports are available on terminal strip E 101 inside the NL-log electronic cabinet. For interconnection between ITI and NL-log use a screened four wire cable (4 x 0.5 mm^2) or two twisted pairs. Inside the ITI transceiver unit the signal cable is terminated to plug J12 positioned on the backplane.

NL-Log serial ports terminal strip E 101		ITI Backplane plug J12
PORT 1	E 101-35 DATA 1 + E 101-36 DATA 1 - E 101-37 CLOCK 1 - E 101-38 CLOCK 1 +	J12 pin 5 J12 pin 4 J12 pin 3 J12 pin 2
PORT 2	E 101-41 DATA 2 + E 101-42 DATA 2 - E 101-39 CLOCK 2 + E 101-40 CLOCK 2 -	J12 pin 5 J12 pin 4 J12 pin 3 J12 pin 2

Table 8.3 Alternative interconnections for NL-log serial ports

8.4 PULSE LOG

Use one of the spare PG16 cable glands in the plug panel of the ITI transceiver unit for entering the cable into the cabinet. Refer to drawing 599-065725 for plug panel reference.

Use a two-wire screened cable - 2 x 0.5 mm^2.

Inside the ITI transceiver unit, the pulse log signal is terminated at the plug J11 (13 pin Phoenix with screw connection).

When the front door of the cabinet is opened, plug J11 can be seen in the upper left corner of the backplane. The text "LOG, A/D, & VRU-INT.F" is printed on the backplane to the left of the plug. The header is soldered to the backplane but the plug can be removed to simplify interconnection of the two pulse-log signal wires (signal and ground).

Pin number 1 of J11 is upper-most and marked in the print, and the plug is "Shape coded" so cannot be mounted the wrong way.

Note

Set switch S10 (bit 1,2,3) according to table 7.1. Switch off the power to the transceiver unit before removing the interface & display board.

Signal interconnection Pulse log signal to J11 pin-12
Pulse log common to J11 pin-13

8.5 ANALOGUE LOG

The ITI system can be interfaced to speed logs with analogue output signals. The analogue interface has a differential input amplifier and an 8-bit analogue to digital converter. Four different input voltage ranges can be selected by altering the values of three resistors.

When the log has an analogue output signal, switch S10 (bit 4,5) must be set according to table 7.2. Also, resistors R24, R26 and R27 must be installed with the values specified in table 7.2 for analogue log output.

Switch S10 (bits 1, 2 and 3) must be set according to table 7.1 for selection of the analogue log interface.

Input A/D-converter	Resistors			DIL switch S10	
	R27	R24	R26	bit 4	bit 5
0- 5 VOLT	Open	Strap	Open	Off	Off
0-10 VOLT	Open	10 K	10 K	On	Off
± 5 VOLT	10 K	10 K	Open	Off	On
± 10 VOLT	5 K	10 K	10 K	On	On

Table 8.4 Switch S10 settings and resistor values for analogue log

The analogue signal coming from the log can be connected as a differential signal or as "single ended". Feed the cable through one of the spare PG16 cable glands in the ITI transceiver cabinet plug panel. The two signal wires should be connected to J11, positioned in the upper left corner of the backplane.

8.5.1 Interconnection

Connection type	Signal	To
Single ended	LOG output signal LOG ground	J11 pin-9 J11 pin-8
Differential	LOG output signal + LOG output signal -	J11 pin-9 J11 pin-8

Table 8.5 Connection types

8.5.2 ITI menu setting

The voltage span of the analogue log output is set by switch S10 (bits 4 and 5) and resistors R24, R26 and R27. However, the system also needs to know the absolute full scale and minimum scale speeds. These parameters must be given to the ITI system through the SYSTEM SETUP menu.

Go to SYSTEM SETUP in the main menu and select ANALOGUE LOG. Enter the correct numbers for the full scale and minimum scale values. Defaults are 30 and 0 knots respectively.

The full scale and minimum scale speed values will be printed in the log technical or users manual.

APPENDIX 9 - ITI - NAVIGATOR INTERFACE

9.1 INTRODUCTION

The ITI system is able to interface to all types of navigator systems that have a serial line output and use the NMEA 0183 standard interface code to exchange data.

For many navigator systems the SIO port electrical standard can be changed by means of links or switch settings. The SIO port "D" on the ITI system used as navigator interface port can be configured as RS 422, RS 232 or current loop.

Check that the navigator has one of these three electrical standards available. The SIO port "D" on the ITI must then be configured to the same electrical standard as the navigator output port. When connecting plug D, make sure that the links on the Control Processor Board (CPB 286) are set according to table 9.1.

Information exchanged between ITI and the Navigator system comprises:

Navigator to ITI ..... Geographical position - $XXGLL
Vessel course and speed - $XXVTG

9.2 HARDWARE CONNECTIONS TO ITI

- Interface cable — Shielded, twisted pair, or two wires with shield. Shield should be connected to ships ground at the navigator.
- Electrical — RS 232, RS 422 or current loop, 4800 baud.
- Protocol — NMEA 0183

9.3 PARTS USED

- Interface cable — Shielded, twisted pair 0.5 mm^2, or two wires with shield.
- ITI plug — Standard DTE 25-pin, male D-connector, Simrad reg. no. 370-047778. Connector housing, reg. no. 397-084674.

Table 9.2 shows the pin assignment of plug D for all three configurations. Only the input data pins of plug D are shown because data is transmitted from the navigator to the ITI system. The serial port D of the ITI system may be found on the plug panel mounted on the bottom of the transceiver cabinet. For the output pin assignments of the navigator, refer to the technical manual delivered with the navigator.

Plug D, pin no.	Description
3 7	Receive data RS 232 Signal ground RS 232
14 15	Data input + RS 422 Data input - RS 422
18 25	Signal input + Current loop Signal input - Current loop

Table 9.1 Pin assignment of plug D on the ITI system

9.4 LINKS

Links to insert in the navigation system . . . . . Refer to the navigation system hand-books

Links to insert in the ITI system . . . . . Either link B6, B7 or B8 must be inserted. See table 9.2 below

Links on CPB286	Port D configuration
B6 inserted	Selects 20 mA current loop
B7 inserted	Selects RS 422
B8 inserted	Selects RS 232

Table 9.2 Links for changing configuration of serial port D

Note

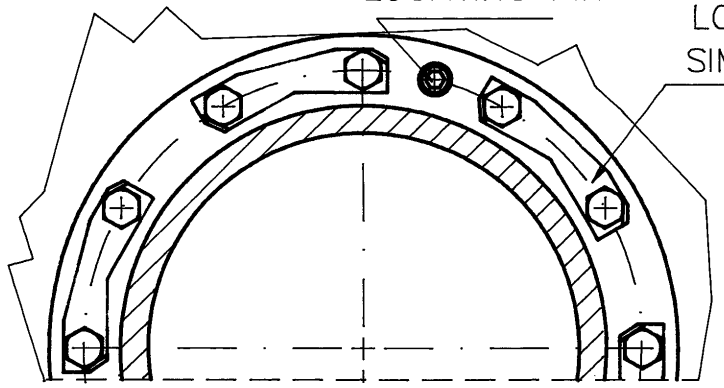
Only one of the three links may be selected.

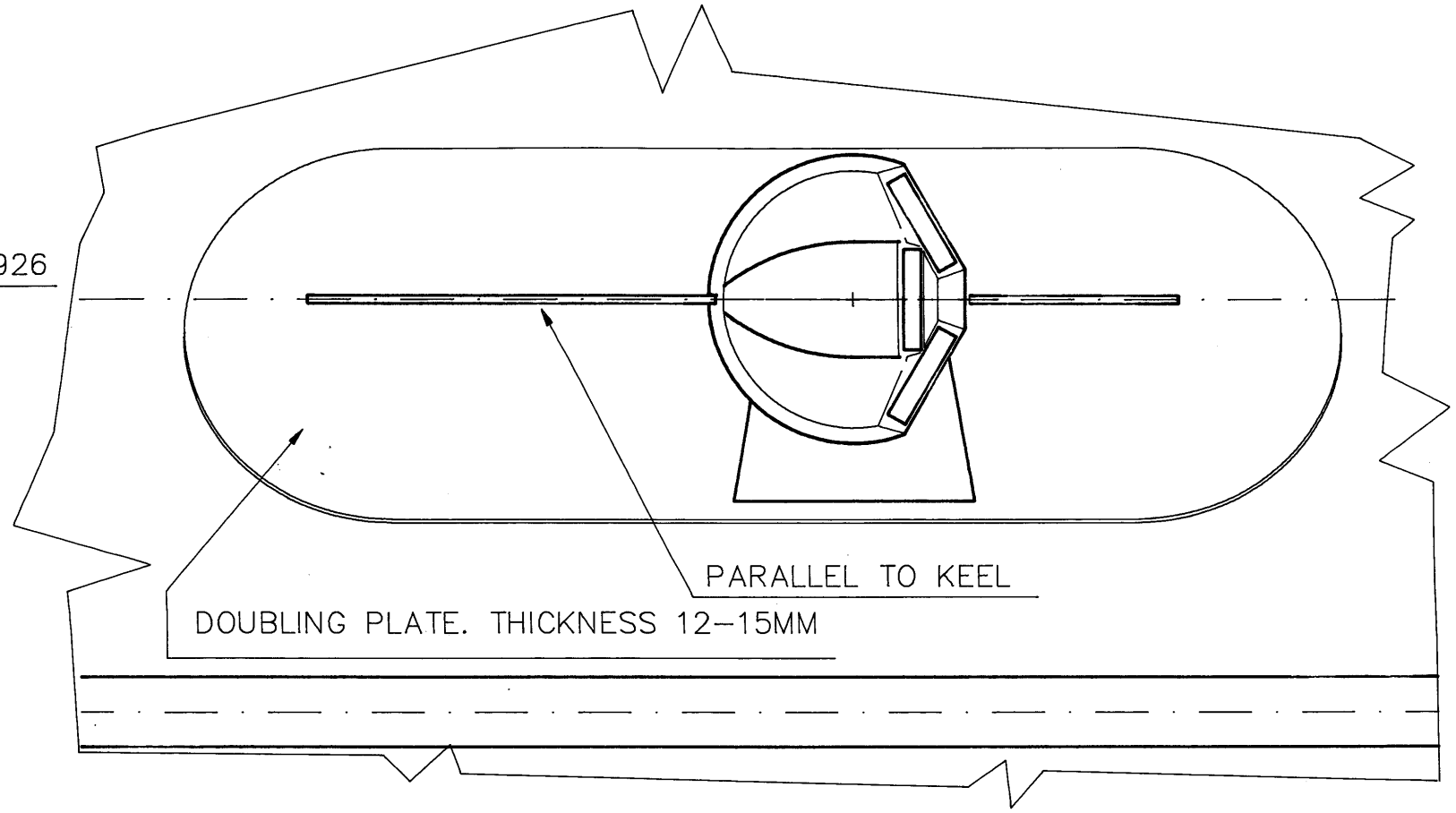
DRAWINGS AND DIAGRAMS

This section contains the drawings and diagrams listed at the front of the manual.

BOW

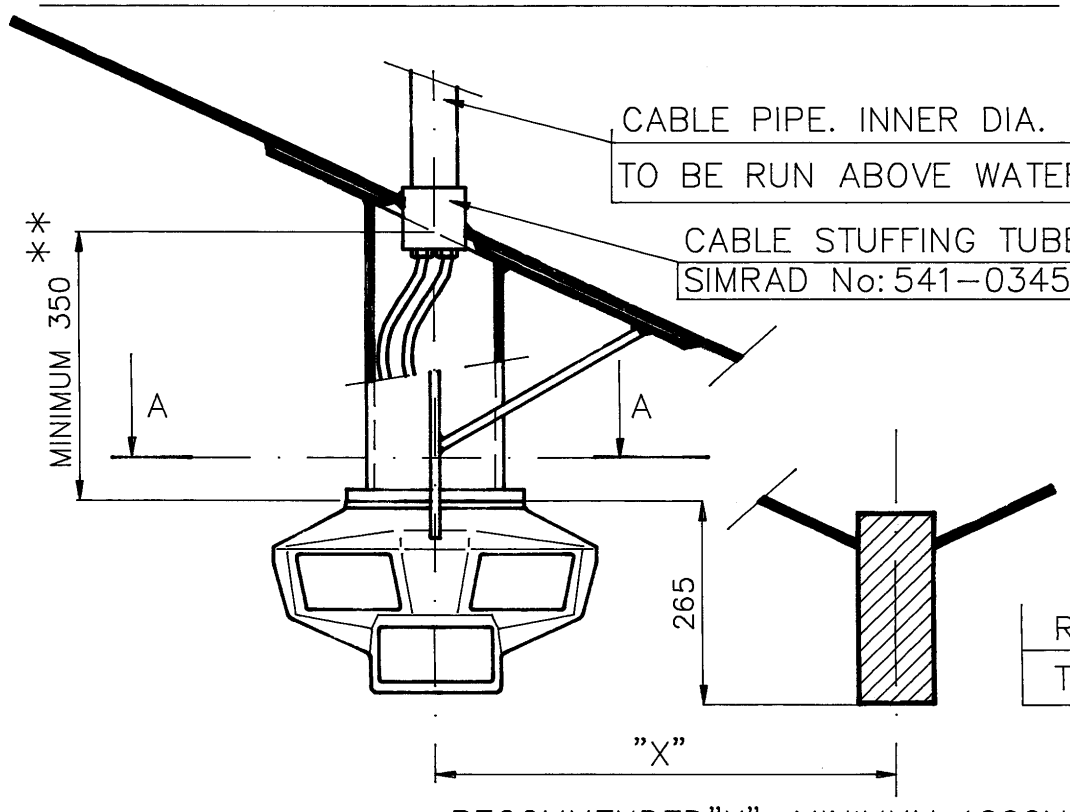
Sec. A: A
Scale: 1: 2.5



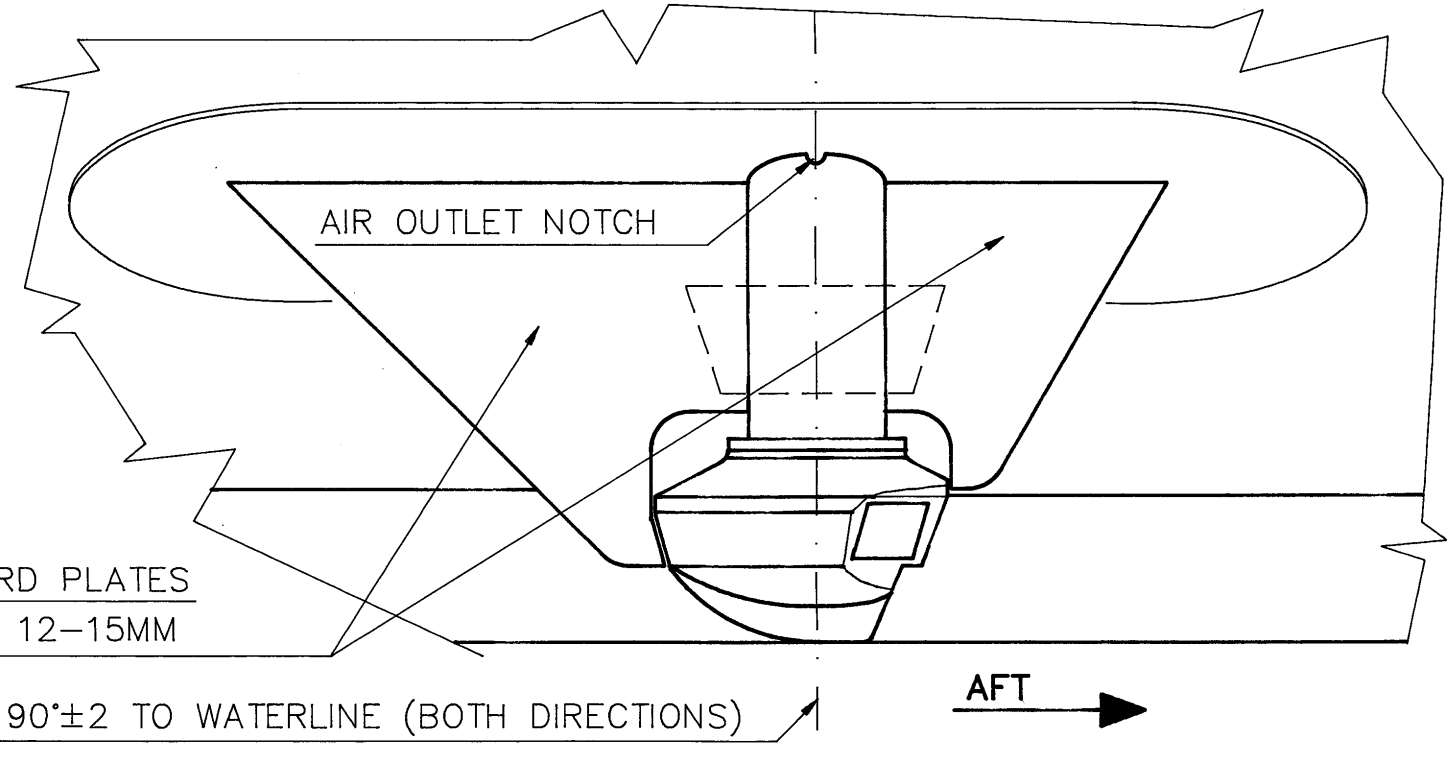


NOTE:

CONCERNING DISTANCE "X":
BE AWARE THAT THE KEEL WILL MAKE A SHADOW ZONE IF THE TRANSDUCER IS PLACED TO CLOSE TO IT.



RECOMMENDED"X" ,MINIMUM 1000MM.



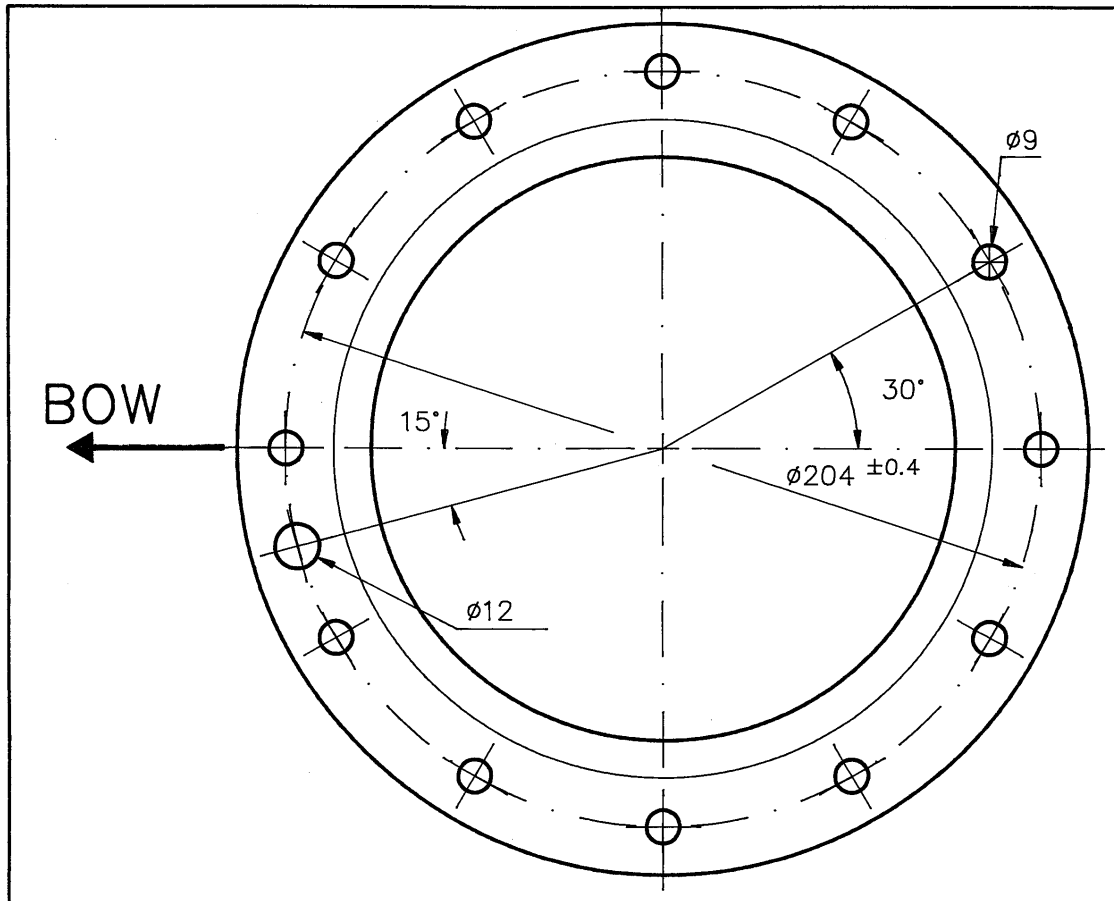
NOTE:

IF LENGTH OF TUBE,MARKED**,MAKES IT DIFFICULT OR IMPOSSIBLE TO REACH CABLE GLANDS FROM BELOW,PROVIDE ACCESS THROUGH SIDE OF TUBE.CLOSE OFF OPENING AFTER INSTALL.

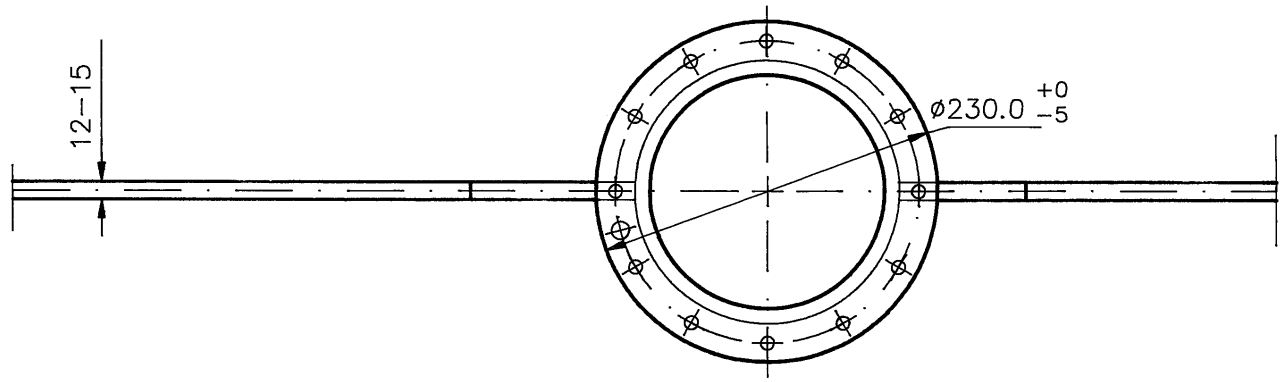
DIMENSIONS/MEASUREMENTS NECESSARY FOR MANUFACTURING THE DETAILS ARE TO BE FOUND ON SHEET 2 OF THIS DRAWING

