JMA-7710-6
JMA-7725-6/9

MARINE RADAR EQUIPMENT

INSTRUCTION MANUAL

IMO COMPLIANCE

JRC Japan Radio Co., Ltd.

PREFACE

Thank you very much for purchasing the JRC marine radar equipment, JMA-7710-6 and JMA-7725-6／9.
This equipment is a marine radar equipment designed to obtain safe operation of marine ships. The equipment consists of a radar signal transceiver unit, a CRT display unit and a scanner unit as its main units.
The ATA NCA-843 unit is combined as an option with the JMA-7700 radar series.

- Before operating the equipment, be sure to read this instruction manual carefully for correct operation.
- Maintain this instruction manual so that operators can refer to it at anytime.
  Refer to this manual when any inconvenience or defect occur.
- This manual covers the issues related to the operation of the radar and ATA only.
  For the issues related to the operation of plotter functions, refer to the following instruction manual.
  NDB-33: Instruction Manual for the Plotter

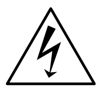
● Before Operation ●

Pictorial Indication

Various pictorial indications are included in this manual and are shown on these equipment so that you can operate them safely and correctly and prevent any danger to you and ／ or to other persons and any damage to your property during operation. Such indications and their meanings are as follows.
Please understand them before you read this manual:

⚠WARNING	This indication is shown where any person is supposed to be in danger of being killed or seriously injured if this indication is neglected and these equipment are not operated correctly.
⚠CAUTION	This indication is shown where any person is supposed to be injured or any property damage is supposed to occur if this indication is neglected and these equipment are not operated correctly.

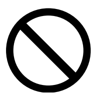
Examples of pictorial indication



Electric shock

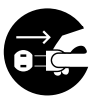
The △ mark represents CAUTION (including DANGER and WARNING).
Detailed contents of CAUTION (“Electric Shock” in the example on the left.)is shown in the mark.

Disassembling prohibited



Prohibition

The ⃠ mark represents prohibition.
Detailed contents of the prohibited action (“Disassembling Prohibited” in the example on the left) is shown in the mark.



Disconnect the power plug

Instruction

The ● mark represents instruction.
Detailed contents of the instruction (“Disconnect the power plug” in the example on the left) is shown in the mark.

Warning label

There is a warning label on the top cover of the equipment.
Do not try to remove, break or modify the label.

● Cautions to be Used During Operation ●

⚠ WARNING

Do not touch the insides of the scanner, transceiver and display unit.

Touching any high voltage area, you will get an electric shock. For maintenance, inspection and adjustment of internal parts of these equipment, consult with our sales office or distributor in your district.

Since the scanner radiator rotates, do not approach it.

The scanner may start rotating suddenly, and consequently any person may be struck and be injured. We recommend you to install the scanner radiator on the roof of the wheel house, flying bridge, trestle, radar mast or any other high position so that no person can approach it. When servicing the scanner, set the scanner safety button to the OFF position.

Install the scanner at any place higher than any person.

If being exposed directly to electric wave at close range, you may suffer adverse influence.

When approaching the antenna for maintenance or inspection, set the power button of the display unit to the ST-BY position.

If being exposed directly to electric wave at close range, you may suffer adverse influence.

⚠ CAUTION

Use these radar only as assisting devices for navigation.
Also, the officer should make the final decision for maneuvering by himself.

Use ATA only as an assisting device for navigation.
Also, the officer should make the final decision for maneuvering by himself.

ATA's information such as vector, target value data, alarm, etc. may contain some errors. Also, targets which cannot be detected with these radar cannot be tracked at their acquisition points.

◆◆◆◆ PRECAUTIONS BEFORE OPERATION ◆◆◆◆

Cautions for high voltage

High voltages from hundreds volts to tens of thousands volts are to be applied to the electronic equipment such radio and radar devices. You do not face any danger during normal operation, but sufficient cares are required for maintenance, inspection and adjustment of their internal components. (Authorized maintenance personnel alone are permitted to implement maintenance, check-ups or adjustment of internal components.)

High voltages of tens of thousands volts are so dangerous as to bring an instantaneous death from electric shock, but even voltages of hundreds volts may sometimes lead to a death from electric shock. To prevent such an accident, make it a rule to turn off the power button, discharge capacitors with a wire surely earthed on an end and make sure that internal parts are no longer charged before you touch any parts inside these devices. At the time, wearing dry cotton gloves ensures you further to prevent such danger. It is also a necessary caution to put one of your hands in the pocket and not to use your both hands at the same time.

It is also important to select a stable foothold always to prevent additional injuries once you were shocked by electricity. If you were injured from electric shock, disinfect the burn sufficiently and get it taken care of promptly.

What to do in case of electric shock

When finding a victim of electric shock, turn off the power source and earth the circuit immediately. If it is impossible to turn off the circuit, move the victim away promptly using insulators such as dry wood plate and cloth without touching the victim directly.

In case of electric shock, breathing may stop suddenly if current flows to the respiration center in the brain. If the shock is not so strong, artificial respiration may recover breathing. When shocked by electricity, the victim will come to look very bad with weak pulse or without beating, resulting in unconsciousness and rigidity.

◆◆◆◆◆◆◆◆◆◆ FIRST AID TREATMENTS ◆◆◆◆◆◆◆◆◆◆

☆ First-aid treatments

As far as the victim of electric shock is not in dangerous condition, do not move him and practice artificial respiration on him immediately. Once started, it should be continued rhythmically.

(1) Do not touch the victim confusedly as a result of the accident, but the rescuer may also get an electric shock.

(2) Turn off the power source calmly and certainly and move the victim away quietly from the electric line.

(3) Call a physician or ambulance immediately or ask someone to call a doctor.

(4) Lay the victim on his back and loosen his necktie, clothes, belt, etc.

(5) a. Examine the victim’s pulse.
b. Examine his heartbeat bringing your ear close to his heart.
c. Examine his breathing bringing the back of your hand or your face close to his face.
d. Check the size of the pupils of his eyes.

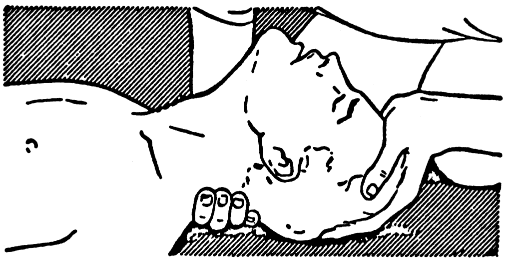
(6) Open the victim’s mouth and take out artificial teeth, cigarette or chewing gum if any. Keep his mouth open, stretch his tongue and insert a towel or the like in his mouth to prevent the tongue from suffocating. (If it is hard to open his mouth due to set teeth, open it with a screwdriver and insert a towel in this mouth.)

(7) Then, close his mouth so that foaming mucus does not accumulate inside.

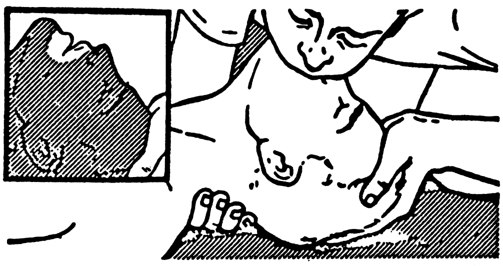
☆ When pulse is beating but breathing has stopped

(1) Tilt the victim's head back as far as this face looks back. (A pillow may be inserted under his neck.)
(2) Push his jaw upward to open his throat wide (to spread his airway).
(3) Pinch the victim's nostrils and take a deep breath, block his mouth completely with yours and blow into his mouth strongly. Take a deep breath again and blow into his mouth. Continue this 10 to 15 times a minute (blocking his nostrils).
(4) Carefully watch that he has recovered his natural breathing and stop practicing artificial respiration.
(5) If it is difficult to open the victim's mouth, insert a rubber or vinyl tube into one of his nostrils and blow into it blocking the other nostril and his mouth completely.
(6) When the victim recovers consciousness, he may try to stand up suddenly, but let him lie calmly and serve him with a cup of hot coffee or tea to keep him warm and quiet. (Never give him alcoholic drinks.)

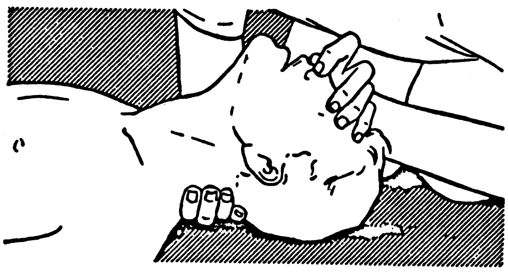
Method of mouth-to-mouth respiration by raising head

①


Raise the victim's head. Support his forehead with one of your hand and his neck with the other hand. → ①
When you tilt his head backward, the victim, in most cases, opens his mouth to the air. This makes mouth-to-mouth respiration easy.

②


Cover his mouth as widely as possible with yours and press your cheek against his nose → ② , or, pinch his nostrils with your fingers to prevent air from leaking. → ③

③


Blow into his lungs.
Continue blowing into his mouth until his breast swells. Blow into his mouth as quickly as possible for the first 10 times.

Mouth-to-mouth respiration

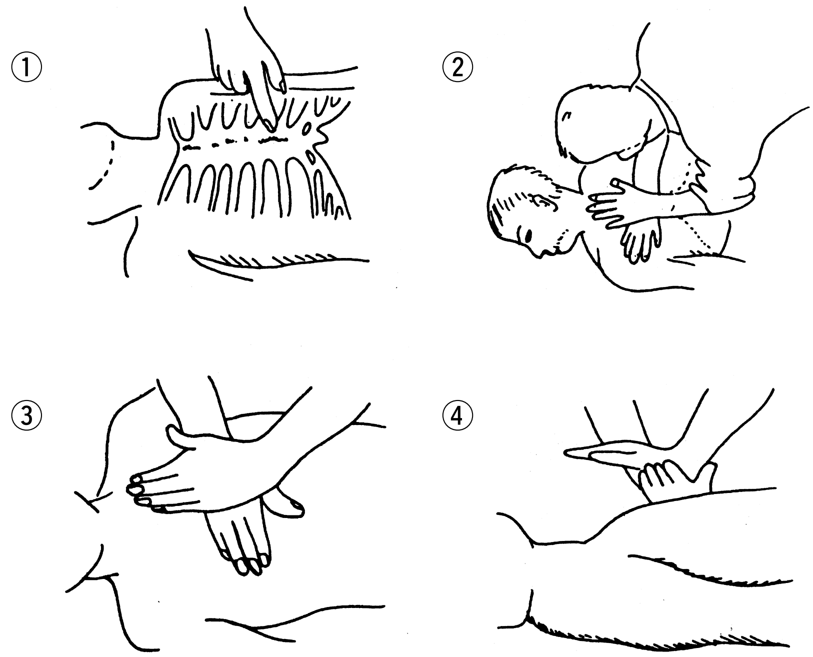
☆ When both pulse and breathing have stopped

When no pulse has come not to be felt, his pupils are open and no heartbeat is heard, cardiac arrest is supposed to have occurred and artificial respiration must be performed.

(1) Place your both hands, one hand on the other, on the lower one third area of his breastbone and compress his breast with your elbows applying your weight on his breast so that it is dented about 2cm (repeat compressing his breast 50 times or so a minute). (Cardiac massage)

(2) In case of one rescuer,
Repeat cardiac massages about 15 times and blow into his mouth 2 times quickly, and repeat this combination.
In case of two rescuers,
One person repeats cardiac massages 5 times while the other person blows into his mouth once, and they shall repeat this combination. (Cardiac massage and mouth-to-mouth respiration)

(3) Examine his pupils and his pulse sometimes. When the both have returned to normal, stop the artificial respiration, serve him with a cup of coffee or tea and keep him warm and calm while watching him carefully. Commit the victim to a medial specialist depending on his condition. To let him recover from the mental shock, it is necessary for persons concerned to understand his situations and the necessary treatments.



Cardiac massage

EQUIPMENT APPEARANCE

Scanner Type NKE-1055-6 (6 feet)

Scanner Type NKE-1056-6M (6 feet)

Scanner Type NKE-1056-9M (9 feet)

Display Unit Type NCD-3901-2

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GLOSSARY

This section explains common maritime terms and the terms used for this equipment.

ATA (Automatic Tracking Aid) :	Supporting equipment for automatically preventing clash.
Fast Time Constant (FTC) :	Rain and snow clutter suppression.
Sensitivity Time Control (STC) :	Sea surface clutter suppression.
Bearing :	Direction
COG :	Course over Ground
CPA/TCPA :	Closest point of approach and time to closest point of approach limit as defined by the observer to give warning when a tracked target or targets will close to within these limits from own ship
CUP (Course-UP) :	An azimuth stabilized display in which a line connecting the centre of own ship with the top of the display is own ship's intended course
EBL (Electric Bearing Line) :	Electric bearing line centering the position of the own ship.
GPS (Global Positioning System) :	Internationally-used positioning system.
Ground stabilization :	A mode of display whereby own ship and all targets are referenced to the ground using ground track or set and drift inputs
Guard zone :	A zone in which an alarm is given when a target is detected
Heading :	The direction in which the bows of a ship are pointing expressed as an angular displacement from north
HL :	Heading Line
HUP (Head-UP) :	Display mode in which the top of the screen corresponds to the ship's head maker.
IMO :	International Maritime Organization
IR :	Interference Rejector
NM :	Nautical Mile (1 nm = 1,852 m)
NSK :	Gyro compass and log interface
NUP (North-UP) :	An azimuth stabilized display in which a line connecting the centre of own ship with the top of the display is north true bearing
Own track :	Automatic track display function.
Range ring :	Fixed range ring.
RM (Relative Motion) :	The combination of relative course and relative speed
RM display :	A display on which the position of own ship remains fixed and all targets move relative to own ship
Relative bearing :	The direction of a target from own ship expressed as an angular displacement from own ship's heading

Relative course : The direction of motion of a target relative to own ship's position expressed as an angular displacement from north. It is deduced from a number of measurements of target range and bearing on own ship's radar

Relative speed : The speed of a target relative to own ship's position. It is deduced from a number of measurements of target range and bearing on own ship's radar

Relative vector : The predicted movement of a target relative to own ship

Scan CORR : Target emphatic processing function.

Scanner : Antenna unit.

Sea stabilization : A mode of display whereby own ship and all targets are referenced to the sea, using gyro heading and single axis log water speed inputs

Target ENH : Target enhancing function.

TM (True Motion) : The combination of true course and true speed

TM display : A display across which own ship and each target moves with its own true motion

VRM : Variable Range Marker

Trails : Tracks displayed by the radar echoes of targets in the form of a synthetic afterglow. The trails may be either relative or true. The true trails may be sea or ground stabilized

SOG : Speed over Ground

True bearing : The direction of a target from own ship or from another target expressed as an angular displacement from north

True course : The true direction of motion of a target expressed as an angular displacement from north. It is obtained by a vector combination of target relative motion and own ship's true motion

True speed : The speed of a target obtained by a vector combination of target relative motion and own ship's true motion

True vector : The predicted true motion of a target as a result of own ship's direction and speed input. The true vector may be either displayed with reference to the water or to the ground

Performance monitor : Additional equipment for monitoring transmission power and receiving sensitivity.

Floating EBL (Electric Bearing Line) : Electric bearing line centering a certain point.

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5	OPERATIONS OF ATA (OPTION)	5
6	TRUE AND FALSE ECHOES ON DISPLAY	6
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1

GENERAL AND EQUIPMENT COMPOSITION

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1.1 Functions

This equipment is a high performance, high quality, highly reliable and totally-large-scale-integrated (excluding special electronic tubes) radar composed of a scanner, a transceiver and a display unit with a high resolution color CRT which adopts the raster scan method.

1.1.1 Functions of This Equipment

1.1.1.1 Functions of Radar

The JMA-7700 series color radar is designed in accordance with IMO (International Maritime Organization) specifications based on international standards. The major functions include target detecting color display, sea, rain or snow clutter restraint, sensitivity adjustment, interference rejection, distance and bearing measurement using a trackball, fixed and variable distance markers and an electronic cursor as well as Standard equipment ATA (manual and automatic target acquisition and vector, tracking and warning display), a plotter (own ship tracking and coastal line display) and an optional simple plotter (make and line display as well as target and course setting).

1.1.1.2 Functions of ATA (Option)

This system, on which a radar is used as a sensor, can be outlined as follows by function:

[I] First Stage : Target Detection from Radar Information

This work corresponds to plotting targets by hand on the radar screen. Assume that a ship is approaching the own ship. You can catch the ship on the radar. Signals from the ship are processed with the data processor and are transferred to the computer as signals of bearing and range related to the own ship. In this stage, the system has the functions to quantize radar information, to reject noises, to eliminate any information other than ship information and to transfer necessary position data of ships to the computer.

