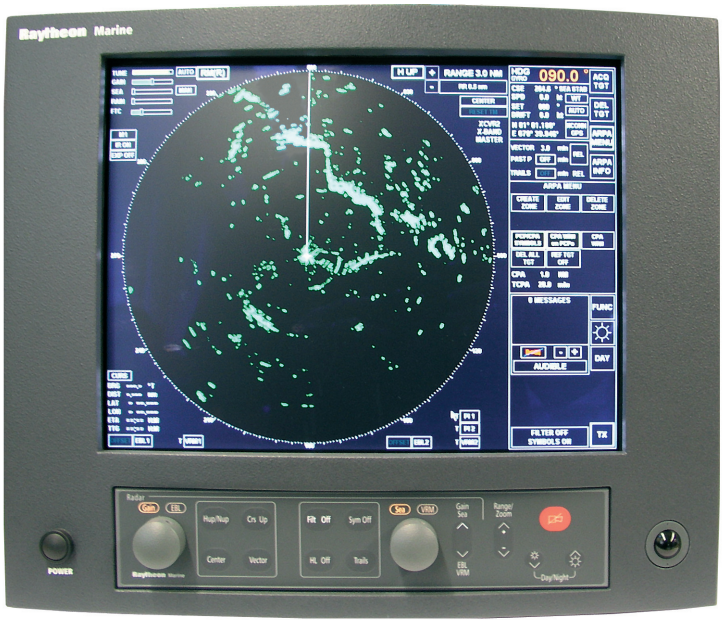
Raytheon Marine

NSC 18

Navigational Radar System

User Manual



3748DOC020102 Edition 14.JAN.2005

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EC Declaration of Conformity

Directive 96/98/EC, last amended by Directive 2002/75/EC

We hereby declare that the product identified below has been manufactured in accordance with the type approved units and complies with the above mentioned European Directive.

Product Description:	**Radar equipment with electronic plotting aid (EPA)**
Type:	**Navigational Radar System NSC18** (system components see attached)
Type Examination by:	GL Luxembourg
Type Approval Certificate No.:	21 051 - 04 Lux (Module B)
Assessment of the Production Quality Assurance by:	GL Luxembourg Notified Body No.: 0801
Certificate No.:	21 052 - 04 Lux (Module D)
Applied Standards:	IEC 60872-1 (1998), IEC 60872-3(2000) IEC 60936-1(1999) IEC 61162 IEC 60945/2002, EN 60945/July2003 MSC.64(67) Annex4(1996), A.694(17),A.278(VIII) A.477(XII), A.823(19) ITU- R M.628-3(11/93), ITU- R M.1177-2(2000)

This declaration has been made in the name of the manufacturer by:

Kiel, January 11, 2005

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Radar equipment with electronic plotting aid (EPA)
Navigational Radar System NSC 18
Listing of the system components:

Unit	Type
Display Unit Software Version Radar Connection - Module NSC	900-014 NG XXX, SA XXX NB45-003.P0001 E00.XX 948-008 NG XXX, SA XXX
The following pedestals/ transceiver may be connected: Pedestals / Transceiver	SU70-10 NR M28347 MTR/X-PED,25KW,AC110/220V M28348 MTR/X-PED,25KW,AC380/440V M28349 MTR/S-PED,30KW,AC110/220V M28350 MTR/S-PED,30KW,AC380/440V M28351 MTR/X-PED,AC110/220V 1ph M28352 MTR/X-PED,AC380/440V 1ph M28354 MTR/S-PED,AC110/220V 1ph M28355 MTR/S-PED,AC380/440V 3ph
The following transceiver may be used: Transceiver, bulkhead mounted	M28353 MK2 X-MTR 25KW down M28356 MK2 S-MTR 30KW down
The following antennas may be connected: X – Band Antenna 6ft MK2 X - Band Antenna 7ft MK2 X - Band Antenna 9ft MK2 X - Band Antenna 12ft	AU11 - 06NR M28342 M28343 M28346
The following performance monitors may be used: Performance Monitor	PM 30-02 X- Band M38390 X – Band M28391 S - Band

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Radar equipment with electronic plotting aid (EPA)

Navigational Radar System NSC 18

Listing of the system components:

Unit	Type
Accessories / Options	
TFT Display 19,0"	JH 19 T01 MMD- Rx
TFT Display 21,0"	JH 20 T04 MMD- Rx
TFT Display 23,1"	JH 23 T02 MMD- Rx
RGB Distributor (Video Splitter)	RGBHV 1 / 4 50 004 HL
Monitor Selector Switch	RGBHV 3 / 3 /1 59017 HL 24
Interswitch Unit	900-020 NGXXX / SAXXX
Software	900-020.P0001 E00.XX

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Annex

A

ACP, Azimuth Commit Point

ARPA, Automatic Plotting Aid

ARP, Azimuth Reset Point

B

BRG, Bearing

C

CPA, Closest Point of Appoach

C–UP, Course Up

CSE, Course

CURS, Cursor

D

DST, Distance

E

EBL, Electronic Bearing Line

ETA, Estimated Time of Arrival

EXCL, Exclusion

EXP, Expansion

F

F, Floating

FTC, Fast Time Constant

FTM, Fix True Motion

H

H–UP, Head Up

HDG, Heading

HW, Hardware

I

ISU, Interswitch Unit

L

LP, Long Pulse

M

MTR, Modulator Transmitter Receiver

N

N–UP, North–Up

NM, Nautical Miles

P

PCP, Potential Collision Point

PMU, Performance Monitor Unit

POS, Position

PPI, Plan Position Indicator

R

RACON, Receiver/Transmitter Transponder Devices used as a Navigation aid

R–UP, Repeater Up

RCSE, Relative course

RM (R), Relative Motion and Relative Trails

RM (T), Relative Motion and True Trails

RNG, Range

RR, Range Rings

RSPD, Relative Speed

S

STBY, Standby

SHM, Ship Heading Marker

SP, Short Pulse

T

T–SCE, Test scenario

TCM, Transceiver control module,

TN, Tune

TTG, Time to go

Tx, Transceiver ON

TCPA, Time of Closest Point of Approach

TM, True Motion

TRU, True

TTG, Time To Go

TFT, Thin Film Transistor

V

VRM, Variable Range Marker

X

XCVR, Transceiver unit

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QUICK STARTUP GUIDE

NSC FUNCTIONS

RECOMMENDED USER ADJUSTMENTS AFTER SWITCHING ON THE NSC RADAR

STDBY/TX	NUP
MODE	RM (T)
TRAILS	TRUE
SPEED	LOG (WT)
VECTOR	TRUE
FILTER (KEY)	ON
ECHO EXP	ON

Cursor

Trackball

ANTI–COLLISION AREAS

ARPA	PCP/CPA, CPA WRN on PCPs
FWD ARPA	CUP

OPTIONAL

VECTOR	REL
PLOT HISTORY	RM (R)
TRAILS	REL

SWITCH ON THE RADAR, SELECT THE BEST PRESETTINGS

1.

Switch **ON** the NSC.
Press the button 5s, the main power has to be switched on.
The *Run–Up* phase is terminated after 190s.
The NSC status is *STANDBY*.

STBY

Select this softkey per cursor. The softbutton name changes to *TX*. The radar is ready for operation.
The attitudes selected last are effective:
These are:
PPI presentations and adjustments, **Antenna** sensitivities, last **Sensor** choice.

2.

Check
- the *ALARM–Messages* (detailed information see chapter 2.3.6.4).
- the position indication between radar information panel and position sensor.
- the radar video with the real area, make a bearing to a known target (bouy, beacon, church).
- the magnetron quality. Check it with the performance monitor (see chapter 2.5.5).

3.

Select the **PPI–presentation** in favor.

RM

means **Relative Motion**, own ship is stationary and other objects, including land masses boys, ships at anchor and ships in motion, move with correct relative speed and course

TM

means **True Motion**, land masses, bouys, ships at anchor, etc. appear exactly as they are. Objects in motion, including own ship, move with correct true speed and course across the operating screen.

N–UP

means **North–Up**, geographic north is upward –*Stabilized operation*–. *GYRO* Compass information is required for North–Up operation.

H–UP

means **Head–Up**, heading is upwards –*Unstabilized operation**–.

C–UP

means **Course–Up**, course is upwards –*Stabilized operation*–. *GYRO* Compass information is required for Course–Up operation.

R–UP

means **Reapter–Up**, repeater indication is upwards –*Unstabilized operation*–.

SITUATION SETTINGS

RNG 6.0 NM / RINGS 1.0 NM

PPI adjustments
Select your required *Range Scale* (highest value 96.0 NM, lowest value 0.125 NM).
Fade the *Range Rings*, Rings are used to make quick assessment of target's approximate range from own ship.
The ship symbole appears in the range scale between 0.125 NM to 96.0 NM **or** in the ring scale 0.02 NM to 16 NM.

Antenna Sensitivity controls

AUTO

TUNE

AUTO mode for *TUNE*.
The *TUNE* control is used to tune the Receiver Frequency to match that of the Transmitter.
The tune adjustment should be made on the medium or long range scales that show radar returns.

GAIN

The *GAIN* control adjusts the sensitivity of the radar display.

AUTO

SEA

AUTO mode for *SEA, RAIN, FTC* (**SFAR**).
The *SEA* control is used to suppress radar returns which are the result of radar signals reflected from *waves*.

RAIN

The *RAIN* control is used to suppress radar returns which are the result of radar signals reflected from rain *drops*.

FTC

FTC performs differentiating, or filtering of rain clouds.

SART OFF

Search and rescue transponder SART ON is to improve detection of SART.

SP

Select the puls length, from short to long pulse and vice versa to optimize the target discrimination with respect to selected range.

IR ON

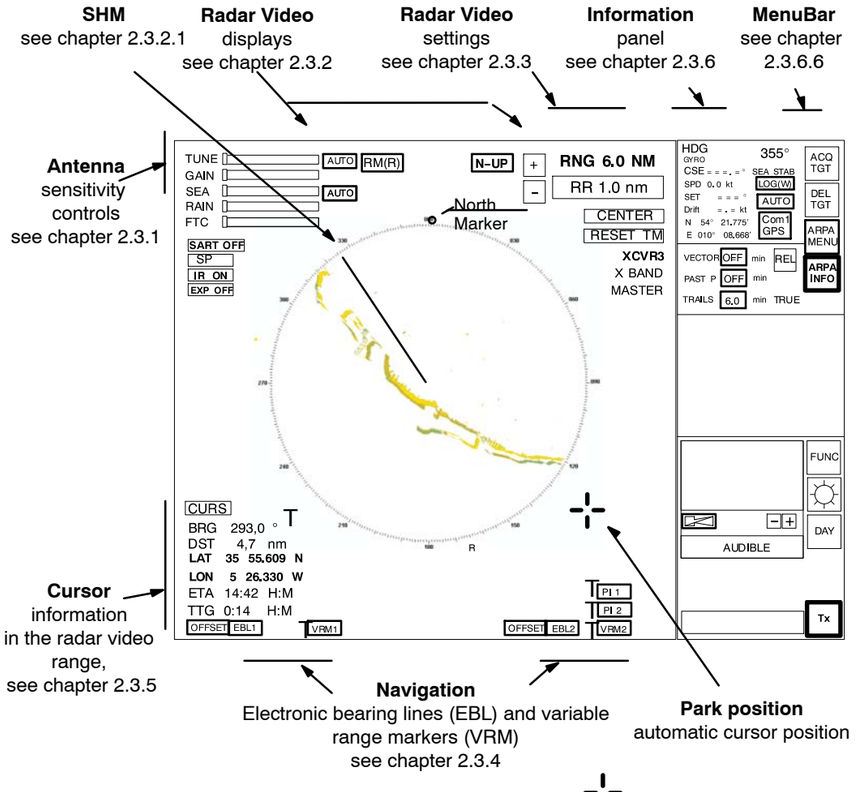
Select the interference function (ON or OFF).

EXP OFF

Select the echo expansion (ON or OFF).

Day or Night mode
Press this button if you want to change in the night mode.

*) *Unstabilized operation* means.
No heading– or speed–sensor was available.
In this case following NSC functions are not possible:
ARPA function, True Motion, Fast Target ON/OFF
Afterglow Trail



Radar operator panel
see chapter 2.2.3

Trackball

used as **SET button**

Trackball
see
chapter 2.2.2

used to **pick–up for** picking–up and **dragging** something

CURSOR SYMBOLS

NORMAL CURSOR outside the PPI

DEFAULT CURSOR

OFFSET CURSOR

ECDIS CURSOR (option see chapter 2.2.2.2)

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IMPORTANT NOTICE AND SAFETY INFORMATIONS

This Radar is an aid to navigation. Its accuracy can be affected by many factors such as equipment defect, environmental conditions, or improper operation. It is the user's responsibility to exercise common prudence and navigational judgement at all times.

ATTENTION

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant IEC 60936 to IEC 60872, IEC 60945.
These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
This equipment generates, uses and can radiate radio frequency energy and, not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the. interference at his own expense.

HIGH VOLTAGE

There is absolutely no danger in handling the external controls of the radar while the radar is in operation. In the radar‘s interior, however, are high voltages which are fatally dangerous to anyone careless handling interior components. Be absoluteley sure that the radar power switch is **OFF** before performing repair work or maintenance .

Furthermore, even when the power switch is turned off, a high voltage remains in certain parts of the radar circuits. In particular, be careful of the magnetron heater circuit, cathode–ray tube anode circuit, etc.. Utilizing a length of wire with one end fully grounded or an insulated srewdriver, ground all high voltage sections to discharge the residual charges and ensure that no charges remain before touching any part of the high voltage sections. In any case, the most dangerous thing to do is to touch any part of the high voltage sections without making sure that the radar power switch is off.

ATTENTION

Exercise care when approaching a rotating antenna. Be sure to turn off the radar power switch before performing maintenance or inspection of the antenna. Also, make sure that nothing or no one is near the antenna when turning on the radar power supply.

MICROWAVE RADIATION

A short exposure to the microwaves radiated by the radar antenna is harmless.
However, avoid prolonged exposure to the microwaves. Never look directly into the wave guide while checking transceiver operation, since microwaves are especially harmful to the eyes.
The radiation of microwaves can be checked with a neon tubel . The neon tube will glow in the presence of microwaves.

1 Introduction

The Operator Manual
An operator should become familiar with the location of the display information and the control panel buttons.

Manual overview.

	Glossary of Terms
chapter 1	for important safety notes
	for showing the NSC Radar System
chapter 2	for operation
	short operation
chapter 3	for theory of operation

The NSC Radar is designed in accordance with the rules of the International Maritime Organization IMO*.

* The International Maritime Organization is the specialized agency of the United Nations with responsibility for safety and security at sea and the prevention of marine pollution from ships.

The main components of the NSC Radar system include (see Figure: 1):
- the Flat Screen Display (TFT Technology)
- the Track ball, or alternatively the Radar Operator Panel to operate the Radar
- the Radar Processor which is, in addition to the NSC software, the interface to the radar antennas (X/S–Band) and peripheral equipment (Gyro Compass, GPS, Log Sensor, AIS, SART).

The operating surface of the NSC Radar:
The NSC Radar can be completely operated via the trackball–controlled cursor. The Radar Operator Panel is designed for the execution of certain NSC functions.

