Technical Manual

UAIS DEBEG 3400

Electronics Unit (Transponder)

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List of Abbreviations

This list also contains abbreviations which are not used in this manual but in additional documentation.

A	
AIS	Universal shipborne **A**utomatic **I**dentification **S**ystem
B	
BIIT	Built-In Integrity Test
C	
COG	Course Over Ground
D	
DCU	Display and Control Unit DEBEG 3401
DSC	Digital Selective Call
E	
ECDIS	Electronic Chart Display and Information System
H	
HDG	Heading
L	
LR	Long Range
M	
MAC	Medium Access Control
MKD	Minimum Keyboard and Display
MMSI	Maritime Mobile Service Identity
P	
PDP	Primary Display Port (Presentation Interface)
PP	Pilot Port (Auxiliary Display Port)
S	
SOG	Speed Over Ground
U	
UAIS	**U**niversal shipborne **A**utomatic **I**dentification **S**ystem
V	
VDL	VHF Data Link
VDM	Serial output message containing VDL information (IEC 61162-1)
VDO	VHF Data-link Own vessel message

1 General

This Technical Manual is the technical reference manual for the following components:

- UAIS DEBEG 3400 Base Unit (Electronics Unit)

The manual contains further information about the antennas (GPS, VHF).

1.1 Software Releases

This manual is valid for all software versions of the UAIS DEBEG 3400. A new software version will be published only if the current version contains any faults.

1.2 General Recommendations for Installation, Maintenance and Repair Work

STN ATLAS Marine Electronics gives advice and recommendations for the arrangement of STN ATLAS Marine Electronics equipment and the installation sites. A prerequisite is that the necessary drawings of the ship should be made available in good time.

This advice and these recommendations are given on the basis of our up-to-date practical experience and to the best of our knowledge. However, they are given without any commitment. As far as is permissible, any liability on the part of STN ATLAS Marine Electronics for resulting damage is expressly ruled out, regardless of whether the damage is of a direct or indirect nature.

Unusual shipbuilding shapes, additions or superstructures as well as environmental influences can impair the functioning of the equipment. We are, of course, willing to help the customer with optimizing solutions subject to suitable commercial arrangements.

The customer is responsible for ensuring that STN ATLAS Marine Electronics equipment is installed properly according to our instructions and in compliance with the regulations issued by the relevant classification society and national authorities.

1.3 Safety Warnings

WARNING
This unit contains electrostatic sensitive devices.
Observe precautions for handling.

The discharge of electrostatic energy into a semiconductor can destroy the semiconductor or change its properties. Before a unit's housing is opened to remove or touch a board, the service equipment, Order No. 586-5011, must be used.

1. The mat must be positioned at the workplace.
2. The potential equalization cable must be connected to the snap fastener and the clamp to a suitable protective earth contact. The cable contains a 1 MΩ resistor which must not be removed.
3. The wrist band must be put on. When the spiral cable is connected to the snap fastener, the discharge line is established.

4. Thoroughly grounded soldering, measurement and test tools must be used. If these tools are supplied with power from the 230 VAC mains, this supply must be protected by a fault current plug, stock No. 593-8099.

Boards and units that contain ESD-endangered semiconductors are marked with the symbol shown above.

All assisting persons who might come into contact with the endangered boards must also use the ESD equipment.

DANGER
It is not permissible to connect the ship's mains to the system before setting-to-work by a qualified technician. The mains must be switched off (e.g. by means of a common isolating switch or a circuit breaker) in the ship's supply or the mains cable must be disconnected until setting-to-work takes place.

If a synchro is connected to the Analog Interface or Interface Expander, dangerous voltages might be present, even although all supplies to the system are switched off.

Capacitors and tubes can store dangerous voltages for several hours, even when they have been disconnected from the supply voltage.

WARNING
Pay attention to the regulations for the prevention of accidents.

DANGER
Even when the system is switched off, there might be a dangerous voltage present on exposed contacts. Therefore, before a unit is opened, it must be ensured that the electrical supply to all units is, and remains, disconnected from the ship's mains.

2 Overview

The DEBEG 3400 is a UAIS Transponder which receives data from other vessels by means of a VHF radio and sends these data to the radar/navigation system.

In the opposite direction, the UAIS receives data from the radar/navigation system and the ship's sensors and transmits these data by means of the VHF radio.

Access to these data and access to the VHF radio for a pilot is prepared by means of an additional pilot port.

The UAIS has a long range port to connect a long distance communication system, for instance a satellite communication system. In this way, the UAIS can be called to send the ship's data. These data are sent back via the long range port to the questioner.

For further details see Section 4.

2.1 Compatibility with Other Systems

The UAIS DEBEG 3400 can be used in the following ATLAS systems:

- UAIS with Display and Control Unit (DCU)
- RADARPILOT/CHARTRADAR ATLAS 1000
- NACOS xx-4
- CHARTPILOT Stand-alone
- NACOS xx-3
- mixed systems consisting of Radar 9xxx and RADARPILOT ATLAS 1000

The UAIS might not work with ATLAS systems/components which are running with older software versions. For further information, see the Technical Manuals of these systems or the Software Release Notes.

It is also possible to use the UAIS DEBEG 3400 within systems from other manufacturers which support the IEC-defined interfaces.

2.2 UAIS with DCU DEBEG 3401

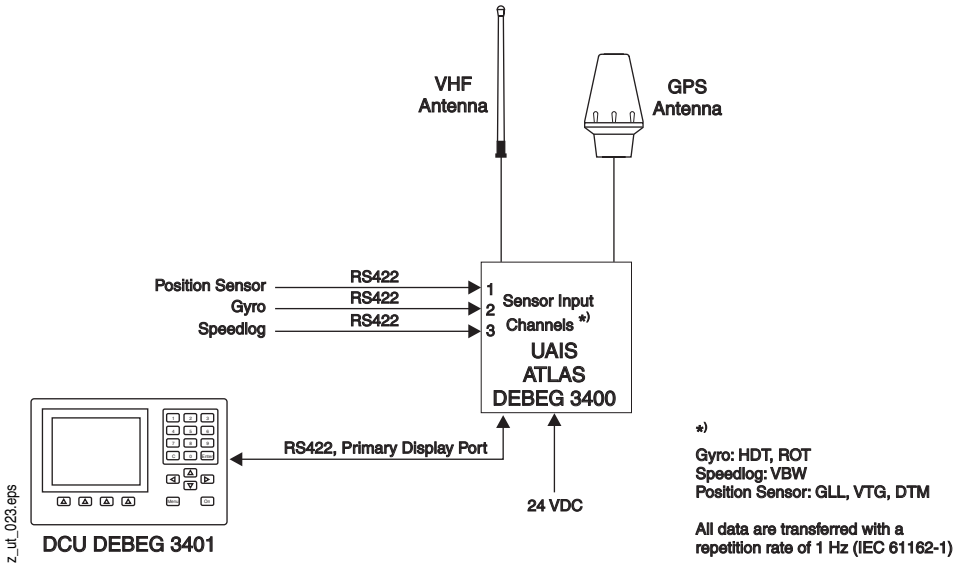

Fig. 2-1 UAIS with DCU DEBEG 3401

The Display and Control Unit DEBEG 3401 can be connected additionally, even if the UAIS is integrated in an ATLAS radar or NACOS system. For this case see Section 2.3, Section 2.4, Section 2.5, Section 2.6 and Section 2.7.

It is also possible to configure and operate the Electronics Unit DEBEG 3400 if it is not integrated in an ATLAS system. In this case, the DCU DEBEG 3401 is needed. For further information refer to the Technical Manual of the Display and Control Unit DEBEG 3401.

2.3 UAIS in RADARPILOT ATLAS 1000 Systems

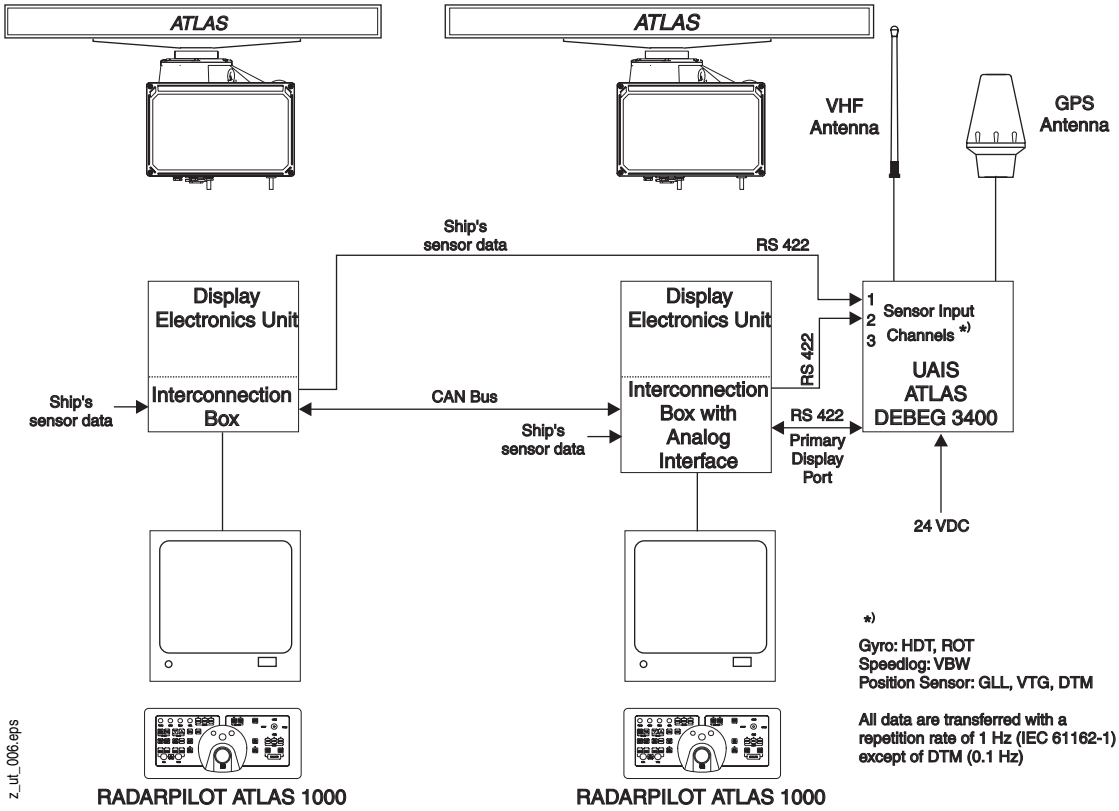

Fig. 2-2 UAIS in RADARPILOT ATLAS 1000 systems

The UAIS DEBEG 3400 is connected to the Interconnection Box of the RADARPILOT ATLAS 1000. The ship's sensors are connected to the radars. The sensor data are transferred from the radar(s) to the UAIS (in dual or multiple installations, from two radars as redundancy, if possible).

The repetition interval of the ship's sensor data is set automatically if the indicator's serial interface is configured as AIS Navigation Data interface.

If a CHARTRADAR ATLAS 1000 is used, a CHARTPILOT ATLAS 9330 is needed as a chartserver. This CHARTPILOT must be connected as shown in Section 2.4.

2.4 UAIS in CHARTRADAR, CHARTPILOT or MULTIPILOT Systems (NACOS xx-4)

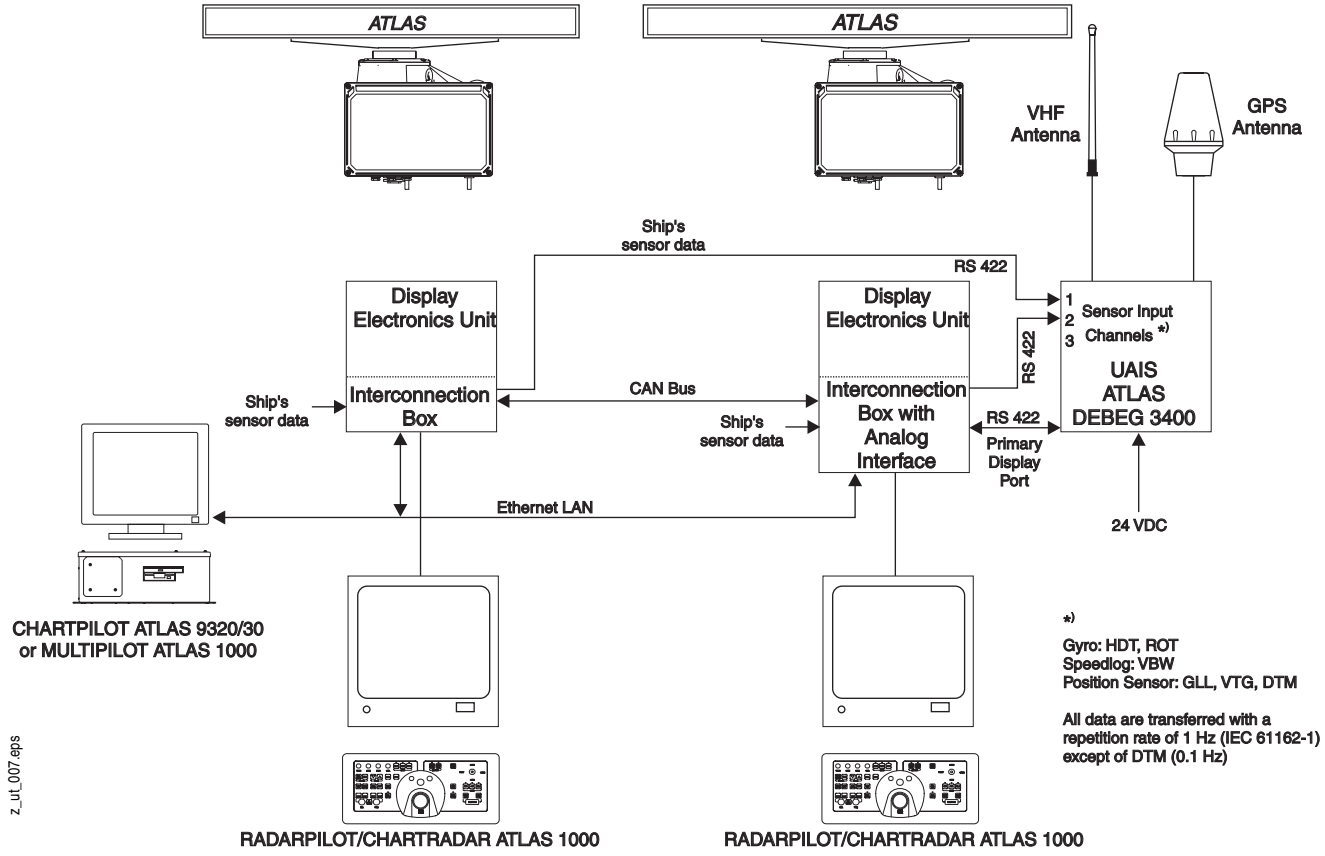

Fig. 2-3 UAIS in CHARTRADAR, CHARTPILOT or MULTIPILOT systems (NACOS xx-4)

The UAIS DEBEG 3400 is connected to the Interconnection Box of the RADARPILOT/CHARTRADAR ATLAS 1000. The ship's sensors are connected to the radars. The sensor data are transferred from the radar(s) to the UAIS (in dual or multiple installations, from two radars as redundancy, if possible).

The repetition interval of the ship's sensor data is set automatically if the indicator's serial interface is configured as AIS Navigation Data interface.

If a CHARTRADAR ATLAS 1000 is used, a CHARTPILOT ATLAS 9320/30 is needed as a chartserver. This CHARTPILOT must be connected via Ethernet LAN as shown in Figure 2-3.

All CHARTPILOT ATLAS systems receive the AIS data from the RADARPILOT ATLAS 1000 via the Ethernet LAN.

2.5 UAIS in CHARTPILOT Stand-alone Systems

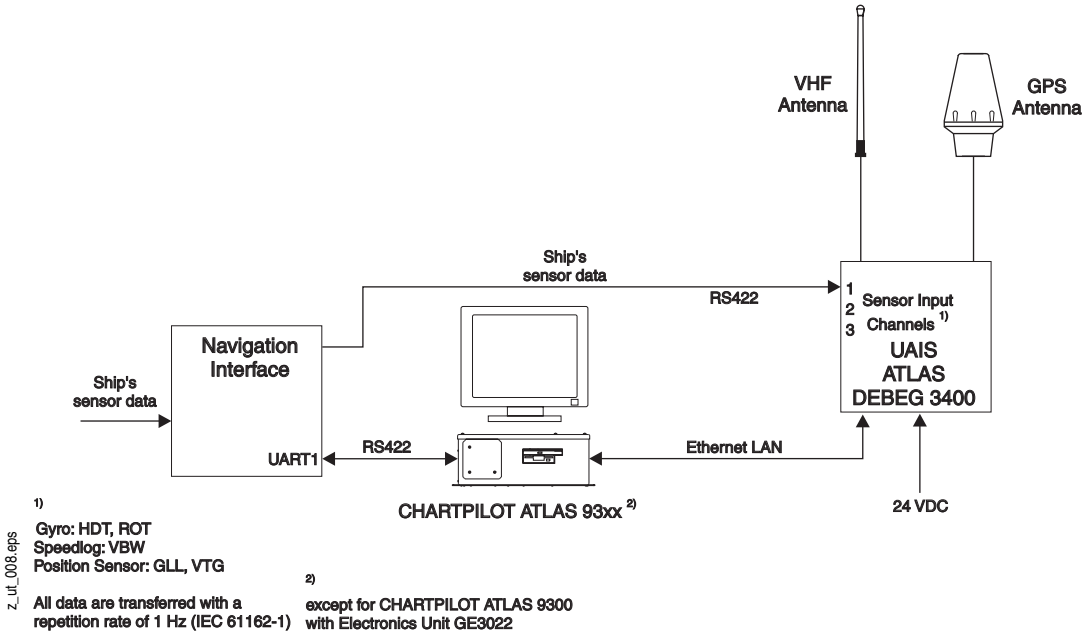

Fig. 2-4 UAIS with CHARTPILOT stand-alone

The UAIS DEBEG 3400 is connected to the CHARTPILOT via Ethernet LAN. The ship's sensors are connected at the Navigation Interface. The sensor data are transferred to the CHARTPILOT via an RS422 interface.