[II] Second Stage : Target Tracking

Targets are plotted at intervals of 3 or 6 minutes with the radar, but tracking on this system is to plot them electrically at intervals of fixed times. This means to compare target position data to be detected every moment with those detected previously so as to check if they are of the same target and also to save data of the target in its file so as to calculate changes of position data of the target.

[III] Third Stage : Judgement of Existence of Ship in Danger of Collision

In this stage, the system calculates speeds and courses of a target ship from ever-changing position data of the target ship obtained in the previous stage so as to judge existence of any danger of collision. After the calculation, the system can easily calculate the closes point of approach to the own ship (CPA = Closest Point of Approach) and the time required to reach the CPA (TCPA = Time to CPA). Both the CPA and the TCPA are compared with the value previously set according to the situations of the own ship so as to judge existence of any danger of collision.

[IV] Fourth Stage : Indication

The above information must be informed to the officer maneuvering the own ship. A variety of indicating methods are available including cathode ray tube and numerical indicator, and various data are available.

This system indicates unprocessed video, vectors (to be selected from true vector and relative vector) of other ships and identification marks of danger ship or safe ship for these ships on the usual radar scope. When the target ship is a danger one, the system will sound an alarm and turns on the alarm lamp to alert the officer.

1.2 Features

Large, high resolution, easily visible diaplay

Thanks to the built-in high-precision (1024 × 768 pixels), non interlacing 21-inch color CRT, a radar video area of more than 250 mm is available. High resolution, near range video images can also be displayed.

Target detection using latest signal processing technology

Unnecessary clutter is eliminated from radar video signals received by the wide dynamic range receiver using the latest digital signal processing technology, improving target detecting performance.

Three (radar, composite and optional plotter) mode display

- In the composite mode, radar video, coastal line and own ship tracks can all be displayed simultaneously.
- In the plotter mode, marks and lines can be created and displayed as well as destination and courses set using the optional plotter function.
  Up to 20,000 points can be used for own ship tracks, marks, and so forth.

Easy-to-operate key arrangement

The basic radar functions can easily be operated since the system has only with the minumum number of keys, enabling quick handling even in an emergency. Various other functions are also available through easy key operation and screen menu selection.

Optional ATA utilizing the latest technologies

The acquiring and tracking functions of the ATA have been improved by adopting the latest radar signal processing and tracking technologies, achieving stable performance even when tracking objects in a clutter.

- Up to 30 targets can be acquired and tracked.
- Hazard statuses are identified by sound displayed using colored symbols with different shapes.
- Fine display of other ship tracks (10 ships × 800 points each) and 7-color display.

Enhanced functions for day and night

The hues of all 4 screens (2 each for day and night) can be set, enabling screen colors to be reproduced according to the operating environment through simple key operation. The screen are very easy to see since echo videos and various graphics are differentiated by color.

Multiple functions

- Radar trailing
- TM (True Motion) display
- Head-up, north-up, course-up and stabilized course-up display
- Own ship track display
- Guard alarm function

1.3 Composition

Equipment componets

Radar type	Scanner unit	Display unit	Remarks		
			Trans-mitting output	Band	Ship's power supply
JMA-7710-6	NKE-1055-6 (6ft slot anttenna) × 1	NCD-3901-2 × 1	10 kW	X	AC220V, 50／60Hz, 1φ AC100／110V, 50／60HZ, 1φ
JMA-7725-6	NKE-1056-6M (6ft slot antenna) × 1	NCD-3901-2 × 1	25 kW		
JMA-7725-9	NKE-1056-9M (9ft slot antenna) × 1	NDC-3901-2 × 1	25 kW		

Spare parts and attachments

Item	Code	Qty.	Remarks
Spare parts	6ZXRD00194	6	Display unit fuse MF60NR-10A
		6	Display unit fuse MF60NR-5A
		3	Display unit fuse MF60NR-0.5A
		6	Display unit fuse MF61-TS7
		9	Display unit power supply circuit fuse MF51NN-3.15A
		3	Display unit power supply circuit fuse MF51NN-10A
		12	Display unit NSK circuit fuse MF51NN-0.5A
		3	Display unit monitor power supply circuit fuse MF51NN-0.5A
		2	Scanner unit NKE-1055 carbon brush S00152-5C-70
		2	Scanner unit NKE-1056 carbon brush 54511-03
Hood	MPOL30274A	1	
Instruction manual	7ZPRD0524	1	

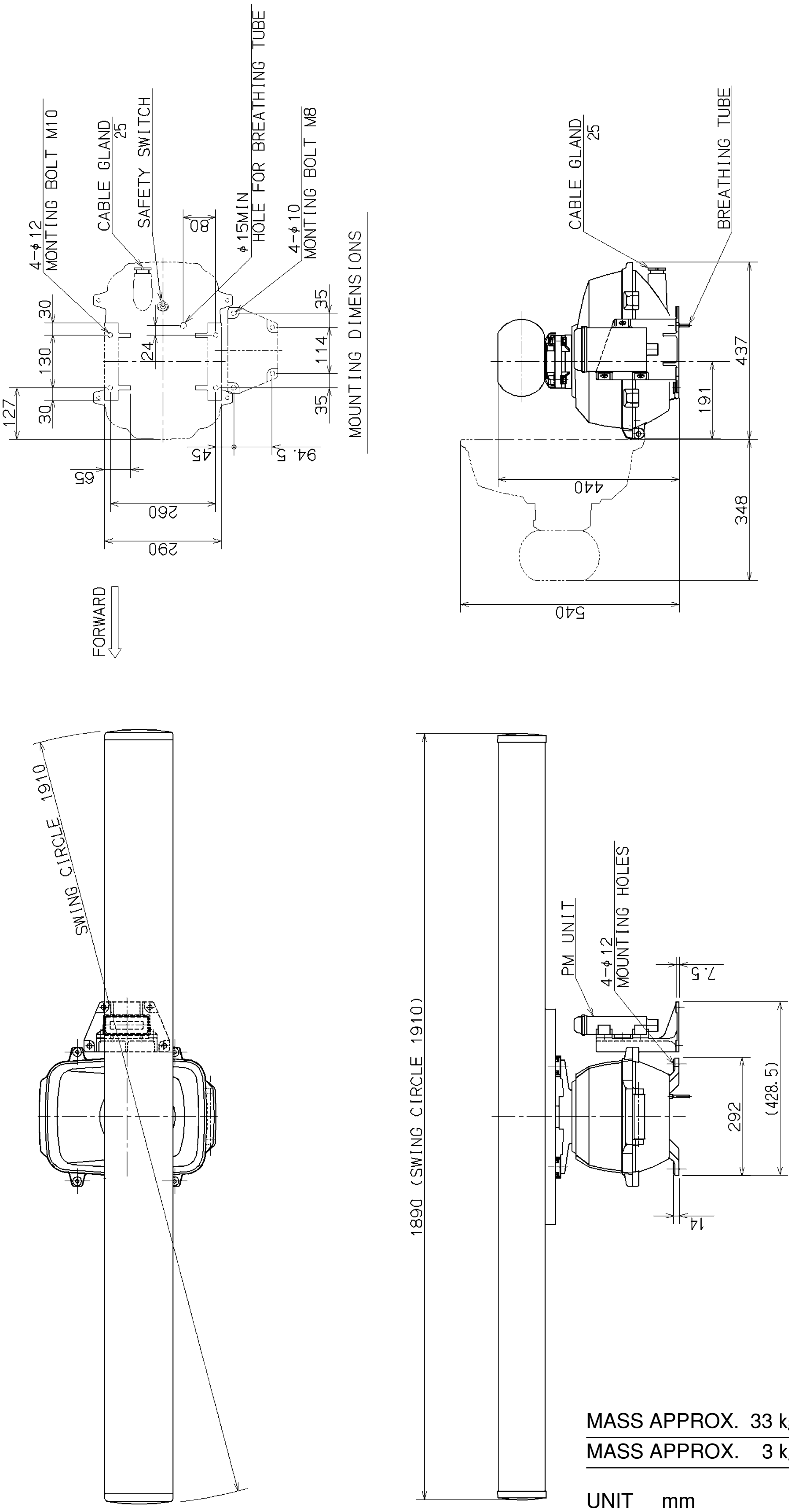
1.4 Configuration

Outline Drawing of Scanner Unit Type NKE-1055-6 .... Fig. 1.1

Outline Drawing of Scanner Unit Type NKE-1056-6M .... Fig. 1.2

Outline Drawing of Scanner Unit Type NKE-1056-9M .... Fig. 1.3

Outline Drawing of Display Unit Type NCD-3901-2 .... Fig. 1.4



MASS APPROX. 33 kg (SCANNER UNIT)

MASS APPROX. 3 kg (PM UNIT)