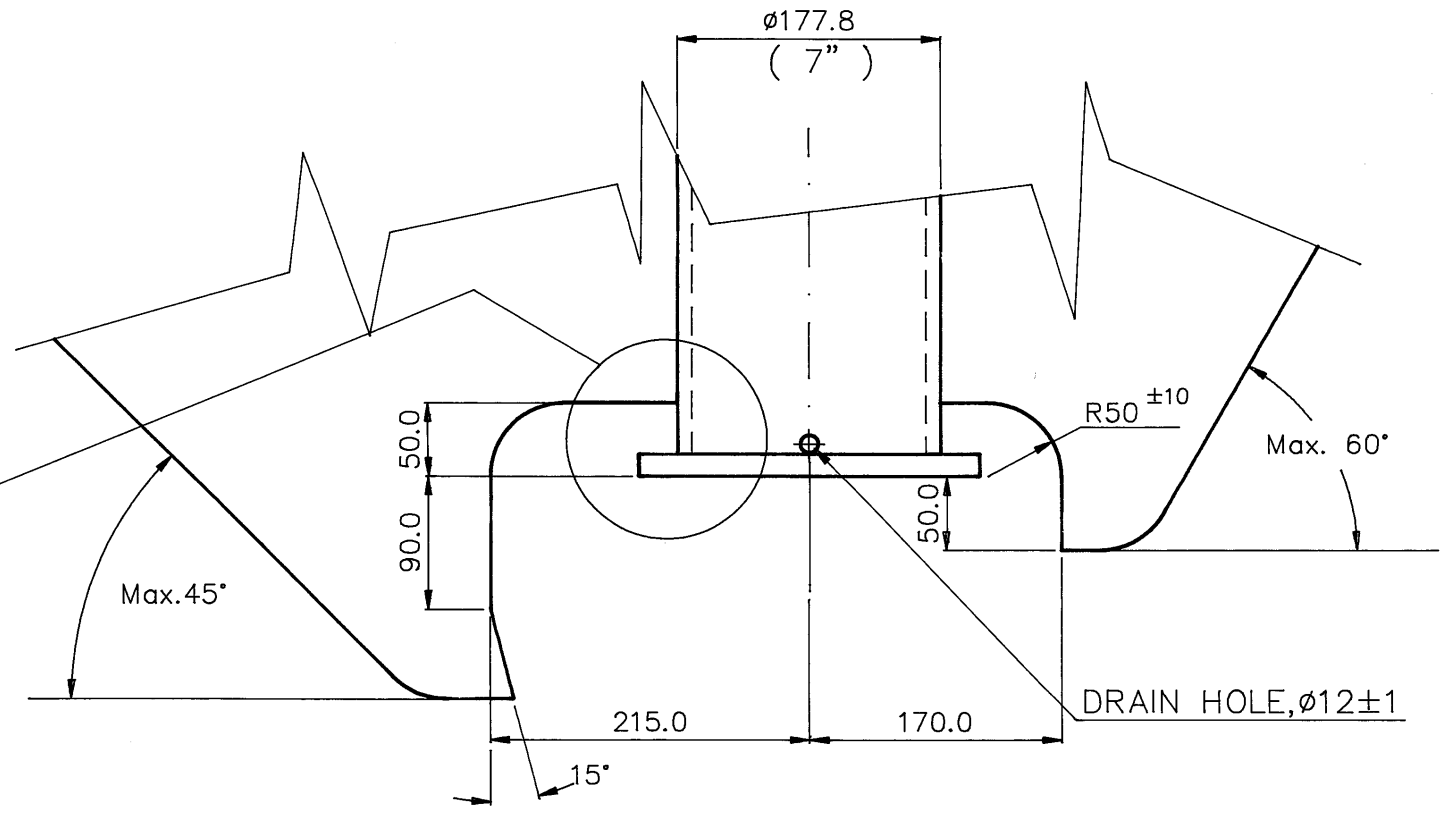
SURFACE TREATMENT(EXCEPT TRANSDUCER): AS FOR HULL PLATING

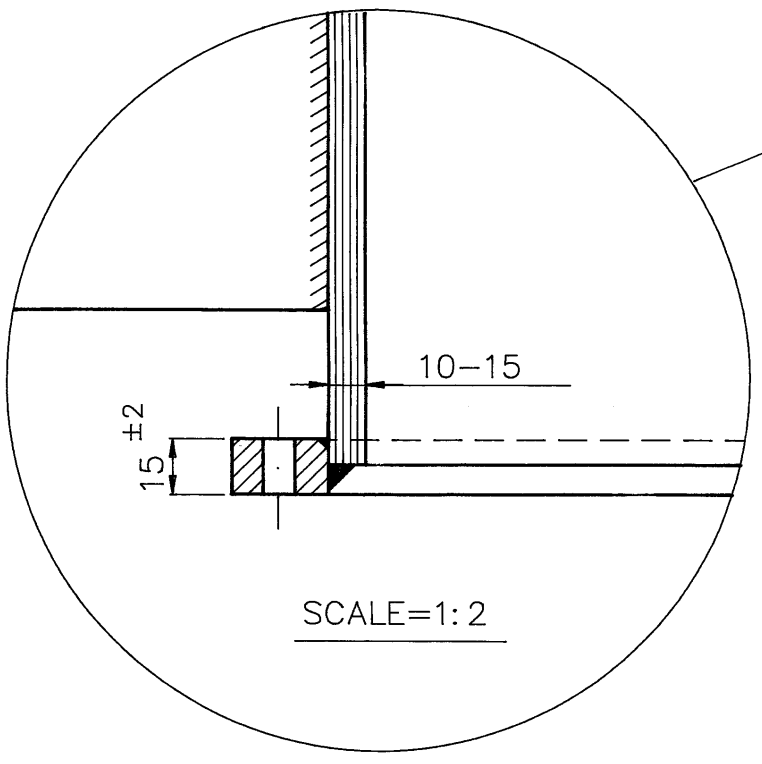
REV./SIGN.	8960 I.S.									
DATE	93.05.03.									
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: – THREAD: –					SIMRAD		
SCALE	1:10	1:2.5	ARRANGEMENT DRAWING					SHEET 1 OF 2		
DRAWN	91.06.14	I.S.	NON–RETRACTABLE TRANSDUCER					830–107748		C
CHECKED	91.06.17	K.Sk.								
APPROVED	91.06.17	T.A.L.	SIMRAD ITI					FILE NO.: 613–88		



HOLE PATTERN IN MOUNTING FLANGE
(SEEN FROM BELOW)
SCALE=1:2



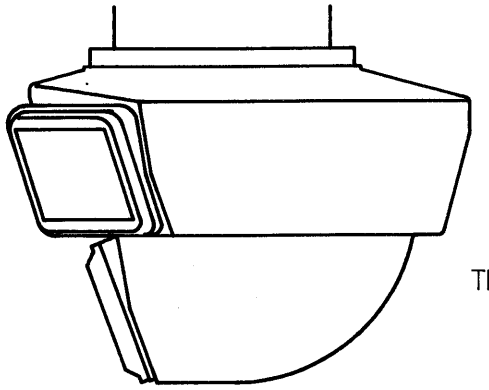




SCALE=1:2

MATERIAL: SHIP'S STEEL QUALITY.
OR STEEL WITH SIMILAR WELDING QUALITY.

REV./SIGN.	8960 I.S.									
DATE	93.05.03.									
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: ±2 THREAD: –						SIMRAD	
SCALE	1:5	1:2	ARRANGEMENT DRAWING						SHEET 2 OF 2	
DRAWN	91.06.15	I.S.	NON–RETRACTABLE TRANSDUCER						830–107748	C
CHECKED	91.06.17	K.Sk.								
APPROVED	91.06.17	T.A.L.	SIMRAD ITI						FILE NO.: 613–88	



TRIPPLE TRANSDUCER HOUSING

TRANSDUCERS ARE NORMALLY TILTED 20° DOWN.

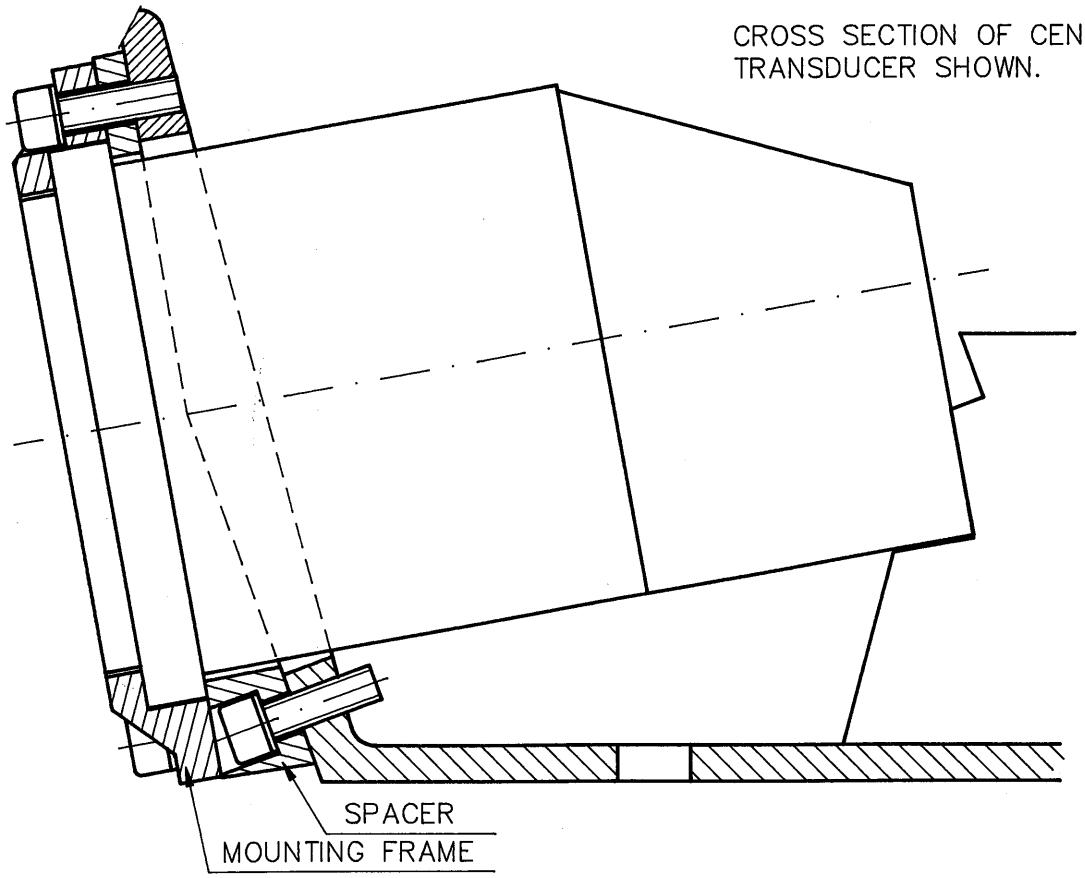
TO ALTER TO 10° DOWN TILT PROCEED AS FOLLOWS:

TOOL REQUIRED: 5MM ALLEN KEY.

WORK SEQUENCE:

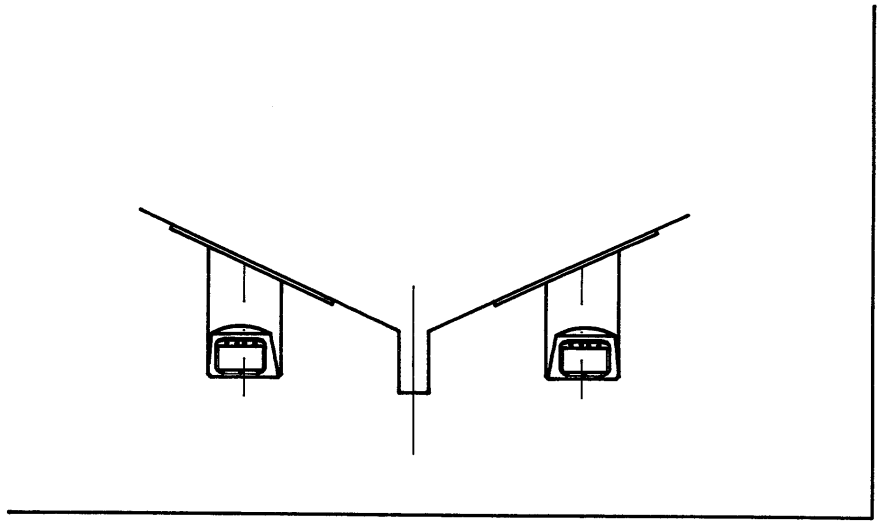
1) UNSCREW MOUNTING FRAME (SAVE BOLTS AND SPRING WASHERS).
2) PULL OUT TRANSDUCER AND LET IT HENG BY THE CABLE.
3) UNSCREW SPACER FASTENING BOLTS,AT THE TOP,
4) ROTATE SPACER 180° AND PUT BOLTS BACK IN PLACE,NOW AT THE BOTTOM.
5) PUT TRANSDUCER AND MOUNTING FRAME BACK IN PLACE AND SECURE BOLTS.
   MOUNTING FRAME IS ALSO ROTATED 180°.

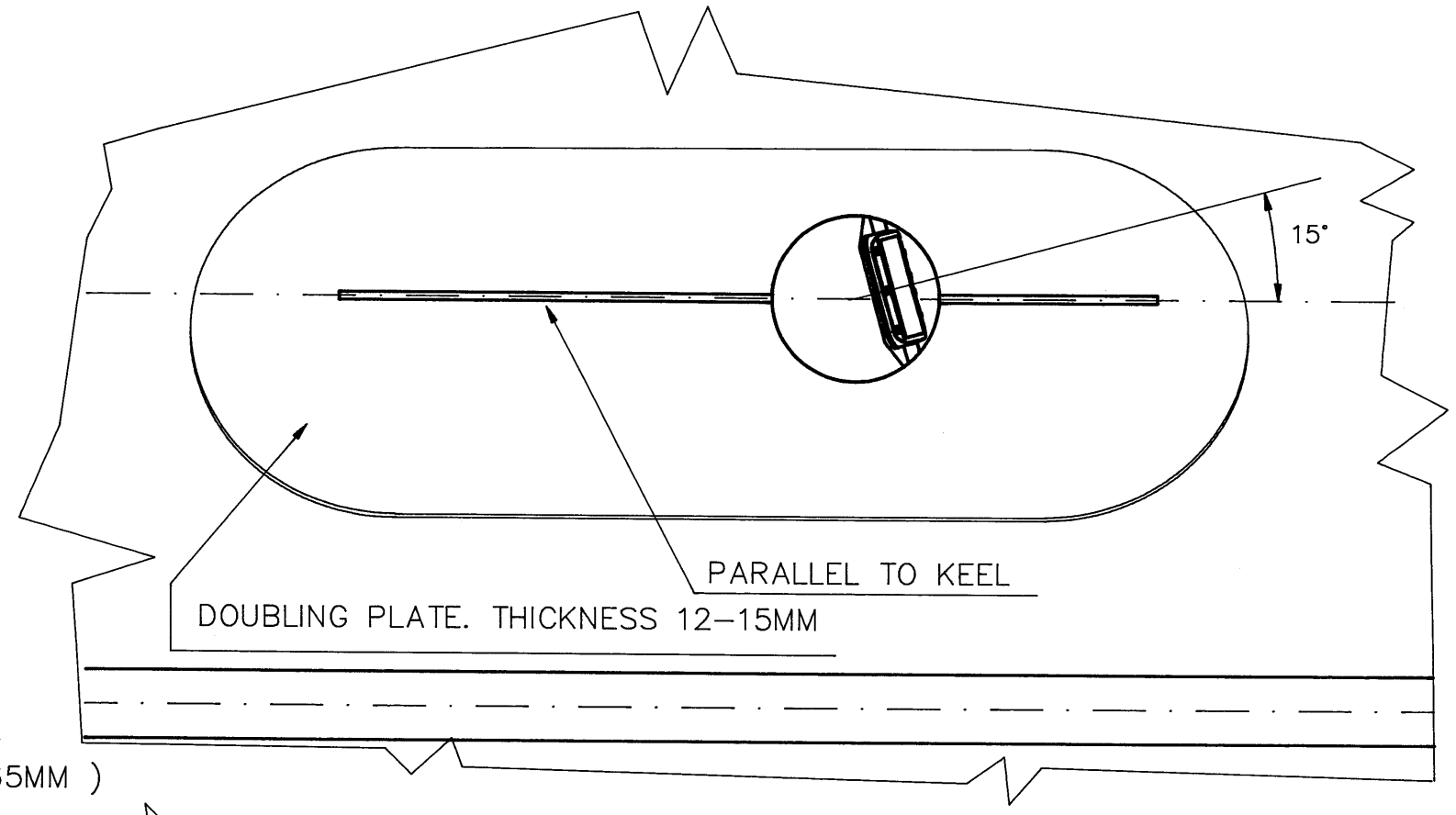
CROSS SECTION OF CENTRE TRANSDUCER SHOWN.



REV./SIGN.									
DATE									
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: – THREAD: –				SIMRAD		
SCALE	–		TRANSDUCER TILT ALTERATION INSTRUCTION TRIPPLE TRANSDUCER ITI				SHEET 1 OF 1		
DRAWN	92.04.28.	I.S.					830–109525		A
CHECKED	92.04.29.	K.E.							
APPROVED	92.04.29.	T.A.L.					FILE NO.: 588–05		

[redacted]

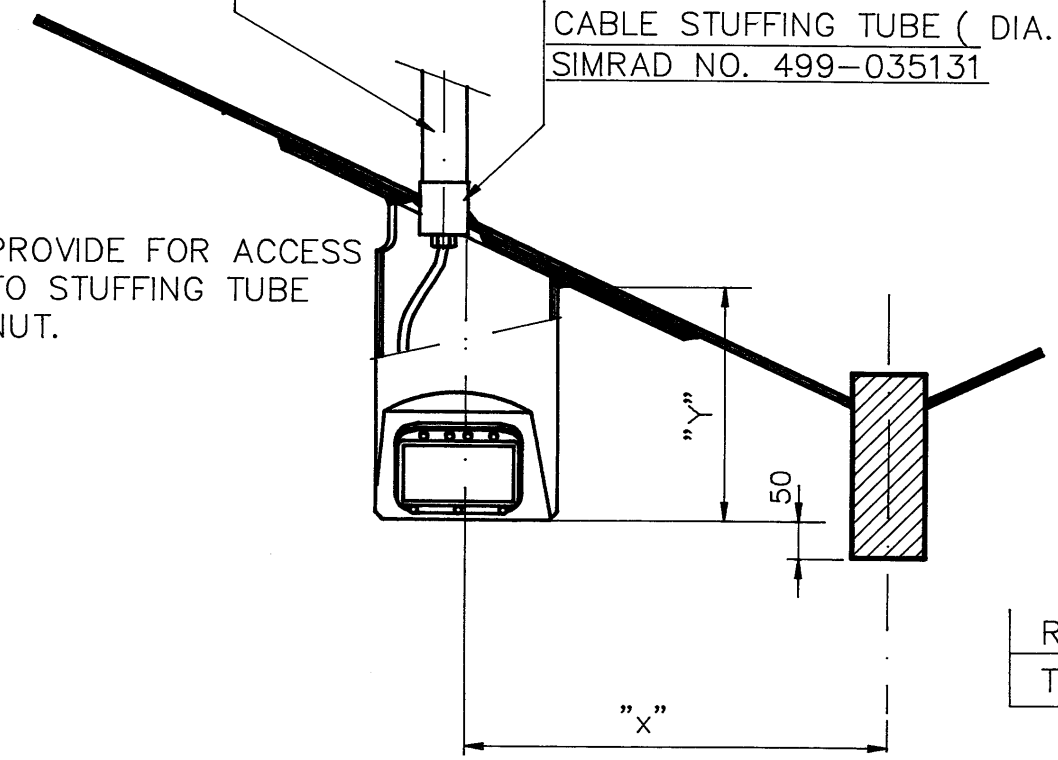




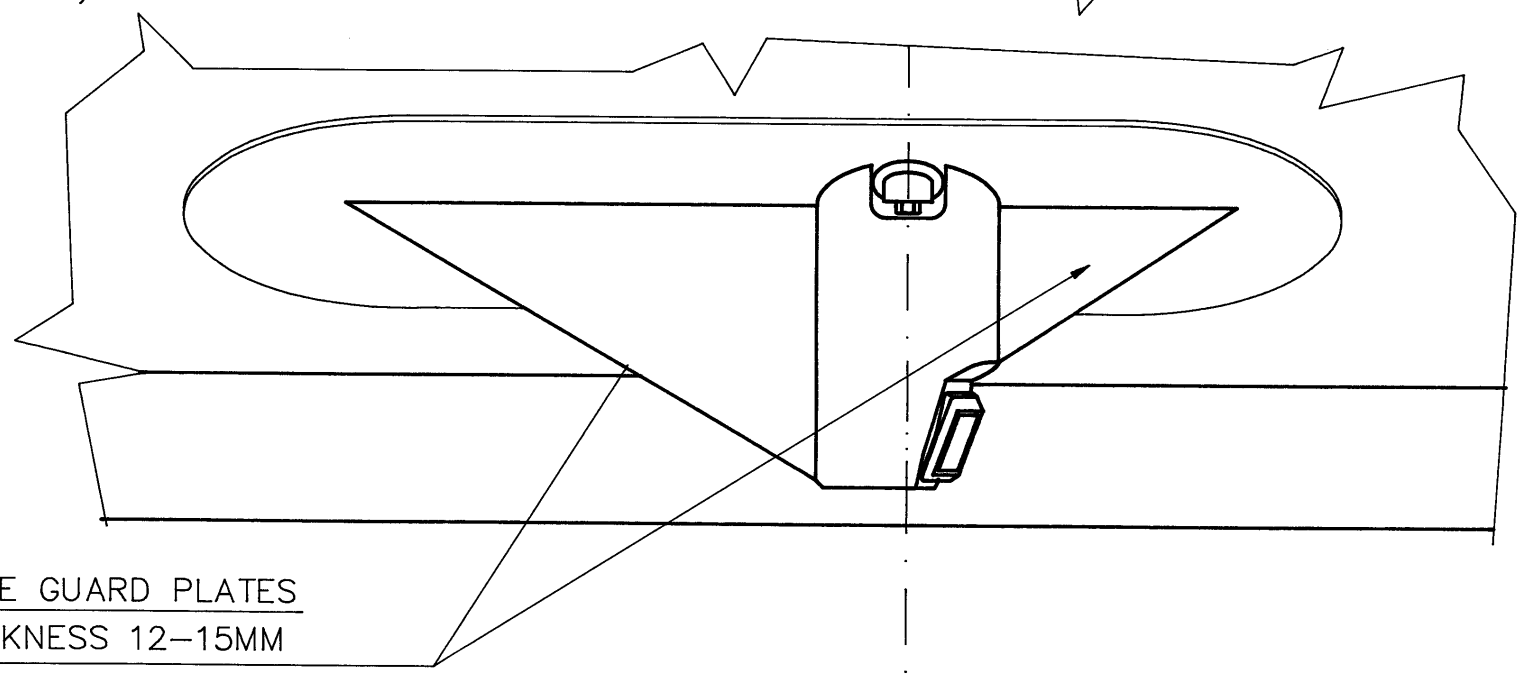
CABLE PIPE. INNER DIA. 50MM
TO BE RUN ABOVE WATER LINE

CABLE STUFFING TUBE (DIA. 65MM)
SIMRAD NO. 499–035131

PROVIDE FOR ACCESS TO STUFFING TUBE NUT.



RECOMMENDED"X" MINIMUM 1200MM.
RECOMMENDED"Y" MINIMUM 600MM.



