

MARINE RADAR  
JMA-5320  
SYSTEM DESCRIPTION

THE JRC RADAR JMA-5320 consists of scanner unit, processing unit, keyboard unit and color LCD raster scan display.

Scanner unit

The MTR is installed within a 6 feet, 7 feet and 9 feet scanner unit. The scanner weight is approximately 52 kg (6ft), 54 kg (7ft) and 56 kg (9ft).

The antenna is rotated 48 rpm (6ft) and 24 rpm (7ft and 9ft) by its driving motor.

This has a 1.2 (6ft) / 1.0 (7ft) / 0.8 (9ft) degree horizontal beam width and 20 degrees for vertical.

The transmitter operates with 6-pulse length and 6 pulse repetition frequencies.

The magnetron, M1568B, rated output is 25kw and is driven by solid-state modulator.

The receiver has a microwave front end, containing the low noise amplifier, mixer, local oscillator, IF amplifier and detector.

Processing unit

The Processing unit weight is approximately 51/53 kg.

Power supply inputs are DC 24 V.

Range scale is 0.125 to 96 miles.

Display mode is HUP/NUP/CUP in relative motion mode and NUP/CUP in true motion mode.

Processing unit has two VRMs and two EBLs and Fixed marker.

Anti-clutter function is Anti-clutter sea and Anti-clutter rain

This function has auto mode and manual mode.

Radar wakes is memorized at intervals of 15 sec to 30 minute

Processing unit has three NMEA port

1'st port is connected with GPS receiver.

2'nd port is connected with other NMEA equipment.

3'd port is connected with magnetic compass or GPS compass ports by NMEA signal.

Keyboard unit

The keyboard unit has 30 keys and 6 volumes, track ball and jog dial.

Keyboard unit and a processing unit are connected with a communication line.

The length of a connection cable is 5m.

Display unit

Display unit is 18.1 inches color LCD display

Resolution size is 1280 x 1024 dots at SXGA standard

Video signal is outputted from a DSUB-15P connector.

The length of connection cable is 5m.

## General Specifications

(1)	Type of Emission	P0N
(2)	Display	Color Raster Scan
(3)	Screen	18.1-inch Color LCD Effective diameter of radar display, more than 250 mm
(4)	Range Scale	0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96nm
(5)	Range Resolution	Less than 25m
(6)	Minimum Detective Range	Less than 28m
(7)	Range Accuracy	Less than 1% of the maximum distance of the range scale in use or less than 15m whichever is larger
(8)	Bearing Accuracy	Less than 1°
(9)	Bearing Indication	Relative Motion mode: Head-up/Course-up/North-up True Motion mode: Course-up/North-up
(10)	Ambient Condition	According to IEC60945-4 Temperature Scanner: -25 to +55°C (Storage Temperature: -25 to +70°C) Other Unit except Scanner: -15 to +55°C Relative Humidity 93% at +40°C Vibration 2 to 13.2Hz, amplitude $\pm 1\text{mm}$ $\pm 10\%$ 13.2 to 100Hz, Gravity acceleration $0.7\text{m/s}^2$ Velocity of the wind 51.5m/s (100kt)
(11)	Power Supply Input	+24VDC (Display Unit) +24VDC (Scanner) *Display Unit and Scanner correspond to 100VAC/220VAC when use NBA-3308.
(12)	Power Consumption	Approx. 400W (In maximum wind velocity)
(13)	Power Supply Voltage Fluctuation	+24VDC -10/+30% (Display Unit) +24VDC -10/+30% (Scanner Unit)
(14)	Pre-heating Time	Approx. Within 3min