UNIT mm

Fig. 1.1 Outline Drawing of Scanner Unit Type NKE-1055-6

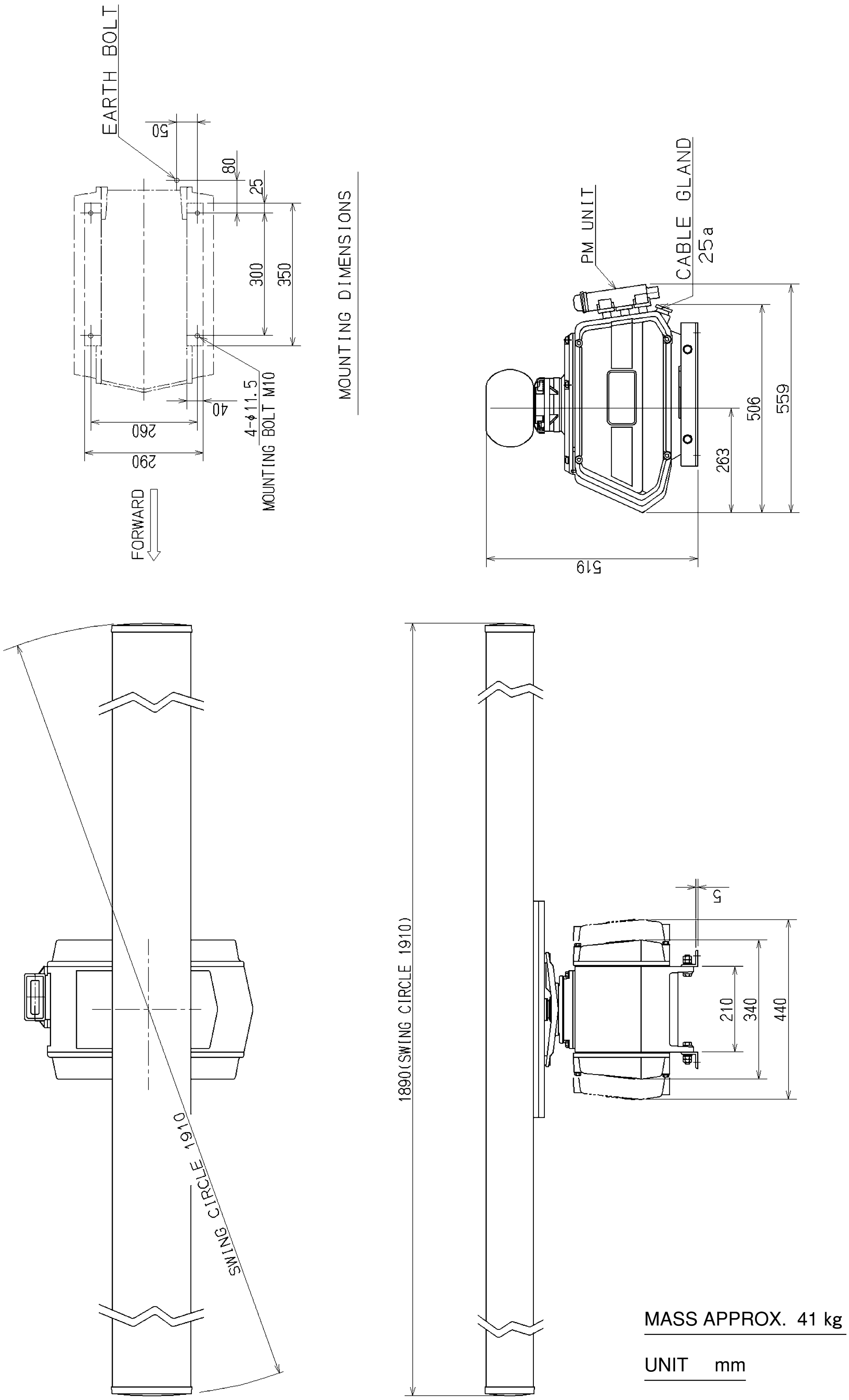


Fig. 1.2 Outline Drawing of Scanner Unit Type NKE-1056-6M

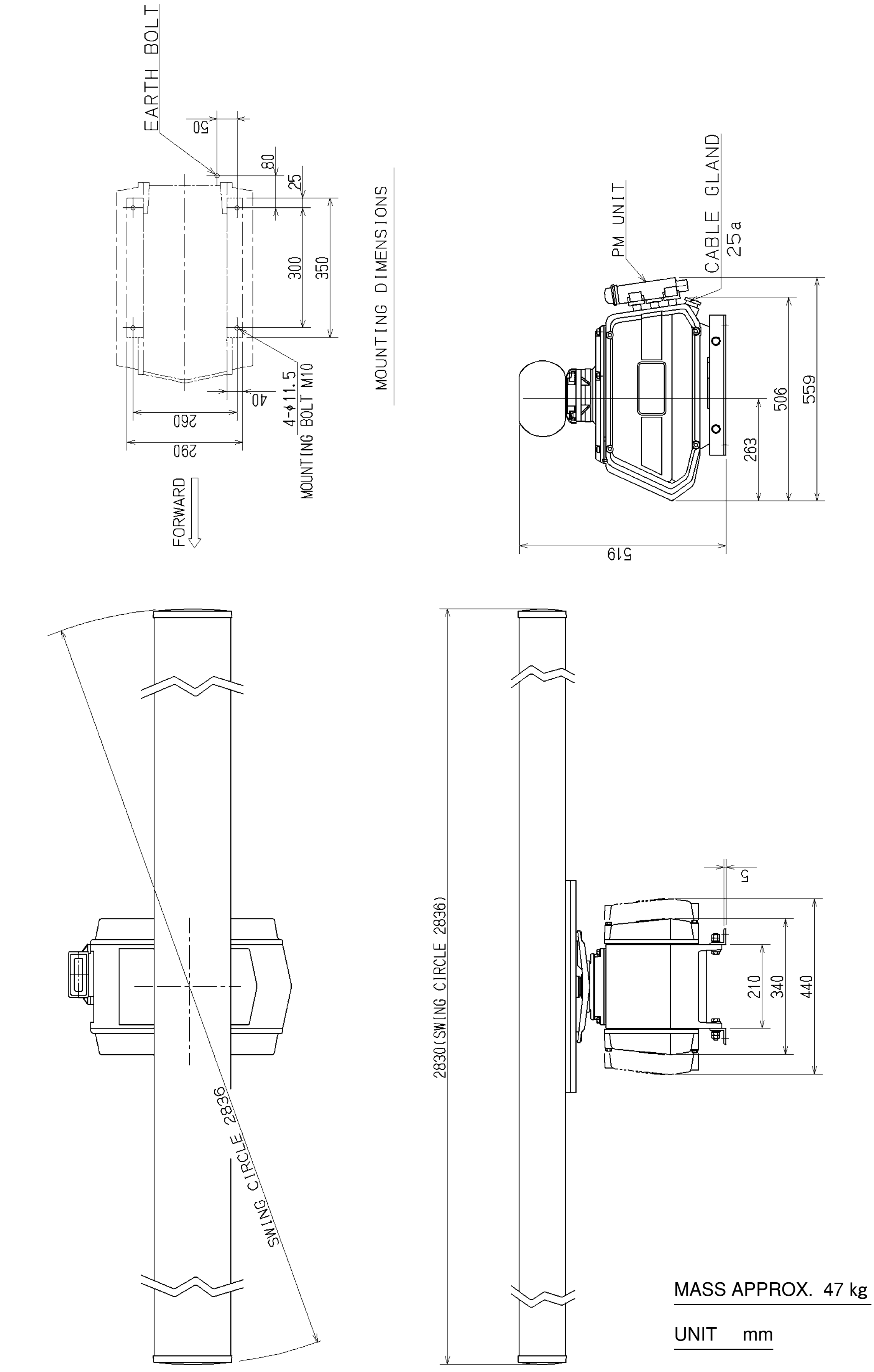
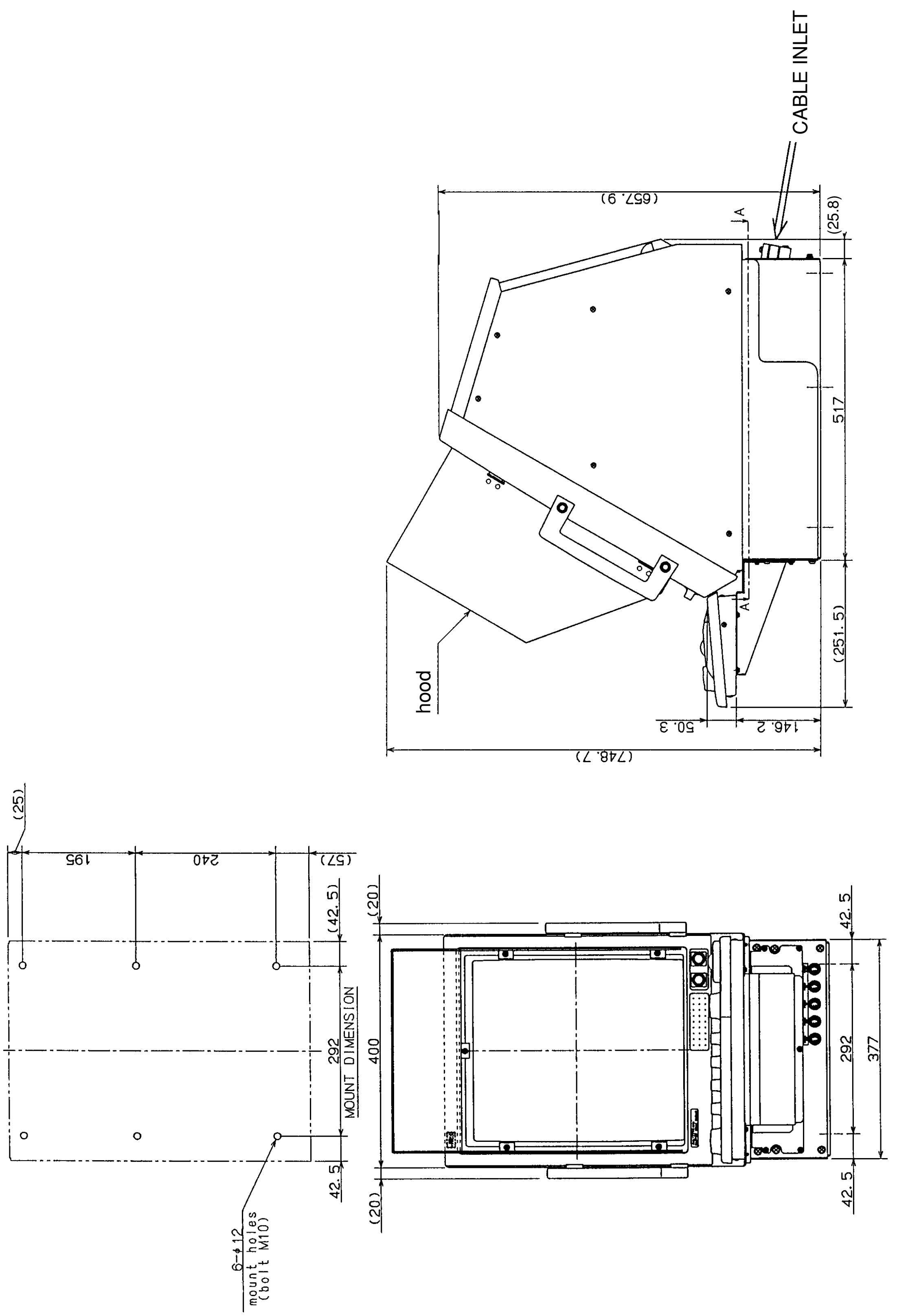


Fig. 1.3 Outline Drawing of Scanner Unit Type NKE-1056-9M



MASS APPROX. 63 kg

UNIT mm

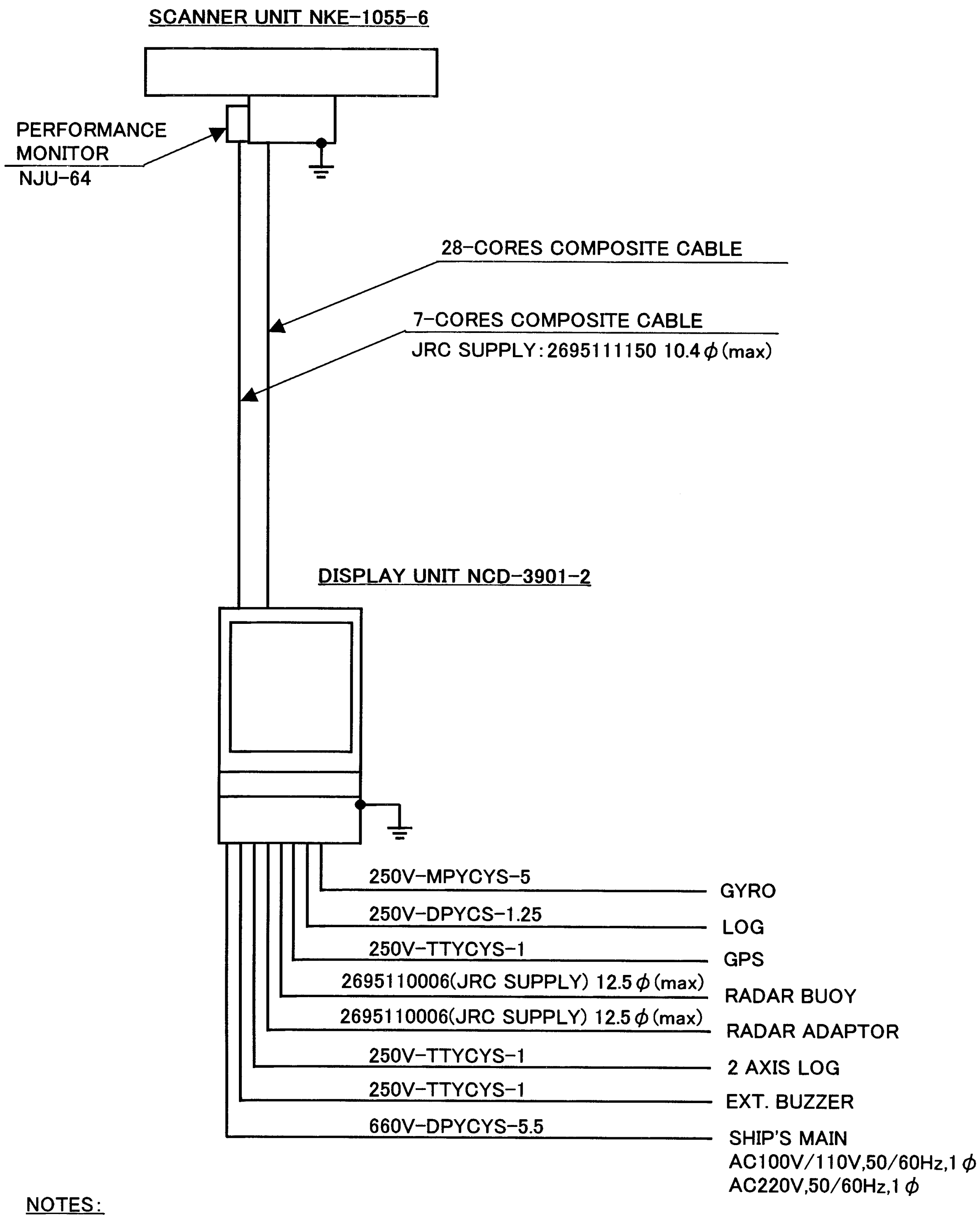
Fig. 1.4 Outline Drawing of Display Unit Type NCD-3901-2

1.5 General System Diagram

General System Drawing of Radar Type JMA-7710-6 .... Fig. 1.5

General System Drawing of Radar Type JMA-7725-6 .... Fig. 1.6

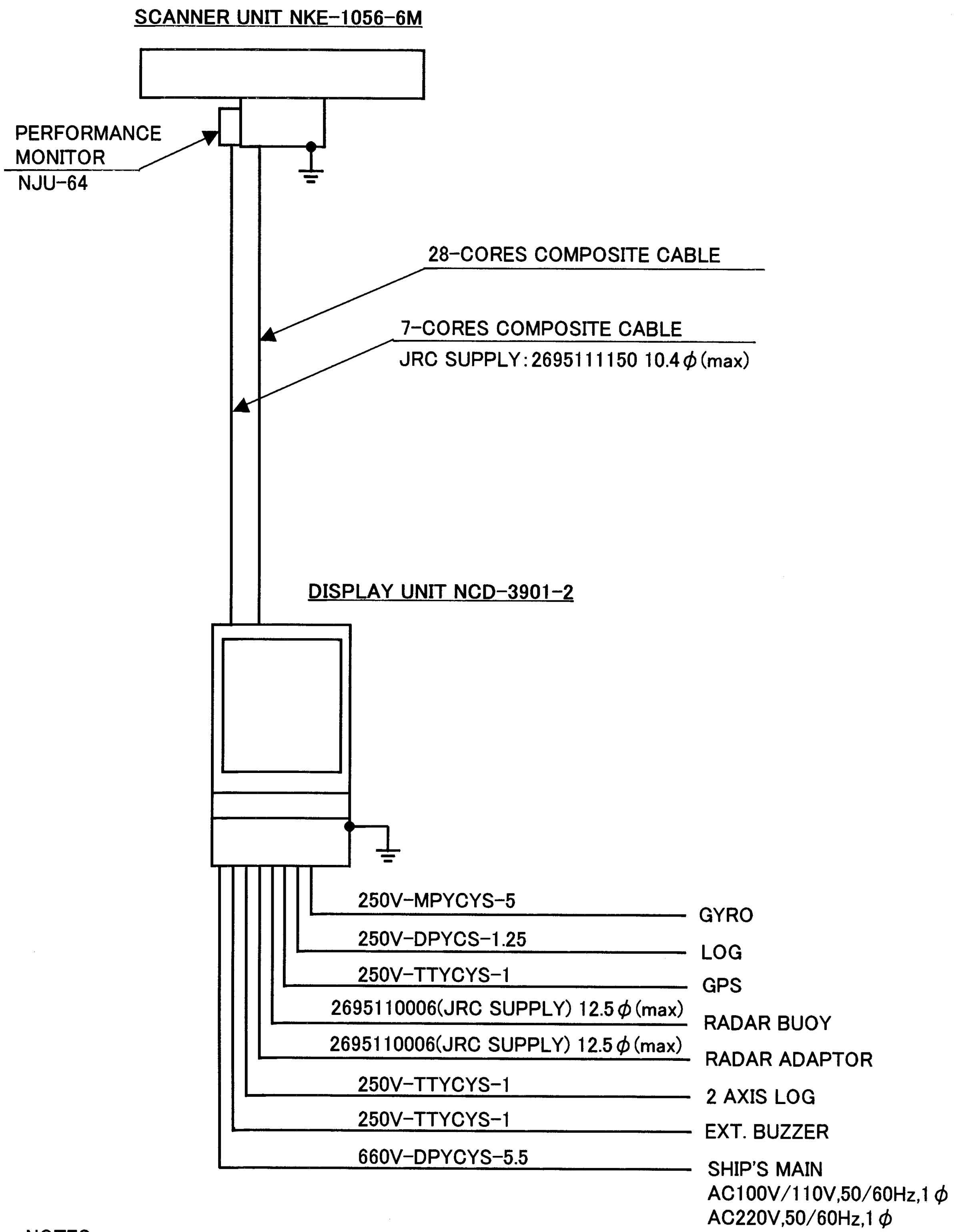
General System Drawing of Radar Type JMA-7725-9 .... Fig. 1.7



NOTES:

ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR.
ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT.
(EX. RADIOTELEPHONE.COMMUNICAITONS RECEIVER AND DIRRECTION FINDER.ETC.)
ESPECIALLY INTER-WIRING CABLES BETWEEN SCANNER UNIT AND DISPLAY UNIT OF THE RADAR SHOULD NOT BE RUN PARALLEL WITH THE CABLES OF RADIO EQUIPMENT.

Fig. 1.5 General System Drawing of Radar Type JMA-7710-6



NOTES:

ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR.
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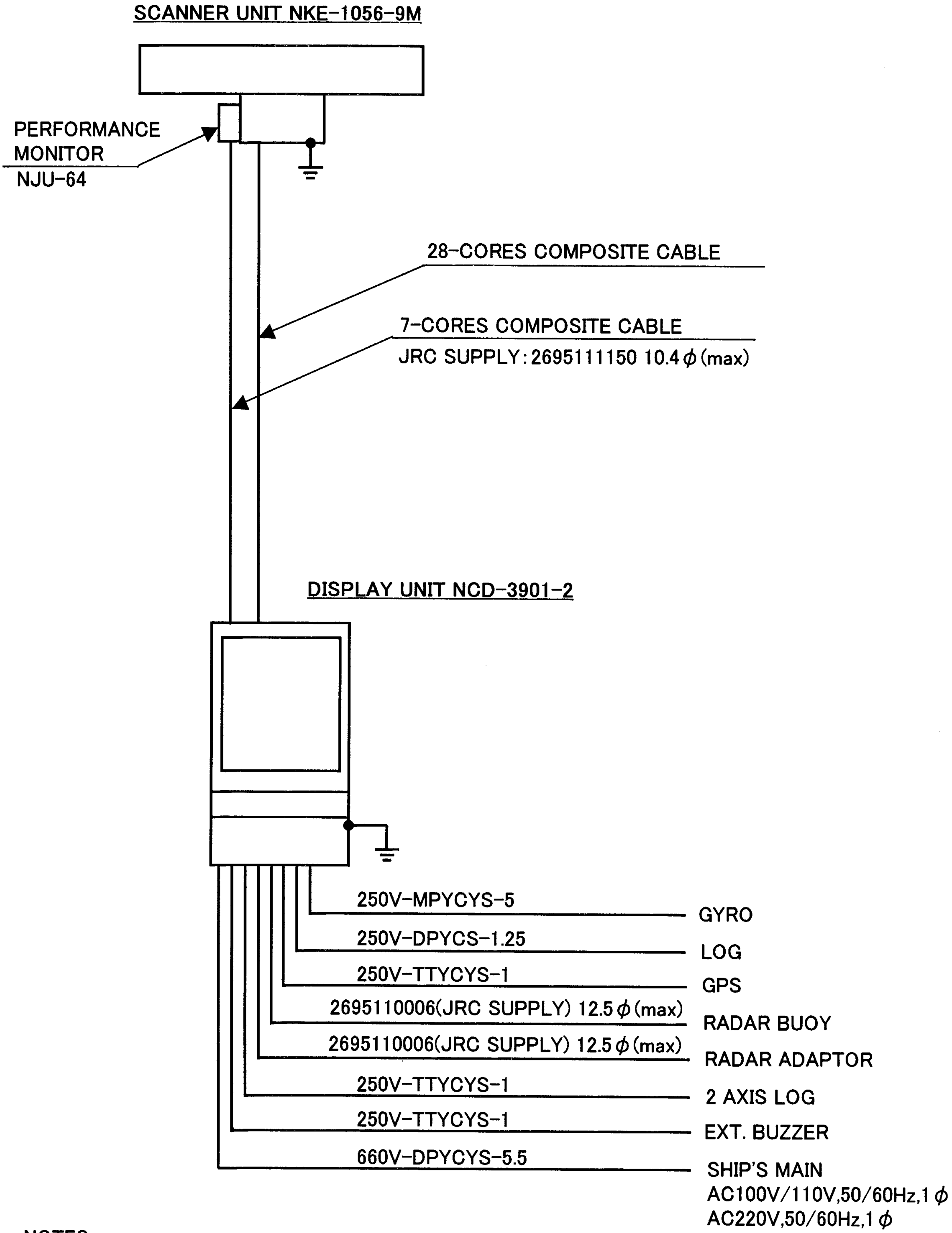
ESPECIALLY INTER-WIRING CABLES BETWEEN SCANNER UNIT AND DISPLAY UNIT OF THE RADAR SHOULD NOT BE RUN PARALLEL WITH THE CABLES OF RADIO EQUIPMENT.