ROPE GUARD PLATES
THICKNESS 12–15MM

90°±2 TO WATERLINE (BOTH DIRECTIONS)

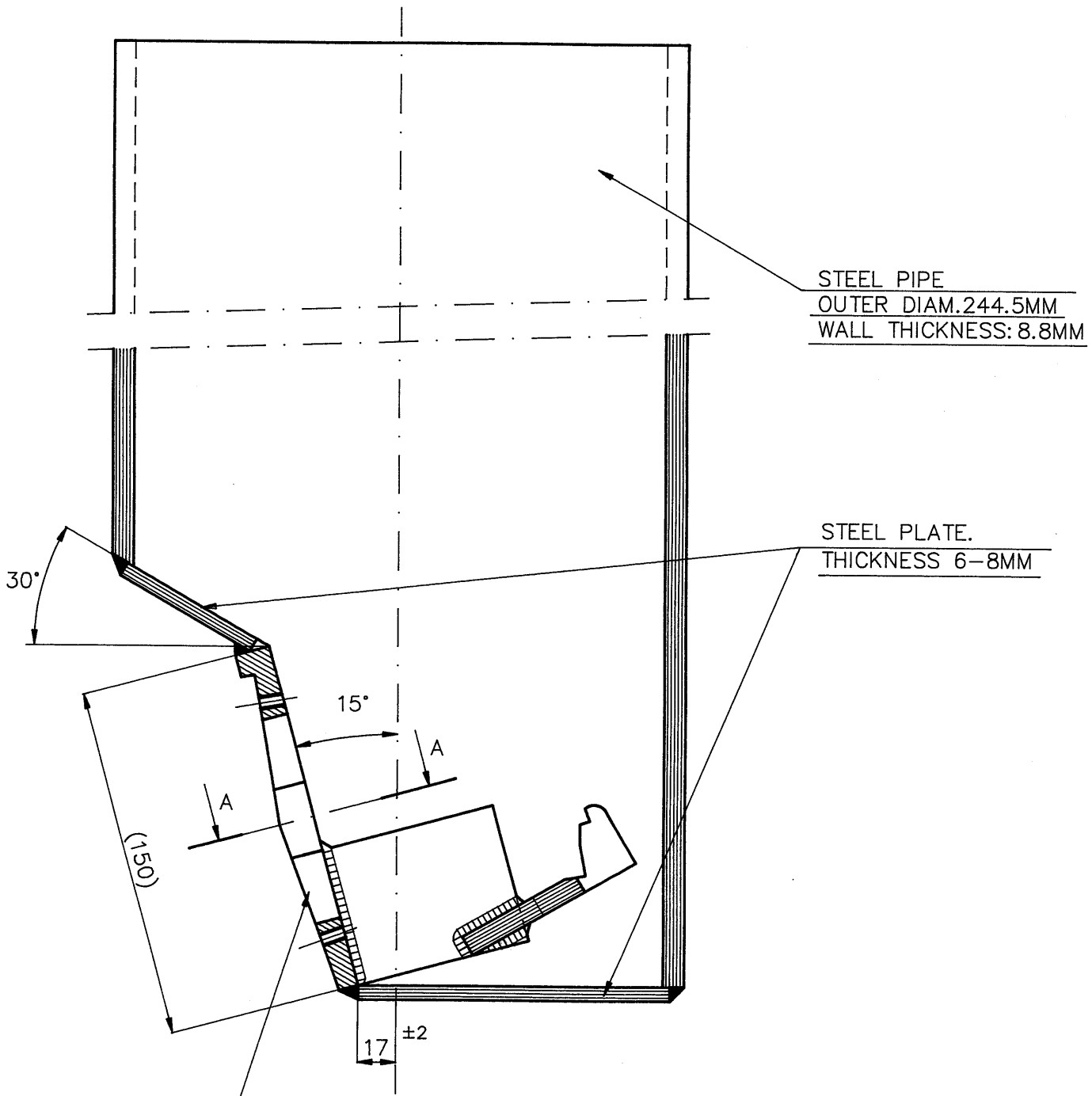
AFT

SURFACE TREATMENT(EXCEPT TRANSDUCER): AS FOR HULL PLATING

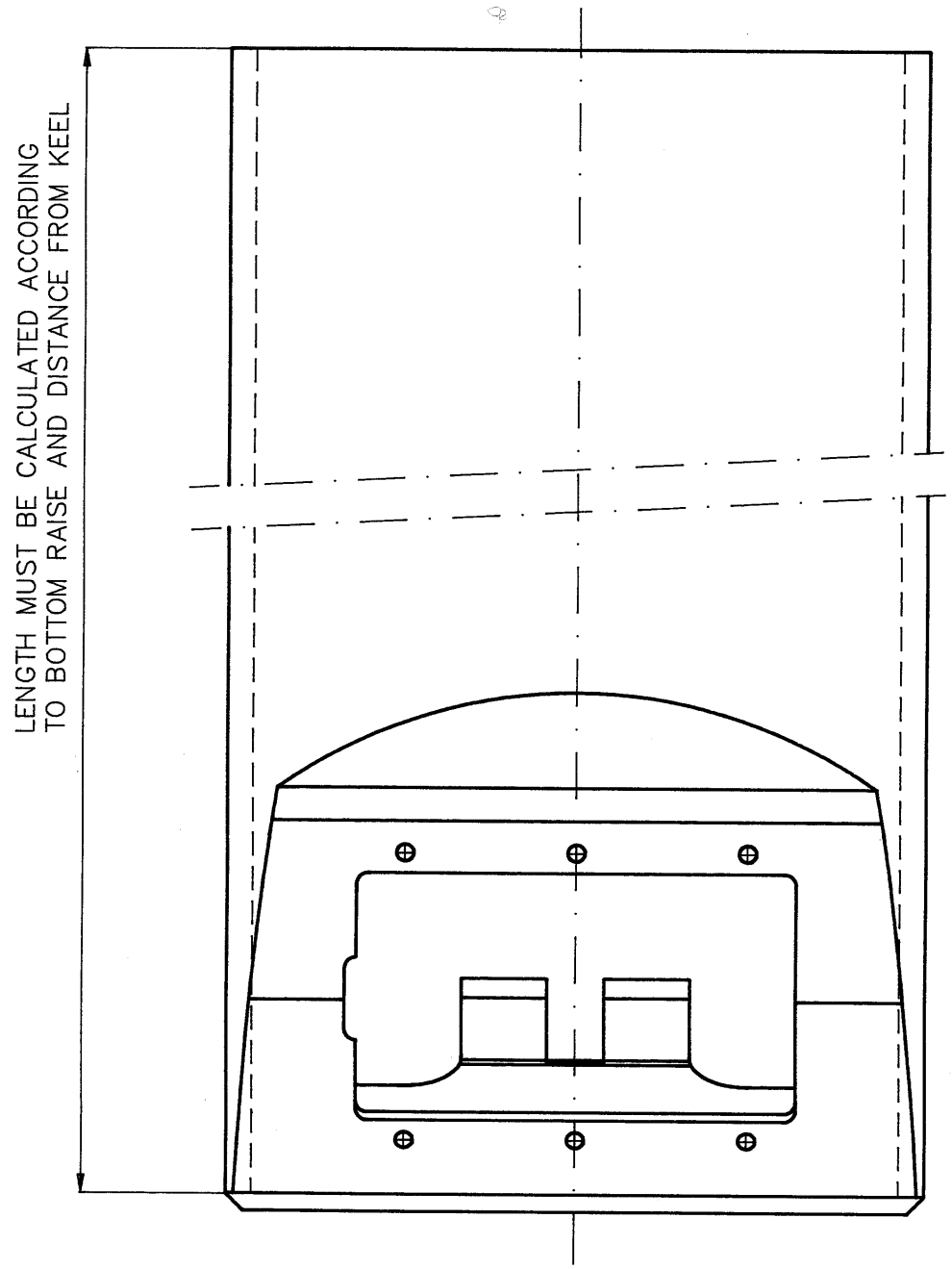
NOTE:

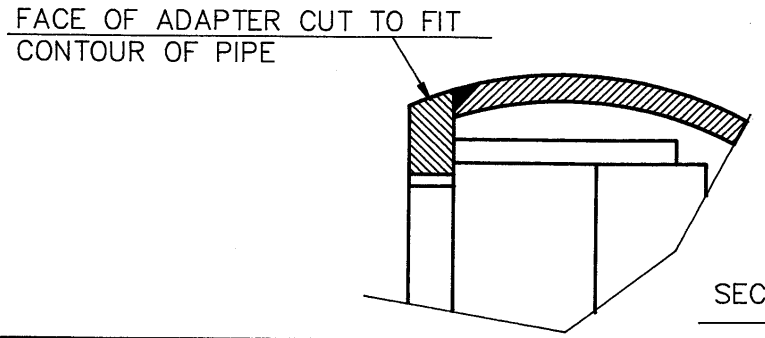
DIMENSIONS/MEASUREMENTS NECESSARY FOR MANUFACTURING
THE DETAILS ARE TO BE FOUND ON SHEET 2 OF THIS DRAWING

REV./SIGN.										
DATE										
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: – THREAD: –							SIMRAD
SCALE	1:10		ARRANGEMENT DRAWING							SHEET 1 OF 2
DRAWN	92.03.16.	I.S.	SINGLE TRANSDUCER MOUNTING							830–109430 A
CHECKED	92.04.29.	K.E.								
APPROVED	9.04.29.	T.A.L.	SIMRAD ITI							FILE NO.: 620–48



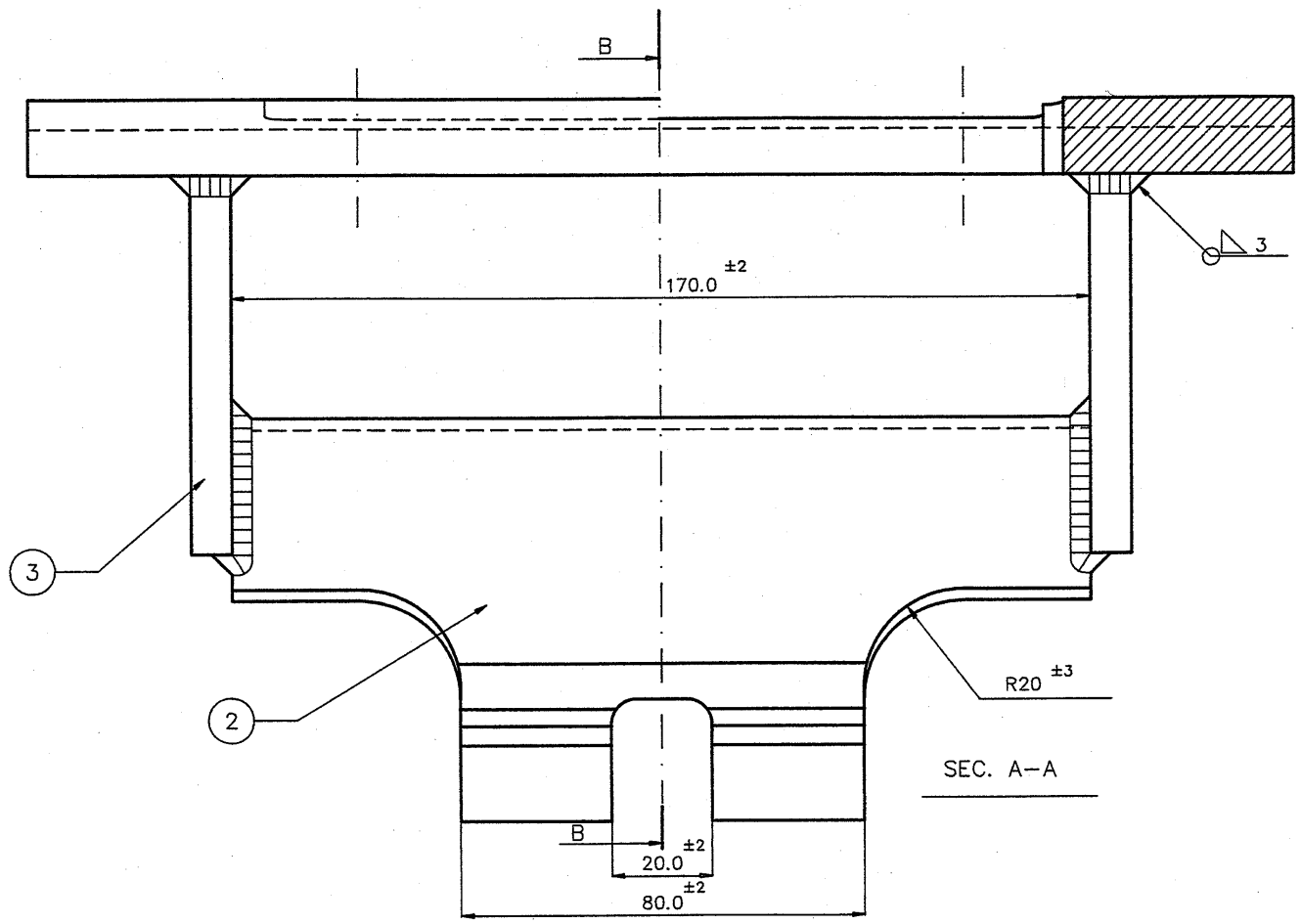
TRANSDUCER ADAPTER
SIMRAD DRAWING NO. 499–109431



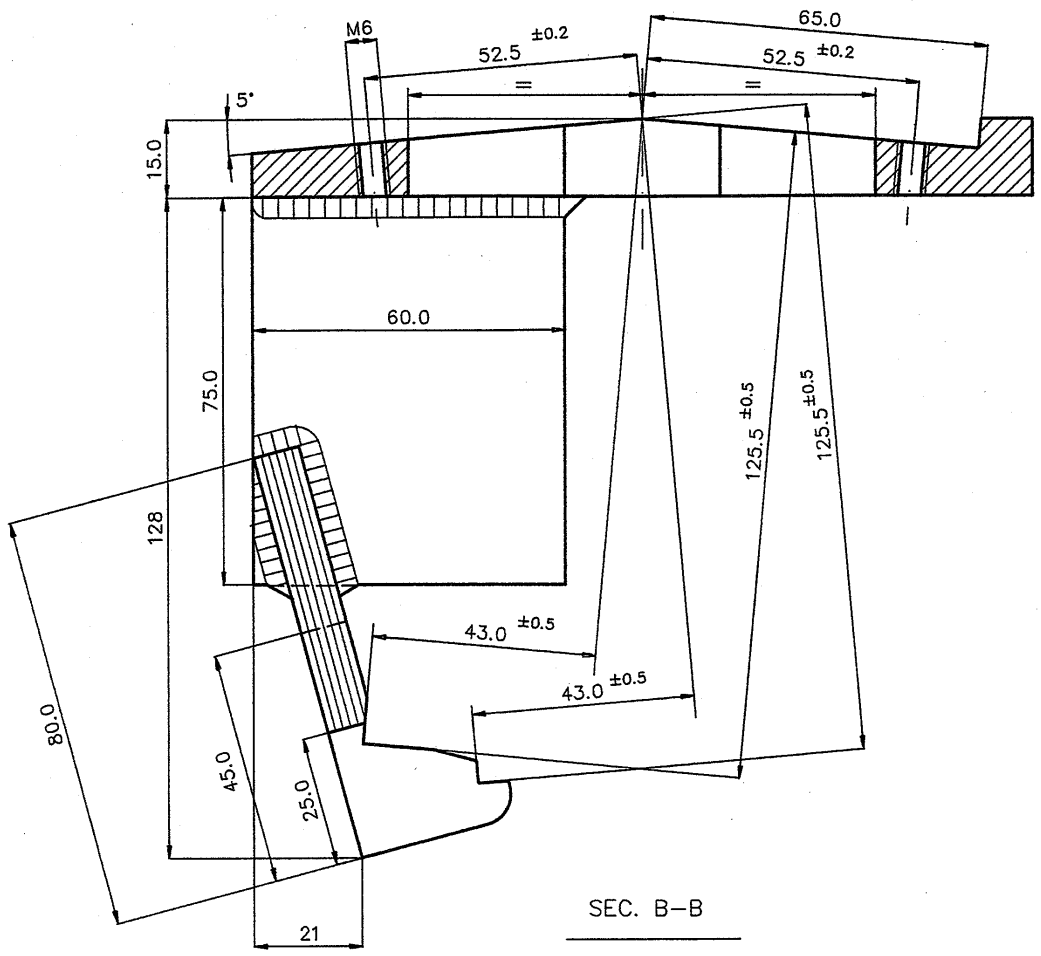


SEC. A–A

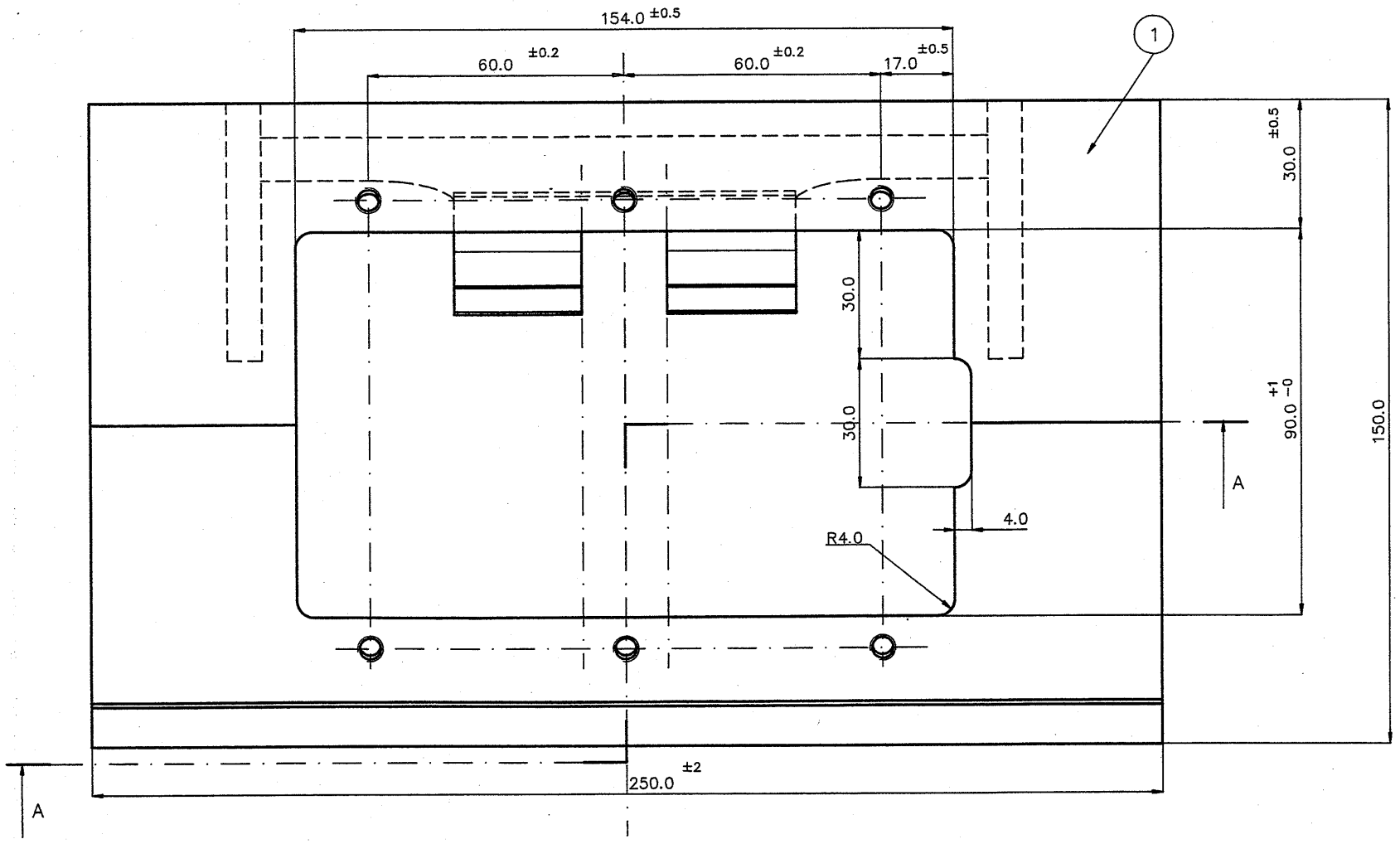
REV./SIGN.											
DATE											
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: – THREAD: –							SIMRAD	
SCALE	1:2.5		TRANSDUCER MOUNTING PIPE SINGLE TRANSDUCER							SHEET 2 OF 2	
DRAWN	92.03.17.	I.S.								830–109430	A
CHECKED	92.04.06.	A.Sk.									
APPROVED	92.04.07.	T.A.L.	ITI							FILE NO.: 620–48	



SEC. A–A



SEC. B–B



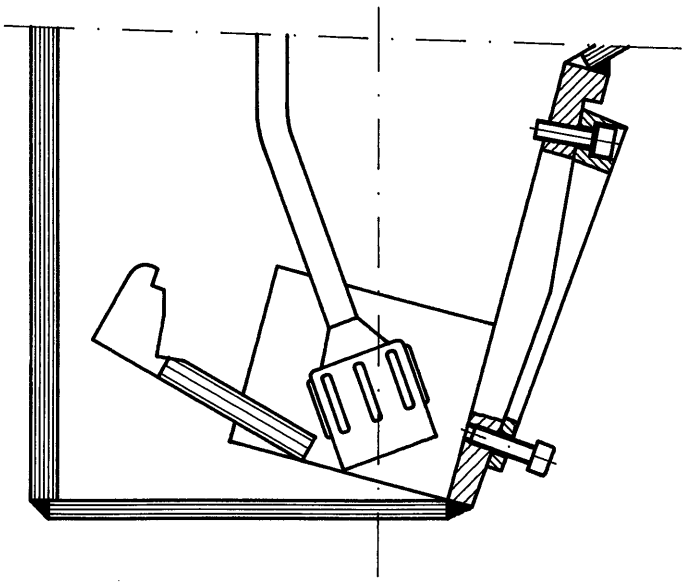
6.3

DETALJENES YTTERKONTURER BEHØVER IKKE MASKINERING.
KAN GJØRES MED SKJEREBRENNER.
CONTOUR OF DETAILS NEED NOT TO BE MACHINED.
MAY BE DONE WITH CUTTING TORCH

SURFACE TREATMENT:
SAND BLASTED
IRON OXIDE PRIMER

Pos.no.	Qty.	DETAIL	DIM./ MATERIAL
3	2	FLAT BAR	60 X 8 NVA
2	1	METRIC BULB FLAT	160 X 9 NVA
1	1	PLATE	250 X 125 X 16 NVA

REV./SIGN.			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: ±2 THREAD: 6g/6H	SIMRAD
DATE				
PROJ. METHOD				SHEET 1 OF 1
SCALE	1:1		TRANSDUCER ADAPTER	499–109431 A
DRAWN	92.03.17.	I.S.	SINGLE TRANSDUCER MOUNTING	
CHECKED	92.04.06.	K.S.E.		FILE NO.: 610–88
APPROVED	92.04.07.	O.T.R.	ITI	



MOUNTING SEQUENCE:

TOOL REQUIRED: 5MM ALLEN KEY.

1) PLACE SPACER AT ADAPTER FACE AS SHOWN.

2) INSERT BOLTS
(INSERT LOWER BOLTS FOR CORRECT ALIGNMENT ONLY.)

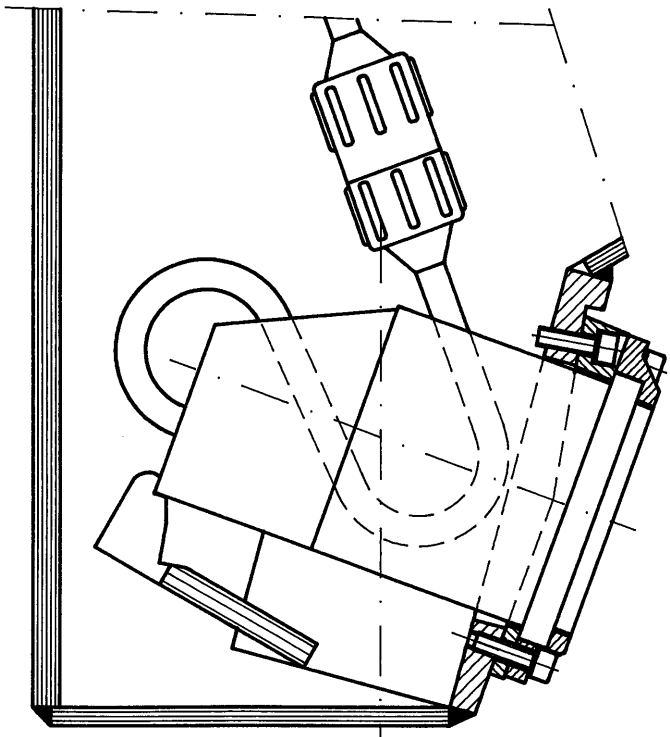
3) TIGHTEN UPPER BOLTS.
(DO NOT FORGET SPRING WASHERS.)

SHOWN POSITION OF SPACER GIVES 20° TILT.

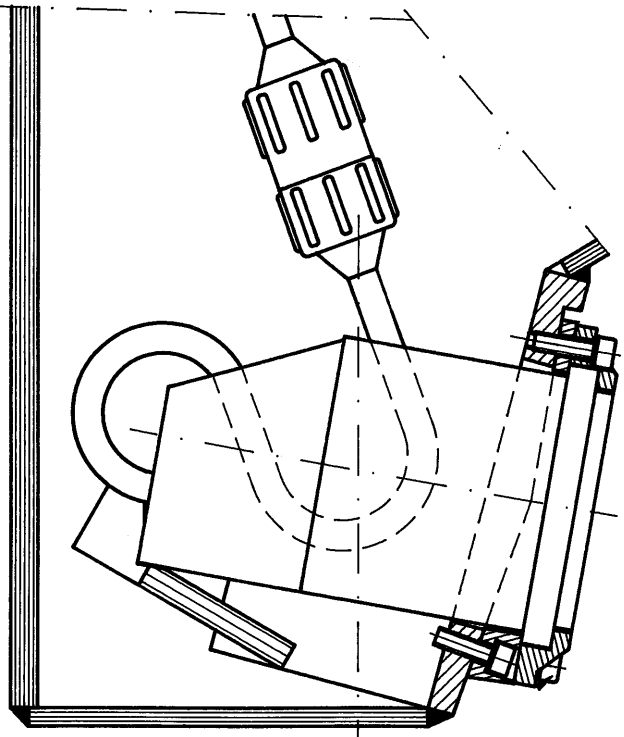
IF 10° TILT IS REQUIRED ROTATE SPACER 180°. (COUNTERSUNK HOLES AT BOTTOM).

MATE PLUG/SOCKET AND SECURE LOCKING SLEWE.

INSERT TRANSDUCER ELEMENT INTO ADAPTER, PUT MOUNTING FRAME IN PLACE AND TIGHTEN BOLTS.



20° TILT.



10° TILT.