NOTE:
If the UAIS Transponder receives the ship's sensor data from Ship's Interface, the output interfaces of the Ship's Interface must be configured as follows:

- Select "IEC 61162-1 edition 2/2000 (NMEA 2.3)" as driver
- Set a repetition interval of **1 s** for the following telegrams:
  - GLL
  - VTG
  - HDT
  - ROT
  - VBW

2.6 UAIS in NACOS xx-3 Systems

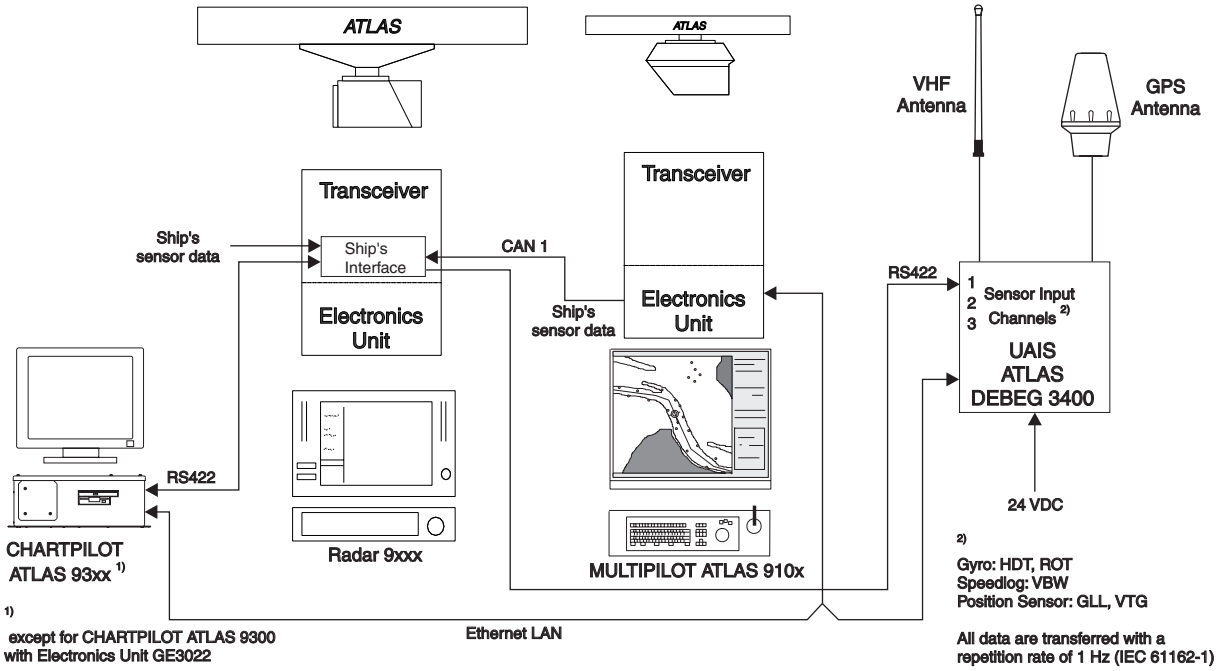

Fig. 2-5 UAIS in NACOS xx-3 systems

The UAIS DEBEG 3400 is connected to the CHARTPILOT via Ethernet LAN.

The ship's sensors are connected to the Ship's Interface. The sensor data are transferred to the UAIS, to the CHARTPILOT and to other radars or MULTIPILOTs. At present, the Radar 9xxx cannot display AIS information.

If two Ship's Interfaces are existing because of redundancy, the ship's sensor output(s) of both Ship's Interfaces must be connected to the Transponder.

NOTE:
If the UAIS Transponder receives the ship's sensor data from Ship's Interface, the output interfaces of the Ship's Interface must be configured as follows:

- Select "IEC 61162-1 edition 2/2000 (NMEA 2.3)" as driver
- Set a repetition interval of **1 s** for the following telegrams:
  - GLL
  - VTG
  - HDT
  - ROT
  - VBW

2.7 UAIS in Radar 9xxx Systems with RADARPILOT ATLAS 1000

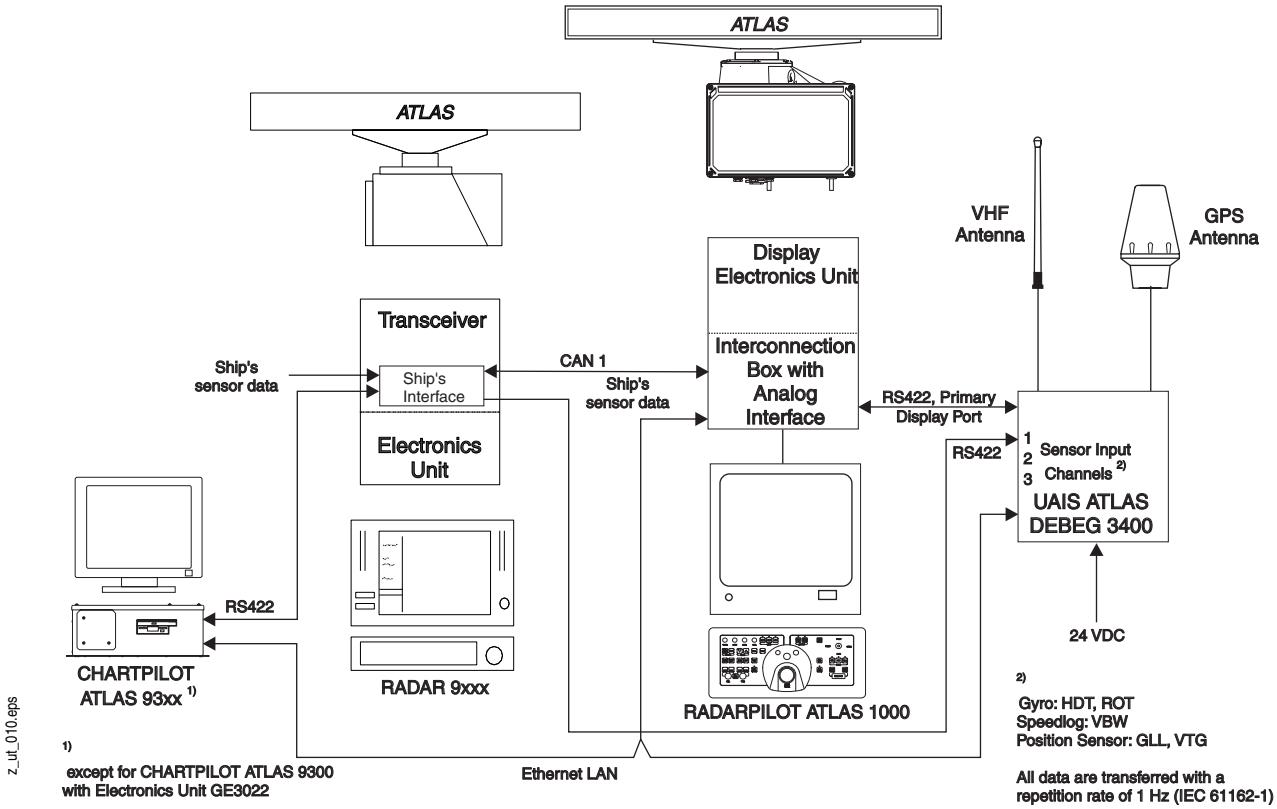

Fig. 2-6 UAIS in Radar 9xxx systems with RADARPILOT ATLAS 1000

The UAIS DEBEG 3400 is connected to the CHARTPILOT via Ethernet LAN and to the Analog Interface of the RADARPILOT ATLAS 1000.

The ship's sensors are connected to the Ship's Interface. The sensor data are transferred to the UAIS, to the CHARTPILOT and to a MULTIPILOT. At present, the Radar 9xxx can not display AIS information.

NOTE:
If the UAIS Transponder receives the ship's sensor data from Ship's Interface, the output interfaces of the Ship's Interface must be configured as follows:

- Select "IEC 61162-1 edition 2/2000 (NMEA 2.3)" as driver
- Set a repetition interval of **1 s** for the following telegrams:
  - GLL
  - VTG
  - HDT
  - ROT
  - VBW

2.8 DEBEG 3400 Electronics Unit

z_ut_012.tif

Fig. 2-7 UAIS DEBEG 3400 Electronics Unit

The aluminum housing contains a single Electronics Unit which consists of the controller, the interfaces, the VHF transmitter/receiver and the GPS receiver. The housing has five cable glands for ship's cables and three coaxial connectors for the connection of Ethernet LAN, GPS and VHF antennas.

3 Installation Recommendations

3.1 General Recommendations

3.1.1 Cables

Cable types, cable data, maximum cable length, special instructions for cable laying and connection details are defined in the **Cabling Documents** of the corresponding equipment (consisting of schematic diagram, remarks, cable list and connection diagram).

Interface connections should be discussed and agreed with STN ATLAS Marine Electronics

In order to ensure proper functioning of the equipment, the cable types should be selected according to the cable lists.

In general, the following points must be taken into account:

- Cables for navigational equipment should never run through the **radio room**.
- For the **cables inside the units** (cabinets), an extra length of 1 metre is necessary at each end. If the height of the unit exceeds 0.5 metre, an extension by 1 m plus the height of the cabinet is necessary.
- The **cables must be marked** by the electrician at both ends with the cable numbers corresponding to the STN ATLAS Marine Electronics Cabling Documents.
- Where necessary, **particular cable glands** - marked with letters and/or numbers - are assigned to the cables.
  The identification letters and numbers are stated in the connection diagrams; they are either fixed to the unit or can be seen from the outline drawings (...BZ or ...MB).
- All cables should be kept as short as possible, especially coaxial cables to minimize attenuation of the signal.
- All connectors installed uotdoors (e.g. on coaxial cables) should be waterproof by design to protect against water penetration into the cable.
- Coaxial cables should be installed in separate signal cable channels/tubes and at least 10 cm away from power supply cables. Crossing of cables should be done at right angles (90°). Coaxial cables should not have any to sharp bends, which may lead to a change in the characteristic impedance of the cable. The minimum bend radius should be 5 times the cable's outside diameter.
- It must be ensured that all **cables - including their screens - are passed into the units in continuous lengths** and are not terminated before reaching the destination equipment.
- With **multicore cables**, it is useful to strip down and lace the single wires according to the terminal sequence.
- Existing **cable grippers** in the units must be used.
- All cable connections must be carefully **checked** after completion of the cable work and all cable **screens must be grounded via the shortest possible connections** - if not stated otherwise in the Cabling Documents/Connection Diagram.
- All **cables must be secured** by means of suitable clamps (pull-relief) before entering the units.
- It must be ensured that cables do not block any **moving parts** within a unit.
- **Power leads** must be protected by "slow-blow" fuses according to their cross section.

3.1.1.1 Maximum Cable Length

Coaxial Antenna Cable for the VHF Antenna

The maximum length of this cable (LCF 12-50) is 80 m. See Section 9, Cabling Documents.

Coaxial Cable for the GPS Antenna

The length of this cable is defined by the cable sets. Prefabricated cables with a length of 20, 30, or 40 m can be delivered.

If a length of more than 40 m is needed, the cable LCF 12-50 of the VHF antenna must be used in combination with TNC-N plug adapters. See Section 9, Cabling Documents.

Ethernet LAN

The Ethernet LAN thin wire cabling (RG-213/U ship's cable or RG58) must not exceed a length of 185 m.

3.1.1.2 Cable Sets

The following cable sets are available:

Purpose/Description	Quantity/m	Order No.
LAN network, cable RG 213/U, 2 BNC connectors	on request	300005394
Connection of the GPS antenna, cable HF2,3LZ/7,3DZ with 2 plugs 11TNC-50-7-2C	20	271256324
Connection of the GPS antenna, cable 02Y(ST)C2Y2.7/7.3AF with 2 TNC plugs	30	300005391
Connection of the GPS antenna, cable 02Y(ST)C2Y2.7/7.3AF with 2 TNC plugs	40	300005392
For the connection of the GPS antenna with cable length >40 m, cable of type Cellflex LCF 12-50 50 Ω must be used.	on request	271257679
Connection of the VHF antenna, cable HF2,3LZ/7,3DZ with 2 plugs 11TNC-50-7-2C	20	271256324
Connection of the VHF antenna, cable 02Y(ST)C2Y2.7/7.3AF with 2 TNC plugs	30	300005391
Connection of the VHF antenna, cable 02Y(ST)C2Y2.7/7.3AF with 2 TNC plugs	40	300005392
For the connection of the VHF antenna with cable length >40 m, cable of type Cellflex LCF 12-50 50 Ω must be used.	on request	271257679

3.1.2 Electronics Units

Dimensions, weights, spaces required for service and maintenance and special installation instructions are stated in the outline drawings and installation drawings of the corresponding unit. In general, the following points also apply:

- The useful life of the components of all Electronics Units (Display Units, Pulse Generators, Transceivers etc.) generally decreases with increasing **ambient temperature**; it is therefore advisable to install such units in air-conditioned rooms. If there are no such facilities - e.g. deckhouse or space near or below the water line - these rooms must at least be dry, adequately ventilated and kept at a suitable temperature in order to prevent the formation of condensation inside these units.
- With most Electronics Units, **cooling** takes place via the surface of the casing.

  The cooling must not be impaired by partial covering of the unit as a result of insulation (if any) of the room (the wall on which the casing is mounted), or by installation of the unit in a confined cabinet.

  Furthermore, the distance from the ceiling and the floor or from a unit situated underneath must be at least 300 mm.
- For service purposes, a **power socket** (AC 220/230 V) and adequate lighting are necessary in the vicinity of each Electronics Unit.
- In the area of the wheel house, the **distance of each Electronics Unit from the magnetic standard compass or the magnetic steering compass** must not be less than the permitted magnetic protection distance.

  This distance is measured from the centre of the magnetic system of the compass to the nearest point on the corresponding unit concerned.
- Units which are to be used on the **bridge wing** must be installed inside the "wing control console" - protected against the weather - if they do not at least correspond to the enclosure type IP 56. In order to avoid misting of the viewing screen, 25 ... 50 W console-heating (power depending on the volume) is recommended.
- When selecting the site of a unit, the **maximum cable lengths** have to be considered according to the notes in the cabling documents (remarks, cable list).
- The **accessibility for maintenance and service** (stated in the outline drawings or installation drawings) must be considered.
- The impairment of a digital read-out or a display screen by **direct light from lamps or the sun** must be avoided. Rear windows must be blacked out by means of roller blinds or Venetian blinds.
- **Disturbing reflections** on the screen of a display caused by pilot lamps and illuminated signs must be prevented by suitable measures (screening or relocating).
- When a unit is being installed, **the base, floor or bulkhead must be checked to ensure that it is flat** in order to avoid twisting of the unit when the fixing screws are tightened, because such twisting would impair mechanical functions. Any unevenness should be compensated for by means of spacing-washers.
- The **grounding screws** of the units must be connected to the body of the ship (ground); the wire used should have a cross sectional area of at least 6 mm.

  Aboard fibreglass (GRP) vessels, a "grounding network" with a high conductance - taking into consideration the working frequencies of the other equipment - must be provided in order to achieve satisfactory EMC (electromagnetic compatibility).

- In the interests of safety during maintaining or servicing, the shipyard should provide a **common isolating switch or circuit breaker** (in conjunction with a contactor, if necessary) for all interconnected equipment.
- **Transportation damage**, even if apparently insignificant at first glance, must immediately be examined and be reported to the freight carrier. The moment of setting-to-work of the equipment is too late, not only for reporting the damage but also for the supply of replacements.
- **The equipment should never be switched on by the electricians who did the installation work - not even just for a moment - never!**

  This is a job for the authorised STN ATLAS Marine Electronics service engineer.
- **After hand-over** of the equipment in good operating condition to the customer, the Installation Report (Annex of the Warranty Certificate) should be filled in completely and then forwarded to STN ATLAS Marine Electronics, Hamburg, as proof of such fulfilment. It is important that these requirements be fulfilled in order to avoid the risk of losing the warranty.

3.1.3 Antennas

See Section 3.2.

3.2 Specific Recommendations

3.2.1 Recommendations Concerning AIS Systems

Recommendations for the installation of AIS systems are published in the IMO document NAV 48/WP.1. See this document for further information. The following sections also contain information which has been taken from IMO NAV 48/WP.1.

3.2.2 Recommendations Concerning the Installation of the Electronics Unit

The Electronics Unit should be mounted on a vertical bulkhead. A distance of at least 300 mm from other devices must be ensured above and below the housing for sufficient air circulation.

3.2.3 Recommendations Concerning the Installation of the VHF Antenna

The digital signals of the AIS may occur as a periodic clicking sound on a ship's radiotelephone. This effect may become stronger when the VHF antenna of the AIS is located near the VHF radiotelephone antenna and when the radiotelephone is operating on channels near the AIS operating channels (for example channels 27, 28, 86).

The antenna should be placed in an elevated position that is as unobstructed as possible, with a minimum of 2 m in the horizontal direction from any structures made of conductive materials. The antenna should not be installed close to any large vertical obstruction. The objective for the VHF antenna is that it should "see" the horizon freely through 360°.

The VHF antenna should be installed safely away from interfering high-power energy sources such as the radar scanner and other transmitting radio antennas, preferably at least 3 m away from and out of the transmitting beam.

Ideally there should not be more than one antenna on the same level. The AIS VHF antenna should be mounted directly above or below the ship's primary VHF radiotelephone antenna, with no horizontal separation and with a minimum of 2 m vertical separation. If it is located on the same level as other antennas, the distance apart should be at least 10 m.

For further information, see Figure 10-4 on page 69.

3.2.4 Recommendations Concerning the Installation of the GPS Antenna

The GPS antenna should be installed where it has a clear "view" of the sky. The objective is that it should "see" the horizon freely through 360° with a vertical observation sector of 5...90° above the horizon. Small diameter obstructions, such as masts and booms, do not seriously degrade signal reception, but such objects should not eclipse more than a few degrees of any given bearing.

Locate the antenna at least 3 m away from and out of the transmitting beam of high-power transmitters (S-Band radar and/or Inmarsat systems). This includes the ship's own AIS VHF antenna.