1.1 Radar System

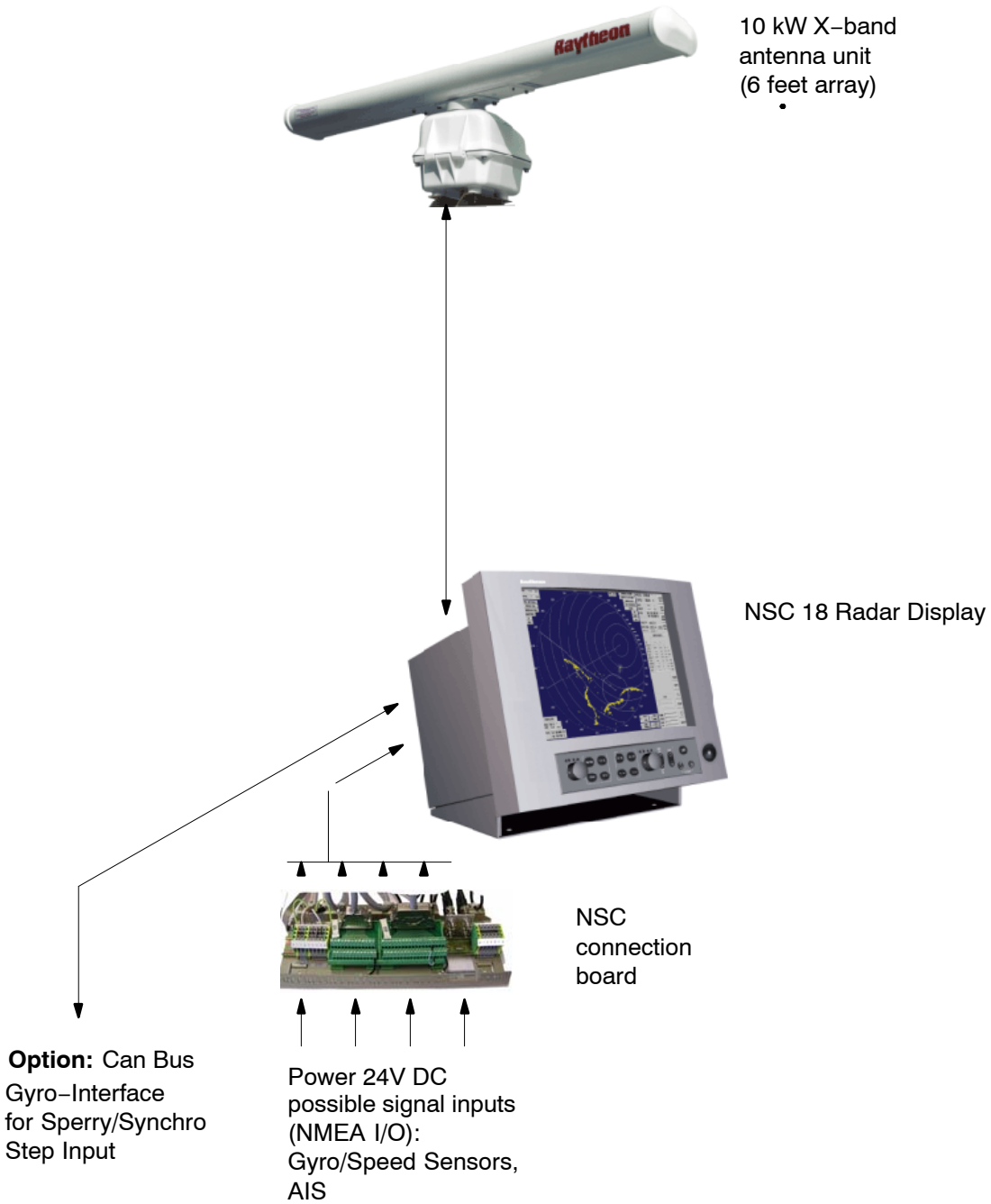
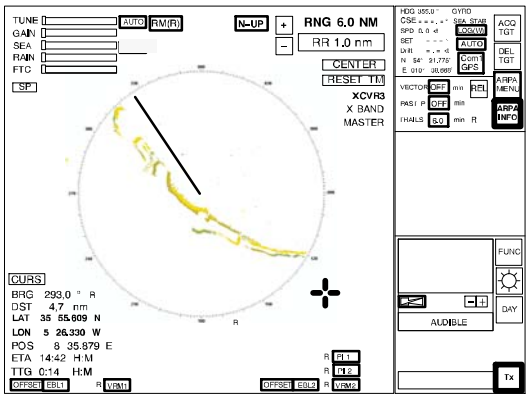


Figure: 1 NSC Radar System

2 OPERATING INSTRUCTIONS

Three components are essential for operation of the NSC 18

Display



Radar control panel

Trackball

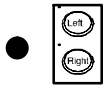


Figure: 2–1 NSC Radar components for operation

Display

The display is a high–resolution TFT (Thin Film Transistor) flat screen color monitor. It shows radar targets and data as well as a number of menus and software buttons.

Trackball

All radar functions can be operated by trackball.

Radar control panel

A range of important functions can also be operated using the radar control panel.

2.1 DISPLAY ORGANIZATION AND SUBMENU STRUCTURE

The following figures provide an overview of the organization of the NSC display and its submenu structure.