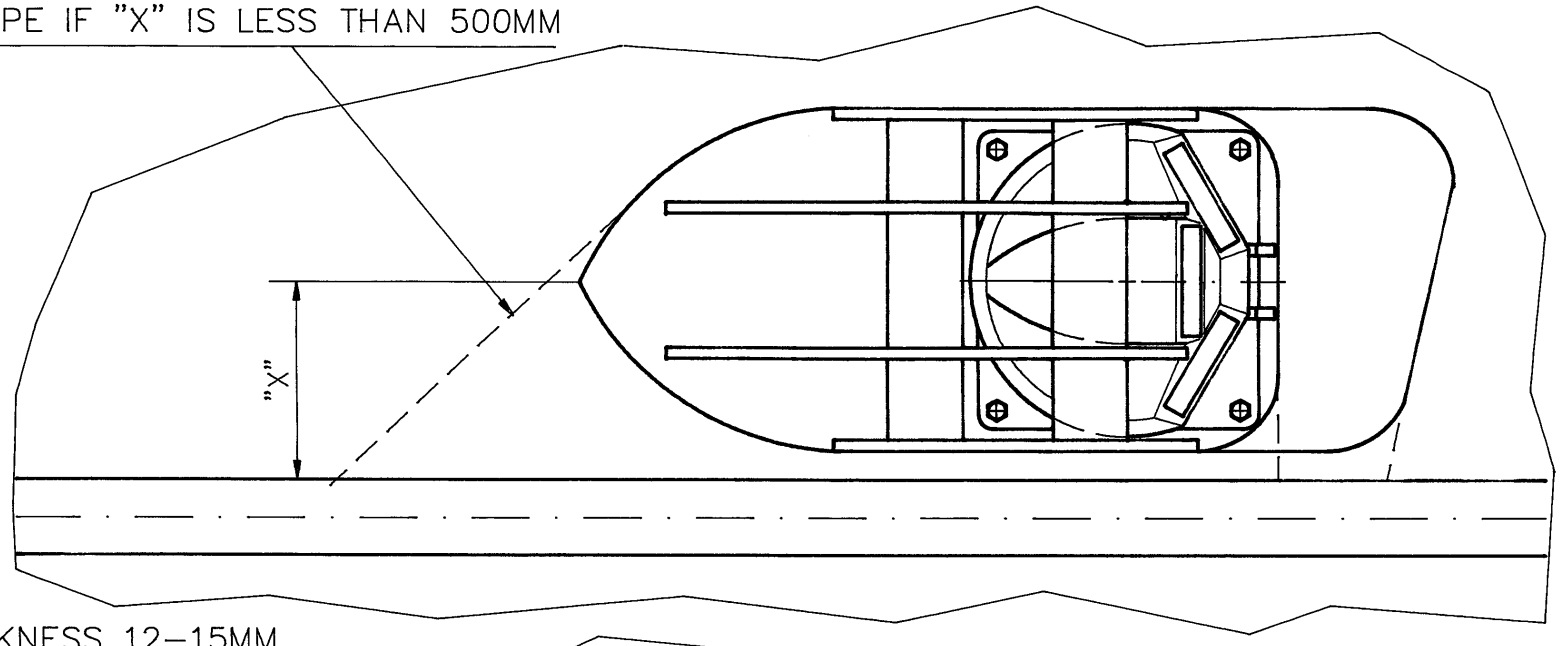
REV./SIGN.									
DATE									
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: – THREAD: –				SIMRAD		
SCALE	1:2.5		TRANSDUCER ELEMENT				SHEET 1 OF 1		
DRAWN	92.04.15.	I.S.	MOUNTING INSTRUCTION				830–109509		A
CHECKED	92.04.29.	K.E.	SPLITBEAM TRANSDUCER						
APPROVED	92.04.28.	T.A.L.	SINGLE TRANSDUCER ITI				FILE NO.: 587–95		

NOTE:

CONCERNING DISTANCE "X":
BE AWARE THAT THE KEEL WILL MAKE A SHADOW ZONE IF THE TRANSDUCER IS PLACED TO CLOSE TO IT.

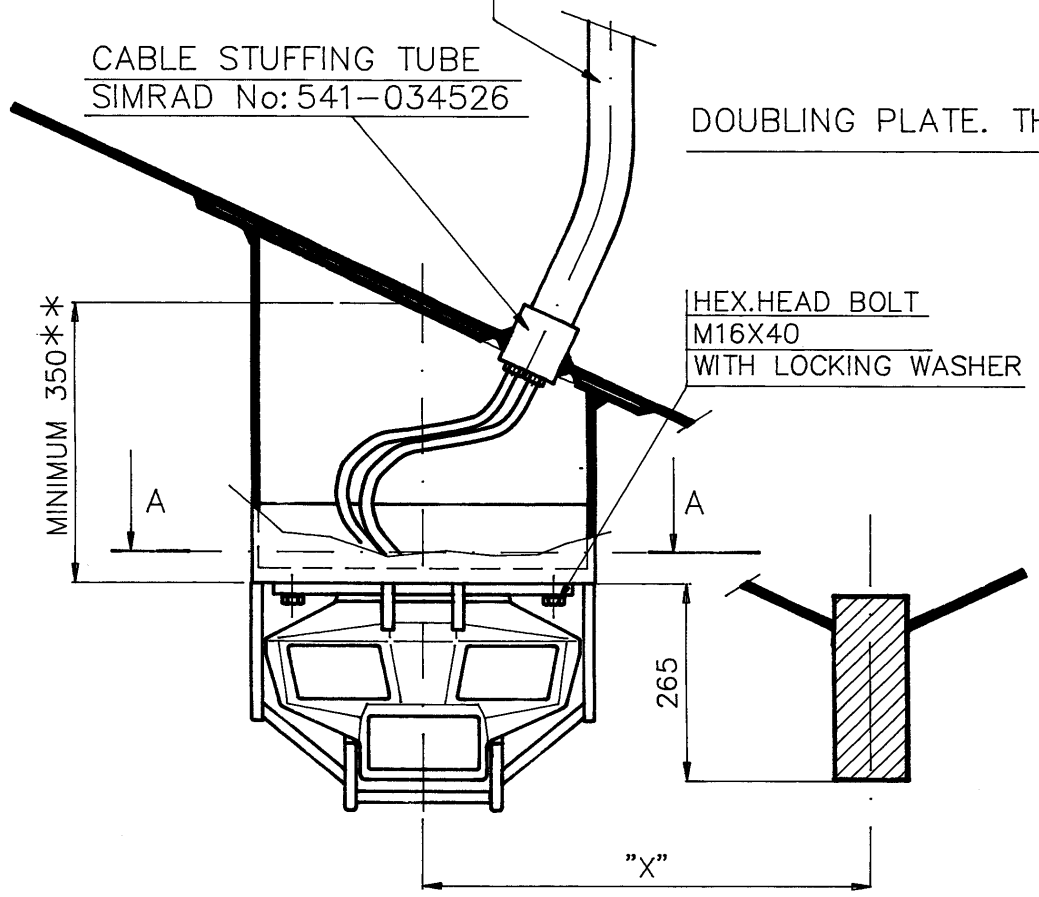
DETAIL DRAWINGS: TRANSDUCER BLISTER 111–108478
TRANSDUCER MOUNTING FLANGE: 599–108480

RECOMMENDED BLISTER SHAPE IF "X" IS LESS THAN 500MM



CABLE PIPE. INNER DIA. 50MM
TO BE RUN ABOVE WATER LINE

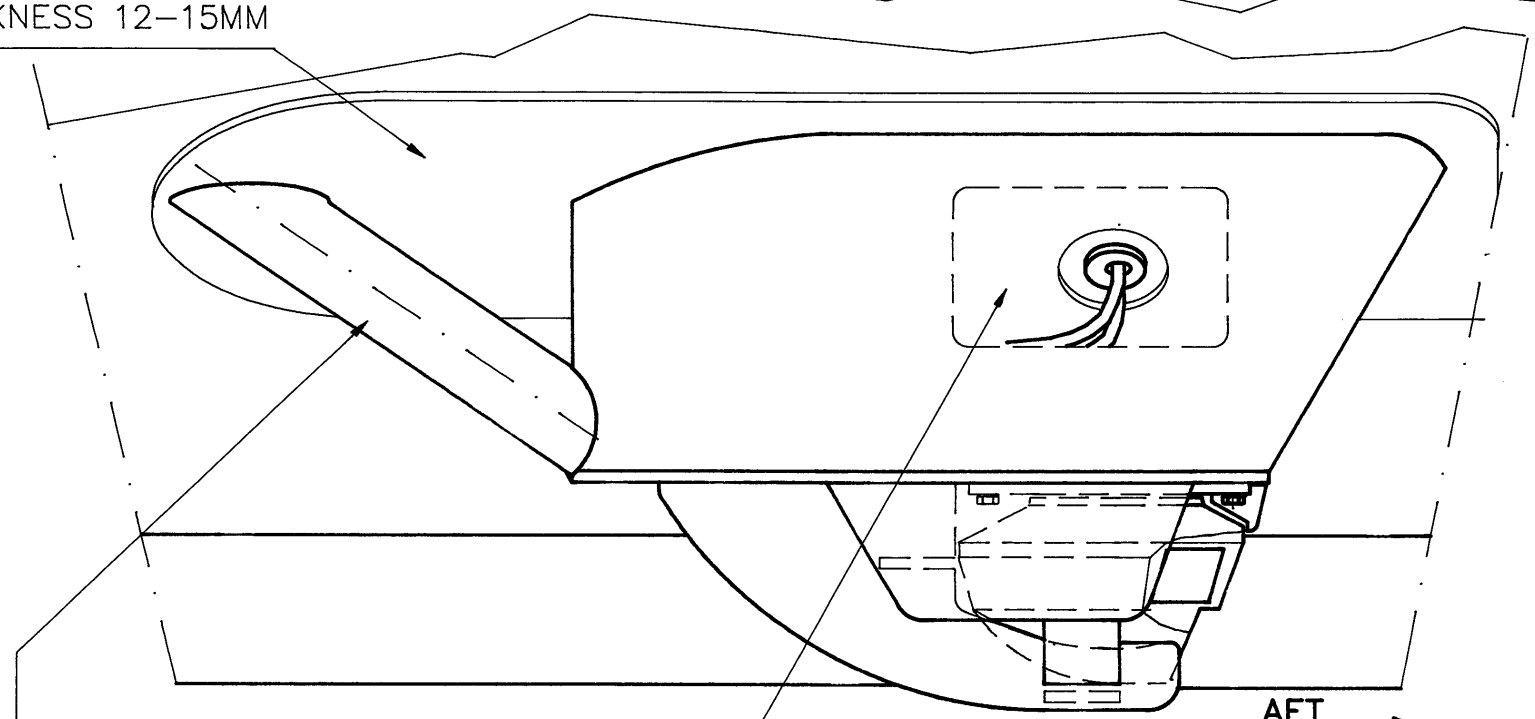
CABLE STUFFING TUBE
SIMRAD No: 541–034526



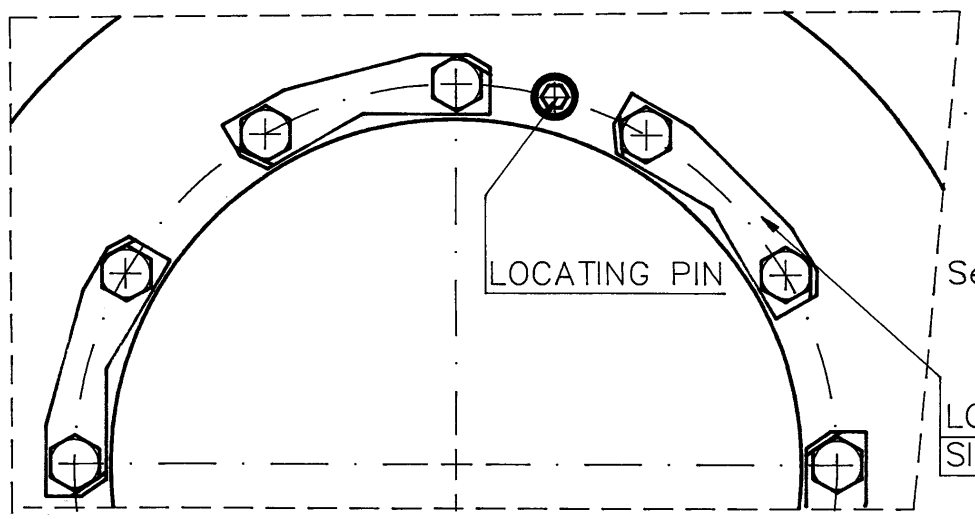
RECOMMENDED "X", MIN. 1000 MM

HEX.HEAD BOLT
M16X40
WITH LOCKING WASHER

DOUBLING PLATE. THICKNESS 12–15MM



HEAVY WALL PIPE. DIA.120–150MM

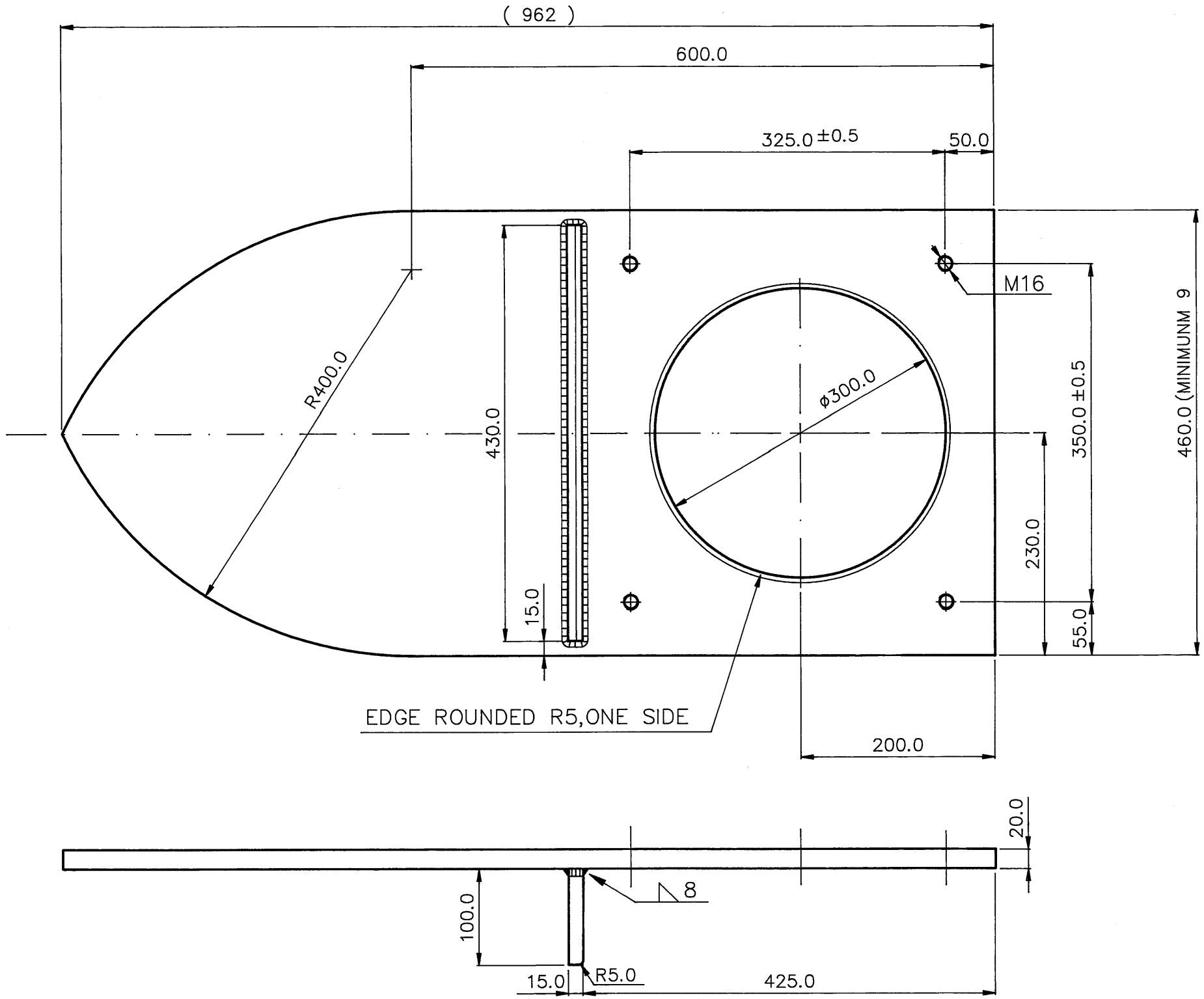


Sec. A: A
1:2

LOCKING PLATE
SIMRAD No.: 575–056926

IF HEIGHT OF BLISTER, MARKED**, MAKES IT DIFFICULT OR IMPOSSIBLE TO REACH CABLE GLANDS FROM BELOW, PROVIDE ACCESS THROUGH SIDE OF BLISTER. CLOSE OFF OPENING AFTER INSTALL. WELDED OR BOLTED COVER

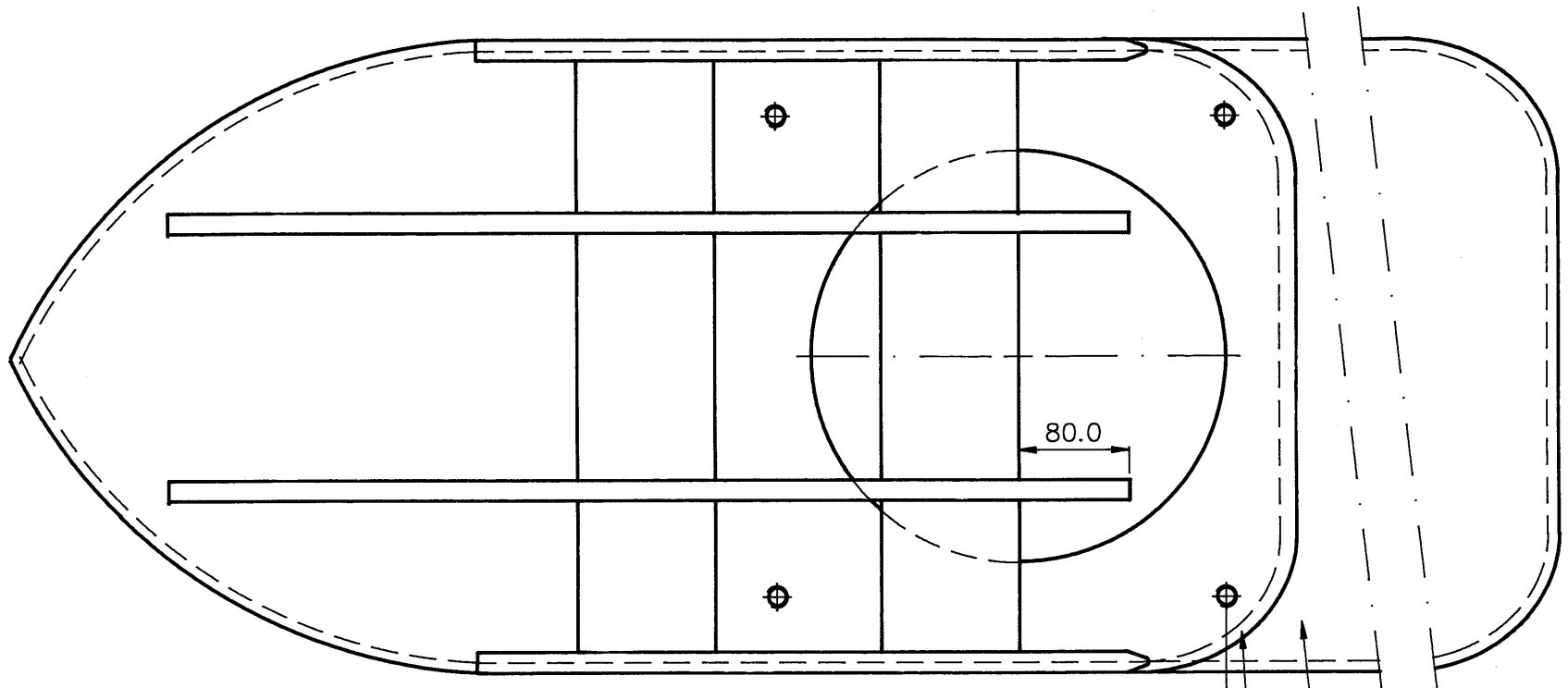
REV./SIGN.	8960 I.S.									
DATE	93.05.03.									
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: ±5 THREAD: –					SIMRAD		
SCALE	1:10	1:2	ARRANGERMENT DRAWING					SHEET 1 OF 1		
DRAWN	91.05.28	I.S.	ICE PROTECTED TRANSDIUCER					830–108477	B	
CHECKED	91.06.27	K.Sk.	BLISTER MOUNTED							
APPROVED	91.08.06	T.A.L.	ITI					FILE NO.: 616–67		

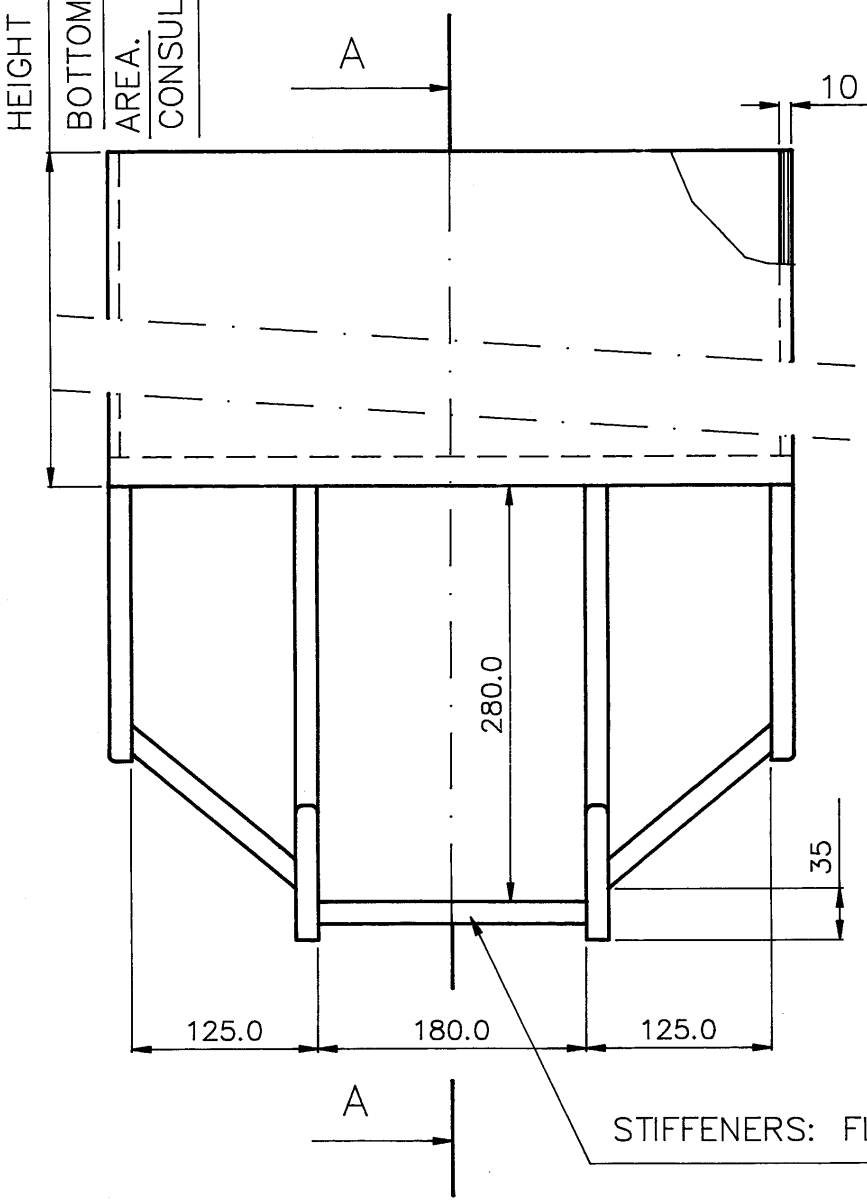


MATERIALE.: 20MM MILD STEEL PLATE AND STEEL BAR 15x100

REV./SIGN.									
DATE									
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: ±2.5 THREAD: 6g/6H				SIMRAD		
SCALE	1:5		BASE PLATE				SHEET 1 OF 1		
DRAWN	91.05.27	I.S.	TRANSDUCER BLISTER				599–108479		A
CHECKED	91.06.27.	K.SE.	ICE PROTECTED TRANSDUCER						
APPROVED	91.08.06.	TAL	ITI				FILE NO.: 616–69		

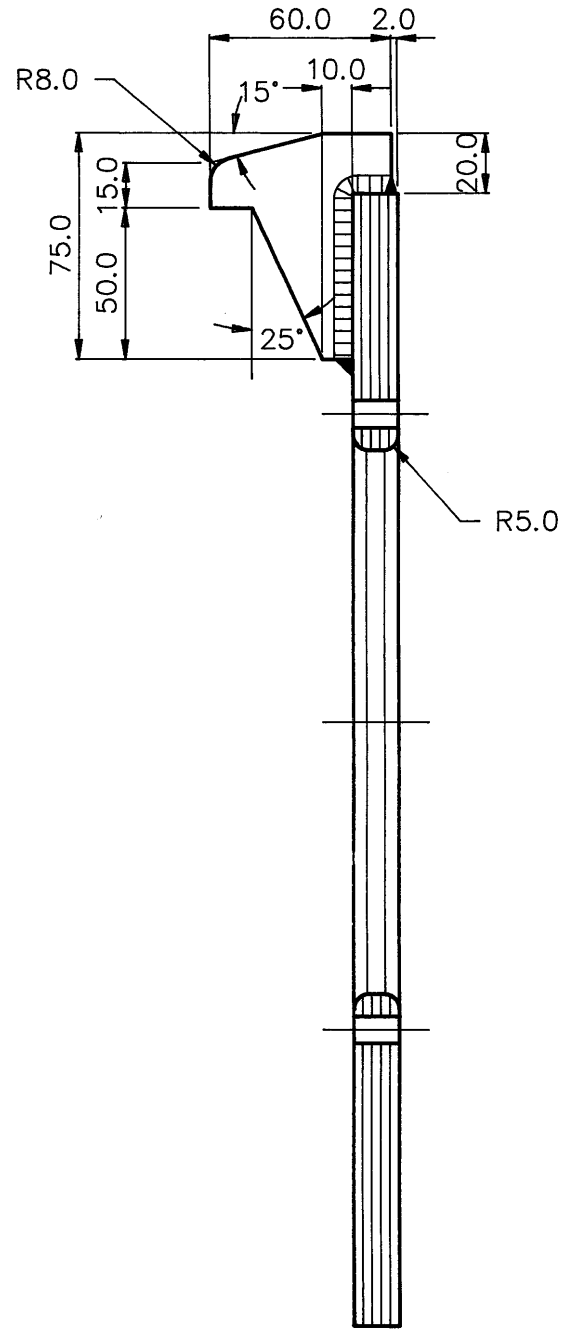
HEIGHT MUST BE CALCULATED ACCORDING TO BOTTOM RAIS AND KEEL HEIGHT IN LOCATION AREA.
CONSULT ARRANGEMENT DWG. 830–108477