3.2.5 Recommendations Concerning Redundancy

If possible, the Electronics Unit should be supplied with the ship's sensor data from two different sources, e.g. in a dual installation with RADARPILOT ATLAS 1000 the UAIS can be supplied with sensor data from both radars.

NACOS xx-3 only:
If two Ship's Interfaces are existing because of redundancy, the ship's sensor output(s) of both Ship's Interfaces must be connected to the Transponder.

3.2.6 Emergency Power Source

It is recommended that an emergency power source such as a uninterruptible power supply should be used. See Section 7 for information about the power consumption of the Electronics Unit.

4 Functional Description

The UAIS system consists of the following components:

- DEBEG 3400 UAIS Transponder
- GPS antenna 1330FB
- VHF antenna CXL 2-1
- optional Display and Control Unit DEBEG 3401

The functionality is described in Section 4.1 by means of the block diagram (Figure 4-3).

4.1 Block Diagram

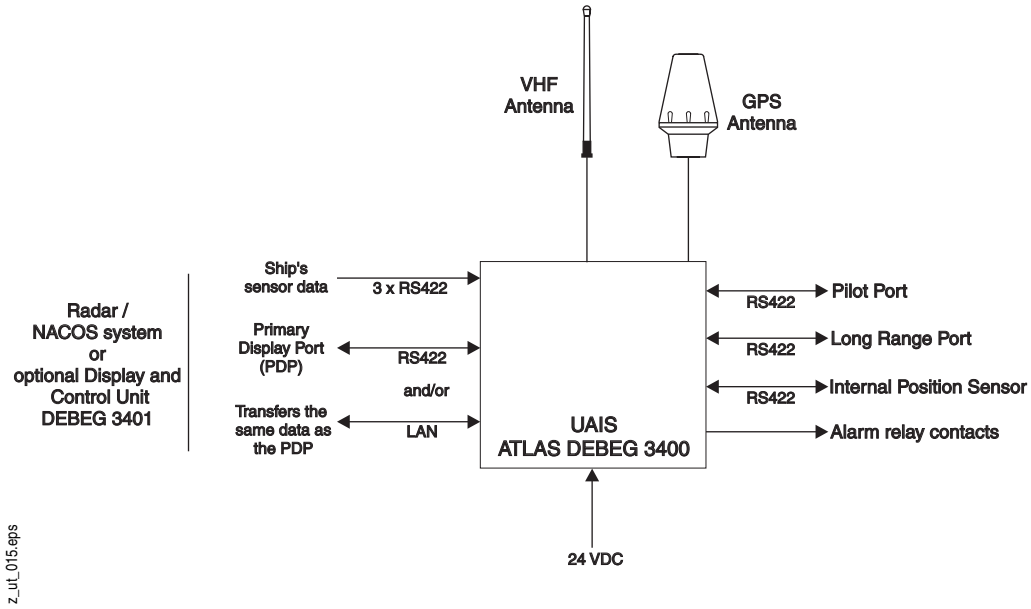

Fig. 4-1 Block diagram of the UAIS System

The UAIS Transponder contains a VHF radio, a GPS receiver and a Mainboard with the interfaces. The UAIS has three inputs for the essential ship's sensor data such as position, speed and heading. These data are supplied by means of the navigation system such, as a RADARPILOT ATLAS 1000. The UAIS communicates with the navigation system via the primary display port and/or the Ethernet LAN. In this way the UAIS is supplied with additional data such as the ship's data, administration data and configuration data.

The ship's data, the ship's sensor data and the position data (from external or internal GPS receiver) are transmitted via VHF.

In the opposite direction, the corresponding data of other ships equipped with AIS systems are received by means of the VHF receiver. These data are processed and sent to the navigation system via the primary display port or the Ethernet LAN.

The functions of the pilot port correspond to the functions of the primary display port, but the pilot port must be made accessible for pilots on the ship's bridge. It must not be used for other purposes.

The DSC Receiver receives messages from external stations such as VTS. By means of the DSC messages, specific settings such as a change of the VHF channels can be controlled.

The VHF transmitter/receiver has a limited range. By means of the connection of a long range communication system (such as a satellite communication system) to the long range port, this limitation can be eliminated. In this way, the UAIS can be called to send the ship's data. The requested data are sent via the long range port and the long range communication system to the questioner. The operator can decide whether a long range request is answered or not. For further information, see the operating instructions of the Display and Control Unit or the navigation system.

4.2 Termination

The wiring must be done in accordance with Figure 4-2 with 50 Ω coaxial cable (for example inside the enclosures, RG 58, for ship's cabling RG 213 / U, see cabling diagrams). The network is a 10 Mbit network.

The BNC-T plugs must be connected directly into the Ethernet Module. It is not admissible to connect the T-plug and the network adapter by means of a coaxial cable.

Proper termination with a 50 Ω BNC termination plug at both ends of the Ethernet line is very important.

It is not permissible to use cable with a characteristic impedance different from 50 Ω.

If no cable is connected to the Ethernet connector, it must also be terminated.

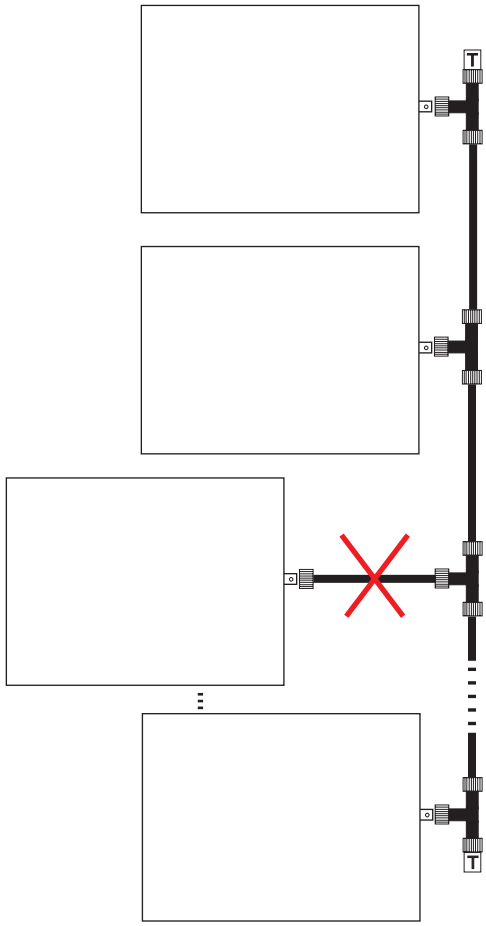

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Fig. 4-2 Principle of wiring for Ethernet LAN

4.3 Description of the Components

4.3.1 DEBEG AIS 3400 Electronics Unit

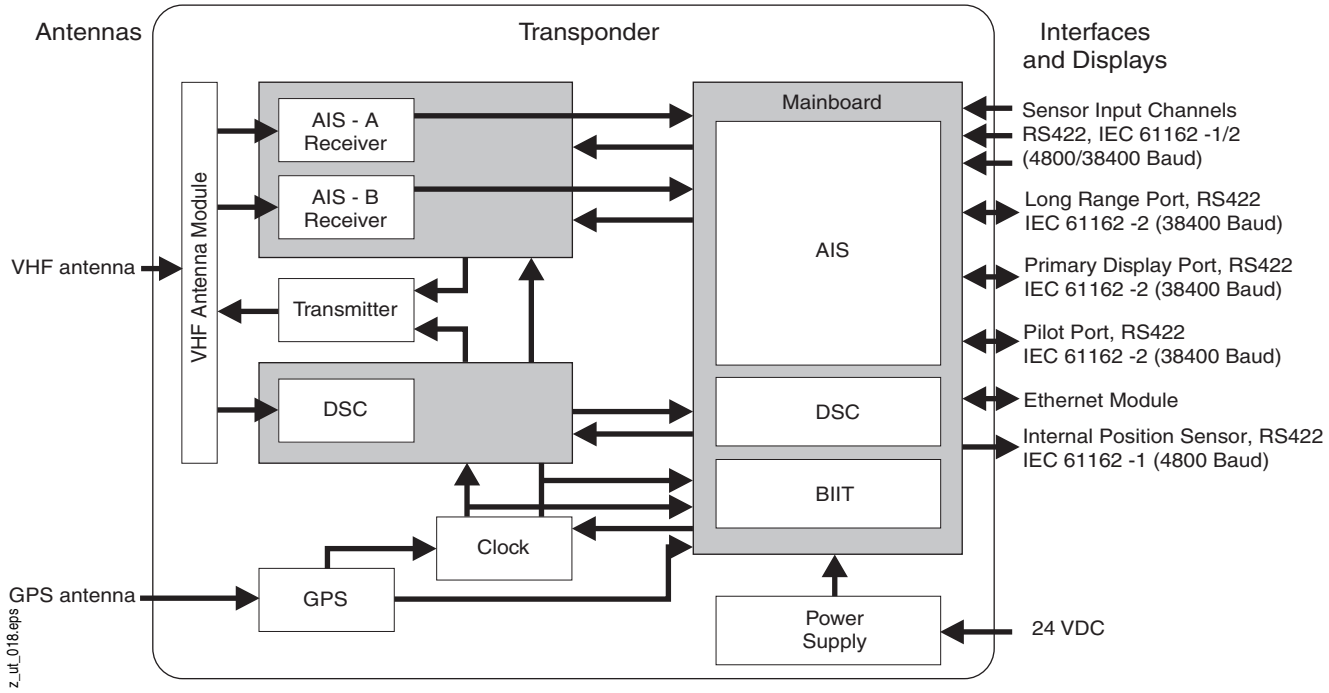


Fig. 4-3 Block diagram of the Electronics Unit

The diagram Figure 4-3 shows the internal structure of the UAIS Transponder with the following parts:

VHF Radio

- VHF Receiver AIS Channel A
- VHF Receiver AIS Channel B
- VHF Receiver DSC Channel 70
- VHF Transmitter AIS Channel A
- VHF Transmitter AIS Channel B

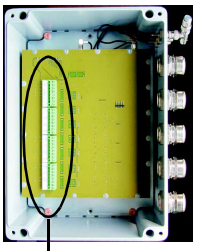
GPS

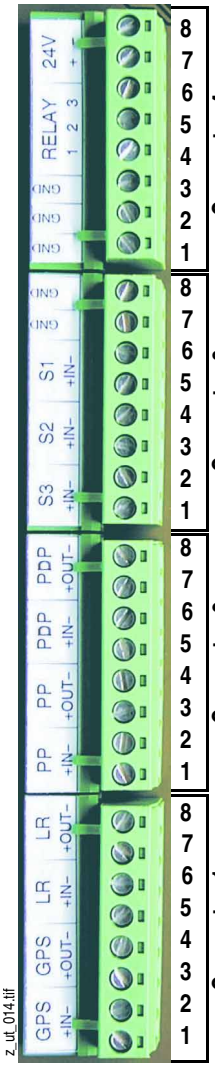
- 12-channel GPS chip

Motherboard and Peripheral Components

- Motherboard pcb
- Processors for the digital signal processing
- 3 interfaces IEC 61162-1/2 for ship's sensor data input
- Long range port IEC 61162-2
- Primary display port IEC 61162-2 and pilot port IEC 61162-2
- Ethernet interface
- Built-in Integrity Test (BIIT)
- Power supply (input 24 VDC -10%, +30%)

Interfaces





Connector 4

Power Supply Input
8 0 V
7 +24 V

Alarm Relay
6 Contact 3, make
5 Contact 2, center
4 Contact 1, break

Ground
Electrically isolated from power supply GND
3 GND
2 GND
1 GND

Connector 3

Sensor Input Channels, RS422, IEC 61162 -1/2 (4800/38400 Baud)
for ship's sensors
8 GND
7 GND
6 Channel 1 -
5 Channel 1 +
4 Channel 2 -
3 Channel 2+
2 Channel 3-
1 Channel 3+

The UAIS can be supplied with the following sensor data, corresponding to IEC 61162-1/2 (bold type = required default telegrams):
- Reference datum (**DTM**, NACOS xx-4, RADARPILOT ATLAS 1000 only)
- Positioning system (GNS, **GLL**, RMC)
- Speed over ground (**VBW**, **VTG**, RMC)
- Course over ground (RMC, **VTG**)
- Heading (**HDT**)
- RAIM indicator (GBS)
- Rate of turn (**ROT**)

Connector 2

Primary Display Port, RS422, IEC 61162 -2 (38400 Baud)
8 Output -
7 Output +
6 Input -
5 Input +
Output of VDM messages (received by VHF) and VDO messages (sent by VHF). The static ship's data such as ship's name, callsign and destination are input by means of the VSD and SSD messages. See IEC 61993-2 for valid messages. This port is connected to the ATLAS system, for example.

Pilot Port, RS422, IEC 61162 -2 (38400 Baud)
4 Output -
3 Output +
2 Input -
1 Input +
See Primary Display Port. Additionally, the sensor data (VDO message) are sent with a repetition rate of 1 Hz.
This port must not be used for the system. It must be accessible for the pilot.

Connector 1

Long Range Port, RS422, IEC 61162 -2 (38400 Baud)
8 Output -
7 Output +
6 Input -
5 Input +
Connection to a long range communication system. Requests by the messages LRI and LRF are answered with LR1, LR2 and/or LR3.

Internal Position Sensor, RS422, IEC 61162 -1 (4800 Baud)
4 Output -
3 Output +
Output of the messages corresponding to (IEC 61108-1):
DTM (datum reference); GGA (GPS fix data); GNS (GNSS fix data); GLL (geographic position, latitude/longitude); RMC (recommended minimum specific GNSS data); VTG (course over ground and speed over ground)
2 Input -
1 Input +

The wires can be connected to the connectors directly by means of screw terminals.

Fig. 4-4 Interfaces of the DEBEG UAIS 3400 Electronics Unit

Coaxial Connectors

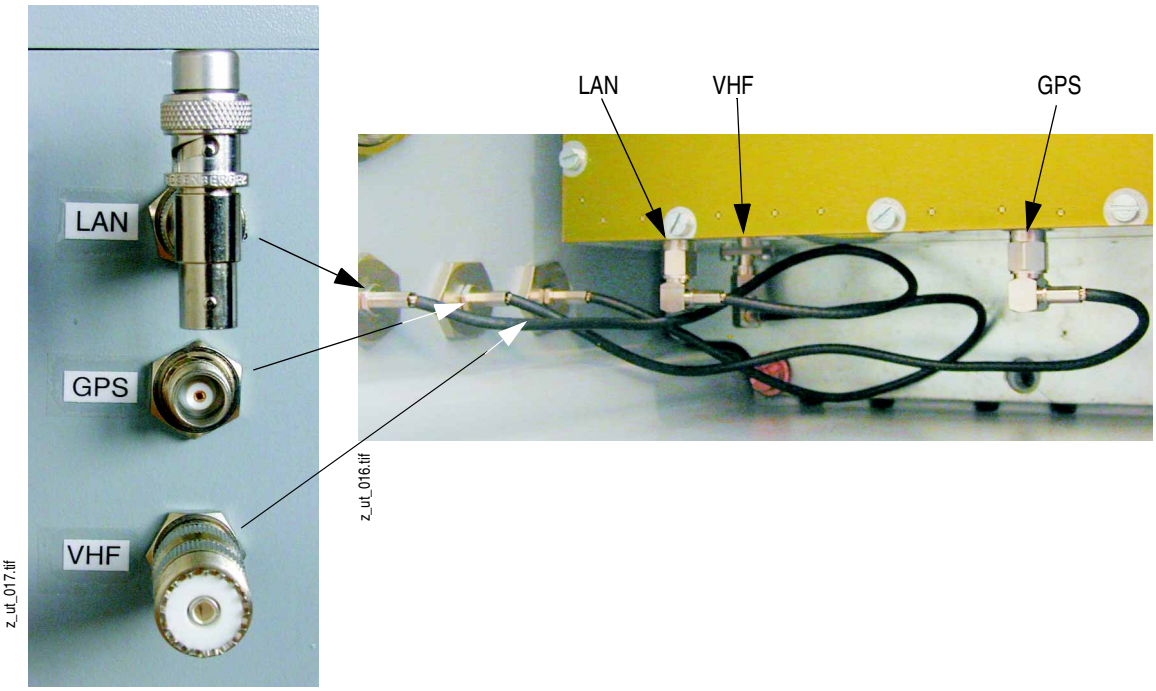


Fig. 4-5 Internal coax wiring

4.3.1.1 Supported Sensor Input Sentences

Input sentences in compliance with IEC 61162-1/-2

Data	Required Sentence (Identifier and Description)	Optional Sentence (Identifier and Description)
Reference Datum	DTM (Datum reference)	
Positioning System: - Time of Position - Latitude/Longitude - Position accuracy	- GNS (GNSS fix data) - GLL (Geographic position latitude/ longitude)	- RMC (Recommended minimum specific GNSS data)
Speed over Ground (SOG)	- VBW (Dual ground/water speed)	- VTG (Course over ground and ground speed) - RMC (Recommended minimum specific GNSS data)
Course over Ground (COG)	- RMC (Recommended minimum specific GNSS data)	- VTG (Course over ground and ground speed)
Heading	- HDT (Heading, true)	
RAIM indicator	- GBS (GNSS satellite fault detection)	
Rate of Turn (ROT)	- ROT (Rate of turn)	

NOTE:
If the UAIS Transponder receives the ship's sensor data from Ship's Interface, the output interfaces of the Ship's Interface must be configured as follows:

- Select "IEC 61162-1 edition 2/2000 (NMEA 2.3)" as driver
- Set a repetition interval of **1 s** for the following telegrams: GLL, VTG, HDT, ROT, VBW