Fig. 1.6 General System Drawing of Radar Type JMA-7725-6



NOTES:

ELIMINATING THE INTERFERENCE ON FREQUENCIES USED FOR MARINE COMMUNICATIONS AND NAVIGATION DUE TO OPERATION OF THE RADAR.
ALL CABLES OF THE RADAR ARE TO BE RUN AWAY FROM THE CABLES OF RADIO EQUIPMENT.
(EX. RADIOTELEPHONE.COMMUNICAITONS RECEIVER AND DIRRECTION FINDER.ETC.)
ESPECIALLY INTER-WIRING CABLES BETWEEN SCANNER UNIT AND DISPLAY UNIT OF THE RADAR SHOULD NOT BE RUN PARALLEL WITH THE CABLES OF RADIO EQUIPMENT.

Fig. 1.7 General System Drawing of Radar Type JMA-7725-9

COLLISION AVOIDANCE

Necessity of Collision Avoidance

Disasters at sea, in particular collisions, have been highlighted as ship's tonnage and speed as well as ocean traffic increased.

A collision of a tanker carrying dangerous matter(s) such as crude oil against a ship brings considerable damages to not only the tanker and the ship but also other ships traveling around, port facilities, inhabitants along nearby coast, fishery resources, etc.

In recent years, the percentage of collisions to disasters at sea has greatly increased. To cope with such situations, some measures to prevent ships from collision have been eagerly required and various equipment have been developed.

Collision Avoidance Problems in Navigation

To avoid collisions of ships has been recognized as one of navigational problems since early times. This section briefly describes how collision avoidance is positioned among navigational problems.

The navigation pattern of all vehicles is considered to be a system consisting of some closed loops irrespective of the media through which vehicles pass, such as air, water, boundary of the both and cosmic space. This pattern is considered in general to consist of two closed loops. One loop is for avoidance of collision against other vehicles, and the other is for finding safe and correct courses to predetermined destinations.

Fig. 1.8 shows the conceptual diagram of navigation pattern of E.W. Anderson. The closed loop for collision avoidance is shown on the left side while the one for finding correct courses is shown on the right side.

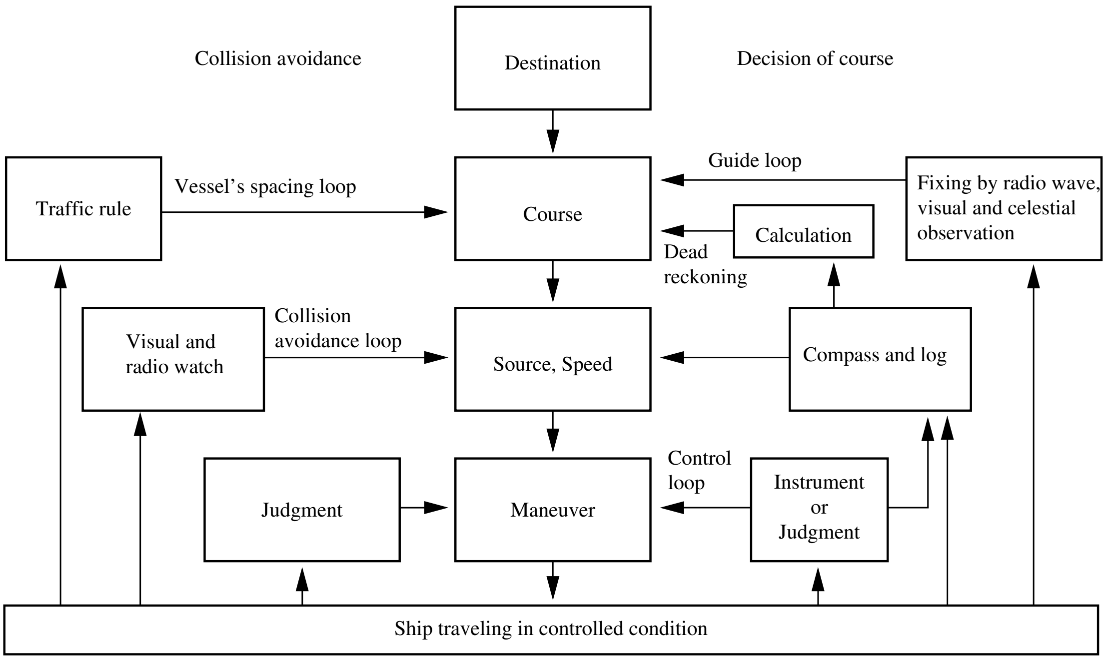


Fig. 1.8 Navigation Pattern

Basic Concept of Collision Avoidance ....

Collision avoidance has two aspects: prediction and avoidance of collision. The prediction of collision is to predict that plural ships come across at a point, and the avoidance is to maneuver ships so as not to come across at the same point with other ships.

In actual practice of maneuvering ships, however, a closed area should be considered instead of a single point. This concept is the CPA (Closest Point of Approach). To predict a collision, it is also necessary to take into account the times that ships take to reach the CPA, and these times are called the TCPA (Time to CPA), which is used to judge dangers of collision. Fig. 1.9 shows the chart called "Collision Triangle."

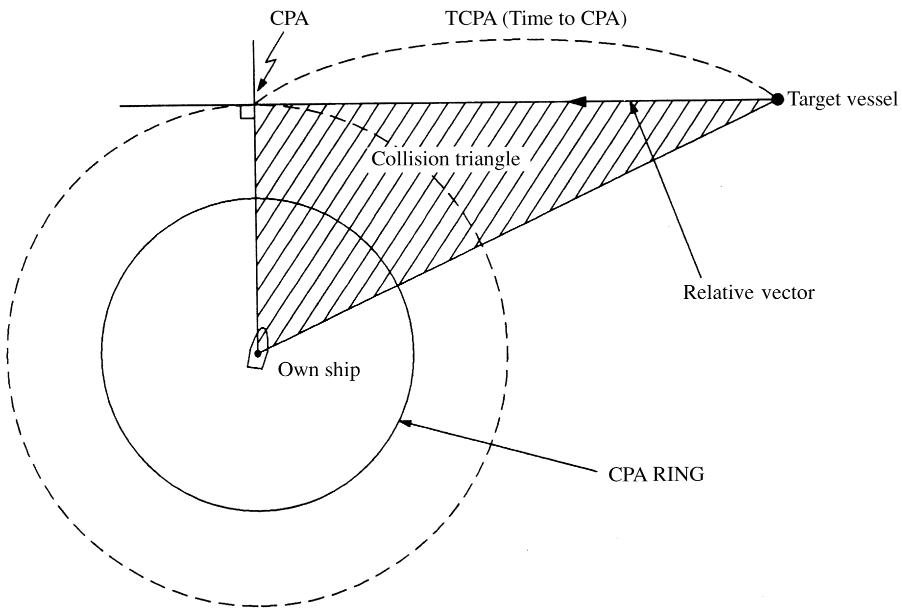


Fig. 1.9 Collision Triangle

Relative Vector and True Vector

When collision avoidance is considered from the view point of the two aspects (prediction and avoidance), the relative vector is necessary for the prediction and the true vector is necessary for the avoidance to find aspects of other ships.

Fig. 1.10 shows the relations between the relative vector and the true vector.

The meanings of the both vectors are as follows:

The relative vector, first of all, enables us to easily understand the outlines of the CPA and the TCPA. The merit of this vector is that the user can understand, at a glance, the degree of danger that all ships shown on the radar scope will collide against each other.

The true vector enables us to easily know speeds and courses of other ships and to find all the aspects at a glance. In the other words, we can find the traffic situations (such as transverse, out sailing, parallel running, reverse running, etc.) stipulated in the Provision of Collision at Sea Act. So, when finding a ship which is going to collide against the own ship, the user can find what rule is applied and how to maneuver the own ship.

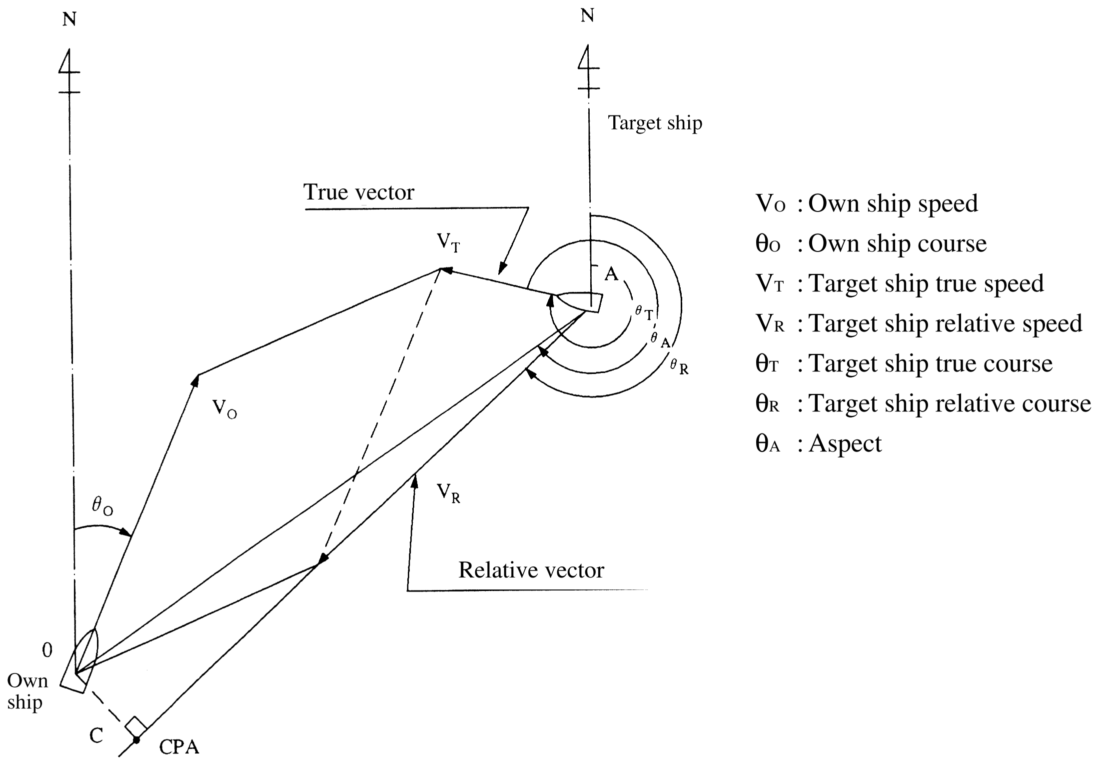


Fig. 1.10 True Vector and Relative Vector

Radar and Collision Avoidance

Radar is still playing an important role for prevention of collision as well as for measuring positions. A plotter is used to improve functions of radar. This plotter is used to check movements of other ships by plotting their positions at intervals of 3 or 6 minutes. The plotting enables the user to know traces of these ships in relation with the own ship and the possibility of collision, or CPA and TCPA. This method is considered effective but should be executed by person, and the number of target ships is limited and the execution takes some minutes.

Set Stabilization ....

Sea stabilization gives correct course and speed through the water.

Heading and Speed inputs from gyro compass and a single axis log (or manually set speed) provide a sea stabilized presentation.

The entire philosophy of Collision Avoidance is based upon knowledge of the heading of other vessels in close quater situations. Only the sea stabilized presentation displays the heading of moving targets.

This presentation provides a good display for Collision Avoidance.

For selecting the sea stabilization, see the subsection “8.5.3.1 Setting Own Ship Speed Equipment”.

2

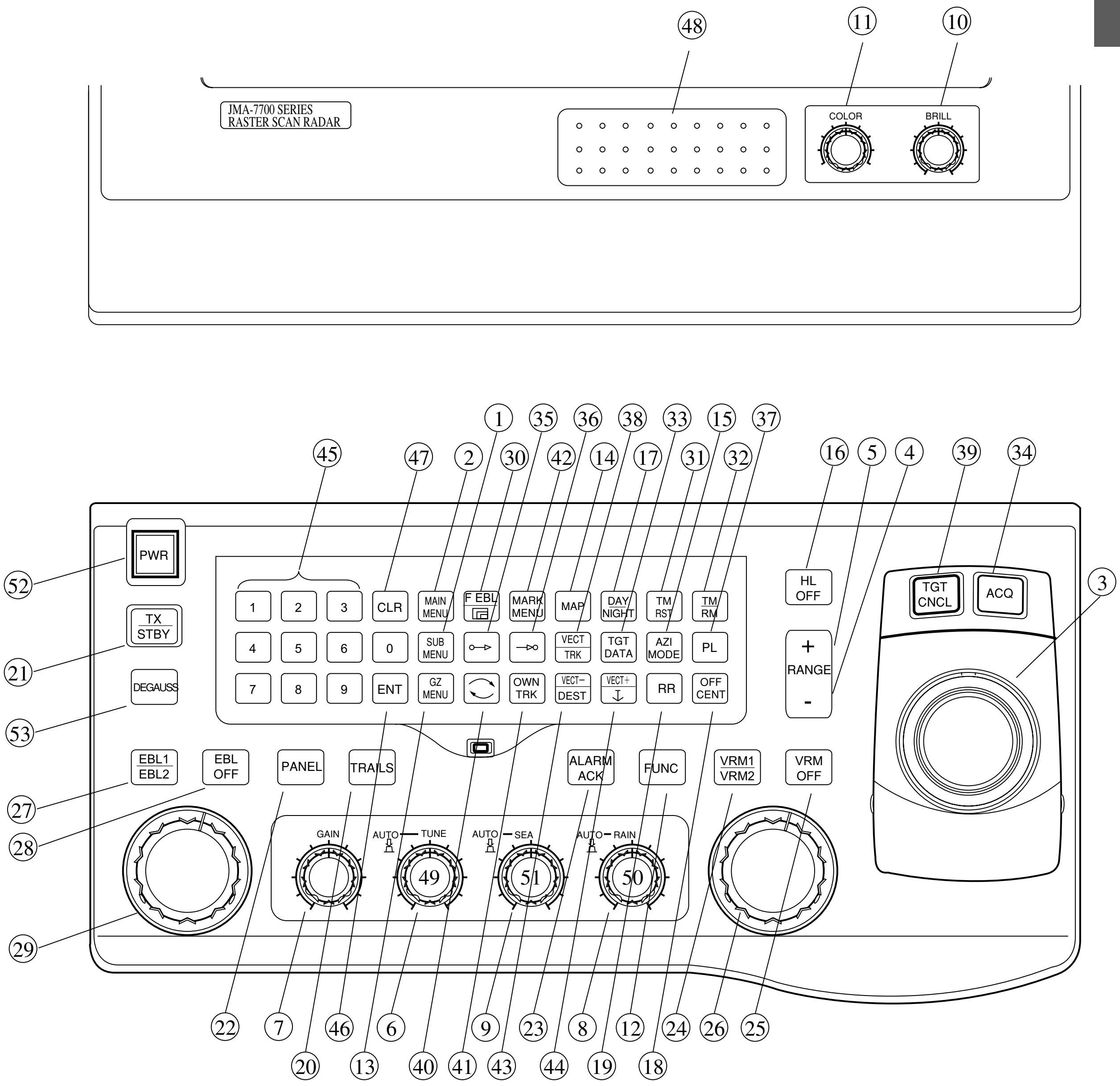
NAMES AND FUNCTIONS OF CONTROL PANEL SWITCHES AND MENU COMPOSITION

2.1 Names and Functions of Control Panel 2-1

2.2 Menu Composition 2-13

2.1 Names and Functions of Control Panel

⚠ CAUTION
Do not put anythig on the touch panel. Deforming may occur if a hot object is placed on it.
Do not apply a strong shock to the touch panel, track ball, and controls, otherwise they may get out of order.



Display Control Panel

Operation controls and keys

Those preceded by a number enclosed in a box are the controls and keys used with ATA model NCA-843.

1 **[SUB MENU] key**
Displays the sub menu on the screen.

2 **[MAIN MENU] key**
Displays the main menu on the screen.

③ **Trackball**
Moves the cursor to a desired position.

④/⑤ **[−] and [+] keys**
Select the range between 0.125 and 96/120 nautical mile.

⑥ **[TUNE] control**
Controls the target on the screen to be seen most clearly.

⑦ **[GAIN] control**
Controls the receiving sensitivity of the radar.

⑧ **[RAIN] control**
Decreases clutter videos due to rain or snow.

⑨ **[SEA] control**
Decreases clutter videos due to reflection from the sea surface.

⑩ **[BRILL] control**
Adjusts the brilliance of the display.

11 **[COLOR] control**
Sets the color for the own and other ship tracks, marks and lines.
(7 colors: white, sky, blue, green, yellow, pink and red)

⑫ **[FUNC] key**
Selects the pre-set video processing

13 **[GZ MENU] key**
Displays the menu for setting an alarm.

⑭ **[MAP] key**
Switches the system to the radar, composite or plotter mode.