## Scanner Unit(NKE-2252) Specifications

(1)	Dimensions	25kW-6ft: Height 440mmxSwing Circle 1910mm 25kW-7ft: Height 440mmxSwing Circle 2270mm 25kW-9ft: Height 440mmxSwing Circle 2825mm		
(2)	Mass	25kW-6ft: Approx. 52kg 25kW-7ft: Approx. 54kg 25kW-9ft: Approx. 56kg		
(3)	Polarization	Horizontal Polarization		
(4)	Directional Characteristics	Horizontal Beam Width:	1.2° (6ft, -3dB width) 1.0° (7ft, -3dB width) 0.8° (9ft, -3dB width)	
		Vertical Beam Width:	20° (6/7/9ft, -3dB width)	
		Sidelobe Level:	Below -26dB (6/7/9ft, within ±10°) Below -30dB (6/7/9ft, outside ±10°)	
(5)	Revolution	24rpm (7/9ft, Normal), 48rpm (6ft, HSC)		
(6)	Peak Power	25kW ±50%		
(7)	Transmitting Frequency	9410±30MHz		
(8)	Transmitting Tube	Magnetron [M1568B(J)]		
(9)	Pulse Width/Repetition Frequency	Short	Middle	Long
	0.125nm	0.07 μS/2200Hz		
	0.25nm	0.07 μS/2200Hz		
	0.5nm	0.07 μS/2200Hz		
	0.75nm	0.07 μS/2200Hz	0.2 μS/2200Hz	
	1.5nm	0.07 μS/2200Hz	0.2 μS/2200Hz	0.4 μS/1400Hz
	3nm	0.2 μS/2200Hz	0.4 μS/1400Hz	0.8 μS/750Hz
	6nm	0.4 μS/1400Hz	0.8 μS/750Hz	1.0 μS/650Hz
	12nm	0.4 μS/1400Hz	0.8 μS/750Hz	1.0 μS/650Hz
	24nm			1.0 μS/650Hz
	48nm			1.0 μS/650Hz
	96nm			1.2 μS/520Hz
?				
(10)	Duplexer	Circulator + Diode Limier		
(11)	Mixer	MIC Front End		
(12)	Intermediate Frequency Amplifier	Intermediate Frequency: 60MHz Band Width: 20MHz (0.08 μS) 6MHz (0.2 μS, 0.4 μS) 3MHz (0.8 μS, 1 μS, 1.2 μS) Gain: More than 90dB Amplifying characteristics: Logarithmic Amplifier		
(13)	Overall Noise Figure	6dB (Average)		

## ***Display Unit(NWZ-147) Specifications***

- |     |                        |  |
|-----|------------------------|--|
| (1) | Structure              | Desk Top Type<br>(LCD Monitor Unit/Keyboard Unit/Processor Unit Separation Structure)  |
| (2) | Screen                 | 18.1-inch Color LCD    1280x1024 dot (SXGA)  |
| (3) | Display mode           | Radar mode<br>Synthesis mode (Synthesis Radar echo and Coastline)<br>Plotter mode (Require Plotter Unit (option))  |
| (4) | Range Scale            | 0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96nm  |
| (5) | Range Marker           | 0.025, 0.05, 0.1, 0.25, 0.5, 1, 2, 4, 8, 16nm  |
| (6) | Bearing Indication     | Rader mode/Synthesis mode<br>Relative motion: North-up, Course-up, Head-up<br>True motion: North-up, Course-up<br>True motion (Plotter mode (Option)): N-up, C-up  |
| (7) | Variable Range Maker   | 2VRM (Digital Display)<br>VRM unit of Display: nm, km<br>VRM Range:0.000 to 295nm (0.000 to 547.0km)   |
| (8) | Electric Bearing lines | 2EBL(Digital Display)<br>Each EBL can be floating displayed.<br>The second EBL can be switched to a parallel lines cursor.<br>EBL unit of Display: 0.1°<br>EBL Range: 0.000° to 359.9°<br>Bearing Indication: Relative bearing and True bearing can be switched. |
| (9) | Cursor                 | Target Range, Bearing and Latitude presentation can be possible to move with<br>trackball.   |