4.3.1.2 Supported Sentences for the AIS Primary Display Port and the Pilot Port

Input

Input sentences in compliance with IEC 61162-1/-2

Data	Sentence Identifier/Description
Normal Access - Parameter Entry	
Voyage information: - Vessel type and cargo category - Navigational status - Draught, max. actual static - Destination - ETA date and time - Regional application flags	VSD (Voyage static data)
Station information: - Vessel name - Call sign - Antenna location - length and beam	SSD (Station static data)
Initiate VHF Data Link Broadcasts	
Safety messages	ABM (Addressed binary message) BBM (Broadcast binary message)
Binary messages	ABM (Addressed binary message) BBM (Broadcast binary message)
Interrogation message	AIR (AIS interrogation information)
AIS Equipment - Parameter Entry	
AIS VHF channel selection AIS VHF power setting AIS VHF channel bandwidth Transmit/Receive mode control	ACA (AIS channel assignment message) ACA (AIS channel assignment message) ACA (AIS channel assignment message) ACA (AIS channel assignment message)
BIIT Input	
Alarm/Indication acknowledgement	ACK (Acknowledgement message)
LR acknowledge	
Manual LR acknowledge	LRF (Long range function)
Proprietary Sentences	
AIS transponder configuration - MMSI - IMO number - Other AIS equipment controls	AISCFG (AIS configuration)
AIS serial input/output configuration	AISSIO (AIS serial input/output)
AIS transmitter on/off, acknowledged by AISTXD from the transponder	AISTXD (AIS transmitter status)
AIS alive message (every 20 s)	AISALV (AIS alive)
Transversal and longitudinal offset of the internal AIS position sensor relative to the ship's system position	AISPOF (AIS offset, relative to system position)
Any telegram which is sent by long range function must be acknowledged by means of AISLRA	AISLRA (AIS long range acknowledgement)
Queries - Query ACA - Query PSAEAISTXD - Query PSAEAISLFS - Query PSAEAISVER	Q Query for ACA data Query for transmitter status Query for transponder log file Query for firmware version

Output

Output sentences in compliance with IEC 61162-1/-2

Data	Sentence Identifier/Description
Prepared by AIS Unit	
Notification that a session initiated by the messages ABM, BBM, AIR is terminated	ABK (Acknowledgement message)
AIS own-ship broadcast data (all transmissions available)	VDO (VHF data link own-vessel message)
Channel management data	ACA (AIS channel assignment message (using query mechanism)
Received on VHF Data Link by AIS Unit	
All VDL AIS messages received Broadcast or addressed to own station	VDM (VHF data link message)
Received on LR Communication System	
LR interrogation message received	LRI (Long range interrogation) and LRF (Long range function identification)
Proprietary Sentences	
AIS transponder power on	AISPWR (AIS power)
Log file data	AISLFS (AIS log file send)
Acknowledge to AIS transmitter status on/off	AISTXD (acknowledge to AIS transmitter status)
Report on a long range interrogation to the MKD	AISLRF (AIS long range function request)
AIS firmware version	AISVER (AIS version)

4.3.1.3 Supported Sentences for the Long Range Port

Input

Input sentences in compliance with IEC 61162-1/-2

Data	Sentence Identifier/Description
Long range interrogation: - Type of request - Geographic area request - AIS unit request	LRI (Long range interrogation)
Long range function identification, Requestor MMSI and Name Request for: - Ship's name, call sign, IMO number - Date and time of message composition - Position - Course over ground - Speed over ground - Destination and ETA - Draught - Ship/Cargo - Ship's length, breadth and type - Number of persons on board	LRF (Long range function identification)

Output

Output sentences in compliance with IEC 61162-1/-2

Data	Sentence Identifier/Description
Long range function identification, MMSI and Name - Ship's name, call sign, IMO number - Date and time of message composition - Position - Course over ground - Speed over ground - Destination and ETA - Draught - Ship/Cargo - Ship's length, breadth and type - Number of persons on board	LRF (Long range function identification)
MMSI of responder MMSI of requestor Ship's name Ship's call sign IMO number	LR1 (Long range response, line 1)
MMSI of responder Date and time of message composition Position Course over ground Speed over ground	LR2 (Long range response, line 2)
MMSI of responder Destination and ETA Draught Ship/Cargo Ship's length, breadth and type Number of persons on board	LR3 (Long range response, line 3)

4.3.1.4 IEC 61162 -1/-2 Interfaces

The interfaces comply with IEC 61162-1:2000 (2nd Edition) and IEC 61162-2:1998.

The designation "-" in this manual corresponds to the designation "Line A" of IEC 61162 -1/-2.

The designation "+" in this manual corresponds to the designation "Line B" of IEC 61162 -1/-2.

4.3.2 VHF Antenna

The VHF antenna CXL 2-1 is a ½λ coaxial, broad band antenna with 50 Ω impedance. For the technical data see Section 7, for installation instructions see Section 3.

4.3.3 GPS Antenna

The GPS antenna 1330 is a GPS L1 antenna for a frequency of 1575.42 ±10 MHz with an integrated amplifier. For the technical data see Section 7, for installation instructions see Section 3.

5 Setting-to-Work/Configuration

5.1 Setting-to-Work

1. The UAIS Transponder and the antennas must be installed as described in Section 3 (Installation Recommendations). For information about the dimensions see Section 10 (Outline Drawings).
2. The cabling and connection must be performed corresponding to the Cabling Documents in Section 9.
3. Depending on the system in which the AIS has to be integrated, the configuration has to be performed as described in Section 5.2.

5.2 Configuration

No adjustments have to be performed on the antennas. These components are ready for use.

The UAIS Electronics Unit (Transponder) must be parameterized via a connected RADARPILOT ATLAS 1000, CHARTPILOT ATLAS 9320/30, MULTIPILOT ATLAS 1000 or the Display and Control Unit DEBEG 3401.

For information in detail, see the corresponding Technical Manuals and the Online Help of these systems.

The following descriptions are an aid for the configuration of the AIS.

NOTE:

Valid for NACOS xx-3 Systems only:
The UAIS Transponder is connected to the Ship's Interface. The output interfaces of the Ship's Interface must be configured as follows:

- Select "IEC 61162-1 edition 2/2000 (NMEA 2.3)" as driver
- Set a repetition interval of **1 s** for the following telegrams:
  - GLL
  - VTG
  - HDT
  - ROT
  - VBW

NOTE:
The system from which the UAIS Transponder has been configured and the UAIS itself must be restarted after any change in the configuration. Otherwise these modifications may have no effect.

5.2.1 Configuration with DCU DEBEG 3401

It is necessary to configure the DCU. For information in detail seee the Technical Manual of the DCU DEBEG 3401.

5.2.2 Configuration with RADARPILOT/CHARTRADAR ATLAS 1000 in NACOS xx-4 Systems

It is necessary to configure the radar and the interfaces. For information in detail seee the Technical Manual of the RADARPILOT/CHARTRADAR ATLAS 1000.

5.2.3 Configuration with CHARTPILOT ATLAS 93xx in NACOS xx-3 Systems

It is necessary to configure the CHARTPILOT ATLAS 93xx and the interfaces of the Ship's Interface. For information in detail seee the Technical Manual of the CHARTPILOT ATLAS 93xx.

5.3 Testing

The Electronics Unit has neither operating elements nor a display. Correct functioning cannot be made visible directly.

To test the interfaces of the ship's sensor inputs and the interface to the display unit (which can be the RADARPILOT ATLAS 1000, CHARTPILOT ATLAS 9330, MULTIPILOT ATLAS 1000 or the Display and Control Unit DEBEG 3401), set the system in operation and select the own ship's symbol. If the own ship AIS data are displayed, the interfaces are working properly.

The VHF Transceiver can only be tested if a second AIS system is within the range of the Transceiver. The signals of this AIS must be received and this second UAIS must receive the signals of your own UAIS.

6 Repair/Maintenance

GENERAL:

The jumper settings and switch settings on a replacement pcb must be the same as on the defective pcb. The wire connections must be made in exactly the same way. Exceptions are explained in this manual.

6.1 Trouble Shooting

6.1.1 Hints

In the case of problems during setting-to-work, the cabling should be checked again. All components must be supplied with power.

- To get more information about the problem, read the system fault messages on the screen and refer to Section 8 on page 51.

6.1.2 Trouble Shooting for UAIS DEBEG 3400 connected to a RADARPILOT ATLAS 1000

6.1.2.1 Indication: System Fault Message 3617 Displayed on Indicator

Procedure:

1. Check the cabling of the Sensor Input Channels and the Primary Display port. See the Technical Manual of the UAIS DEBEG 3400 and or the Technote T0211-340x-002 for further information.
2. Check the correct setting of the S1 and the jumpers of the Interface Assembly SH3014G203. S1 must be set to position 2. No jumpers should be connected to the pins 1...4. See the Technical Manual of the RADARPILOT ATLAS 1000 for further information.

If the system fault message is still existing, the communication on the Primary Display Port must be checked. Proceed as follows:

Test of the RADARPILOT ATLAS 1000 Output

1. Power Down the system
2. Connect the AIS output TB14 and TB15 of the Analog Interface additionally to an indicator serial interface (TB1) of the radar. If there is a free input, this one should be used. If all inputs are used, one of them must be disconnected. Figure 6-1 shows the connection to the serial interface No. 4 as an example.

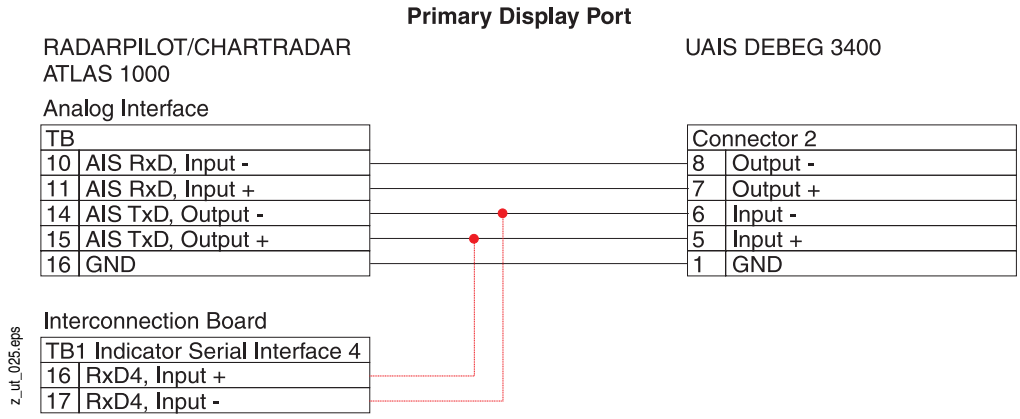


Fig. 6-1 Cable connection for the interface monitoring Radar > UAIS

3. Power on the radar. Configure the concerned indicator serial interface by means of the System Maintenance Manager as follows

   Path:
   Configure > **Radar** > **Indicator** > **Indicator x** > **Serial Interfaces** > **Serial I/O x**
   Parameters:
   - **Driver**, set to **NMEA183 (IEC 61162-1/2)**
   - **Baud Rate**, set to **38400**
   - **Wind**, set to **Connected** (if the interface has been used for a ship's sensor with NMEA183 (IEC 61162-1/2) protocol beforehand, it is not necessary to modify this parameter.)

4. The Serial I/O Monitor must be started.

   Path:
   Service > **Indicator** > **Serial I/O Monitor**

   Select the used interface from the drop down list and mark the check box **Rx**. Start the monitoring by clicking on **Run**. The protocol can be saved on a diskette.

Fig. 6-2 Protocol Radar TxD

If the AIS voyage data is modified or safety related messages are sent, the protocol must show telegrams corresponding to the telegrams in Figure 6-2. If there is no communication on the interface, the Analog Interface is defective or has a wrong software version (The software version must be F or newer. To check the software version, use the **Telemonitoring Data** menu of the System Maintenance manager. The line for the Analog Interface must look as follows: SIR10T GE3044P207 F) or the configuration of the radar is faulty. See the Technical Manual of the radar for further information.

NOTE:
If a ship's sensor is connected to the interface which has been used for the test, it must be made sure, that all modifications of the parameterization of this interface that were necessary for the test are canceled.

Test of the UAIS DEBEG 3400 Output

1. Power Down the system
2. Connect the AIS Primary Display Port TB7 and TB8 additionally to an indicator serial interface (TB1) of the radar. If there is a free input, this one should be used. If all inputs are used, one of them must be disconnected. Figure 6-1 shows the connection to the serial interface No. 4 as an example.

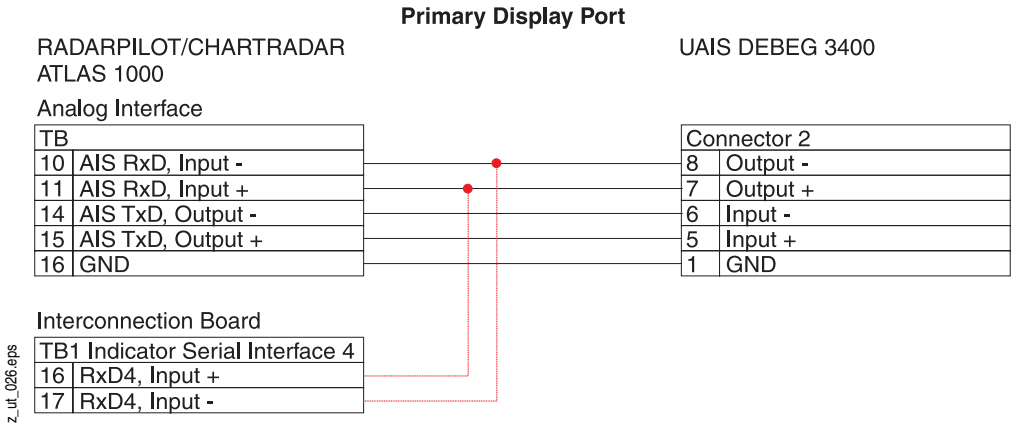


Fig. 6-3 Cable connection for the interface monitoring UAIS > Radar

3. Power on the radar. Configure the concerned indicator serial interface by means of the System Maintenance Manager as follows

   Path:
   Configure > **Radar** > **Indicator** > **Indicator x** > **Serial Interfaces** > **Serial I/O x**
   Parameters:
   - **Driver**, set to **NMEA183 (IEC 61162-1/2)**
   - **Baud Rate**, set to **38400**
   - **Wind**, set to **Connected** (if the interface has been used for a ship's sensor with NMEA183 (IEC 61162-1/2) protocol beforehand, it is not necessary to modify this parameter.)

4. The Serial I/O Monitor must be started.

   Path:
   Service > **Indicator** > **Serial I/O Monitor**

   Select the used interface from the drop down list and mark the check box **Rx**. Start the monitoring by clicking on **Run**. The protocol can be saved on a diskette.

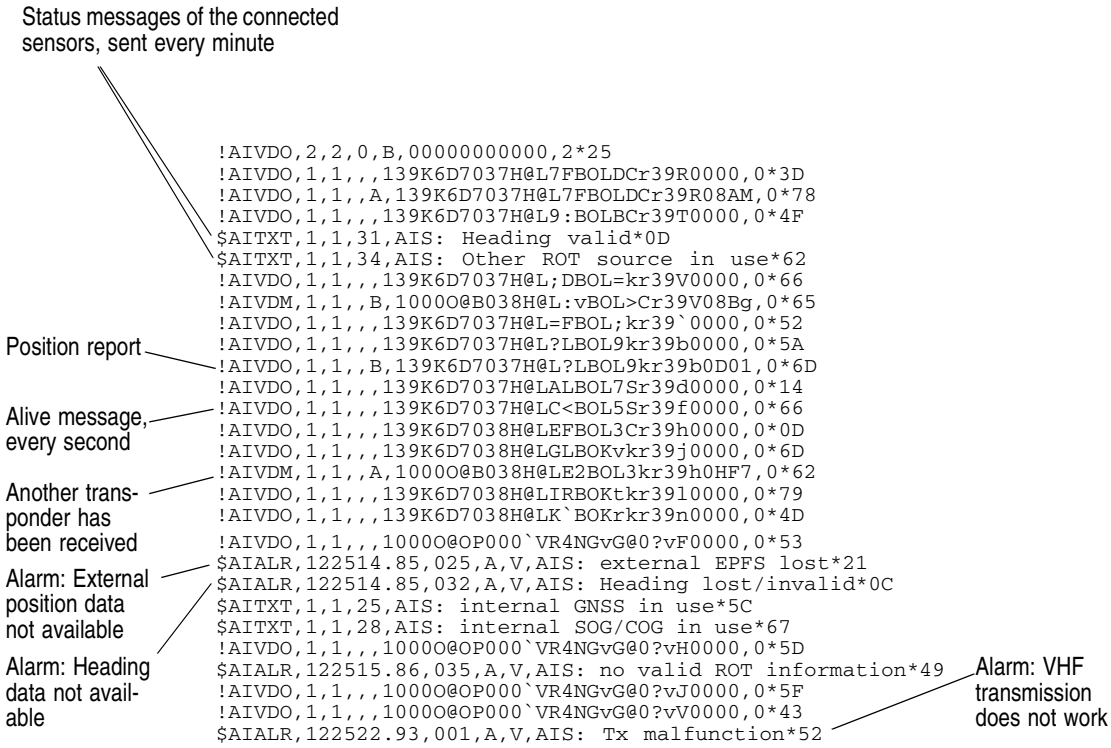


Fig. 6-4 Protocol UAIS TxD

Figure 6-4 shows the protocol which has been transmitted by a UAIS. The alarm messages can be forced by disconnecting the sensors and/or the VHF antenna.

If there is no communication on the interface, the UAIS is not working. If the power supply and the cable connection are correct, the UAIS Transponder seems to be defective.

NOTE:
If a ship's sensor is connected to the interface which has been used for the test, it must be made sure, that all modifications of the parameterization of this interface that were necessary for the test are canceled.

6.1.2.2 Indication: System Fault Message 3616 Displayed on Indicator

If the system fault message 3616 is displayed, it is likely that the problems are caused by the Analog Interface.

Procedure:

1. Check the configuration of the Analog Interface. See the Technical Manual of the RADARPILOT ATLAS 1000 for further information.
2. Check the correct setting of the S1 and the jumpers of the Interface Assembly SH3014G203. S1 must be set to position 2. No jumpers should be connected to the pins 1...4. See the Technical Manual of the RADARPILOT ATLAS 1000 for further information.

