

2 SETUP, TEST and CALIBRATION



It is recommended to follow the procurement sequences.



It is recommended to note adjusted values.

For doing this SETUP procedure you have to use

- a USB keyboard
- a USB memory stick
- PS 2 mouse

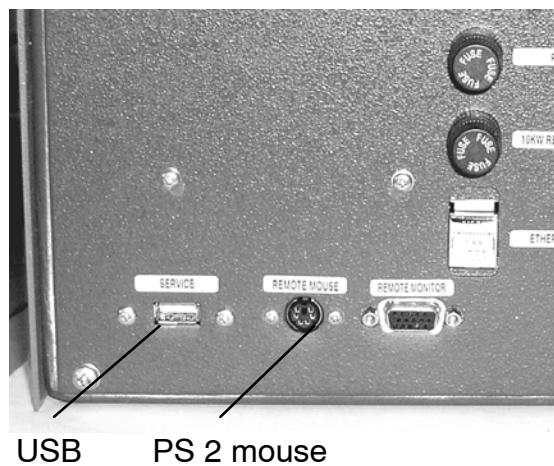


Figure: 2-1 NSC 18 back view

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2.1 System Setup and Test

1. TRANSCEIVER	Setting to define the transceivers and displays of the equipment.	see chapter 2.4
2. VIDEO SET/ TEST	Signal trigger true bearing and true distance (see also Video Levels a.m.)	see chapter 2.4.4
3. USER PREF.	<p>Setting of: Pulse with Heading line Curved Heading line Arpa Configuration CRP</p> <p>Adjustment of Transceivers: – Antenna high – Pedestal fwd/aft pos. – Pedestal port/stbd pos. – Transmission line length</p> <p>– Zero range – Antenna Azimuth Offset – Tuning preset – Noise Preset – Video Level – Sector Blanking</p>	<p>see chapter 2.6.1</p> <p>see chapter 2.4</p> <p>see chapter 2.4.3 and 2.4.5</p> <p>see chapter 2.4.5.1</p> <p>see chapter 2.4.5.2</p> <p>see chapter 2.4.5.3</p> <p>see chapter 2.4.5.4</p> <p>see chapter 21.4.1</p> <p>see chapter 2.4.8</p>
4. COM-PORTS	Setting of data for all COM ports	see chapter 2.7.1
5. DEFAULT/ TEST/SAVE	Includes: Installation test Factory test Extended tools (BITE)	actually not implemented see chapter 2.9.1
6. ETHERNET	Setting of dataformat for the ETHERNET interface	see chapter 2.8.1

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2.2 Start of System Setup and Test

The service installation and setup menu is found in the **STANDBY** (**step 1**) condition – SERV.

For Testing the menus can be used in any order .

For Installation, at new building or adding new transceivers, follow the chapter 2.4.

A keyboard is connected at the USB connector to enable entering LABEL data. Also a USB hub with keyboard and trackball is recommended for NSC18 to make mouse action faster. For software E0010 and later, a USB keyboard is not necessary, an on screen keyboard (OSK) will appear.

PASSWORD is “test”

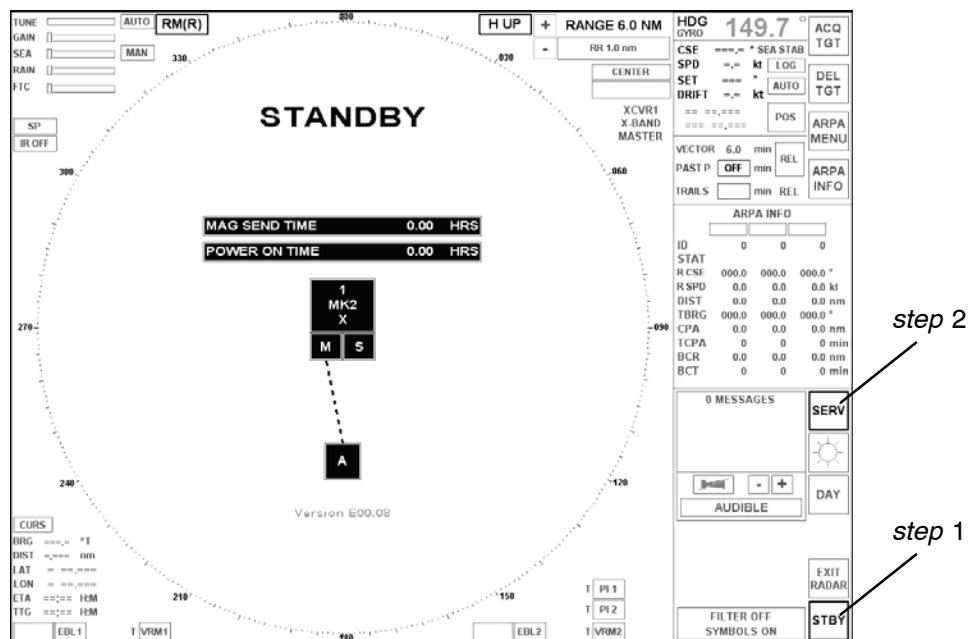


Figure: 2-2 Start of Installation Setup

Setup menu can be selected by activating “SERV” (**step 2**), see Figure: 2-2

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After Selecting “SERV” below mentioned Software–module has to be activated by a doubleclick (see Figure: 2–3 **step 1**).

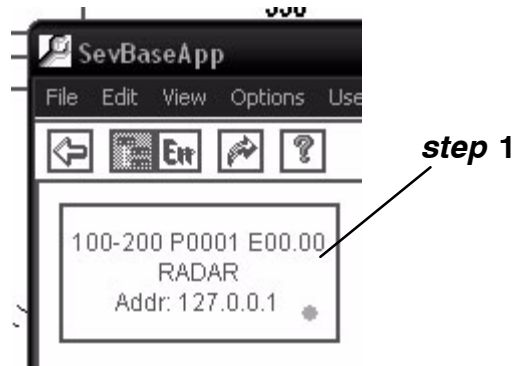


Figure: 2–3 Software module for Setup procedure

After selection of the Software–module the respective program has to be selected and started (see Figure: 2–4 **step 2**).

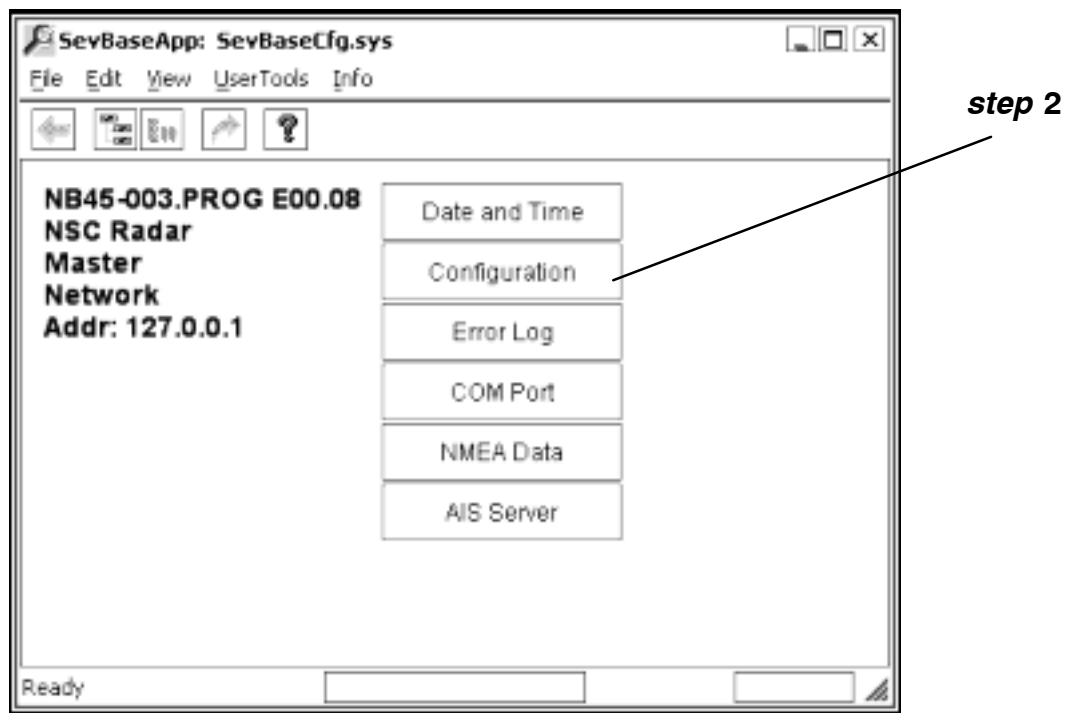


Figure: 2–4 Start program for Setup procedure

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- **Date and Time**

This is normally always U.T.C.. User can also change it at the Radar Start Menu.

- **Configuration**

This is for Radar SETUP, Oscilloscope function and some Built in Testing.

- **Error Log**

This is to save an ERROR RECORD to USB memory to send to Raytheon or your Agent or to the Radar Store to receive later.

- **COM Port (Factory use)**

Port Viewer tests all data coming into the computer before Raytheon software tries to use it. In workshop testing, connect loopback cables from out puts to inputs to use RUN.

- **NMEA Data**

This can be used to check real data inputs as seen by Raytheon Systems from Sensors.

- **AIS Server**

AIS data can be over a Network cable from ECDIS, or by direct input to an COM Port. Normally use the RADAR CONFIGURATION menu.

This menu does the same function and is not necessary except for later testing.

2.3 The Configuration Menu

2.3.1 General Information

This configuration menu is used for both NSC types (NSC 18 and NSC 25 / 34). The following Figure: 2-5 gives an overview to handle this menu.

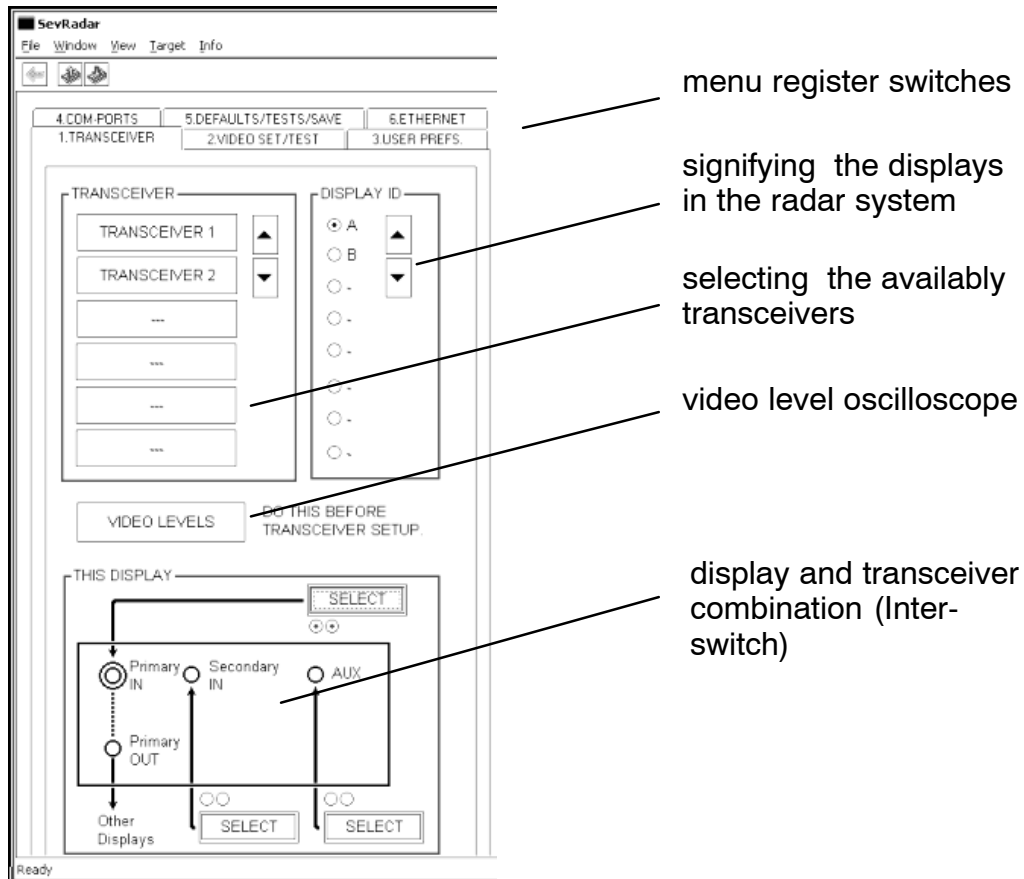


Figure: 2-5 Configuration Menu

2.4 Configuration – 1. TRANSCEIVER –

PROJECT DIAGRAM (see chapter 2.4.1)

It is necessary to know the Transceiver (XCVR1, 2, 3, 4, 5, 6) and Display (A, B, C, D, E, F) connections. Consult the project diagrams, confirm which Transceivers (XCVR) are Mk2 25kW/30kW, which are TCM (10kW) controlled. The system is completely flexible. Change or modification to the plan is always possible and can be done now.

TCM and TCU interfaces

A Transceiver Control Module (TCM) required only for interfacing to the 10kW pedestal.

A TCM is also inside remote powered interfaces called Transceiver Control Units, up to 450 meters away from the display.

NSC 18

NSC18 (10kW) always has a TCM internal for **Primary Input**.

NSC18 can have a 10kW connected directly to Primary IN using internal TCM, and/or a 10kW connected to Secondary IN using external.

NSC18 can also have two TCUs connected or ISU and TCU.

NSC 25 / 34

NSC25 or 34 can have two TCUs connected to Primary IN and Secondary IN. A third is possible using AUX. input (special order computer from factory).

INTERSWITCH LIGHT

To economies in purchase price, for two displays, an ISU is not required. But both must be in good working order for “cross-over” function.

INTERSWITCH UNIT

The function of the interswitch (ISU) is to route the downlink and uplink (XCVR control signals) between all of the XCVRs (MTRs) and Displays in the interswitch system. The advantage of ISU is “cross-over” function when one display or monitor is defective or being serviced.

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SETUP

It is necessary to set the complete ship system in this Installation menu at this display and again at each other display.

There is no exchange of interface information over network.

NSC25 (10kW) or NSC34 (10kW) use Transceiver Control Units (TCUs).

To set the configuration follow the items shown as configuration points **CP ...** .

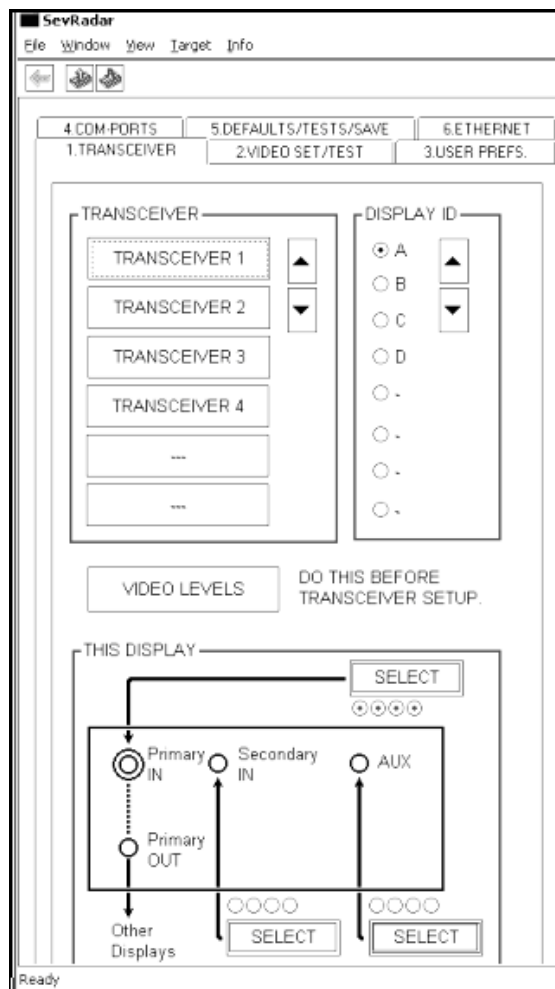


Figure: 2-6 Configuration Step One – Transceiver – (basic menu for system configuration)

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2.4.1 Project Planning (Info and Examples)

The type of radar to be installed depends on customer requirements. NSC is very flexible. Visibility is the first priority, and will determine where and what masts are necessary. When radiation safety is critical, the NSC can set Blank Sectors for any Scanner where no transmissions occur.

NOTE

NSC25 and 34 can take two TCU inputs as standard.

NSC18 can be replugged internally to also take two long distance TCU inputs, in which case, its external multipolar connector is no longer used and the internal TCM needs to be disconnected from the CAN Bus or power removed, or programmed to a spare identity of 3,4 or 5. Otherwise it will continue to react and make messages on the CAN Bus as transceiver 1, mixed with the TCU1 messages.

In principle, with workshop work, all displays can each be replugged to take 3 10kW scanners (one TCM and two TCUs for the NSC18, or three TCUs for the NSC25 and 34), however this should be ordered specially from factory or can only be done by fully trained Raytheon Service Personnel.

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Example One

The system has four radars but only two displays. Using ISU, any display can control or view any scanner. If ISU power fails, it switches direct through "fail safe". Then A will control scanner 1, and B control scanner 2 only. Scanners 3 and 4 will not operate until power is restored to the ISU.

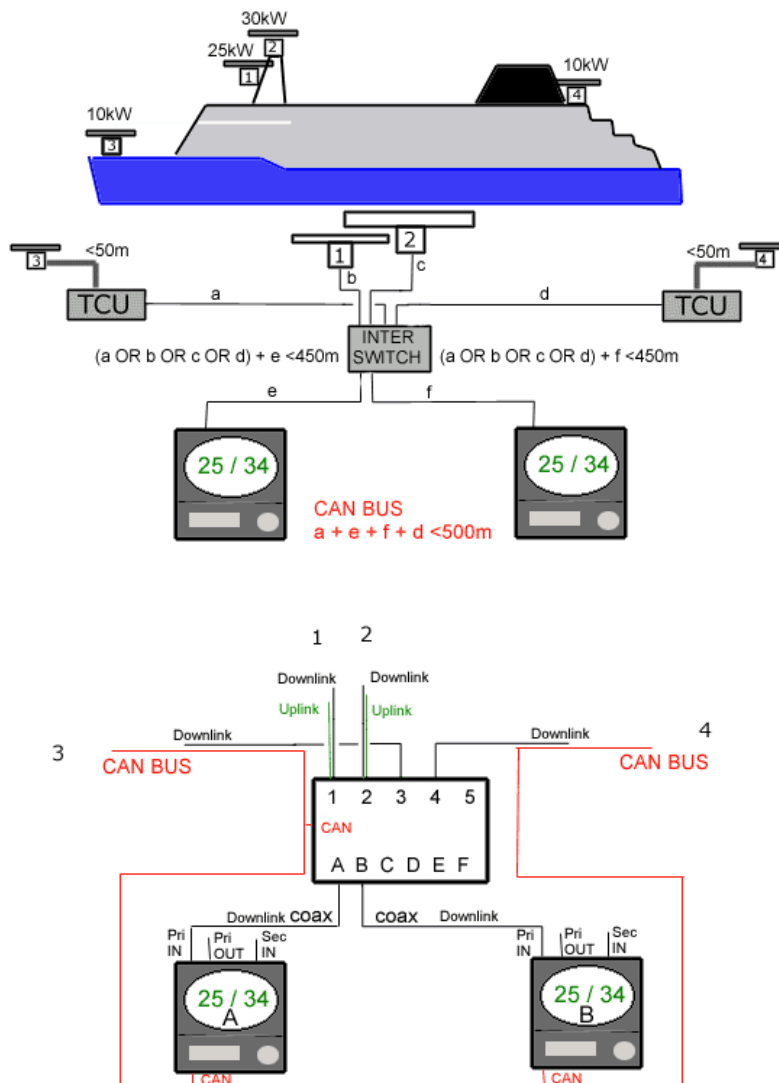


Figure: 2-7 Passenger Ferry with 4 Radars

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Example Two

The system has three radars. Using ISU, any display can control or view any scanner. Up to four Uplink/Downlink scanner types can be connected to 1,2,3,4. Connection 5 has no Uplink and is extra for Slave signal operation or for a TCU.

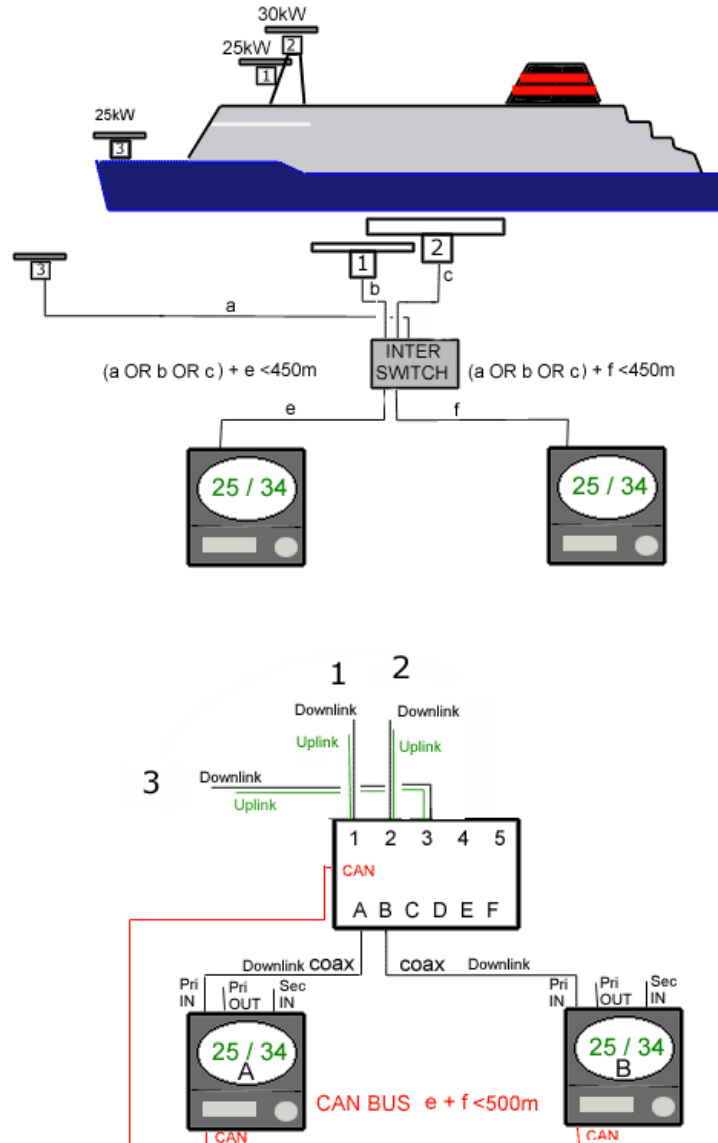


Figure: 2-8 Passenger Ferry with 3 Radars

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Example Three (in preparation)

The system has two radars. With no ISU, the primary inputs to each display are matched with Uplink outputs. The primary outputs are buffered copies of the same downlink signal. These are sent across to the other display's secondary input.

Therefore, for the other display to be able to be Slave to this scanner picture, both radar displays must be serviceable, and with power.

If one display fails or is without power, the other will be able to be Master of its own scanner only.

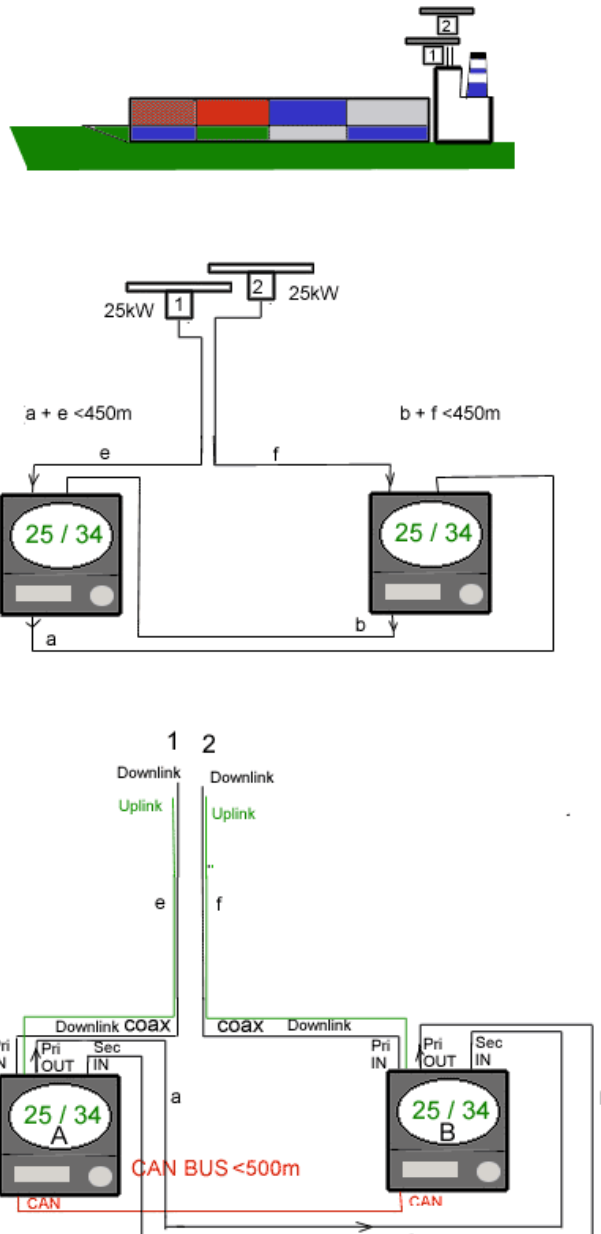


Figure: 2-9 Medium Container Ship with 25 kW

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Example Four

The system has two radars. With no ISU, the primary inputs are from the TCUs, and the TCUs are always controlled by CAN Bus. The primary outputs are buffered copies of the same downlink signal. These are sent across to the other display's secondary input.

Therefore, for the other display to be able to be Slave to this scanner picture, both radar displays must be serviceable, and with power.

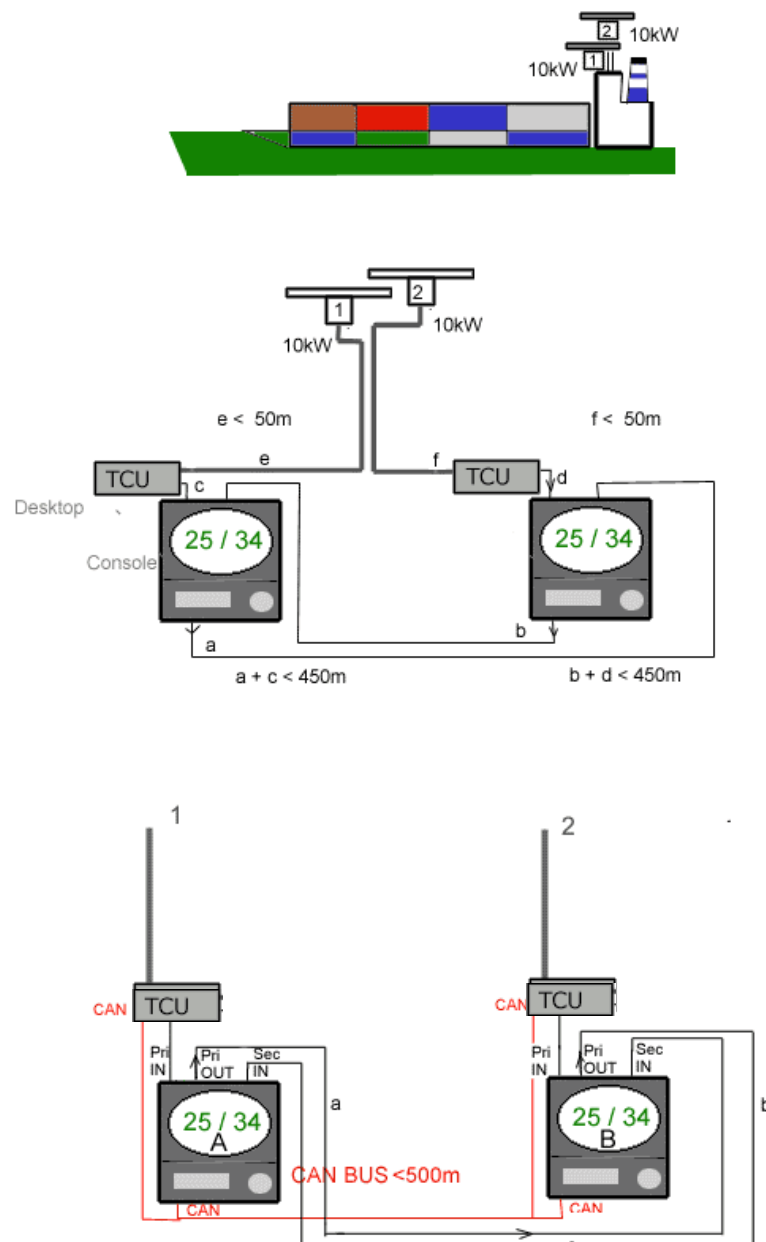


Figure: 2-10 Smaller Container Ship with 10kW

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Example Five

The system has two radars. With NSC18, a TCM is included in each display.

–The Primary input connector for NSC18 is a multipolar connector for the 10kW signal cable. This cable can be a maximum of 65 meters (tested), but 50m is maximum standard delivery length, and longer is not recommended.