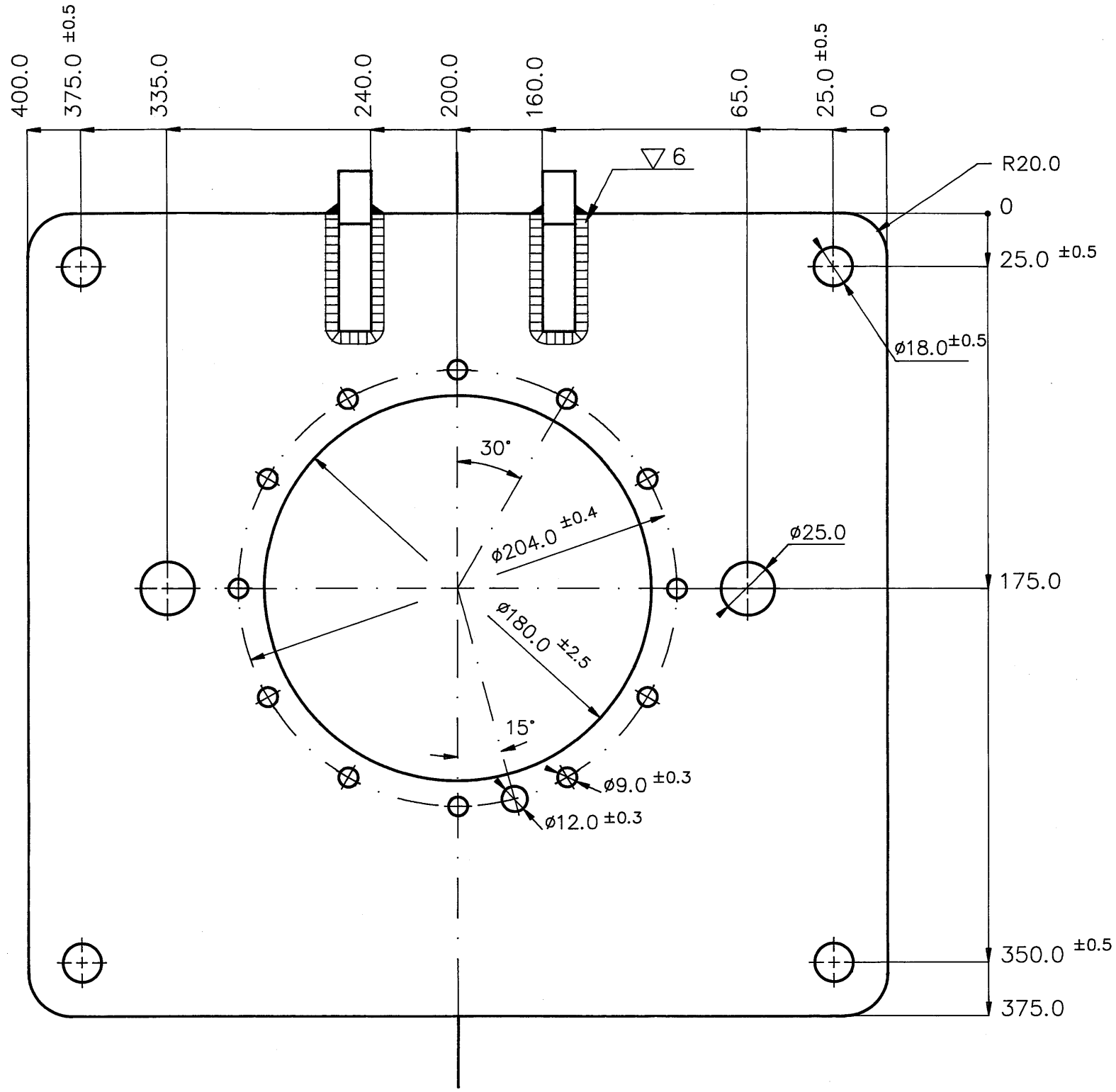




STIFFENERS: FLAT BAR 15 X 100MM

REV./SIGN.										
DATE										
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: ±2 THREAD: –						SIMRAD	
SCALE	1:5		TRANSDUCER BLISTER						SHEET 1 OF 1	
DRAWN	91.05.27	I.S.	ICE PROTECTED TRANSDUCER						111–108478	A
CHECKED	91.06.27	K.SK.								
APPROVED	91.08.06.		ITI						FILE NO.: 616–68	

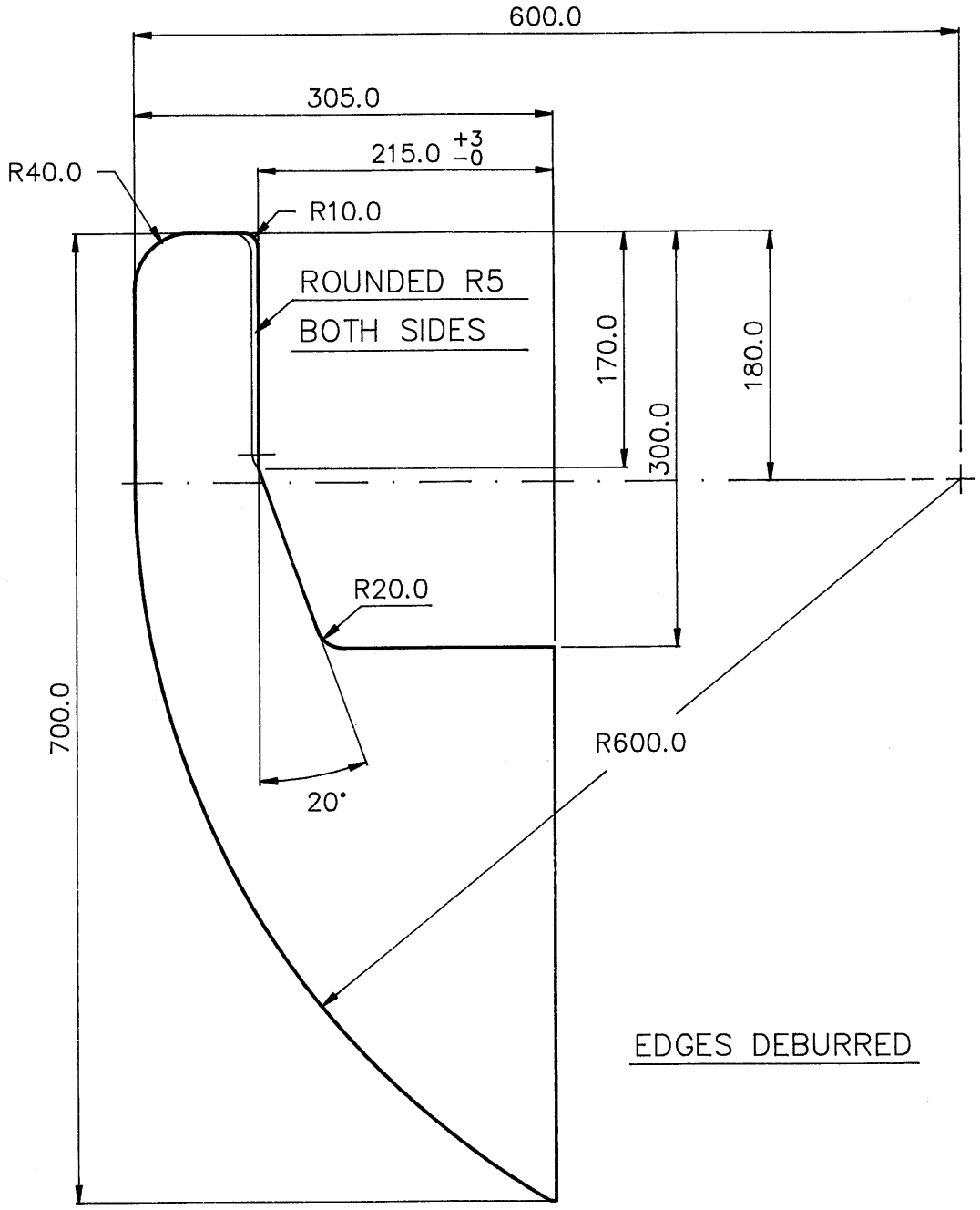




SURFACE TREATMENT : PROTECT AGAINST CORROSION AND FOULDING WITH PAINT SYSTEMS COMMONLY USED ON SHIPS.

MATERIALE.: 15MM MILD STEEL PLATE

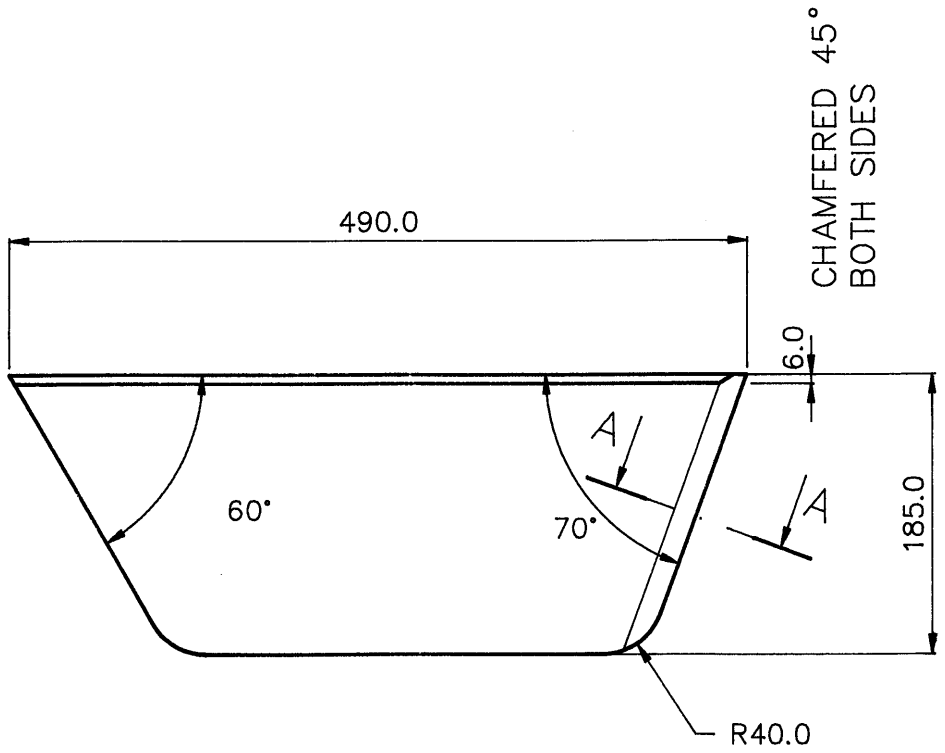
REV./SIGN.									
DATE									
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: ±2.5 THREAD: 6g/6H					SIMRAD	
SCALE	1:2.5		TRANSDUCER MOUNTING FLANGE					SHEET 1 OF 1	
DRAWN	91.05.27	I.S.	ICE PROTECTED TRANSDUCER					599–108480	A
CHECKED	91.06.27	K.SK.							
APPROVED	91.08.06	T.AL.	ITI					FILE NO.: 616–70	



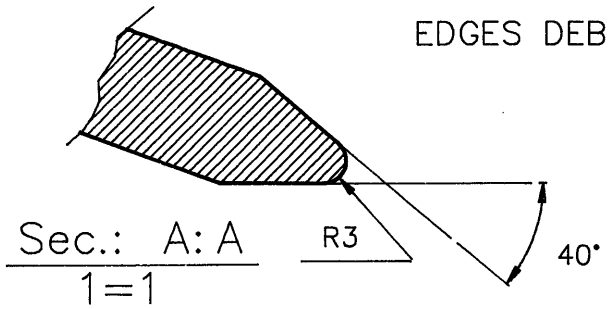
EDGES DEBURRED

MATERIALRE.: 15MM MILD STEEL PLATE

REV./SIGN.									
DATE									
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: ±2.5 THREAD: –				SIMRAD		
SCALE	1:5		INNER GUARD PLATE				SHEET 1 OF 1		
DRAWN	91.05.27	I.S.	TRANSDUCER BLISTER				599–108481		A
CHECKED	91.06.27	K.SK.	ICE PROTECTED TRANSDUCER						
APPROVED	91.08.06.	TAR.	ITI				FILE NO.: 581–57		



EDGES DEBURRED



Sec.: A:A
1=1

MATERIALE.: 15MM MILD STELL PLATE

REV./SIGN.									
DATE									
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: ±2.5 THREAD: –				SIMRAD		
SCALE	1:5	1:1	OUTER GUARD PLATE				SHEET 1 OF 1		
DRAWN	91.05.27	I.S.	TRANSDUCER BLISTER				599–108482		A
CHECKED	91.06.27.	K.Sk.	ICE PROTECETED TRANSDUCER						
APPROVED	91.08.06.	T.A.L.	ITI				FILE NO.: 581–58		

NOTE:

KNOWING THAT TRAWL DOORS COMES IN MANY DIFFERENT SHAPES,AND DIFFERS IN POSITION DURING TOWING, MOUNTING THE SPREAD SENSOR ADAPTERS MAY IMPLICATE USE OF FILLER PLATES TO OBTAIN A PROPER INSTALLATION SINCE THE ADAPTERS ARE DESIGNED TO BE AS UNIVERSAL. AS POSSIBLE.

*) FOR BOTTOM TRAWLING THE SENSOR ADAPTER SHOULD ALWAYS BE WELDED TO THE UPPER PART OF THE TRAWL DOOR.

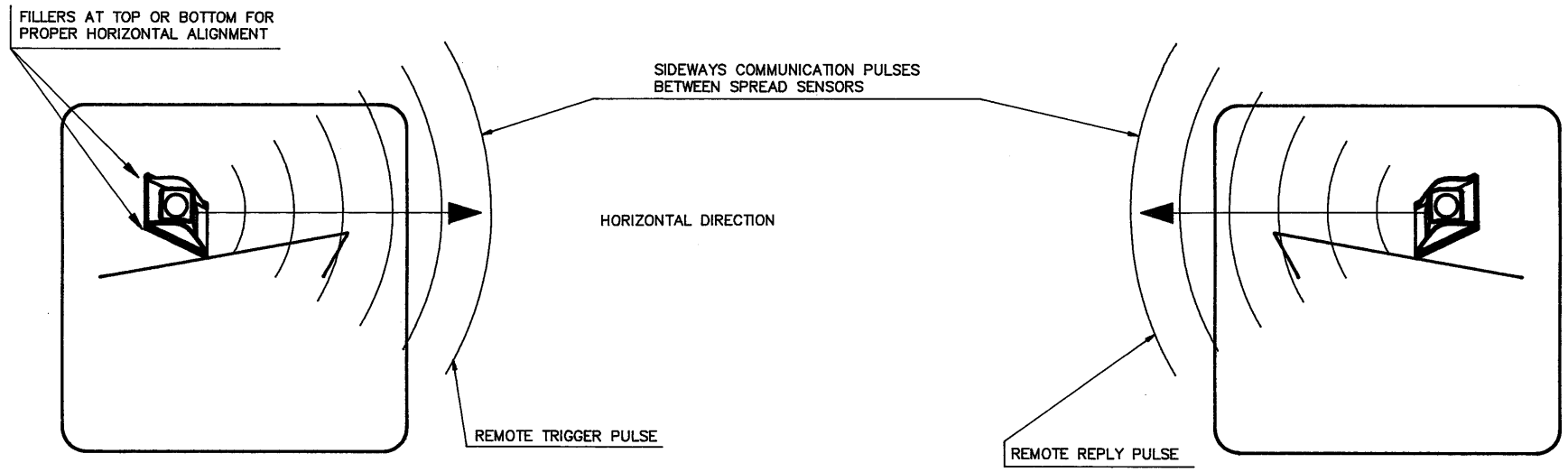


Fig. C (Seen from vessel)

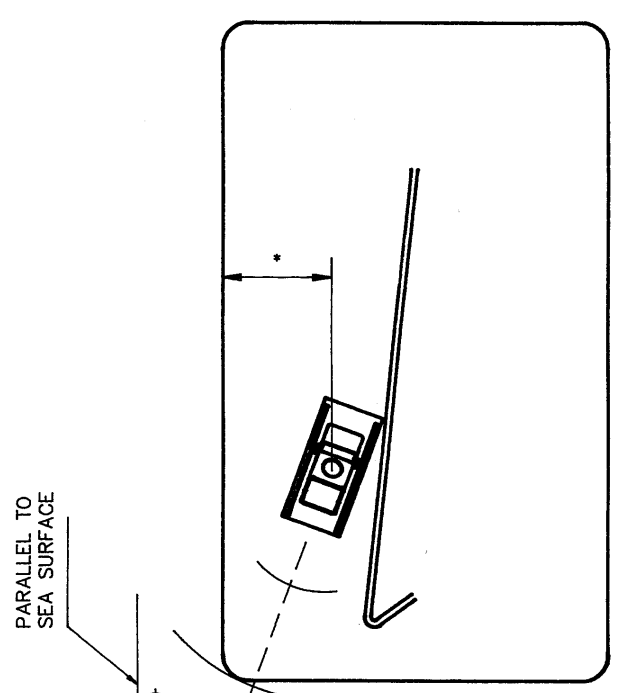
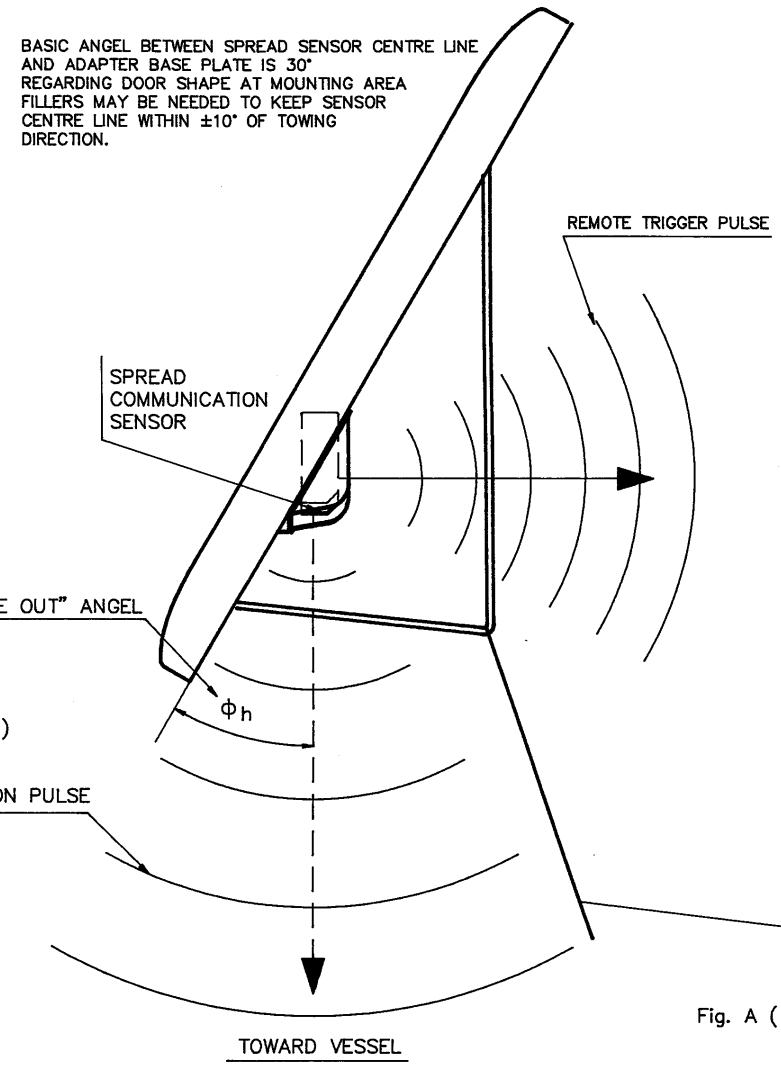


FIG. B (seen from side)