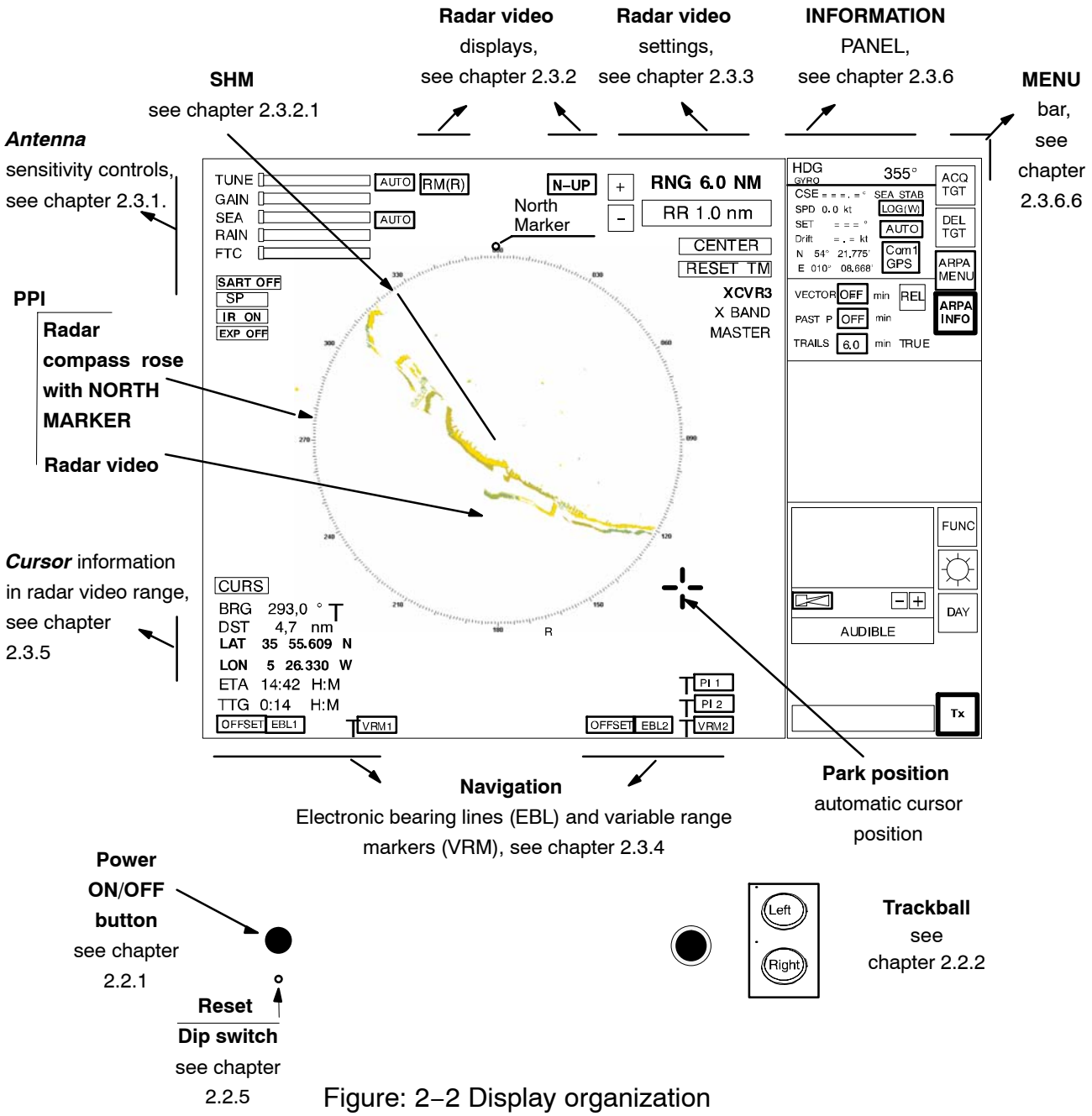


Figure: 2–2 Display organization

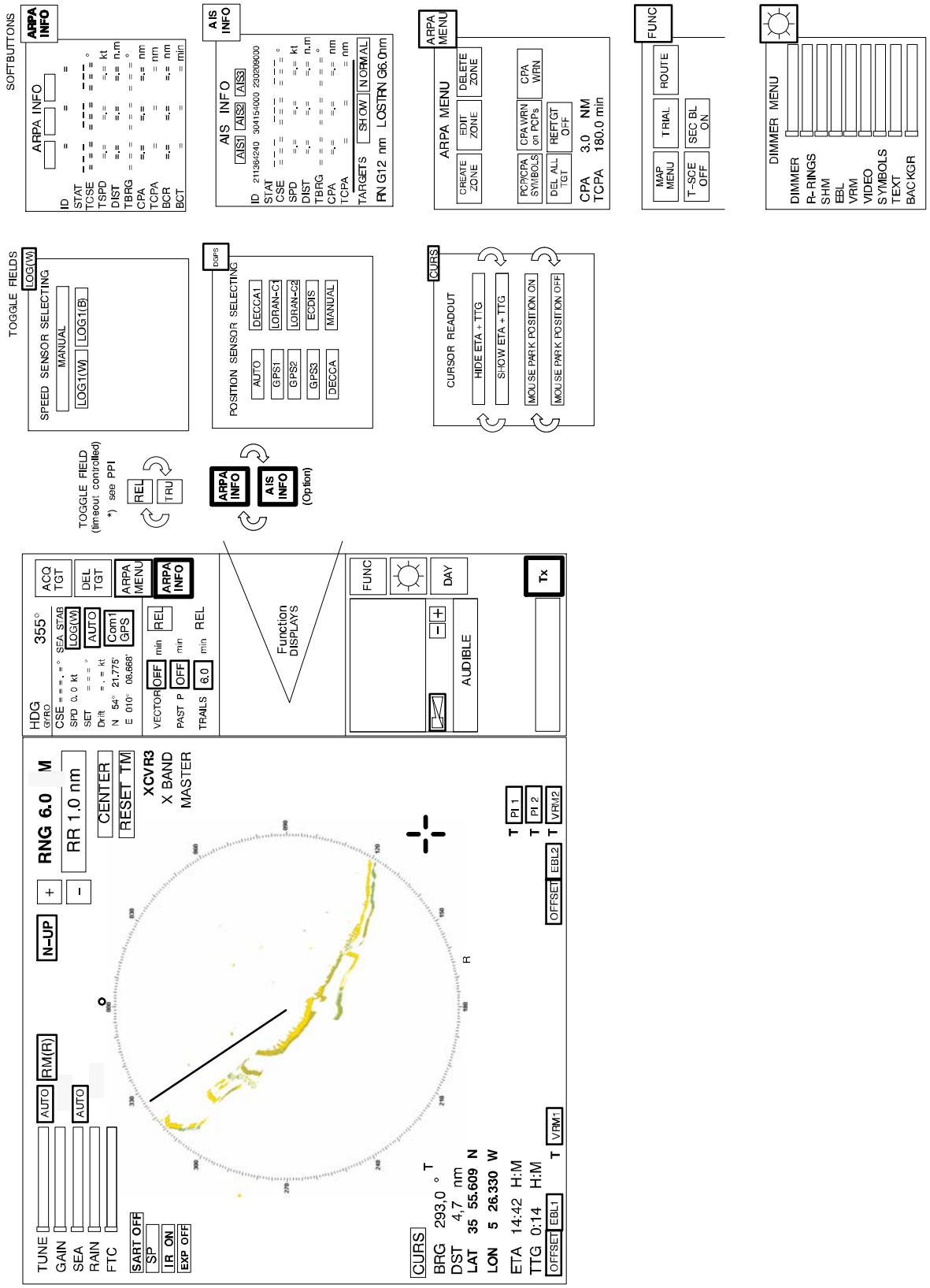


Figure: 2–3 Display and submenu organization

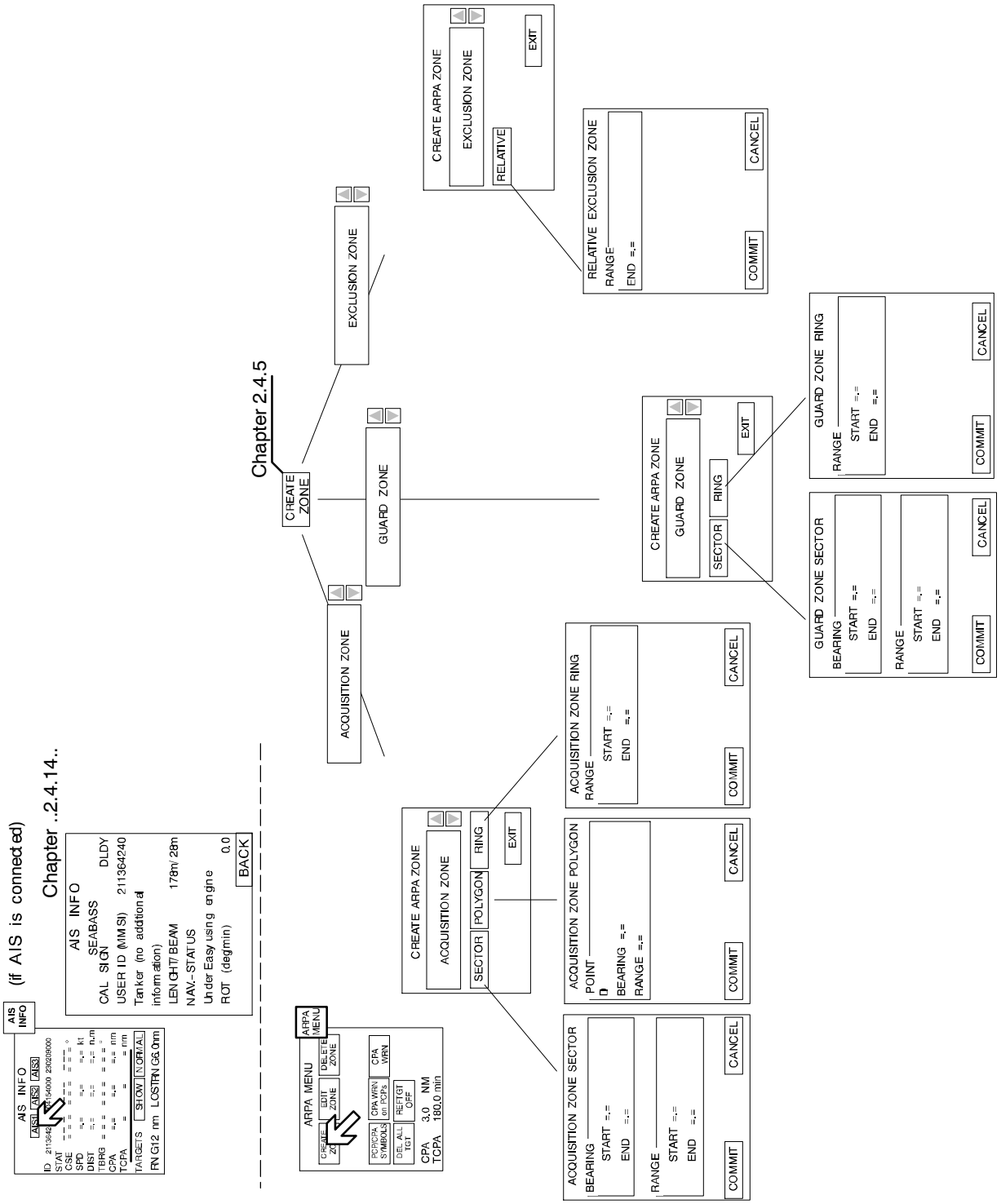


Figure: 2–4 Display and organization of AIS INFO and ARPA MENUs

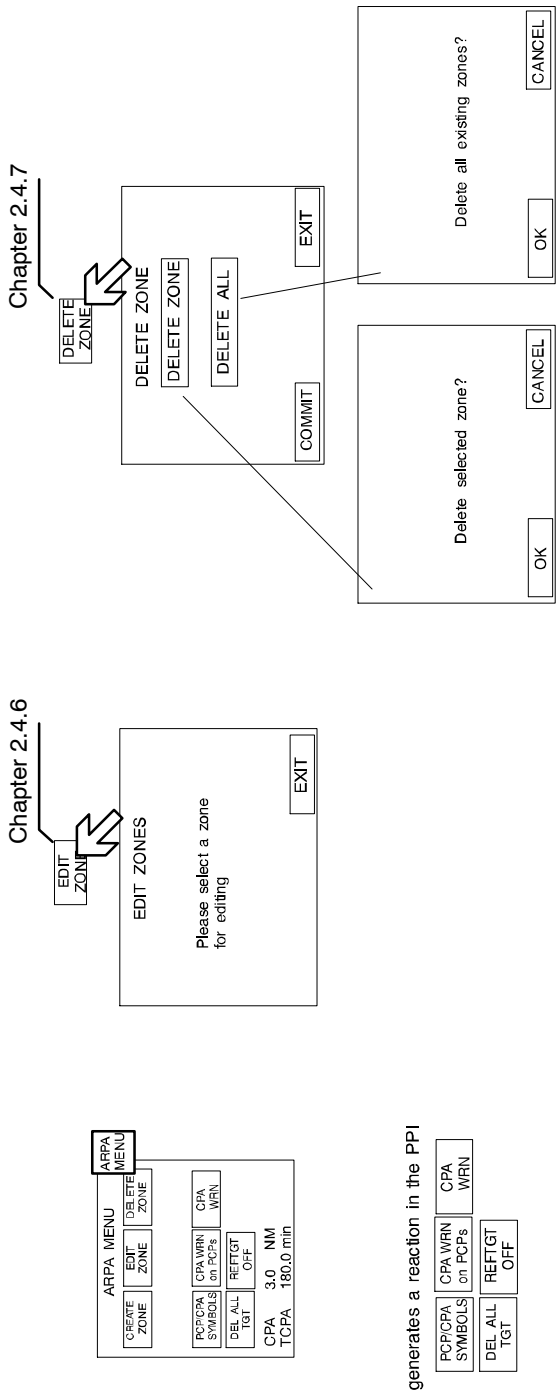


Figure: 2–5 Display of ARPA submenu and selected functions

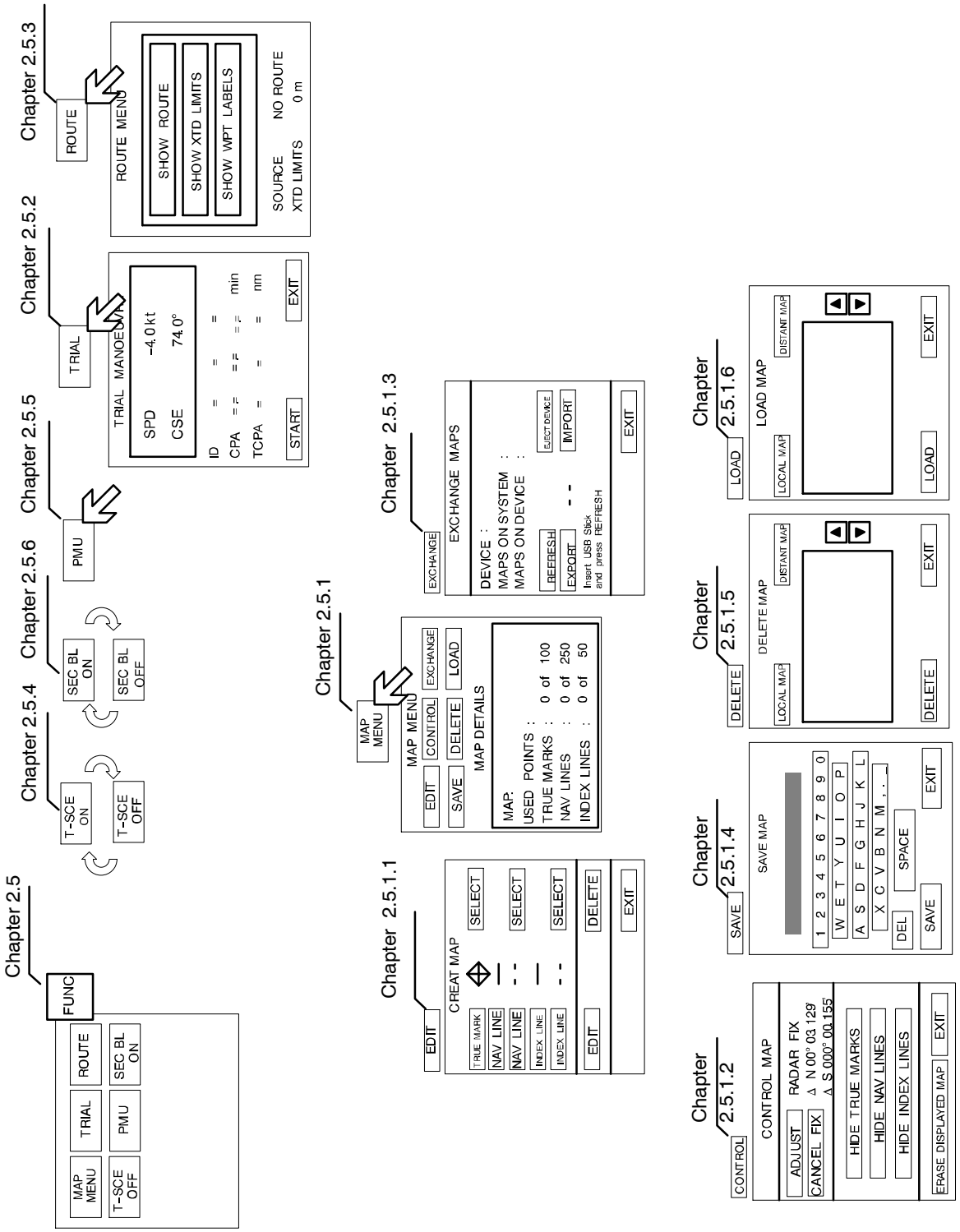


Figure: 2–6 Display of FUNCtion submenu and selected functions

2.2 FIRST STEPS IN OPERATION

This chapter describes following basic functions

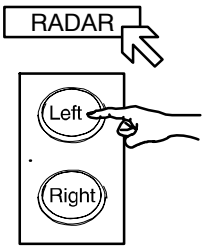
- Switching ***ON*** the NSC radar system, ***STANDBY*** mode, synchronization setting of the heading signal (see chapter 2.2.1)
- How to use the ***CURSOR*** (see chapter 2.2.2)
- How to handle the ***RADAR OPERATOR PANEL*** (see chapter 2.2.3)
- Operator controls in the NSC display (see chapter 2.2.4)
- ***System reset*** (see chapter 2.2.5)
- Switching ***OFF*** the NSC radar system (see chapter 2.2.6)

2.2.1 Switching ON

Positioned on front, lower left side.

Power button

Pressing the button switches on the power.



- The **Radar Utility Selector** window appears in the display.
  Select the RADAR softkey in the window and press the **Left** button on the trackball.

- After about 40 seconds, the message STANDBY appears in the image center.

- The system configuration diagram is shown in the center of the display area (see Figure: 2–7).
  Select the desired transceiver combination XCVR ..... and the master/slave assignment if possible (system specific).
  The STANDBY message changes to WARM UP.

- After a few minutes the warm up period is complete and the WARM UP message changes back to STANDBY.

- NSC Radar is in STANDBY mode.
  The NSC beeps when
  the NSC radar software detects an internal or external malfunction;
  a simultaneous alarm message is displayed.
  Acknowledging the alarm message switches off the acoustic signal. The alarm message is hidden, but it can be called up again.

  NSC status:
  The transceiver is not transmitting.
  The antenna is not rotating.
  No radar video in PPI, STANDBY.
  Service and setup menu accessible.
  The operating temperature is maintained by the magnetron.

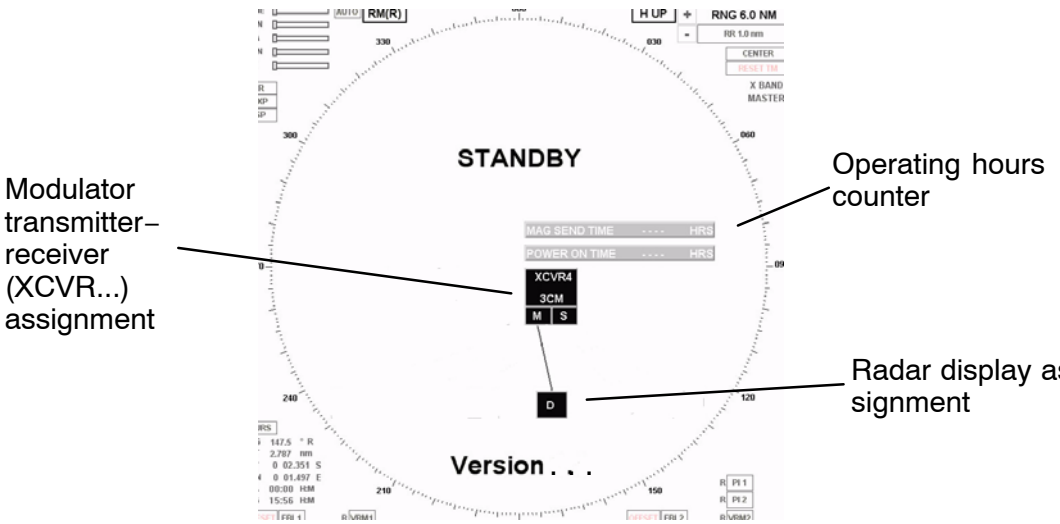
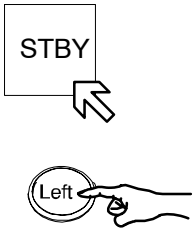


Figure: 2–7 NSC Radar in STANDBY mode –System configuration diagram –



Switching the radar ON

Using the trackball, place the cursor on the **STBY** softkey and press the **Left** button on the trackball.

The name of the softkey changes to **Tx** and is highlighted.

After 1..2 scans the radar video is displayed in the PPI area.
All settings for optimization of the system can be made by using the toggle fields and softkeys that are constantly available.

2.2.2 How to use the CURSOR

When using the trackball, the cursor is moved by rolling the ball in the appropriate direction.
The trackball–guided cursor is the central control for using this radar.

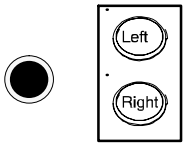


Figure: 2–8 Trackball

The trackball is equipped with two buttons.

This button is used as the **Left** button.

This means:

- Using the trackball, place the cursor over a softkey from the menu bar and press the button. The softkey function is activated (see chapter 2.2.4.1).

- Using the trackball, place the cursor over a text line (e.g. SET, DRIFT) or a toggle field with slider function. Press and hold the upper button and move the trackball.
  The slider below the text line or toggle field is moved horizontally, and a value is displayed (see chapter 2.2.4.4).
  Press **Left** button again to store the value.

- Using the trackball, place the cursor over a slider, e.g. GAIN, press and hold the **Left** button and move the trackball. The slider will follow the trackball to the left or the right.

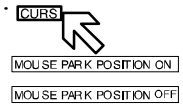
This button is used for **Pick** up and drag operations.

This means:

Normally used in the radar video to **pick up** a symbol e.g. EBL/VRM and drag the symbol to a new position within the radar video using the trackball.

Press the **Left** button to **set up** the symbol.

2.2.2.1 Cursor in park position



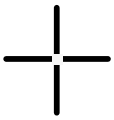
This function is selectable.
Select the CURS button, the CURSOR READOUT displays in the function display.

MOUSE PARK POSITION ON means;
If you do not use the cursor for some time, it jumps automatically into **park position** outside the radar video area, see Figure: 2–14.
Move the trackball and you will see the cursor again.

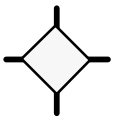
MOUSE PARK POSITION OFF means;
No park position function.

2.2.2.2 Cursor symbols

Figure: 2–9 Cursors illustrate the various cursor symbols that will be seen when using the NSC display.



DEFAULT CURSOR



OFFSET CURSOR

second cursor symbol (in red) appears in the radar video if the NSC Radar and the NSC ECDIS are combined as a system

Figure: 2–9 Cursor symbols

2.2.3 Radar operator panel

The radar operator panel is designed to execute the most commonly used functions.

Signaling:
Illumination of the buttons and status indicators is switched on when the relevant action is activated.

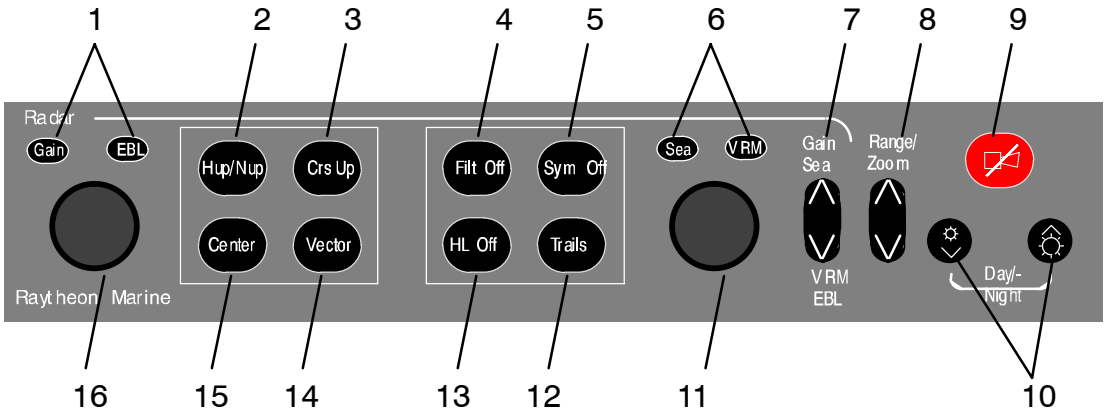


Figure: 2–10 Radar operator panel

1/6	**Status indicators**, press toggle switch (7). The function activated is indicated by (Gain Sea). Use the **dial** (16) to adjust the **Gain**. Use the **dial** (11) to adjust the **Sea**. The **Gain** control adjusts the sensitivity of the radar video. The **Sea** control is used to suppress radar returns which are the result of radar signals reflected from waves.
2	**Radar Video displays**, press button to use **Head up** or **North up**. Head up means the ship's bow is upwards. North up means geographic north is upwards.
3	**Radar Video display**, press button to use **Course up**. Course up means the course is upwards.
4	**Anti–clutter** filter **ON/OFF**, press the button. In case of heavy clutter developing on the Radar Video, the NSC computer creates a profile of the echo. Within this profile, the received echoes are monitored for a certain period (Scan–to–scan method). Irregular echoes are suppressed on the Radar Video. Regular echoes are indicated on the Radar Video.

5	**Hides** the **symbols** in the radar video. Press the button and the artificial symbols will disappear. Press again to **show** the symbols. Symbols are EBLs, VRMs, PL, ARPA zones, MAPs.
6/1	**Status indicators**, press toggle switch (7). The activated function is indicated by (EBL VRM). Use the **dial** (11) to adjust **EBL**. Use the **dial** (16) to adjust **VRM**.
7	**Toggle switch**. Can be switched between upper position, **Gain** / **Sea** and lower position, **VRM** / **EBL**. See **status indicators** (1/6) and use **dial** (16) or **dial** (11).
8	**Toggle switch**. Range selection, switches the radar ranges up and down.
9	**Alarm indicator** (flashing) and **alarm acknowledgment**.
10	**Dimmer** buttons for **button illumination** and **radar display backlight**. Press **both buttons** to switch between **Day**/**Night mode**.
11	**Dial**, see 6/1.
12	Press button in steps, the **Trails indicator changes to the next higher mode**. The steps available are OFF, 1.0, 3.0, 6.0, OFF, see TRAILS toggle field in information panel.
13	Press and hold the button. The **Heading Line** disappears during this time.
14	Press button to use **to change VECTOR LENGTH**.
15	**Center** to reset your own ship to the middle of the PPI or to activate **OFF CENTER**
16	**Dial**, see 1/6.

Table:1 Radar operator panel – Function overview –

2.2.4 Softkeys and operator controls in NSC display

2.2.4.1 Softkeys in menu bar

The text on the softkeys always describes the current mode status.

Example:

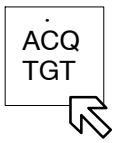
DAY means that the radar is in **DAY mode**

STBY means that the radar is in **Standby mode**

Clicking on the software button changes the status.

A selected softkey is distinguished from a non–selected softkey by its lighter contours.

Softkeys in action

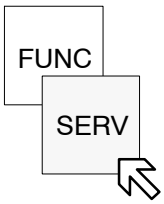


- This softkey function allows manual acquisition of visible targets within the radar video (see chapter 2.4.2).

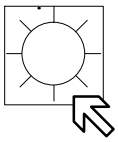
- This softkey function allows individual, acquired targets to be cancelled, except for those which have transmitted a collision alarm.

- For the CREATE ZONE, EDIT ZONE, DELETE ZONE, SAVE EXCL ZONE, LOAD ZONE functions (see chapter 2.4).

- For the current ARPA tracking information.
- For the current AIS information (option).



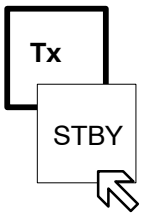
- For additional radar video functions e.g. MAP MENU.
  The Maps function allows the operator to create and permanently store maps (see chapter 2.5).
- Using the NSC in the STANDBY mode the softkey function FUNC changes to SERV (service mode). The service mode is used to configure your radar system.



- To find the optimum brightness for the visual features of the PPI and for the visual features located around the PPI (see chapter 2.3.6.6).

- This softkey function allows you to choose whether the NSC operates in DAY mode or in NIGHT mode (see chapter 2.3.6.6).

- This softkey function allows you to exit the NSC RADAR completely (see chapter 2.2.6).



- This softkey function allows you to choose between NSC in STANDBY or TRANSCEIVER ON (see chapter 2.3.6.6).