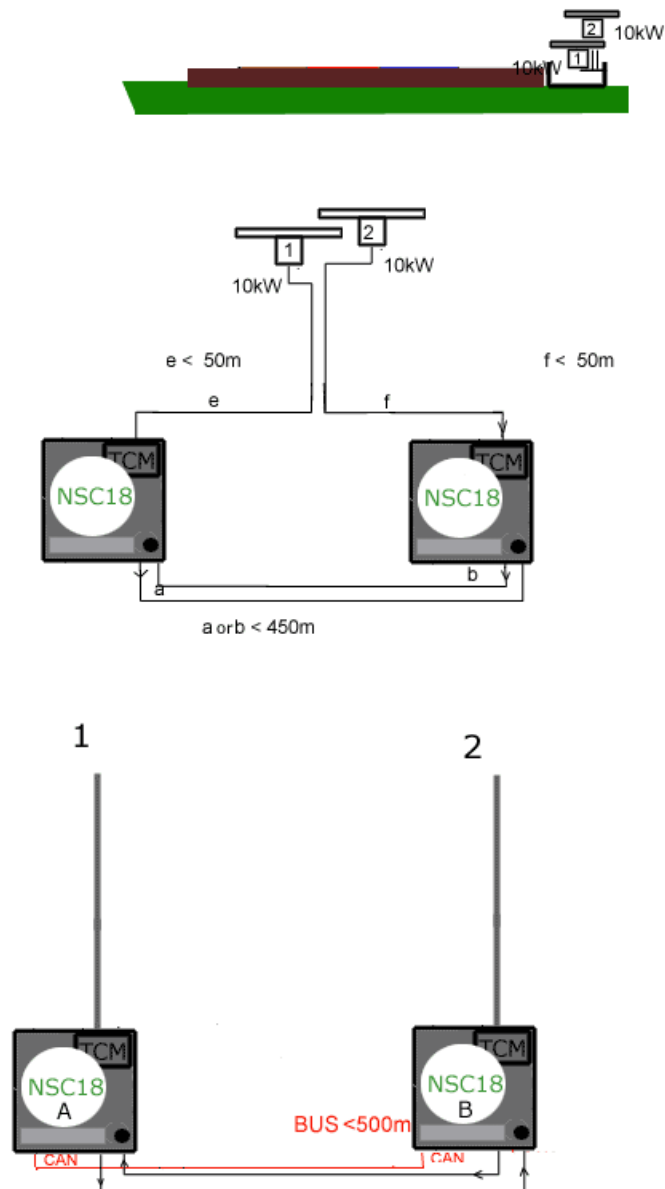


Figure: 2-11 Large Barge type vessel with 10kW

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Example Six

Some of these vessels put one radar on the wheelhouse, and one elsewhere, positioned optimum for a particular entry on one bank of a river, for example. If two are spaced apart, Blank Sectors may be needed. The cable maximum of 50m for the 10kW means a TCU is advisable for ease of cable laying, maintenance and signal quality. The first length from the 10kW to TCU or NSC18 should be as short as possible.

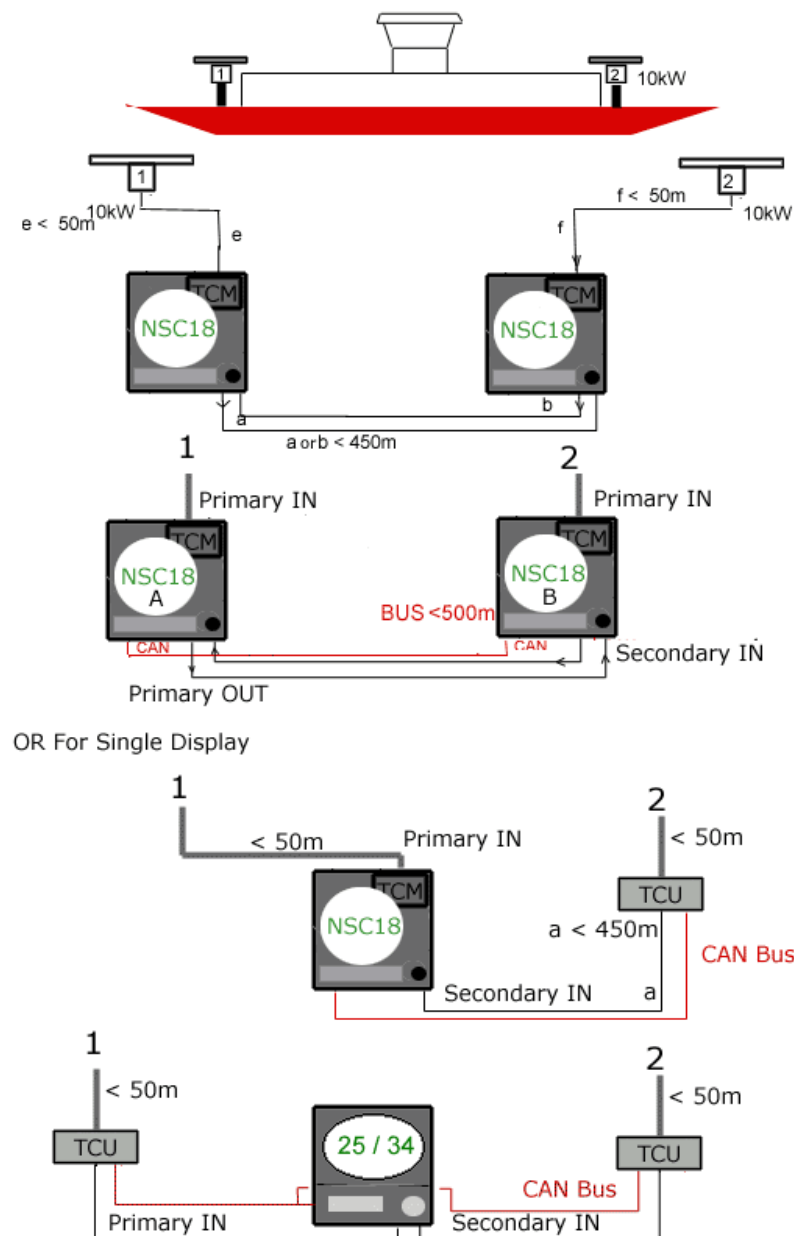


Figure: 2-12 Small or Large Ferry with 10kW

2.4.2 Using Interswitch in the System

2.4.2.1 Using the Interswitch Light Configuration (in preparation)

Refer to Figure: 2–13

CP 1.

In this example, there are XCVRs set using the down arrow key, and two displays on the vessel.

CP 2.

The button for A has been selected to name this display as A.

CP 3.

The XCVR count for This Display increases automatically in the connection diagram. Initial is all XCVRs connected to Primary IN.

CP 4.

Then the SELECT for **Secondary IN** is set at display A to receive the XCVR2 signal from Display B (see also Figure: 2–14)

The XCVR count snow shows XCVR1 at **Primary IN** for Display A, and XCVR2 at **Secondary IN**.

In this example, the installation engineer moves to Display B and sets the correct parameters there.

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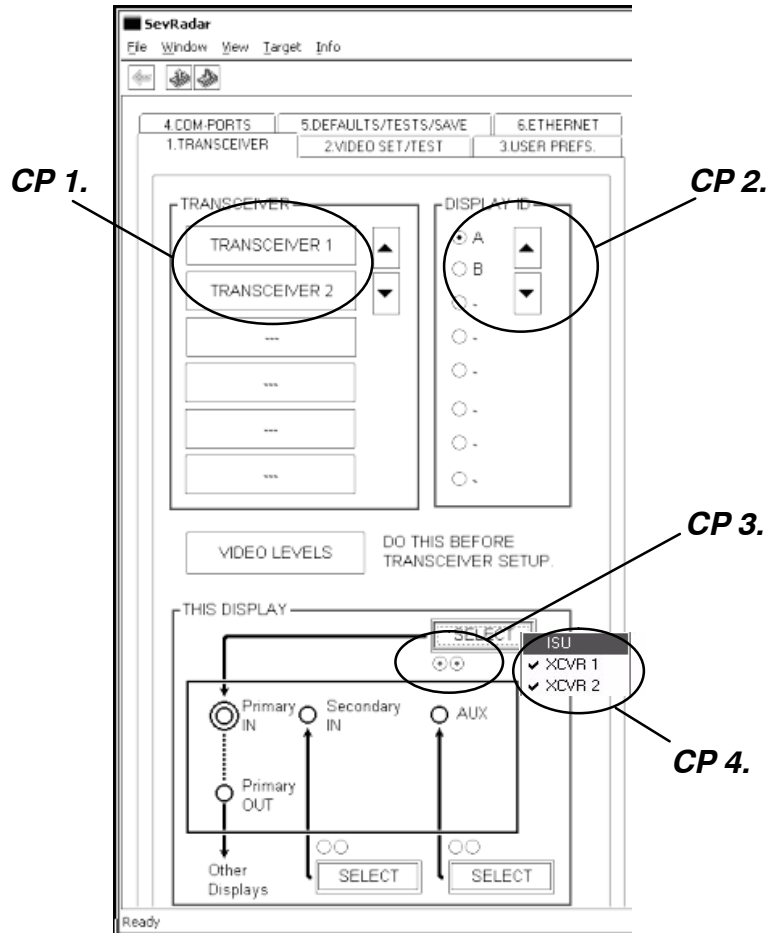


Figure: 2-13 Display A

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The next diagram shows the choice at B display, using the B display with cable connections.

CP 5.

The XCVR count shows XCVR2 at **Primary IN** for Display B, and XCVR1 data will come from A to **Secondary IN** (see Figure: 2-14).

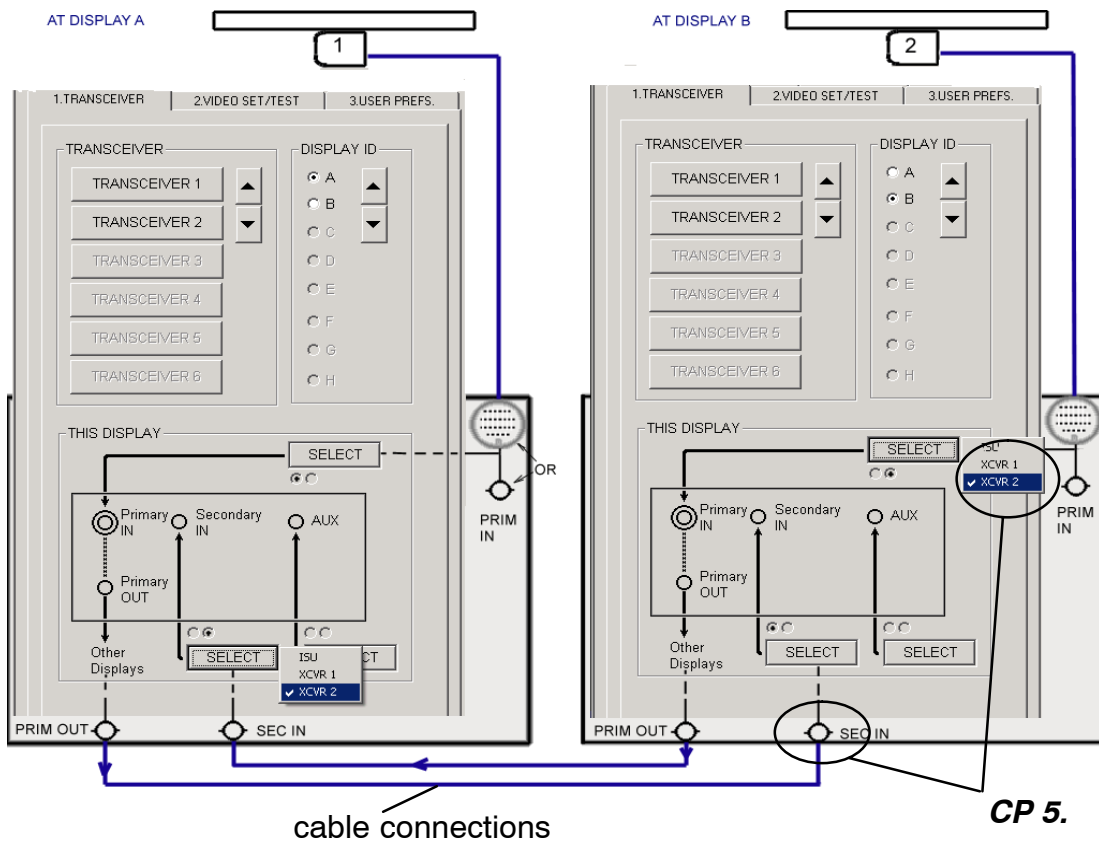


Figure: 2-14 Display B

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2.4.2.2 Using the full Interswitch Unit

Please look at Project Diagrams when an Interswitch Unit (ISU) is installed it is normal to connect to **PRIMARY IN** on all displays.

However Secondary IN can be used for ISU connection, its a free decision (for example when an NSC 18 display is used as a part of a larger ship system or used as emergency spare part to temporarily replace a defective NSC 25/34).

All displays using ISU can taken additional MK2 (Slave) or TCU (Master) signals on spare ports.

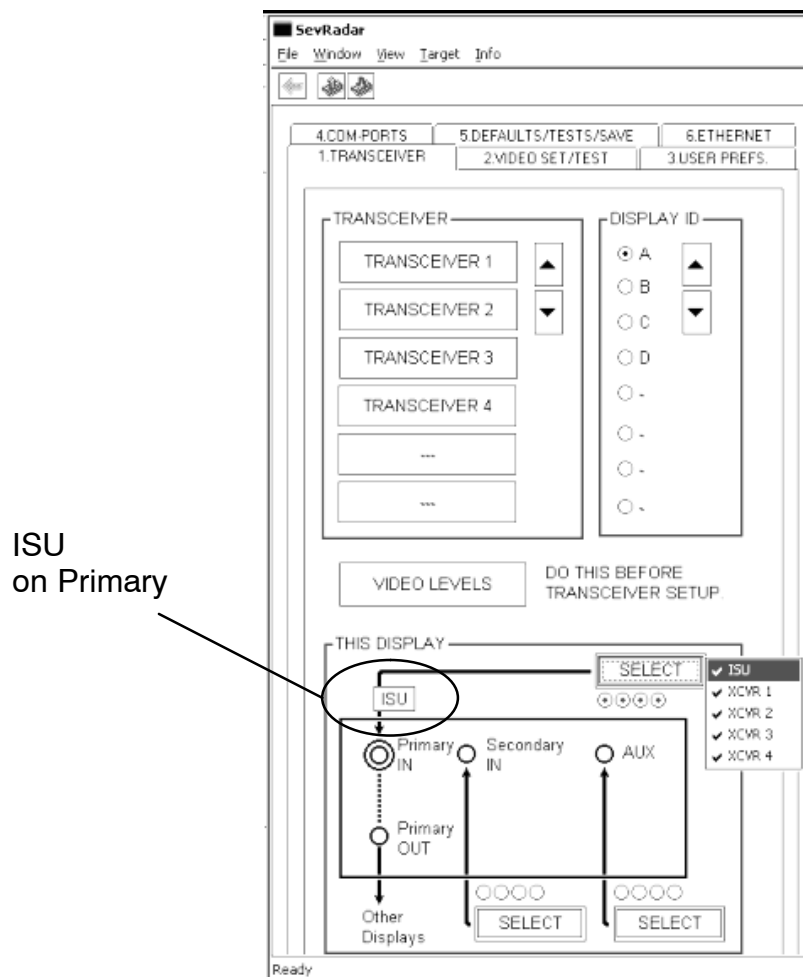


Figure: 2-15 Example with Interswitch Unit

2.4.3 Transceiver Types

NOTE

MAKE A RESTART OF RADAR. CLOSE SERV MENU AND SELECT "EXIT RADAR". RESTART THE RADAR NOW BEFORE CONTINUE THIS CHAPTER:

These details have to be entered at each display on the bridge.
There is no transfer of details from one display to the other by network.

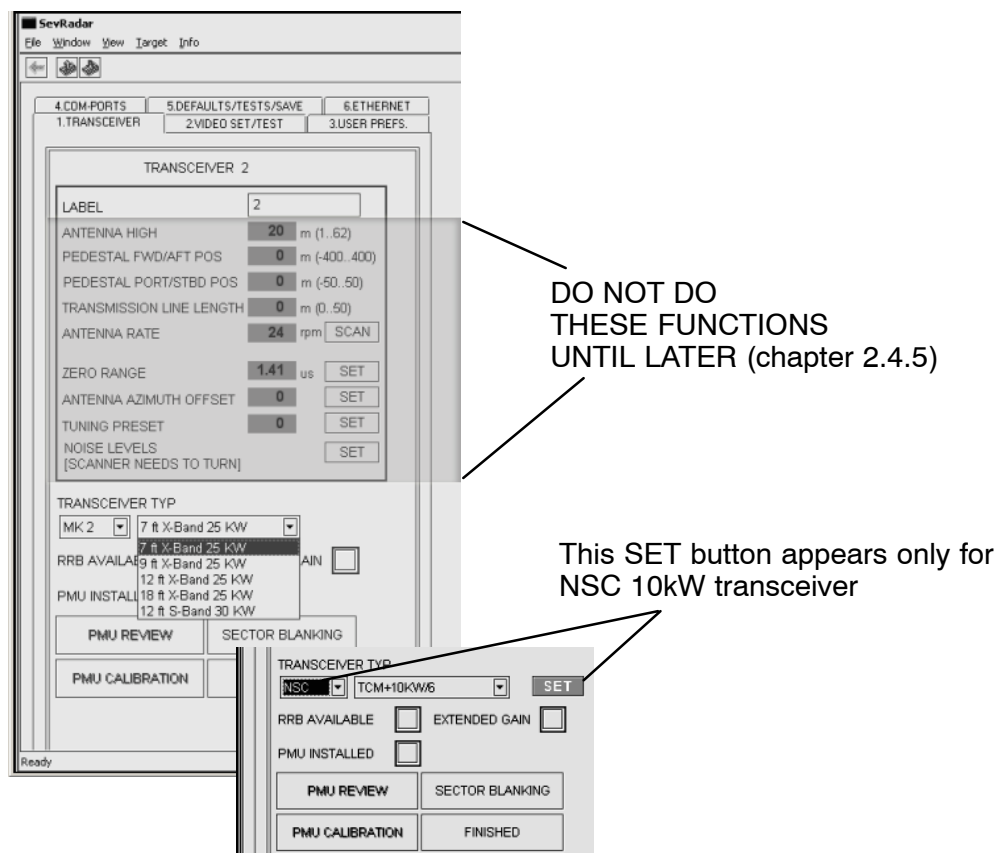


Figure: 2-16 Example for **CP 6**.

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CP 6.

First the TRANSCEIVER TYPE is selected and a label entered if desired, but this is optional. In this example (see Figure: 2–16), a Mk2 pedestal.

IF USING ONLY MK2 PEDESTALS, GO NOW TO CHAPTER 2.4.4.

IF USING TCM OR TCU TO CONNECT 10kW PEDESTALS CONTINUE HERE.

All TCM delivered from the factory are ready for connection as XCVR1 when inside TCU, and when inside NSC18.

Inside NSC18, the TCM is only connected to Primary Input and **MUST** be programmed to be controller for any Transceiver number 1 to 6. This is because the factory does not know where the project team on board choose to use other TCMs and TCUs (fully flexible).

It is necessary to “program” the extra TCMs or TCUs or NSC18 as 2 or 3 or 4 or 5 or 6 onboard the ship.

This program function is using the red SET button (see Figure: 2–16) and sends a command from this display, using CAN BUS to the internal TCM (NSC18) or external TCU (NSC25/34).

All TCM and all TCU are listening for this command at all times. Any display can be used as a tool to program any TCM or TCU because all are connected by CAN BUS.

CP 7.

Therefore before pressing SET it is necessary to have only one Display and one TCM/TCU with power.

All other equipment must be powered OFF.

The CAN BUS must be connected in full, and terminated.

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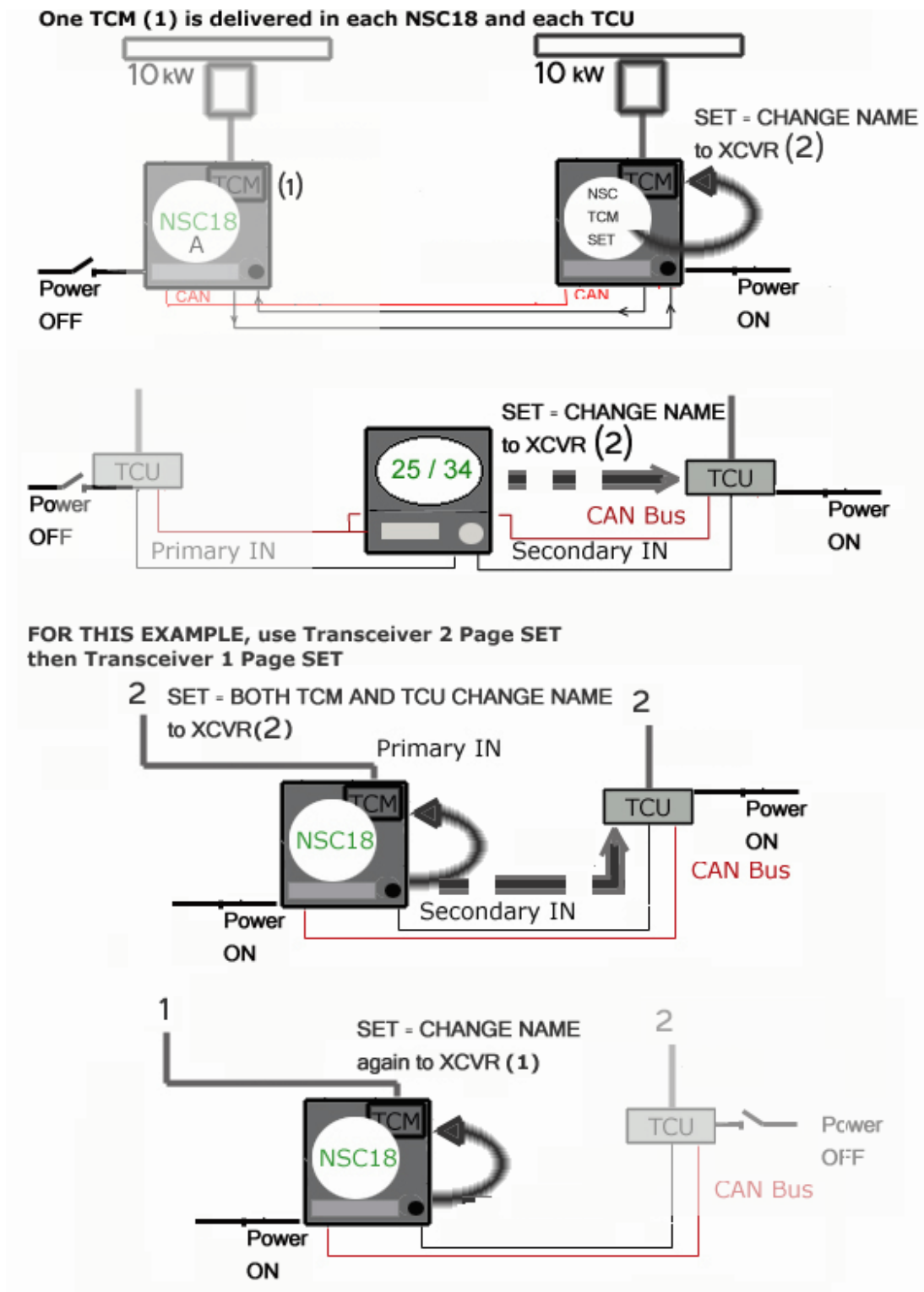


Figure: 2-17 Possible TCM / TCU (10kW) variations

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NOTE

It is optional to have power to the pedestal, not necessary to transmit. Programming can be done internally using NSC18 with TCM alone. To confirm that the TCM and TCU have been programmed correctly, it is necessary to power on the pedestal and transmit – check antenna rotation starts.

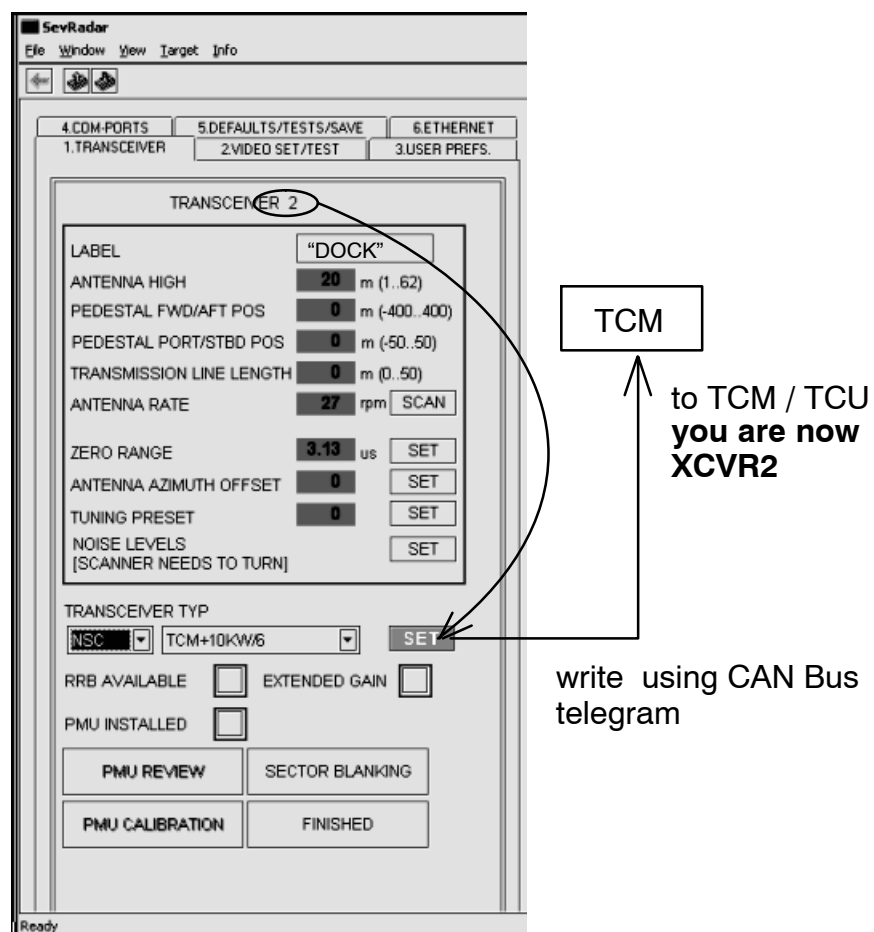


Figure: 2-18 Example **CP 8**.

CP 8.

This example (see Figure: 2-18), the local TCM or powered TCU is being programmed as XCVR2. The label is optional and the choice of the Master of the Vessel can be decided later.

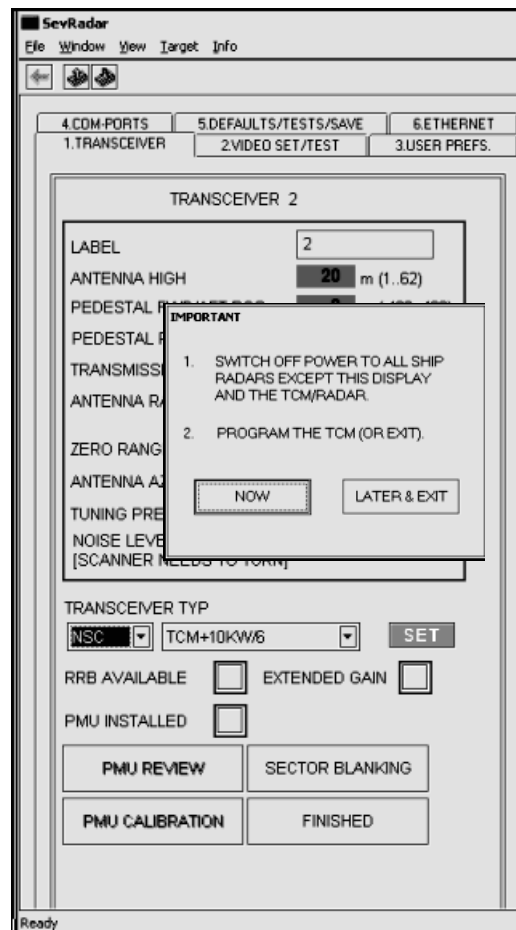


Figure: 2-19 Example **CP 9**.

CP 9.

In this example, the local TCM or powered TCU is being programmed as XCVR2. The label is optional and the choice of the Master of the Vessel can be decided later.

NOTE

For NSC18 the internal TCM that will control a 10kW pedestal is being programmed. Its number is not dependent on the display ID chosen at step (**CP 2**).

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For example:

Display B (any NSC or NSC18) can be used to program a TCU for identification as TCU/XCVR4.

When all TCM and TCU have been permanently programmed, it is possible to switch power on to all equipment at the same time on the ship. If SET is accidentally pressed again, while power is applied, then all TCM and TCU will receive the same number. The programming procedure will have to be repeated.

CP 10.

Now select FINISHED, select EXIT RADAR.

Make a new start.

NOTE

When an NSC 10kW transceiver TCU has been programmed, it is not necessary to program that XCVR TCU again from any other display. When programming other TCU XCVRs later, that XCVR MUST be switched OFF by removing power.

If this display is an NSC18, when programming other XCVRs TCUs or NSC18 TCM units, this display MUST be switched OFF by removing power because it also has a TCM inside.

2.4.4 VIDEO LEVELS

All below mentioned settings and adjustments have to be performed for each transceiver at each display. It is to recommend to note the settings.

CP 11.

Before doing this, the display must be restarted CLOSE SERV TOOL.
SELECT "EXIT RADAR" and choose RADAR RUN.

NOTE

If there is no signal trigger, the level has to be set to "400".
After that the level adjustment can be set to the yellow line (as shown in Figure: 2-20).

Before doing the zero range or noise level, it is necessary to have the correct trigger level on the XCVR selected.