⑮ **[AZI MODE] key**
Switches the screen to the true bearing, relative bearing, course-up or stabilized course-up mode.

⑯ **[HL OFF] key**
The HL (Heading Line) can be cleared while this switch is being pressed.

⑰ **[DAY ／ NIGHT] key**

Switches the screen color and brilliance according to each setting.

⑱ **[OFF CENT] key**

Moves the position of the own ship within the screen to display your desired direction wide (within 66% of the radius) or returns the ship to the center.

⑲ **[RR] (RANGE RINGS) key**

Turns the fixed range scale display on and off.

⑳ **[TRAILS] key**

Displays or deletes the radar trail.

㉑ **[TX ／ STBY] key**

Selects between the transmission and standby modes.

㉒ **[PANEL] key**

Adjusts the character light brilliance of each switch and control on the control panel.

㉓ **[ALARM ACK] key**

Stops alarm sound.

㉔ **[VRM1 ／ VRM2] key**

Selects the display of variable range scale 1 or 2.

㉕ **[VRM OFF] key**

Selects turning on or off of the display of variable range scale 1 or 2.

㉖ **[VRM] control**

Changes the variable range scale size.
When the parallel index lines is displayed, the parallel line interval is changed

㉗ **[EBL1 ／ EBL2] key**

Selects the display of EBL1, EBL2 or the parallel index lines.

㉘ **[EBL OFF] key**

Selects turning on or off of the display of EBL1, EBL2 or the parallel index lines.

㉙ **[EBL] control**

Turns the bearing of EBL1, EBL2 or the parallel index lines.

㉚ **[F EBL ／] (floating EBL) key**

Switches the EBL2 to the floating EBL.

㉛ **[TM RST] key**

Manually resets the own ship position in the true motion display mode.

㉜ **[TM ／ RM] key**

Switches the screen display to the true motion (TM), to the relative motion (RM), to the stabilized relative motion (SRM) or to the true motion with constant own ship position (CTM).

33 **[TGT DATA] key**
Displays the target numerical values or sets or clears the target number using the EPA or ATA.

34 **[ACQ] key**
Manually acquires the target when the EPA or ATA is used.

35 **[○—▷] (originating point) key**
Measures the distance between two points with the end point switch (in the radar mode).
Sets the simple course between two points with the end point switch (in the composite and plotter modes).

36 **[—▷○] (end point) key**
Measures the distance between two points with the originating point switch (in the radar mode).
Sets the simple course between two points with the originating point switch (in the composite and plotter modes).

37 **[PL] key**
Switches the transmission pulse length (short, medium and long).

38 **[VECT／TRK] key**
Switches the vector display between true and relative.

39 **[TGT CNCL] key**
Cancels the target symbol and vector which are being tracked by the EPA or ATA and stops the tracking.

40 **[ ] (reverse) key**
Turns the cursor display on and off and fixes it.
Used for the numerical data display in the EPA or ATA.

41 **[OWN TRK] key**
Enables the [COLOR] control to set the own ship track color.
Opens the menu for setting the own ship track storing interval, memory clear, etc.

42 **[MARK MENU] key**
Enables the [COLOR] control to set the mark and line colors.

43 **[VECT −／DEST] key**
Decreases the vector length when the EPA or ATA is used.

44 **[VECT ＋／↓] key**
Increases the vector length when the EPA or ATA is used.

45 **[0 to 9] keys**
Selects menu items and enters numerical data, etc.
Enters the event and cursor marks and lines when the plotter function is added.

46 **[ENT] key**
Selects menu items and enters numerical data.

㊼ **[CLR] key**

Clears the entry of numerical data and the target number in the EPA or ATA, etc.

㊽ **ROM ／ RAM card slot**

The JRC ／ ERC chart ROM card is inserted here to display the chart.
The RAM card is inserted here to plays back the data stored inside.

㊾ **[TUNE] key**

Turns automatic tuning on and off.

㊿ **[RAIN] key**

Turns auto rain ／ snow reflection restraint on and off.

(51) **[SEA] key**

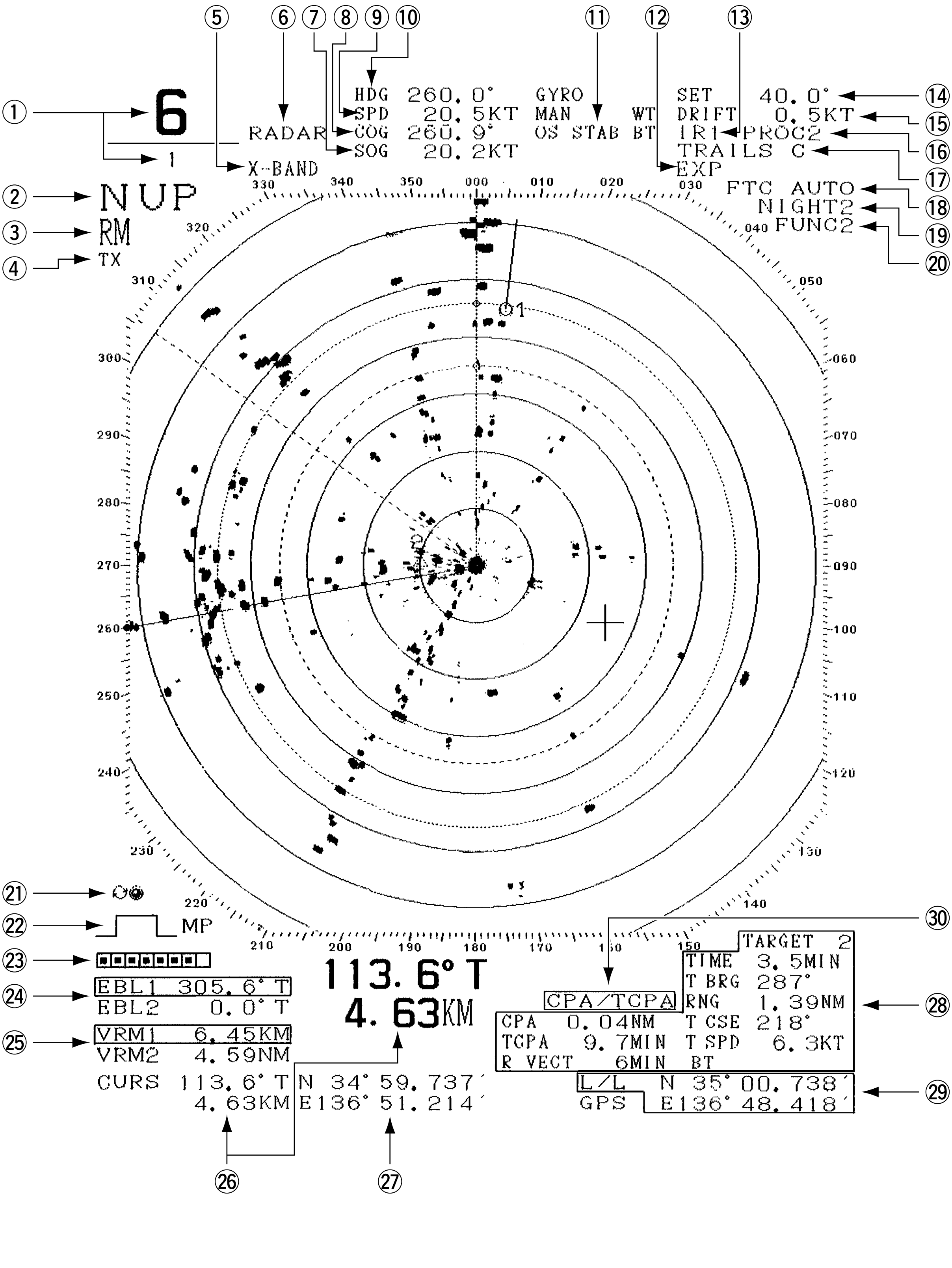
Turns auto sea surface reflection restraint on and off.

(52) **[PWR] switch**

Turns the radar on and off.

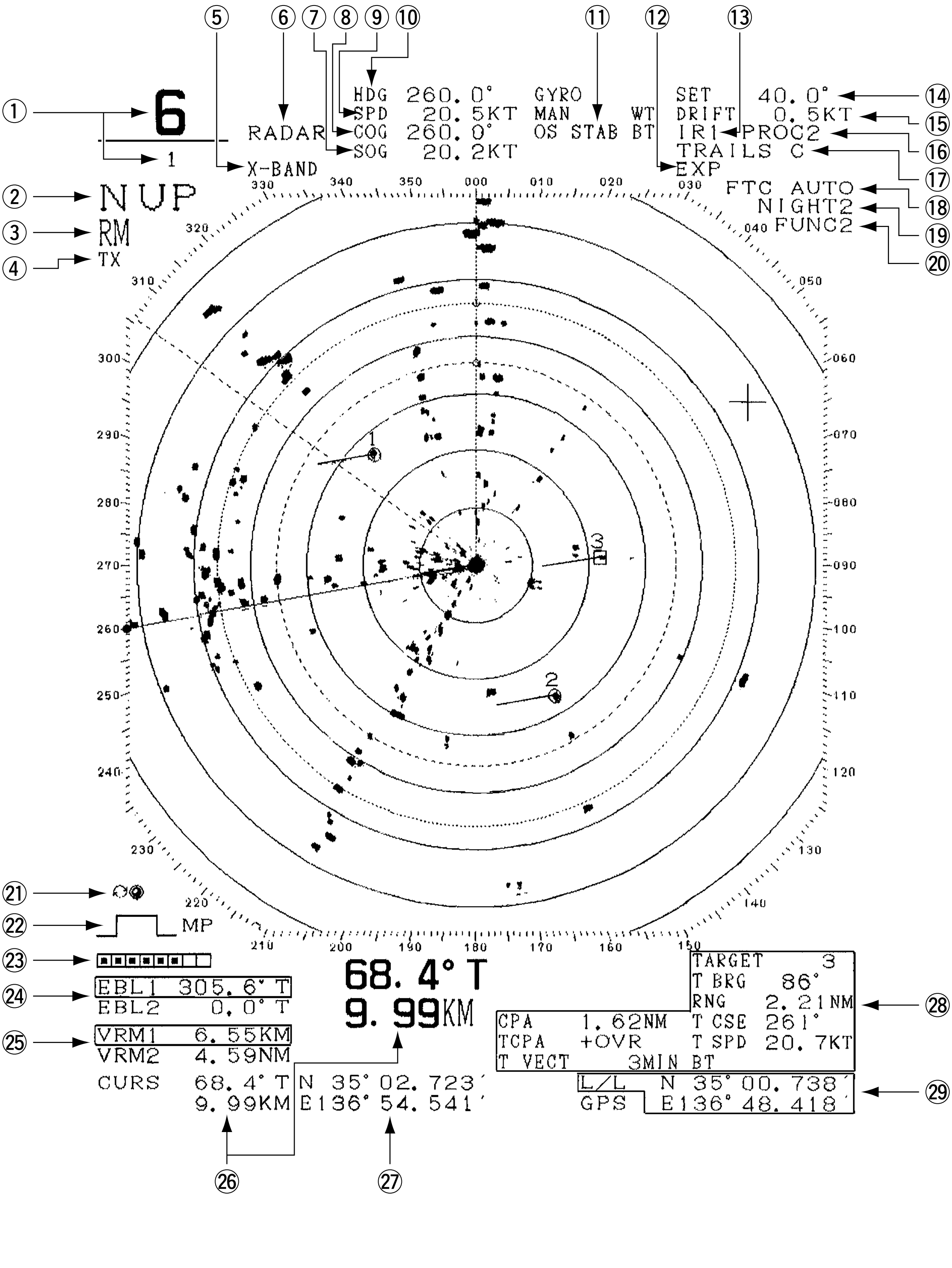
(53) **[DEGAUSS] key**

Degausses the display.



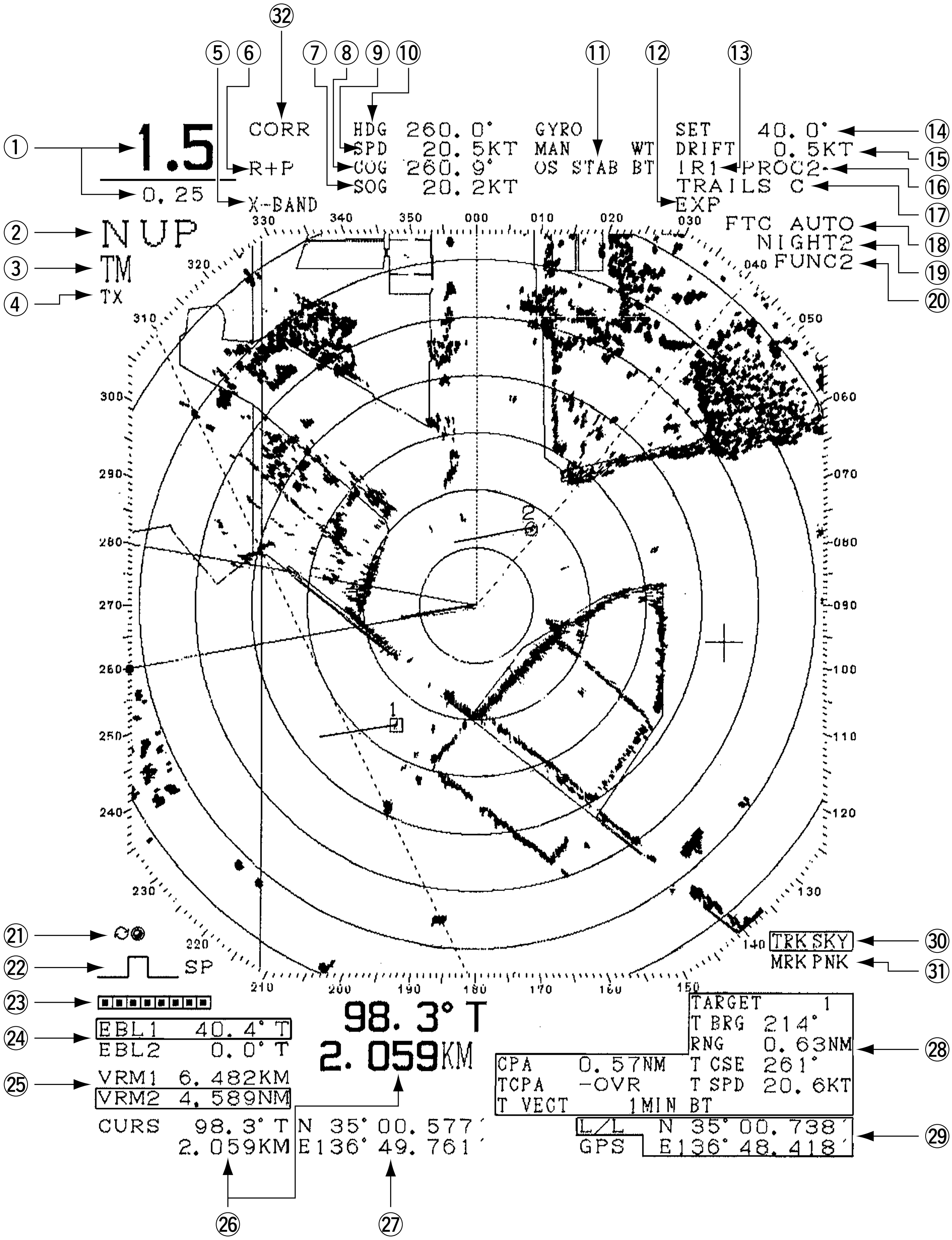
Screen Readouts

①	Range ／ range ring spacing	→	3.3.3	Selecting Range Scales [RANGE] ／
			3.3.11	Displaying Fixed Range Ring [RR]
②	Bearing display	→	3.3.7	Selecting Presentation Mode [PRESENTATION MODE]
③	Relative motion (RM) ／ true motion (TM) display	→	3.3.8	Selecting True Motion ／ Relative Motion Display Modes [TM ／ RM] [TM RST]
④	Standby (STBY) ／ transmission (TX) display	→	3.1.1	Turning Power on and Starting the System
⑤	Frequency band display			
⑥	Mode selection display	→	3.3.22	Selecting Display Mode [MAP]
⑦	Speed over ground			
⑧	Course over ground			
⑨	Own ship speed			
⑩	Own ship heading direction			
⑪	Stabilization mode display			
⑫	Target expansion display	→	3.3.16	Enhancing Target
⑬	Radar interference rejection	→	3.2.9	Rejecting Radar Interference
⑭	Set	→	8.5.3.4	Setting Drift
⑮	Drift	→	8.5.3.4	Setting Drift
⑯	Video processing	→	3.3.20	Displaying Video Processing Screen
⑰	Radar track (Trails)	→	3.3.10	Displaying Other Ship's Trails [TRAILS]
⑱	Auto FTC or Auto STC	→	3.2.4	Suppressing Sea Clutter [SEA]
⑲	Day ／ night display	→	3.2.7	Selecting DAY ／ NIGHT Modes [DAY ／ NIGHT]
⑳	Function name	→	3.4	Using Function Key [FUNC]
㉑	Cursor fixed display			
㉒	Pulse width	→	3.3.4	Selecting Pulse Width [PL]
㉓	Tuning indicator	→	3.2.1	Tuning [TUNE]
㉔	EBL 1 ／ 2 bearing	→	3.3.2	Using EBL (Electronic Cursor) [EBL1 ／ EBL2]
㉕	VRM 1 ／ 2 range	→	3.3.12	Displaying Variable Range Markers [VRM1 ／ VRM2]
㉖	Cursor bearing ／ range from own ship to cursor			
㉗	Cursor position LAT ／ LON			
㉘	Target data EPA	→	3.3.23.4	Displaying Plot Numerical Data
㉙	Own ship position LAT ／ LON			
㉚	Alarm indication EPA	→	3.3.23.10	Turning Alarm Sound On ／ Off