2.2.4.2 Operator controls in NSC display

To handle this NSC display, you need to use certain built–in operator controls. These operator controls are as follows:

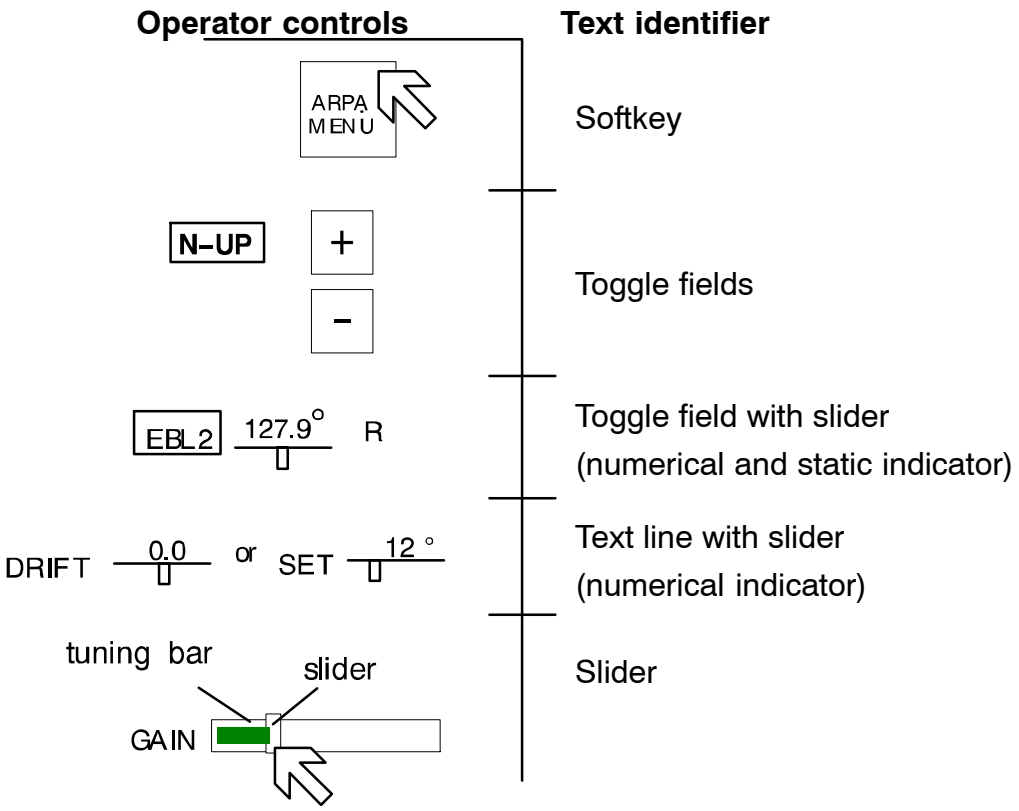
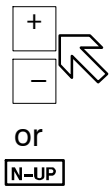


Figure: 2–11 Operator controls in NSC display

All these controls can be selected using the trackball–guided cursor and the trackball **Left** button.

2.2.4.3 Toggle fields

The toggle field functionalities are called up by pressing the **trackball buttons** or alternatively (partially) using the buttons on the operator panel.

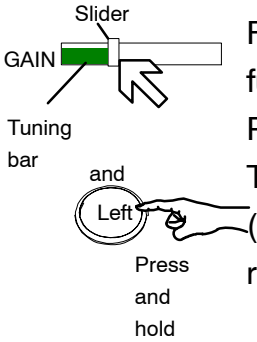


Example:
The range is increased by clicking on the (+) button and decreased using the (–) button.

2.2.4.4 Sliders

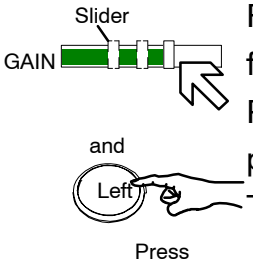
The slider settings can be analog or made in steps.

Analog slider setting



For analog setting, the cursor must be positioned on the slider for the desired function (e.g. GAIN).
Press and hold the trackball button, move the trackball.
The slider is moved to the right or the left, according to the trackball direction (see concurrent tuning bar display). The slider setting is transferred to the radar video immediately.

Steps, slider setting using trackball

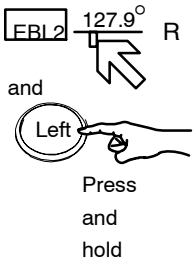


For this setting, the cursor must be positioned in the open area of the slider frame (e.g. GAIN).
Pressing the trackball button moves the slider gradually towards the cursor position (see concurrent tuning bar display).
The slider setting is transferred to the radar video immediately.

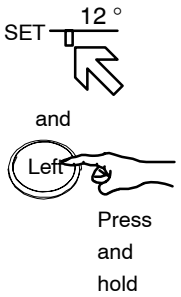
NOTE

Slider settings are individual. Within the NSC technology, these values are treated as transient values.
Transient values cease to be valid after switching to STBY or switching off the unit. When the unit is switched on again, the sliders are set to their default values.

Toggle field with slider



Position the cursor on the toggle field, press and hold the trackball button.
A slider appears below the toggle field.
The slider can make an analog movement in the desired direction using the trackball. In parallel, the numerical value above the slider changes.
Releasing the trackball button concludes the setting.
Click the numerical field again to store the selected value.



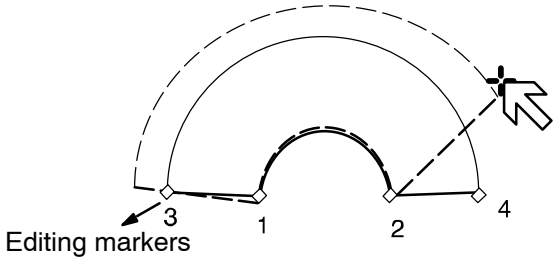
Text line with slider (used for SET and DRIFT values)

Position the cursor on the text line value field, press and hold the trackball button. A slider appears below the value field.
The slider can make an analog movement in the desired direction using the trackball.
In parallel, the numerical value above the slider changes.
Releasing the trackball button concludes the setting.
Click in field again to store the values.

.

2.2.4.5 Drag and drop

This cursor controlled operation is used in radar video;
e.g. if an acquisition zone is to be changed.



Pick up:
Position the cursor on the zone

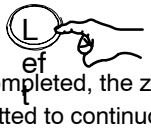
Press once

The zone is now shown in a dotted form,
editing markers are shown at the corners.

Position the cursor on the desired marker.

Press and hold

Drag the marker to the desired position

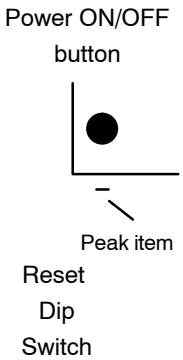
Drop:
Press once 

The change is completed, the zone
switches from dotted to continuous form.

Figure: 2–12 Drag and drop

2.2.5 System reset

When a system reset is carried out, only the NSC software is re–initialized; the transceiver remains actuated.



Procedure:
Trigger the system reset. Press the dipswitch briefly with a pointed object.

The display turns dark briefly and the system is re–initialized.
The NSC display appears with the following basic settings.

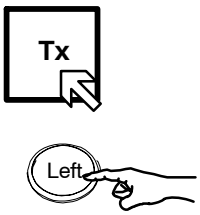
After any restart, the NSC display unit makes certain basic settings. These include

- TUNE in AUTO mode
- GAIN in center position
- SEA in 0 position
- RAIN in 0 position
- FTC in 0 position
- DIMMER in max. position
- Range in 6NM
- Vector at 6.0 min

2.2.6 Switching OFF the NSC radar system

The following procedure should be used to switch off the NSC radar system.

Procedure:



Switching the radar OFF

Using the trackball, place the cursor on the **TX** softkey and press the button from the trackball group.

The name of the softkey changes to **STBY** and is highlighted.

- radar echo disappears
- the antenna stops, no transmission
- the name of the softkey **FUNC** changes to **SERV** (Service).
- the softkey EXIT RADAR appears

Pressing this softkey the RADAR Utility selector appears

Select **Operator Close System and Power Off** in the RADAR Utility selector window and press the button from the trackball again.

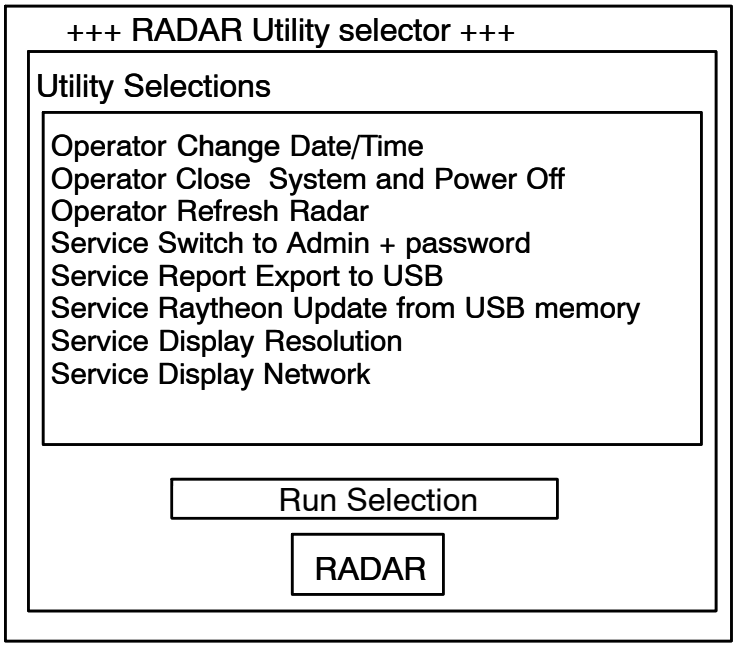


Figure: 2–13 RADAR Utility selector

Power button

Press the power button for approx. 4s.
The process is complete.

2.3 DISPLAY OPERATIONS AND INDICATORS

This chapter describes the function sections of the NSC display see Figure: 2–14.

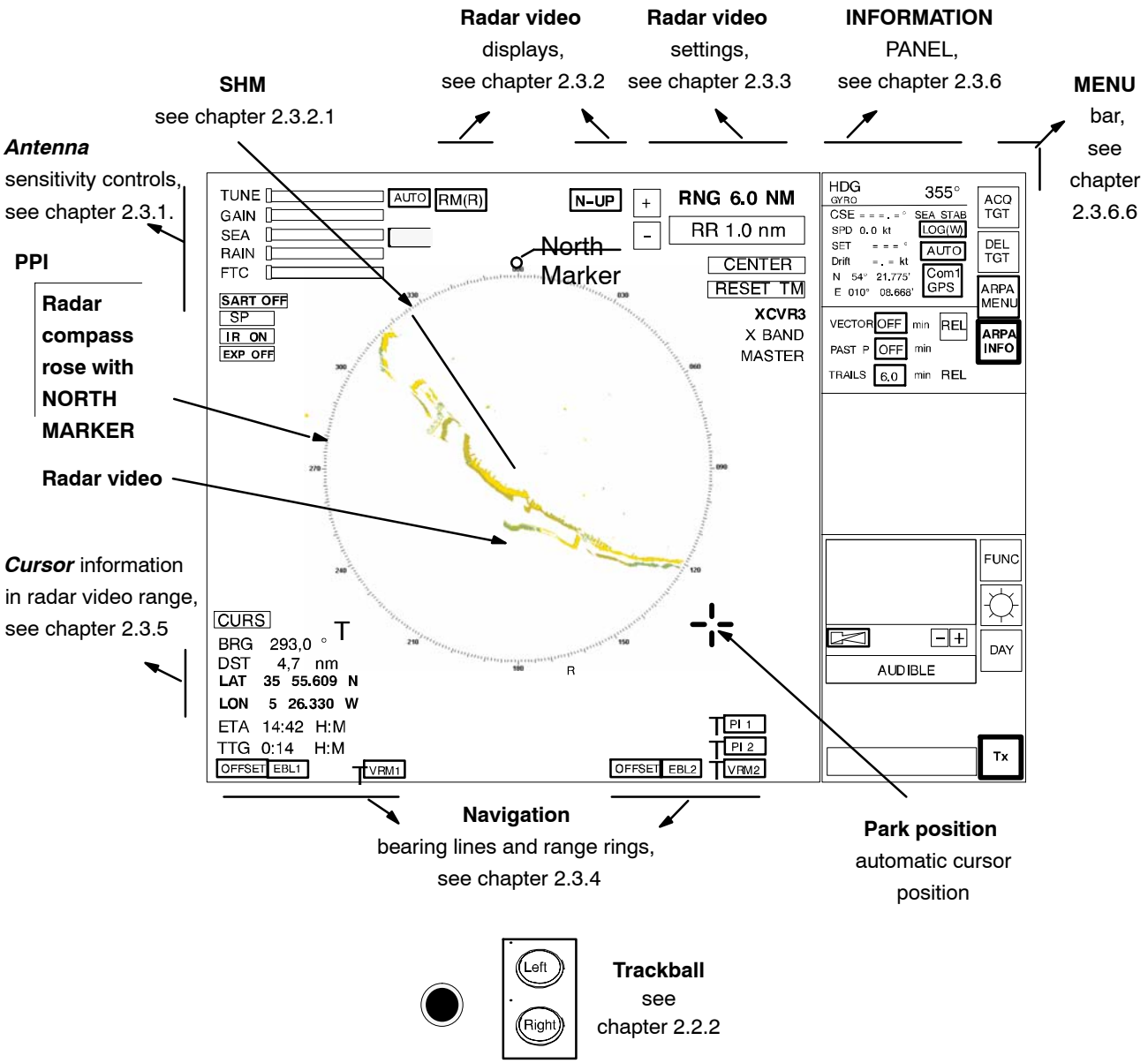


Figure: 2–14 Display organization

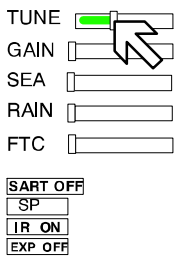
2.3.1 Sensitivity controls

2.3.1.1 Gain and clutter processing

The NSC uses a digital video processing technique called *Scan to Scan integration* or *field processing*. This process requires 3 complete antenna rotations or scans of the antenna in order to *build up* or *decay* detected targets.

To the operator, this means that when a target is first detected, it appears dim. If, on the next scan, it is still present at the same location, it appears at medium brightness and on the third scan, it appears at full brightness. As long as the target is present, it will appear at full brightness.
If the target fades in and out, then it will remain on the screen, dropping from full brightness to medium and back to full brightness.
If the target is lost altogether, then it will take three scans before it completely disappears.
Understanding this 3 scan integration is crucial for operation of the **Gain**, **Sea** and **Rain** clutter controls, because if an adjustment is made to any of these controls, *it requires 3 complete scans to properly observe the results of the adjustment*. The same applies if a radar target is used as a tuning indicator when manually tuning the radar.

2.3.1.2 TUNE



MAN

AUTO

MANual TUNE

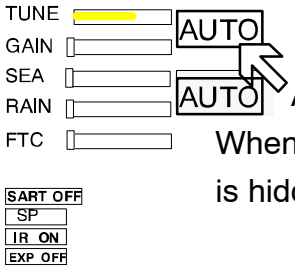
The tune function uses the trackball to control tuning of the receiver frequency to match that of the transmitter. The tuning should be adjusted on the medium or long range scales (6 NM or higher) that show radar returns.

For a preliminary manual setting:
Use the trackball to place the cursor on the TUNE slider then press the **Left** trackball button.
Rotate the trackball for maximum deflection of the slider.
As this setting must be averaged over a complete antenna revolution, a peak detector is included for operator convenience.

The tip of the tuning bar (yellow color) remains at the peak signal detected during one complete revolution of the antenna.

NOTE

Bear in mind the fact that the transmitter frequency will drift for the first thirty (30) minutes of operation from a cold start due to inherent magnetron characteristics. As a result of this, the receiver tuning will change during this time and a final tuning adjustment should be made after approximately thirty (30) minutes of operation. The tuning should also be checked at four–hourly intervals thereafter.



AUTO TUNE (only available in Master mode)

When auto tuning is activated, manual tuning is not available. The slider symbol is hidden and the tuning bar color changes to yellow.

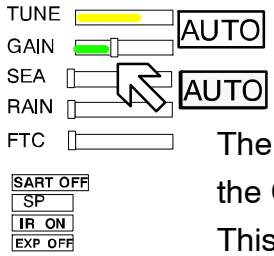
Auto tune is only available if the NSC radar is working in Master mode.

NOTE

With automatic receiver adjustment, the tendency indicator adjusts itself to the maximum value.

– *If the magnetron is at the end of its service life and the transmission spectrum has become abnormal, select manual tuning.*

2.3.1.3 GAIN

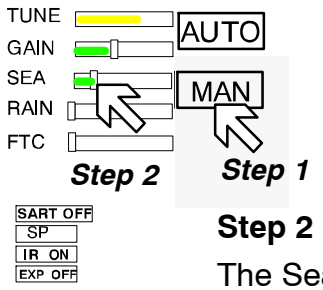


The GAIN control adjusts the sensitivity of the radar video. If properly adjusted, the GAIN control results in noise appearing as a light speckle at the dim level. This light speckle setting results in maximum detectability of targets against background noise. If GAIN is set too low, weak or distant targets could be missed. Excessive gain increases background noise and could make target detection more difficult. A gain slider is provided to indicate the GAIN control setting.

Once the GAIN control has been set, it will automatically maintain the same setting for all ranges. It is not necessary to readjust whenever a new range scale is selected. However, it should be adjusted to optimize the radar video as clutter (sea and/or rain) conditions change.

The gain control function is active over its entire rotation range.

2.3.1.4 SEA



Step 1

Select MANual mode

Step 2

The Sea control is used to suppress radar returns which are the result of radar signals reflected from waves. This effect is commonly known as sea clutter.

The effects of sea clutter are greater (more reflected energy) at close range and vary with wave height and wind.

It should also be noted that sea clutter is reduced on the leeward side of the ship as the retreating wave fronts do not provide as many radar returns as oncoming waves.

Small targets (buoys etc.) often return nearly the same energy as do the waves and can therefore be lost in the clutter. However, since sea clutter is random in nature, the gain and clutter processing circuitry together with the SEA control allow the operator to reduce the sea returns to a light background speckle at low brightness level while maintaining targets in the sea clutter at full brightness.