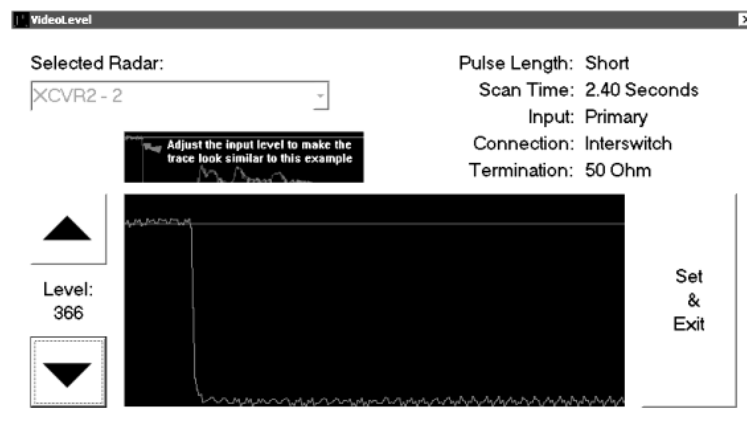


Figure: 2-20 Example (**CP 11.**)

The function is an oscilloscope for measuring the level of the signal from the XCVR that you are working with now. The tool will already know which port to measure from the information already entered at **CP 6.** to **CP 12.** repeated for a different transceiver.

Use the UP and DOWN arrow keys to set the trigger level to the yellow line (as shown in the upper right corner of Figure: 2-20).

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NOTE

The **Primary IN** Port level can also be viewed at Primary Output using an oscilloscope instead of this tool. The trigger level at yellow line is equivalent to 5V trigger level (terminated 50 Ohm), or 10V unterminated.

It is possible to continue with the full setup for this radar, (**CP 13**) onwards, or repeat (**CP 6.**) to (**CP 12.**) for each XCVR. This choice may depend on shipyard work and which pedestals have power and can rotate.

When SET and EXIT has been pressed, the measurement has been saved for this display for that XCVR only. The main radar will restart so that another different port can be calibrated.

2.4.5 Mk2 pedestals under use

Find the Common Reference Point of the ship for ECDIS or autopilot. If there is no CRP, then it is normal to choose a central point on the bridge, for example steering position.

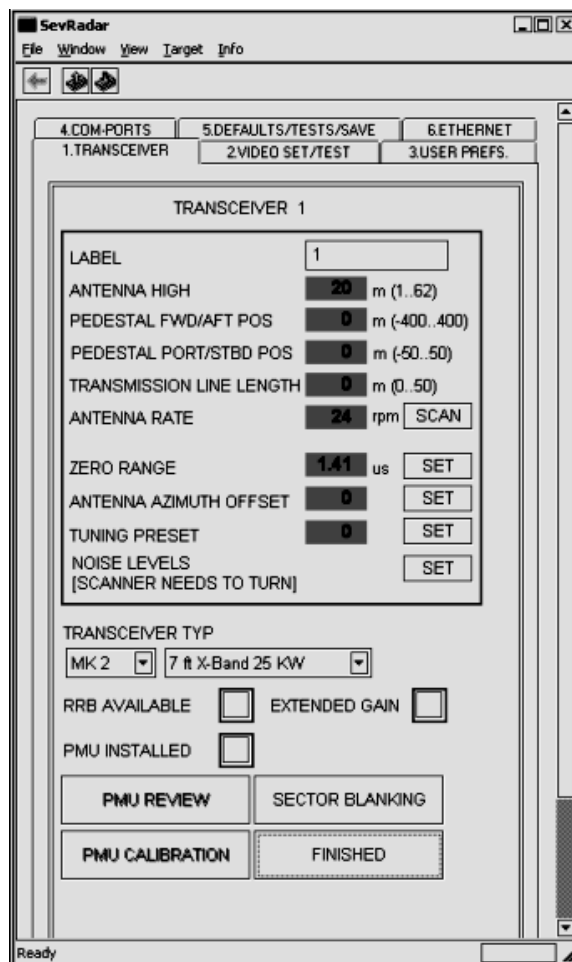




Figure: 2-21 Example *CP 12.* and *CP 13.*

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CP	Designation	Comment
CP 12.	ANTENNA HEIGHT	can be set by click and slide – is height above sea level.
	PEDESTAL FWD/AFT POS	+ = forward of the Common Reference Point (often this is chosen as the steering position on ship center lines see chapter 2.6.1).
	PEDESTAL PORT/STBD POS	+ = starboard of the Common Reference Point.
	TRANSMISSION LINE LENGTH	length of waveguide used if XCVR is MTR DOWN. All 10kW and MTR UP = 0.
	ANTENNA RATE / SCAN  VERY IMPORTANT FOR CORRECT ARPA FUNCTION.	is the normal speed in light winds. This is different for 50/60Hz power and different for 10kW pedestals. Can be set by trackball using a stopwatch, or the SCAN feature. This reference speed is used to detect if the belt or encoder slips to make ANTENNA ALARMS.
	ZERO RANGE	Adjustment of displayed distance versus true distance.
	ANTENNA AZIMUTH OFFSET	Adjustment of displayed bearing versus actual bearing.
	TUNING PRESET	This setting is essential for NSC–Radar. Is has to be performed in 4 occasions: 1 First installation 2 Magnetron change 3 Receiver change 4 Control board change By this the tuning point is set to the middle of the display.

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<i>CP</i>	Designation	Comment
CP 13.	NOISE PRESET  VERY IMPORTANT MUST BE DONE AFTER VIDEO LEVELS FINISHED	This is to adjust the gain in that manner, that also small radar contacts are displayed but not the dots caused by radar noise.
	PMU INSTALLED	For MK2 XCVR only.
	EXTENDED GAIN	Normally OFF.
	RRB AVAILABLE	This is used only for warships and rescue craft which have an receiver connected to display helicopter transponder.
	PMU	ON for MK2. OFF for 10kW TCM/TCU (manual, external PMU).
	SECTOR BLANKING	This is to set sectors in which no Radar transmission sectors is sent out. Value 0.0 is not accepted for 10kW (do not start a blank sector on ship's head).

2.4.5.1 ZERO RANGE



Figure: 2-22 Example ZERO RANGE

NOTE
It is to recommend to switch to "max 3nm" range scale.

CP 14.

ZERO RANGE – can be copied from another display where this data is already measured for another transceiver. Or press SET.

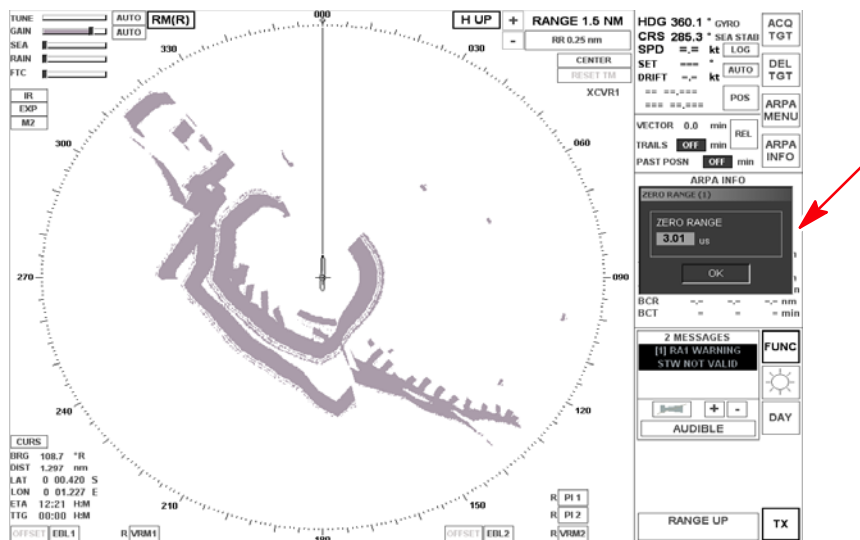


Figure: 2-23 Example CP 14.

Refer to Figure: 2-23

The XCVR is selected, the STDBY button is pressed to change status to TX. The zero range is false. The Bank to starboard is not straight as it should be compared to charts or visual. The Bank can be pulled to correct shape.

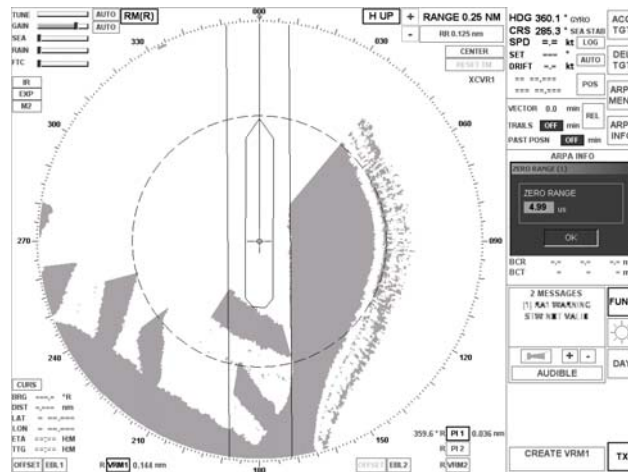


Figure: 2-24 Example **CP 14.**, continued

Refer to Figure: 2-24

The Range Scale can be reduced, Parallel Index lines are useful tools to make straight edges.

VRM can be used to measure and make a particular range.

The picture is correct when the Bank is not pulled, when it is straight.

Record this zero range to enter into the Transceiver Page on other displays concerning this XCVR.

NOTE

After Zero Range has been set, if radar presentation on ECDIS is not correct in range, investigate the Common Reference Point settings for radar and for position sensors GPS1,2 etc. in ECDIS.

If a scan converter (radar underlay) on ECDIS is not correct, check the setup menus at ECDIS.

2.4.5.2 ANTENNA AZIMUTH OFFSET

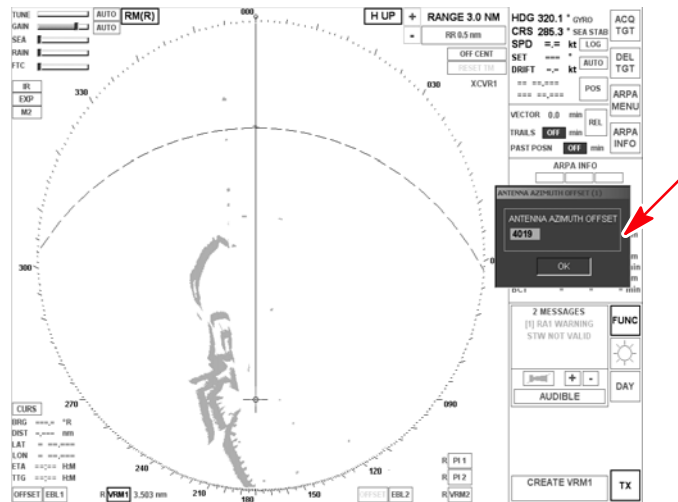


Figure: 2–25 Example **CP 15**.

CP 15.

AZIMUTH OFFSET can be copied from another display where this data is already measured for another transceiver. Or press SET.

BEST METHOD

Refer to Figure: 2–25

The XCVR is selected, the TX button is pressed to change status to TX. HUP is selected. Off Center.

The best target is something floating in the same stream of water, 3 miles from own ship. For example a tug.

This cancels the effect of drift, when we are in the same tidal stream, and makes alignment easier.

The tug can be controlled by radio to move to own ship head This is easier than trying to steam toward the tug.

SECOND METHOD

If no target can be controlled, or no target is on ship head, or own ship cannot manoeuvre, or own ship is yawing; it will be possible to use North Up mode later.

For using North Up mode, the COMPORTS menu 4 is used to enable Gyro data.

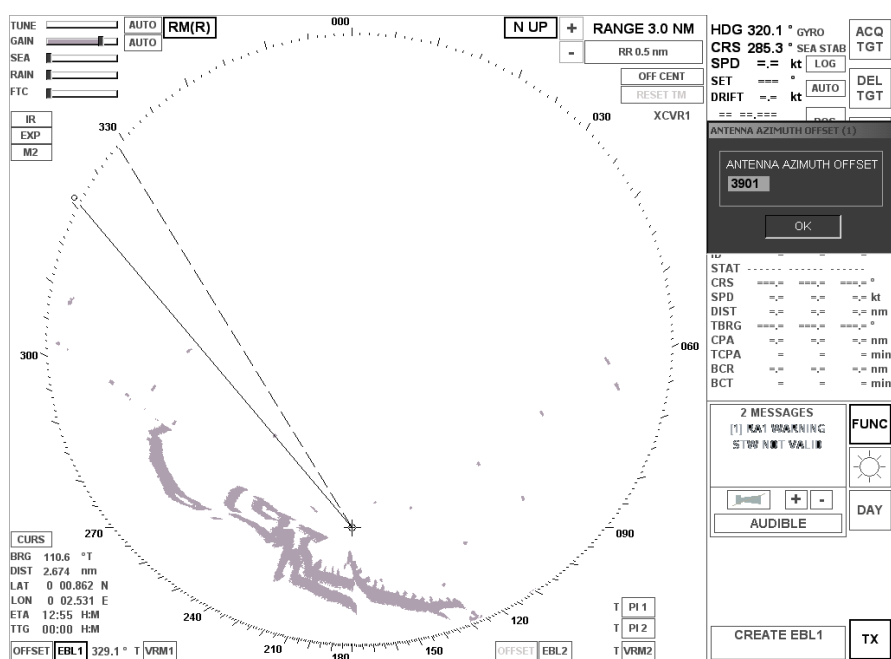


Figure: 2-26 Example **CP 15.**, continued

Refer to Figure: 2-26

An azimuth pylon, or camera is used, with the same gyro as the radar display. In this example a target is found at 329.1 degrees.

On the radar EBL1 is used to set 329.1 degrees, NUP set.

Azimuth Offset is adjusted until the video echo moves correctly to that bearing 329.1 degrees.

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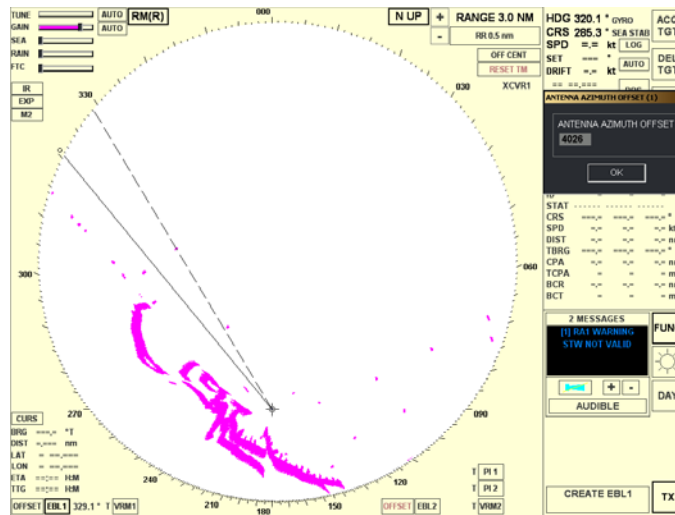


Figure: 2-27 Example CP 15., continued

NOTE

This adjustment using North Up will be unaffected when own ship is yawing or sea state is rough. The azimuth pelorus readout can discriminate to 0.25 degrees with an experienced user. Ask the Master for assistance to do this measurement well. Using gyro, because of Latitude, temperature, speed, there is always absolute error at pelorus and radar but it is the same error. Therefore the method is possible but not as good as. BEST METHOD HEAD UP (HUP).

NO METHOD

Never use a Chart with this NUP method to measure an angle from own ship position. Using Chart readouts, the absolute error of the gyro will affect the radar as usual. Comparison is not possible with true chart information which has no error. Never use an ECDIS Radar overlay.

Never use a Chart underlay for Azimuth Offset adjustment in any mode. All radar + chart presentations are affected by absolute gyro errors. The radar is not at fault, the radar azimuth offset cannot be done using those systems.

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Never use AIS target comparison.

Azimuth Offset is complete using raw video and visual targets on ship head or using pelorus. Later, if radar presentation on ECDIS or Chart Underlay is not correct, investigate the Gyro. Latitude and Speed correction, the condition of the gyro and consider service may be necessary for the Gyro.

If gyro quality cannot be improved, the ECDIS program may have Gyro correction input for the user.

2.4.5.3 TUNING PRESET

CP 16.

The radar switches to tune setup. The control of the tune bar is blocked and only possible by “+” or “-” softbutton.

- Typical values for 10kW are **80 150.**
- Typical values for MK2 is **127.**

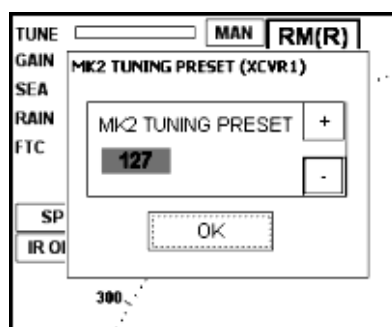


Figure: 2–28 Tuning Preset

NOTE

Be careful to ignore smaller tune points in the range **0 50.**

2.4.5.4 NOISE LEVELS

CP 17.

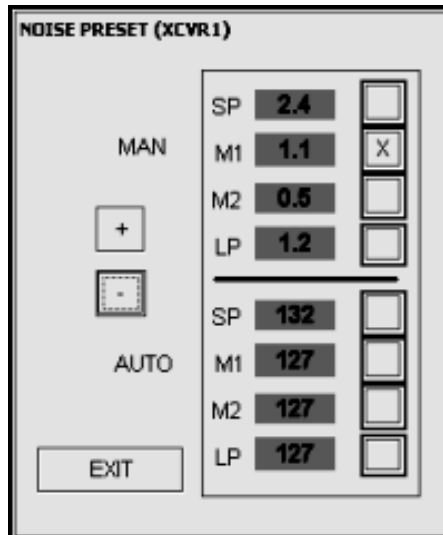


Figure: 2-29 Example to adjust Noise Preset

Noise Preset is done for MAN and AUTO anti-clutter modes.

The radar should be Master (M) of XCVR. It switches automatically to 24nm and required pulse lengths.

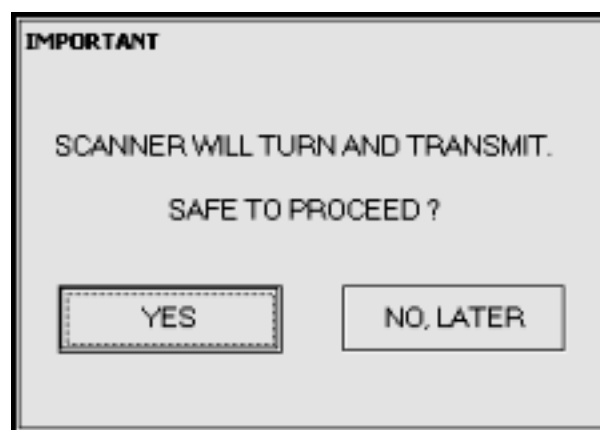


Figure: 2-30

NOTE

The scanner will turn!

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2.4.6 PMU REVIEW

Not available in the moment.

2.4.7 PMU CALIBRATION

Not available in the moment.

2.4.8 SECTOR BLANKING

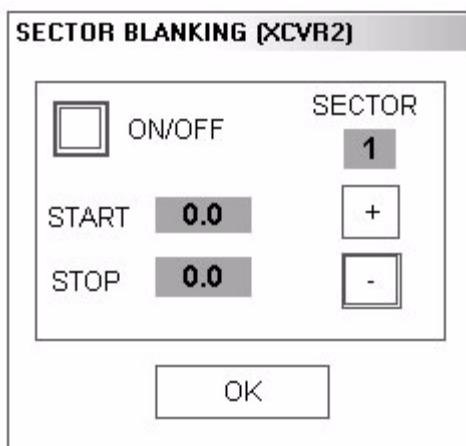


Figure: 2–31 Example to adjust Sector Blanking

CP 18.

SECTOR BLANKING is used to stop transmission only on certain sectors. This can be for safety for passenger areas on some vessels.

This can be necessary because reflections from mast structures make false indications.

After sectors have been done, a sheet must be given to the the Master and in this book for each XCVR.

The Operator will be able to switch all ON or OFF in normal use, but not able to modify the sectors.

(The radar will start up for the user with sectors blanked).

The blank sectors for each XCVR are best copied into each display for each XCVR.

However, they are stored permanently in the XCVR itself or its TCM.

The displays SERV menus are used as editors for those sectors stored in the pedestal or TCM/TCU.

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2.4.9 FINISHED

FINISHED means all details have been written into this display for that XCVR.

2.5

Configuration 2.VIDEO SET/TEST (see chapter 2.4.4)

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2.6 Configuration – 3.USER PREFS. –

2.6.1 USER PREFS

USER PREFS – User Preferences

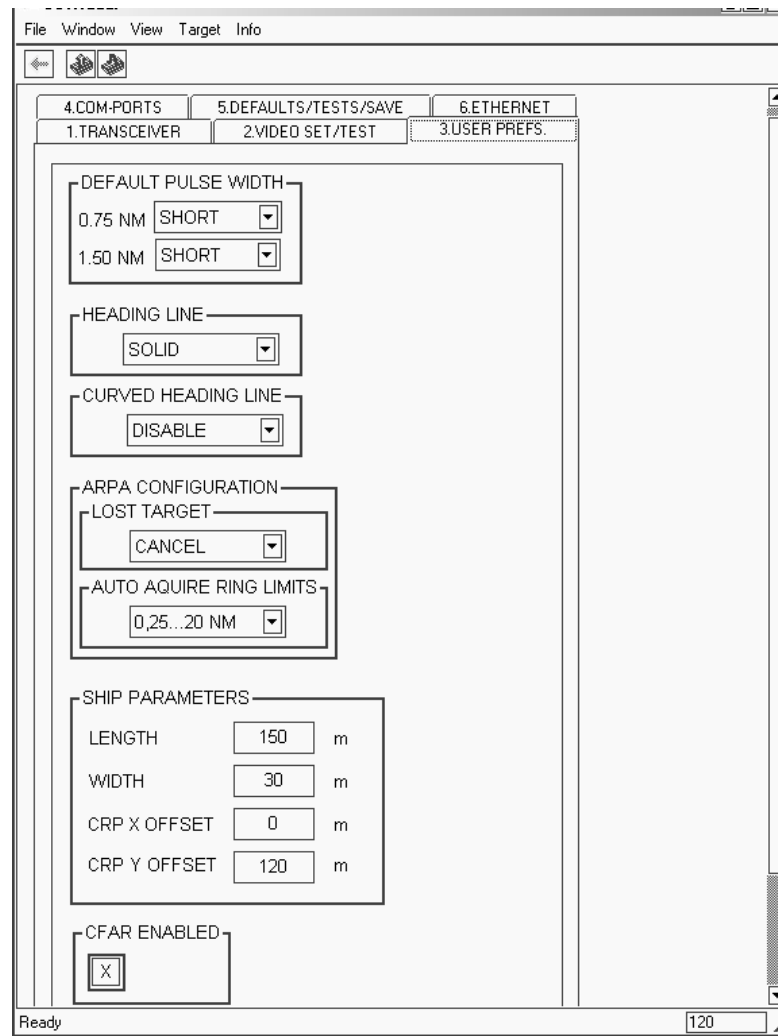


Figure: 2–32 Example **CP 19**.

CP 19.

These preferences will affect this display only.

These preferences apply to any XCVR in use from this display.

- **DEFAULT PULSE WIDTH – SHORT.**

Some users may prefer to begin these ranges in MED1 pulse.

User change to SP is still possible in normal use.

NOTE

DEFAULT PULSE WIDTHS:

Will apply for all XCVRs the same, at this display. Other displays can have different defaults. The display which is MASTER controls the use.

HEADING LINE – Normally SOLID.

When a user requires to see video under the Heading Line, there is a key on the panel HL Off.

CURVED HEADING LINE: When autopilot data is available, using ARCP (Autopilot Remote Control Panel).

The radius and delay are automatically applied to the NSC radar curved heading line feature. At the first version of NSC there is no manual curved heading line feature when autopilot not connected.

Refer to Figure: 2–32

CP 20.

- **ARPA CONFIGURATION**

LOST TARGET:

CANCEL means a lost track will be deleted automatically after ********* seconds, after a warning has been made.

COAST means a lost track will continue in dead reckoning at last known course and speed after a warning. The user must delete.

A Coasting track will not be re-acquired.

Coasting assists the user to find a track that temporarily faded or

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moved through blank sectors. The disadvantage of COAST is that they continue tracking out to maximum range, even with no echo to follow.

AUTO ACQUIRE RING LIMITS:

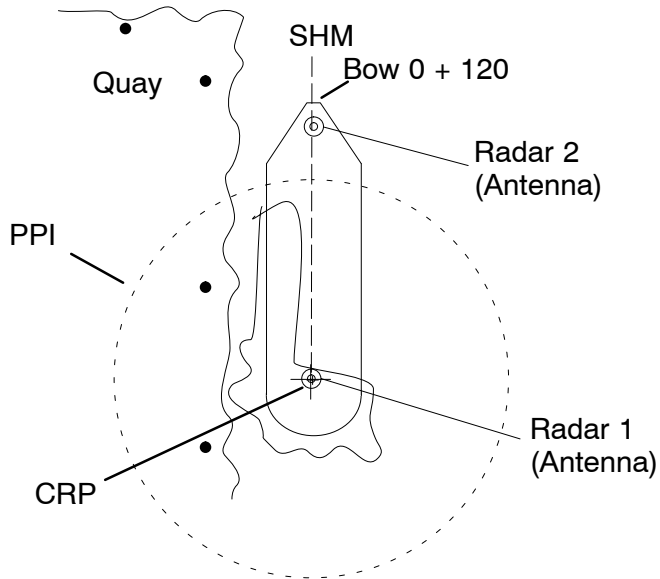
Some authorities required that auto acquire was limited to 3 – 6 nm.
Default is 0.25nm to 20 nm.

The NSC user has auto acquire zones, polygon, sectors, rings and without limits.

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● SHIPS PARAMETERS

Refer to Figure: 2-32 and Figure: 2-33



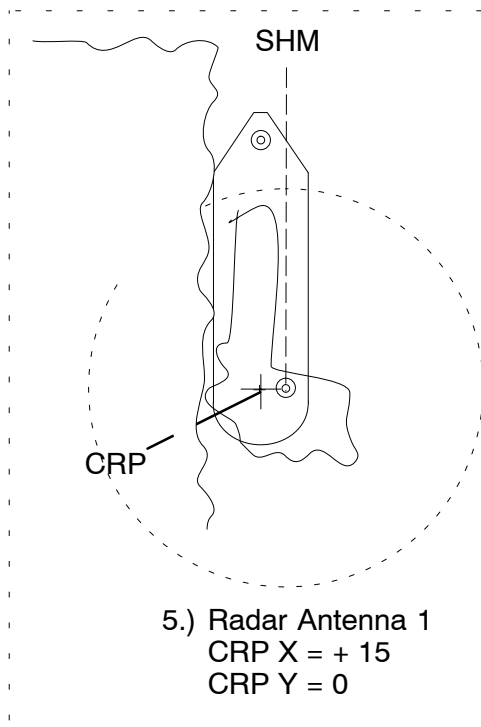
- 1.) Ship has two Radars
- 2.) Ship Bow CRP defines where is CRP

3.) Radar offsets is not yet done

4.) Picture not correct

- ⊙ Radar position
- + Common Reference Point (CRP)

AT DISPLAY A



AT DISPLAY B

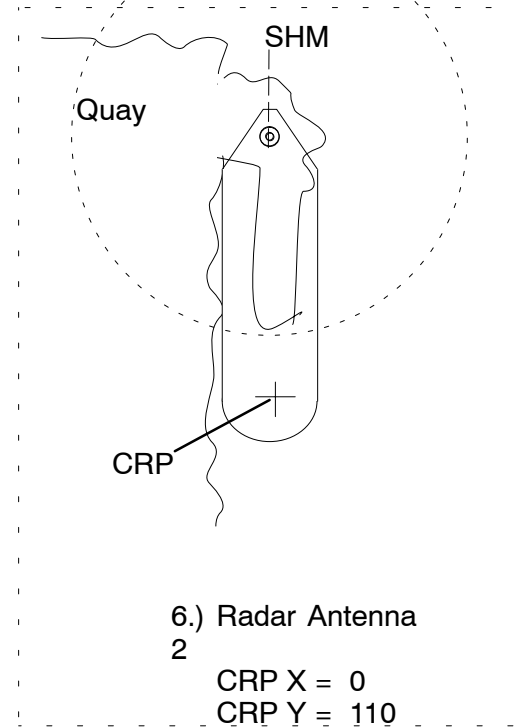
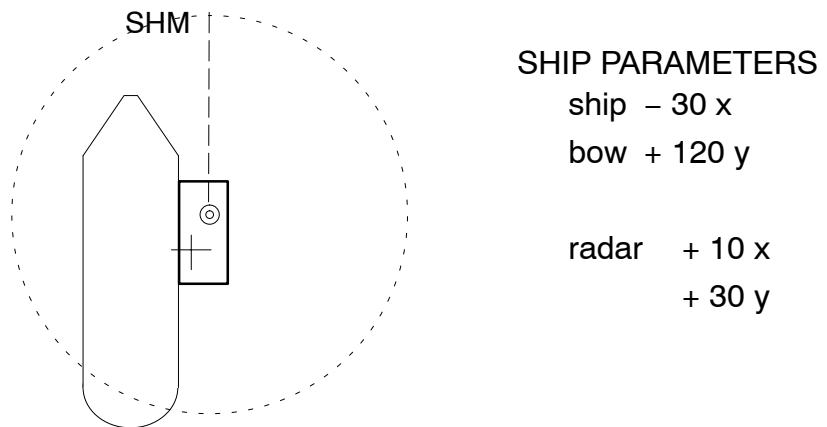


Figure: 2-33 CRP (Common Reference Point)

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If you do not know the CRP (Common Reference Point); or nobody can decide; or the retrofit vessel has No CRP, it can be decided now. When these ship details SHOW where is the bow forward of the CRP – this defines the CRP.

The CRP can be anywhere, for example the steering position. The user preferences ship parameter X and Y show where is the bow from CRP.