3. Check the software version of the Analog Interface. The software version must be F or newer. To check the software version, use the **Telemonitoring Data** menu of the System Maintenance manager. The line for the Analog Interface must look as follows:
   SIR10T GE3044P207 F

6.2 Opening the Housings

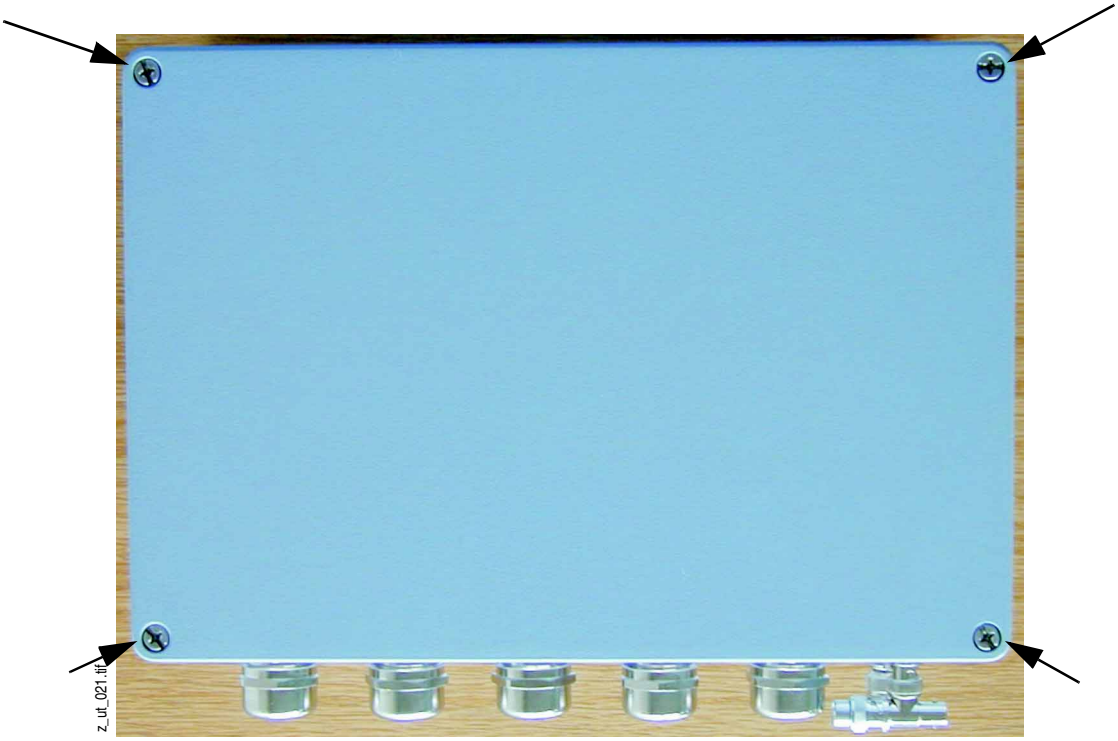


Fig. 6-5 Opening of the Transponder housing

Undo the four screws in the cover. The screws cannot be removed. Disconnect the grounding cable from the cover.

To close the housing, proceed in the reverse order.

6.3 Fuses

Electronics Unit

The Electronics Unit contains no fuses.

6.4 Exchange of Parts and Testing

6.4.1 Electronics Unit (Transponder)

If the Electronics Unit is defective, the complete Electronics Module inside the housing must be exchanged.

For the exchange, proceed as follows:

1. Disconnect/switch the UAIS from the mains supply.
2. Open the housing as described in Section 6.2 on page 43.
3. Disconnect the three coaxial cables.
4. Mark the 4 plugs and disconnect them.
5. Unscrew the screws of the mounting plate.

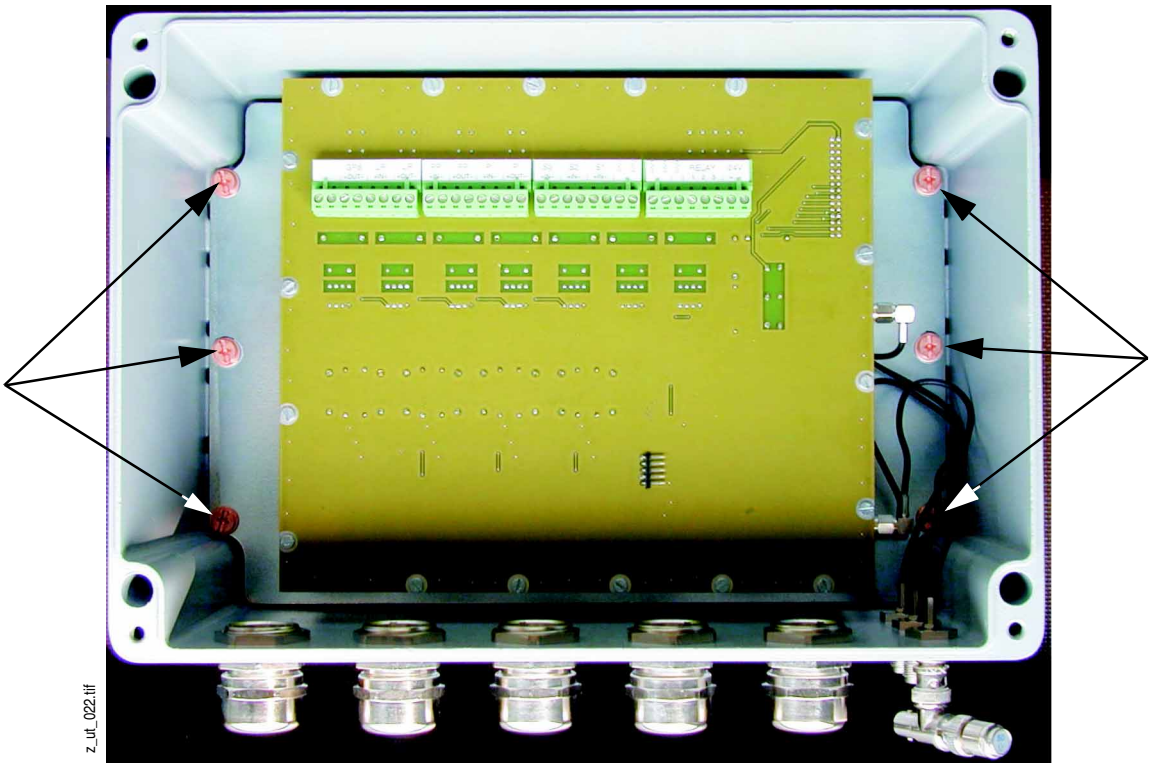


Fig. 6-6 Exchange of the Electronics Module

6. Lift the Module carefully out of the housing.
7. To mount the new Module, proceed in the reverse order. Further adjustments or setting are not necessary.

6.4.2 Antennas

If one of the antennas is defective, it must be exchanged. See the Spare Part List for the order number.

6.5 Maintenance

The UAIS DEBEG 3400 contains no parts which have to be serviced.

6.6 Spare Parts

6.6.1 Spare Part Concept

At present, the UAIS DEBEG 3400 components are not intended for repair by a service technician. The complete modules must be exchanged.

6.6.2 Spare Part List

Some of the components may be modified at short intervals, so that it is likely that it will not be possible to deliver spare parts which are absolutely identical to the original part. In such cases, a Technote for the exchange is delivered with the spare part and new versions of components are added to this manual as soon as possible.

Description	Order Number
VHF Antenna CXL 2-1	271246315
GPS Antenna 1330 FP	271257889
UAIS DEBEG 3400 Electronics Unit (NG 3030 G 010)	300005451

7 Technical Data

7.1 Conformity to Standards, Environmental Conditions

The UAIS DEBEG 3400 Electronics Unit complies with DIN EN 60945 (Maritime navigation and radio-communication equipment and systems - General requirements - Methods of testing and required test results).

The Electronics Unit belongs to the category "protected from the weather".

The antennas belong to the category "exposed to the weather".

The UAIS DEBEG 3400 complies with EN 61993-2:2002.

The interfaces of the UAIS DEBEG 3400 comply with IEC 61162-1:2000 (2nd Edition) and IEC 61162-2:1998.

7.2 Performance

7.2.1 Performance Data of the UAIS

General

Housing:	IP66
Operating temperature:	-15...+55°C (DIN EN 60945)
Humidity:	Max. 95% at 40°C (DIN EN 60945)
DC voltage (supply):	24 VDC -10%, +30% -> 21.6...31.2 V (DIN EN 60945)
DC current (consumption):	Typ. 1.2 A at 24 V, max. 2.5 A (momentarily during transmission)

GPS Receiver

Receiver architecture:	Single board receiver
Channels:	12, parallel
Time to first fix:	Hot start 0.3 minutes Warm start 0.8 minutes Cold start 2.0 minutes
Navigation modes:	3-D and 2-D, depending on the number of tracked satellites.

VHF Transceiver

The Transceiver corresponds to IEC 61993-2 FDIS, chapter 15

Transmitting power:	2 W/12.5 W
Input sensitivity:	-107 dBm (AIS and DSC)

7.2.2 Performance Data of the VHF Antenna CLX 2-1

Antenna type:	½λ coaxial, broad band
Frequency:	144...165 MHz
Impedance:	Nom. 50 Ω
Polarization:	Vertical
Gain:	0 dBd
Bandwith:	21 MHz
SWR:	< 1.5
Max. power:	150 W
Connector:	UHF female
Colour:	Marine white
Total length:	Approx. 1.15 m
Weight:	Approx. 300 g
Mounting:	1" threaded mast tube

For the outline drawings see Section 10.

7.2.3 Performance Data of the GPS Antenna

General:

Color:	White
Weight:	163 g
Nominal RF input:	TNC female
Operating temperature:	-40...+85°C
Humidity:	95% relative humidity

Antenna Element:

Frequency:	1575.42 ±10.0 MHz
Impedance:	50 Ω
Nominal VSWR:	1.5:1 max.
Polarization:	Right hand circular
Gain:	+4.5 dBiC nom.

Low Noise Amplifier:

Frequency:	1575.42 ±10 MHz (GPS L1)
Impedance:	50 Ω
Nominal output VSWR:	2.0:1
Max. gain:	26.5 ±3 dB
DC voltage (supply):	5...26 VDC through connector
DC current (consumption):	25 mA typ., 40 mA max.
Filtering:	Dual ceramic filter

7.3 Dimensions and Weights

For dimensions and weights, see the technical drawings. The drawings are shown in Section 10.

7.4 Compass Safe Distances

	Standard compass	Steering compass	Standard compass reduced	Steering compass reduced
Transponder DEBEG 3400	1.05 m	0.65 m	0.65 m	0.4 m
VHF Antenna CXL 2-1	0.3 m	0.3 m	0.3 m	0.3 m
GPS Antenna 1330FB	0.3 m	0.3 m	0.3 m	0.3 m

8 System Fault Code List

The following error codes (integrity alarm conditions) can be displayed at the connected display unit (for example a DCU or a RADARPILOT ATLAS 1000). See also Section 6 from page 37 on for further information.

Error	Description Text	Cause/ Source	Reaction of the System Remedy
001	AIS: Tx malfunction	VHF Antenna, cabling	Reaction: The Transponder stops the transmission. Remedy: Check of the antenna and the antenna cabling (short circuit or missing contact at the connectors)
002	AIS: Antenna VSWR exceeds limit (VSWR = Voltage Standing Wave Ratio)	VHF antenna, installation	Reaction: The Transponder continues operation. Remedy: Check of the antenna and the antenna cabling (75 Ω cable instead of 50 Ω cable)
003	AIS: Rx channel 1 malfunction	Internal Error	Reaction: The Transponder stops the transmission on the affected channel. Remedy: The Transponder must be exchanged.
004	AIS: Rx channel 2 malfunction		
005	AIS: Rx channel 70 malfunction		
006	AIS: general failure	Internal Error	Reaction: The Transponder stops the transmission. Remedy: The Transponder must be exchanged.
008	AIS: MKD connection lost (MKD = Minimum Keyboard Display)	No Operating/ Display Unit connected	Reaction: The Transponder continues operation. Remedy: The Display Unit (for example a DCU or a RADRPILOT ATLAS 1000) does not communicate with the Transponder. Check the cabling/connection of the Primary Display Port. Check if the Display Unit is working.
025	AIS: external EPFS lost (EPFS = Electronic Position Fixing System such as GPS)	No valid position data at interface S1, S2, S3	Reaction: The Transponder continues operation with the position data of the internal position sensor. If there is no valid position data available from the internal position sensor, additionally error 026 is displayed. Remedy: The telegrams GLL, GNS, GGA, RMC can not be received. Check the sensor and the cabling; Check if the system that delivers the data is working (RADARPILOT ATLAS 1000); Check the baud rate settings of the sensor inputs.
026	AIS: no sensor position in use	No valid position from internal position sensor	Reaction: The Transponder continues operation. Remedy: Check the cabling and the antenna of the internal GPS sensor.
029	AIS: no valid SOG information	No data from external sensor and from internal position sensor	Reaction: The Transponder continues operation. Remedy: The telegrams VBW, VTG, RMC can not be received. Check the sensor and the cabling; Check if the system that transmits the data is working (RADARPILOT ATLAS 1000); Check the baud rate settings of the sensor inputs.

Error	Description Text	Cause/ Source	Reaction of the System Remedy
030	AIS: no valid COG information	No data from external sensor and from internal position sensor	Reaction: The Transponder continues operation. Remedy: The telegrams VTG, RMC can not be received. Check the sensor and the cabling; Check if the system that transmits the data is working (RADARPILOT ATLAS 1000); Check the baud rate settings of the sensor inputs.
032	AIS: Heading lost/invalid	No data from external sensor	Reaction: The Transponder continues operation. Remedy: The telegrams HDT can not be received. Check the sensor and the cabling; Check if the system that transmits the data is working (RADARPILOT ATLAS 1000); Check the baud rate settings of the sensor inputs.
035	AIS: no valid ROT information	No data from external sensor	Reaction: The Transponder continues operation. Remedy: The telegrams ROT can not be received. Check the sensor and the cabling; Check if the system that transmits the data is working (RADARPILOT ATLAS 1000); Check the baud rate settings of the sensor inputs.
051	AIS: Channel management information not accepted	E.g. overlapping with an existing area	Reaction: The Transponder continues operation. Remedy: Check the channel management information.
052	AIS: GPS receiver fault		Reaction: The Transponder continues operation without internal GPS data and without direct GPS time syncronization. Remedy: The Transponder must be exchanged.

9 Cabling Documents

Grounding

All components of the radar system have contacts such as bolts or terminals for grounding. Grounding is important for EMC purposes as well as for protecting people's lives.

Both purposes are covered by the standard grounding of the system's housings to the ship's metallic structure (bolted or welded). Regardless of the type of ship's grounding (e.g. star pattern or ground plane pattern), no potential difference should be measurable between two different ground connectors. Potential differences cause compensation currents on the cable shields. If the ship has no metallic structure, all conductively connected metallic parts form an artificial ground.

All ground connections should be as short as possible. If possible, different units should be connected to individual ground connectors. Whenever possible, metallic housings should be screwed or welded directly to the ship's metallic structure. If a safe grounding contact is not ensured, additional conductors are necessary. Furthermore, all ground connections should have a low RF-impedance, and should be resistant against vibration and corrosion. Grounding conductors on an open-air deck must be made of corrosion-protected steel, and inside the ship they must be made of copper.

The grounding should be done in such a way that the connection can be inspected in a convenient manner.

EMC Purposes

The shields of all cables must be connected at both ends if no other instructions are given.

Protective Ground

All removable metallic parts of the housings are grounded by means of separate, flexible cables to the main structure of the housing. It is important to connect this ground-cable after parts have been dismounted or exchanged.