Screen Readouts with ATA

①	Range ／ range ring spacing	→	3.3.3	Selecting Range Scales [RANGE] ／
		→	3.3.11	Displaying Fixed Range Ring [RR]
②	Bearing display	→	3.3.7	Selecting Presentation Mode [PRESENTATION MODE]
③	Relative motion (RM) ／ true motion (TM) display	→	3.3.8	Selecting True Motion ／ Relative Motion Display Modes [TM ／ RM] [TM RST]
④	Standby (STBY) ／ transmission (TX) display	→	3.1.1	Turning Power on and Starting the System
⑤	Frequency band display			
⑥	Mode selection display	→	3.3.22	Selecting Display Mode [MAP]
⑦	Speed over ground			
⑧	Course over ground			
⑨	Own ship speed			
⑩	Own ship heading direction			
⑪	Stabilization mode display			
⑫	Target expansion display	→	3.3.16	Enhancing Target
⑬	Radar interference rejection	→	3.2.9	Rejecting Radar Interference
⑭	Set	→	8.5.3.4	Setting Drift
⑮	Drift	→	8.5.3.4	Setting Drift
⑯	Video processing	→	3.3.20	Displaying Video Processing Screen
⑰	Radar track (Trails)	→	3.3.10	Displaying Other Ship's Trails [TRAILS]
⑱	Auto FTC or Auto STC	→	3.2.4	Suppressing Sea Clutter [SEA]
⑲	Day ／ night display	→	3.2.7	Selecting DAY ／ NIGHT Modes [DAY ／ NIGHT]
⑳	Function name	→	3.4	Using Function Key [FUNC]
㉑	Cursor fixed display			
㉒	Pulse width	→	3.3.4	Selecting Pulse Width [PL]
㉓	Tuning indicator	→	3.2.1	Tuning [TUNE]
㉔	EBL 1 ／ 2 bearing			
㉕	VRM 1 ／ 2 range	→	3.3.12	Displaying Variable Range Markers [VRM1 ／ VRM2]
㉖	Cursor bearing ／ range from own ship to cursor			
㉗	Cursor position LAT ／ LON			
㉘	Target data of ATA	→	5.5.1	Types of Data Readouts to be Displayed
㉙	Own ship position LAT ／ LON			



Screen Readouts With Plotter Option and ATA (R+P Mode)

①	Range ／ range ring spacing	→	3.3.3	Selecting Range Scales [RANGE] ／
		→	3.3.11	Displaying Fixed Range Ring [RR]
②	Bearing display	→	3.3.7	Selecting Presentation Mode [PRESENTATION MODE]
③	Relative motion (RM) ／ true motion (TM) display	→	3.3.8	Selecting True Motion ／ Relative Motion Display Modes [TM ／ RM] [TM RST]
④	Standby (STBY) ／ transmission (TX) display	→	3.1.1	Turning Power on and Starting the System
⑤	Frequency band display			
⑥	Mode selection display	→	3.3.22	Selecting Display Mode [MAP]
⑦	Speed over ground			
⑧	Course over ground			
⑨	Own ship speed			
⑩	Own ship heading direction			
⑪	Stabilization mode display			
⑫	Target expansion display	→	3.3.16	Enhancing Target
⑬	Radar interference rejection	→	3.2.9	Rejecting Radar Interference
⑭	Set	→	8.5.3.4	Setting Drift
⑮	Drift	→	8.5.3.4	Setting Drift
⑯	Video processing	→	3.3.20	Displaying Video Processing Screen
⑰	Radar track (Trails)	→	3.3.10	Displaying Other Ship's Trails [TRAILS]
⑱	Auto FTC or Auto STC	→	3.2.4	Suppressing Sea Clutter [SEA]
⑲	Day ／ night display	→	3.2.7	Selecting DAY ／ NIGHT Modes [DAY ／ NIGHT]
⑳	Function name	→	3.4	Using Function Key [FUNC]
㉑	Cursor fixed display			
㉒	Pulse width	→	3.3.4	Selecting Pulse Width [PL]
㉓	Tuning indicator	→	3.2.1	Tuning [TUNE]
㉔	EBL 1 ／ 2 bearing			
㉕	VRM 1 ／ 2 range	→	3.3.12	Displaying Variable Range Markers [VRM1 ／ VRM2]
㉖	Cursor bearing ／ range from own ship to cursor			
㉗	Cursor position LAT ／ LON			
㉘	Target data of ATA	→	5.5.1	Types of Data Readouts to be Displayed
㉙	Own ship position LAT ／ LON			
㉚	Own track color			
㉛	Mark ／ Line color			
㉜	Correcting chart posion			

2.2 Menu Composition

In addition to functions to be selected using keys on the front panel, this radar has some other functions available on menus. To select these functions, press the numeric keys (0 to 9), CLR and ENT keys.

The menu are composed as follows:

MAIN MENU [MAIN MENU]
Pressing this key opens the main menu on the bottom of the screen and pressing again clears it.

SUB MENU [SUB MENU]
Pressing this key opens the sub menu on the bottom of the screen and pressing again clears it.

2.2.1 Menu Selection

(1) In order to select each item on the menu, press the numeric key corresponding to it.

(2) In order to change the contents in the item, press the same key used in (1) to select it and press the ENT key.
The underlined setting indicates the current one. The display is highlighted when selected. Pressing the ENT key confirms the setting.

(3) In order to change the numerical part in the item, press the same key used in (1), enter an appropriate value using the numeric key and press the ENT . When numeral value input is enabled, the input part is displayed in a box.

Note

- Press the CLR key to clear the input value.
- When items are shown on more than one pages, "PREV" and "NEXT" will be displayed on the upper right corner of the screen.
  In this case, press the 9 key to display the next menu or the 0 key to display the previous menu. (Format is the same as above.)
- Any item in the menu marked with "(STBY)" should be operated after setting the STBY mode by pressing the TX/STBY key. (Format is the same as above.)

2.2.2 Menu List

MAIN MENU

MAIN MENU

1. RADAR/TRAIL BRILL
2. RR/VRM/EBL BRILL
3. ATA BRILL
4. GRAPHIC DATA BRILL
5. PROCESS
6. IR
7. FLOATING EBL
8. VECTOR
9. GRAPHIC DATA DISP OFF

SUB MENU

SUB MENU

1. RADAR #1 MENU
2. RADAR #2 MENU
3. RADAR #3 MENU
4. RADAR #4 MENU
5. ATA #1-#2 MENU
6. PLOTTER MENU
7. ATA TRACK MENU
8.
9. INIT SETTING #1-#4 MENU

OWN TRK

OWN TRACK

1. DELETE OWN TRACK
2. OWN TRK MEM INTERVAL
3. OWN TRACK MEMORY

GZ MENU Without the ATA function

RADAR ALARM

1. FUNCTION
2. RADAR ALARM MODE
3. RADAR SECTOR ZONE
4. RADAR SENSITIVITY LEVEL
5. AUDIBLE RADAR ALARM

GZ MENU With the ATA function (Optional)

RADAR ALARM

1. FUNCTION
2. AUDIBLE ATA ALARM
3. ATA SECTOR ZONE
   (AUTO ACQ)

Note

- When items are shown on more than one pages, “PREV” and “NEXT” will be displayed on the upper right corner of the screen.
- In this case, press the 9 key to display the next menu or the 0 key to display the previous menu. (Format is the same as above.)

SUB MENU

1

RADAR #1

1. TARGET EXPANSION
2. RADAR VIDEO MENU
3. RADAR TRAILS MENU
4. ZOOM
5.
6.
7. DISPLAY COLOR MENU

2

RADAR VIDEO

1. VIDEO LATITUDE
2. VIDEO NOISE REJECTION
3. AUTO DR CONT
4. PROCESS SWITCHING
5. PROC SWITCH RANGE

3

RADAR TRAILS

1. RADAR TRAILS INTERVAL
2. RADAR TRAILS REF LEVEL
3. RADAR TRAILS REDUCTION
4. RADAR TRAILS PROCESS
5. RADAR TRAILS SMOOTHING

7

BACK GROUND

1. RADAR AREA
2. OUTSIDE OF RADAR AREA

9

RADAR COLOR

1. TARGET COLOR
2. RADAR TRAILS COLOR

SUB MENU

2

RADAR #2

1. GYRO
2. EBL BEARING
3. PARALLEL INDEX LINE
4.
5. CURSOR MENU
6. STERN FLASH
7. KM/NM VRM1
8. KM/NM VRM2

5

CURSOR

1. CURSOR LENGTH
2. FIXED CURSOR

SUB MENU

3

RADAR #3

1.
2.
3. EPA MENU
4. XMIT REPETITION FREQUENCY
5.
6.
7. PERFORMANCE MONITOR

3

EPA

1. VECTOR TIME
2. PLOT NUMBER
3. LIMITS
4. AUDIBLE WARNING
5. DISPLAY OF CPA RING

SUB MENU

4

RADAR #4

1. OWN TRK MEM INTERVAL
2. DELETE OWN TRACK
3. OWN TRACK MEMORY
4. DISP OWN TRACK COLOR
5. CLEAR OWN TRACK COLOR

9

CHART DISPLAY

1. C-MAP MENU
2. JRC/ERC CARD MENU
3. CONTOUR OF JRC CARD MENU
4. NAV INFORMATION

1 **(Note)**

C-MAP

1. GRID DISPLAY
2. SOUNDING DISPLAY
3. SOUNDING DEPTH UNIT
4. LIGHT SECTORS DISPLAY
5. LIGHT SECTORS DISPLAY LEVEL
6. FILL LAND AREA

2

JRC CARD

1. FILL LAND AREA
2. ERC DISP REQUEST

Note

- This C-MAP menu can be used only in plotter mode (option).

4

NAV INFO

1. SETTING WPT/CANCELLATION WPT
2. WAYPOINT INPUT

9

DISP NAV INFO

1. DISP WPT
2. DISP WPT / NUMBER COMMENT
3. DISP MARK COLOR / TYPE

3

CONTOUR

1. 10M
2. 20M
3. 30M
4. 40M
5. 50M
6. 60M
7. 70M
8. 80M
9. OTHER

9

CLEAR NAV INFO

1. CLEAR MARK COLOR / TYPE

SUB MENU

5

ATA #1

1. ATA SYMBOL/TARGET DATA
2. VECTOR TIME
3. PAST POSITION
4. PAST POSITION TIME
5. LIMITS

9

ATA #2

1. AUDIBLE WARNING
2. DISPLAY OF CPA RING
3. ATA TEST MENU
4. SIMULATION

3

ATA TEST

1. TEST VIDEO
2. VECTOR CONST
3. VIDEO TD LEVEL
4. VIDEO HIGH LEVEL
5. VIDEO LOW LEVEL
6. GATE SIZE
7. ATA NOISE LEVEL
8. ATA FTC LEVEL

SUB MENU

7

ATA TRACK

1. TRACK FUNCTION
2. TRACK COLOR
3.
4. TRK DISPLAY
5. TRK MEM INTERVAL

9

CLEAR TRACK

1. CLEAR TRACK COLOR
2. CLEAR TRACK NUMBER
3. CARD 2 TRACK DISP

SUB MENU

9

INIT SET #1

1.
2. SPEED EQUIPMENT
3. MANUAL SPEED
4. FUNCTION MENU
5. BUZZER VOLUME
6. DRIFT
7.
8.

9

INIT SET #2

1. BEARING ADJUSTMENT
2. RANGE ADJUSTMENT
3. TUNE ADJUSTMENT
4. SETTING OF PRF
5. PM ADJUSTMENT
6. DATA INPUT FORMAT
7. INITIALIZING GPS MENU (STBY)
8. SETTING GPS MENU (STBY)

9

INIT SET #3

1. SHIFT COAST LINE #1
2. SHIFT COAST LINE #2
3. LAT/LON CORRECTION
4. CHART CENTER POSITION
5. DATA/TIME
6.

7

INITIALIZE GPS/GPS STATUS

0. PREVIOUS MENU
1. POSITION
2. EXCLUSION SAT
3. GEODETIC
4. ANTENNA HEIGHT
5. FIX MODE
6. DOP LEVEL
7. POSN AVERAGE
8. SEND DATA
9.

8

SETTING DGPS/DGPS STATUS

0. PREVIOUS MENU
1. MODE
2. FREQUENCY
3. BAUD RATE (BPS)
4. SET DATA
5. SEND DATA
6.
7.
8.
9.

4

SET FUNC

1. FUNCTION 1 SETTING MENU
2. FUNCTION 2 SETTING MENU
3. FUNCTION 3 SETTING MENU
4. FUNCTION 4 SETTING MENU

9

SET FUNC x -1

1. MODE
2. PROCESS
3. IR
4. AUTO STC/FTC
5. TGT EXPANSION
6. SAVE PRESENT STATE

9

SET FUNC x -2

1. PULSE WIDTH 0.75NM
2. PULSE WIDTH 1.5NM
3. PULSE WIDTH 3NM
4. PULSE WIDTH 6NM
5. PULSE WIDTH 12NM

9

SET FUNC x -3

1. VIDEO LATITUDE
2. VIDEO NOISE REJECTION
3. GAIN OFFSET
4. XMIT REPETITION FREQUENCY
5. SMALL BUOY DETECTION
6. AUTO DR CONT

9

SET FUNC x -4

1. RADAR TRAILS INTERVAL
2. RADAR TRAILS REF LEVEL
3. RADAR TRAILS REDUCTION
4. RADAR TRAILS PROCESS
5. RADAR TRAILS SMOOTHING

9

SET FUNC x -5

1. PROCESS SWITCHING
2. PROC SWITCH RANGE
3.
4.
5.
6. INITIALIZE

9

INIT SET #4

1. MAINTENANCE MENU (STBY)
2. DIAGNOSTIC #1 MENU
3. DIAGNOSTIC #2 MENU (STBY)

1

MAINTENANCE MENU
0. PREVIOUS MENU
1. ANTENNA HIGHT
2.
3. ANTENNA SWITCH
4. PARTIAL MASTER RESET
5. ALL MASTER RESET
6. INTERNAL SETTING to CARD 2
7. CARD 2 to INTERNAL SETTING
8. MEMOLIZE USER SETTING
9. RESTORE USER SETTING

2

DIAGNOSTIC 1

1. SENSOR TEST
2. LINE TEST
3. ATA STATUS
4. ROM VERSION
5. ERROR LOGGING

MAG I.
RUNNING TIME
TX TIME

1

SENSOR TEST

SAFETY SWITCH
BEARING PULSE (BP)
BEARING PULSE (BZ)

2

LINE TEST

NSK
UART 1
UART 2
ATA

3

ATA STATUS

TRACKING NUMBER
TD INTERRUPT NUMBER
GZ NUMBER

4

ROM VERSION

MAIN CPU
NSK
ATA CPU
ATA TD

5

ERROR LOGGING

XXXXXXXXXX
XXXXXXXXXX

3

DIAGNOSTIC 2

1. MEMORY TEST (STBY)
2. KEY SWITCH TEST (STBY)

1

MEMORY TEST
0. PREVIOUS MENU
1. SRAM
2. GRAPHIC RAM
3. FLASH ROM
4. ATA COMMON RAM
5. CARD 1
6. CARD 2

2

KEY SWITCH TEST
0. PREVIOS MENU
KEY
TRACK BALL
VOLUME
SHAFT ENCODER
ROTARY SWITCH
DIPSW1
DIPSW2

Note

- When items are shown on more than one pages, “PREV” and “NEXT” will be displayed on the upper right corner of the screen.
- In this case, press the **9** key to display the next menu or the **0** key to display the previous menu. (Format is the same as above.)