SHIP PARAMETERS
ship - 30 x
bow + 120 y

radar + 10 x
+ 30 y

Figure: 2-34 Example – Aircraft Carrier –

2.7 Configuration – 4.COM-PORTS –

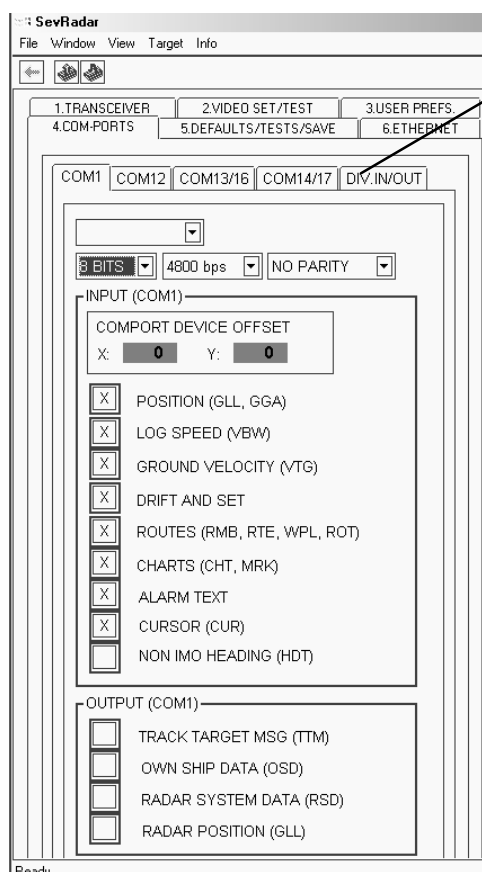
2.7.1 COM PORTS

(see connection diagram 900-012.HP012)

5 INPUT, 3 OUTPUT.

Ports 1,11,12,13,14,15,16,17 RS422 Input and Output,

There are no ports 2,3,4,5,6,7,8,9,10



COM 1

INPUT COM 1 (RxD 1)

OUTPUT COM 1 (TxD 1)

COM 12

INPUT COM 12 (RxD 12)

COM 13/16

INPUT COM 13 (RxD 13)

OUTPUT COM 16 (TxD 16)

COM 14/17

INPUT COM 14 (RxD 14)

OUTPUT COM 17 (TxD 17)

DIV.IN/OUT

INPUT COM 11 (GYRO 11)

INPUT PULSLOG

OUTPUT COM 15 (XCVR Uplink 15)

Figure: 2-35 Example (**CP 21.**) (COM Ports)

CP 21.

COM PORT 11, 12, 13, 14 OUTPUT are not used, not accessible, not configurable except for loopback test programs.

COM PORTs 15, 16, 17 INPUT are not used, not accessible, not configurable except for loopback test programs.

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COM PORT 1 INPUT (Terminal module U14), 1+, 20–

Can be any input data, but is the only standard port possible for AIS @ 34800 baud.

AIS data can, as alternative, come from ECDIS or another NSC Radar Display using the LAN. ARCP data can be mixed with other data (e.g. with Nav. Manager) and is automatically accepted.

DIV.IN/OUT

COM PORT 11 INPUT (Terminal module U14), 2 +, 21–

automatically reserved only for Raytheon Course Bus INPUT or Fast NMEA (GYRO).

COM PORT 15 OUTPUT (Terminal module U14), 17+, 36–

automatically reserved only for Mk2 Uplink Control cables OUTPUT for Mk2 pedestal XCVRs.

PULSLOG ON/OFF (Terminal U13), Status Input IN1, IN2, IN3

Examples:

SENSOR	LABEL (see Figure: 2–36)	PORT
1.	⇒ LOG ⇒	COM 1 RxD
2. AIS	⇒ ECDIS Server ⇒	ETHERNET
3. AUTOPILOT	⇒ ARCP ⇒ ⇐ ⇐	COM 13 RxD, 16 TxD or 14, 17 or COM 1
4. ROUTES	⇒ ECDIS ⇒ ⇐ ⇐	COM 14 RxD, 17 TxD or 13, 16 or COM 1
5. POSITION	⇒ GPS ⇒	COM 12
6. VDR	⇐ ⇐	COM 1 TxD

NOTE

For ARCP bidirectional configuration, the label ARCP must be used.

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CP 22. Examples

DIV.IN/OUT

COM11 can be selected as Course Bus or Nav. Data Repeater/CAN BUS or Fast NMEA.

COURSE BUS is supplied by STD 20, STD22 or NDR

Non-Raytheon Digital Repeaters with synchronization functions (ADITEL products) make Course Bus. Raytheon Nav. Data Repeater (NDR) can also make course bus.

NAV DATA REPEATER is a Raytheon product accepting many step or synchro types.

NDR can be connected anywhere to the CAN BUS providing fast gyro data. Raytheon STD22 compass can also provide gyro data on the CAN BUS.

FAST NMEA is an international standard. Normal connection is by SERIAL IO (COM11).

Special projects have internal connection to an RID pcb (normally only military).

SLOW NMEA

If one of the COM Ports NMEA is receiving HDT or VHW telegram and has been selected see chapter 2.7.3, and if all other gyro connections fail, or are not possible, then SLOW NMEA can be selected.

The tracker is, then not IMO ARPA and the radar filter will not function to best performance.

CP 23. Examples

DIV.IN/OUT

XCVR (COM15) Unlike Mk2 RPU systems, the Uplink from NSC is not a paralleled system.

MK2 UPLINK is a dedicated uplink stream that will transmit to one Mk2 pedestal when this display is Master. It is also used to link up to an ISU. Normally ON = X.

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If this display is connected to more XCVRs using an ISU, its commands are made by CAN BUS to the ISU and converted there to Uplink. If the ISU goes power off, all the ISU relays switch the uplinks straight through, ISU 1 in to ISU 1 (A) out, ISU2 in to ISU 2 (B) out etc.

If this display is connected to another display without ISU (Interswitch LIGHT), and is set to Master of the other XCVR e.g. this display A controls XCVR 2, the commands are sent by CAN BUS from display A to B and converted there into Uplink commands. Therefore COM15 is only hardwired once to one pedestal or the ISU.

The Uplink will only function in a connection to its primary XCVR whose downlink comes to its primary input port (via Interswitch ISU or direct connection).

CP 24.

COM1 (1+, 20-) COM12 (3+, 22-), COM13 (4+, 23-) and
COM14 (5+, 24-)

INPUT ports for normal NMEA and/or ARCP telegrams 4800, 8, 1, N or
AIS 38400 baud COM 1 only.

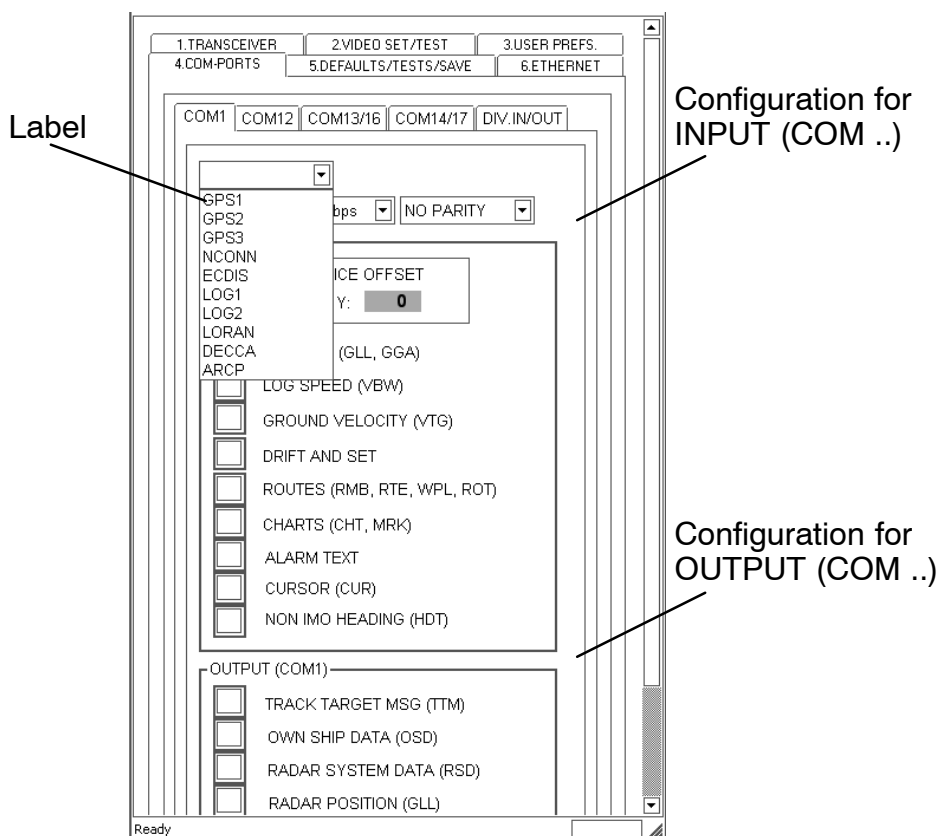


Figure: 2-36 Example (CP 24.)

2.7.2 Label

The label (see Figure: 2–36) at the top will appear in the User selection menus for LOG or POS.

There are default values if not using a keyboard.

5 Characters maximum.

NCONN = input from a Navigation Manager showing the Selected Sensor on the Nautoconning of an IBS.

ABCDE = Double clicking the label area with trackball and entering letters with USB keyboard e.g. AP10, SAGEM.

2.7.3 Configuration INPUT (COM)

COM PORT DEVICE OFFSET – The distance of the sensor from the Common Reference Point. The CRP can be chosen as the center of the bridge.

Distances are meters of the sensor from the CRP not from the radar, not from the display.

x= *****, y=*****

For ECDIS data, the data is already corrected for CRP, so the values are Zero.

POSITION – GGA or GLL:

<p style="text-align: center;">NOTE</p>

<p style="text-align: center;">RMC sentence is not read by NSC</p>

LOG SPEED – VBW: Speed through Water and/or over Bottom ahead/port/starboard.

NSC does not auto select. User must select.

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GROUND VELOCITY – VTG. Normally from GPS. Bottom vector of Course Made Good and Speed Made Good.

DRIFT and SET: NSC offers the user Automatic (VBW Water data is subtracted from VTG Bottom data), or read NMEA, or enter Manually at the PPI.

ROUTES – RMB: This is the "lollipop" symbol drawing a straight line from own ship to next waypoint. GPS data.

ROUTES – RTE WPL. List of waypoint numbers in the actual route. Waypoints from either GPS or ECDIS

ROUTES – ROT. This is another alternative method for the list of waypoints in a route from GPS or ECDIS.

CHARTS – CHT; MRK: These are SENC functions coming from ECDIS

ALARM TEXT: These are IBS system alarms from central alarm system and Navigation Manager

CURSOR – CUR: This is the ECDIS cursor position.

NON IMO HEADING – HDT: (ARPA requires Fast NMEA or Course Bus.)
This is slow NON IMO heading alternative.
Normally do not use this (see **CP 23.**)

NOTE

For ARCP (Autopilot Remote Control Panel) no data types need to be selected (the port is handled automatically).
But ARCP must be the label (see chapter 2.7.1 **CP 21.** .)

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2.7.4 Configuration OUTPUT (COM)

CP 25.

COM 1 (8+, 27-) COM 16 (11+, 30-) COM 17 (13+, 32-)

OUTPUT ports for normal NMEA and/or ARCP telegrams 4800, 8, 1, N

TRACK TARGET MSG (TTM) The track number as seen on the PPI with ARPA data.

OWN SHIP DATA (OSD): The Course and Speed of the vessel as displayed now by this Radar Display. For ships with NDR, and no other digital data, this can be used to forward data to ECDIS. However, with this method, the radar must always be ON for ECDIS to show HDG additional to GPS vector

RADAR SYSTEM DATA (RSD): The Range Scale in use, the Radar Cursor position.

RADAR POSITION (GLL): When Dead Reckon is in use, ARPA has an auto drift function for corrected/improved DR.

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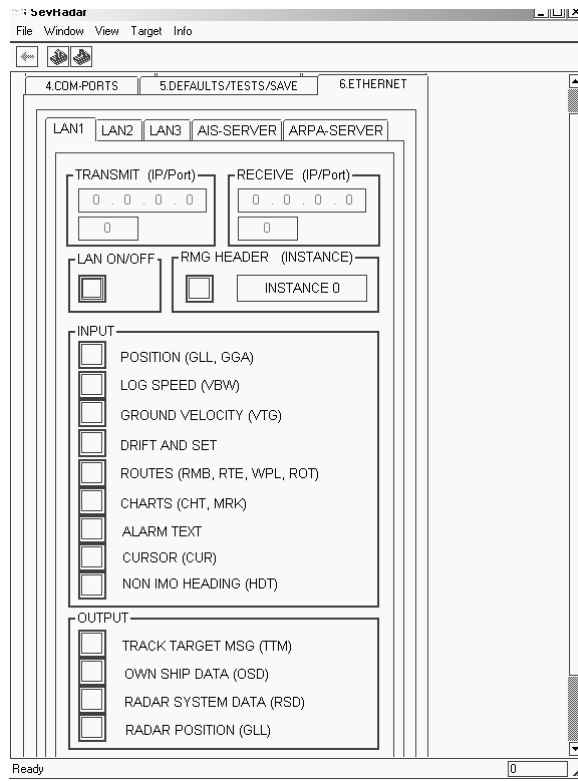


Figure: 2-37 Example (CP 25.)

2.8 Configuration – 6.ETHERNET –

2.8.1 ETHERNET

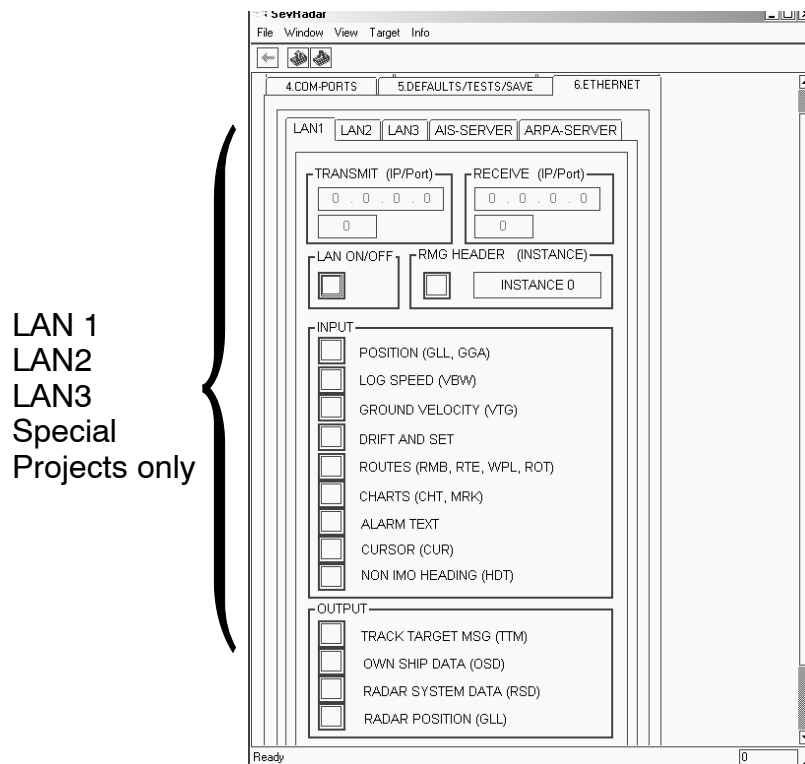


Figure: 2–38 Example (ETHERNET –LAN)

CP 26.

The LAN connections are used in some systems to receive data
LAN 1, LAN 2, LAN 3 are not used in the Commercial Ship Installations.
Separate instruction are issued for special purpose.
No parameters necessary – skip to **CP 27.**

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2.8.2 Networkconfiguration for NSC PC's

When a Radar takes a part in a network or connected to a hub, Raytheon do not know which computer will be A, B, or C etc..

Therefore use this sequence to SET the addresses correctly at each display.

This work has been done before using the ETHERNET configuration.

For doing this follow the next steps:



Pressing this softkey the RADAR Utility selector appears



Select **Service Display Network** in the RADAR Utility selector window and press the button from the trackball again.

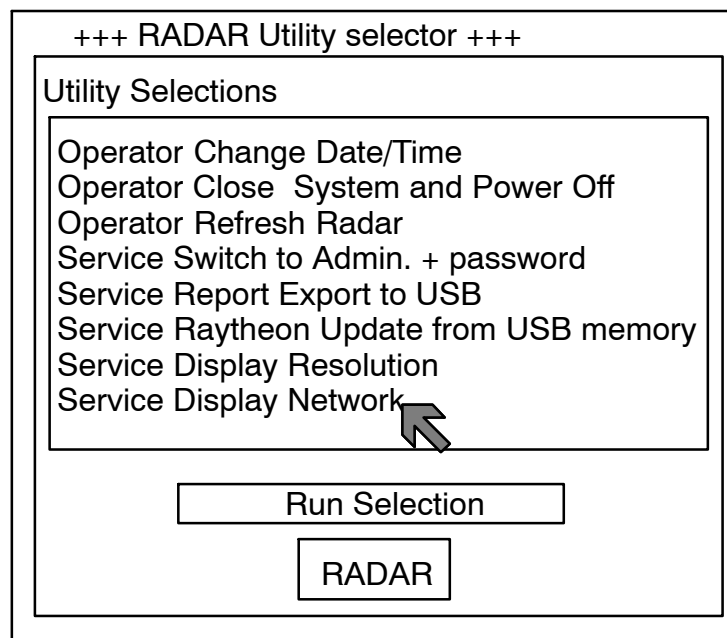


Figure: 2-39 Select **Service Display Network** in the RADAR Utility selector

If you have no keyboard to do this configuration use the radar operator panel.

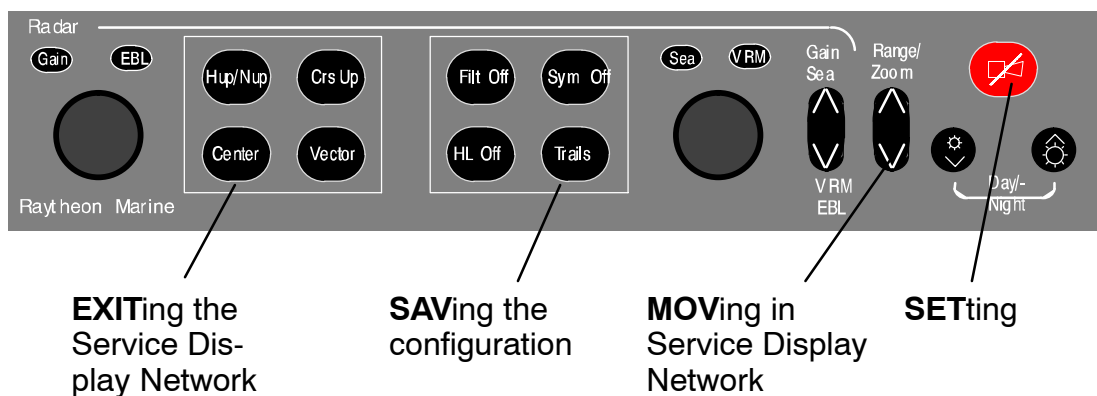


Figure: 2–40 Configuration settings with the radar operator panel

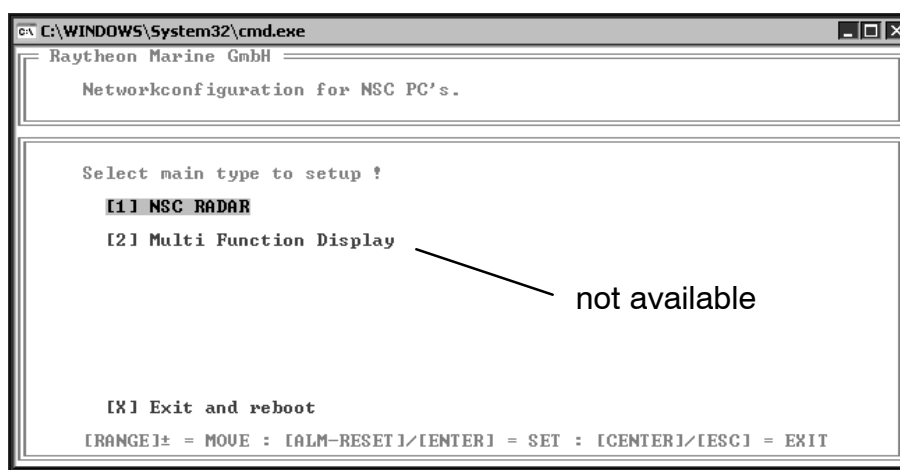


Figure: 2–41 Select main type to setup

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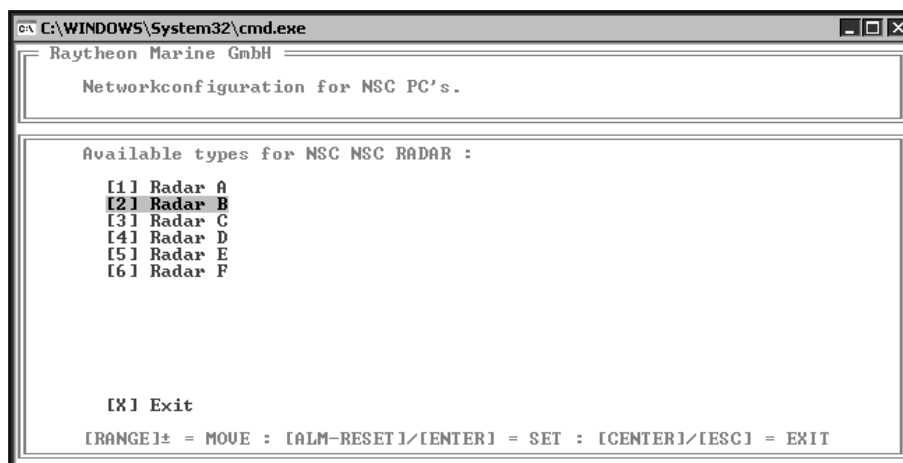


Figure: 2-42 Available types for NSC Radar

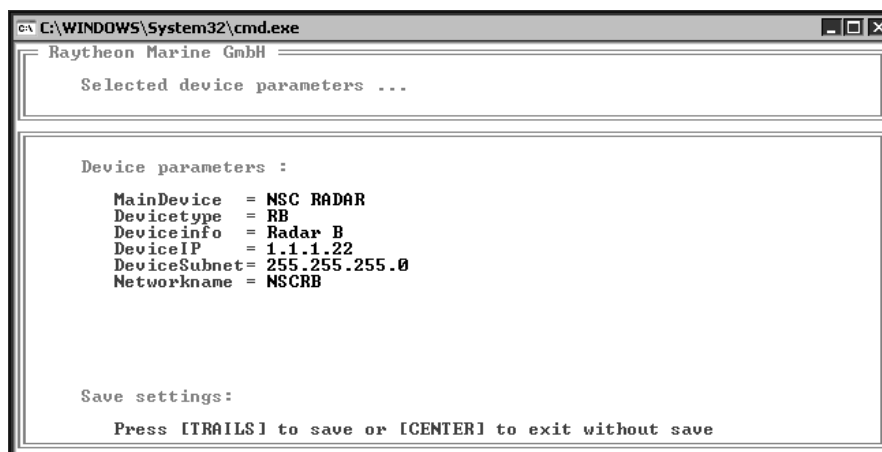
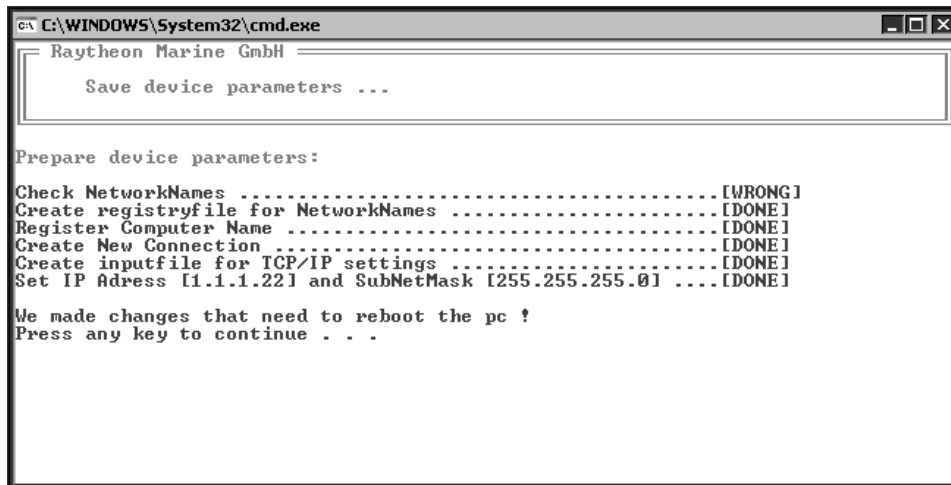


Figure: 2-43 Device parameter

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```
C:\WINDOWS\System32\cmd.exe
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Save device parameters ...

Prepare device parameters:
Check NetworkNames ..... [WRONG]
Create registryfile for NetworkNames ..... [DONE]
Register Computer Name ..... [DONE]
Create New Connection ..... [DONE]
Create inputfile for TCP/IP settings ..... [DONE]
Set IP Address [1.1.1.221] and SubNetMask [255.255.255.0] ..... [DONE]