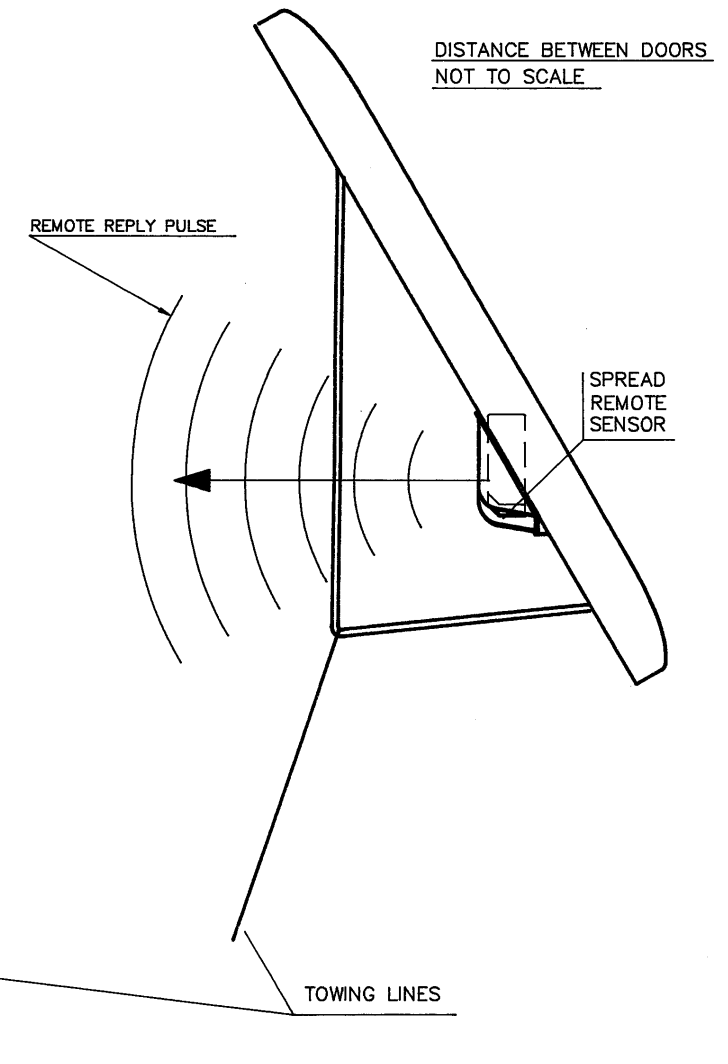
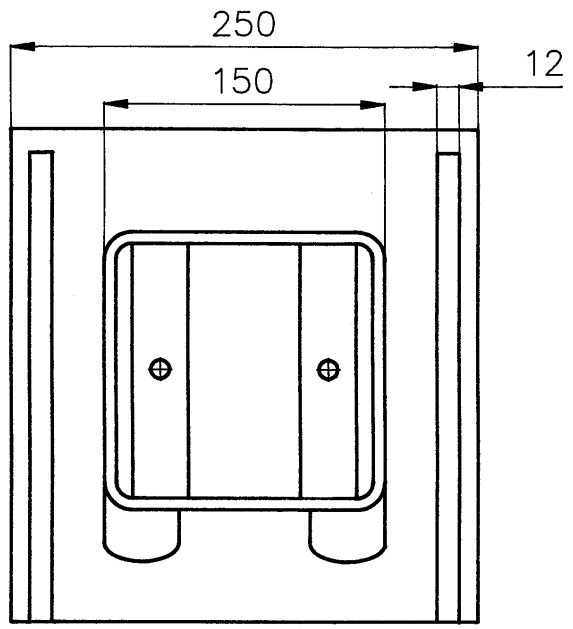
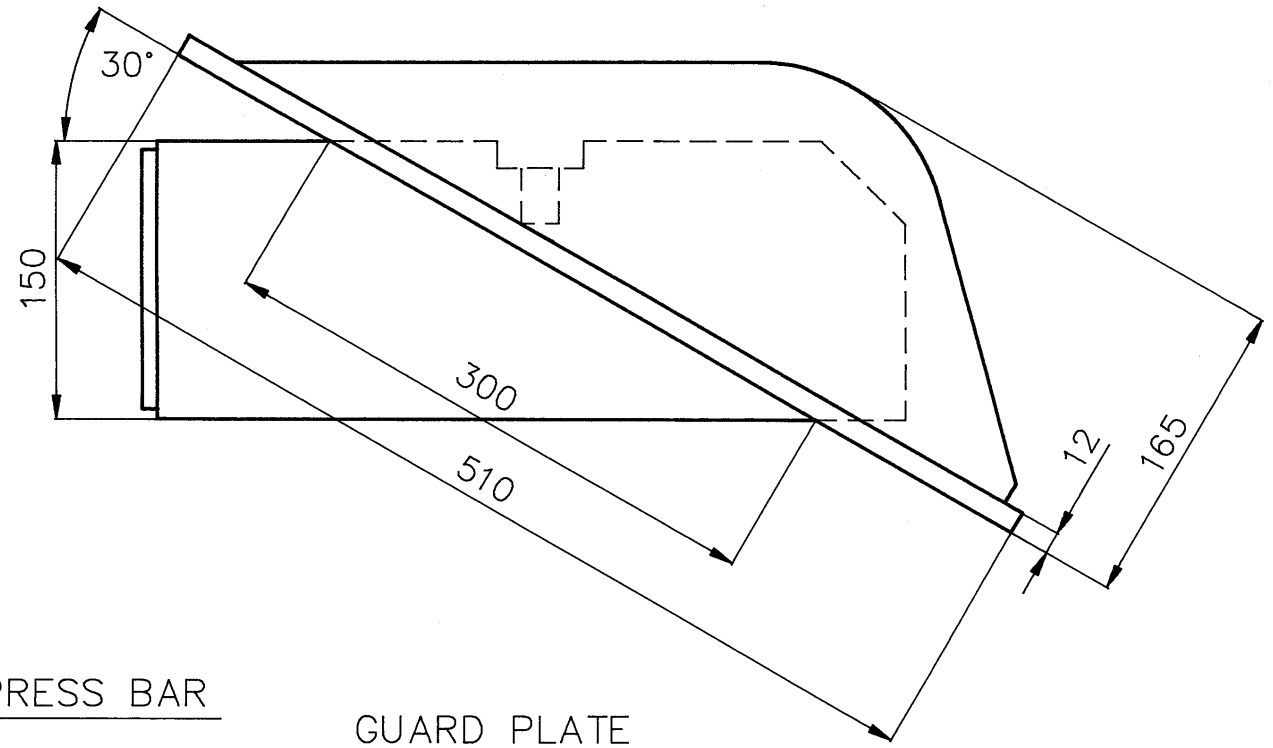
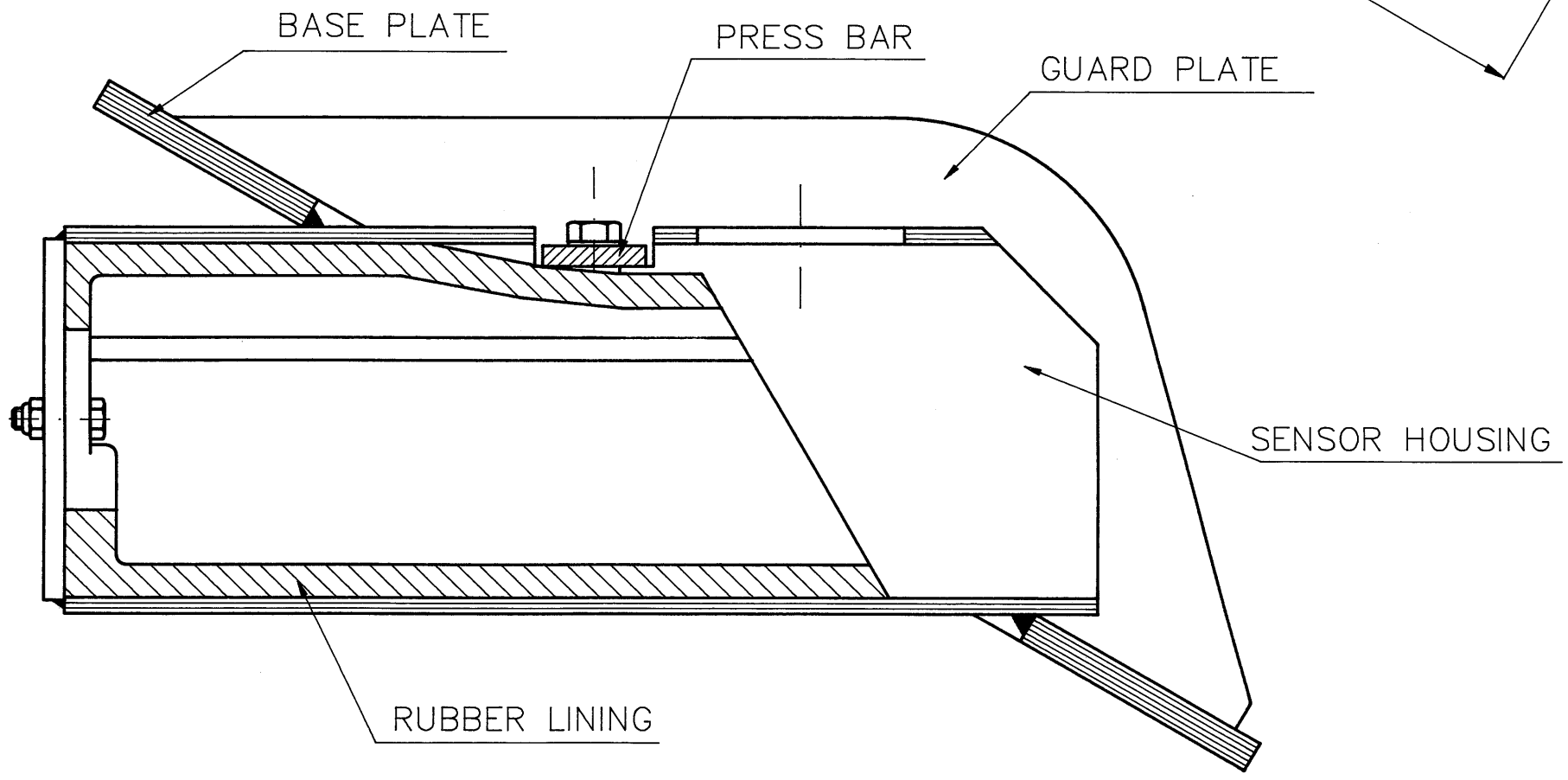


Fig. A (seen from above)

REV./SIGN.									
DATE									
PROJ. METHOD			UNLESS OTHERWISE STATED,TOLERANCE: DIM.: – THREAD: –				SIMRAD		
SCALE	–		MOUNTING INSTRUCTION				SHEET 1 OF 1		
DRAWN	91.10.25.	I.S.	SPREAD SENSOR ADAPTER				830–108919		A
CHECKED	91.10.25.	T.A.L.							
APPROVED	91.10.25.	T.A.L.	ITI				FILE NO.: 618–66		

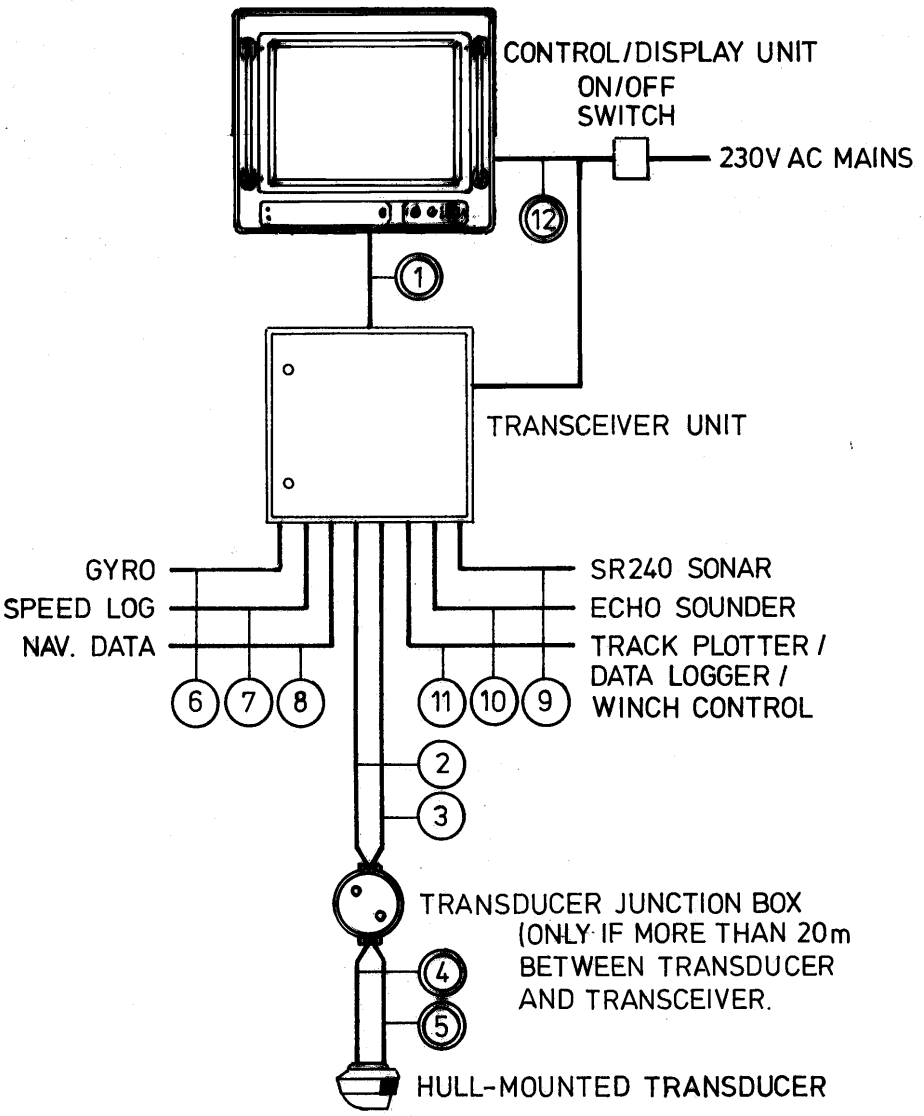






REV./SIGN.									
DATE									
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: – THREAD: –				SIMRAD		
SCALE	1:4	1:2.5	OUTLINE DIMENSIONS				SHEET 1 OF 1		
DRAWN	91.10.25.	I.S.	SPREAD SENSOR ADAPTER				830–108920		A
CHECKED	91.10.25	T.A.L.							
APPROVED	91.10.25.	T.A.L.	ITI				FILE NO.: 618–67		

ISO-TOLERANSER



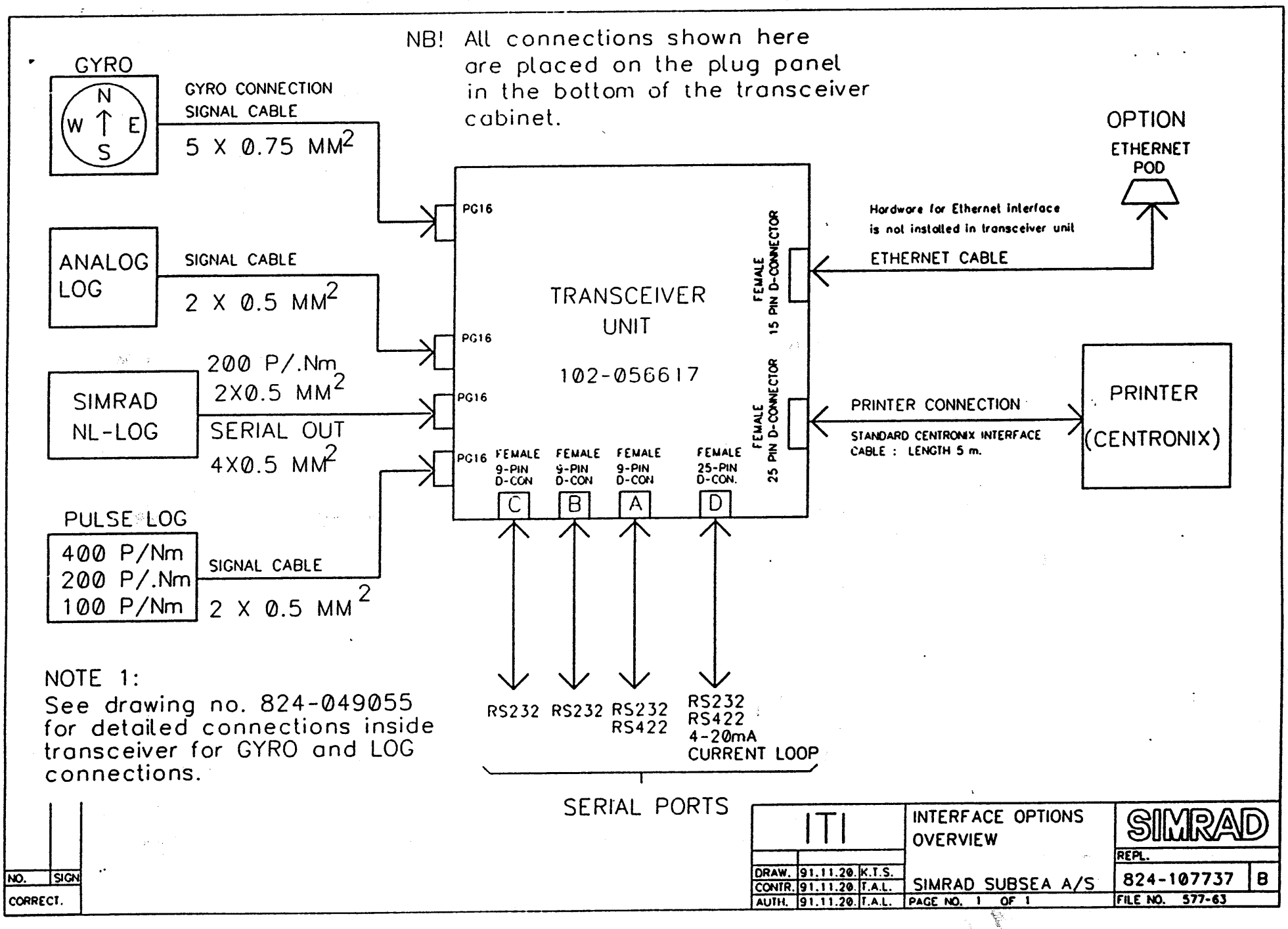
CABLE NO.	CABLE TYPE	CABLE DIAM./REMARKS
1	DATA CABLE	SEE NOTE 1
2,3	RCOP / 250V, 4 x 1.5 mm² w/screen	13.5mm
4,5	RYXC 4 x 1.5 mm² w/screen	12.5mm SEE NOTE 2
6,7	SCREENED CABLE 5 x 1.5mm²	15mm
8,9,10,11	SCREENED CABLE 3 x 0.5mm²	6mm
12	STD. POWER CABLE WITH PLUG	8mm

◎ : DELIVERED BY SIMRAD

○ : DELIVERED BY SHIPYARD

NOTE 1: STD. LENGTH 2m
NOTE 2: STD. LENGTH 20m

B 97.04.17. K.Sk.	PROJ. METODE	TOLERANSER FOR IKKE SPESIELT TOLERANSESATTE MÅL: MIDDELS NS 1430	SIMRAD
NR. SIGN.	MÅLEST.	CABLE PLAN SIMRAD ITI HULL MOUNTED TRANSDUCER INSTALLATION	ERST.
ENDRINGS-MELDING	TEGN. 91.01.08. K.Sk.		824-107874 B
	KONTR. 91.01.09. K.Eg		ARKIV NR. 578-26
	GODKJ. 91.01.09. T.A.L.		



NOTE 1:
See drawing no. 824-049055 for detailed connections inside transceiver for GYRO and LOG connections.

NO.	SIGN
CORRECT.	

DRAW.	91.11.20.	K.T.S.
CONTR.	91.11.20.	T.A.L.
AUTH.	91.11.20.	T.A.L.

ITI

INTERFACE OPTIONS OVERVIEW

SIMRAD SUBSEA A/S

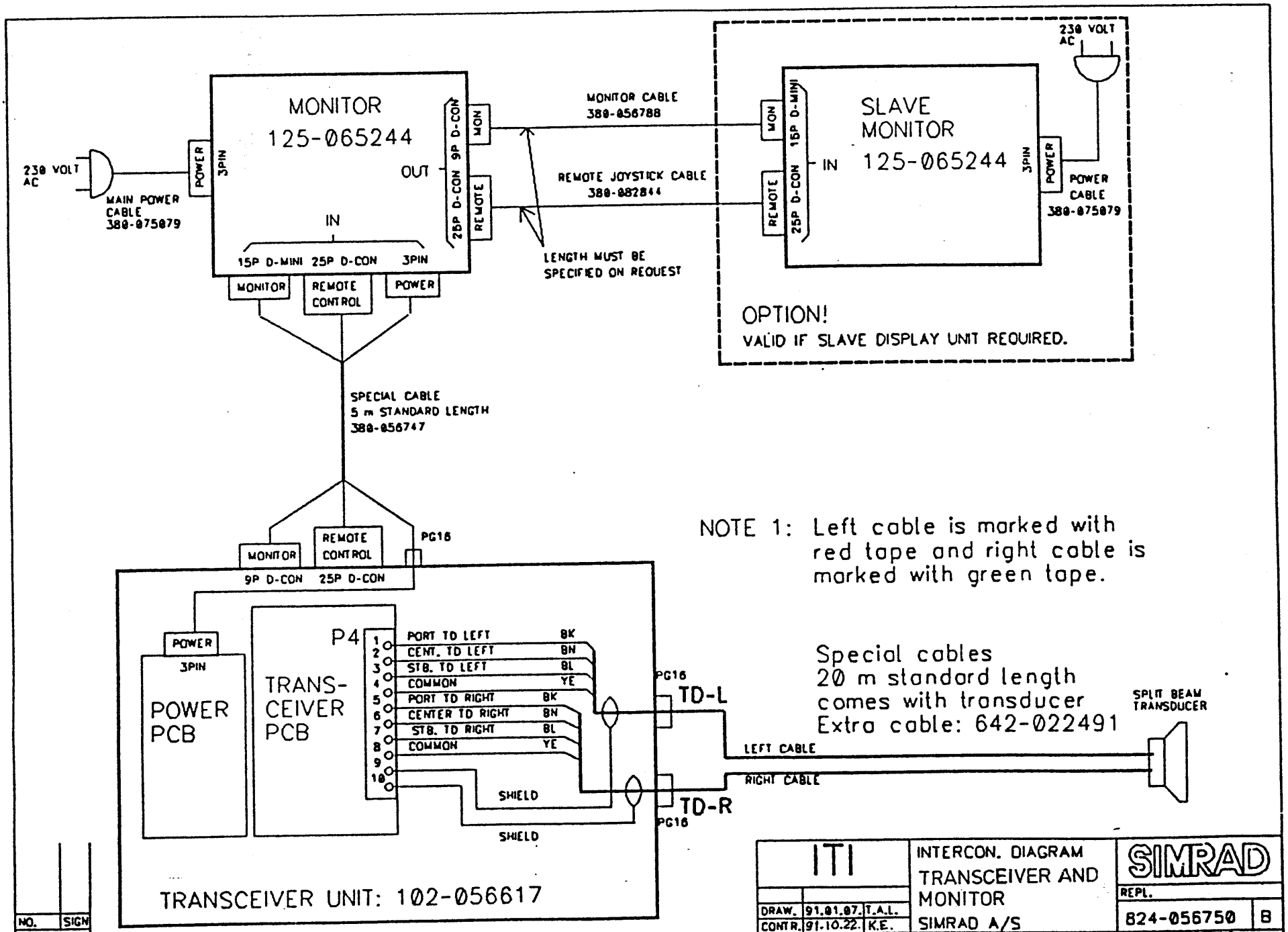
PAGE NO. 1 OF 1

SIMRAD

REPL.

824-107737 B

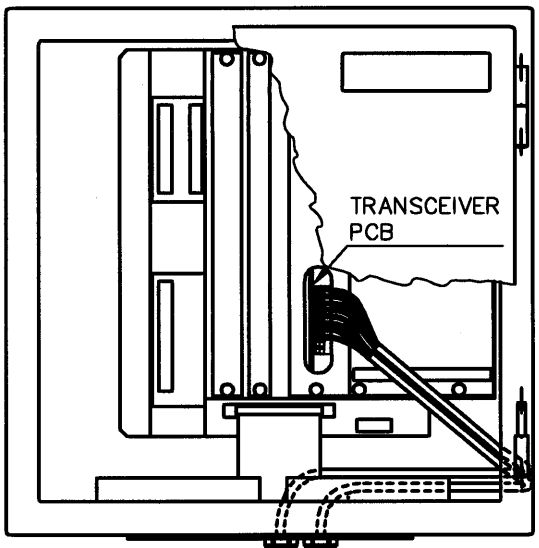
FILE NO. 577-63

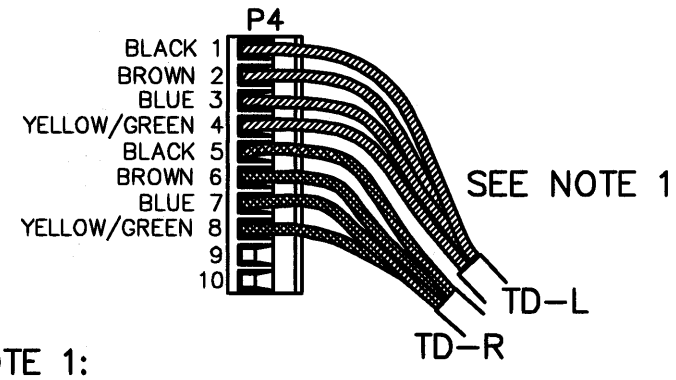


NO.	SIGN
CORRECT.	

ITI			INTERCON. DIAGRAM TRANSCEIVER AND MONITOR SIMRAD A/S	SIMRAD
				REPL.
DRAW.	91.01.07.	T.A.L.		824-056750 B
CONTR.	91.10.22.	K.E.		
AUTH.	91.10.22.	T.A.L.	PAGE NO. 1 OF 1	FILE NO. 652-82

ITI TRANSCEIVER UNIT





NOTE 1:

THE CABLE SCREEN IS TO BE TERMINATED AND CONNNECTED TO THE CABLE GLAND TD–L AND TD–R, ACCORDING TO A PROFESSIONAL CABLE GLAND ASSEMBLY PROCEDURE, SEE FIGURE 1. (BE SURE TO HAVE SUFFICIENT CABLE LENGTH INSIDE THE CABINET).
REMOVE CAREFULLY THE AL/POLYESTER FOIL 10cm FROM END OF CABLE, REMOVE 11mm OF INSULATION FROM ENDS OF WIRES, AND PRESS ON WIRE FERRULES WITH SPECIAL TOOL. THEN CONNECT TO P4 AS SHOWN.

TD–L TD–R

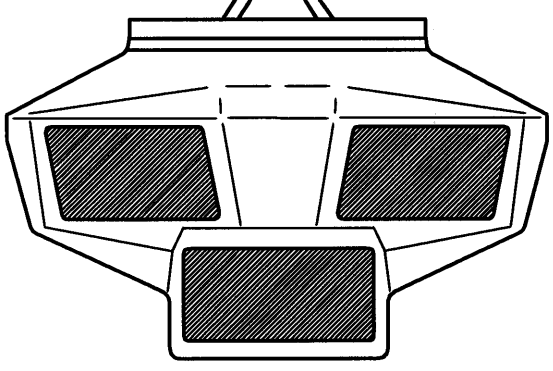
PORT TRANSDUCER CABLE

STARBOARD TRANSDUCER CABLE

20m TRANSDUCER CABLE
DELIVERED AS STANDARD LENGTH.
EXTENTION CABLE:
SIMRAD Reg. No. 642–022491

NOTE 2:

LEFT CABLE IS MARKED WITH RED COLOUR AT THE CABLE END.
RIGTH CABLE IS MARKED WITH GREEN.