SUB MENU

6

PLOTTER

1. WPT/ROUTE MENU
2. WPT SETTING MENU (STBY)
3. DISP/DEL OF TRK/MARK COLOR MENU (STBY)
4. CLEAR MEMORY/INIT CARD MENU (STBY)
5. MEM CAPACITY/COPY MEM MENU (STBY)
6.
7.
8. PLOTTER SETTING MENU (STBY)

1

WPT/ROUTE

1. WAYPOINT ALARM
2. ROUTE ALARM
3. SETTING OF ROUTE SEQUENCE
4. SELECT SCHEDULED ROUTE
5. ROUTE SEQUENCE
6. WPT SWITCH MODE
7. WPT SKIP/BACK SKIP MENU
8. SETTING WPT/CANCELLATION WPT

7

WPT SKIP/BACK SKIP MENU

0. PREVIOUS MENU
1. WPT SKIP
2. WPT BACK SKIP

2

WPT SETTING

0. PREVIOUS MENU
1. WAYPOINT ENTRY
2. WAYPOINT INPUT

3

DISPLAY/DELETE OR TRACK/MARK IN DISTINCTION COLOR

0. PREVIOUS MENU
1. DISP OWN TRK COLOR
2. DISP MARK COLOR/TYPE
3. CLEAR OWN TRK COLOR
4. CLEAR MARK COLOR/TYPE
5.
6.
7.
8.
9.

4

CLEAR MEMORY/INITIALIZE CARD

0. PREVIOUS MENU
1. CLEAR MARK/LINE DATA
2. CLEAR WPT/ROUTE DATA
3. FORMAT CARD 2
4.
5.
6.
7.
8.
9.

5

MEMORY CAPACITY/COPY MEMORY

0. PREVIOUS MENU
1. MEM CAPACITY
2. COPY INSIDE -> CARD 2
3. COPY CARD 2 -> INSIDE
4. COPY CARD 1 -> CARD 2
5. CLEAR FILE -> CARD 2
6. CARD 2 OWN TRACK DISP
7. CARD 2 MARK DISP
8. SHOW CARD 1
9. SHOW CARD 2

8

PLOTTER SETTING

0. PREVIOUS MENU
1. SCALE
2. PRESET SCALE
3. VECTOR/NUMBER DISPLY MENU
4. MARK SETTING MENU
5.
6.
7.
8.
9.

3

VECTOR/NUMBER DISPLAY

0. PREVIOUS MENU
1. SELECT LINE
2. OWN VECTOR LENGTH
3. WPT VECTOR
4. WPT/ROUTE DISPLAY
5. WPT NUMBER DISPLAY
6. RTE NUMBER DISPLAY
7. STATUS OF ORG/DEST
8. SCALEBAR DISPLAY
9.

4

MARK SETTING

0. PREVIOUS MENU
1. MARK SIZE
2. MARK FONT
3.
4.
5.
6.
7.
8.
9.

3

BASIC OPERATION

3.1 Flow of Operation 3-1
3.2 Preparation 3-5
3.3 Basic Operation 3-15
3.4 Using Function Key [FUNC] 3-62
3.5 Displaying the Chart 3-75
3.6 Displaying Own Ship Track 3-79
3.7 Displaying Navigation Information 3-89

3.1 Flow of Operation

Turning power on and starting the system

▼

Tuning

▼

Observation and video adjustment

▼

Data acquisition and measurement

▼

Ending operation and stopping the system

Basic operation is explained on the following pages.

3.1.1 Turning Power on and Starting the System

⚠ **CAUTION**

The radar may be damaged if the 100 V AC/200 V AC changeover switch on the back of the indicator is not set in the correct direction according to the ship's power.

Procedures

1. **Check that the ship's power is supplied to the system.**
2. **Press the power switch to turn the power on.**

   PWR

   The warm-up timer appears on the screen.
3. **Press TX/STBY.**

   Radar transmission starts and the scanner unit starts rotating.
   "STBY" on the upper left of the screen changes to "TX".

   Pressing the TX/STBY switch before "STBY" is displayed does not enable radar transmission.

Attention

- Immediately after radar installation, after replacement of the magnetron or if the system has not been operated for a long time, set the system to the standby mode and leave it as it is for 20 to 30 minutes before setting it to the transmit mode.
- When turning power on after power was once turned off, wait 5 min or more after setting the power switch to OFF until setting it to ON again.
- Insufficient warming-up may cause sparks inside the magnetron and may make its oscillation unstable. Start the transmitting mode with the short-pulse range and then go on to the long-pulse range. If the oscillation becomes unstable during the period, immediately reset the system to the standby mode, leave it as it is for 5 to 10 minutes and restart the system. Repeat this until the system comes to oscillate stably.

3.1.2 Degauss

Procedures **1. Press the DEGAUSS key to degauss the screen.**

> Attention
>
> Use this function only when degaussing is necessary due to misalignment of colors, etc. on the screen.
> A sufficient effect can be obtained from one cycle of degaussing. There is no need to perform successive degaussing.
> If it is inevitable to perform successive degaussing, wait at least 30 sec after the degassing key was once pressed until that key is pressed again.

3.1.3 Tuning

Procedures **1. Press the + RANGE − key to select any range between 6 and 96/120 nautical miles.**

Press the minus (-) side of the + RANGE − key to decrease the range.

Press the plus (+) side of the + RANGE − key to increase the range.

2. Turn the AUTO-TUNE control.

Adjust the video for best presentation.
If radar display doesn't show a weak target, adjust the control until the turning bar on the lower left of the screen indicates the maximum.

To use Auto Tuning mode

Procedures **1. Press the AUTO-TUNE control.**

Select auto tuning mode, "AUTO" appears on the right of the tuning bar.

Exit **2. Press the AUTO-TUNE control again.**

"AUTO" disapears on the right of the tuning bar, changes to manual mode.

3.1.4 Observation and Video Adjustment

Procedures **1. Press the [+ RANGE –] key to select the range appropriate for observation.**

2. Turn the [GAIN] and [BRILL] controls so that the target is displayed most clearly.

3.1.5 Data Acquisition and Measurement

For details, see section “3.3 Basic Operation” and chapter “4 Measurement”.

3.1.6 Ending Operation and Stopping the System

To stop transmission

Procedures **Press the [TX/STBY] switch.**

This stops radar transmission and scanner unit rotation. "TX" on the upper left of the screen changes to "STBY".

Keep the system in the standby mode if it is expected to be reset to the transmit mode soon. This enables the user to select the transmit mode again simply by pressing the [TX/STBY] switch.

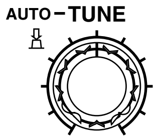
To turn off

Procedures **Press the [PWR] switch to turn the system off.**

This stops the power to be supplied to the system.

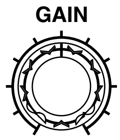
3.2 Preparation

3.2.1 Tuning [TUNE]



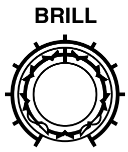
This control is used to tune the receiver.
When the tuning does not match, the receiving sensitivity decreases and the operator may miss weak or distant targets.
For manual tuning, adjust the TUNE control so that the target is displayed most clearly. If radar display doesn't show radar return, adjust the control until the tuning bar on the lower left of the screen indicates its maximum right.
Since it takes about ten minutes for the oscillation frequency of the magnetron to stabilize after the transmit mode has been set, adjust the control again 10 minutes later.

3.2.2 Adjusting Sensitivity [GAIN]



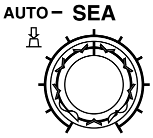
This control is used to adjust the receiving sensitivity of the radar. Turning it clockwise increases the sensitivity and expands the radar picture observation range. Excessive gain, however, increases receiver noises on the screen and could make target detection more difficult.
When sighting targets densely located on the screen or targets near the own ship, turn the knob counterclockwise to reduce the sensitivity. If gain is set too low, weak or distant targets could be missed.

3.2.3 Adjusting CRT Brilliance [BRILL]



This control is used to adjust the brilliance of the total screen. Turning it clockwise increases the brilliance. Adjust it to the best condition for you.

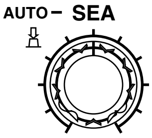
3.2.4 Suppressing Sea Clutter [SEA]



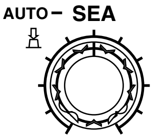
This control is used to suppress sea clutter. Although turning it clockwise increases the suppressing effect, excessive suppressing could miss weak target at short range.

To use Auto Suppressing Sea Clutter mode

Procedures

1. Adjust the 

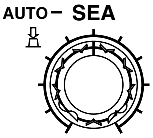
so that the target is displayed most clearly.

2. Press the 

control.

Select auto suppressing sea clutter mode, then "STC AUTO" appears on upper right of the screen. Turn the control again when the target is not displayed most clearly.

Exit

3. Press the 

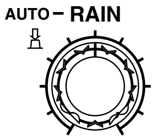
control again.

"STC AUTO" disappears on the upper right of the screen, changes to manual mode.

Note

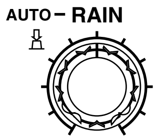
- Auto suppressing sea clutter mode can not select with auto suppressing rain and snow clutter mode.

3.2.5 Suppressing Rain and Snow Clutter [RAIN]



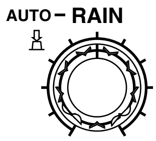
This control is used to suppress rain/snow clutter. Although turning it clockwise enables contours of targets obscured by rain/snow clutter to be seen, excessive suppressing could miss weak targets. It is more effective for suppressing sea clutter to use this control together with the [SEA] control.
Keep the knob at its leftist position for normal operation.

To use Auto Suppressing Rain and Snow Clutter mode

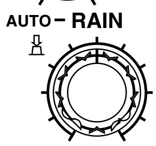
Procedures **1. Press the** 

control.

Select auto suppressing rain and snow clutter mode, and "FTC AUTO" appears on the upper right of the screen.

Turn the 

control when the target is not displayed most clearly.

Exit **2. Press the** 

control again.

"FTC AUTO" disappears on the upper right of the screen, and changes to manual mode.

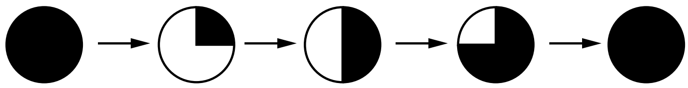
Note

- Auto suppressing rain and snow clutter mode can not select with auto suppressing sea clutter mode.

3.2.6 Adjusting Brilliance

Procedures **1. Press the MAIN MENU key to open the main menu.**

Brilliance increases in the four levels as shown below every time each setting key for adjusting brilliance is pressed and pressing it again returns the system to the original status.



1 [RADAR ／ TRACK BRILL]: Adjusts brilliance of radar video.

2 [RR ／ VRM ／ EBL BRILL]: Adjusts brilliance of the fixed range scale, variable range scales (VRMs1 and 2) and electronic cursors (EBLs1 and 2).

3 [ATA BRILL]: Adjusts brilliance of the ATA symbol vector.
It is used to adjust brilliance of the symbol vector of the electronic plot (EPA) when the ATA is not added (This system mounts the ATA as standard equipment, so this function is usually not available.)

4 [GRAPHIC DATA BRILL]: Adjusts brilliance of the letters outside the fixed bearing range, of the cursor inside the fixed bearing range, of the HL, of the mark line, of the own ship track, of the other ship track, and of the coast line.

Note

- The red and white marks, lines, and tracks change by "3. ATA BRILL".

By brilliance adjustment of radar videos, only the gamma correction value changes and the maximum brilliance remains unchanged. (The radar signal brilliance of a strong level remains unchanged and the radar signal brilliance of a weak level changes.)

Main menu

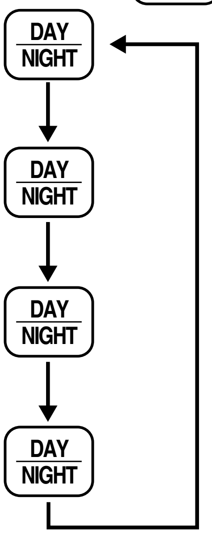
MAIN MANU				
1. RADAR ／ TRAIL BRILL	●	[DAY1]		
2. RR ／ VRM ／ EBL BRILL	●	[DAY1]		
3. ATA BRILL	●	[DAY1]		
4. GRAPHIC DATA BRILL	●	[DAY1]		
5. PROCESS	OFF	PROC1	PROC2	PROC3
6. IR	OFF	IR1	IR2	IR3
7. FLOATING EBL	OFF	ON		
8. VECTOR	TRUE	RELATIVE		
9. GRAPHIC DATA DISP OFF				

Brilliance, once adjusted, is stored depending on the selected day/night mode (refer to subsection “3.2.7 Selecting DAY ／ NIGHT Modes [DAY ／ NIGHT]”).

Exit **2. Press the MAIN MENU key.**

3.2.7 Selecting DAY ／ NIGHT Modes [DAY ／ NIGHT]

Procedures **Press the DAY/NIGHT key.**



Pressing this key changes the mode from "DAY1" to "DAY2", "NIGHT1" to "NIGHT2" in this order.

The brilliance set at the time of selecting each mode is stored. For adjusting brilliance, refer to subsection “3.2.6 Adjusting Brilliance”.

3.2.8 Setting Color

This control is used to set the background colors of inside and outside the bearing scale as well as radar and trail video colors in each mode (four modes of DAY1, 2 and NIGHT1 and 2).
The following colors can be set.

Element	Colors that can be set
BACKGROUND COLOR (within PPI)	Black, Blue
BACKGROUND COLOR (outside of PPI)	Black, Sky blue
TARGET COLOR	Yellow, Green, Orange
RADAR TRAILS COLOR	Sky blue, White, Green

Screen display colors can be set and stored independently in each screen color arrangement mode.

Recommended setting

Reduce the brilliance other than radar videos during nighttime to reduce glare.

	Daytime setting	Nighttime setting
Brilliance of each element	Maximum brilliance of each element (radar video = 2)	Reduce the brilliance of graphic and distance marker.
Background color	Black or Blue (optional)	Black
Radar video	Yellow	Green, Orange

3.2.8.1 Background Color

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [1] key to open the RADAR #1 menu.**
3. **Press the [7] key to open the BACKGROUND menu.**
4. **Press the [1] key to select the background color inside the bearing scale. (Radar area)**

   Two colors, including black, are available.

   Press the [1] key to select the color for DAY1 and press the [ENT] key.

   Press the [1] key again to select the color for DAY2 and press the [ENT] key.

   Select the colors for NIGHT1 and 2 in the same way.
5. **Press the [2] key to select the background color outside the bearing scale.**

   Two colors, including black, are available.

   Press the [2] key to select the color for DAY1 and press the [ENT] key.

   Press the [2] key again to select the color for DAY2 and press the [ENT] key.

   Select the colors for NIGHT1 and 2 in the same way.
6. **Press the [SUB MENU] key.**

Background

BACK GROUND				0. PREV 9. NEXT
1. RADAR AREA	DAY1:	BLK	<u>BLU</u>	
	DAY2:	BLK	<u>BLU</u>	
	NIGHT1:	<u>BLK</u>	BLU	
	NIGHT2	<u>BLK</u>	BLU	
2. OUTSIDE OF RADAR AREA				
	DAY1:	BLK	<u>SKY</u>	
	DAY2:	BLK	<u>SKY</u>	
	NIGHT1:	BLK	<u>SKY</u>	
	NIGHT2:	BLK	<u>SKY</u>	

3.2.8.2 Setting Radar Video and Trails Color

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [1] key to open the RADAR #1 menu.**
3. **Press the [7] key to open the BACKGROUND menu.**
4. **Press the [9] key to open the RADAR COLOR menu.**
5. **Press the [1] key to select "TARGET COLOR".**

   Three colors (yellow, green, orange) are available.

   Press the [1] key to select the color for DAY1 and press the [ENT] key.

   Press the [1] key again to select the color for DAY2 and press the [ENT] key.

   Select the colors for NIGHT1 and 2 in the same way.
6. **Press the [2] key to select "RADAR TRAILS COLOR".**

   Three colors (sky, white and green) are available.

   Press the [2] key to select the color for DAY1 and press the [ENT] key.

   Press the [2] key again to select the color for DAY2 and press the [ENT] key.

   Select the colors for NIGHT1 and 2 in the same way.