We made changes that need to reboot the pc !
Press any key to continue . . .
```

Figure: 2-44 Save device parameters

2.8.3 AIS INPUT to RADAR using ETHERNET

CP 27.

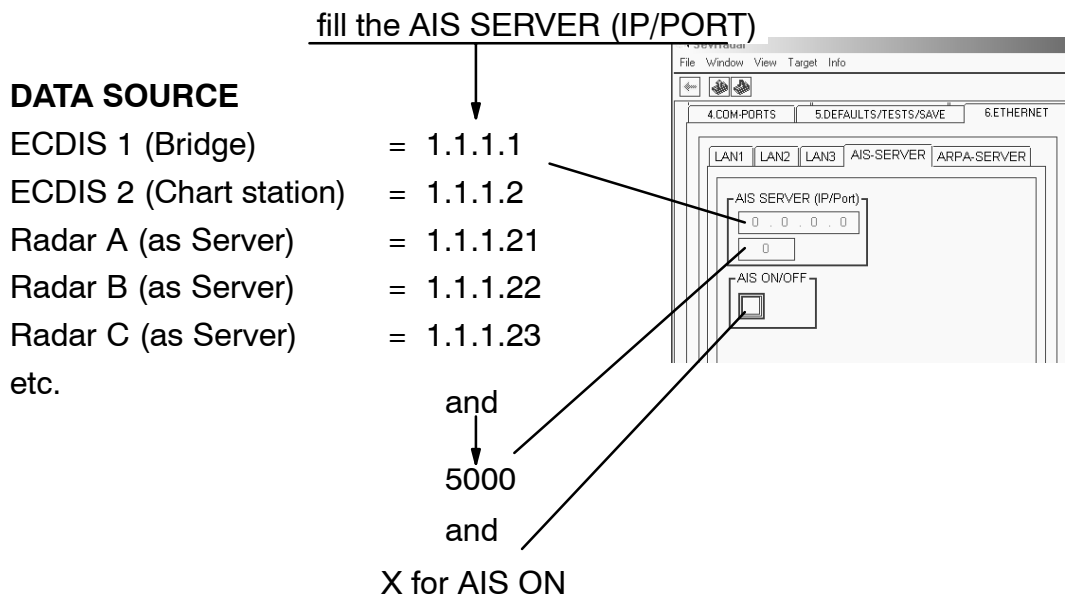


Figure: 2-45 AIS Input to RADAR

Example

Radar configuration for AIS and ECDIS combination

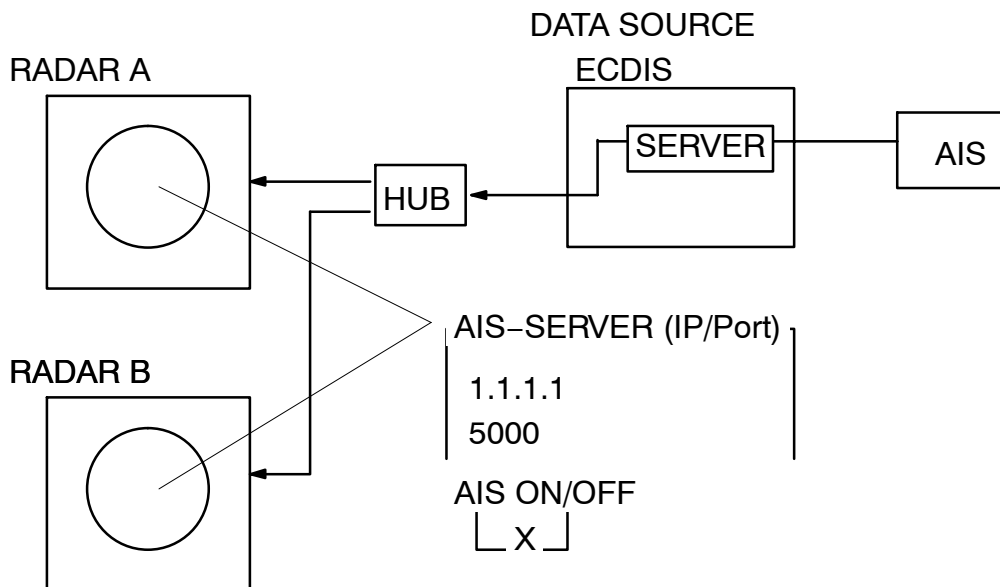


Figure: 2-46 Radar and ECDIS 1 configuration

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2.8.4 AIS to ETHERNET OUTPUT from RADAR

CP 28.

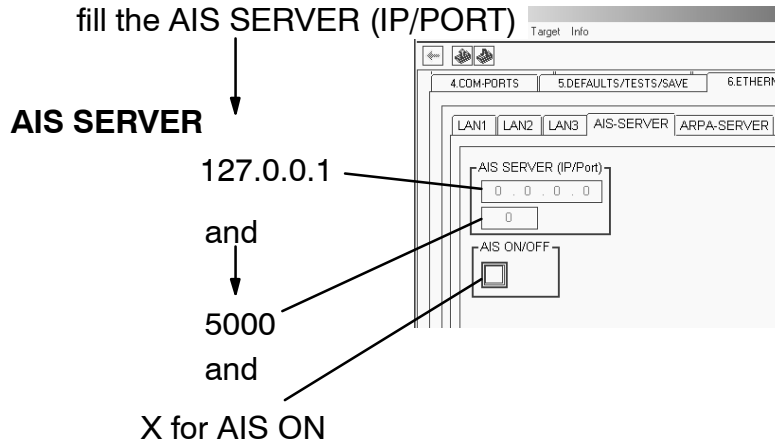


Figure: 2-47 AIS to Ethernet OUTPUT from Radar

Example

Radar configuration for AIS

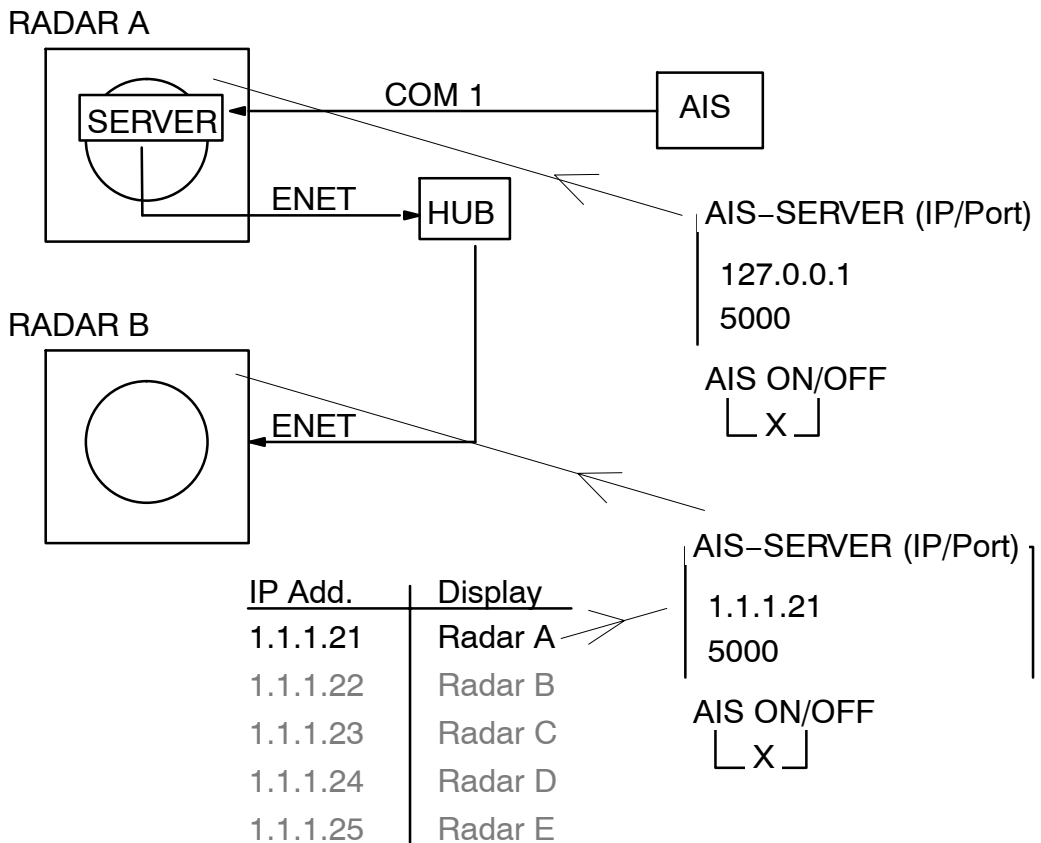


Figure: 2-48 Radar configuration for AIS

2.9 Configuration 5. DEFAULTS / TESTS / SAVE

CP 29.

Normally no tests are necessary for normal installation.

If use of the System indicates a video problem –

check the TCM and TCU were all programmed correctly (see **CP 7. CP 8. CP 9.**) and repeat the VIDEO SET/TEST check the downlinks are all working and the correct level for triggers (see **CP 11.**).

If use of the System indicates an NMEA data problem, select this COM_ TEST.

There are two types:

- Radar External Control needs loopback links on all com ports to check the NSC hardware. See Diagnostics ********* in Service Section.
- Radar Internal Data which reads the NMEA input data directly.

If use of the System indicates a Course Bus problem,

Check the wiring,

Check that the Gyro Latitude and Speed corrections have been set at the Gyro Control Panel.

Use some other Course Bus receiver, such as a PC test program or Digital Repeater to test the signal.

NOTE

The GYRO STD20 / 22 must be fully warmed up for Radar.

2.9.1 Defaults / Tests / Save

(see Figure: 2–49)

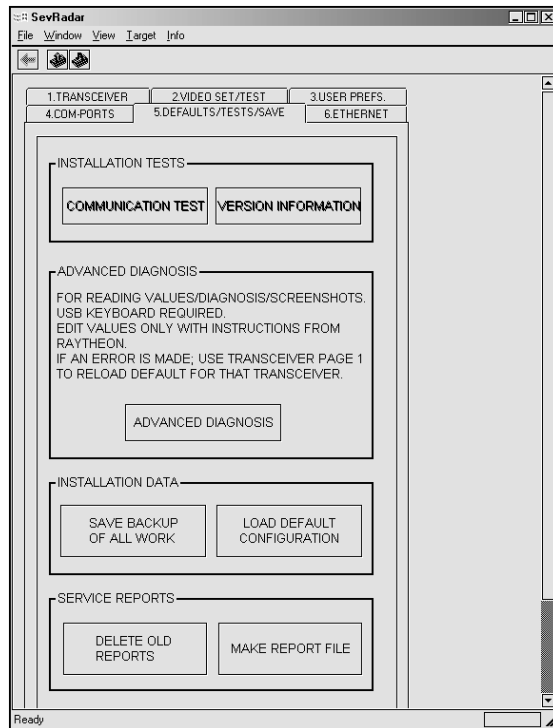


Figure: 2–49 DEFAULTS / TEST / SAVE window

INSTALLATION TESTS

COMMUNICATION TEST

in the moment not available

VERSION INFORMATION

is an software development information window only

ADVANCED DIAGNOSIS

ADVANCED DIAGNOSIS (Password –call Raytheon Product Support)

If no video is seen on the system the ADVANCED DIAGNOSIS has to be used.

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INSTALLATION DATA

SAVE BACKUP OF ALL WORK

When Radar configuration is finished the SAVE BACKUP OF ALL WORK ***MUST*** be used.

Special link to the **RADAR Utility selector** window When the ship has sailed, if the Deck Officer thinks some problem has

occurred after some time he can press **Operator Refresh Radar**.

This will immediately set the radar again to the condition of the backup (except the Date / Time continue as normal).

In this way, the ship Captain or Service Engineer can always go back to a good configuration before running the Radar.

For doing this follow the next steps:



Pressing this softkey the RADAR Utility selector appears



Select **Operator Refresh Radar** in the RADAR Utility selector window and press the button from the trackball again.

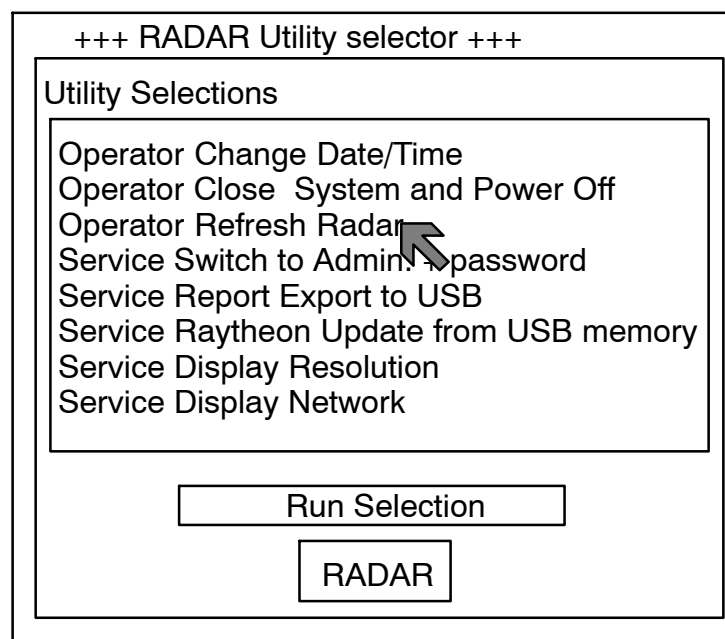


Figure: 2-50 RADAR Utility selector

LOAD DEFAULT CONFIGURATION

The NSC is delivered with defaults already loaded. LOAD DEFAULTS is not necessary for normal installation. If installation is in error and needs to be corrected, this can be done using the normal menus above.

LOAD DEFAULTS is not necessary to correct things. If it is decided to begin again completely from fresh, or as part of a major overhaul, loading defaults can be used.

Pressing LOAD DEFAULTS will shut down NSC and load a completely new empty configuration file, as from factory.

NSC will reboot/restart or must be powered down and powered ON again by the engineer.

SERVICE REPORTS

DELETE OLD REPORTS

If you press this softbutton OLD REPORTS will be deleted.

MAKE REPORT FILE

If you press this softbutton the radar software creates a REPORT FILE from the current software situation. Its advantage is to send this REPORT FILE to the Raytheon SERVICE center by mail.

For reading out this file you have to change into RADAR Utility selector (see LEERER MERKER).

Insert a USB memory stick into the Radar USB connection and press

Service Report to USB, as shown before.

2.9.2 Changing the this Display Resolution

This will take place if the owner changed the NSC Display to a lower or higher diagonal level.

Normally the Display Resolution was preset in the factory by Raytheon.



Pressing this softkey the RADAR Utility selector appears



Select **Service Display Resolution** in the RADAR Utility selector window and press the button from the trackball again.

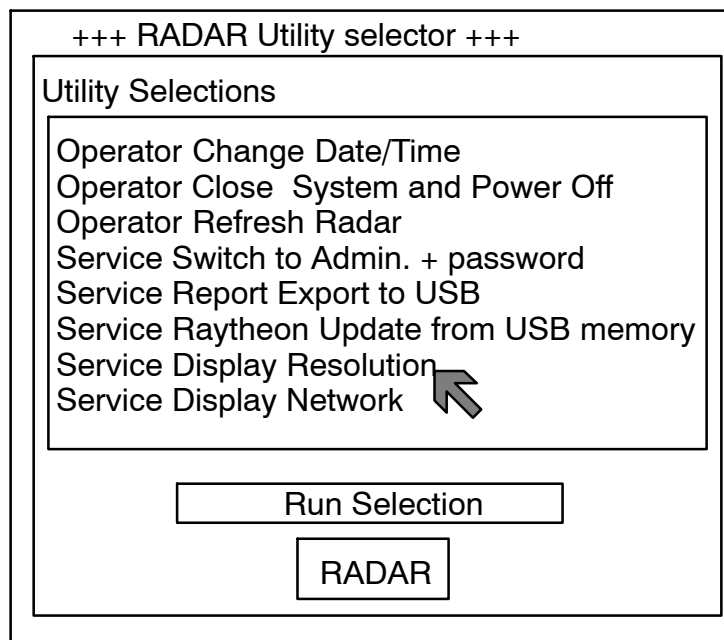


Figure: 2-51 Open the RADAR Utility selector

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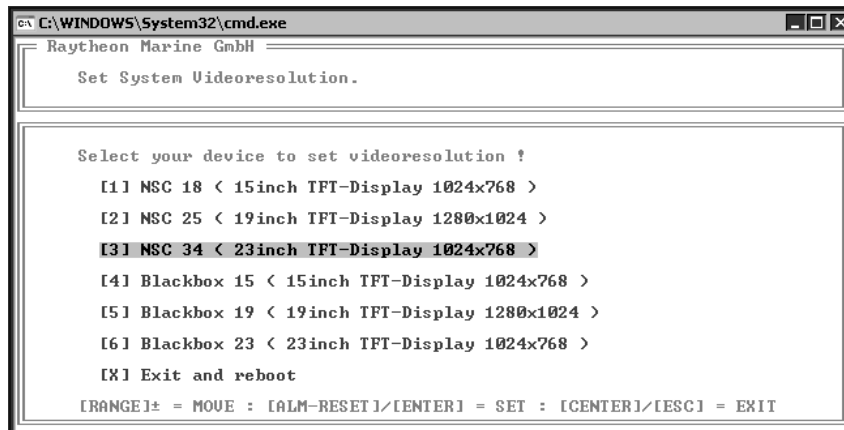


Figure: 2-52 Select desired resolution

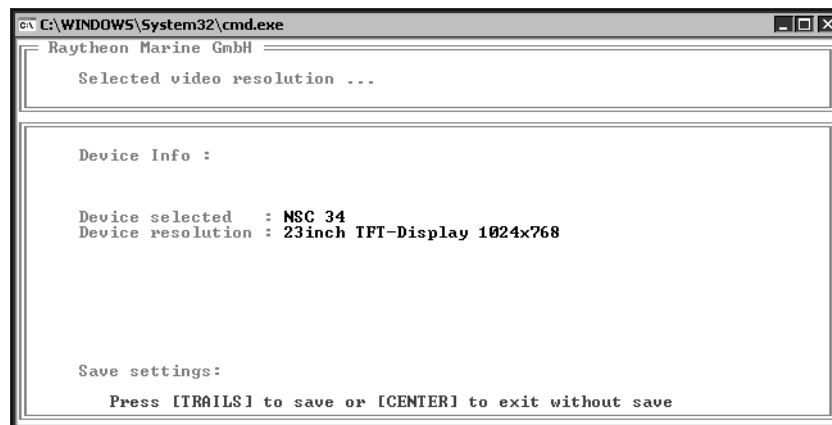


Figure: 2-53 Save settings

3 Preventive Maintenance – X-Band Pedestal with 6 ft. Antenna –

3.1 Preventive Maintenance

This chapter describes the preventive maintenance action to be performed at scheduled intervals in order to guarantee continuous and maximum availability of the pedestal.

Table 3–1 contains step–by–step description of the procedure, time required to perform the operation, tools and instruments necessary to accomplish the task and safety precautions.

Time intervals for maintenance are marked as listed below.

The intervals symbols are the following:

- D = daily
- W = weekly
- M = monthly
- Q = quarterly (4 months)
- S = semi– annually (6 months)
- A = annually
- R = as specified

NOTE



During normal operating conditions as well as maintenance the antenna rotation can be stopped by setting the safety switch to the **OFF** position.

3.1.1 Maintenance Pre–condition

NOTE



Before attempting any operations listed in Table 3–1, mains must be disconnected from the pedestal.

Service and Installation Manual

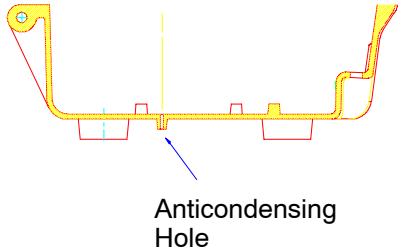
3.1.2 List Instrumentation and Tools for Maintenance

Special Tools;

- silicone grease
- metallic brush
- metal wire with section 2 mm²
- Socket wrench 13 mm

3.1.3 Preventive Maintenance

The Table 3–1 lists all maintenance operations, periodicity, qualified personal skill for maintenance operation, time required to perform maintenance operation and notes.

Location	Periodicity	Procedure
Pedestal screws tightening	R1 (2 years)	Check that nr. 4 M10 screws of pedestal and nr. 4 M8 screws closing cover are well tightened. If not, tighten them with socket wrench 13 mm.
Pedestal inside	A1	Check that anti-condensing hole is open. If it is clogged, clean it with a 2mm ² metal wire. 
	R2 (2years)	Check that M8 bolts of RTM plate are tightened. If not, tighten them with a socket wrench 13 mm
	R3 (4years)	Lubricate pedestal hinges, seal and antenna mounting base with silicon grease using a brush.

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Location	Periodicity	Procedure
	R4 (3years)	Inspect gear for clearance and abrasion
Motor brushes	A2	Check motor brushes, if less than 4 mm in length replace them (refer to par. 5.3.15). (new brush thickness is 10 mm.).
Antenna and pedestal exterior	A3	The antenna and the pedestal exterior should be washed with fresh water.

Table 3-1 Scheduled maintenance operations

3.2 Corrective Maintenance

3.2.1 Pedestal Replacement Procedure

Special tools:

- Socket wrench 13 mm.

To have access to the pedestal, proceed in the following mode:

- loosen 4 M8 screws with a socket wrench 13 mm;
- open the pedestal.

3.2.1.1 ACP-30020 motor control board replacement

Special tools:

- Philips screw driver 3 mm;
- Socket wrench 13 mm.

ACP-30020 board replacement procedure:

- Refer to the pedestal access procedure;
- disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
- take off the 4 nuts M8, remove washers and take out the RTX plate;
- disconnect J1, J5 and J6 connectors of the ACP 30020.
- loosen the 6 M3 x 12 TC screws and replace the ACP 30020.

To reassemble the new ACP-30020 board, reverse the above procedure.

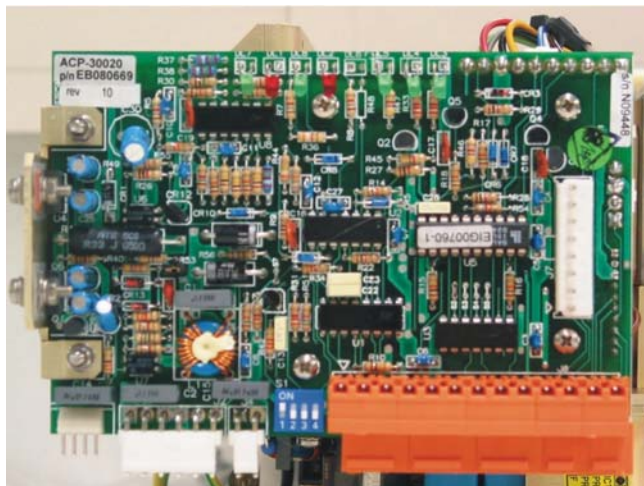


Figure: 3-1 ACP-30020 motor control board

3.2.2 MDL-301 modulator board replacement

Special tools:

- Philips screw driver 3 mm.
- Socket wrench 13 mm.

MDL 301 board replacement procedure

- Refer to the pedestal access procedure;
- Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
- Take off 4 M8 nuts, remove washers and take out the RTX plate;
- Disconnect J1 and J2 connectors;
- Remove the modulator cover, unscrewing 10 M3 x10 TC screws;
- Disconnect J3 connector;
- Take off the yellow- green ground wire; unscrewing 1 M3 x 12 TC screw connecting the wire lug to the magnetron;
- Unsolder the yellow/ green magnetron wires;
- Loosen the 4 M3 X 12 TC screws and replace the MDL 301.

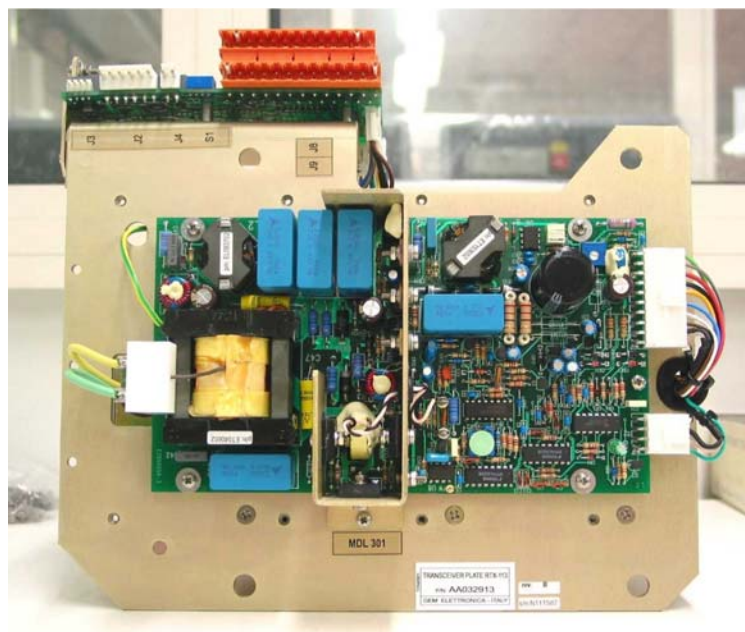


Figure: 3-2 MDL-301 modulator board

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- Reassemble and connected the MDL-301 on the plate and perform the following adjustment:
 - Execute the Warm up;
 - On the ACP-30020 board, set dip-switch 4 of S1 to ON.
 - Set Radar to extra long pulse and use VR1 on modulator MDL- 301 to adjust the magnetron current until DL8 on the ACP-30020 board is lit.
 - Switch off the equipment, on the ACP-30020 board set dip-switch 4 of S1 to OFF.

3.2.3 Magnetron replacement

CAUTION



The magnetron contains sensitive and magnetic parts. Once removed, place the magnetron on a non-steel surface and away from magnetizable objects

Special tools (NON-Ferrous/NON-Magnetic tools):

- Philips screw driver 3 mm;
- Socket wrench 13 mm.

Magnetron replacement procedure:

- Refer to the pedestal access procedure;
- Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
- Take off the 4 nuts M10, the washers and take out the RTX plate;
- Remove the MDL 301 cover, unscrewing the 10 M3 x 10 TC screws;
- Unsolder 2 wires (yellow and green) of the pulses transformer;
- Unscrew the 4 M4 x 12 screws holding the magnetron.

To reassemble the new magnetron, reverse the procedure.

For the adjustment procedure refer to the MDL-301 modulator board procedure.



Figure: 3-3 Magnetron

3.2.4 Front-end replacement

Special tools:

- Philips screw driver 3 mm;
- Socket wrench 13 mm.

LNFE replacement procedure:

- Refer to the pedestal unit access procedure;
- Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
- Take off the 4 nuts M10, the washers and take out the RTX plate;
- Remove the IFB-200 cover unscrewing the 6 M3 X 10 TC screws
- Disconnect J1 connector;
- Unscrew the 4 M4 x 8 TC screws fixing the front-end to the IF holder.
- Unscrew the 4 M4 x 50 TC screws fixing the front-end to the limiter and circulator.

To reassemble the new front-end, reverse the procedure.

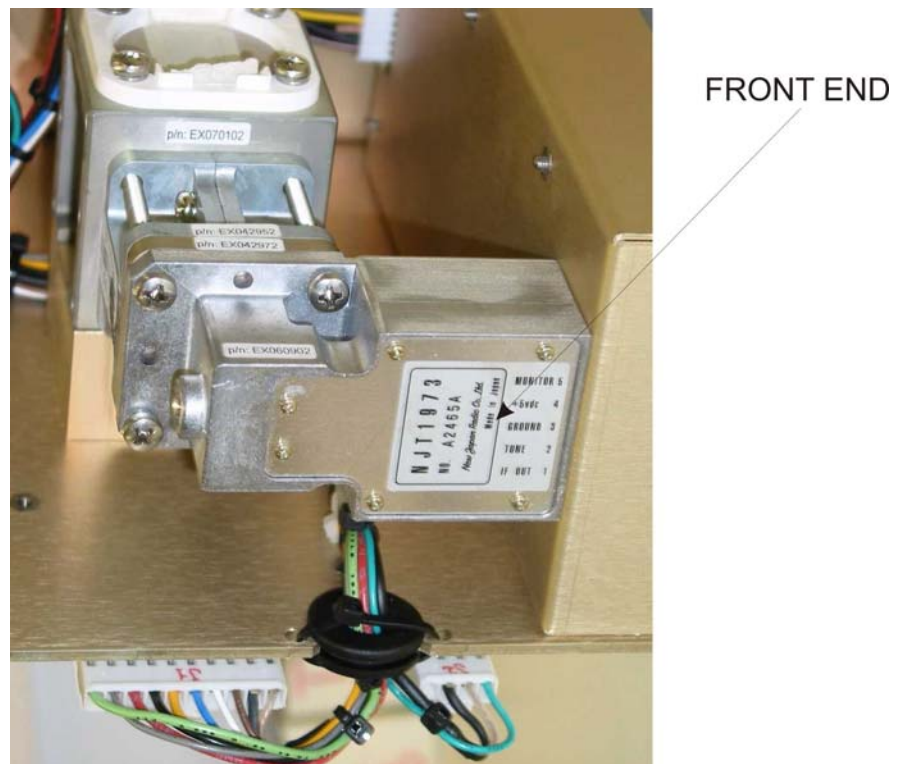


Figure: 3-4 Front end

3.2.5 Antenna Motor Group replacement

Special tools:

- Philips screw driver 3 mm;
- Socket wrench 13 mm.

Antenna motor replacement procedure:

- Refer to the pedestal access procedure;
 - Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
 - Take off the 4 nuts M8, the washers and take out the RTX plate;
 - Unscrew the 4 M5x16 TE screws fixing the motor group to the scanner unit;
- To reassemble the new motor group, reverse the procedure.

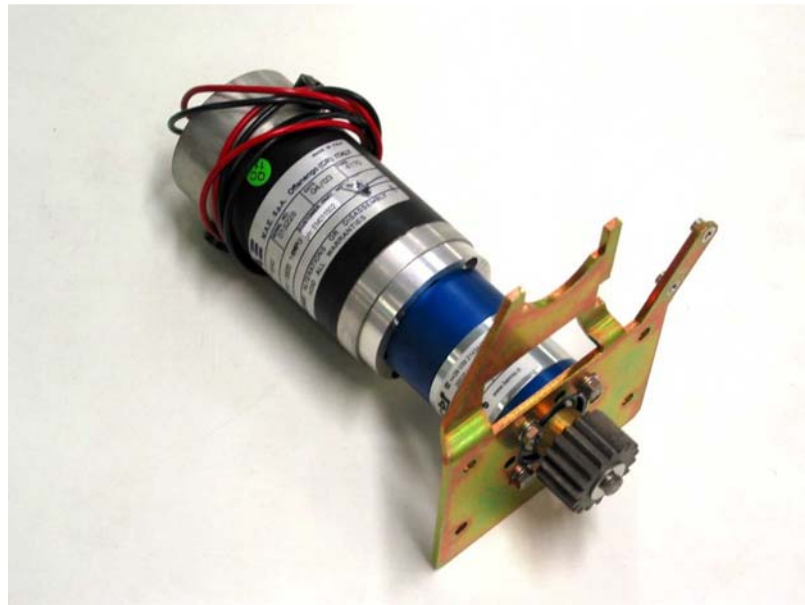


Figure: 3-5 Antenna motor group

3.2.6 RTM Plate replacement

Special tools:

- Philips screw driver 3 mm;
- Socket wrench 13 mm.

To replace RTM plate, proceed in the following mode:

- Refer to the scanner unit access procedure;
- Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
- Take off the 4 nuts M8, the washers and take out the RTX plate.

To reassemble the new RTM plate, reverse the procedure.

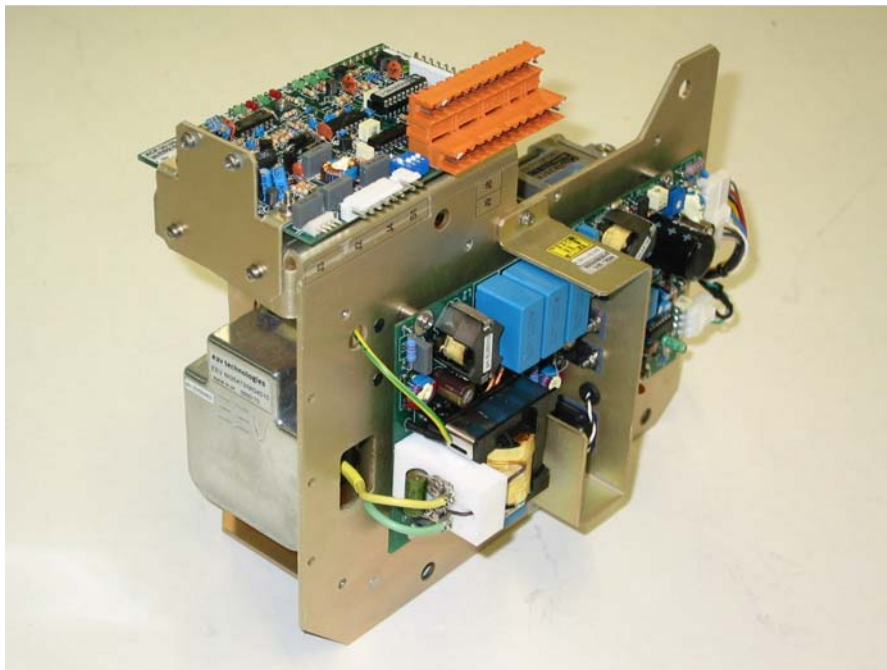


Figure: 3–6 RTM plate

3.2.7 Circulator replacement

Special tools:

- Philips screw driver 4 mm;
- Socket wrench 13 mm.

Circulator replacement procedure:

- Refer to the pedestal access procedure;
- Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
- Take off the 4 nuts M8, the washers and take out the RTX plate;
- Unscrew the 4 M4x12 TC screws fixing the magnetron spacer to the circulator;
- Unscrew the 4 M4x50 TC screws fixing the front end and limiter to the circulator;
- Unscrew the 4 M4x60 TC screws fixing the circulator to the RTM plate.

To reassemble the new circulator, reverse the procedure observing the direction of the circulator.



Figure: 3-7 Circulator

3.2.8 Limiter replacement

Special tools:

- Philips screw driver 4 mm;
- Socket wrench 13 mm.

Limiter replacement procedure:

- Refer to the pedestal access procedure;
- Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
- Take off the 4 nuts M8, the washers and take out the RTX plate;
- Unscrew the 4 M4x50 TC screws fixing the front end to the limiter;
- Remove the limiter between the circulator and the front end with filter.

To reassemble the new limiter, reverse the procedure observing the direction of the limiter and of the filter.

LIMITER



Figure: 3–8 Limiter

3.2.9 Filter replacement

Special tools:

- Philips screw driver 4 mm;
- Socket wrench 13 mm.

Filter replacement procedure:

- Refer to the pedestal access procedure;
- Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
- Take off the 4 nuts M8, the washers and take out the RTX plate;
- Unscrew the 4 M4x50 TC screws fixing the front end to the limiter;
- Remove the front end with filter.

To reassemble the new filter, reverse the procedure observing the direction of the filter.

FILTER



Figure: 3-9 Filter

Service and Installation Manual

3.2.10 IFB-200 receiver board

Special tools:

- Philips screw driver 3 mm;
- Socket wrench 13 mm.

IFB-200 receiver board replacement procedure:

- Refer to the pedestal access procedure;
- Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
- Take off the 4 nuts M8, the washers and take out the RTX plate;
- Unscrew the 6 M3x12 TC screws and remove the cover of the receiver module;
- Disconnect all connectors;
- Unscrew the 6 M3x12 TC and take off the receiver module.

To reassemble the new receiver module, reverse the procedure.

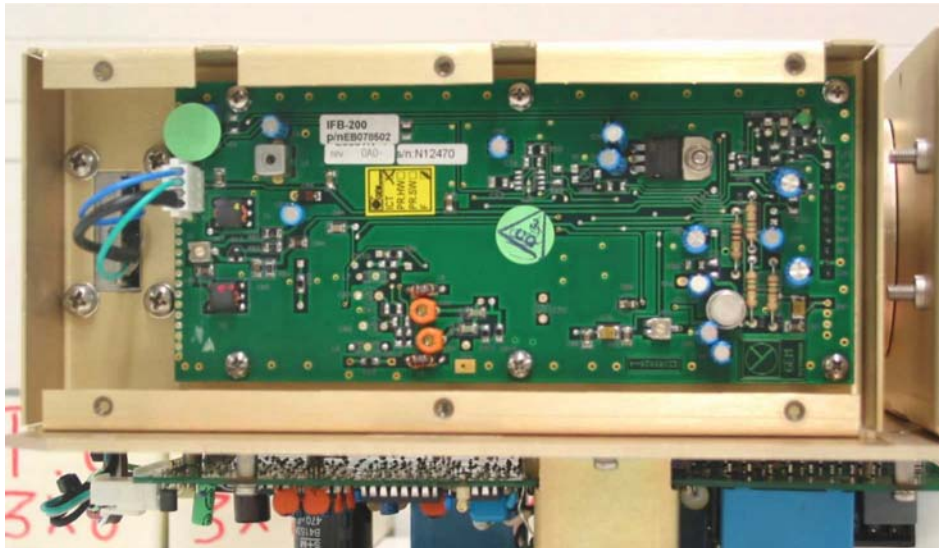


Figure: 3-10 IFB-200 receiver board

3.2.11 HLT-11000 HL board replacement

Special tools:

- Philips screw driver 4 mm;
- Socket wrench 13 mm.

HLT-11000 HL board replacement procedure:

- Refer to the pedestal access procedure;
- Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
- Take off the 4 nuts M8, the washers and take out the RTX plate;
- In the upper side of the pedestal unscrew the 2 M4x10 TC screws fixing the HLT-11000 board to the pedestal.

To reassemble the new module, reverse the procedure.



Figure: 3-11 HLT-11000 HL board

3.2.12 Antenna Rotation Motor replacement

Special tools:

- Philips screw driver 3 mm;
- Socket wrench 13 mm.

Antenna motor group replacement:

- Refer to the pedestal access procedure;
- Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
- Take off the 4 nuts M8, the washers and take out the RTX plate;
- Unscrew the 4 M5x16 TE screws fixing the motor group to the scanner unit;
- Cut the cable ties of the J2 cable, J2 is located on the board ACP-30020;
- Separate the power supply wires of the motor group from the wires connected to the HLT-12000 board;
- Unplug the RED and BLACK wires from the J2 connector;
- Unscrew the 2 M4x10 TC screws fixing the board to the motor group;
- Unscrew the 4 M4x12 TE screws (point 1 fig. 5-12) fixing the mounting plate to the motor;
- Unscrew the 1 M4x12 TE screw (point 2 fig. 5-12) fixing the gear to the motor;

To reassemble the new motor, reverse the procedure.

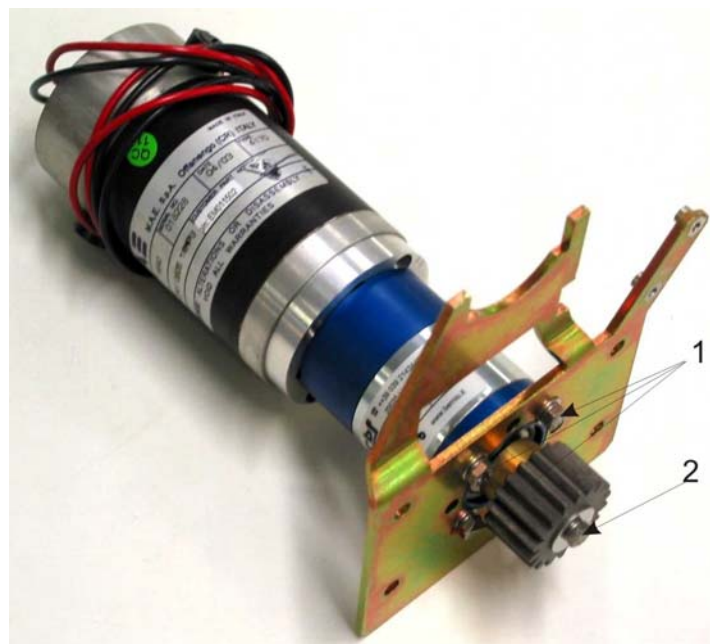


Figure: 3-12 Antenna rotation motor

3.2.13 HLT-12000 encoder board replacement

Special tools:

- Philips screw driver 3 mm;
- Socket wrench 13 mm;
- Cutters.

HLT-12000 encoder board replacement:

- Refer to the pedestal access procedure;
 - Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
 - Take off the 4 nuts M8, the washers and take out the RTX plate;
 - Cut the cable ties of the J2 cable, J2 is located on the board ACP-30020;
 - Separate the power supply wires of the motor group from the wires connect to the board HLT-12000;
 - Unplug the wires RED and BLACK from the J2 connector;
 - Unscrew the 2 M4x10 TC screws fixing the board to the motor group;
- To reassemble the new encoder module, reverse the procedure.

HLT-12000

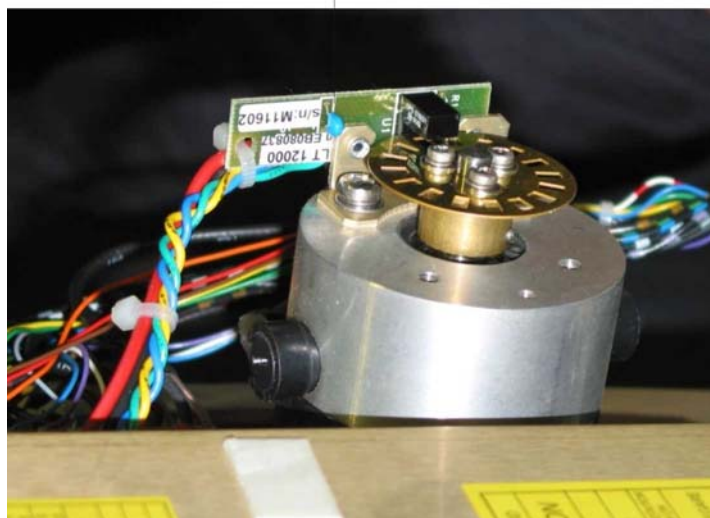


Figure: 3-13 HLT-12000 encoder board

3.2.14 Brushes replacement

Special tools:

- Philips screw driver 3 mm;
- Socket wrench 13 mm;