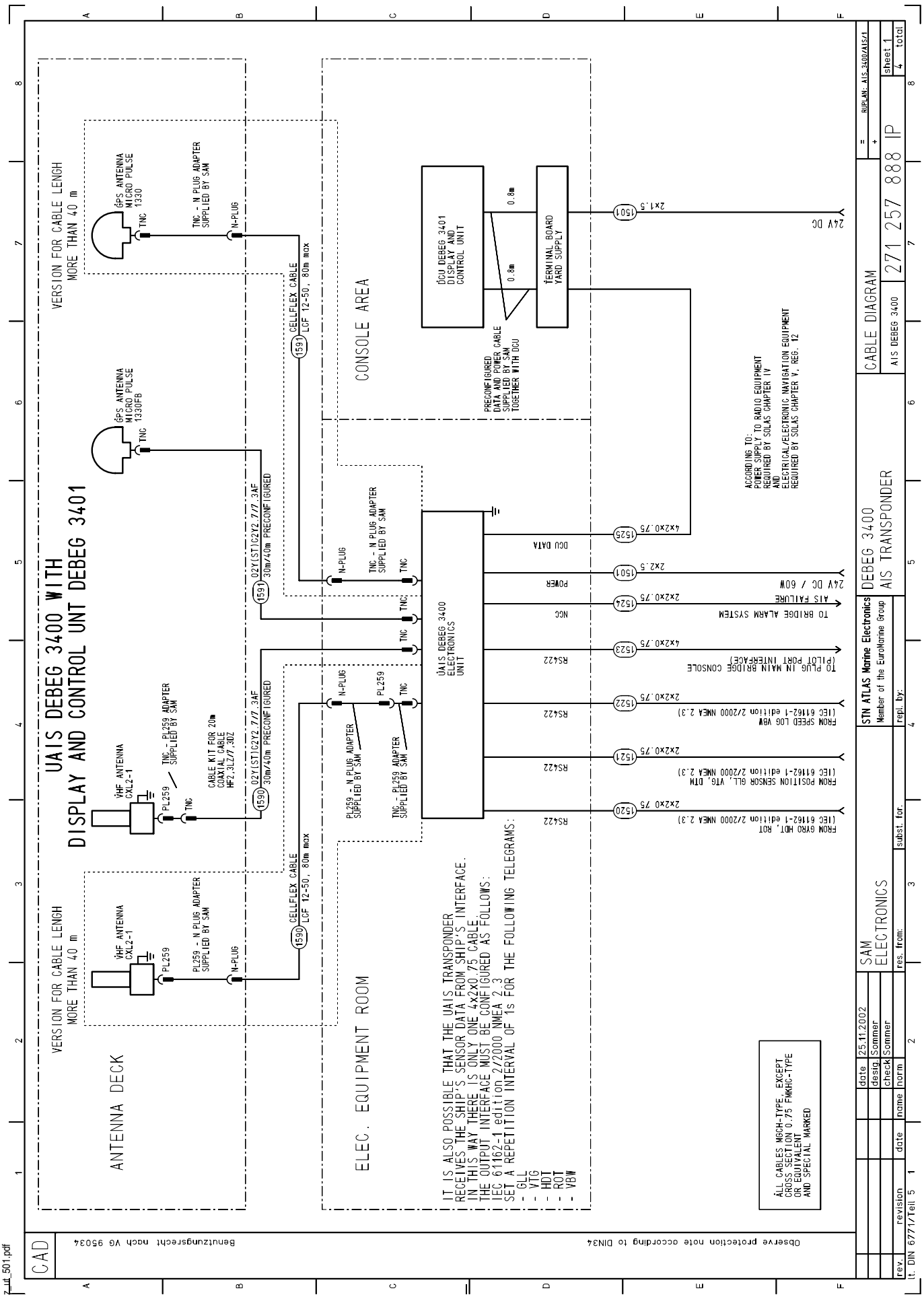


Fig. 9-1 Cable Diagram 1/4, Transponder with DCU DEBEG 3401

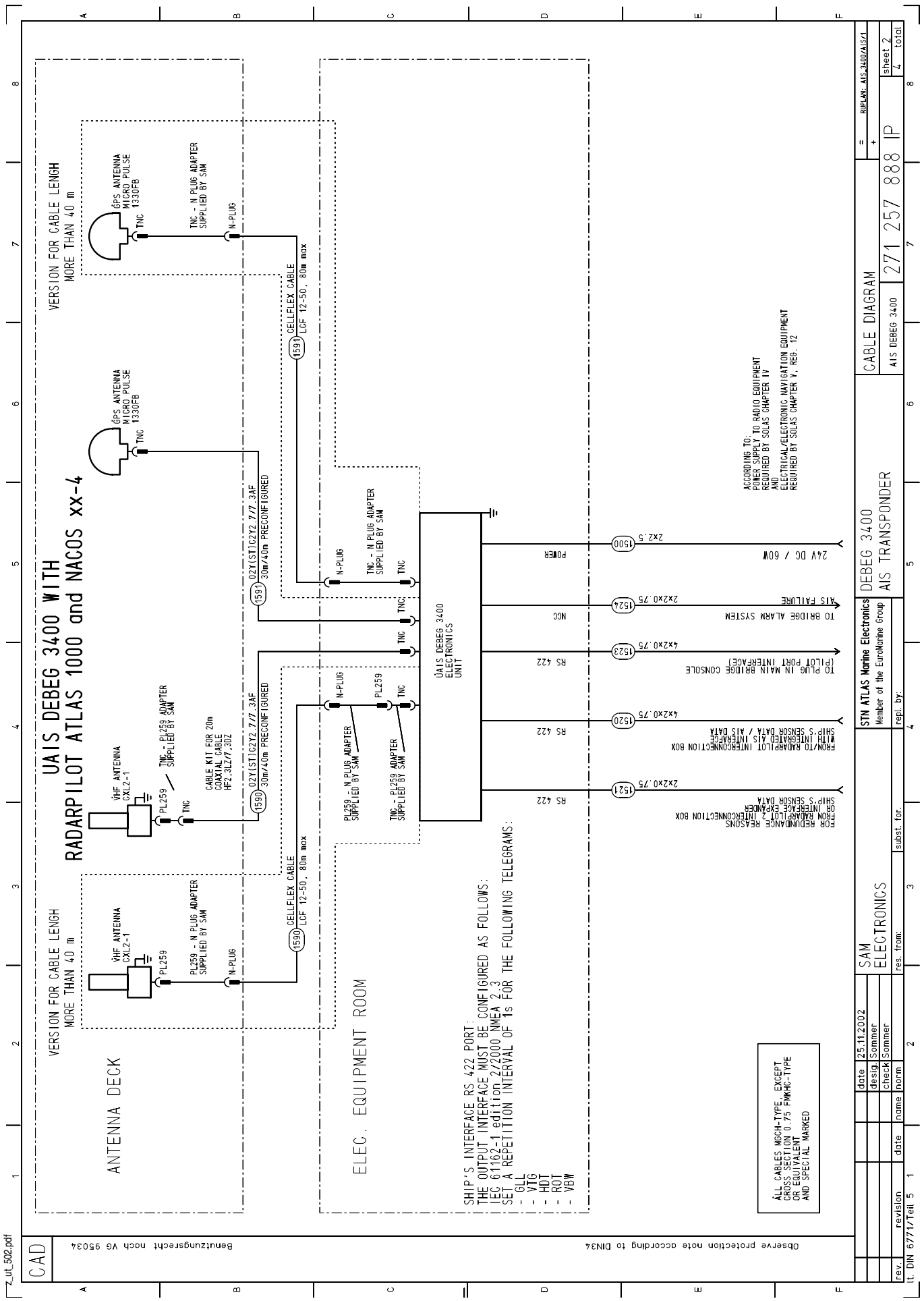


Fig. 9-2 Cable Diagram 2/4, Transponder with RADARPILOT ATLAS 1000/NACOS xx-4

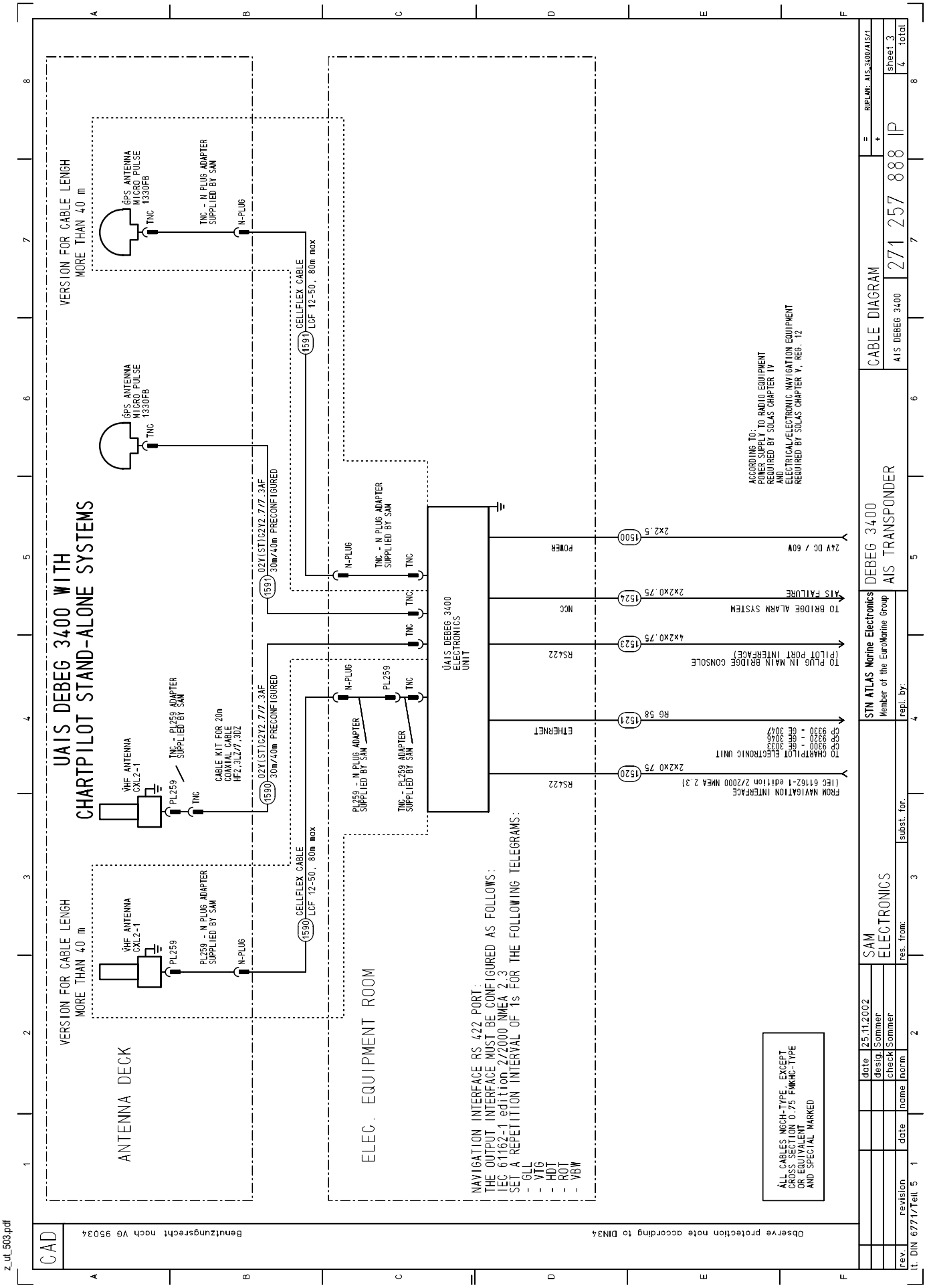


Fig. 9-3 Cable Diagram 3/4, Transponder with CHARTPILOT Stand-alone

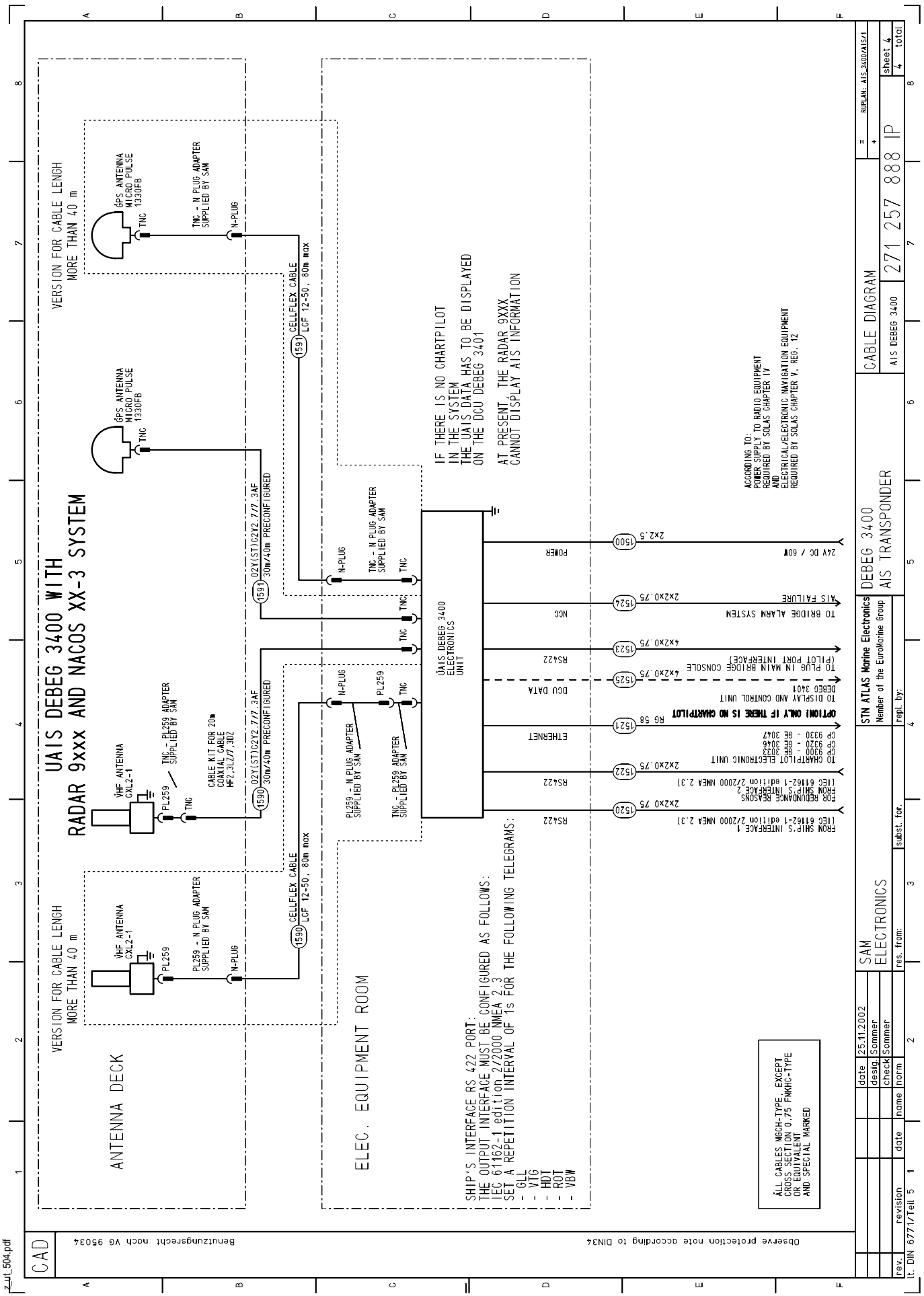


Fig. 9-4 Cable Diagram 4/4, Transponder with RADAR 9xxx/NACOS xx-3

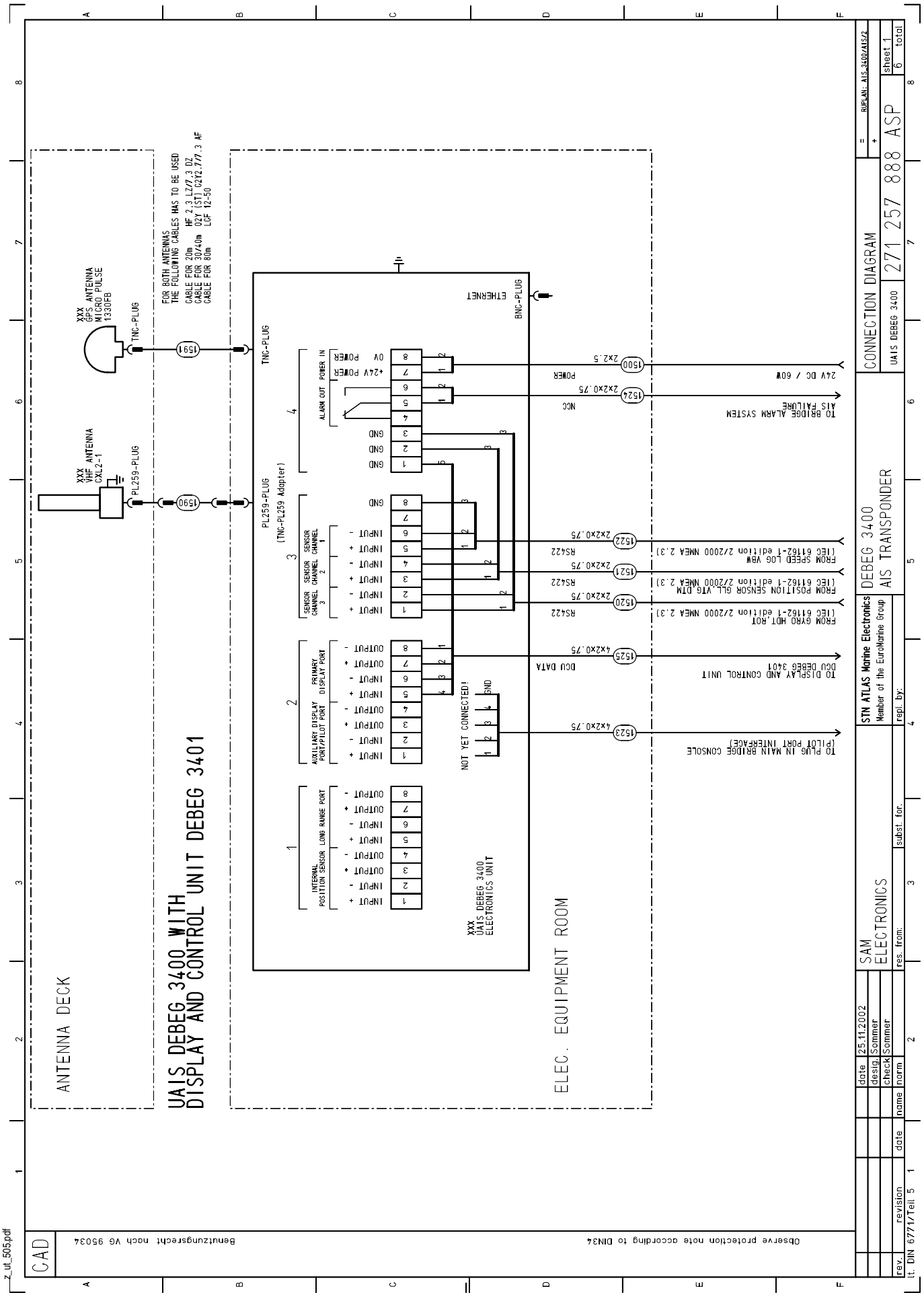


Fig. 9-5 Connection Diagram 1/6, Transponder with DCU DEBEG 3401

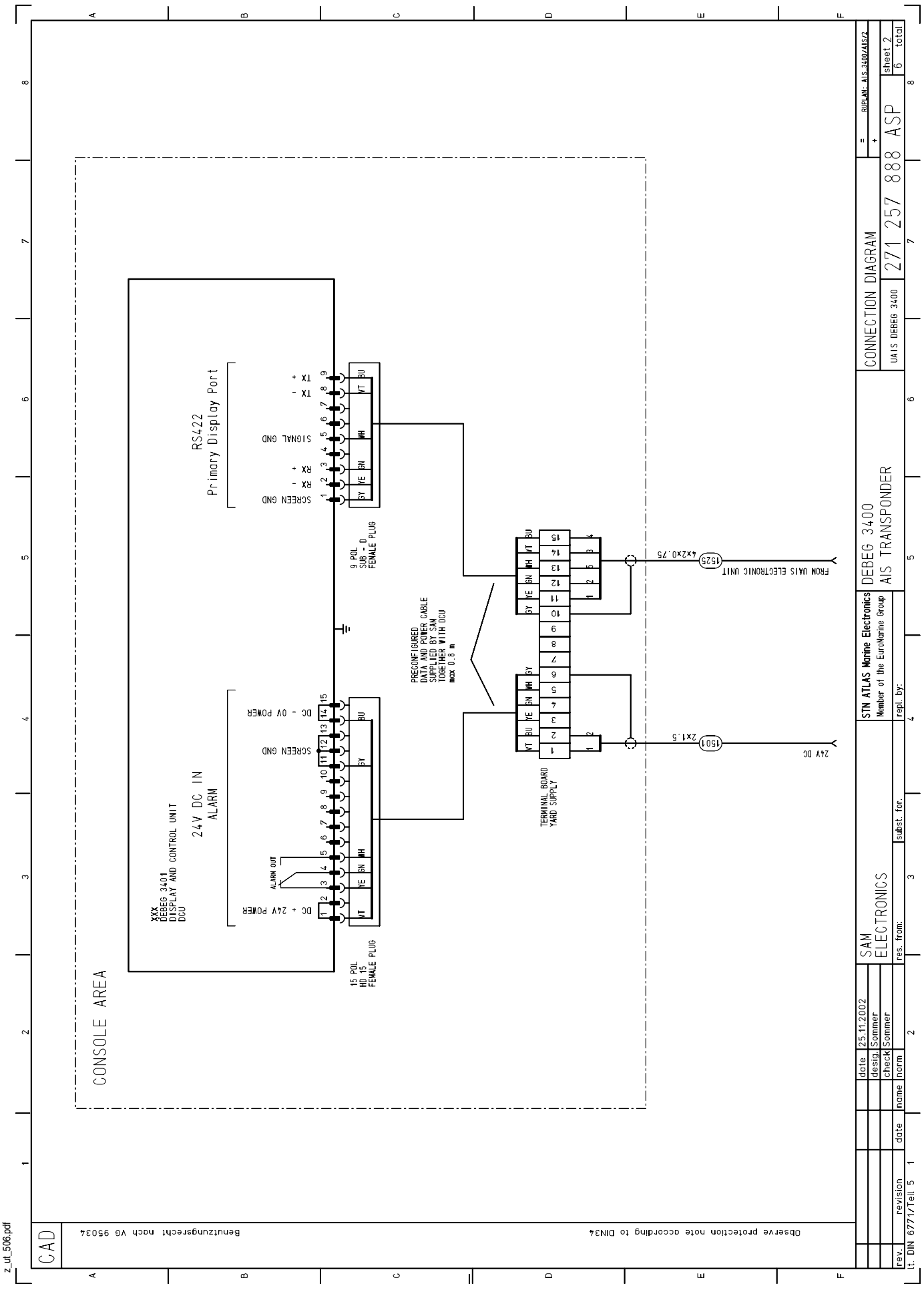


Fig. 9-6 Connection Diagram 2/6, Transponder Primary Display Port, Alarm Contacts