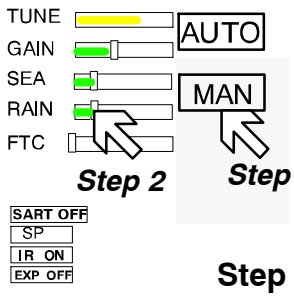
The effect of the Sea control is at its greatest at short range. Its effect reduces progressively as the range increases. At a range determined by the height of the radar antenna above the water (and other factors), the effect of the SEA control ceases altogether. This is typically about 8–10nm.
The ideal sea control setting will reduce sea returns to a light speckle. Scan–to–scan integration will keep the sea returns at a low brightness level, while targets in the sea clutter will be shown at full brightness.
The sea clutter control should be adjusted in small increments, with pauses to observe 3 scans for the results.
In heavy sea clutter, some clutter peaks may come through at brighter levels, especially rollers, so an average setting should be chosen. It is important to note that if the Sea Clutter control is adjusted to completely remove all clutter, then some targets may not be detected.

NOTE

The NSC uses gyro and speed information as part of the clutter removal process. It is therefore highly recommended that you use gyro stabilization and ensure that the manual speed or speed log input is accurate.

In heavy wind driven seas where more sea clutter appears on the windward side of the ship, a slight amount of FTC can balance the clutter (see chapter 2.3.1.6) Then adjust the SEA control to reduce sea clutter. If too much SEA is applied during periods of light clutter, then a band of noise could appear on the edges of the sea clutter.

2.3.1.5 RAIN RATE

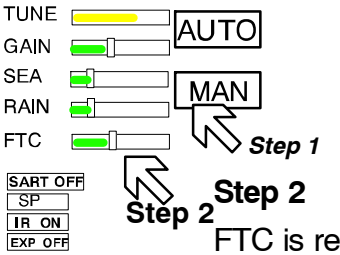


Step 1
Select MANual mode

Step 2
The function of the RAIN control is to enable the operator to suppress radar returns which are the result of radar signals reflected from rain drops.
This effect is commonly known as rain clutter. As with sea clutter, the rain clutter tends to mask small targets (or large targets if the rain is intense).

When heavy rain is falling in the vicinity of the operator's ship (up to 6–10 nm) and the resulting rain clutter is obscuring nearby targets, then the rain rate slider should be used. Advance the rain rate control slightly and observe the results (wait 3 scans).
The ultimate goal is to reduce the nearby rain clutter until it is a very light speckle at the dim level. This setting will reduce the rain returns and will have little effect on strong constant target video returns. Weaker targets (usually appear where rain returns are less intense) may be suppressed along with the rain.
Most of these weaker targets can be restored by making an FTC adjustment (see chapter 2.3.1.6).

2.3.1.6 Filtering rain clouds FTC



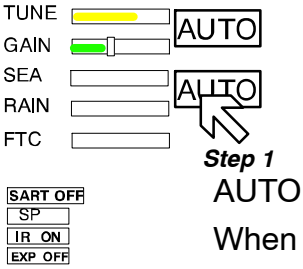
Step 1

Select MANual mode

Step 2

FTC is responsible for differentiation or filtering of rain clouds. Advance the FTC control slowly (remember the 3 scans) until only the leading edges of the rain clutter are visible. As the FTC is increased, weaker returns will reappear. Stronger returns will begin to reduce in the visible area. The best setting will be a balance between restoration of weaker returns and adequate size of the stronger returns.
Use the trackball to place the cursor on the slider then press the upper trackball. Rotate the trackball to increase or decrease the amount of FTC.
Adjusting the FTC will also reduce the land echoes and thin out larger targets.
With FTC on and in a light sea, it is possible to overcompensate with the SEA control; if so, with FTC ON a false noise ring may be displayed.
Too much FTC will shorten or delete RACON responses.

2.3.1.7 CFAR



Step 1

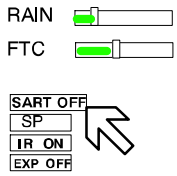
AUTO

When AUTO is activated, the slider symbols for SEA, RAIN and FTC are hidden and the bar color changes to yellow.
This AUTO mode activates the CFAR (Constant Fault Alarm Rate) functionality.
CFAR describes a control algorithm, which uses the evaluation of echoes to calculate statistical average values for SEA, RAIN and FTC.
These average values are used for optimization of the radar video.

NOTE

Use of CFAR simplifies radar video optimization. However, depending on the weather conditions misinterpretations are possible.
In case of doubt, switch to MANUAL compensation for SEA, RAIN and FTC to clarify the situation. RACONs are best seen in MANUAL.

2.3.1.8 Search and rescue transponder SART ON/OFF (option)



The SART ON/OFF does not activate ownship SART. It changes receiver bandwidth to improve SART detection by this radar.

Information about the SART transponder

The purpose of the SART is to trigger a secondary alarm when search and rescue units are searching for a life raft/lifeboat in distress. The SART will help the units to pinpoint exactly where the distressed boats are located in a large area. This is done with the help of the radar on the search ship or helicopter. When the SART is interrogated (hit) by a radar signal, it will immediately start to transmit a number of sweeps covering the complete maritime 3 cm radar band. These sweeps are detected on the radar screen and used to navigate directly towards the distressed life raft, for details on radar display.

The maximum distance to a ship will normally be about 10 NM or approximately 30 nm to a helicopter, depending on the helicopter's altitude. The transponder will not give any alarms further away than this.

How is this situation displayed on the NSC Radar?

This situation appears automatically in the radar video.
The echo display in the radar video depends on the distance of the transponder from your own ship and can be interpreted as follows.

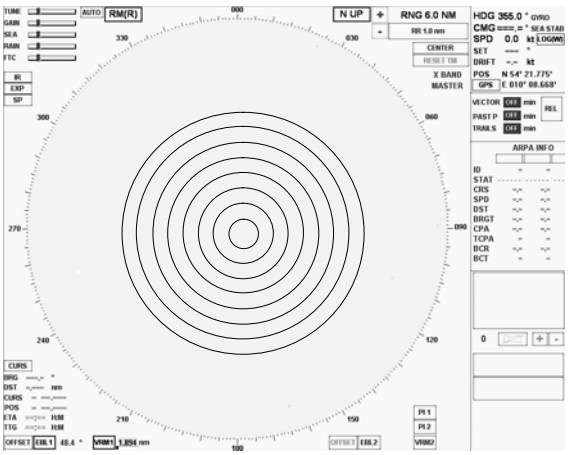


Figure: 2–15 SART transponder < 0.2 NM

The SART transponder is in the immediate vicinity.

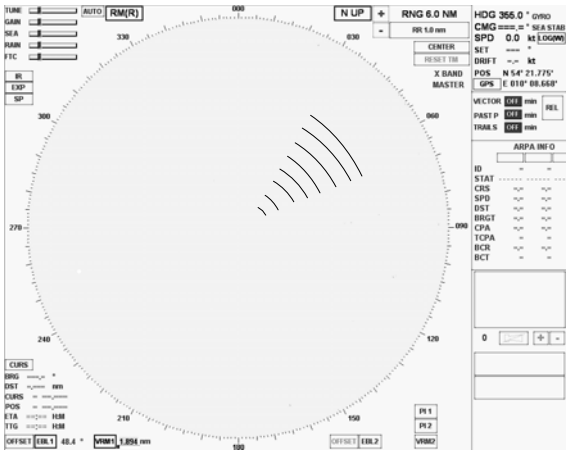


Figure: 2–16 SART transponder ~1 NM

The SART transponder is in the vicinity.

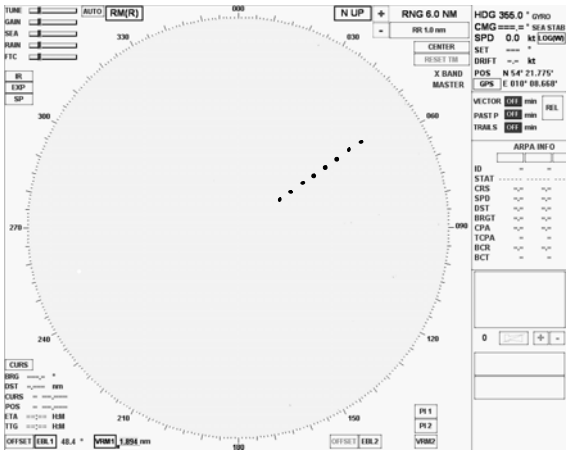
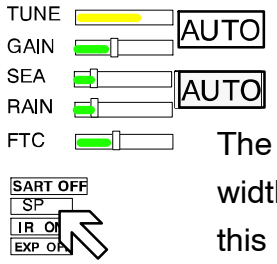


Figure: 2–17 SART transponder > 2 NM

The SART transponder is a long distance away.

2.3.1.9 Pulse width selection



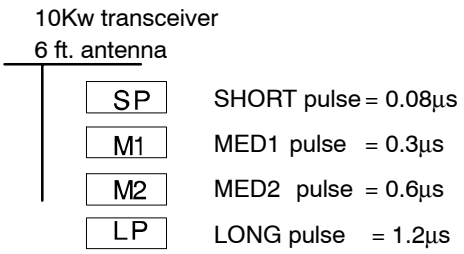
see
Figure: 2–18

The pulse width toggle field allows selection of the desired transmitter pulse width for the current range scale selected. If there is no pulse width toggle field, this indicates that it is not available for the range currently being used.
Selecting this toggle field allows the pulse length to be switched e.g. from short pulse to medium pulse and vice versa to optimize target discrimination with respect to the selected range.

NOTE

Use of a longer pulse improves target reception but, at the same time, increases clutter returns.
When a shorter pulse is used, reception of some weaker targets will decrease, but clutter will also decrease, resulting in better target detection.

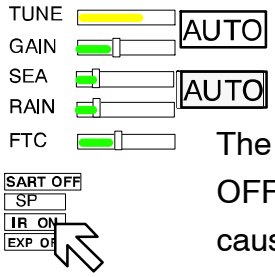
The available pulse width selections for the NSC display are illustrated in Figure: 2–18.



Information
A longer pulse width means;
more power, stronger targets returns but also more disturbances.
Long pulses are necessary in high ranges to detect small targets more effectively.

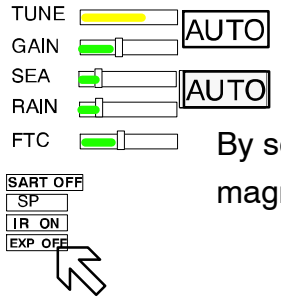
Figure: 2–18 NSC pulse width

2.3.1.10 Interference selection



The interference toggle field allows selection of the function interference ON or OFF. The function of interference rejection is activated to eliminate echo effects caused by other radar system from ships nearby.

2.3.1.11 Echo expansion



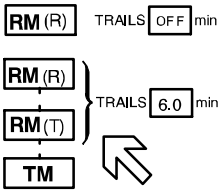
By selection this toggle field, the function of echo expansion is activated to magnify small radar echoes.

2.3.2 Radar video displays

2.3.2.1 Ship heading marker

When the button is pressed, only the ship heading marker (SHM) display is turned OFF, enabling the operator to view a target that is obscured by the heading line.
When the button is released, the heading line is turned ON again.

2.3.2.2 Relative Motion $_{(R)}$, Relative Motion $_{(T)}$, True Motion



The RM ($_R$), RM ($_T$), TM legend in the upper left of the display shows the current mode for radar video presentation. Position the cursor on the toggle field and press the trackball button. Select the preferred motion.

General
If **Relative Motion** is selected, your own ship is stationary and all other objects, including land masses, buoys, ships at anchor and ships in motion, move with the correct **relative** speed and course.

In this case Relative Motion provides two special settings linked to the TRAILS toggle field (see chapter 2.3.6.2).
The following figures show the differences in the radar video.

Relative Motion

RM (R)	for relative motion and relative trails
RM (T)	for relative motion and true trails

Relative Motion without TRAILS

If no trails (set 2) are activated, the RM (R) and RM (T) are identical.

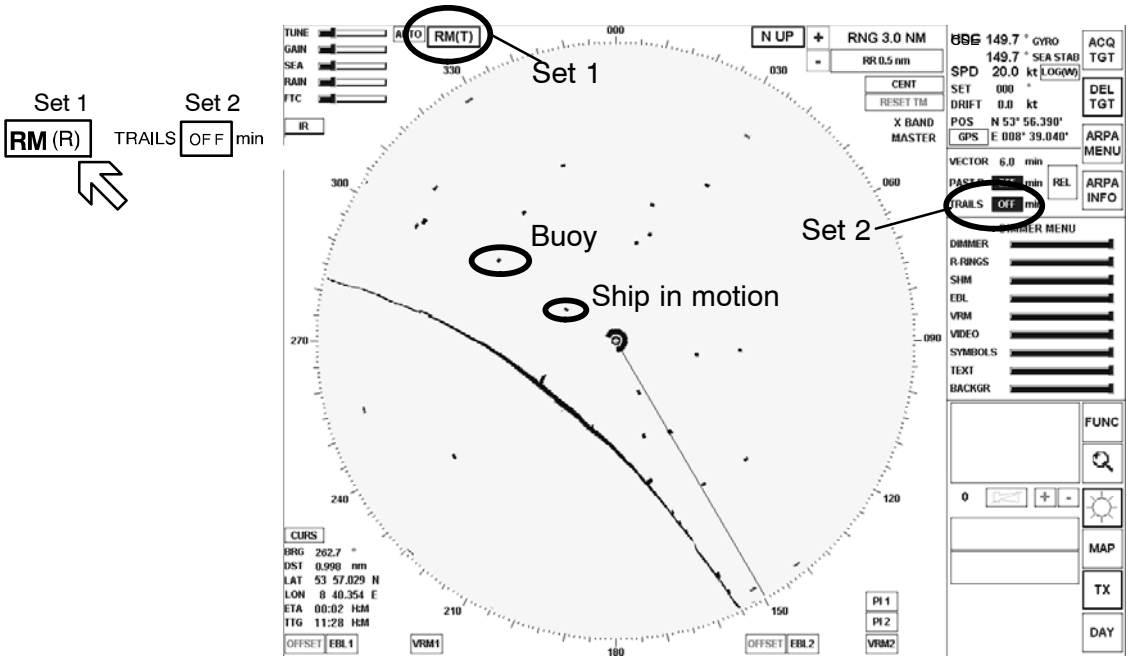
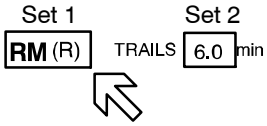


Figure: 2–19 Relative Motion without TRAILS

Relative Motion (R) with TRAILS

A ship in motion in the same speed and heading (e.g. shipping lane) is displayed with no afterglow in the radar video.

Relative trails is the original radar method to view plot history (also with EBL) to quickly see which approach own ship. In Figure: 2–20 the other ships are all heading west (ARPA data). Relative Trails / BCR information is an option for experienced radar operators.



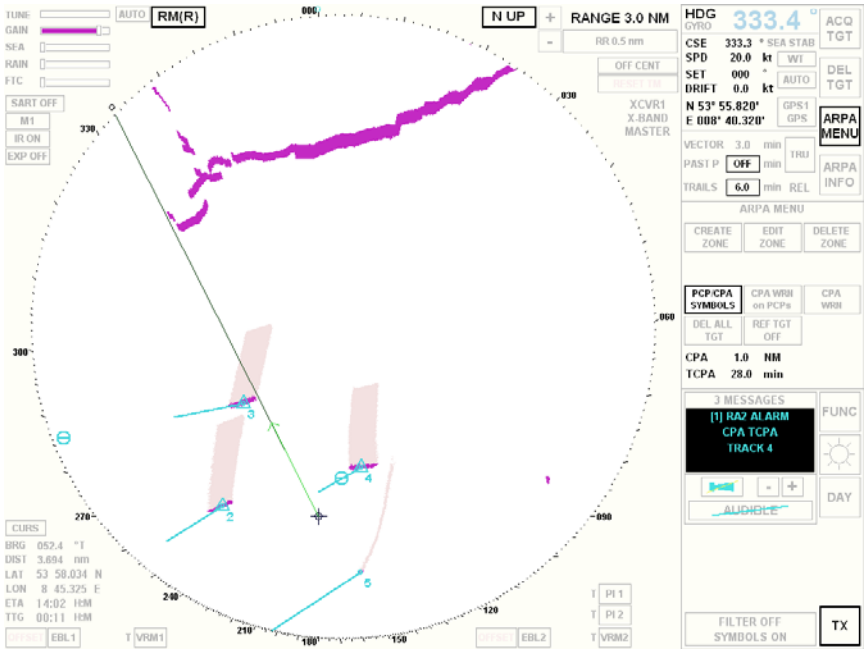


Figure: 2–20 Relative Motion (R) with TRAILS

Relative Motion (T) with TRAILS

In this case, land masses, buoys, ships at anchor, etc. appear exactly as they are, as stationary objects. Objects in motion, including your own ship, move across the radar video with the correct true speed and course. The trail afterglow displays the track.