- Screw driver flat tip 4 mm.

Motor brushes replacement:

- Refer to the pedestal access procedure;
- Disconnect J2, J3, J8 and J9 connectors of the ACP 30020;
- Take off the 4 nuts M8, the washers and take out the RTX plate;
- Unscrew the 4 M5x16 TE screws fixing the motor group to the scanner unit;
- Unscrew the 2 plastic screws of the motor group;
- Extract the 2 connectors with the brushes;
- Remove the brushes from the fasten connectors.

To reassemble the new brushes,reverse the procedure.



Figure: 3-14 Brushes

3.2.15 6 Foot X-Band Array replacement

Special tools:

- Hexagonal wrench 13 mm.

Array replacement procedure:

- Unscrew the 4 M8x35 TE screws fixing the array to the scanner unit.
- Apply a thin layer of silicon grease to all surfaces;

To reassemble the new array, reverse the procedure.



Figure: 3-15 6 foot X-band array

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3.3 PCB Board Description

3.3.1 Pedestal overview

The pedestal is connected to the NSC Display see Figure: 3–16, connection plan Figure: 3–21 and block diagram Figure: 3–17.

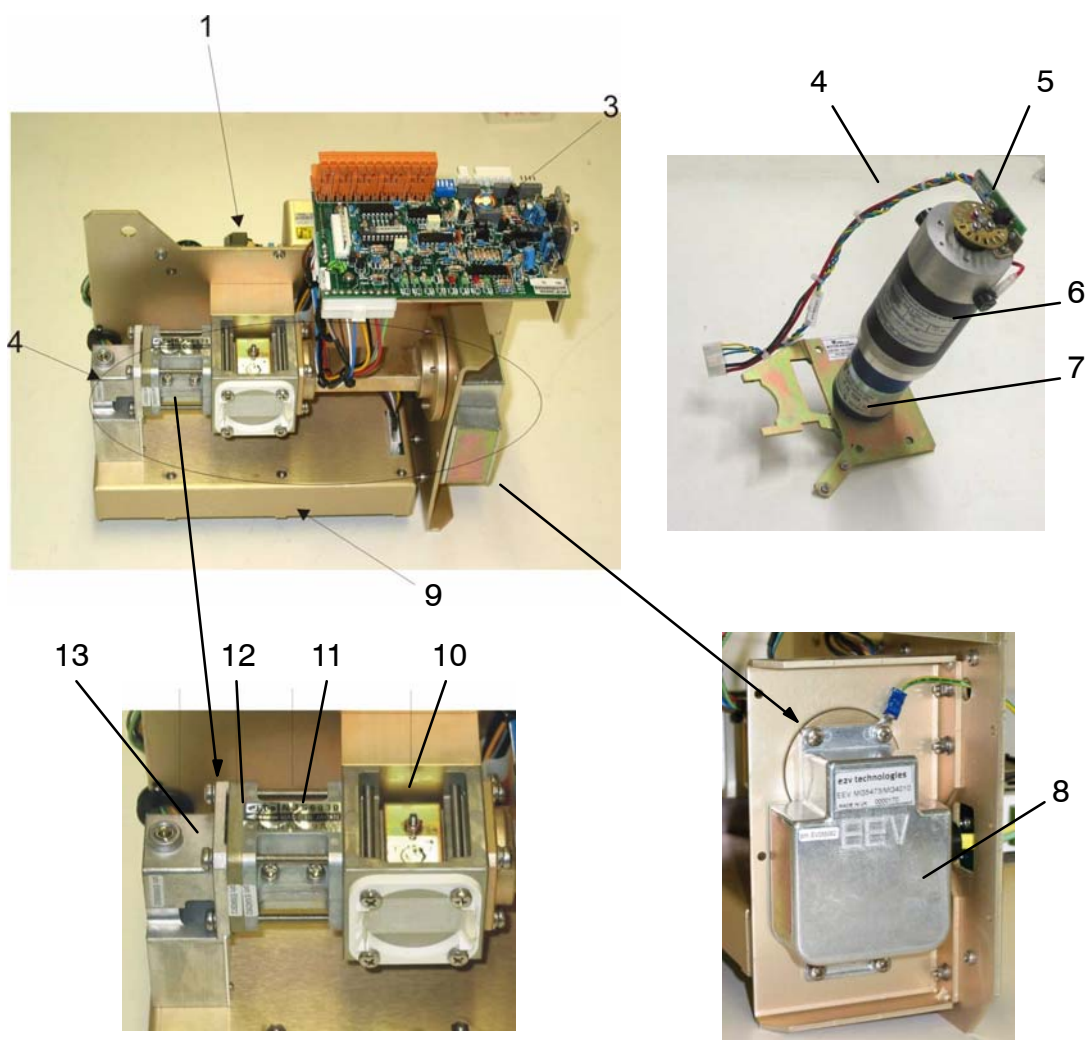


Figure: 3–16 Pedestal – sub assemblies –

- | | | | |
|---|----------------------------|----|--------------------|
| 1 | MDL–301 modulator PCB | 8 | Magnetron |
| 2 | IFB–200 IF – Amplifier | 9 | Microwave assembly |
| 3 | ACP30020 motor control PCB | 10 | Circulator |
| 4 | GM–046 motor group | 11 | Limiter |
| 5 | HTL 12000 | 12 | Filter |
| 6 | Motor | 13 | Front end |
| 7 | Gear Box | | |

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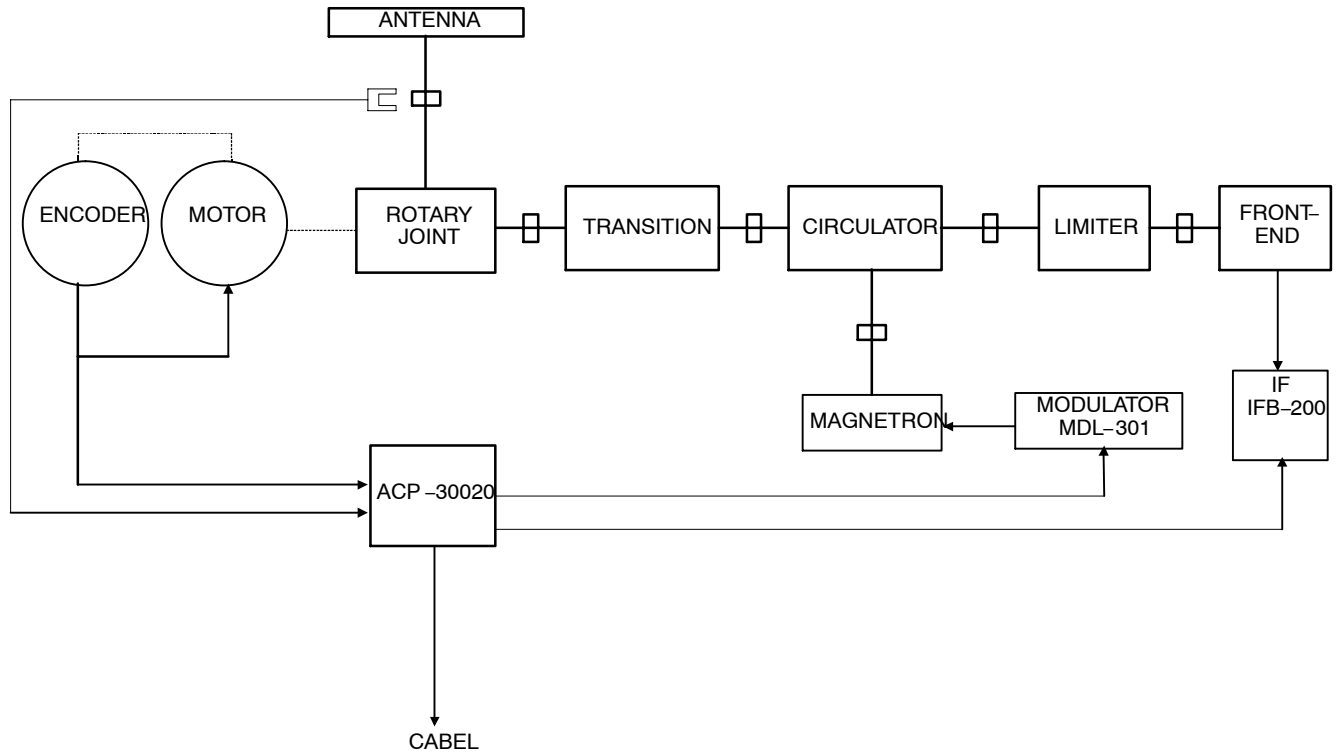


Figure: 3-17 Pedestal blockdiagram

3.3.2 IFB-200 receiver board

The IFB-200 consists of a logarithmic amplifier and LNFE, the dynamic range is better than 100dB.

Figure: 3-18 depicts the overall function diagram of the IFB- 200 circuitry.

The input circuitry contains a two stage preamplifier with a very low noise figure. The outputs of the following amplifier chain U2 through U10 are summed by a filter network to achieve a logarithmic response.

Two selectable filters are included centered on the 60 MHz IF frequency to select either 4 MHz or 20 MHz bandwidth for short/ medium pulse operation.

The filter circuitry is selected by the signal BW: low level (0V) selects wide, high level (5V) selects narrow bandwidth.

The IFB- 200 module includes also a tune indicator circuitry to allow for accurate tuning which is enabled by the G_TN signal (tune suppression from modulator) during main bang only.

The small portion of the transmit signal that penetrates down during main bang is then detected by the LNFE and used to generate the TN_REG signal which will vary the frequency of the VCO in the LNFE for for maximal response.

TN_IND (tune indication) is derived from the detected and peak rectified main bang signal to represent the accuracy of the tune frequency.

Regulator U11 provides 5VDC to the LNFE.

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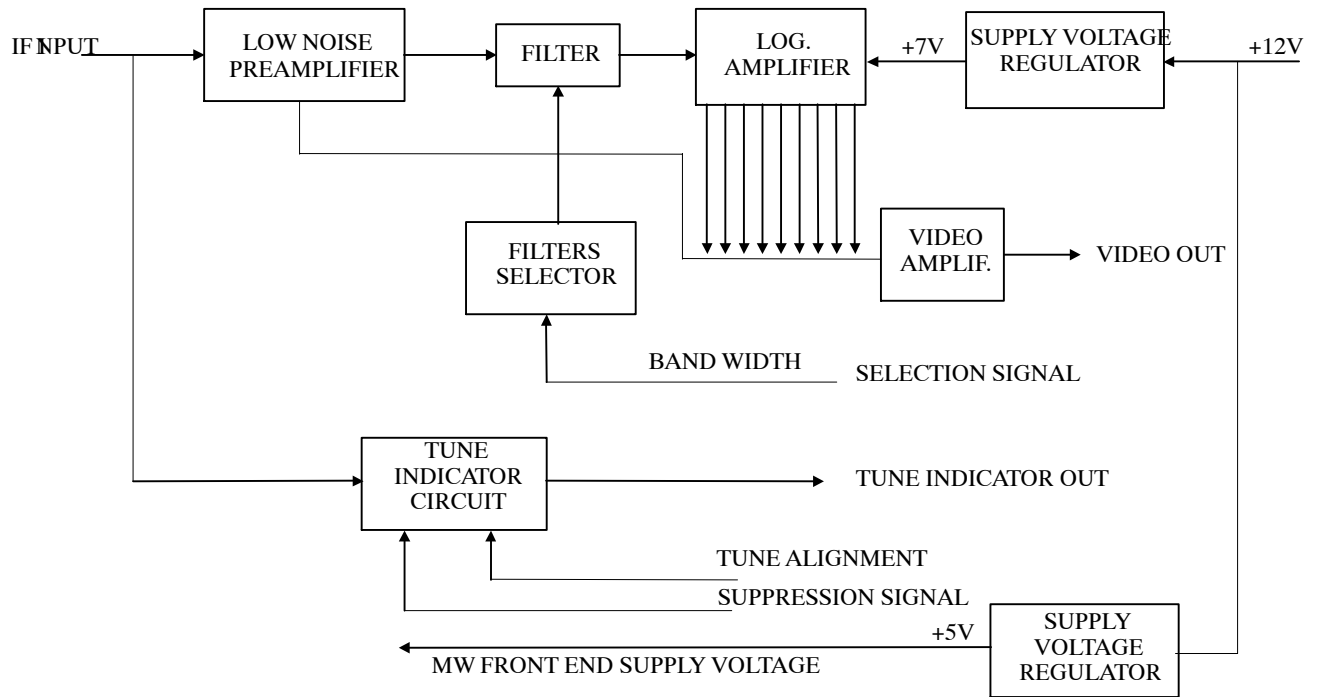


Figure: 3-18 IFB-200 board block diagram

3.3.3 MDL-301 modulator board

The solid state Modulator contains the high voltage/ filament heater power supply and the pulse forming network to drive the Magnetron, furthermore, an over-voltage and overcurrent protection circuitry.

The HV power supply is of the flyback type consisting of T1 which is driven by Q5 and controlled by U6 PWM to generate 380 VDC output from 24 VDC. The generation of high voltage is controlled by SB_OP, a low level on SB_OP is enabling the PWM U6.

The switching frequency is approx. 75 kHz with variable pulse duration to stabilize the output voltage with respect to current demand. VR1 is used to adjust the 380 VDC and subsequently the magnetron peak power. The pulse transformer T2 is driven by MOSFETs Q14, 15, 16 with pulses 380VDC in amplitude and 80ns, 300ns, 600ns or 1.2µs in duration selectable by the signals RAD0 and RAD1, while the PRF is directly determined by the TRIG input signal.

The output of T2 is neg. 5.6 kV applied to cathode of the magnetron.

During the three minute warm up delay upon power on, the SB_OP signal carries high level to suppress the generation of HV.

U2 derives the G_TN signal from the TRIG signal which is used on the receiver circuitry.

U1 and Q2 use the RAD1 signal to generate the BW1 signal to adapt the bandwidth filters on the IF amplifier.

The table depicted below shows the mode of operation with respect to the signals RAD0/ 1, Trig, SB_OP.

SB_OP	RAD0	RAD1	TRG	MODE
X	X	X	absent	stand-by
1	X	X	X	stand-by
0	0	0	present	radiate, short pulse
0	1	0	present	radiate, medium pulse
0	0	1	present	radiate, long pulse
0	1	1	present	radiate, extra long pulse

Table 3-2 Operator mode and Pulse Width

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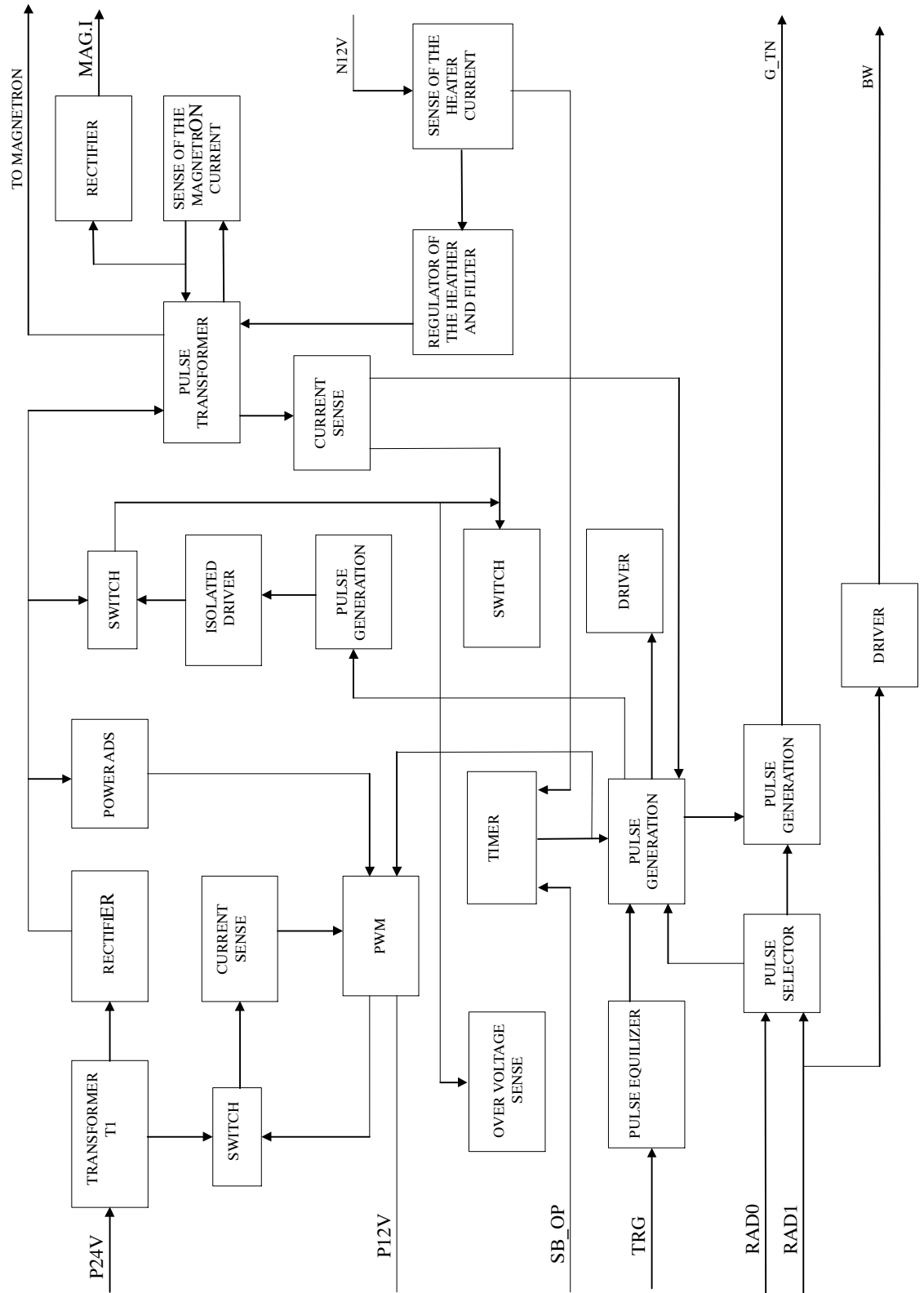


Figure: 3-19 MDL-301 board block diagram

3.3.4 ACP 30020 motor control board

This PCB see block diagram Figure: 3–20 provides controls and safety protection for the antenna drive motor, and processes antenna azimuth pulses from the encoder converting 2688 pulses/rotation (ACP0) to 2048 pulses/rotation (ACPOUT).

The ACP 30020 board provides regulated 22VDC (P_MOT and N_MOT) to the drive motor. Q1 and R1 limit the current during start up and provide overcurrent protection during operation. The Standby/ Operation signal (SB_OP) controls antenna rotation through optocoupler U6 and FET Q6.

Furthermore, azimuth and heading line pulses from optical sensors are processed and output through line drivers to be used in the display unit. Four DIP switches allow azimuth pulse generation for display testing purposes.

According to the 4 DIP switch settings the following operations can be enabled:

DIP-1	DIP-2	DIP-3	DIP-4	Operation
OFF	OFF			PLL=ACP0 Input
ON	OFF			PLL=ACP2 Input (for GM046)
OFF	ON			PLL=ACP4 Input
ON	ON			PLL=ACP1 Input
		ON	OFF	Operating mode Transmitter OFF–LNFE Simulated ACP (ACP1 750Hz)
		OFF	ON	OPERating mode Eng. Rot. OF Simulated ACP (OUTPLL)

Table 3–3 ACP 30020 board S1 switch configuration

The ACP 30020 monitors also the magnetron current and indicates the MAG I condition by lighting one of three LEDs: DL2 MAG I high (red), DL1 MAG I low (red), DL8 MAG I OK (green).

Furthermore, LEDs DL5, DL4 and DL3 indicate the presence of the supply voltages 24VDC, –12VDC and +12VDC.

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Germany

LED DL7 indicates proper tuning of the receiver.

LED Indications

DL 1 Mag I too Low

DL 2 Mag I too High

DL 3 + 12V

DL 4 – 12V

DL 5 +24V (Modulator)

DL 6 not used

DL 7 tune ind. O.K.

DL 8 Mag I O.K.

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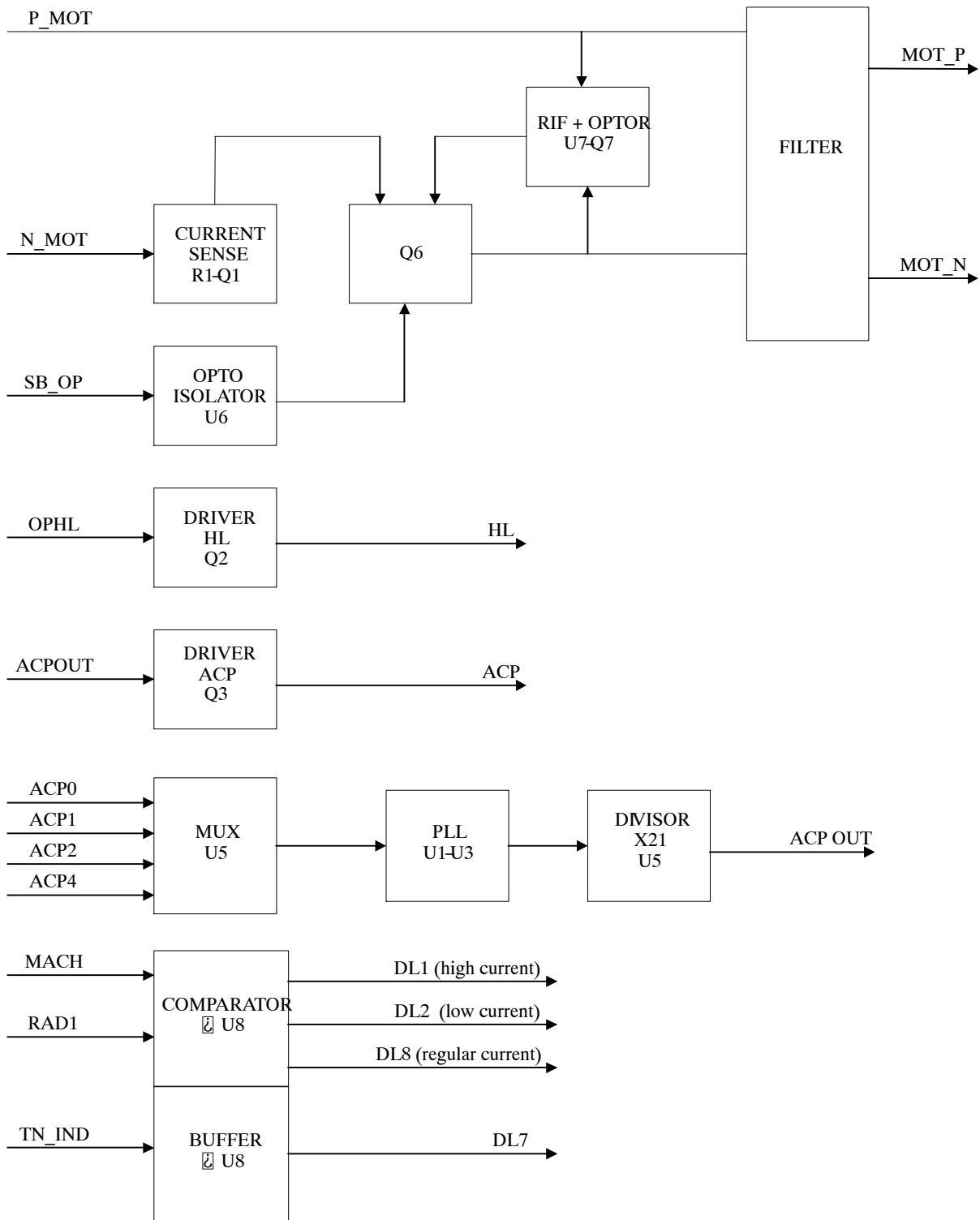


Figure: 3-20 ACP-30020 board block diagram

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3.3.5 Interconnecting Diagram

The interconnecting diagram of the pedestal to refer Figure: 3-21.

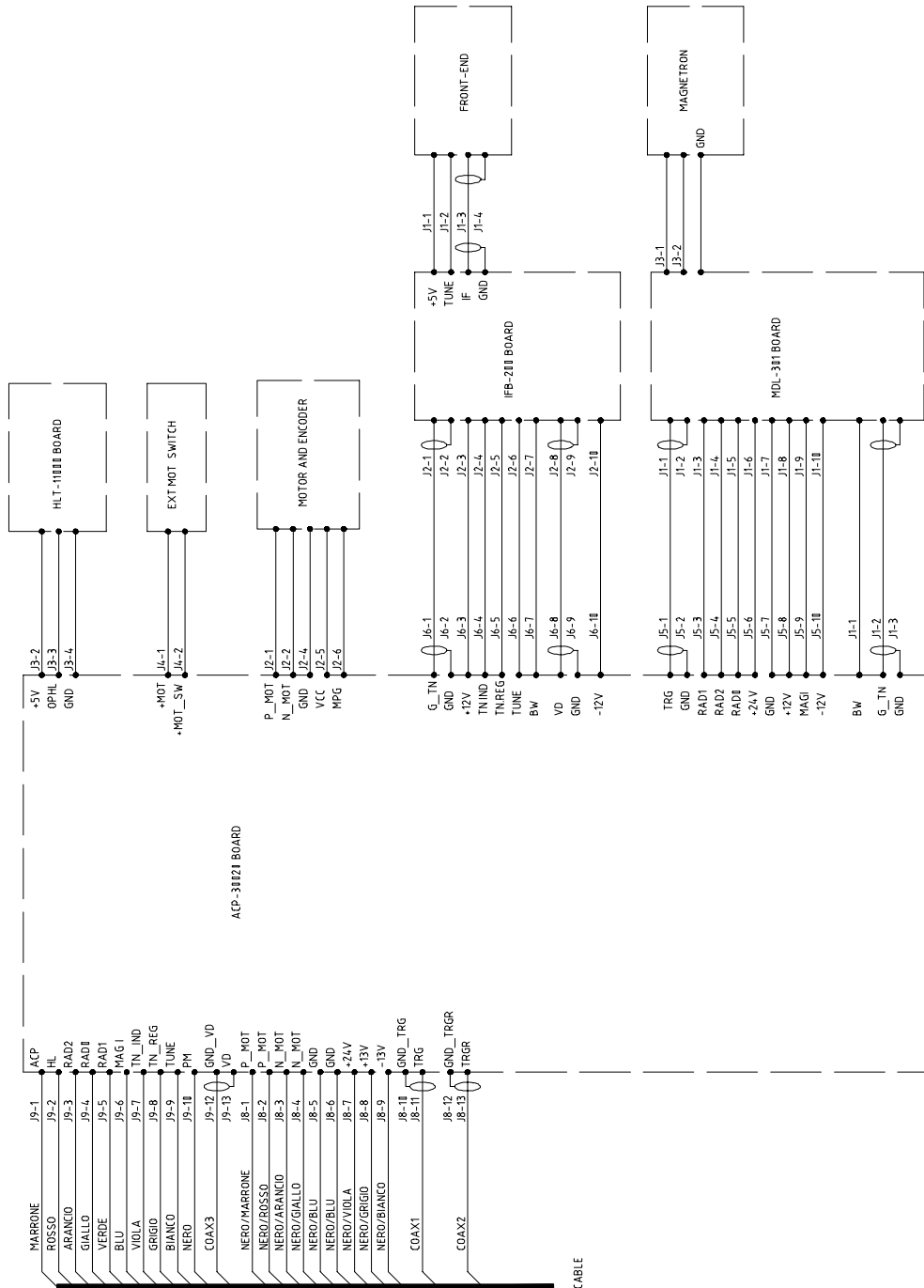


Figure: 3-21 Pedestal block diagram

4 Preventive Maintenance – NSC Display –

This chapter describes the preventive maintenance action to be performed at scheduled intervals in order to guarantee continuous and maximum availability of the NSC Display.

4.1 Cleaning the NSC Display

Clean the exterior of the Display, using a soft dampened with a mild cleaning solution such as dish-washing detergent.

4.1.1 Changing the air filter

Remove air filter.

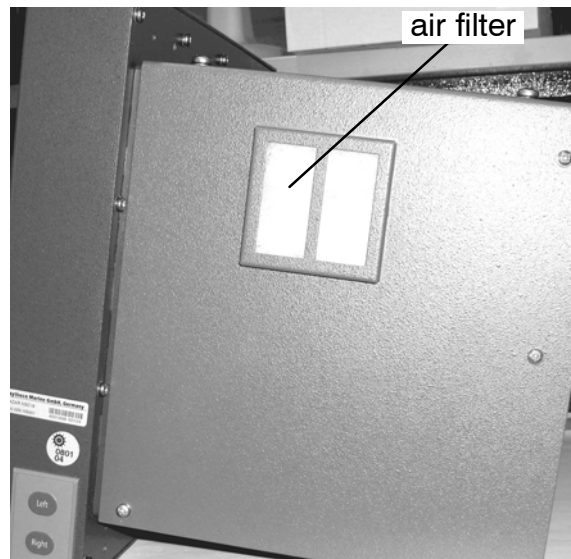
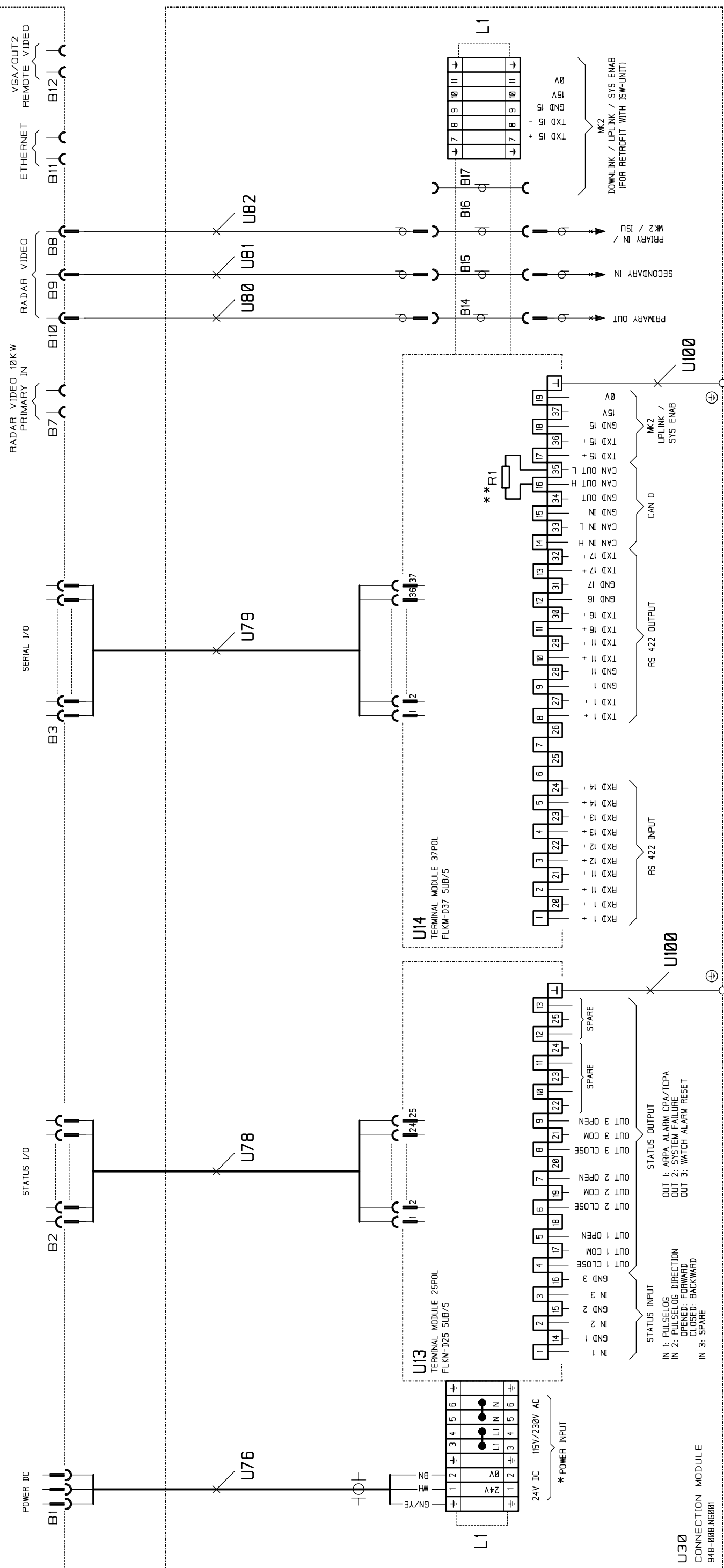


Figure: 3–22 NSC 18 air filter

U10
NSC 18 TFT-TT
900-014.NG001



DIN CODE	DENOMINATION	TYPE/DRAWING NR.	POS.NR.	FROM PARTS LIST
B14-B15-B16	CONNECTOR	U5914/U	24	948-008.NG001
L1	TERMINAL STRIP NSC	948-008.00-001	8	948-008.NG001
R1	RESISTOR 150 OHM	WN 164-1	35	948-008.NG001
U10	MONITOR NSC 18 TFT-TT	900-014.NG001		900-014
U13	TERMINAL MODULE 25POL	FLKM D25 SUB/5	2	948-008.00-001
U14	TERMINAL MODULE 37POL	FLKM D37 SUB/5	3	948-008.00-001
U30	RADAR CONNECTION MODULE NSC	948-008.NG001	3	900-012.NG001

DIN CODE	DENOMINATION	TYPE/DRAWING NR.	POS.NR.	FROM PARTS LIST
U76	CABLE	NBS0-174	3	948-008.01
U78	DSUB-CABLE 25POL 1.5M	2302146	1	948-008.NG001
U79	DSUB-CABLE 37POL 1.5M	2302214	2	948-008.NG001
U80, U81, U82	BNC-KOAX. CABLE 50 OHM 1.5M	RG58	3	948-008.NG001