## Processor Unit(NDC-1273) Specifications

- |      |                                |   |
|------|--------------------------------|---|
| (1)  | Structure                      | Desk Top Type (Horizontal putting and length putting using combinedly)  |
| (2)  | Dimensions                     | Height 170mm×Width 300mm×Depth 320mm  |
| (3)  | Mass                           | Approx. Below 10kg  |
| (4)  | Tune Method                    | Auto(Bar-graph indicate)<br>* Manual operation can be adjusted in maintenance mode.   |
| (5)  | STC (SEA)                      | AUTO/MANUAL   |
| (6)  | FTC (RAIN)                     | AUTO/MANUAL   |
| (7)  | Radar Interference Rejection   | Built-in (The effect can be adjusted by three stages.)  |
| (8)  | Scan Correlation               | Function1/2/3, 2 Peak Hold Processing<br>Automatic change of processing method.<br>(Target range synchronize/Clutter synchronize)<br>Rθ scan correlation can be done by the addition high performance signal processing board.  |
| (9)  | Bearing Marker                 | 360° in 1° digit.<br>Relative motion: Fixation<br>True motion: Rewrite at a position correct in every scan.   |
| (10) | Heading Line                   | Electronic (Stern Line can be displayed.)   |
| (11) | Guard Zone Alarm (Radar Alarm) | Invasion, Secession, OFF can be Selected.<br>With buzzer sound.(Possible to output to External buzzer. )<br>Zone-1: Ring.(0.1 to 32nm, Relative position)<br>Zone-2: Arbitrary polygon.(Limitation within range of display.<br>Longitude and latitude are fixed. )<br>Number of zone: Can be memorized up to 16 and can be used simultaneously.<br>Structure of zone: 16 corner or less.<br>Automatically acquisition by ATA described in Section "ARPA". |
| (12) | Off Center                     | Within 66% of the radius of any range. (Except 96nm)<br>Can be operated in all mode in relative motion.<br>Trail is succeed at Off Center mode.   |
| (13) | True motion Unit               | Built-in (Except 96nm)  |
| (14) | True motion reset position     | 66% of radius of any range.<br>Possible to manual reset.  |
| (15) | Twice zoom                     | The zoom center is 66% radius of any range. (Except 0.125nm)  |
| (16) | Radar trails indication        | True motion: (Only true motion)<br>Relative motion:<br>True motion trails and relative motion trails can be selected.<br>Trail time length:<br>15 sec/30 sec/1 min/3 min/6 min/10 min/15 min/30 min/60  |

min/Continuous/OFF

Arbitrary trail time length can be displayed at any time.

Possible to display time series trail and continuous trail by color classification.

Built-in Trail thinning process.

Trail function can be use at true motion reset.

When range is changed, Trail function can be use.

Trail function can be use at Off Center. (Relative motion)

When motion indication and bearing indication changed, Trail function can be use.(Only true motion trails indication.)

(17) Variety of Pulse width

Long/Middle/Short (0.75, 1.5, 3,6,12 nm)

(18) Target enhance

3 stages can be changed.

(19) Correct position

When synthesis Radar and Coastline is displayed, position can be corrected by manually.

(20) Display color

Radar echo: 16 stages (Yellow, Green, Orange, Color)

Radar trails: 16 stages (White, Light blue, Green)

Fixed Maker: Monochrome (white)

VRM1/VRM2/EBL1/EBL2: Monochrome (Cyan)

Character/Bearing Marker: 2 stages (White, Green, Orange)

Heading Line/Cursor: Monochrome (White)