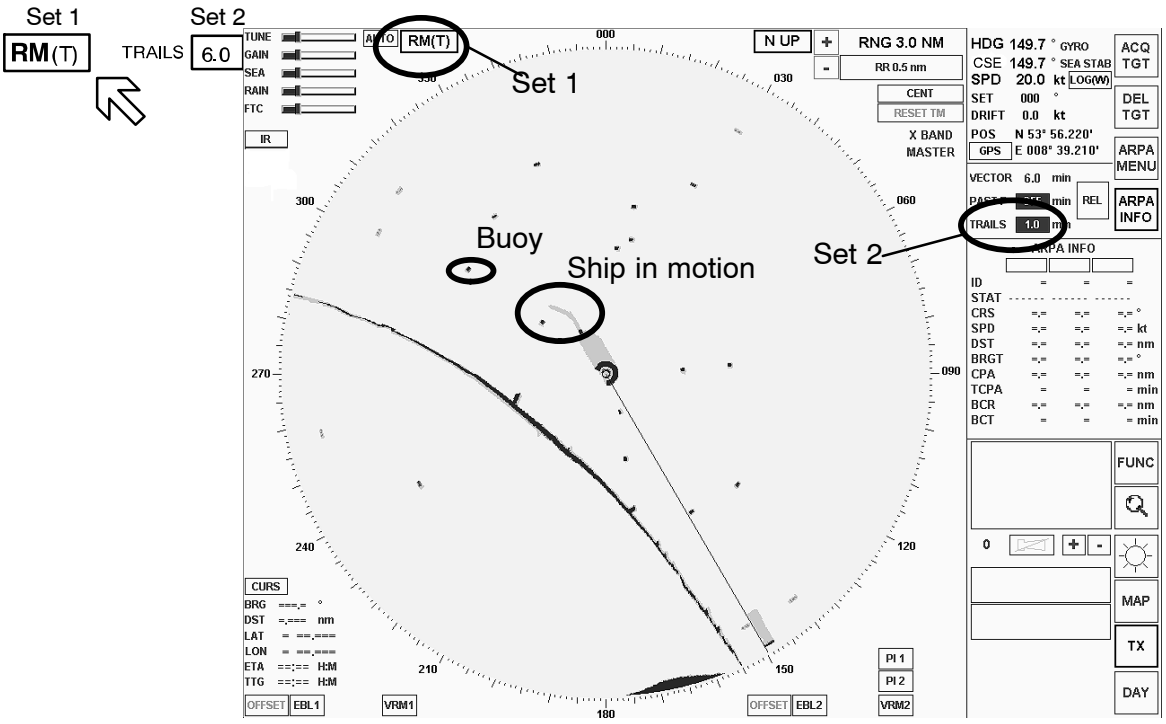


Figure: 2–21 Relative Motion (T) with TRAILS

TM

TRUE MOTION

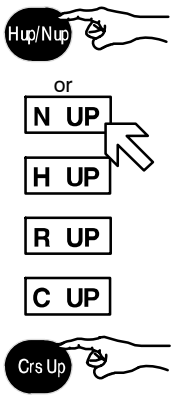
If **True Motion** is selected, land masses, buoys, ships at anchor, etc. appear exactly as they are, as stationary objects, while objects in motion, including your own ship, move across the operating screen with the correct true speed and course.

True Motion mode is available for range scales from 0.25 nm to 24 nm (inclusive) and in either N UP or C UP mode. If the range moves above 24 NM, the origin of your own ship is centered.

2.3.2.3 North Up, Head Up, Course Up and Repeater Up

This toggle field is used to select either North Up (N UP), Head Up (H UP), Course Up (C UP) or Repeater Up (R UP) as the orientation of the radar video. The N UP, H UP, C UP and R UP legend in the upper right of the display shows the current orientation mode of the radar video, radar rose and SHM display. Position the cursor on the toggle field and press the **Left** button. Select the preferred motion.

Selected by



The **North Marker** continues mark compass north on the radar rose (red circle).

North up means that geographic north is upwards.
–Stabilized operation–
Gyro information is required for N UP operation. When the unit is switched on, N UP is selected automatically. If the gyro is inoperative, an audible alarm sounds and the words GYRO OUT appear in the WARNING MESSAGES area. ARPA functions are disabled and H UP mode is automatically selected.

If N UP mode is selected, 000° represents compass North (see Figure: 2–22).

Visual impression
The radar video is rotated to a northerly direction. North is at the top (000°). This effect is comparable with an ordinary sea chart on which North is at the top.
The SHM shows the ship's correct compass heading.

Response to a change of course:
The SHM rotates in line with the change of course.
The radar video remains stationary.

Relative or true
The radar video can be presented in Relative Motion (RM (..)) or True Motion (TM).

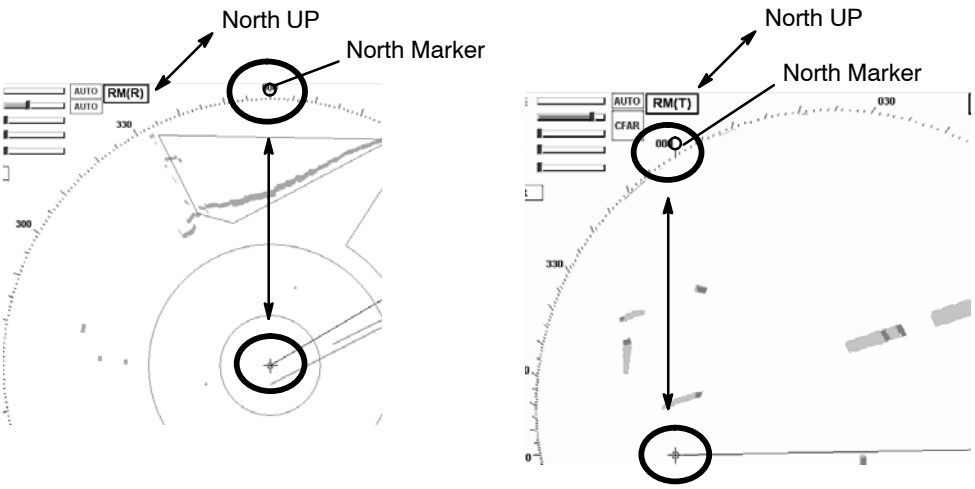


Figure: 2–22 North UP in (RM (R)) or (RM (T))

Head UP means the heading is upwards

> **WARNING**
> Filter and Trails do not function in **Head UP**. Course UP is preferred.

The SHM is displayed relative to north. Rain and sea clutter will appear as high level radar video.

- The radar video is not stabilized by the gyro compass
- The anticlutter functions RAIN, SEA, FTC are not available
- Radar bearings are relative bearings (lateral)
- TRUE MOTION is not possible
- ARPA continues to function

(manual)
Step 1
RM (R)
+
Step 2
H UP

- Manual

Head UP alignment (Step 2) can only be selected using the Relative Motion preset (step 1).

- Automatic

If the gyro compass heading is not available, the radar will switch to **Head UP** mode automatically.

Visual impression
Head UP corresponds to the line of vision “ship’s head up”.

Change of course
The radar video rotates in line with the change of course.
The SHM remains at heading upwards (relative) (000°).

Relative or true
The radar video can only be presented in Relative Motion (RM (..)).

Course UP means the course is upwards.
–Stabilized operation–

Visual impression
Course UP corresponds to the line of vision “ship’s head up”.
The SHM remains on course.

Change of course
The SHM indicates the change of course.
The radar video remains unchanged.

Transfer change of heading to the radar video

If the change of course is to correspond to the line of vision “ship’s head up”, the button on the control unit must be pressed.
The radar video rotates in line with the change of course.

Relative or true
The radar video can be presented in Relative Motion (RM (..)) or True Motion (TM).

Functions
Filter, Trails and ARPA all functions in Course UP.

Functions
Filter, Trails and ARPA all functions in Course UP.

Repeater UP means the repeater indicator is upwards
–Stabilized operation–

WARNING
Filter and Trails do not function in **Repeater UP**. Course UP is preferred.

Repeater UP is a special feature of the NSC Radar. In this display mode, the bearing scale behaves like a compass rose where the ship heading marker (SHM) acts as the lubber line.

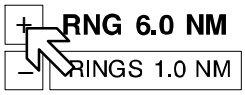
Visual impression
Repeater UP corresponds to the line of vision “ship’s head up”.

Response to a change of course
The radar video rotates in line with the change of course.
The radar rose rotates in line with the change of course.
SHM remains unchanged.

Relative or true
The radar video can only be presented in Relative Motion (RM (..)).

2.3.3 Radar video settings

2.3.3.1 Range RNG

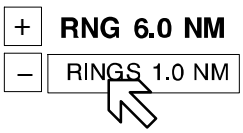


Range (RNG) shows the selected range area in NM.
The NSC allows up to 11 range settings.
Selecting the relevant toggle fields switches the range image displayed up or down.

Range RNG in NM	Range ring distance in NM	Range rings RR
0.125	0.0625	2
0.25	0.125	2
0.5	0.25	3
0.75	0.25	3
1.5	0.25	6
3.0	0.5	6
6.0	1.0	6
12.0	2.0	6
24.0	4.0	6
48.0	8.0	6
96.0	16.0	6

Table:2 Overview range, SHM and rings

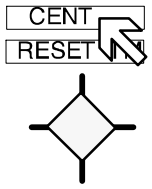
2.3.3.2 RINGS



The spacing between the rings is defined in the Range Rings (RR) toggle field. The Range Rings toggle field is also used to turn range rings ON/OFF in the radar video.

This toggle field automatically shows the distance between the rings in nautical miles. Activating the toggle field displays the rings in the radar video.

2.3.3.3 CENTer



or using button

Selecting this toggle field changes the name to OFF CENTer, the cursor jumps into the upper area of the radar video range and the cursor symbol changes. Place the cursor at a position within the permitted range and press the **Left** button (trackball button).

Press the OFF CENTer toggle field (or button) if the radar video is to be shown in the CENTer (see Figure: 2–23), or moved again (both).

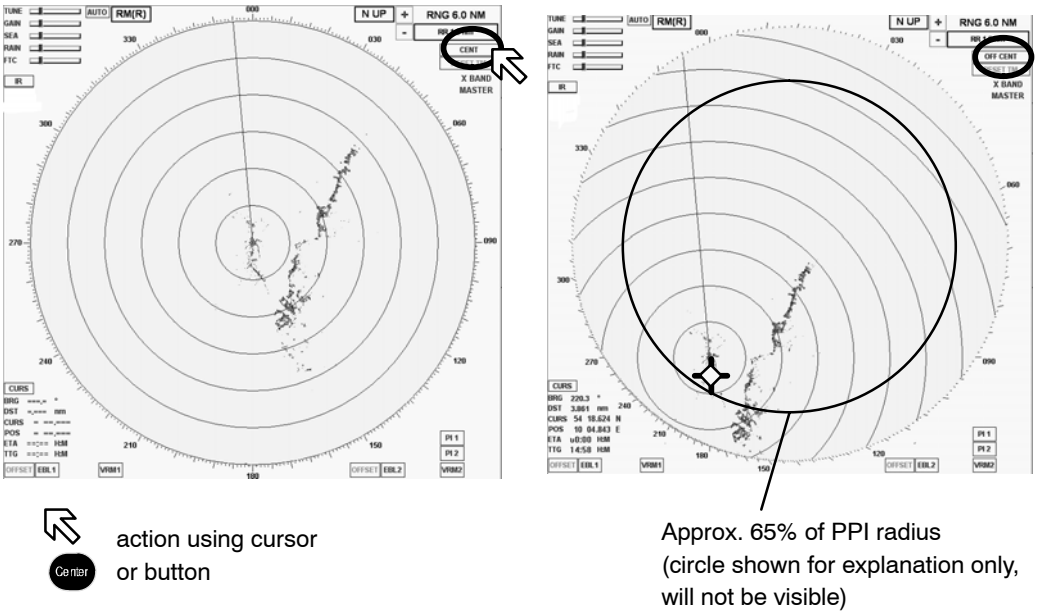
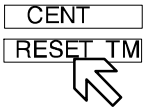


Figure: 2–23 CENTer and OFF CENTer

Pressing CENter key is convenient to activate the OFF CENter cursor and track ball is used to confirm the required position.

2.3.3.4 RESET TM toggle field

RESET TM can only be used in conjunction with the **TM** preset.



With the **TM** setting, the radar video is carried in the direction of travel by approx. 65% of the PPI up to a radial limit (see Figure: 2–23) according to course direction.
When this limit is reached, the radar video is reset by this 65% along the current course.

RESET TM
Activating the toggle field resets the radio video.
Depending on the situation, this allows a maximum forward view in the radar video.

2.3.4 Electronic bearing lines (EBL) and variable range markers (VRM)

Electronic bearing lines and variable range markers are tools used to determine bearings and distances.

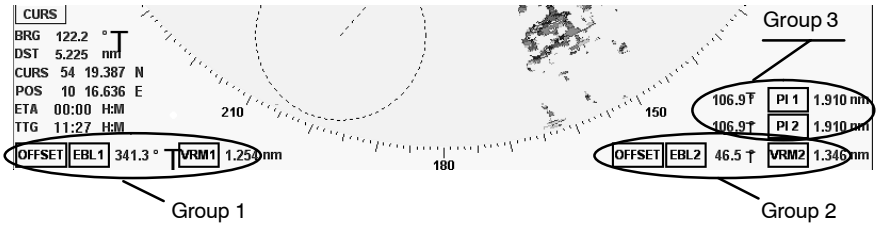


Figure: 2–24 Select EBL and VRM

Here:

EBL 1/2 for **E**lectronic **b**earing **l**ine with **OFFSET** function
VRM 1/2 Variable **r**ange **m**arker with **OFFSET** function
PI 1/2 for **P**arallel **i**ndex line

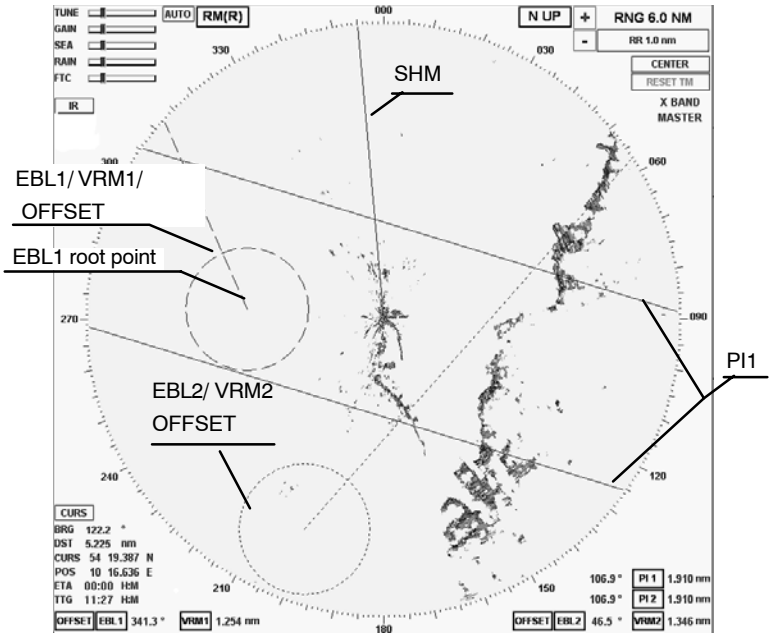
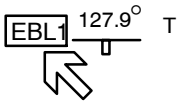


Figure: 2–25 Radar video with 2 EBL, 2 VRM and PI

2.3.4.1 Enabling EBL / VRM OFFSET using cursor



The **electronic bearing line EBL** is used for the bearing.
Starting from your own position, the EBL is placed on a desired target, e.g. using the cursor. The current co–ordinates are displayed numerically to the right of the toggle field (°).

The numerical display is normally displaying as true information when the GYRO sensor is available. If the GYRO sensor is not available the numerical display changes automatically to relative information.

T(rue) shows the numerical bearing value to the target as a true value (in terms of North).

R(elative) shows the numerical bearing to the target as a relative value (relative to ship heading).

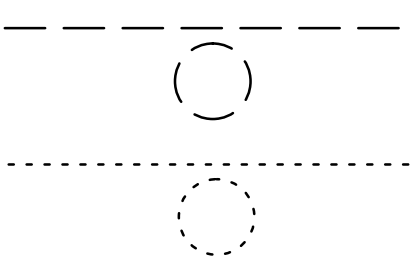
The **variable range marker VRM** is used to mark a particular range circle.
The zone can be your own position or the EBL1 root point, for example. The current radius is displayed to the right of the toggle field (NM).

Electronic bearing lines EBL and **variable range markers VRM** can be used jointly as a group.

Identification of the EBL and VRM representation

– EBL 1
VRM 1

– EBL 2
VRM 2



The dotted EBL is drawn from your own ship through the cursor symbol.
Place the cursor on a selected target and press the **Left** button on the trackball.
The dotted VRM is extended from your own ship by moving the cursor symbol.

Use the cursor to move the bearing line or the range marker.
Place the cursor on the EBL or VRM. Press the **Right** button on the trackball to pick up and drag the EBL or VRM.

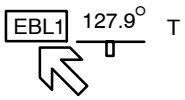
Press the **Left** button on the trackball to drop the EBL or VRM at the desired position.
The **OFFSET** allows the EBL1 root point and the VRM1 origin to be moved anywhere within the radar video as an EBL/VRM group.

NOTE
If the floating function is canceled, the point of origin of the EBL/VRM is reset to the image center!

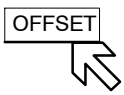
2.3.4.2 Editing EBL and VRM

The EBL and/or VRM can be placed and changed using the cursor or the operator panel (see Figure: 2–26).
When using the operator panel, you are restricted to the EBL1 and VRM1 group.
The NSC provides 3 options for editing the EBL/VRM, which can be used comprehensively as required.