U100	WIRING	900-021.55	8	900-021.NG001

CAD B 4596 A

2004	DATE	NAME
BEARBEI	21.12.	RAMM
GEPR	21.12.	
NORM		
FREIG		

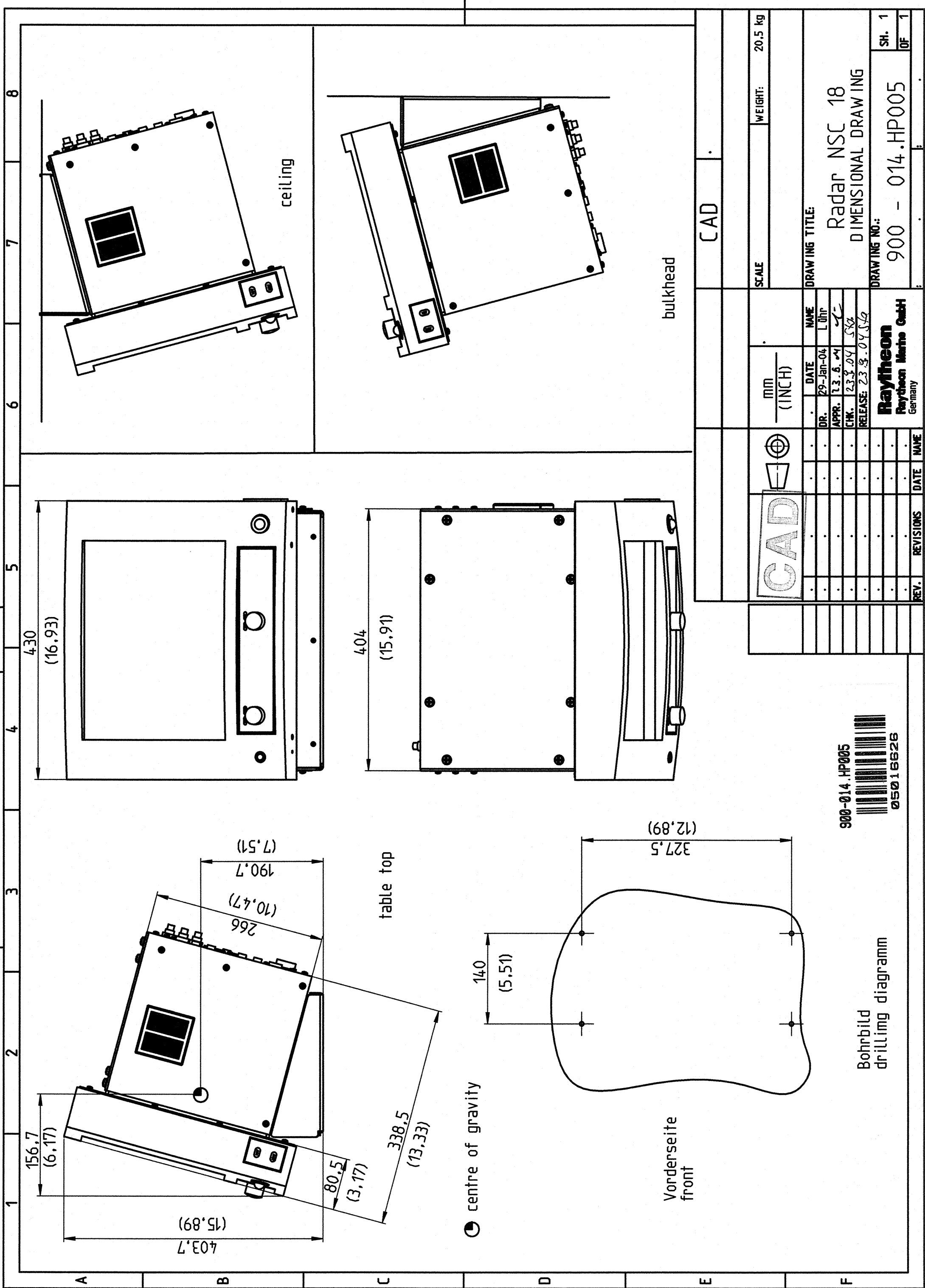
BEZEICHNUNG
NSC 18

ANSCHLUSSPLAN / CONNECTION DIAGRAM
ZEICHNUNGSNUMMER
900-014.HP013

Raytheon
Raytheon Marine GmbH
Germany

ERS FÜR
ERS DURCH

BL. 1
VON 1



Bohrbild
drilling diagram

REV.	REVISIONS	DATE	NAME

MM	(INCH)	DATE	NAME
		29-Jan-04	Lühr
		13.6.04	
		23.3.04	SKG
		23.3.04	SKG

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Raytheon Marine GmbH
Germany

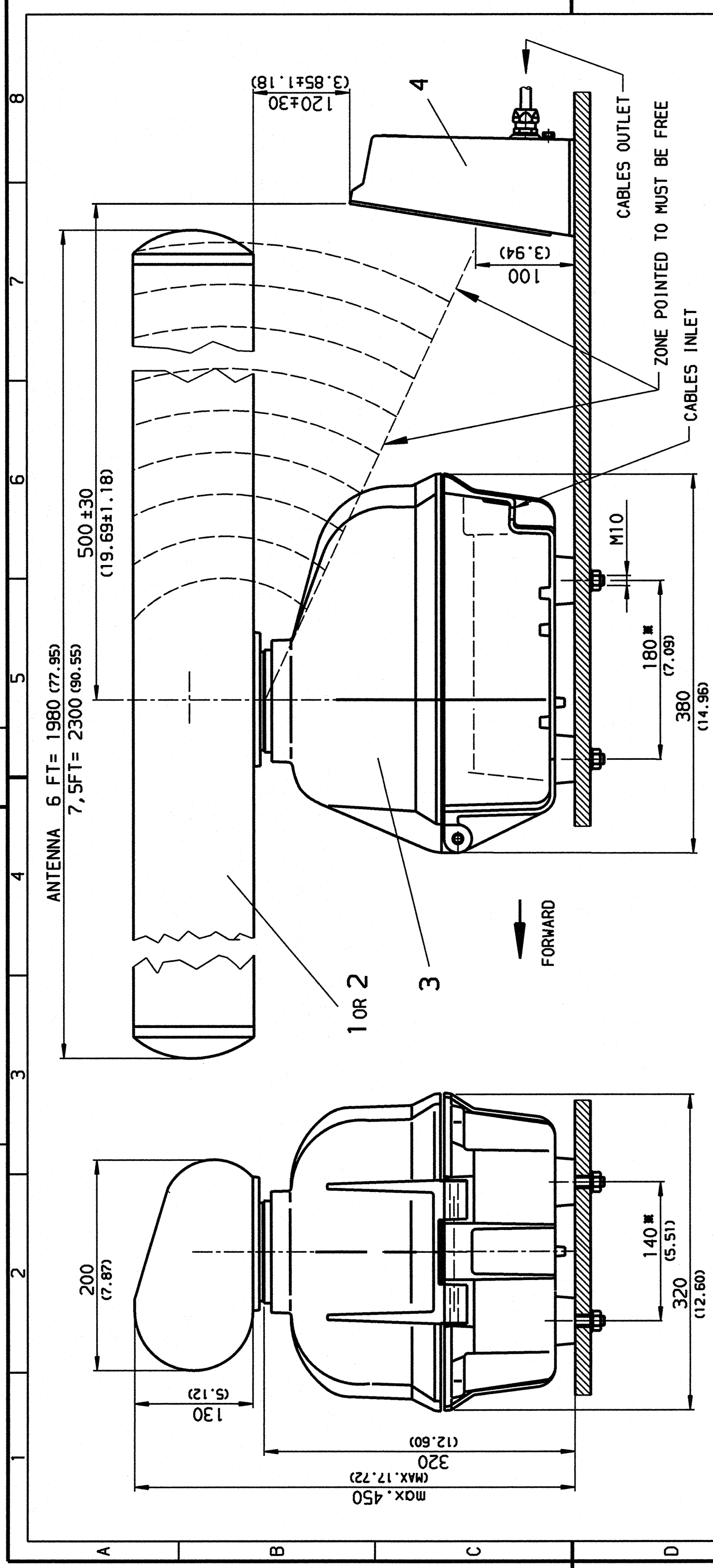
DRAWING TITLE:
Radar NSC 18
DIMENSIONAL DRAWING

DRAWING NO.:
900 - 014.HP005

SH. 1
OF 1

SCALE	WEIGHT:	20,5 kg
DRAWING NO.: 900 - 014.HP005		
DRAWING TITLE: Radar NSC 18 DIMENSIONAL DRAWING		
SH. 1 OF 1		

CAD



DIMENSIONS WITHOUT TOLERANCES ARE MAX. DIMENSIONS

POS.	TYPE	ID. NO.	WEIGHT
1	7,5 FEET ANTENNA UNIT AU 11-07 NA	2.808351	≈8,2kg
2	6,0 FEET ANTENNA UNIT AU 11-06 NR	2.808251	≈5,8kg
3	PEDESTAL 10KW X-BAND SU 70-10 NR	2.808252	≈26 kg
4	PERFORMANCE MONITOR SENSOR PM30-02 WITH POWER SUPPLY > APM-020 (OPTIONALLY)	2.808254	≈2,0kg ≈1,3kg

REFERRING TO DRILLING SCHEME ON BOARD SHIP

TYPE OF ENCLOSURE: IP56 EN 60529

CAD

CAD

mm (INCH)	2004	DATE	NAME
DR.	20.09.	Scherrans	
APPR.	26.10.04		
CHK.	26.10.04		
RELEASE:	22.09.04		

REV.	REVISIONS	DATE	NAME
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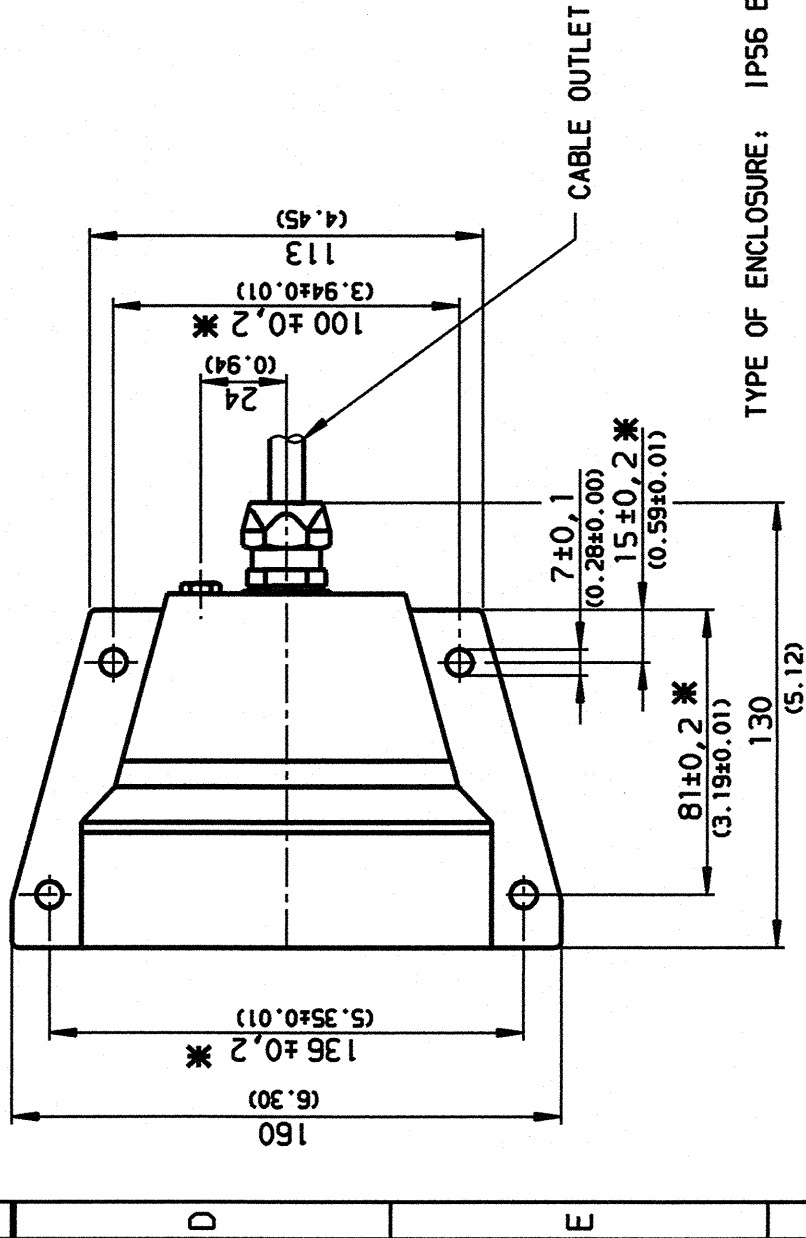
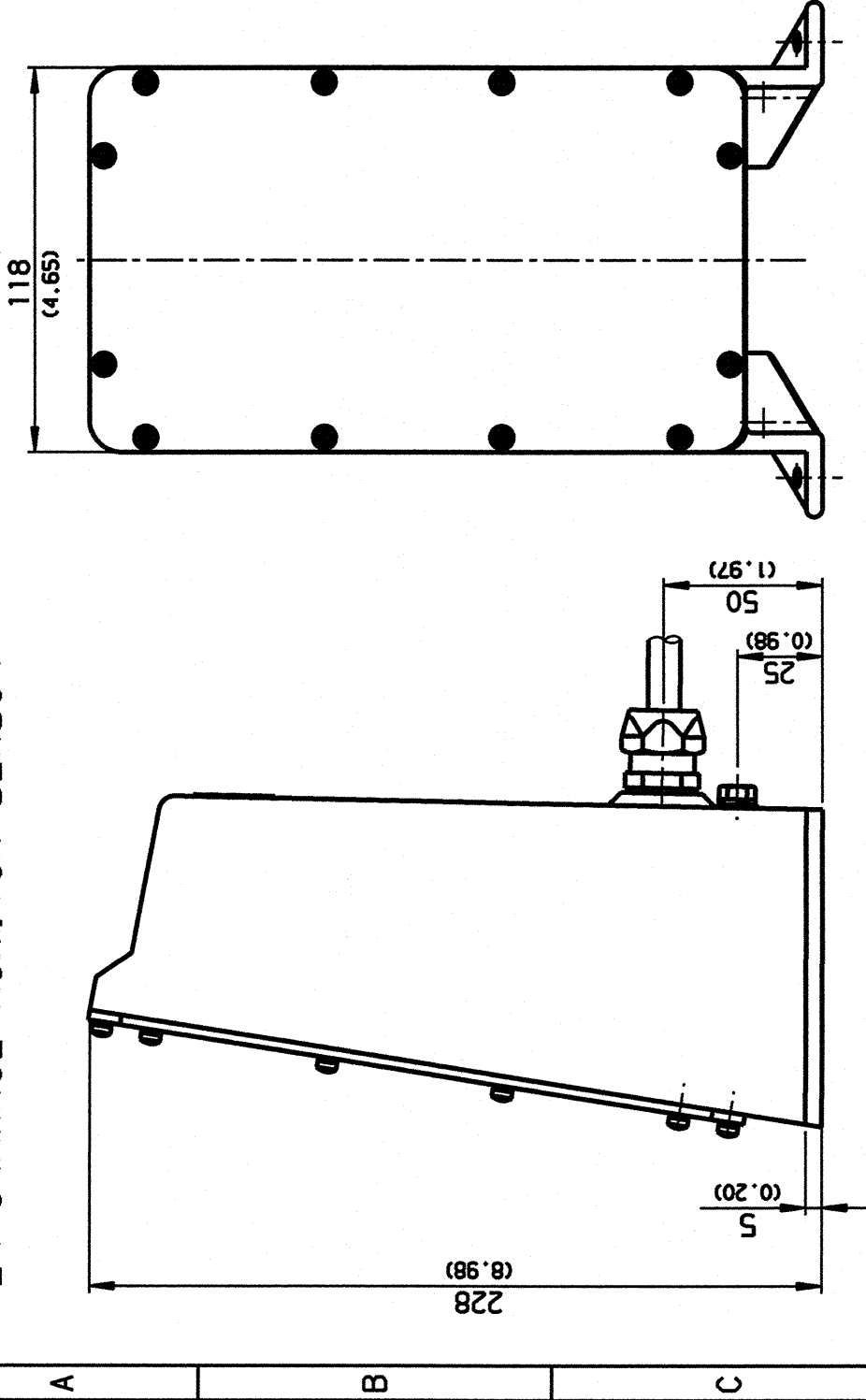
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DRAWING NO.:		NB99-HP0048
SCALE:		-

NB99-HP0048



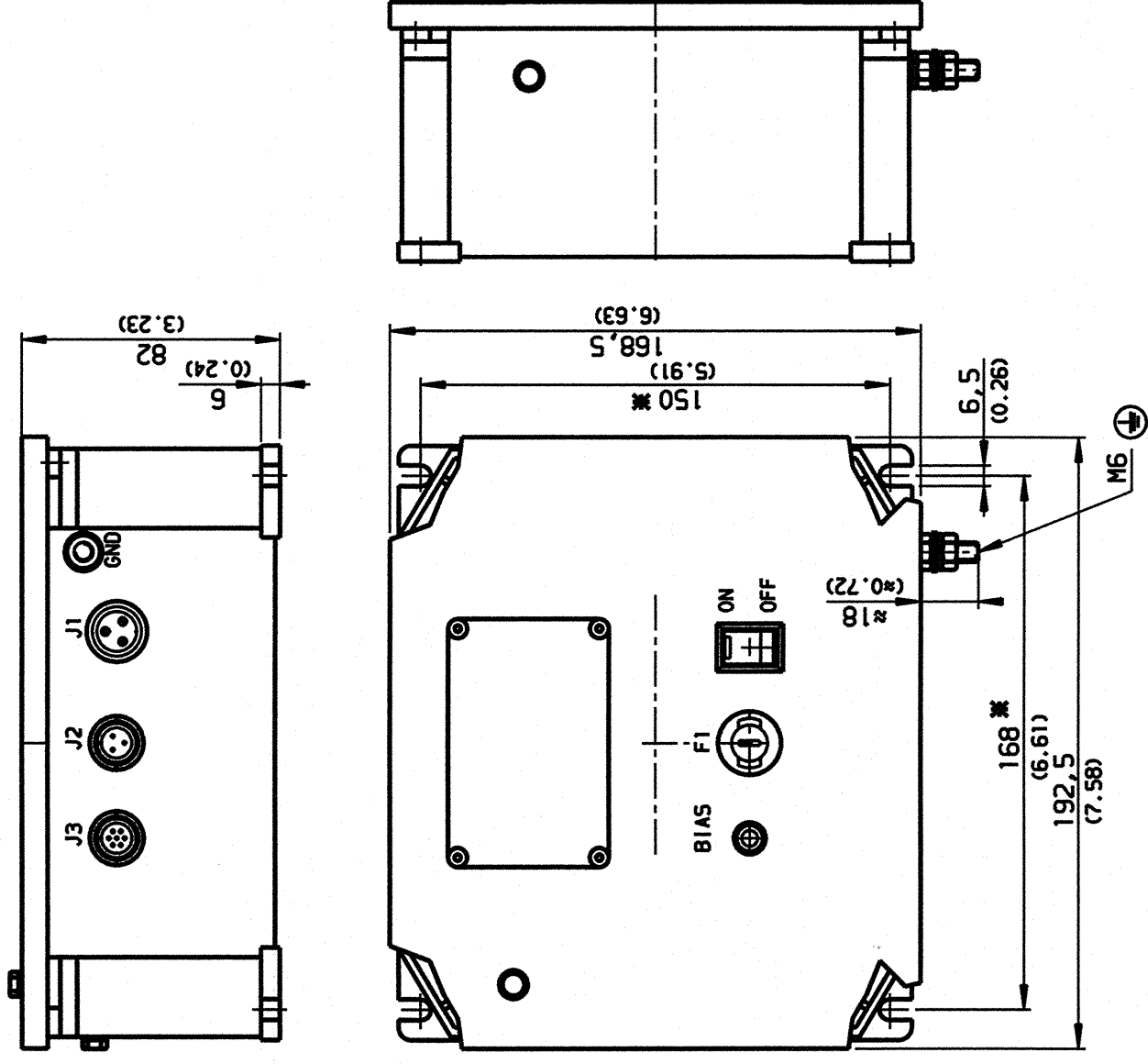
05017501

PERFORMANCE MONITOR SENSOR



* REFERRING TO DRILLING SCHEME ON BOARD SHIP DIMENSIONS WITHOUT TOLERANCES ARE MAX. DIMENSIONS

POWER SUPPLY



TYPE OF ENCLOSURE: IP55 EN 60529

POS.	TYPE	ID. NO.	WEIGHT
4	PERFORMANCE MONITOR SENSOR PM30-02 WITH POWER SUPPLY APM-020	2.808254	≈ 2,0kg ≈ 1,3kg

CAD

CAD

REV.	REVISONS	DATE	NAME
1			
2			
3			
4			

2004	DATE	NAME
DR.	20.09.	Scherrons
APPR.	20.9.04	LSA
CHK.	22.9.04	LSA
RELEASE:	22.9.04	LSA

DRAWING TITLE:
X-PEDESTAL SU 70-10NR
DIMENSIONAL DRAWING

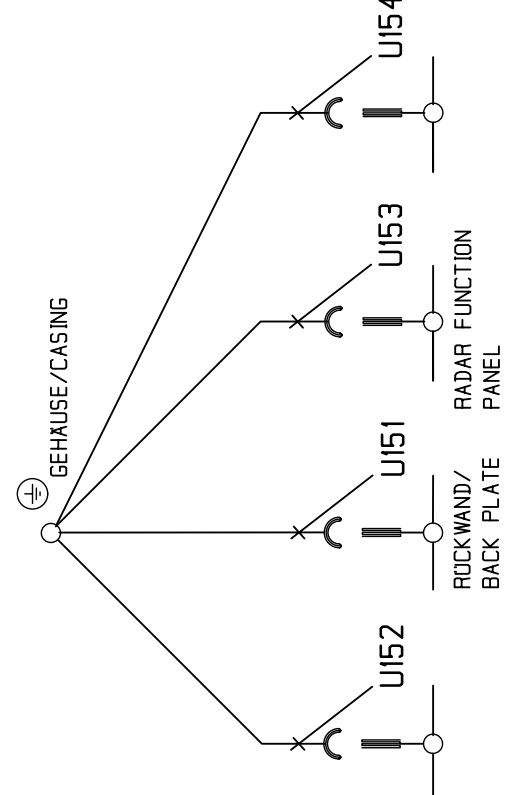
DRAWING NO.:
NB99-HP0048

SCALE: -

SH. 2
OF 2

Raytheon
Raytheon Marine GmbH
Germany

DIN CODE	BENENNUNG DESCRIPTION	TYP-/ZEICHNUNGS-NR. TYPE/DRAWING NO.	POS.NR. POS.NO.	AUS STÜCKLISTE F.PARTS LIST
B1	BUCHSENGEHAUSE	VS-15-BU-DSUB -3P	28	900-014.NG001
B11	INLINE COUPLER / RJ45	VS-8-BU-RJ45	27	900-014.NG001
N1,N2	SCHOTTKY-DIODE	D55 2x61-0,1A IXYS	16	900-014.NG001
F1-F5	FUSE	HTB-461	31	900-014.NG001
U1	PC / NSC18	607 282 INONET	3	900-014.NG001
U2	TFT-DISPLAY / NSC18	INONET	2	900-014.NG001
U3	TRACKBALL 19MM NSC	948-003.NG001	11	900-014.NG001
U4	RADAR-OPERATOR-PANEL	948-002.NG002	10	900-014.NG001
U5	VGA-SPLITTER			900-014.NG001
U6	BUZZER MODUL		9	
U7	RADAR INTERFACE PCB	900-014.100	4	900-014.NG001
U8	RADAR DATA PROCESSOR	900-014.100	4	900-014.NG001
U9	PC-DC NETZTEIL 10-30V	MPD-810H	6	900-014.NG001
U10	SERIAL I/O-MODULE	900-010.20	7	900-014.NG001
U11	TRANSCEIVER-CONTROL-MODULE	900-019.100	5	900-014.NG001
U12	POWER-TRANSFER-MODULE	900-010.21	8	900-014.NG001
U13	DC/DC MODULE 18-36V	VI-JW3-CX	15	900-014.NG001
U20	BACK PLATE	900-014.07-001		900-014
U21	MONTAGEBLECH	900-014.05-001		900-014
U22	PC-HALTER	900-014.01-001		900-014
U23	FRONT CASING	900-014.03-001		900-014
U24	PROFILRAHMEN	900-014.04-001		900-014



- 0.75² BK
- / 1.5² BK
- // 1.5² WH
- // 1.5² GNYE

CAD B 4538 D

ALLGEMEINTOLERANZ
ISO 2768 - mK

2004	DATUM	NAME
BEARB	21.09.	RAMM
GEPR	21.09.	
NORM		
FREIG		

BENENNUNG
RADAR NSC 18

BAUSCHALTPLAN / WIRING DIAGRAM

ZEICHNUNGSNUMMER
900-014.HP008

ERS.FÜR
ERS.DURCH

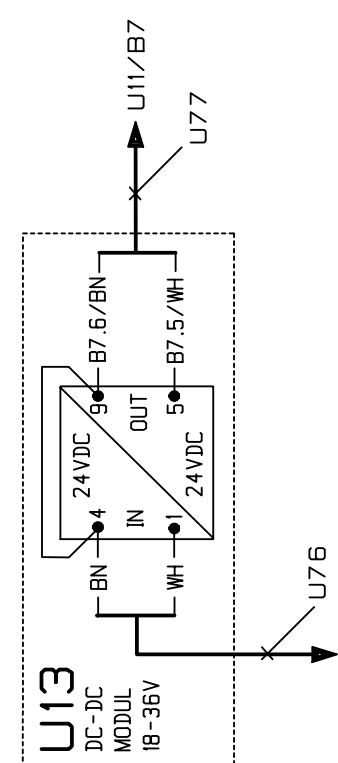
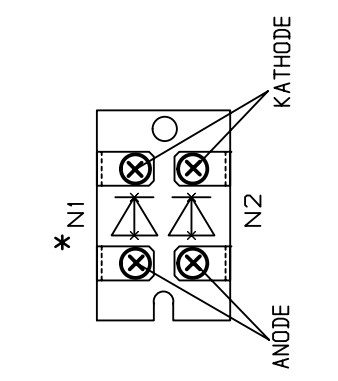
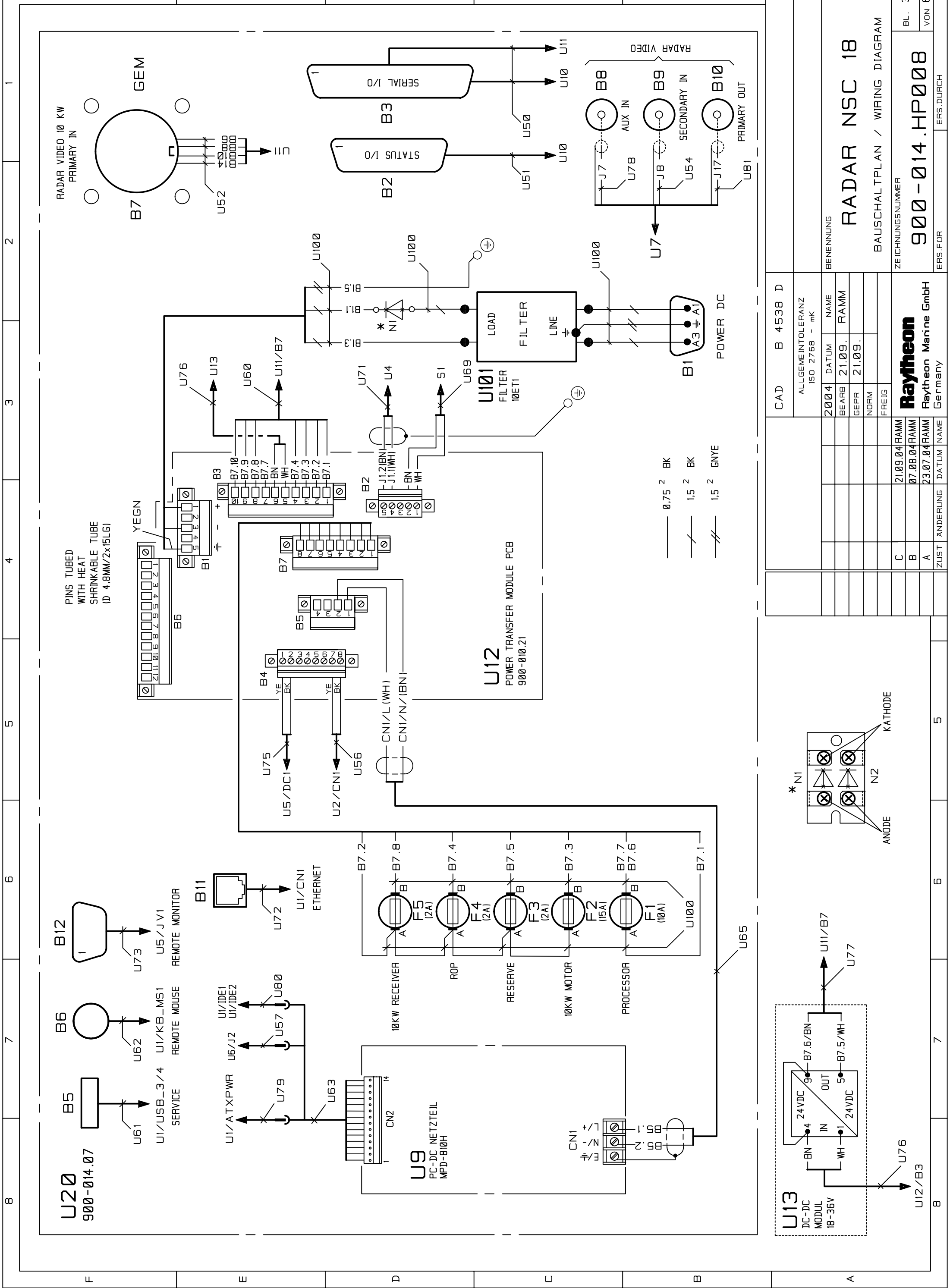
BL. 1
VON 6

Raytheon
Raytheon Marine GmbH
Germany

ZUST	ÄNDERUNG	DATUM	NAME
C		21.09.04	RAMM
B		07.08.04	RAMM
A		23.07.04	RAMM

8		7		6		5		4		3		2		1	
DIN CODE	BENENNUNG DESCRIPTION	TYP-/ZEICHNUNGS-NR. TYPE/DRAWING NO.	POS.NR. POS.NO.	AUS STOCKLISTE F.PARTS LIST	STECCKER-BESCHRIFTUNG PLUG-LETTERING										
U49	CABLE / CAN BUS	NB60-160		900-014.10											
U50	CABLE 1 / SERIAL I/O	NB60-203		900-014.10											
U51	CABLE 2 / STATUS I/O - CAN BUS	NB60-204		900-014.10											
U52	CABLE / GEM	NB60-163		900-014.10											
U53	CABLE / 34POL.. FLACHBAND	NB60-172-0.3M		900-014.10	J8.J17										
U54	CABLE / COAX	NB60-164-0.8M		900-014.10	J26/B11										
U55	CABLE / COAX	NB60-165-0.4M		900-014.10											
U56	CABLE / PTM-TFT - POWER TRANSFER MODULE	I12507	INONET	00607292											
U57	CABLE / XY - POWER	I12644	INONET	00607292											
U58	CABLE / MB - COM1 - SERIAL I/O	NB60-166-0.6M		900-014.10											
U59	CABLE / MB - VGA-SPLITTER	00112600	INONET	00607292											
U60	CABLE / POWER	NB60-202		900-014.10											
U61	CABLE / MB - USB-HDR - REMOTE USB	I12113	INONET	00607292											
U62	CABLE / MB - PS/2-REMOTE PS/2	I12504	INONET	00607292											
U63	CABLE / MB - PC-DC POWERSUPPLY	MPD-810H		900-014.10											
U64	CABLE / MB - SPEAKER-HUFENMODUL	I12506	INONET	00607292											
U65	CABLE / POWER	NB60-168		900-014.10											
U66	CABLE / MB- USB- RADAR OPERATOR PANEL			DELIVERED WITH U4											
U67	CABLE / MB- COM2-HDR- PTM-TFT	I12605	INONET	00607292											
U68	CABLE / TRACKBALL - RADAR OPERATOR PANEL			DELIVERED WITH U3											
U69	CABLE / S1 (ON/OFF)	NB60-169-0.7M		900-014.10											
U70	CABLE / S2 (RESET)	NB60-170		900-014.10											
U71	CABLE / PTM - RADAR OPERATOR PANEL	NB60-171		900-014.10											
U72	CABLE / MB- RJ45-	I12032	INONET	00607292											
U73	CABLE / BACK PLATE - VGA-SPLITTER	I12502	INONET	00607292											
U74	CABLE / TFT - VGA-SPLITTER	I12501	INONET	00607292											
U75	CABLE / PTM - VGA-SPLITTER	I12508	INONET	00607292											
U76	CABLE / PTM - DC/DC MODULE	NB60-198		900-014.10											
U77	CABLE / DC/DC MODULE - TCM	NB60-198		900-014.10											
U78	CABLE / COAX	NB60-164-0.9M		900-014.10	J9										
U79	CABLE / CABLE / POWER EXTENSION WIRE	I12152		900-014.10	LG 0.2M										
U80	CABLE / XY - POWER	I12644													
U81	CABLE / COAX	NB60-164-0.8M		900-014.10											
U100	WIRING	900-014.16		900-014.NG001											
U101	FILTER	I0ET1	CORCOM	12	900-014.NG001										
U151	CABLE/MASSEBAND	105-083.01-027		43	900-014.NG001										
U152	CABLE/MASSEBAND	105-083.01-027		43	900-014.NG001										
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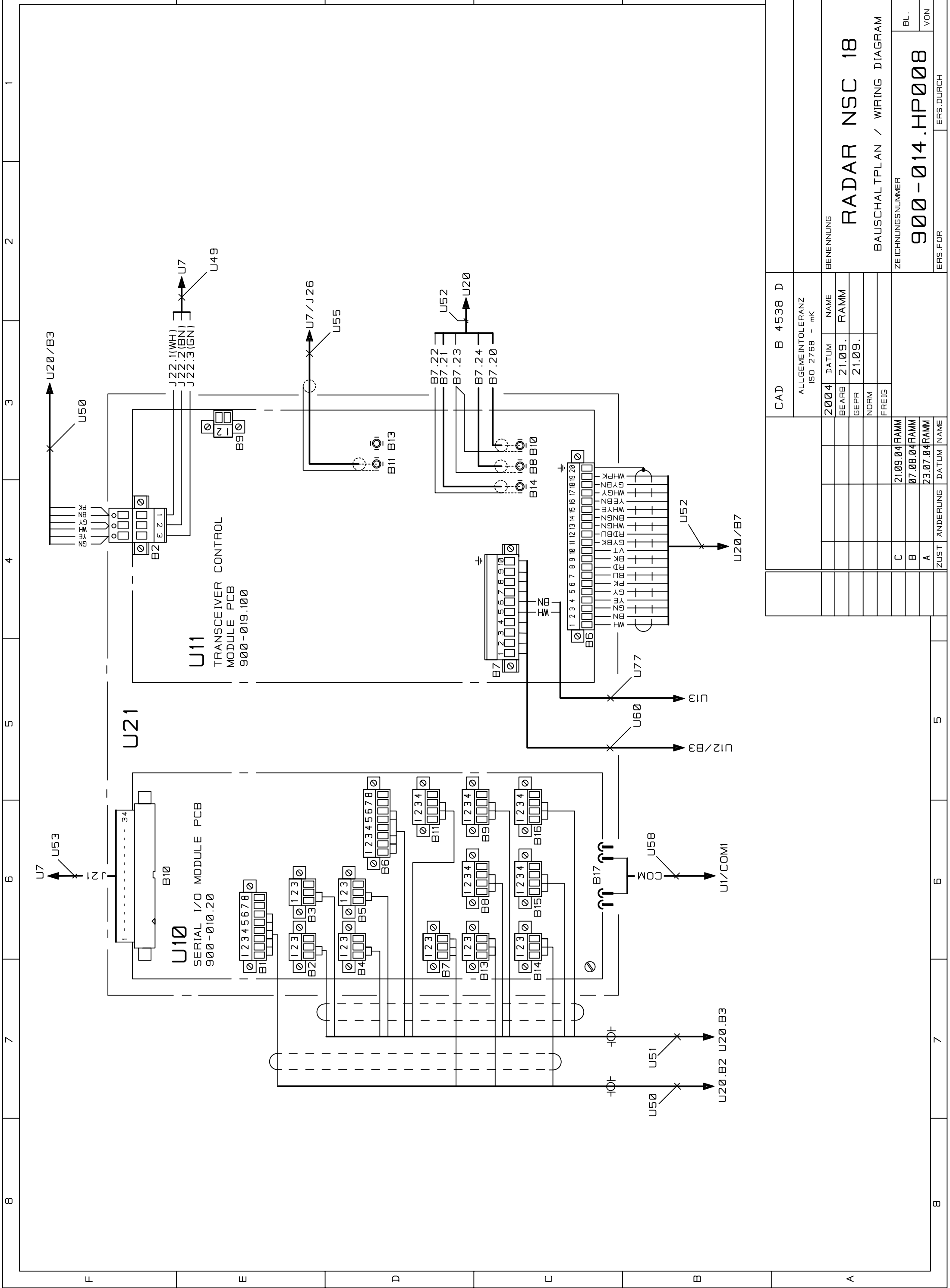
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ALLGEMEINTOLERANZ ISO 2768 - mk			
2004		DATUM	
BEARB	21.09.	NAME	
GEPR	21.09.	RAMM	
		NORM	
		FREIS	
BENENNUNG			
RADAR NSC 18			
BAUSCHALTPLAN / WIRING DIAGRAM			
ZEICHNUNGSNUMMER			
900-014.HP008			
ERS.FÜR			
ERS.DURCH			
RAYTHEON			
Raytheon Marine GmbH			
Germany			
ZUST ANDERUNG		DATUM / NAME	
C	21.09.04	RAMM	
B	07.08.04	RAMM	
A	23.07.04	RAMM	
BL. 2		VON 6	



CAD B 4538 D	
ALLGEMEINTOLERANZ ISO 2768 - mk	
2004	DATUM NAME
BEARB 21.09.	RAMM
GEPR 21.09.	
NORM	
FREIG	
C	21.09.04 RAMM
B	07.08.04 RAMM
A	23.07.04 RAMM
ZUST	ÄNDERUNG DATUM NAME

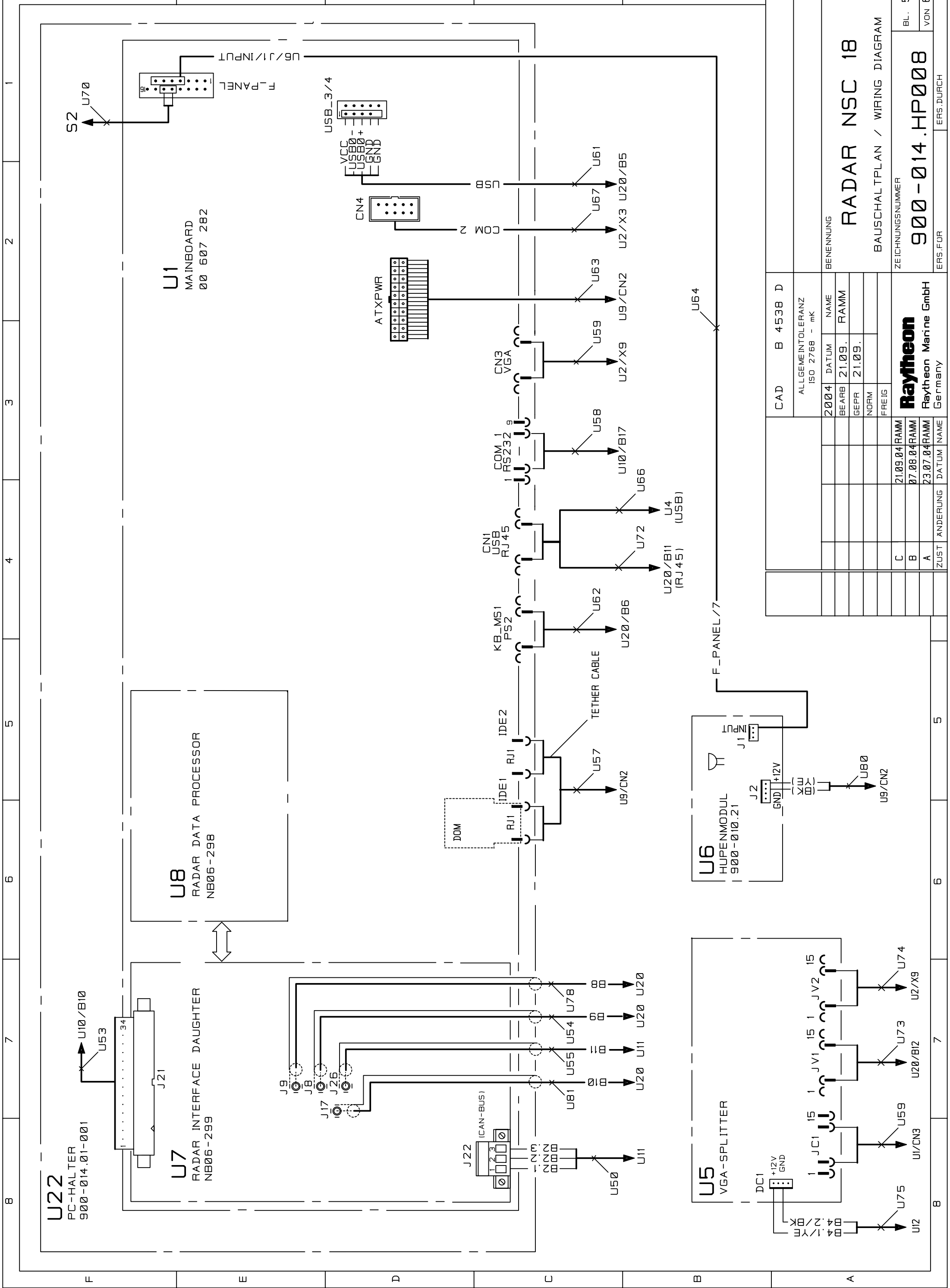
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RADAR NSC 18	
BAUSCHALTPLAN / WIRING DIAGRAM	
ZEICHNUNGSNUMMER	
900-014.HP008	
ERS.FÜR	ERS.DURCH
BL. 3	VON 6





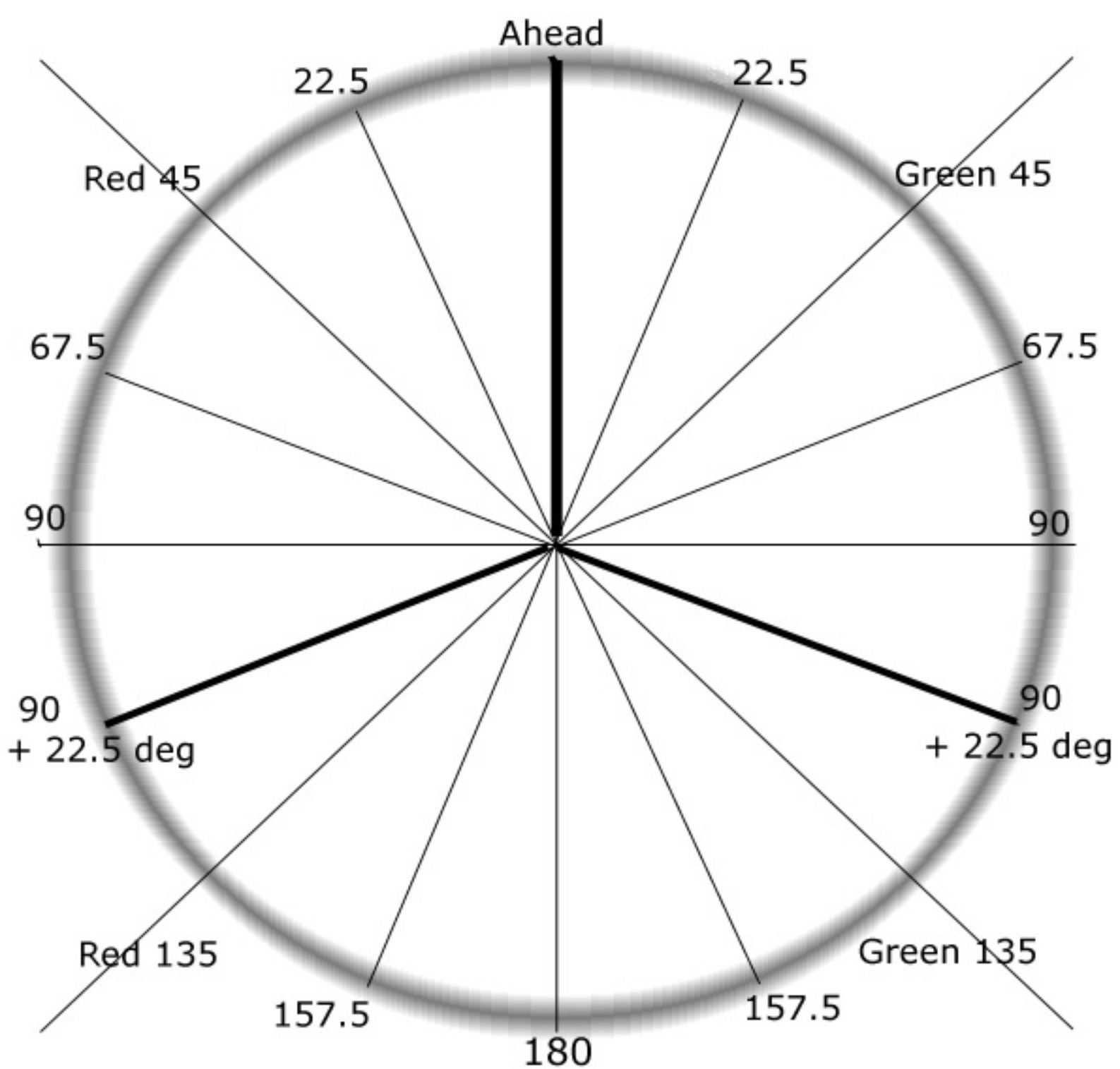
CAD B 4538 D		BENENNUNG	
ALLGEMEINTOLERANZ ISO 2768 - mk		RADAR NSC 18	
2004	DATUM	NAME	
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GEPR	21.09.		
	NORM		
	FREIG		
ZUST		ANDERUNG	DATUM
C		21.09.04	RAMM
B		07.08.04	RAMM
A		23.07.04	RAMM

BAUSCHALTPLAN / WIRING DIAGRAM		ZEICHNUNGSNUMMER	
900-014.HP008		ERS.FÜR	
ERS.FÜR		VON	
BL. 4		VON 6	



CAD B 4538 D	
ALLGEMEINTOLERANZ ISO 2768 - mk	
2004	DATUM NAME
BEARB.	21.09. RAMM
GEPR.	21.09.
NORM	
FREIG	
C	21.09.04 RAMM
B	07.08.04 RAMM
A	23.07.04 RAMM
ZUST.	ÄNDERUNG DATUM NAME

BENENNUNG		RADAR NSC 18	
BAUSCHALTPLAN / WIRING DIAGRAM			
ZEICHNUNGSNUMMER			
900-014.HP008		BL. 5	VON 6
ERS.FÜR		ERS.DURCH	
Raytheon Marine GmbH Germany			



Blank Sectors (not transmitted)

Sector Start				
Sector End				

Reflect sectors (mast, funnel, w'house)

Sector Start				
Sector End				

PMU calibration Sector

New Magnetron Date				
GAIN full, start echo				
GAIN full, end echo				