Own Ship's track/Another Ship's track: 7 stages

Coastline/Isobaths: 16 stages

# Keyboard Unit(NCE-7699) Specifications

- |   |   |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
|---|---|--|-------------------------------|---------------------------|------------------------------------|---------------------------|---|---------------------------------------|------------------------|-----------------------------|-------------|--|-------------|--|-------------|--|-------------|--|---------------------------------|-------------------------|---------------------------------|-------------------------|-------------------|------------------------|----------------------------|-------------------------------------|---------------------------------|--|--------------|--------------------------------|-------------|--------------------------------|--------------------------------|--------------------------|--------------------|---|--|---|----------------------------|--|------------------------------|---|---------------------------------|---|-----------------------|----------------------|------------------------------|------------------------------------|---|---|------------------|--|---|---|-----------------|---------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-------------------------|-------------|-------------|--|---------------------|-----------|
| (1)                                       | Structure   | Structure of keyboard unit is separate from processor unit.<br>Desk-Top type<br>Correspond Flush mount   |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| (2)                                       | Switch  | Gain (Transmit pulse width can be changed by PUSH-SW.)<br>SEA (AUTO/MANU can be changed by PUSH-SW.)<br>RAIN (AUTO/MANU can be changed by PUSH-SW.)<br>MULTI (Adjustment item can be changed by PUSH-SW.)<br>EBL (Floating EBL ON/OFF can be changed by PUSH-SW.)<br>VRM<br>Trackball  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| (3)                                       | Operation switch  | <table border="0"> <tr> <td style="vertical-align: top; padding-right: 20px;">STBY/OFF (Standby/Power off):</td> <td>Stop transmit, Power off.</td> </tr> <tr> <td>TX/OFF (Transmit start/Power off):</td> <td>Start transmit, Power off</td> </tr> <tr> <td>PANEL(Brightness of keyboard adjustment):</td> <td>Brightness of keyboard switch adjust.</td> </tr> <tr> <td>ALARM ACK(Stop Alarm):</td> <td>Acknowledge and stop alarm.</td> </tr> <tr> <td>EBL1(EBL1):</td> <td>Selection display and non-display of EBL1.</td> </tr> <tr> <td>EBL2(EBL2):</td> <td>Selection display and non-display of EBL2.</td> </tr> <tr> <td>VRM1(VRM1):</td> <td>Selection display and non-display of VRM1.</td> </tr> <tr> <td>VRM2(VRM2):</td> <td>Selection display and non-display of VRM2.</td> </tr> <tr> <td>RANGE+(Increase display range):</td> <td>Increase display range.</td> </tr> <tr> <td>RANGE-(decrease display range):</td> <td>decrease display range.</td> </tr> <tr> <td>ACQ(acquisition):</td> <td>ATA target acquisition</td> </tr> <tr> <td>TGT DATA(Numeric display):</td> <td>Numeric display of tracking target.</td> </tr> <tr> <td>TGT CNCL(Release of selection):</td> <td>Release of selection of tracking target.</td> </tr> <tr> <td>MOB(Marker):</td> <td>Turning on and release marker.</td> </tr> <tr> <td>ENT(Enter):</td> <td>Left side button of trackball.</td> </tr> <tr> <td>CLR/INFO(Release/Information):</td> <td>Right side of trackball.</td> </tr> <tr> <td>MAP(Display mode):</td> <td>Selection display and non-display of MAP(NAV LINE, etc...).</td> </tr> <tr> <td></td> <td>Selection of Rader, Synthesis and Plotter mode.</td> </tr> <tr> <td>AZI MODE(Display azimuth):</td> <td>Selection of North-up, Course-Up, Head-Up.</td> </tr> <tr> <td>TM/RM(True/Relative Motion):</td> <td>Selection true motion, relative motion.</td> </tr> <tr> <td>RR/HL(Fixed ring/Heading Line):</td> <td>Selection display and non-display of fixed ring and heading line.</td> </tr> <tr> <td>OFF CENT(Off Center):</td> <td>Off center operation</td> </tr> <tr> <td>GZ ALARM (Guard zone alarm):</td> <td>Setting and release of guard zone.</td> </tr> <tr> <td>VECT T/R (True/Relative motion vector):</td> <td>Selection of true motion and relative motion of vector.</td> </tr> <tr> <td>TRAILS (Trails):</td> <td>Selection display and non-display of trails.</td> </tr> <tr> <td>Day/Night(Brightness of screen switch):</td> <td>Selection of screen arrangement of color.</td> </tr> <tr> <td>FUNC(Function):</td> <td>Selection of signal processing.</td> </tr> <tr> <td>USER KEY1(User key1):</td> <td>User assignment key1.</td> </tr> <tr> <td>USER KEY2(User key2):</td> <td>User assignment key2.</td> </tr> <tr> <td>RADAR MENU(Radar menu):</td> <td>Rader menu.</td> </tr> <tr> <td>MARK(MARK):</td> <td>Selection display and non-display of mark.</td> </tr> <tr> <td>ATA MENU(ATA menu):</td> <td>ATA menu.</td> </tr> </table> | STBY/OFF (Standby/Power off): | Stop transmit, Power off. | TX/OFF (Transmit start/Power off): | Start transmit, Power off | PANEL(Brightness of keyboard adjustment): | Brightness of keyboard switch adjust. | ALARM ACK(Stop Alarm): | Acknowledge and stop alarm. | EBL1(EBL1): | Selection display and non-display of EBL1. | EBL2(EBL2): | Selection display and non-display of EBL2. | VRM1(VRM1): | Selection display and non-display of VRM1. | VRM2(VRM2): | Selection display and non-display of VRM2. | RANGE+(Increase display range): | Increase display range. | RANGE-(decrease display range): | decrease display range. | ACQ(acquisition): | ATA target acquisition | TGT DATA(Numeric display): | Numeric display of tracking target. | TGT CNCL(Release of selection): | Release of selection of tracking target. | MOB(Marker): | Turning on and release marker. | ENT(Enter): | Left side button of trackball. | CLR/INFO(Release/Information): | Right side of trackball. | MAP(Display mode): | Selection display and non-display of MAP(NAV LINE, etc...). |  | Selection of Rader, Synthesis and Plotter mode. | AZI MODE(Display azimuth): | Selection of North-up, Course-Up, Head-Up. | TM/RM(True/Relative Motion): | Selection true motion, relative motion. | RR/HL(Fixed ring/Heading Line): | Selection display and non-display of fixed ring and heading line. | OFF CENT(Off Center): | Off center operation | GZ ALARM (Guard zone alarm): | Setting and release of guard zone. | VECT T/R (True/Relative motion vector): | Selection of true motion and relative motion of vector. | TRAILS (Trails): | Selection display and non-display of trails. | Day/Night(Brightness of screen switch): | Selection of screen arrangement of color. | FUNC(Function): | Selection of signal processing. | USER KEY1(User key1): | User assignment key1. | USER KEY2(User key2): | User assignment key2. | RADAR MENU(Radar menu): | Rader menu. | MARK(MARK): | Selection display and non-display of mark. | ATA MENU(ATA menu): | ATA menu. |