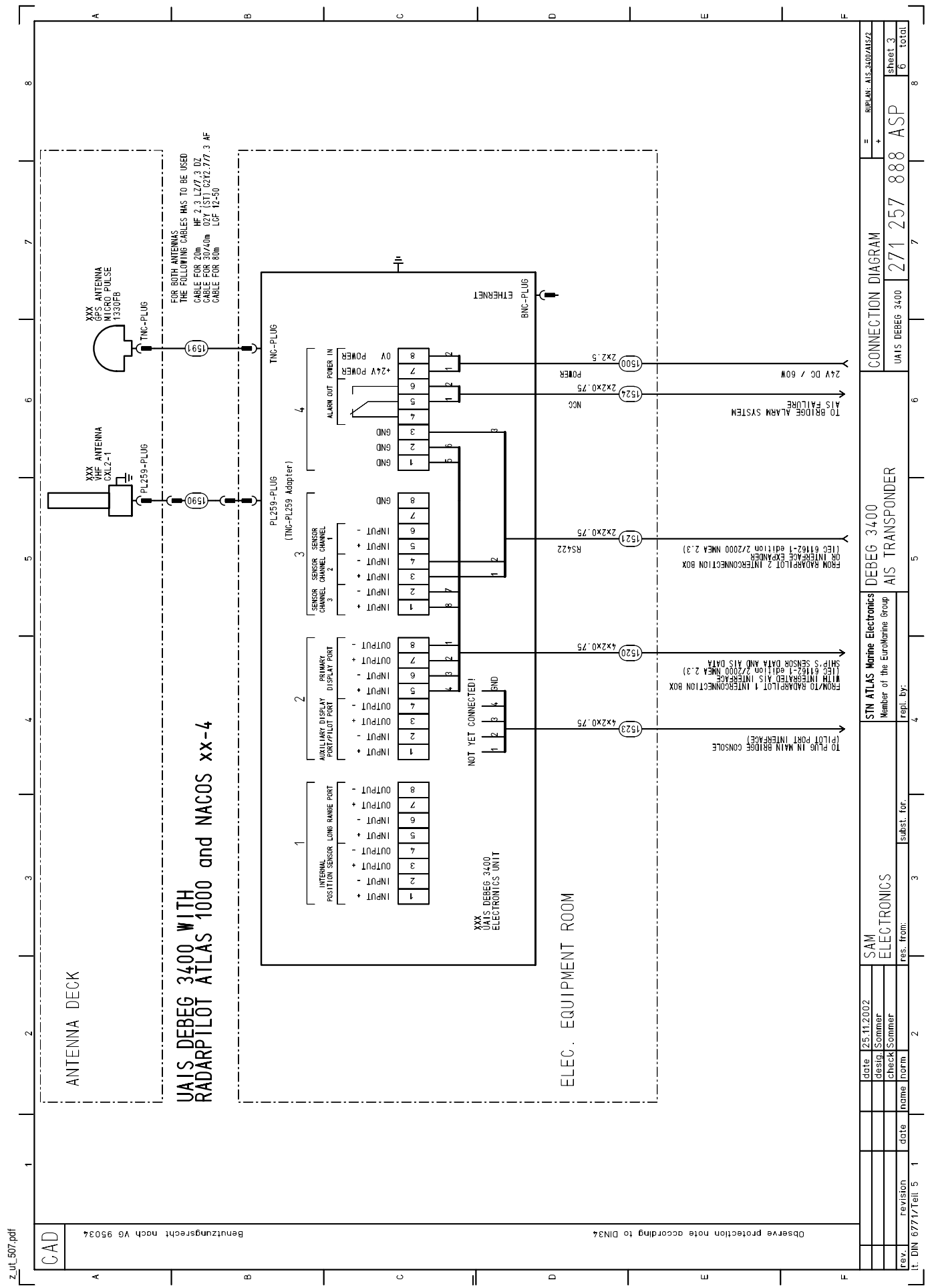


Fig. 9-7 Connection Diagram 3/6, Transponder with RADARPILOT ATLAS 1000/NACOS xx-4

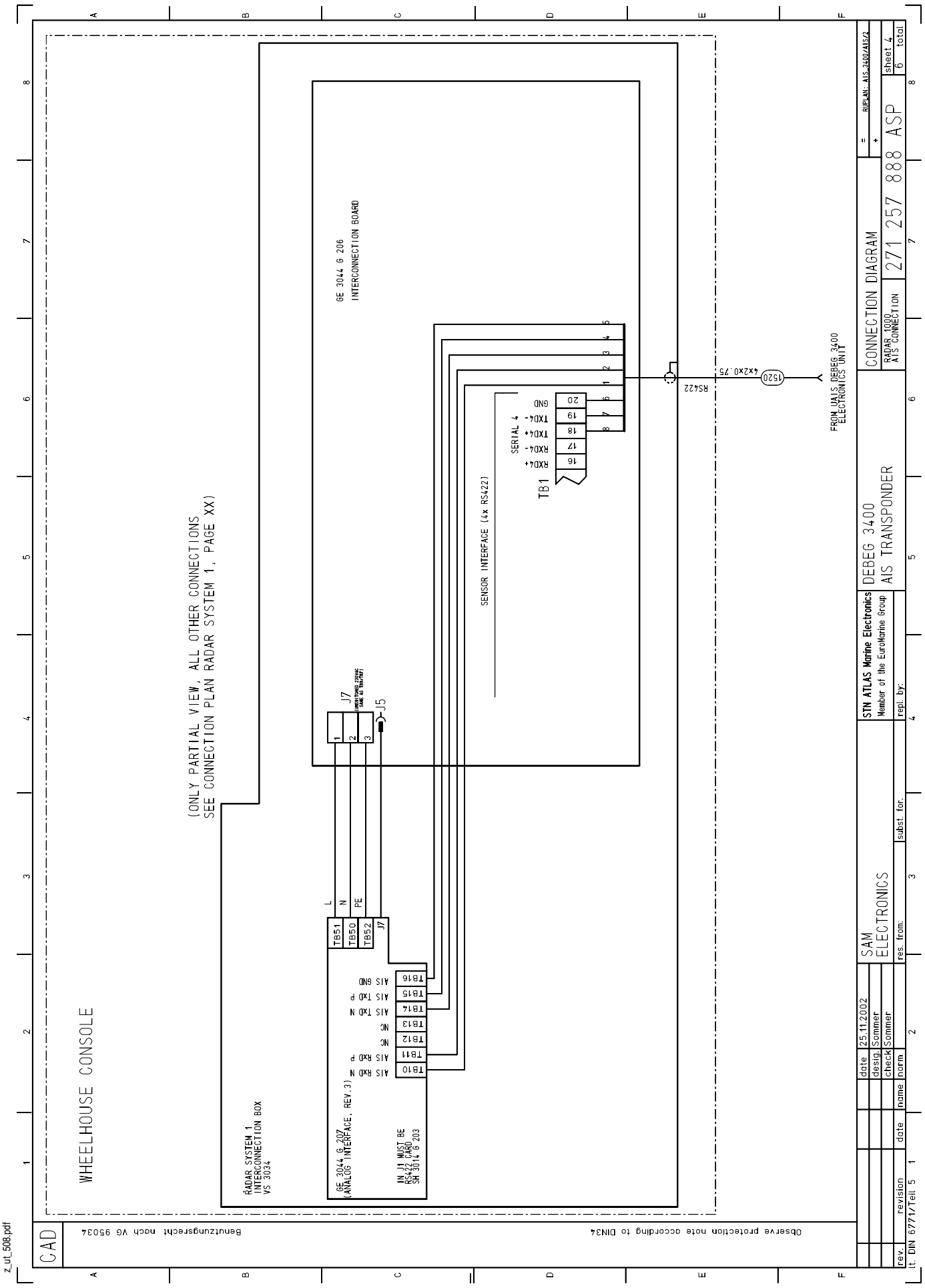


Fig. 9-8 Connection Diagram 4/6, Connection of Primary Display Port to Analog Interface