TRIPLE SPLITBEAM TRANSDUCER

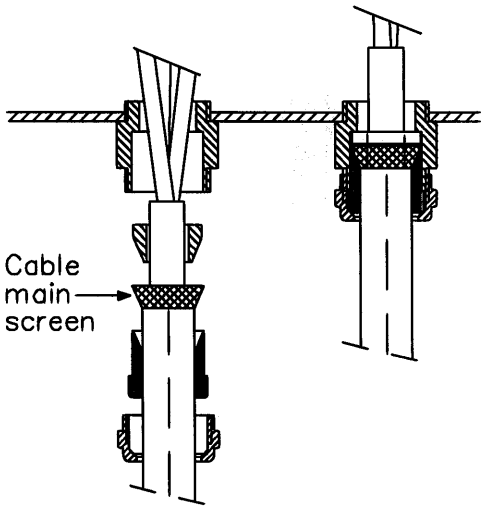
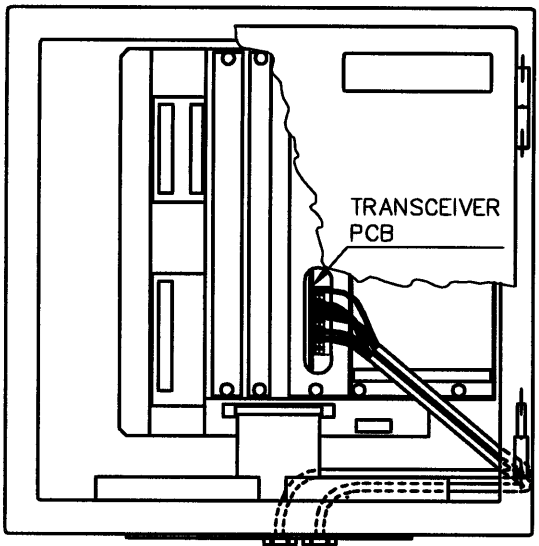
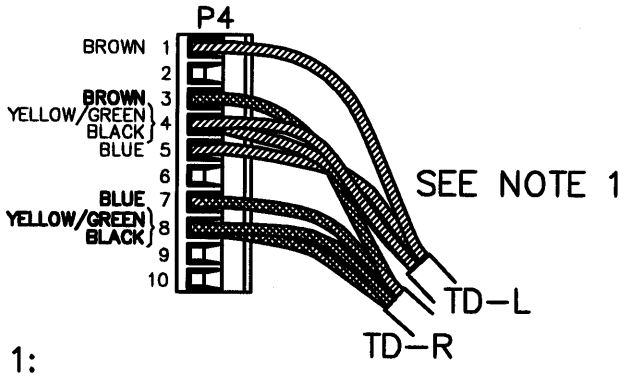


FIGURE 1 Termination of the cable main screen

REV./SIGN.	B K.Sk.	C K.Sk.								
DATE	98.10.15.	99.01.15.								
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: THREAD:				PARTS LIST:	SIMRAD A KONGSBERG Company		
SCALE			CABLE CONNECTION TRIPLE TRANSDUCER ITI				SHEET 1 OF 1	SH.SIZE: A4	REV.:	
DRAWN	92.06.26.	K.Sk.					830–109716		C	
CHECKED	92.06.26.	K.Eg.								
APPROVED	92.06.26.	T.A.L.					FILE NO.: 872–06			

ITI TRANSCEIVER UNIT





NOTE 1:

THE CABLE SCREEN IS TO BE TERMINATED AND CONNNECTED TO THE CABLE GLAND TD–L AND TD–R, ACCORDING TO A PROFESSIONAL CABLE GLAND ASSEMBLY PROCEDURE, SEE FIGURE 1. (BE SURE TO HAVE SUFFICIENT CABLE LENGTH INSIDE THE CABINET).
REMOVE CAREFULLY THE AL/POLYESTER FOIL 10cm FROM END OF CABLE, REMOVE 11mm OF INSULATION FROM ENDS OF WIRES, AND PRESS ON WIRE FERRULES WITH SPECIAL TOOL. THEN CONNECT TO P4 AS SHOWN.

TD–L TD–R

PORT TRANSDUCER CABLE

STARBOARD TRANSDUCER CABLE

20m CABLE W/PLUG MOUNTED DELIVERED AS STANDARD

EXTENTION CABLE:
SIMRAD Reg.No. 642–022491

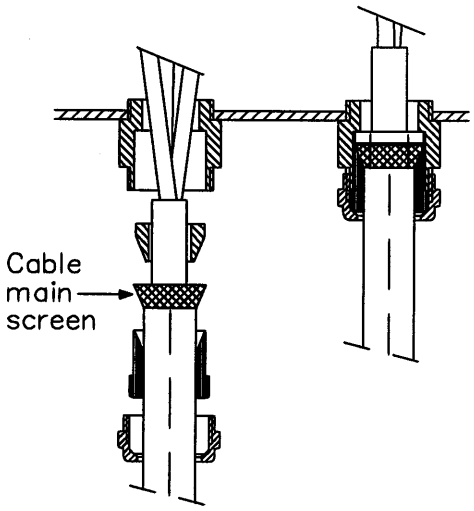
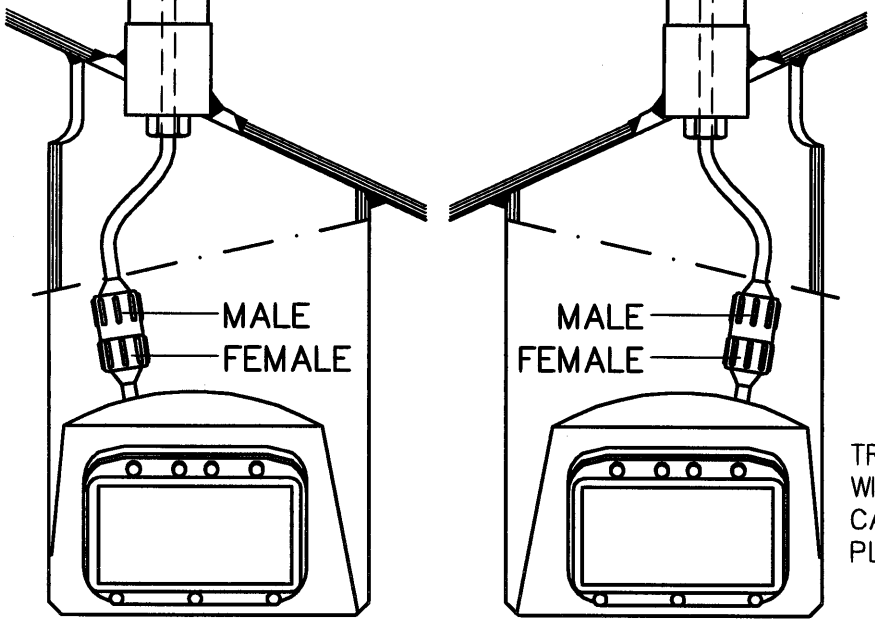


FIGURE 1 Termination of the cable main screen



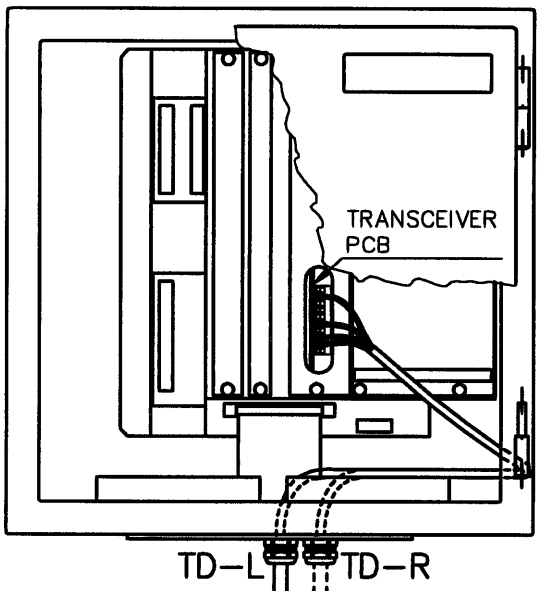
SPLITBEAM TRANSDUCER PORT SIDE

SPLITBEAM TRANSDUCER STARBOARD SIDE

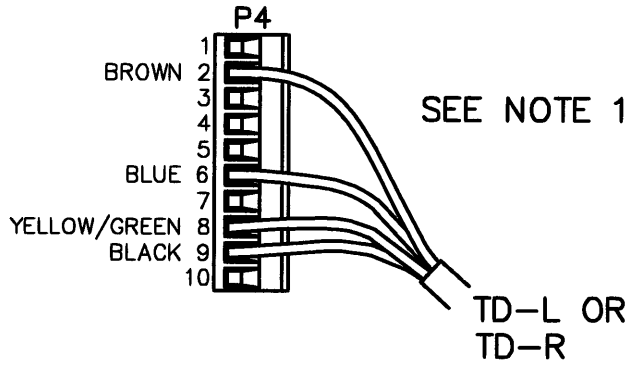
TRANSDUCERS DELIVERED WITH APPR. 400mm CABLE AND FEMALE PLUG MOUNTED.

REV./SIGN.	B K.Sk.	C K.Sk.								
DATE	98.10.15.	99.01.15.								
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: THREAD:				PARTS LIST:	SIMRAD A KONGSBERG Company		
SCALE			CABLE CONNECTION DUAL TRANSDUCER ITI				SHEET 1 OF 1	SH.SIZE: A4	REV.:	
DRAWN	92.06.25.	K.Sk.					830–109715		C	
CHECKED	92.06.25.	K.Eg.								
APPROVED	92.06.25.	T.A.L.					FILE NO.: 872–05			

ITI TRANSCEIVER UNIT



TD–L TD–R

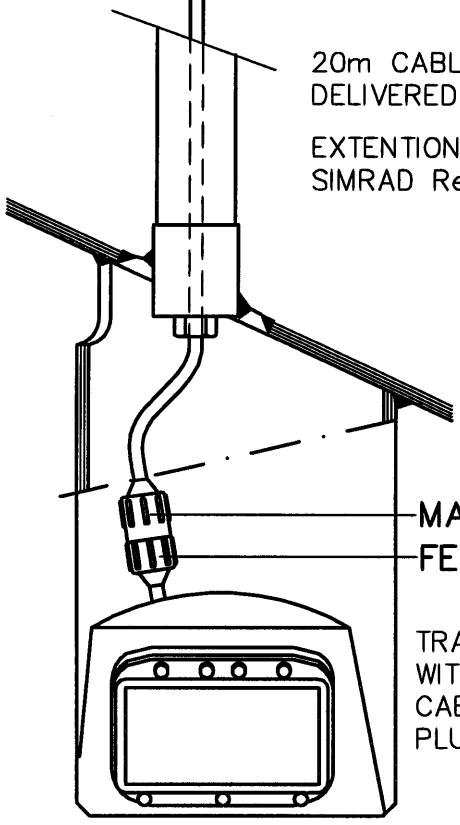


NOTE 1:

THE CABLE SCREEN IS TO BE TERMINATED AND CONNNECTED TO THE CABLE GLAND TD–L OR TD–R, ACCORDING TO A PROFESSIONAL CABLE GLAND ASSEMBLY PROCEDURE, SEE FIGURE 1. (BE SURE TO HAVE SUFFICIENT CABLE LENGTH INSIDE THE CABINET).
REMOVE CAREFULLY THE AL/POLYESTER FOIL 10cm FROM END OF CABLE, REMOVE 11mm OF INSULATION FROM ENDS OF WIRES, AND PRESS ON WIRE FERRULES WITH SPECIAL TOOL. THEN CONNECT TO P4 AS SHOWN.

20m CABLE W/PLUG MOUNTED DELIVERED AS STANDARD.

EXTENTION CABLE:
SIMRAD Reg.No. 642–022491.



TRANSDUCER DELIVERED WITH APPR. 400mm CABLE AND FEMALE PLUG MOUNTED.

SPLITBEAM TRANSDUCER

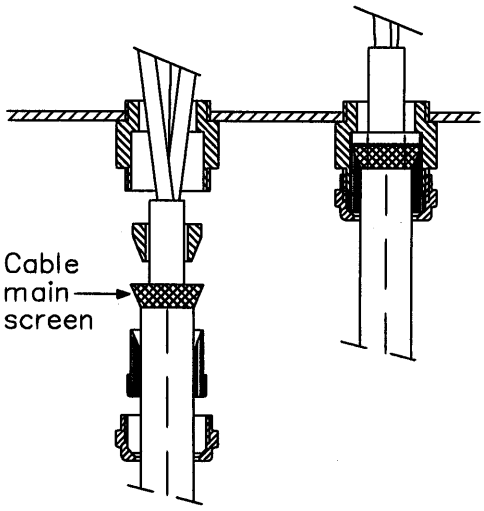
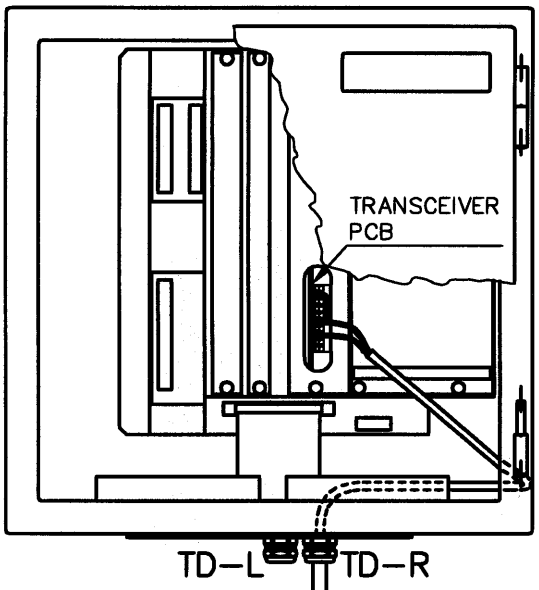


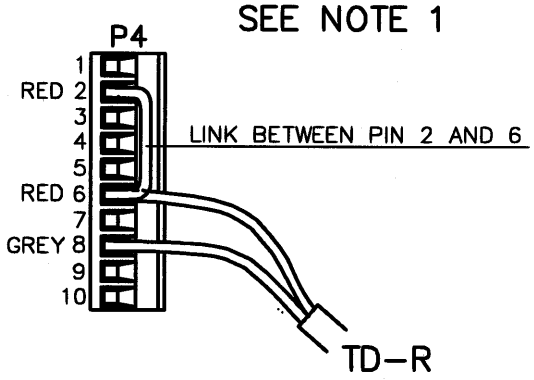
FIGURE 1 Termination of the cable main screen

REV./SIGN.	B K.Sk.	C K.Sk.								
DATE	98.10.15.	99.01.15.								
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: THREAD:				PARTS LIST:	SIMRAD A KONGSBERG Company		
SCALE			CABLE CONNECTION SINGLE TRANSDUCER ITI				SHEET 1 OF 1	SH.SIZE: A4	REV.:	
DRAWN	92.06.26.	K.Sk.					830–109714		C	
CHECKED	92.06.26.	K.Eg.								
APPROVED	92.06.26.	T.A.L.					FILE NO.: 872–04			

ITI TRANSCEIVER UNIT



SEE NOTE 1



NOTE 1:

THE CABLE SCREEN IS TO BE TERMINATED AND CONNNECTED TO THE CABLE GLAND TD–R ACCORDING TO A PROFESSIONAL CABLE GLAND ASSEMBLY PROCEDURE, SEE FIGURE1. (BE SURE TO HAVE SUFFICIENT CABLE LENGTH INSIDE THE CABINET).
REMOVE CAREFULLY THE AL/POLYESTER FOIL 10cm FROM END OF CABLE, REMOVE 11mm OF INSULATION FROM ENDS OF WIRES, AND PRESS ON WIRE FERRULES WITH SPECIAL TOOL. THEN CONNECT TO P4 AS SHOWN.

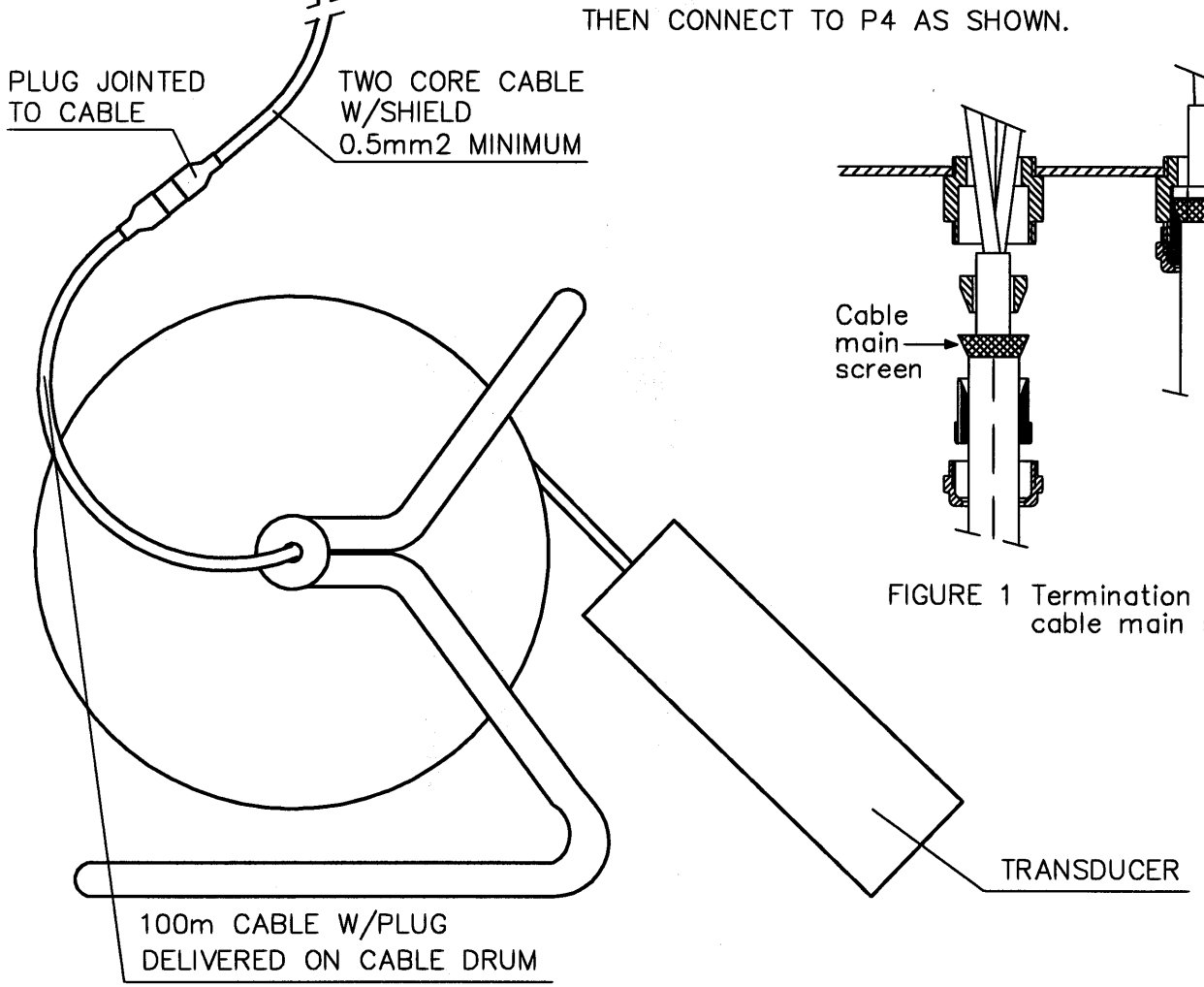
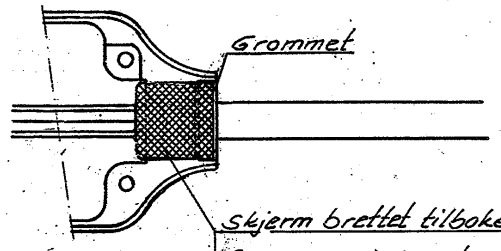


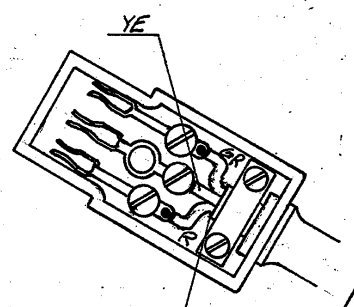
FIGURE 1 Termination of the cable main screen

REV./SIGN.	B K.Sk.	C K.Sk.								
DATE	98.10.15.	99.01.15.								
PROJ. METHOD			UNLESS OTHERWISE STATED, TOLERANCE: DIM.: THREAD:				PARTS LIST:	SIMRAD A KONGSBERG Company		
SCALE			CABLE CONNECTION TOWED TRANSDUCER ITI				SHEET 1 OF 1	SH.SIZE: A4	REV.:	
DRAWN	92.06.25.	K.Sk.					830–109717		C	
CHECKED	92.06.25.	K.Eg.								
APPROVED	92.06.25.	T.A.L.					FILE NO.: 872–07			

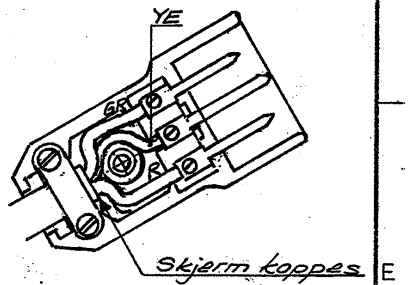


Skjerm brettet tilbake over yttermantel og grommet
Screen folded back over jacket and grommet

NB! Benytt den av de medfølgende grommets som akkurat passer til kabelens diameter.
Use that enclosed grommet who exactly fits the cables diameter.



Skjerm kappes
Screen to be cut



Skjerm kappes
Screen to be cut.

30 cm avstand mellom Panduit-klammerne (pos.7)
30 cm space between the Panduit cable ties (pos.7)

NB! D-connectorene skal koples 1 til 1, 2 til 2 os.v.
Dette gjelder dog ikke for 15-pins connectoren. (pos. 9)

D-connectors to be connected 1 to 1, 2 to 2 and so on.
However, the 15-pin connector is not connected this way.

Kutt ubrukte ledere like lange som de andre, og isoler dem.
Cut unused conductors the same length as the others, and insulate them.

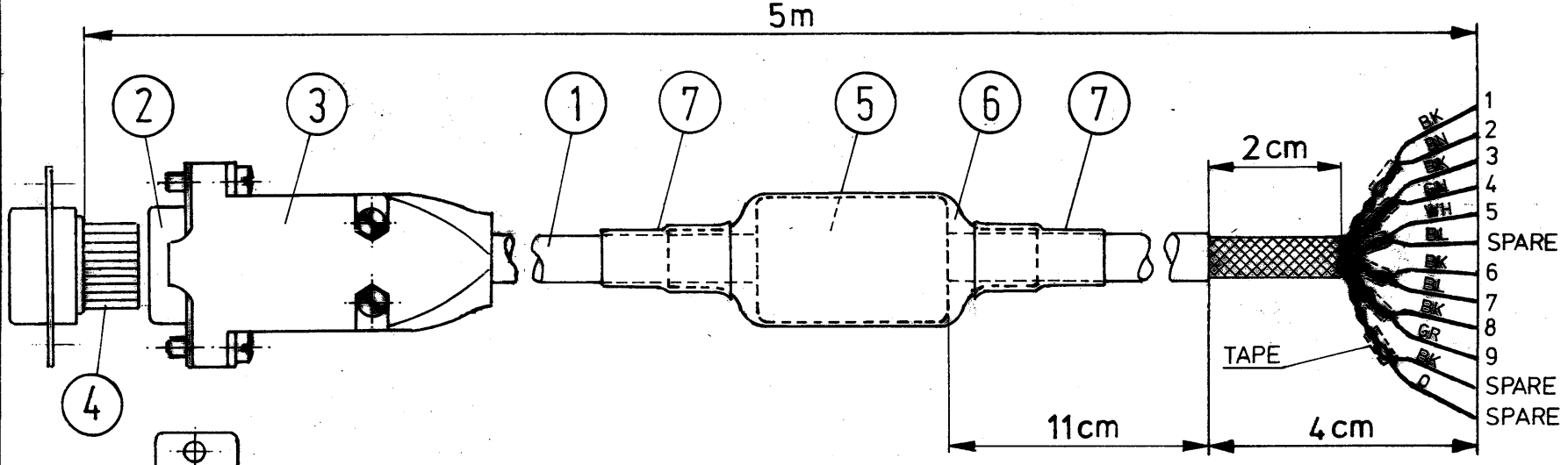
NR.	SIGN.	ENDRINGS-MELDING
10159 96.03.20.	K.G.L.	
10012 95.11.23.	K.G.L.	
9539 94.08.23.	K.G.L.	
8572 92.04.07.	K.G.L.	

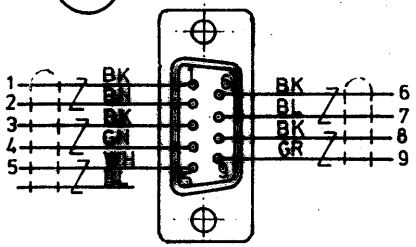
PROJ. METODE		TOLERANSER FOR IKKE SPESIELT TOLERANSESATTE MÅL: MIDDELS NS 1430	SIMRAD
MÅLEST.	1:1		ERST.
TEGN.	91.04.19. K.G.L.	Interface Cable Transceiver-Monitor 5m Mitsubishi Display ITI	380-108340 E
KONTR.	91.04.22. HAS		
GODKJ.	91.04.22. T.A.R.		ARKIV NR. 608-81

ENDRINGS-MELDING	NR	SIGN	
	9539	K.Sk.	10/59
	94.08.23		96.03.20

PROJ. METODE	MALEST		
	TEGN.	92.06.11	
	KONTR.	92.06.15	T.A.L.
	GODKJ.	92.06.15	T.A.L.