| STBY/OFF (Standby/Power off):             | Stop transmit, Power off.   |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| TX/OFF (Transmit start/Power off):        | Start transmit, Power off   |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| PANEL(Brightness of keyboard adjustment): | Brightness of keyboard switch adjust.                             |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| ALARM ACK(Stop Alarm):                    | Acknowledge and stop alarm.                                       |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| EBL1(EBL1):                               | Selection display and non-display of EBL1.                        |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| EBL2(EBL2):                               | Selection display and non-display of EBL2.                        |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| VRM1(VRM1):                               | Selection display and non-display of VRM1.                        |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| VRM2(VRM2):                               | Selection display and non-display of VRM2.                        |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| RANGE+(Increase display range):           | Increase display range.   |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| RANGE-(decrease display range):           | decrease display range.   |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| ACQ(acquisition):                         | ATA target acquisition  |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| TGT DATA(Numeric display):                | Numeric display of tracking target.                               |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| TGT CNCL(Release of selection):           | Release of selection of tracking target.                          |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| MOB(Marker):                              | Turning on and release marker.                                    |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| ENT(Enter):                               | Left side button of trackball.                                    |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| CLR/INFO(Release/Information):            | Right side of trackball.  |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| MAP(Display mode):                        | Selection display and non-display of MAP(NAV LINE, etc...).       |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
|   | Selection of Rader, Synthesis and Plotter mode.                   |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| AZI MODE(Display azimuth):                | Selection of North-up, Course-Up, Head-Up.                        |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| TM/RM(True/Relative Motion):              | Selection true motion, relative motion.                           |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| RR/HL(Fixed ring/Heading Line):           | Selection display and non-display of fixed ring and heading line. |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| OFF CENT(Off Center):                     | Off center operation  |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| GZ ALARM (Guard zone alarm):              | Setting and release of guard zone.                                |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| VECT T/R (True/Relative motion vector):   | Selection of true motion and relative motion of vector.           |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| TRAILS (Trails):                          | Selection display and non-display of trails.                      |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| Day/Night(Brightness of screen switch):   | Selection of screen arrangement of color.                         |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| FUNC(Function):                           | Selection of signal processing.                                   |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| USER KEY1(User key1):                     | User assignment key1.   |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| USER KEY2(User key2):                     | User assignment key2.   |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| RADAR MENU(Radar menu):                   | Rader menu.   |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| MARK(MARK):                               | Selection display and non-display of mark.                        |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |
| ATA MENU(ATA menu):                       | ATA menu.   |  |                               |                           |                                    |                           |   |                                       |                        |                             |             |  |             |  |             |  |             |  |                                 |                         |                                 |                         |                   |                        |                            |                                     |                                 |  |              |                                |             |                                |                                |                          |                    |   |  |   |                            |  |                              |   |                                 |   |                       |                      |                              |                                    |   |   |                  |  |   |   |                 |                                 |                       |                       |                       |                       |                         |             |             |  |                     |           |