Cursor
In this example, the EBL1 is shown, starting from the current position of the ship.



Position the cursor on the desired target and press the **Right** trackball button.
This places EBL1.

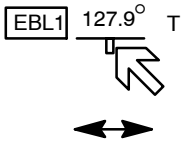


Select the Offset toggle field if EBL1 is to be moved parallel.
Pressing the **Left** button moves EBL1 to the new position.

The bearing and the variable range area can be changed at any time.

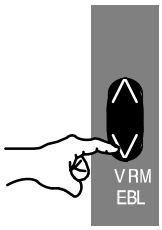
Bearing and cursor

Place the cursor on EBL 1, press the **Right** trackball button.
Find the desired target and press the **Left** trackball button.



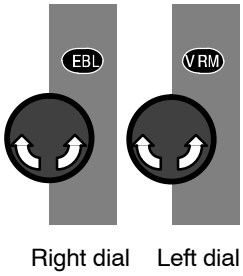
Bearing / **distance and toggle field** with slider

Depending on the toggle field, the bearing (EBL) or the distance (VRM) can be edited by moving the slider (see chapter 2.2.4.4).



Bearing / **distance and operator panel**

This alternative method of operation allows the EBL1/VRM1 function to be displayed or adjusted quickly. Pressing the toggle switch releases the rotary dials for the operation.
The **EBL** and **VRM** status LEDs light up.



The EBL/VRM is always placed at your own position.
Parallel movement is not possible when using the operator panel.
Adjust the EBL/VRM rotary dials to change the bearing (EBL) or the variable range area (VRM).
The variable range area is directly linked to the range rings (RNG) and adapted accordingly in the display.

2.3.4.3 Deactivating EBL and VRM

The EBL/VRM displays can be hidden by selecting the toggle field again.

Position the cursor on the desired toggle field.
Press the **Left** button.

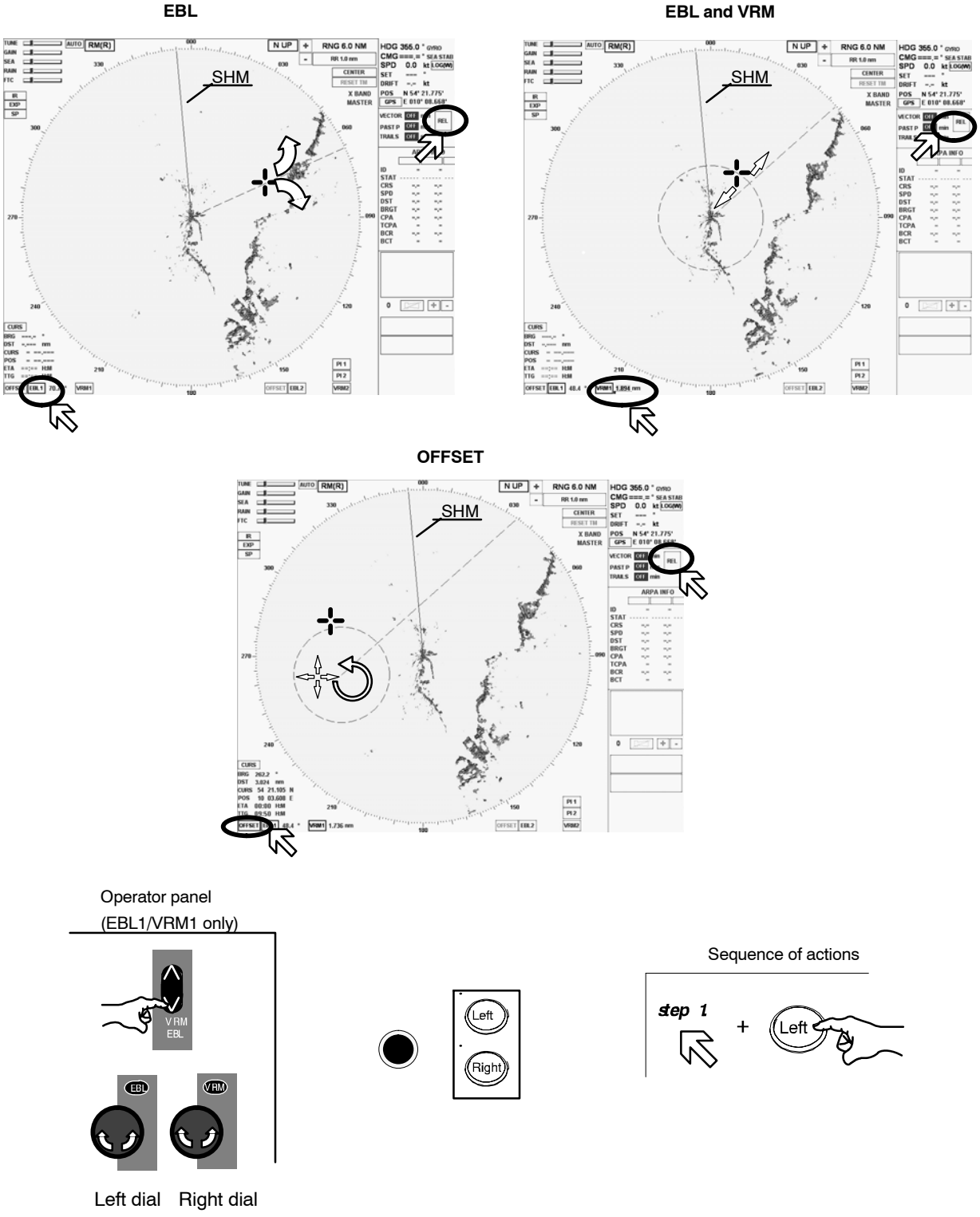
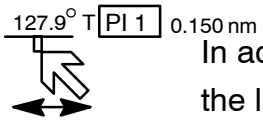


Figure: 2–26 Navigating with bearing lines and variable range markers

2.3.4.4 Parallel index line PI

Parallel index lines **PI** are used to mark the limits of areas or channels. These lines can thus be used to observe the progression of a course, for example.

The parallel index lines can only be called up and positioned (distance and bearing) using the trackball.
After calling them up, the parallel index lines are shown in the radar video parallel to the position in a ship's head up direction.



In addition to the toggle field, the current relative or true direction (°) is shown on the left and the current distance (nm) to your own position is shown numerically on the right.

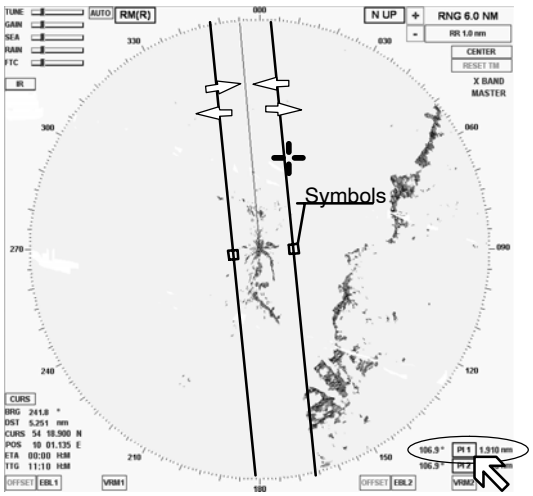
Changing the distance and/or bearing (see Figure: 2–27)

Position the cursor on a parallel index line.
Pressing the trackball button displays a symbol on each parallel index line. This symbol corresponds to the image of your own position.

The distance for the parallel index lines can now be changed by moving the cursor (step 1).

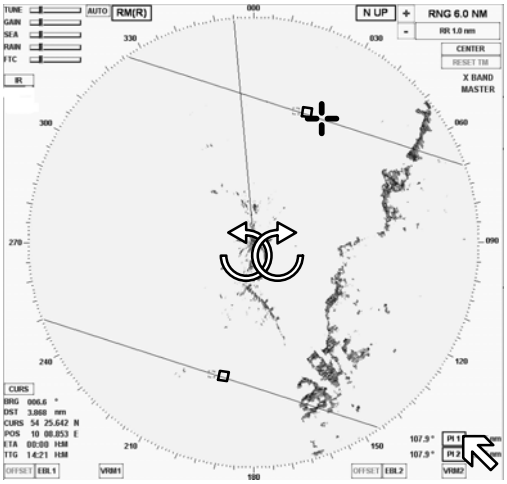
Pressing the trackball button changes the functionality from distance to bearing (step 2).
The direction of the parallel index lines can now be changed by moving the cursor. Position the cursor close to the compass rose and set the desired direction.

Pressing the **Left** trackball button again concludes the two processes. The symbols are hidden.



PI 1 or PI 2 selected

Step 1
Select the distance



Step 2
To change
the bearing

once

Press button again

to complete the task

Step 3
Hiding **PI 1** or **PI 2**

Figure: 2–27 Navigating with parallel index lines

2.3.4.5 Deactivating the parallel index line PI

The PI displays can be hidden by selecting the toggle field again (see Figure: 2–27).

2.3.5 Cursor information in the radar video

If the cursor is positioned within the PPI, the position data will be listed in the cursor information area. This data is the cursor position (CURS POS), bearing (BRG), distance (DST), estimated time of arrival (ETA) and time to go (TTG) relative to your own ship.

```
CURS
BRG   293,0 ° R
DST     4,7  nm
LAT  0 02.135   S
LON  0 00.395   E
ETA  14:42  H:M
TTG  0:14   H:M
```

- CURS — Toggle field used to open the CURSOR READOUTS in the function display area of the information panel (see Figure: 2–28).
  Select SHOW ETA + TTG or HIDE ETA + TTG or
  Select MOUSE PARK POSITION ON/OFF.

- BRG — bearing from cursor to your own ship's position.
  Use the central softkey (see Figure: 2–3) to select display of true (T) or relative (R) values for the bearing.

- DST — Distance information from cursor position to your own ship's position.

- LAT.... — Latitude cursor position with geographic trend marker .
  LON.... — Longitude cursor position with geographic trend marker .

Selected from CURSOR READOUTS menu

- ETA — Estimated time of arrival at cursor position if present speed is maintained.

- TTG — Time to go from your own ship's position to cursor position.

2.3.6 Information panel

The Info Panel is structured as follows.

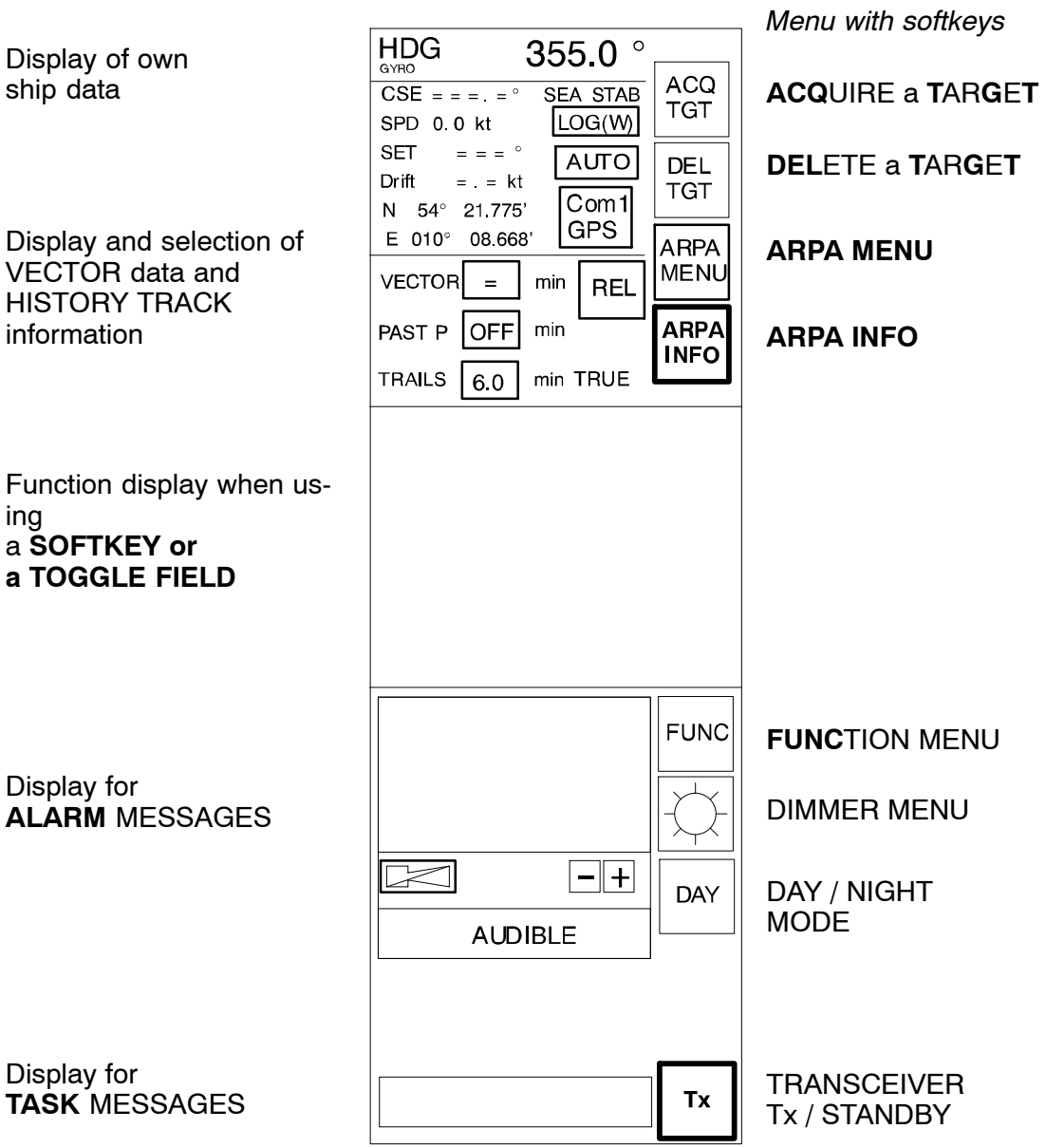
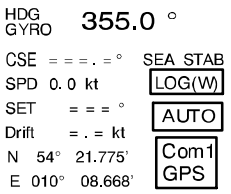


Figure: 2–28 NSC information panel

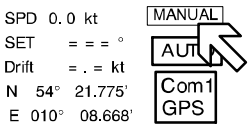
2.3.6.1 Display of OWN SHIP DATA

This field displays the following parameters for the ship's motion:



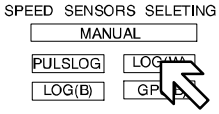
- HEADING (HDG). The sensor type being used is indicated (e.g. gyro).

- Course (CSE) is the true course over ground.
  The difference between course made good and heading (HDG) is the drift angle commonly referred to as SET.

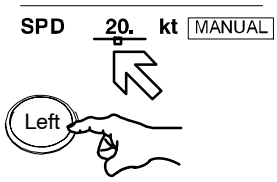


- The speed source defaults to MANUAL when the system is powered up. If a speed log is to be used as the source input, then place the cursor on the toggle field and press the trackball button.

The SPEED SENSOR SELECTION function display appears.
Select a sensor.

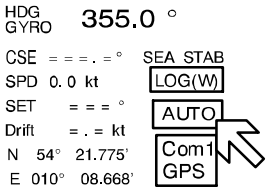


If the speed source is lost due to malfunction, the system reverts back to MANUAL mode.



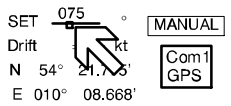
To set MANUAL input, use the slider function from the numeric indicator.

- Indication of SET and DRIFT values, automatically (AUTO) or using the manual (MANUAL) input option.
  SET indicates the drift bearing in °.
  DRIFT indicates the drift speed in kt.



AUTO mode

Set and drift information is derived from the speed sensor input.
If the speed source is lost due to malfunction, the values will be canceled.
Select another speed sensor if possible or switch to manual or select Reference Target.

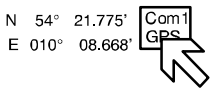


Press button
to save the value

MANUAL mode

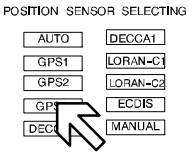
Place the cursor on the toggle field and press and hold the **Left** button on the trackball. To set MANUAL inputs, use the slider function and the trackball. Release the **Left** button and press it again.

The parameter values for SET and DRIFT depend on one another.
Both parameters must therefore be defined separately but as a pair.
The NSC system will not accept a single parameter value as an input value.



- Position sensor selection to select the source sensor to obtain your own ship's position data in latitude and longitude.

If a position sensor is to be selected as the source input, then place the cursor on the toggle field and press the trackball button.



The POSITION SENSOR SELECTION function display appears.
Select a sensor.

2.3.6.2 Display and selection of VECTOR and HISTORY TRACK information

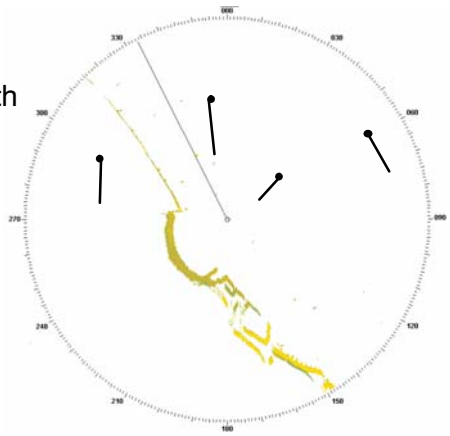
This information area allows the operator to select TRUE or RELATIVE VECTORS. True vectors show the true course speed of the target and your own ship. Relative vectors show the target's relative motion compared to your own ship. Your own ship does not have a relative vector. The vector length displayed is determined by the selected time and indicates the distance to be traveled at a given speed.