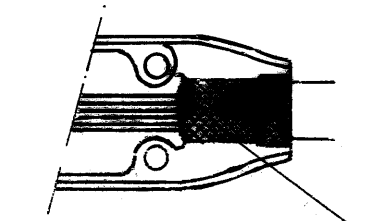
CABLE, MONITOR - TTL VIDEO SIMRAD ITI





CUT UNUSED CONDUCTORS THE SAME LENGTH AS THE OTHERS, AND INSULATE THEM (ALSO CONDUCTORS MARKED "SPARE" ON THE OTHER END OF THE CABLE).

THE TWISTED PAIRS IN THIS END SHOULD BE TAPED TOGETHER IN ORDER TO REMAIN THE TWISTING. (FOR LATER CONNECTION TO A TTL VIDEO CONNECTOR).



TRANSCEIVER 9-PIN D-CONNECTOR	TTL PIN ASSIGNMENT	COLOUR
1	GND	BLACK
2	GND	BROWN
3	R	BLACK
4	G	GREEN
5	B	WHITE
6	INTENSITY	BLACK
7	BLANK	BLUE
8	H. SYNC	BLACK
9	V. SYNC	GREY

SIMRAD

ERST.

380-109679

C

ARKIV NR. 588-85

ENDRINGS-MELDING	NR	SIGN
	9027 93.07.27	
	9539 94.08.23.	
	10159 96.03.20.	

PROJ. METODE

MÅLEST		
TEGN.	92.06.11.	
KONTR.	92.06.15.	
GODKJ.	92.06.15.	

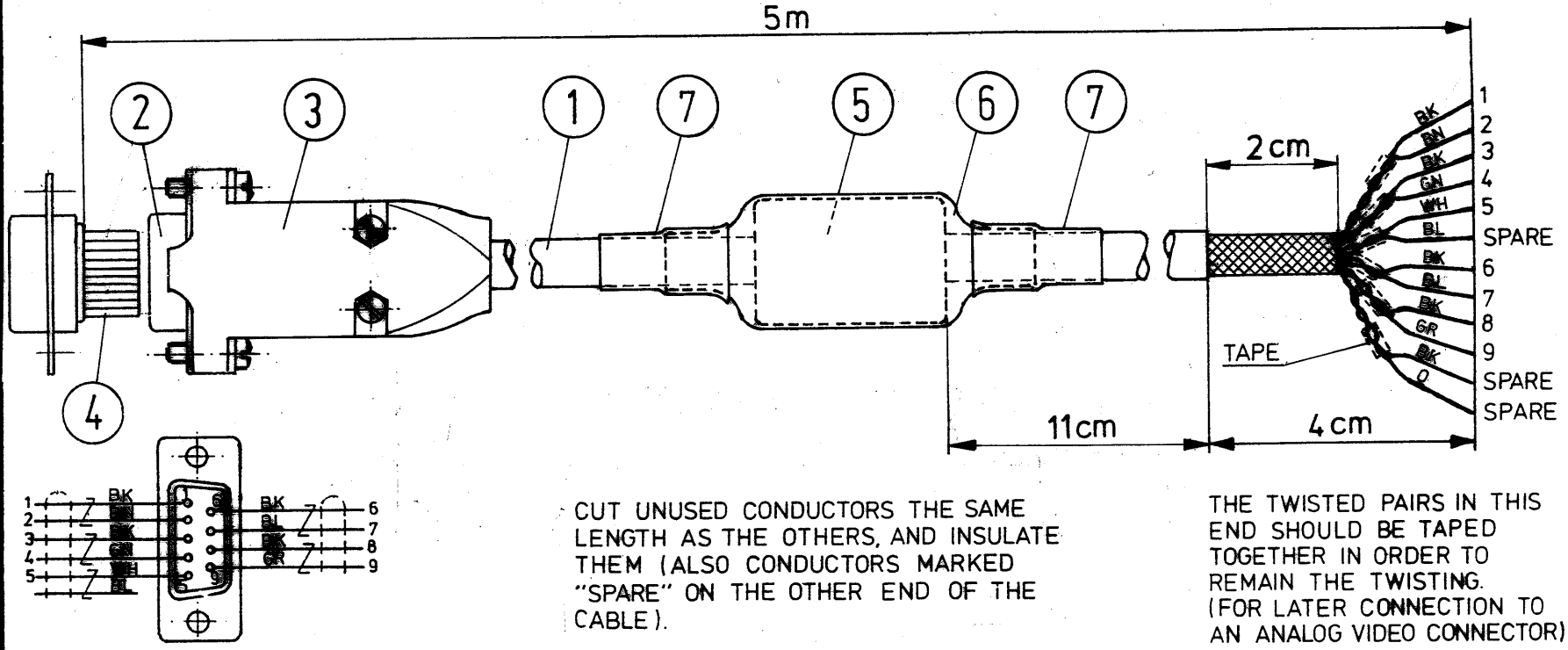
CABLE, MONITOR - ANALOG VIDEO SIMRAD ITI

SIMRAD

ERST.

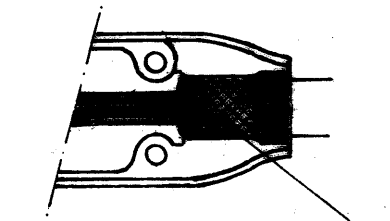
380-109680 D

ARKIV NR. 588-86



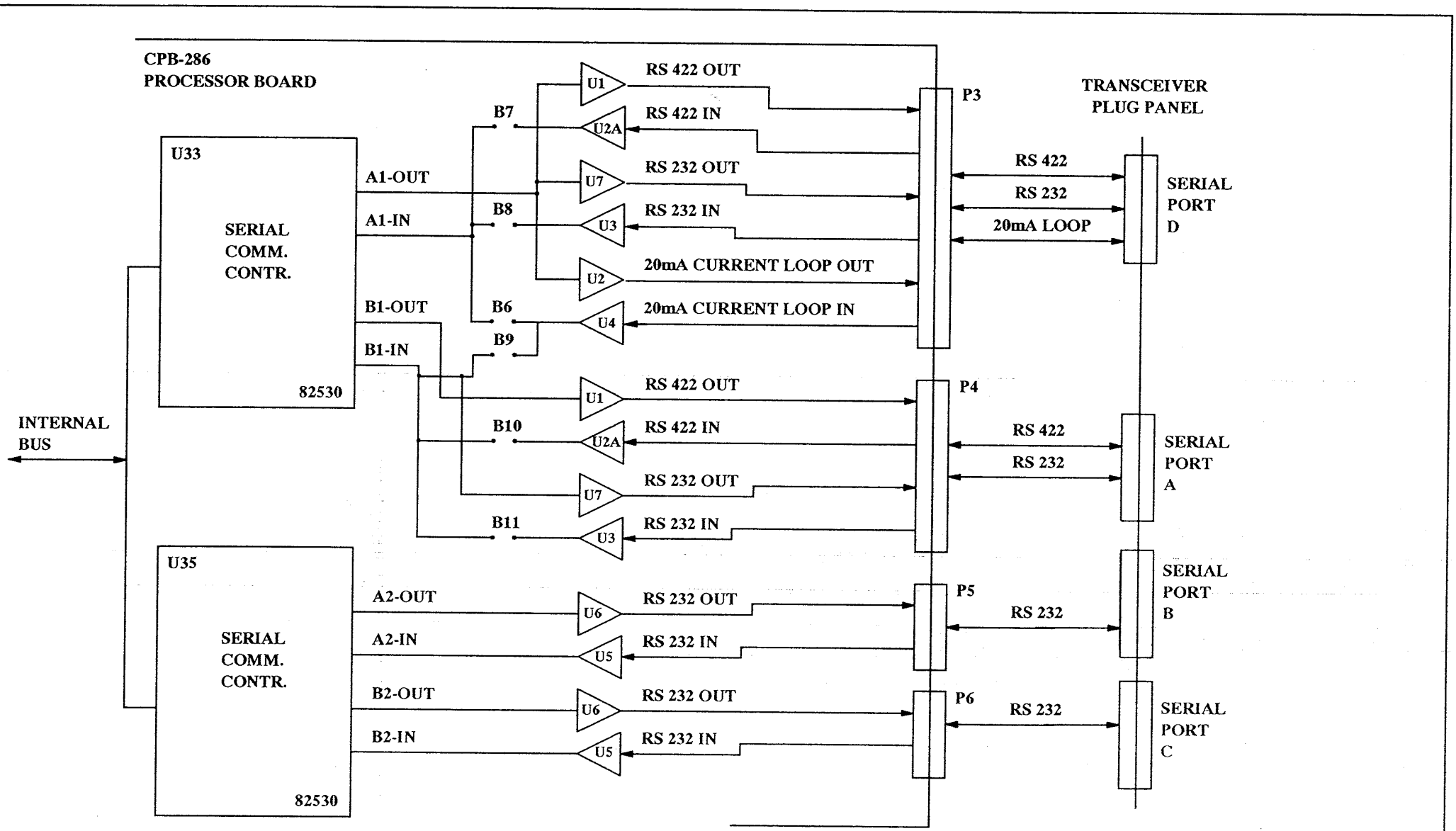
CUT UNUSED CONDUCTORS THE SAME LENGTH AS THE OTHERS, AND INSULATE THEM (ALSO CONDUCTORS MARKED "SPARE" ON THE OTHER END OF THE CABLE).

THE TWISTED PAIRS IN THIS END SHOULD BE TAPED TOGETHER IN ORDER TO REMAIN THE TWISTING. (FOR LATER CONNECTION TO AN ANALOG VIDEO CONNECTOR).



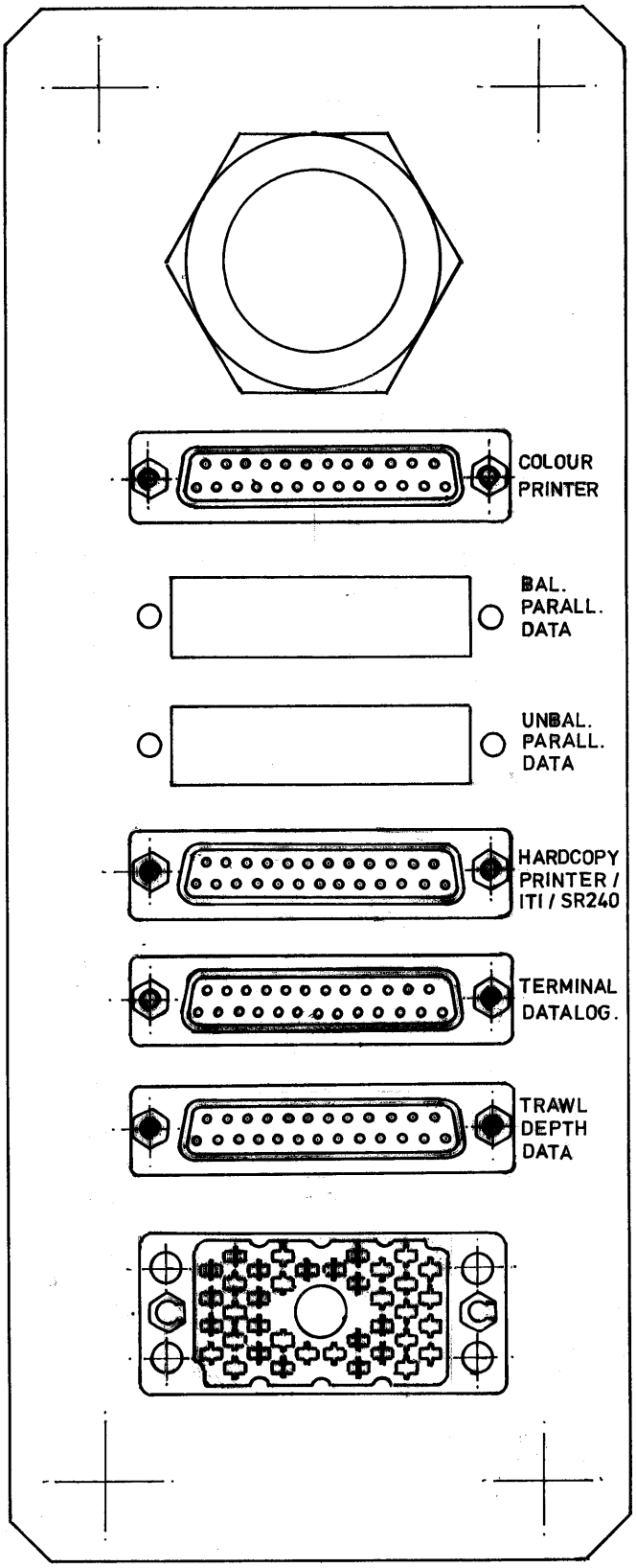
SCREEN FOLDED BACK OVER JACKET AND GROMMET

TRANSCEIVER 9-PIN D-CONNECTOR	ANALOG PIN ASSIGNMENT SYNC. ON GREEN	COLOUR
1	R	BLACK
2	G	BROWN
3	B	BLACK
4	N.C.	GREEN
5	N.C.	WHITE
6	GND	BLACK
7	GND	BLUE
8	H. SYNC	BLACK
9	V. SYNC	GREY



PROJ. METHOD		UNLESS OTHERWISE STATED, TOLERANCE: DIM: THREAD:	SIMRAD	
SCALE		SIMRAD ITI INTERFACE CONNECTION BLOCK DIAGRAM	LOCATION: FL005	
DRAW	91.06.27. KBS		824-108590	A
CHKD	91.06.27. NB			
APPR	91.06.27. NB		FILE NO: 582-52	

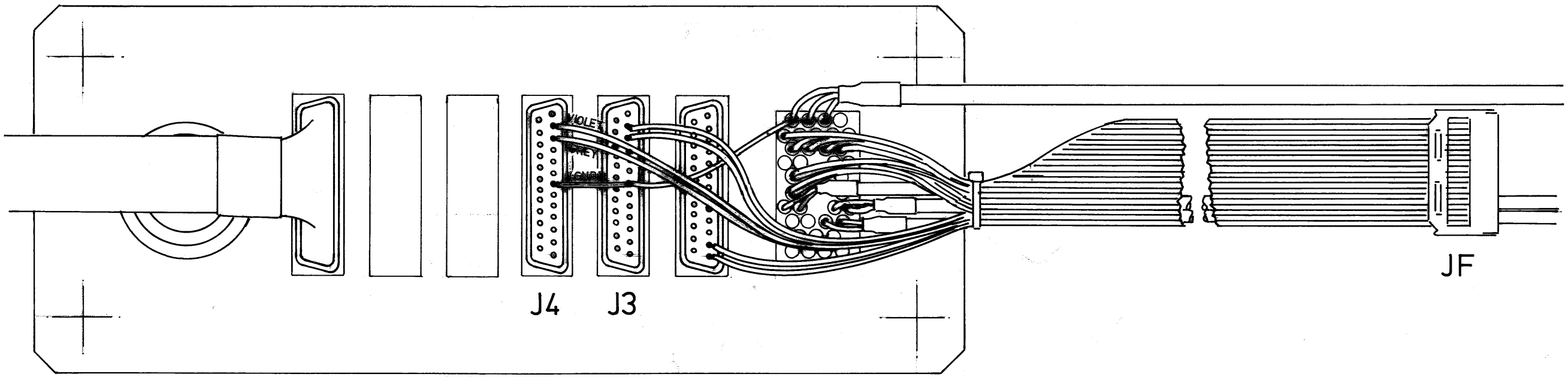
ISO-TOLERANSER



PROJ. METODE		TOLERANSER FOR IKKE SPESIELT TOLERANSESATTE MÅL: MIDDELS NS 1430	SIMRAD
MÅLEST.	1:1	PLUG PANEL ES380 TRANSCEIVER CABINET	ERST.
TEGN.	91.04.10. K.S.E.		830-108308 A
KONTR.	91.04.10. T.A.R.		
GODKJ.	91.04.10. R.G.		ARKIV NR. 580-67

NR.	SIGN.	ENDRINGS-MELDING

ISO-TOLERANSER



NR.	SIGN.
ENDRINGS-MELDING	

PROJ. METODE		TOLERANSER FOR IKKE SPESIELT TOLERANSESATTE MÅL: **MIDDELS NS 1430**
MÅLEST.	1:1	HARDWARE MODIFICATION INSIDE ES380 TRANSCEIVER CABINET FOR SR240 & ITI INTERFACING
TEGN.	91.04.10.	
KONTR.	91.04.10.	V.A.R.
GODKJ.	91.04.10.	K.S.

SIMRAD

ERST. 830-108307 **A**

ARKIV NR. 616-08

/USER/TRONDJ/OP/049055AC.DRW 17 DEC 90 18:21 last update: 17 DEC 90 16:51

CPU

J1

INT.FACE

J3

TRANSCEIVER

J5

POWER

J7

MULTIBUS

IO_BUS

INTERFACEBUS

TO PAGE 2

J2

J4

J6

J8

J9

J10

HV

HVGND

FAN 1

FAN 2

TERM.STRIP MKDS4

CHASSIS

VDD (15VOLT)

VSS (-15VOLT)

GND

PCB OVERVIEW

CPB286 — P1 96 PIN, P2 96 PIN

IDC786 — P1 96 PIN, P2 96 PIN

ITI-Rx/Tx — P1 96 PIN, P2 96 PIN

ITI-POWER — P1 15 PIN, P2 15 PIN

NO.	SIGN
CORRECT.	

ITI		BACKPLANE (ITBP) TRAWL INSTR. ITI-SYSTEM SIMRAD SUBSEA A/S	SIMRAD
DRAW.	89.08.31 KTS		REPL.
CONTR.	90.12.17. EMO		824-049055 C
AUTH.	90.12.17. TAL	PAGE NO. 1 OF 2	FILE NO. 527-30

/USER/TRONDJ/OP/049055BC.DRW 18 DEC 90 09:28 last update: 17 DEC 90 16:53

FROM PAGE 1

IO BUS

INTERFACEBUS

LOG, A/D, & VRU-INT.F.

J11

1 R/P-TRIG
PITCH
ROLL
IO_IN1
IO_IN2
A_D~
A_D
LOG
SUBLOG
13

J13

1 IO_OUT1
IO_OUT2
IO_OUT3
IO_OUT4
IO_IN3
IO_IN4
IO_IN5
IO_IN6
IO_IN7
IO_IN8
13

I/O's

J12

1 NL_CLK~
NL_CLK
NL_DAT~
NL_DAT
REF~
REF
13

SYNCRO & NL-INT.FACE

R4 R3 R2 R1

S3 S2 S1

S7

NOTE1 NOTE2

D1 6X ZPD4.7
D2 D3 D4 D5 D6

4X 0.01UF

C4 C2 C1 C3

REF

ZPD4.7 D7
ZPD4.7 D8

ZPD2.7 D9
ZPD2.7 D10

REF.POINT

S8

1 16
2 15
3 14 S3
4 13 S3~
5 12 S2~
6 11 S2
7 10 S1~
8 9 S1

NOTE1:

MATCH RES. R1,R2.R3 & R4 TO THE VOLTAGE OUTPUT FROM THE GYRO

25 - 50V - 3.9KOHM/2W
110V - 10KOHM/2W
220V - 22KOHM/2W

NOTE2:

THE GYRO INPUT IS WIRED FOR GYROS WITH STEPPER SIGNAL OUTPUT.

FOR GYROS WITH SYNCRO SIGNAL OUTPUT, CUT THE LINK S7 ON THE BACKPLANE.

NOTE3:

THE REFERENCE SHALL ALWAYS BE CONNECTED TO REF~ WETHER IT IS POS. OR NEG.

FOR STEPPER GYROS WITH POSITIVE REFERENCE VOLTAGE, TURN SOCKET S8 SO THAT THE + MARK WILL POINT TOWARDS THE REF. POINT.

FOR GYROS WITH 50/400 Hz SYNCRO SIGNAL THE SOCKET SHALL BE MOUNTED AS SHOWN HERE.

S1 S2 S3 S4 S5 S6 GND

J15

50 12VOLT
RCV
RCV~
TRMT
TRMT~
CLSN
CLSN~
40
ETHERNET
PB3
PB2
PB1
PB0
30
JOYSTICK, BUZZER
5VOLT
20
-12VOLT
12VOLT
BUZ
DIG.B
V.SYNC
DIG.G
H.SYNC
AN.B/DIG.R
BLANK
AN.G
INTENS
AN.R
10
MONITOR INTERFACE
1

J14

26
BUSY
ACKN~
PA7
PA6
PA5
PA4
PA3
PA2
PA1
ERROR~
PA0
STROBE~
CENTRONIX INTERFACE
1

D 98.01.09	KSK
NO.	SIGN
CORRECT.	

ITI

DRAW.	90.08.31.	KTS
CONTR.	90.12.17.	EMO
AUTH.	90.12.17.	TAL

BACKPLANE (ITBP)
TRAWL INSTR.
ITI-SYSTEM
SIMRAD SUBSEA A/S

PAGE NO. 2 OF 2

SIMRAD

REPL.

824-049055 D

FILE NO. 589-91

ISO-TOLERANSER

POWER

J7

U1

U3

TRANC.

J5

U4

U5

U2

U6

INT.FACE

J3

R7

R5

R8

R6

CPB-286

J1

J8

J6

C2

C1

C4

C3

D2

D1

D8

D5

D3

D9

D6

D4

D10

D7

J4

J2

J9

J15

J14

ETHERNET JOYSTICK BUZZER MON. INTERFACE

CENTRONIX INTERFACE

SYNCRO/NL-INT.FACE

J12

S1

S2

S5

S3

S6

S4

S7

REF.POINT

S8

R4

R1

R2

R3

J10

LOG. A/D./VRU-INT.F

J11

CHASSIS

I/O'S

J13

1

2

3

J11P

J13P

J12P

PROJ. METODE		TOLERANSER FOR IKKE SPESIELT TOLERANSESATTE MÅL: MIDDELS NS 1430	[redacted]
MÅLEST.		ASSEMBLY DRAWING BACKPLANE TRAWLINSTR. SIMRAD ITI	ERST. 382-049053
TEGN.	90.11.27 T.J.		
KONTR.	90.11.27		
GODKJ.	90.11.27 KJS		ARKIV NR. 613-79

NR.	SIGN.	ENDRINGS-MELDING

/USER/TRONDJ/OP/056668AB.DRW 18 DEC 90 09:43 last update: 17 DEC 90 17:03

CHASSIS MOUNTED

MAINS S1 1A

S2 1A

230/110 VOLT

AC POWER

115V~

220V~

J1

CHASSIS MOUNTED

TRF6

BK

115V~

BN

R

115V~

O

GN

10V R

VIO

14V WH

WH

14V BK

40V

BN BL

U

R6

S20K300

MKDS4

P2 A32

P2 C32

CHASSIS

P2 A16

P2 C16

TO FAN 1 115V~

P2 A18

P2 C18

P2 A20

P2 C20

TO FAN 2 115V~

P2 A22

P2 C22

TP1

TP2

TP3

TP4

TP5

TP6

TP7

TP8

KBPC604

D1

KBPC604

D2

KBPC604

D3

D4

1N4005

LT1003

IN

OUT

GND

U1

C1

15000UF

C6

4.7MF

5V

P1 A30

P1 C30

P1 A32

P1 C32

GND

P1 A2

P1 C2

LK2

LK1

SENSE

P1 A6

P1 C6

D5

1N4005

LM7812

24V

IN

OUT

COM

U2

C2

2200UF

C7

4.7MF

12V

P1 A8

P1 C8

P1 A10

P1 C10

GND

P1 A4

P1 C4

P1 A14

P1 C14

P1 A26

P1 C26

D6

1N4005

LM7912

-24V

IN

OUT

COM

U3

C3

2200UF

C8

4.7MF

-12V

P1 A20

P1 C20

P1 A22

P1 C22

P2 A2

P2 C2

P2 A4

P2 C4

P2 A6

P2 C6

HV

R4

22

7W

R5

470

7W

F1

0.5A

C4

68UF

C5

1000UF

HV_GND

P2 A8

P2 C8

P2 A10

P2 C10

P2 A12

P2 C12

5V 12V -12V

5V

555-2001

D8

1K

R3

12V

555-2001

D7

10K

R1

10K

R2

-12V

555-2001

D9

FRONT VIEW

7812CT 7912CT

GND

INPUT

INPUT GND OUTPUT

GND INPUT OUTPUT

BOTTOM VIEW

LT1003

INPUT

OUTPUT

CASE IS GND

1 2

C	98.01.09	KSK
NO.		SIGN
CORRECT.		

	ITI	
DRAW.	89.09.01	KTS
CONTR.	90.06.05	EMO
AUTH.	90.06.05	TAL

ITI-POWER
TRAWL INSTR.
ITI_SYSTEM
SIMRAD SUBSEA A/S

PAGE NO. 1 OF 1

SIMRAD

REPL.

824-056668 C

FILE NO. 595-41

Simrad ITI
Installation manual

Simrad ITI
Installation manual

Simrad ITI
Installation manual

Simrad ITI
Installation manual