# Option

## Plotter(NDB-34)

### Synthesis mode

Projection:	Mercator projection (Latitude 70 degree or less.)
Scale:	Synchronize range scale
Own ship trail:	Color of 7 stages. Interval of storage: 10/30 sec, 1/3/5/10/30/60 min or every 1/3/5 nm and OFF Storage capacity of Own ship trail: 7,000 point
Cursor mark:	Color of 7 stages Storage capacity of cursor mark: 20,000 point Variety of cursor Mark: 19
Event mark:	Color of 7 stages Storage capacity of event mark: Include in cursor mark Variety of event mark: 3 kinds, (Two kinds can be switched. /8 form to selection.)
Line:	Variety of external event mark: One kind, Monochrome Color of 7 stage Storage capacity of line: Include in cursor mark Variety of line: Solid line, broken line, alternate long and short dash line
Coast line data:	Coast line ROM card (Option)(ERC, JRC, C-Map NT+) Selected one isoline can be displayed.
Painting out:	ON/OFF can be selected.
External memory:	Memory card (Option)
Destination and sea route:	Destination can be set up to 99 point. Information of destination: Azimuth, distance and the time to required destination. Setting of sea route: 10 sea routes. (10 destination for one sea route can be set.) Alarm of sea route: Destination, Secession, Invetion, Secession
Position compensation:	Radar display synchronize range scale coast line by manual.

### Plotter mode

Projection:	Mercator projection (Latitude 85 degree or less.)
Scale:	1/1,000 to 1/10,000,000 are continuously selected. 10 stage can be changed (Preset can be used)
Own ship trail:	Color of 7 stages. Interval of storage: 3/5/10/30 sec, 1/3/5/10/30/60 min Every 1/3/5 nm and OFF Storage capacity of Own ship trail: 7,000 point
Cursor mark:	Color of 7 stages Storage capacity of cursor mark: 20,000 point Variety of cursor Mark: 19
Event mark:	Color of 7 stages Storage capacity of event mark: Include in cursor mark Variety of event mark: 3 kinds, (Two kinds can be switched. /8 form to selection.)
Line:	Variety of external event mark: One kind, Monochrome Color of 7 stage Storage capacity of line: Include in cursor mark Variety of line: Solid line, broken line, alternate long and short dash line
Coast line data:	Coast line ROM card (Option)(ERC, JRC, C-Map NT+) Selected one isoline can be displayed.
Painting out:	ON/OFF can be selected.

External memory:	Memory card (Option) Own ship trail, another ship trail, cursor mark, event mark, line, destination, sea route can be memorized.
Destination and sea route:	Destination can be set up to 99 point. Information of destination: Azimuth, distance and the time to required destination. Setting of sea route: 10 sea routes. (10 destination for one sea route can be set.) Alarm of sea route: Destination, Secession, Invation, Secession

## ARPA(NCA-877W)

### Radar mode, synthesis mode

Manual acquisition, Automatically acquisition(by two of guard ring)	
Automatic tracking of 100 targets can be done.	
Maximum tracking range:	32nm
Display of tracking data:	6 at the same time. (Can be scroll.)
Naming function:	Possible to name by the alphabet up to 8 character to each target. The range, azimuth, CPA, TCPA, true course, true speed, BCR, BCT of target can be displayed. (When naming is displayed, BCR/BCT can't be displayed.)
Vector display:	True/Relative
Past position:	Exclusive display and another ship trail.
Alarm of danger ship:	Depends on CPA/TCPA setting.

### Synthesis mode

Another ship trail:	20 targets. 1000 point per one target can be displayed. (Own ship trail and marks are another.)
Display color:	Color of 7 stages (The display color of each target can be set.) (The display color of all targets can be set by the batch. In this case, the display color is one color.)
Interval of storage:	3/5/10/30 sec, 1/3/5/10/130/160 min, 1/3/5/10 nm Possible to storage in memory card(Optional).

## ATA(NCA-877)

### Radar mode, synthesis mode

Manual acquisition, Automatically acquisition(by two of guard ring)	
Automatic tracking of 30 targets can be done.	
Maximum tracking range:	32nm
Display of tracking data:	6 at the same time. (Can be scroll.)
Naming function:	Possible to name by the alphabet up to 8 character to each target. The range, azimuth, CPA, TCPA, true course, true speed, BCR, BCT of target can be displayed. (When naming is displayed, BCR/BCT can't be displayed.)
Vector display:	True/Relative
Past position:	Exclusive display and another ship trail.
Alarm of danger ship:	Depends on CPA/TCPA setting.

### Synthesis mode

Another ship trail:	20 target.s 1500 point per one target can be displayed. (Own ship trail and marks are another.)
Display color:	Color of 7 stages (The display color of each target can be set.) (The display color of all targets can be set by the batch. In this case, the display color is one color.)
Interval of storage:	3/5/10/30 sec, 1/3/5/10/60 min, 1/3/5/10 nm Possible to storage in memory card(Optional).

**NSK unit(NCT-59)**

**AIS interface(NQA-4250)**

**Inter Switch(NQE-3141-4)**