First of all, the desired targets need to be acquired in the radar video (see chapter 2.4.2).

- VECTOR
  By selecting this softkey, you can define the vector time of the acquired targets, defined by indicating the target vector length derived from the target speed; this can be continuously adjusted between 0.0 and 30.0 min. (see Figure: 2–29).

VECTOR 6 min REL

The variable vector length range is adjustable between 0.0 and 30.0 min.



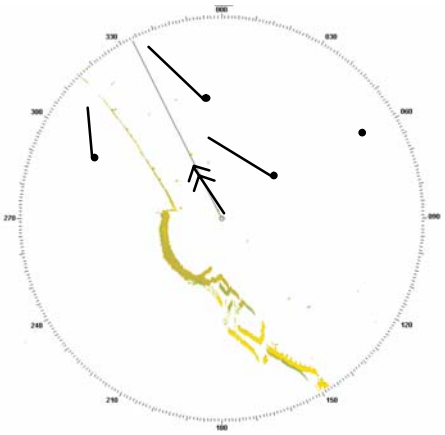
- Target acquisition

Display
——— target vector

information
Relative vectors show the motion of targets relative to your own ship. Extending the vectors allows you to clarify any anticipated risk of collision.
Any stationary tracked target displays a vector opposite to your own ship's heading with a length equal to your own ship's speed.

VECTOR 6 min TRU

The variable vector length range is adjustable between 0.0 and 30.0 min.



- Target acquisition

Display
——— target vector

information
Absolute vectors allow an overview of the overall traffic situation (ships and navigation marks). Extending the vectors allows you to clarify any anticipated risk of collision.
Tracked targets which are not moving do not display a vector.

Figure: 2–29 Vector information

- PAST POSITION
  In addition to their symbol, all acquired targets can be given a history track. With the PAST POSITION function switched on, a past position point is set at the target symbol's position (see Figure: 2–30).
  The interval between two past positions can be adjusted.

  Past positions indicate the last completed maneuver of the acquired targets. In absolute (TRUE) view, it is possible to differentiate between changes of course and changes of speed.

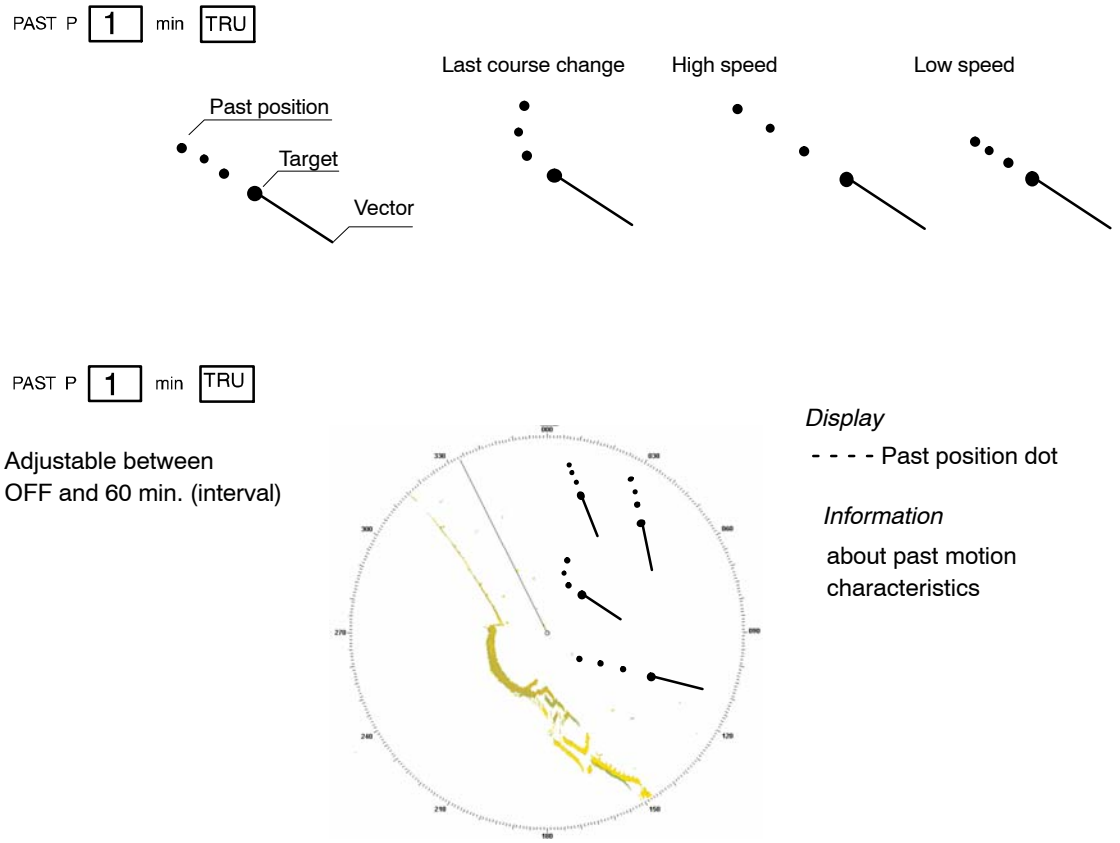


Figure: 2–30 Past position information

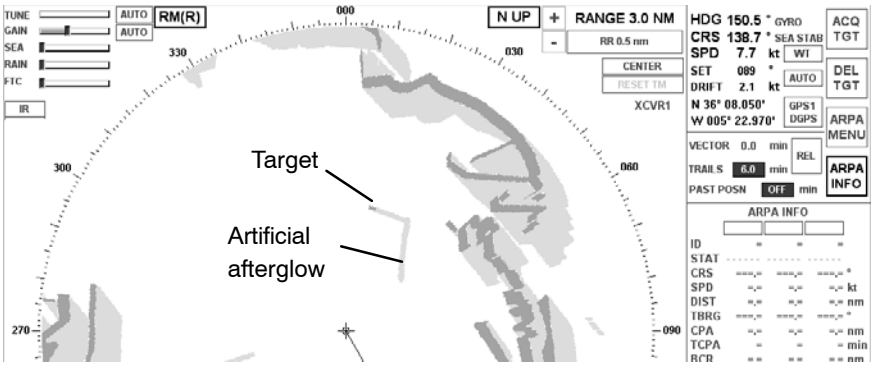
TRAILS 1 min REL
3
6
OFF

TRAILS

With this function, all targets located in the acquisition range are given an artificial afterglow (see Figure: 2–31).
These afterglows indicate the route traveled
(length of artificial afterglow) in the set time.
Trails support situation assessment in the radar video.

Trails is an ARPA independent function that permits an assessment of the current situation in the acquisition range.

Trails can be displayed as RELATIVE or TRUE.



Display
See artificial afterglow in the PPI

Information
about past motion characteristics

Figure: 2–31 TRAILS information

2.3.6.3 Function display

This display shows a range of submenus.
The different menus are called up using the softkeys in the menu bar and the toggle fields.
Some submenus are equipped with softkeys or toggle fields that can be used to select further menus.

2.3.6.4 Display for ALARM

Alarms are listed in an alarm message field until the cause no longer exists and the operator has acknowledged them.

Alarms provide the operator with an indication of dangerous situations or sensor failure.
Alarms are output when there is a situation that is critical to safety.
Alarms must be acknowledged, and will only be removed from the alarm list when the situation that caused the alarm no longer exists.

These messages are displayed in the alarm readout display.
The alarm messages are numbered.
The alarm readout display is a scrolling field.
You can move up and down the alarm message list by pressing the up and down buttons under the alarm readout display.

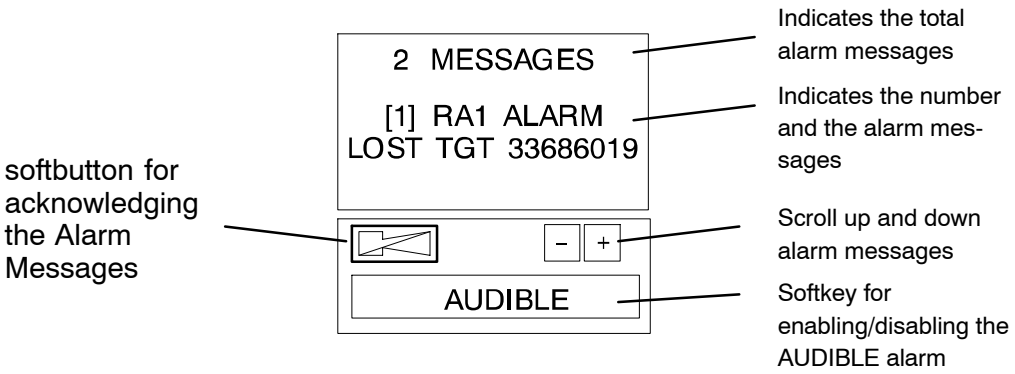
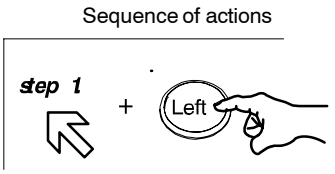


Figure: 2–32 Display for alarm messages



As Alarms are received, they are displayed in the chronological order in which they occurred. If (and only if) all current alarms have been acknowledged, the scroll function can be used to scroll through the.

When an alarm is received it will be placed at the top of the list. A new alarm will

be shown in RED text strings on a WHITE flashing background.
Alarms that have been acknowledged will be shown as RED text string preceded with a number.

The Alarm Acknowledge button on the control panel is used to acknowledge the oldest active unacknowledged alarm. Once the alarm is acknowledged, the text string will become RED, a number will appear at the beginning of the alarm text string, and if needed the list will be automatically scrolled down in order to see any other unacknowledged alarms in the list that are not currently displayed.
The following ALARM table shows all possible alarm indications and first proposal how to handle an ALARM message.

ALARM MESSAGE	a.) Problem Description b.) Corrective Action
SLOW ANTENNA	a. A signal from transceiver/Adaptive Interface which indicates the antenna is not rotating at the correct RPM b. Refer to the maintenance section for troubleshooting and repair
XCVR HIGH TEMP	a. A signal has been received from the transceiver indicating that excessive temperatures are occurring b. Refer to the maintenance section for troubleshooting and repair
GYRO OUT (HW GYRO OUT ALARM) hw hardware	a. Gyro compass has become inopera–tive. Indicates that an invalid signal has been received b. Refer to the maintenance section for troubleshooting and repair
ANTENNA STOPPED	a. A signal from the transceiver/Adapter Interface which indicates that the antenna is not rotating b. Refer to the maintenance section for troubleshooting and repair

ALARM MESSAGE	a.) Problem Description b.) Corrective Action
DOWNLINK (DOWN LINK ERROR ALARM)	a. An error has occurred on the transceiver to the display link b. Refer to the maintenance section for troubleshooting and repair
UPLINK ERROR (UP LINK ERROR)	a. An error has occurred on the display to the transceiver link b. Refer to the maintenance section for troubleshooting and repair
LOST TGT (LOST TARGET ALARM)	a. b.
CPA TCPA (CLOSEST POINT OF APPROACH or TIME OF CLOSEST POINT OF APPROACH)	a. Track will pass inside CPA limit b. Only Tracks sooner than TCPA limit can be alarm
GUARD ZONE (GUARD ZONE INTRUSION)	a. Tracks already acquired have moved into a area under watch b.
NO TRIGGER	a. Radar probably not transmitted b.
NO POSITION (POS OUT ALARM)	a. b.

ALARM MESSAGE	a.) Problem Description b.) Corrective Action
TRG RTN ERROR (GEM TRG RTN ERROR ALARM) TRG Trigger RTN Return	a. b.
TCM TIMEOUT ERROR (TCM TIMEOUT ALARM ERROR) TCM Transceiver Control Module....	a. b.
ISU TIMEOUT ERROR (ISU TIMEOUT ALARM ERROR) ISU Interswitch	a. b.
ISU MALFUNCTION ERROR (ISU ERROR ALARM)	a. b.
ISU EMERG MODE ERROR (ISU EMERGENCY MODE ALARM)	a. b.
TN INDICATOR (GEM TN INDICATOR ERROR ALARM) TN Tune	a. b.
NO ACP ACP Azimuth Commit Point	a. b.
NO ARP ARP Azimuth Reset Point	a. b.
CAN BUS ERROR (GEM CAN BUS ERROR ALARM)	a. b.

2.3.6.5 Display for task messages

On this display, the status of the ANTI CLUTTER Filter and the symbols (EBLs, VRMs, PL, ARPA zone, MAPs) are indicated in clear text. The respective functions can be selected on the Radar Operator Panel via the buttons **FILT OFF** and **Sym Off**.

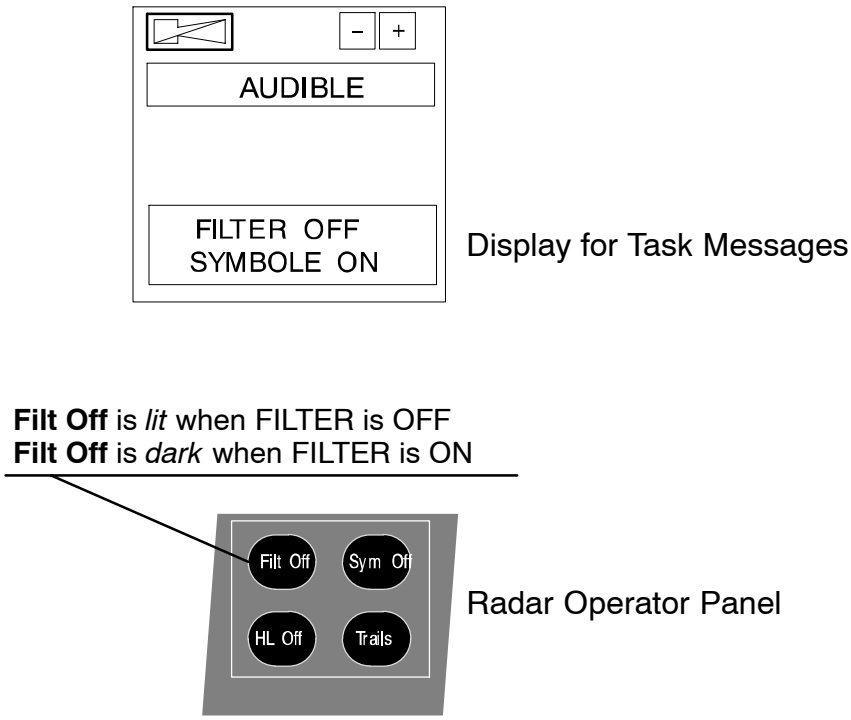
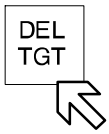


Figure: 2–33 Display for Task Messages

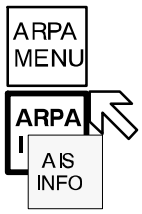
2.3.6.6 Menu with softkeys

ACQUIRE **T**AR**G**E**T**
This softkey allows manual acquisition of visible targets within the radar video (see chapter 2.4.2).

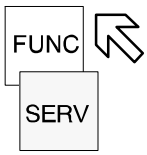


DELETE a **T**AR**G**E**T**
The softkey function allows individual, acquired targets to be canceled, except for those that have transmitted a collision alarm.

- Press the softkey
  Position the cursor on the target to be canceled;
  press the trackball button. The artificial target symbol on top of the echo is eliminated (the echo is maintained).

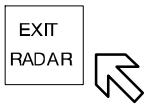


ARPA MENU and **ARPA INFO** and **AIS INFO**
see chapter 2.4.3

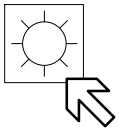


FUNCTION MENU see chapter 2.5

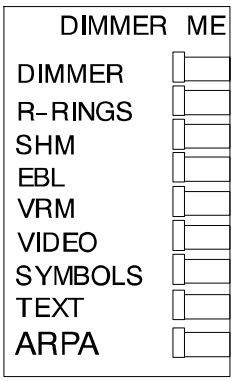
SERVice MENU
see Service Manual



EXIT RADAR



BRIGHTNESS CONTROL
Pressing this softkey activates BRIGHTNESS CONTROL.
The DIMMER MENU appears in the function display.

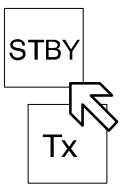


The DIMMER MENU provides several sliders which allows individual adjustment of the various parts of the radar display.

- DIMMER slider used for dimming the whole radar display
- R–RINGS slider used for dimming the RANGE RINGS
- SHM slider used for dimming the ship heading marker
- EBL slider used for dimming the electronic bearing line
- VRM slider used for dimming the variable range marker
- VIDEO slider used for dimming all video information in the PPI
- SYMBOLS slider used for dimming all artificial symbols
- TEXT slider used for dimming radar rose
- ARPA slider used for dimming the ARPA symbols

DAY / **NIGHT** display

This softkey is used to switch between DAY and NIGHT modes.
When the radar is switched **ON**, it always starts in DAY mode.



STBY / **Tx** display
Pressing the STBY button switches the NSC radar system from STBY to transmit mode