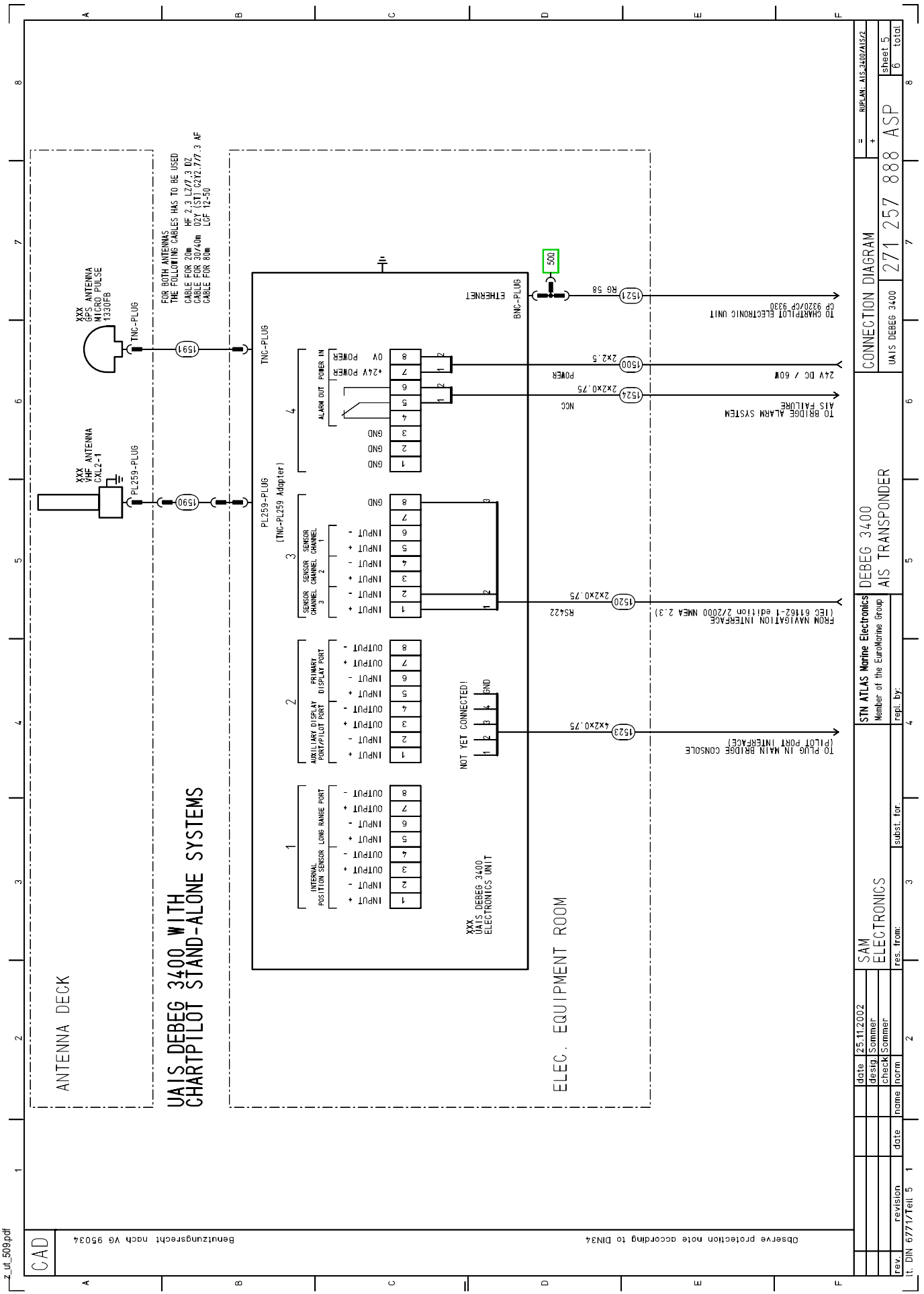


Fig. 9-9 Connection Diagram 5/6, Transponder with CHARTPILOT Stand-alone

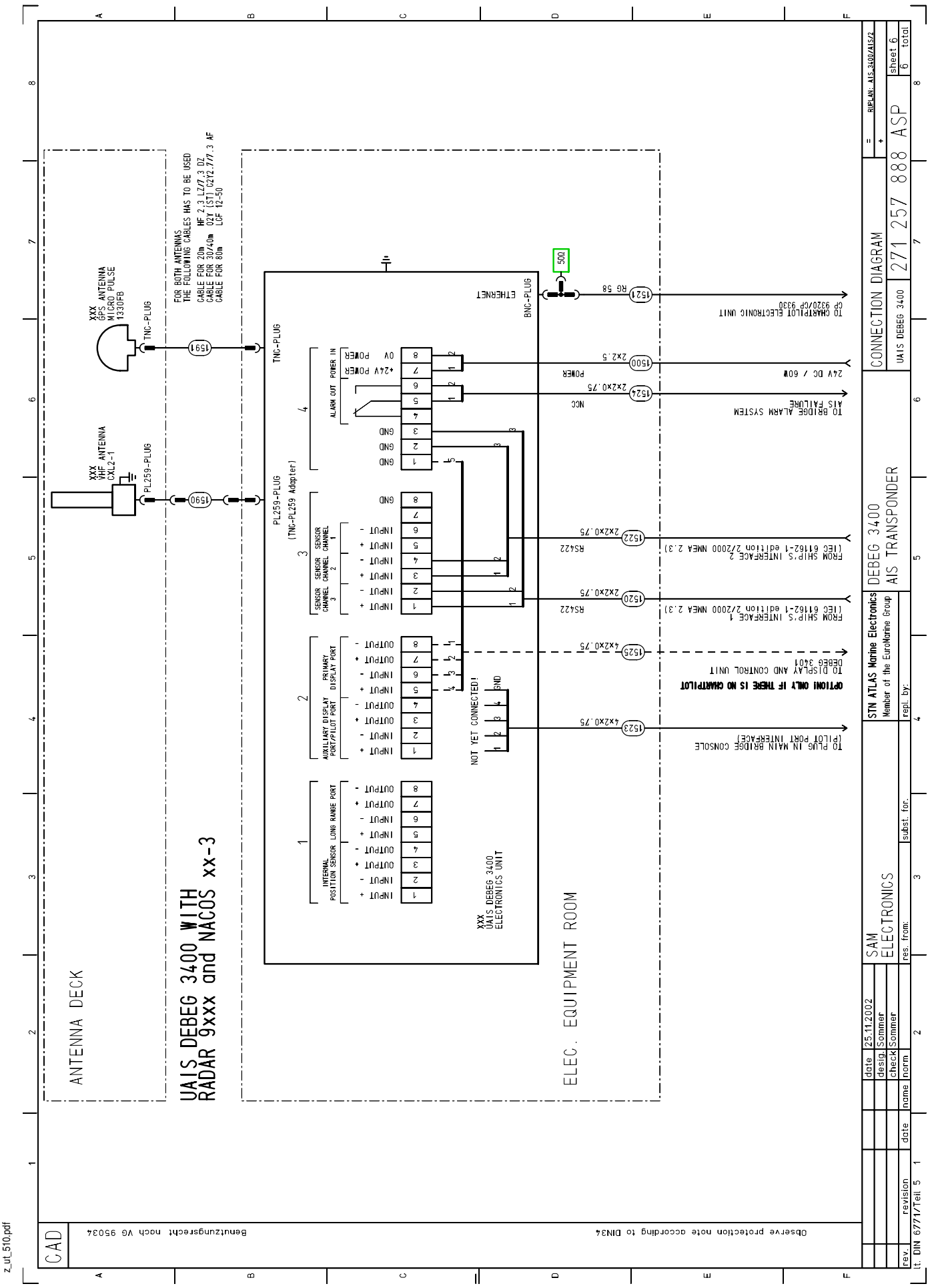


Fig. 9-10 Connection Diagram 6/6, Transponder with Radar 9xxx/NACOS xx-3

10 Outline Drawings

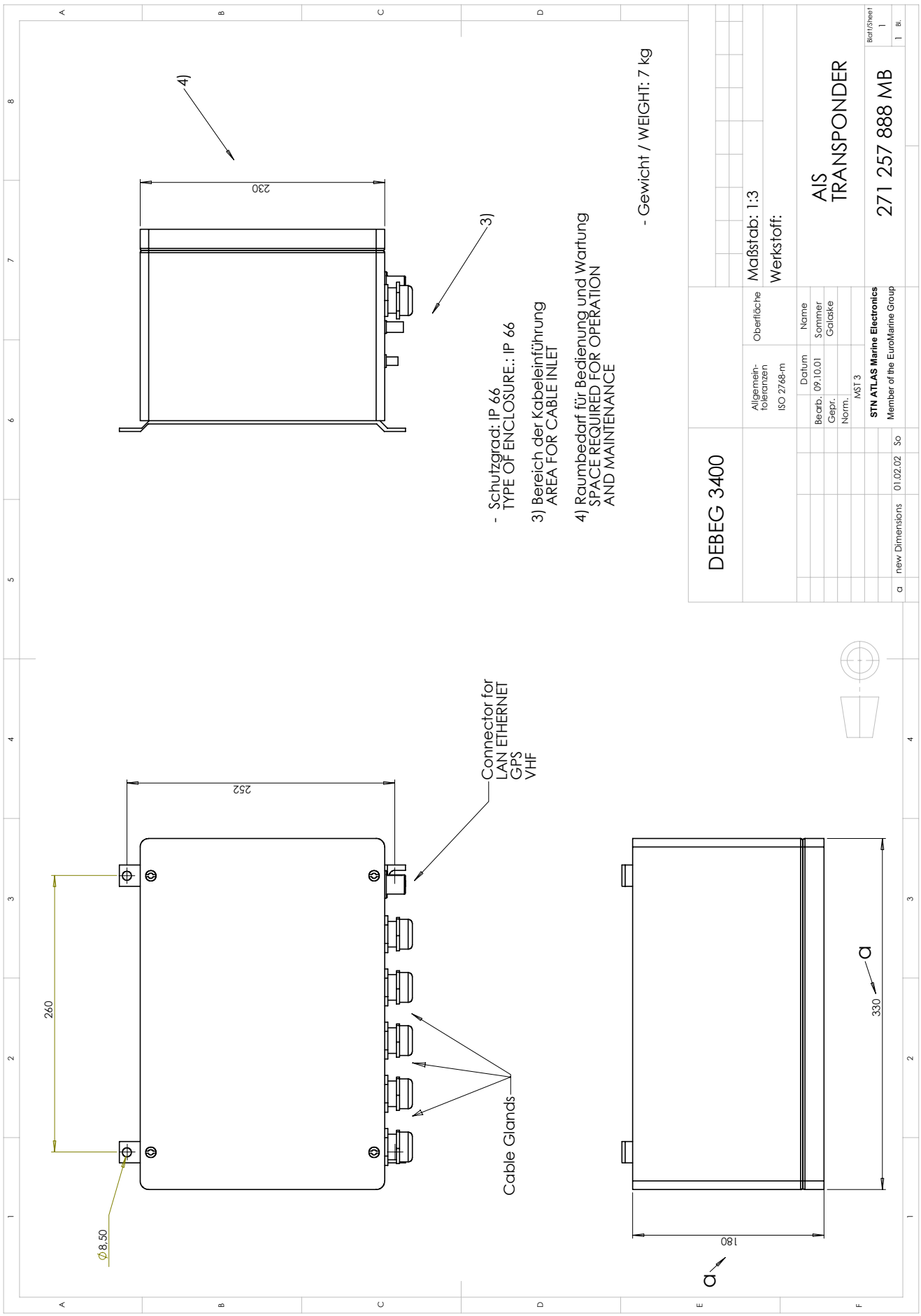


Fig. 10-1 AIS Electronics Unit (Transponder) DEBEG 3400, 271.257.888-MB

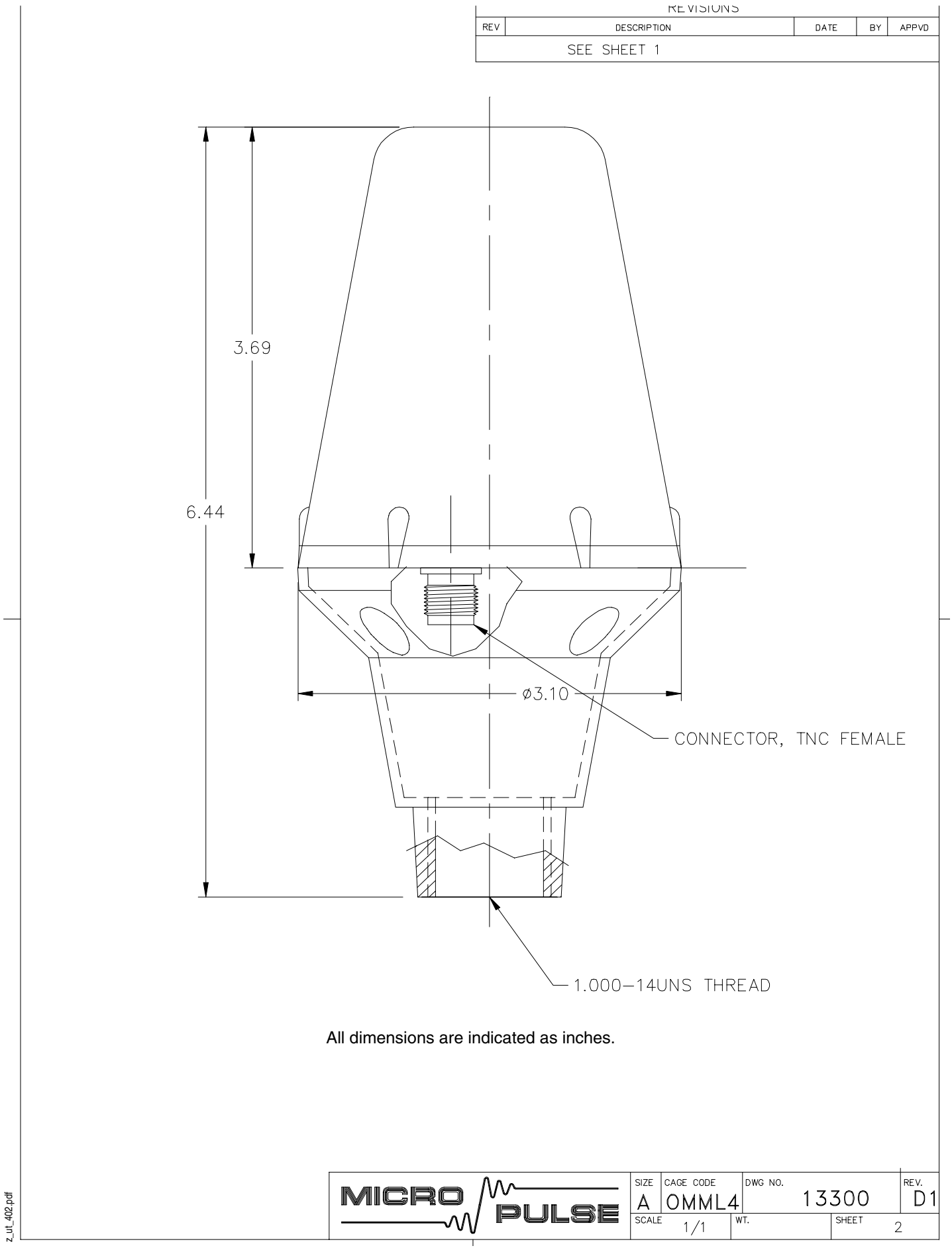


Fig. 10-2 AIS GPS antenna, 1/2

REVISIONS

REV	DESCRIPTION	DATE	BY	APPVD
C	DWG NO. 13300, REV B, DTD 11/16/95 REDRAWIN W/CHG. SEE ECO NO. 343	08/06/96	JL	09/03/96
D	SEE ECO No. 597	03/06/97	EA	
D1	ADD CODE "1" PASSIVE, ECO 1860	5/27/99	JB	

SPECIFICATIONS:

IDENTIFICATION INFO:				
1. MICRO PULSE PN:	1330FB OR 1330FW	1332FB OR 1332FW	1333FB OR 1333FW	1331FW
GENERAL:				
1. COLOR:	SEE TABLE	SEE TABLE	SEE TABLE	SEE TABLE
2. WEIGHT:	5.75 OZ, NOMINAL	5.75 OZ, NOMINAL	5.75 OZ, NOMINAL	5.75 OZ, NOMINAL
3. RF INPUT:	TYPE TNC FEMALE	TYPE TNC FEMALE	TYPE TNC FEMALE	TYPE TNC FEM
ENVIRONMENTAL:				
1. OPERATING TEMP:	−40°C TO +85°C	−40°C TO +85°C	−40°C TO +85°C	−40?C − +85?C
2. HUMIDITY:	95% RELATIVE HUMIDITY	95% RELATIVE HUMIDITY	95% RELATIVE HUMIDTY	95% REL HUMIDTY
ANTENNA ELEMENT:				
1. FREQUENCY:	1575.42 ±10.0 MHz	1575.42 ±10.0 MHz	1575.42 ±10.0 MHz	1575.42?10.0MHZ
2. IMPEDANCE:	50 OHMS NOMINAL	50 OHMS NOMINAL	50 OHMS NOMINAL	50OHMS NOMINAL
3. VSWR:	1.5:1 MAXIMUM	1.5:1 MAXIMUM	1.5:1 MAXIMUM	1.5:1 MAX
4. POLARIZATION:	RIGHT HAND CIRCULAR	RIGHT HAND CIRCULAR	RIGHT HAND CIRCULAR	RIGHT HAND CIRC
5. GAIN:	+4.5 dBiC NOMINAL	+4.5 dBiC NOMINAL	+4.5 dBiC NOMINAL	+4.5 dBIC NOM
LOW NOISE AMPLIFIER:				
1. FREQUENCY:	1575.42 MHz	1575.42 MHz	1575.42 MHz	N/A
2. IMPEDANCE:	50 OHMS NOMINAL	50 OHMS NOMINAL	50 OHMS NOMINAL	N/A
3. VSWR:	2.0:1 MAX	2.0:1 MAX	2.0:1 MAX	N/A
4. GAIN:	26.5dB ±3.0 dB	13dB ±3dB	44dB ±4dB	N/A
5. DC VOLTAGE:	5 TO 26 VDC	5 TO 26 VDC	5 TO 26 VDC	N/A
6. DC CURRENT:	25 mA TYP, 40 mA MAX	25 mA TYP, 40 mA MAX	46 mA TYP, 55 mA	N/A
7. FILTERING:	DUAL CERAMIC FILTERS	DUAL CERAMIC FILTERS	MAX DUAL CERAMIC FILTERS	N/A

ANTENNA ORDERING INFORMATION

1 3 3 X X X
- COLOR
- CONNECTOR
- AMPLIFIER
- ANTENNA BASE NUMBER

EXAMPLE: 1330FW = 133, 26dB, TNC CONN, WHITE

AMPLIFIER		CONNECTOR		COLOR		
CODE	DESCR.	CODE	TYPE	CODE	COLOR	COLOR NO.
0	26 dB	F	TYPE TNC FEMALE	B	BLACK	N/A
2	13 dB			W	WHITE	N/A
3	40 dB					
1	PASSIVE					

APPROVALS	DATE	DO NOT SCALE DRAWING
DRAWN J. LOWE	05/30/96	TOLERANCES ON:
CHECKED		.X ± .10
ENGINEER		.XX ± .03
		.XXX ± .010
		FRACTIONS ± 1/16
		ANGLES ± 1°

MICRO PULSE
ANTENNAS DESIGN & MANUFACTURE

ANTENNA–
GPS, MARINE

SIZE	CAGE CODE	DWG NO.	REV.
A	OMML4	13300	D1

SCALE	WT.	SHEET
1/1		1 OF 3

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Fig. 10-3 AIS GPS antenna, 2/2

CXL 2-1

Marine VHF Antenna

DESCRIPTION:
This maritime VHF antenna is developed for use on board ships and thanks to the 1" revolving nut mounting system it can be mounted in the mast, in the auxiliary mast as well as on the cross-beam. By means of PROCOM's flange mount it can easily be mounted even on the roof top.

Bear in mind that the higher the antenna is mounted the better coverage.

Avoid mounting the antenna parallel with and in the neighbourhood of other metal parts, such as mast, supporting wires etc. Free mounting and as high as possible is most preferable, otherwise the SWR and the radiation diagram will be influenced.

The antenna is a 1/2 λ design and this means that it needs neither loading coils, ground-plane, radials nor other auxiliary arrangements.

CXL 2-1 can, without problems, operate together with duplex filter and on the semi-duplex channels, owing to the fact that it is broad-banded (see SWR diagram). In other words, CXL 2-1 has a shipshape SWR on the RX-frequencies, which is just as important as it is for the TX-frequencies.

Furthermore, the antenna is a grounded radiator antenna and therefore it shows a DC-short across the coaxial cable.

A fiberglass conical tube completely encloses the carefully designed radiating element to assure long dependable service in all climates.

SPECIFICATIONS:

MODEL	:	CXL 2-1
ANTENNA TYPE	:	1/2λ coaxial, broad-band
FREQUENCY	:	144-165 MHz
IMPEDANCE	:	Nom. 50 Ω
POLARISATION	:	Vertical
GAIN	:	0 dBd
BANDWIDTH	:	21 MHz
SWR	:	< 1.5
MAX. POWER	:	150 Watt
CONNECTOR	:	UHF-female
ANTENNA COLOUR	:	Marine white
DIA. IN TOP END	:	8 mm
DIA. IN BOTTOM END	:	16 mm
TOTAL LENGTH	:	Approx. 1.15 m
WEIGHT	:	Approx. 300 g
MOUNTING	:	1" threaded mast tube or PROCOM's special mounting for flat surface

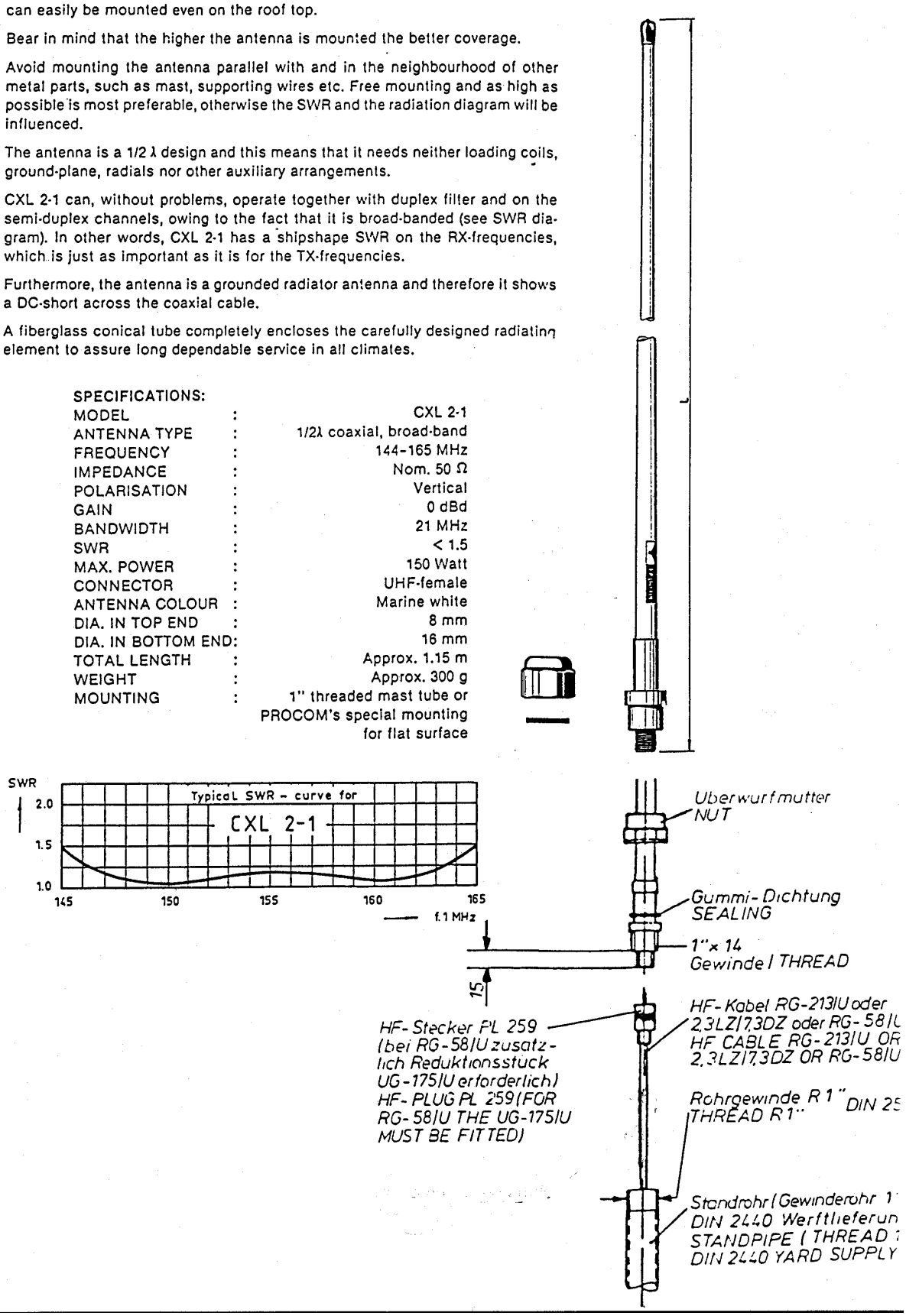

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Fig. 10-4 AIS VHF antenna

Notes

Space for your notes.