Exit

7. **Press the [SUB MENU] key.**

Radar color

RADAR COLOR					0. PREV
1. TARGET COLOR	DAY1:	YEL	GRN	ORN	
	DAY2:	YEL	GRN	ORN	
	NIGIHT1:	YEL	GRN	ORN	
	NIGIHT2:	YEL	GRN	ORN	
2. RADAR TRAILS COLOR	DAY1:	SKY	WHT	GRN	
	DAY2:	SKY	WHT	GRN	
	NIGHT1:	SKY	WHT	GRN	
	NIGHT2:	SKY	WHT	GRN	

3.2.9 Rejecting Radar Interference

Attention

If you'll watch the RADAR BEACON and the SART, set IR as follows.

IR OFF

Procedures

1. **Press the MAIN MENU key to open the MAIN MENU.**
2. **Press the 6 key to select "IR".**
3. **Press the 6 key to select "OFF", "IR1", "IR2" or "IR3" according to the radar interference status.**
   "IR1", "IR2" or "IR3" then appears on the upper right of the screen to display the interference rejection circuit operation. "IR3" is most effective for the radar interference.
4. **Press the ENT key.**

Exit

5. **Press the MAIN MENU key.**

Main menu

MAIN MANU				
1. RADAR/TRACK BRILL	●	[DAY1]		
2. RR/VRM/EBL BRILL	●	[DAY1]		
3. ATA BRILL	●	[DAY1]		
4. GRAPHIC DATA BRILL	●	[DAY1]		
5. PROCESS	OFF	<u>PROC1</u>	PROC2	PROC3
6. IR	OFF	<u>IR1</u>	IR2	IR3
7. FLOATING EBL	<u>OFF</u>	ON		
8. VECTOR	<u>TRUE</u>	RELATIVE		
9. GRAPHIC DATA DISP OFF				

3.2.10 Adjusting Control Panel Brilliance [PANEL]

Procedures

Brilliance increases in the four levels every time the PANEL key is pressed and pressing it again returns the system to the original status.

3.2.11 Stabilization

<u>Sea Stabilization</u>

Sea stabilization gives correct course and speed through the water.

Heading and Speed inputs from gyro compass and a single axis log (or manually set speed) provide a sea stabilized presentation.

The entire philosophy of Collision Avoidance is based upon knowledge of the heading of other vessels in close quater situations. Only the sea stabilized presentation display the heading of moving targets.

This presentation provides a good display for collision Avoidance.

For the sea stabilization, select "MANUAL", "LOG" or "2AXIS/WT" on subsection “8.5.3.1 Setting Own Ship Speed Equipment”.

<u>Ground Stabilization</u>

Ground stabilization gives correct course and speed over the ground.

Course Over the Ground (COG) and Speed Over the Ground (SOG) are for information only.

The display can be ground stabilized by input from a position fixing equipment (GPS) or from a dual axis log.

For the ground stabilization, select "GPS" or "2AXIS/BT" on subsection “8.5.3.1 Setting Own Ship Speed Equipment”.

Note

- Composite mode (R+P) or optional Protter mode provides a ground stabilized presentation by input from a position foxing equipment (GPS).

3.3 Basic Operation

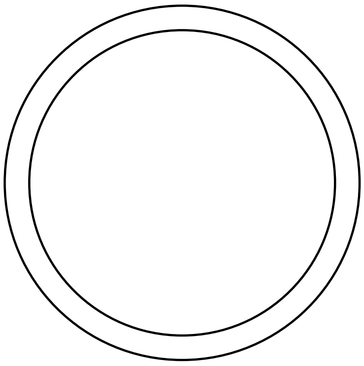
Attention

If you'll watch the RADAR BEACON and the SART, set the process as follows.

IR OFF

PROCESS OFF

3.3.1 Using Trackball to Move Cursor "+"



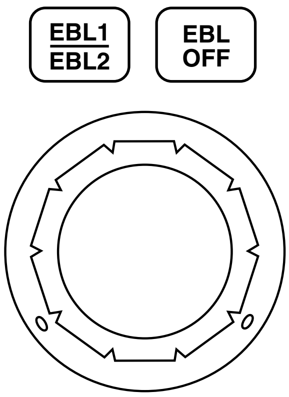
The cursor mark "+" is often used to designate positions in various operations. The cursor mark is interlocked with motions of the trackball. When the trackball is turned vertically and horizontally, the cursor mark also movers vertically and horizontally. The cursor readouts at the lower left of the screen read the distance and the bearing of the cursor.
The operator is recommended to get accustomed to designate positions by using the trackball before operation.

Note

- When the mode of fixed cursor is selected, the cursor is fixed in the direction of the axis selected on the menu. (See subsection "3.3.17 Setting Cross Cursor Length and Fixing Cursor Position".)

3.3.2 Using EBL (Electronic Cursor) [EBL1 ／ EBL2]

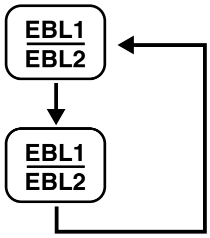
The EBL (Electronic Cursor) is absolutely necessary to measure distance and bearing.
The operator is recommended to get accustomed to move the cursor before operation.



Procedures

Displaying EBL

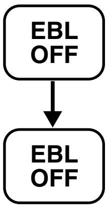
The EBL currently selected is displayed in a box on the lower left of the screen.



Pressing the [EBL1 ／ EBL2] key once displays (selects) EBL1.

Pressing it again displays (selects) EBL2.

Clearing EBL



Pressing the [EBL OFF] switch once clears the EBL outside a box on the lower left of the screen.

Pressing it again clears the other EBL.

Display of Bearing readout of EBL

◎ Bearing readouts of EBL1 and EBL2 currently shown on the radar display are displayed on the lower left of the screen.
Also, EBL1 or EBL2 currently activated is displayed in a box on the lower left of the screen.

Motion of EBL

◎ **EBL1**

- EBL1 is displayed as a line originating from own ship to outer edge of radar display.
- EBL1 rotates in the same direction as the EBL control.

◎ **EBL2**

- EBL2 is displayed as a line originating from own ship to outer edge of radar display.
- EBL2 rotates in the same direction as the EBL control.

<When EBL2 is used in the floating EBL mode>

EBL2 can be used as a floating EBL.

– Motion of Floating EBL –

- EBL2 is displayed as a line originating from the cursor mark "+" as it moves.
- The originating point moves in the same direction as the trackball.
- EBL2 rotates in the same direction as the EBL control.
- VRM2 on the EBL2 is displayed as a circle.
  When EBL2 is changed to the parallel index line, VRM2 is not displayed.

Procedures

1. **Press the [MAIN MENU] key to open the MAIN MENU.**
2. **Press the [7] key to select "FLOATING EBL".**
3. **Press the [7] key to select "OFF" or "ON".**
4. **Press the [ENT] key.**

Exit

5. **Press the [MAIN MENU] key.**

Setting EBL Display

Select EBL true and relative bearing display.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [2] key to open the RADAR #2 menu.**
3. **Press the [2] key to select "EBL BEARING".**
4. **Press the [2] key to select "TRUE" or "RELATIVE" and press the [ENT] key.**

   Selecting "RELATIVE" displays "R" and selecting "TRUE" displays "T" in the EBL bearing column on the lower left of the screen.

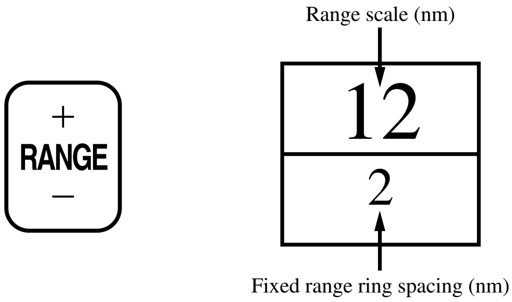
Exit

5. **Press the [SUB MENU] key.**

Radar #2

RADAR #2			0. PREV
1. GYRO	0.0°		
2. EBL BEARING	<u>TRUE</u>	RELATIVE	
3. PARALLEL INDEX LINE	<u>OFF</u>	ON	
4.			
5. CURSOR MENU			
6. STERN FLASH	<u>OFF</u>	ON	
7. KM ／ NM VRM1	KM	<u>NM</u>	
8. KM ／ NM VRM2	KM	<u>NM</u>	

3.3.3 Selecting Range Scales [RANGE]



The operator can select various range scale among 0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 32, 48, 96 /120 (nm). Press the minus (-) side of the [+ RANGE –] key to decrease the range or plus (+) side of the [+ RANGE –] key to increase it. The current range in use and the range ring spacing are seen in the upper left of the screen.

3.3.4 Selecting Pulse Width [PL]

[PL]

The operator can select three pulse widths (SP (short pulse), MP (medium pulse) and LP (long pulse) by pressing the [PL] key when the range scale is any of 0.75, 1.5, 3, 6 and 12 nm. The current pulse width is displayed like " MP" on the lower left of the screen. Using the short range increases target resolution and decreases clutter returns. Using the long pulse increases target reception and decreases clutter returns although target resolution also decreases.

3.3.5 Disabling Ship's Head Marker [HL OFF]

[HL OFF]

The heading line (HL) showing the course of the own ship is always displayed on the screen. While the [HL OFF] key is pressed, the HL disappears and targets in the direction of the bow can be observed easily. In the course-up display mode, pressing this switch returns the to the top of the screen.

◎ When the ship's stern marker (dotted line) is displayed on the screen, the marker also disappears while this key is pressed.

3.3.6 Using Parallel Index Line

The parallel index line is displayed in half area of radar display.

Procedures

1. Press the SUB MENU key to open the SUB MENU.

2. Press the 2 key to open the RADAR #2 menu.

3. Press the 3 key to select "PARALLEL INDEX LINE".

4. Press the 3 key to select "ON" and press the ENT key.

The parallel lines appear on the screen (EBL2 changes to them).

Exit

5. Press the SUB MENU key.

Cancellation

Press the 3 key in "PARALLEL INDEX LINE" (procedure 4) to select "OFF" and press the ENT key.

The parallel lines disappear and change to EBL2.

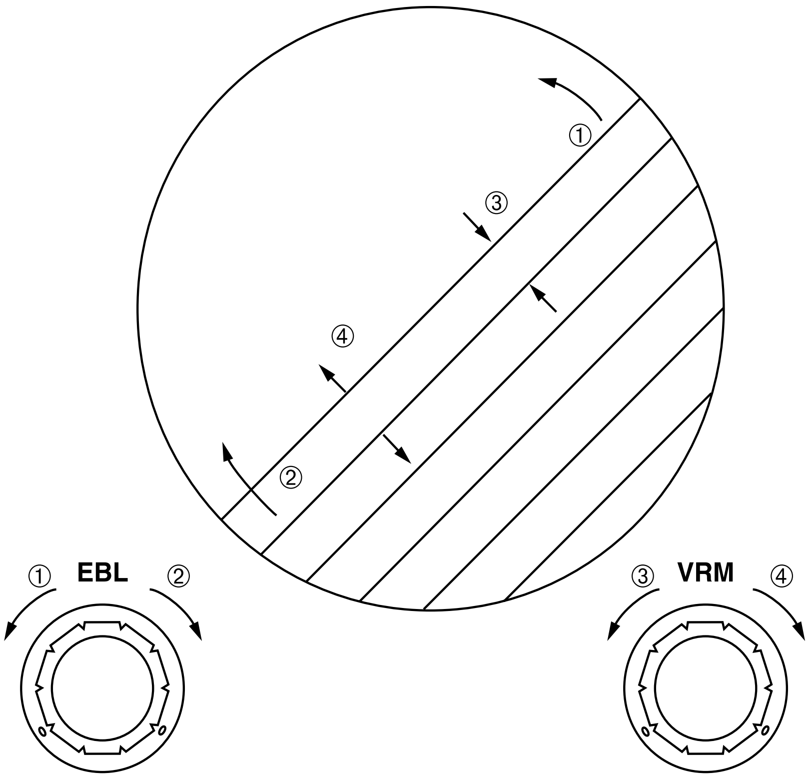
Radar #2

RADAR #2		0. PREV
1. GYRO	XXX.X°	
2. EBL BEARING	TRUE	RELATIVE
3. PARALLEL INDEX LINE	OFF	ON
4.		
5. CURSOR MENU		
6. STERN FLASH	OFF	ON
7. KM ／ NM VRM1	KM	NM
8. KM ／ NM VRM2	KM	NM

Motion of Parallel Index Line

◎ The parallel index line rotate in the same direction as the EBL control (① and ②).
◎ The parallel index line interval can be changed by rotating the VRM control (③ and ④).
◎ The angle of the parallel index line is displayed in the **EBL2** box on the lower left of the screen.
◎ The interval of the parallel index line is displayed in the VRM2 box on the lower left of the screen.

Display of parallel index line



<Changing parallel index line interval>

◎ The bearing and interval of the parallel index lines can be changed in the operation mode of EBL2 or VRM2 respectively.

3.3.7 Selecting Presentation Mode [PRESENTATION MODE]

This control switches presentation mode from [Head Up] to [Course Up], [North up] to [Stabilized Course Up] every time the switch is pressed.
The current presentation mode is displayed as "HUP", "CUP", "NUP" or "SCUP" on the upper right of the screen.

The presentation mode that can be used vary according to the motion mode.
See subsection “3.3.8 Selecting True Motion／Rative Motion Display Modes [TM／RM] [TM RESET]”
.

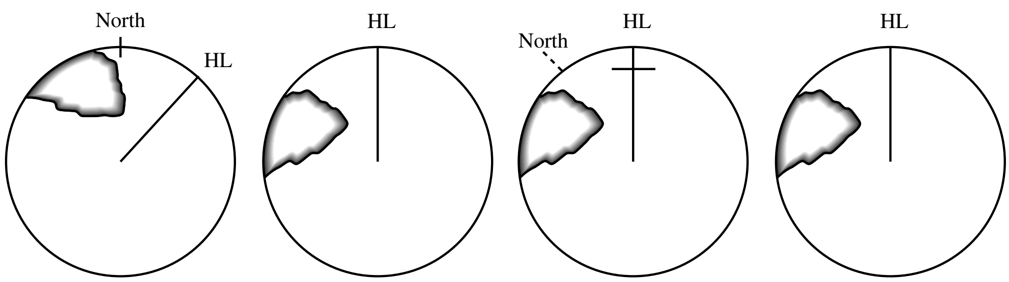
"HEAD UP"
The heading line (HL) is always pointed vertically to the top center of the radar display (0 degree on the bearing scale). Since targets are displayed in the directions relative to the bow, the operator can sight them on the radar display in the direction he really sees them.
When the own ship traverses, the surrounding targets are rotated at each scan.

"COURSE UP"
Selecting "COURSE UP" places the heading line (HL) on 0 degree on the bearing scale. As in the case of the NORTH UP, stationary targets remain stable on the radar display and the bearing of the HL changes as the own ship changes its course. After the own ship course is changed, the new course can be updated by pressing the switch three more times to select the COURSE UP display or pressing the 

key.
Surrounding targets will not ratate according to the traversing of the own ship.

"NORTH UP"
North is always at the top of the screen (0 degree on the bearing scale). The merits of this presentation mode are as follows: Stationary targets remain stable and can be easily found on the chart, and their true bearings can be read immediately.
Surrounding targets will not ratate according to the traversing of the own ship.

"STABILIZED COURSE UP"
The heading line (HL) is always fixed at the top of the screen (0 degree on the bearing scale) by resetting it every rotation. During video processing, the fixed target is displayed stably and unnecessary targets such as sea clutters decrease. This display is available only in the radar mode.
Surrounding targets will not ratate according to the traversing of the own ship.



North-up display Head-up display Course-up display Stabilized course-up display

3.3.8 Selecting True Motion ／ Relative Motion Display Modes [TM ／ RM] [TM RST]

Outline of the Motion Mode

- The "Motion mode" determines in which motion of relative motion or true motion the moving of the own ship and other targets are displayed.
- In "Motion mode", the mode is switched sequentially by pressing the TM/RM key.
- In TM/CTM mode, a composite display with plotter is possible, however, in RM/SRM, composite display is not allowed.

RM : Relative motion. The own ship is fixed on the center and other targets are displayed in relative motion.
A radar trail is relative motion display.
Video processing is performed in relative motion mode. (Video processing cannot be used when H-UP is selected.)

SRM : Stabilized relative motion. The own ship is fixed on the center and other targets are displayed in relative motion.
A radar trail is relative motion display.
Video processing is performed in true motion mode.

TM : True motion. The own ship and other targets are displayed in true motion mode on the globe fixed screen.
Video processing is performed in true motion mode.

CTM : True Motion with Constant Own Ship Position. The own ship is fixed on the center and other targets are displayed in relative motion mode.
A radar trail is true motion display.
Video processing is performed in true motion mode.

Note

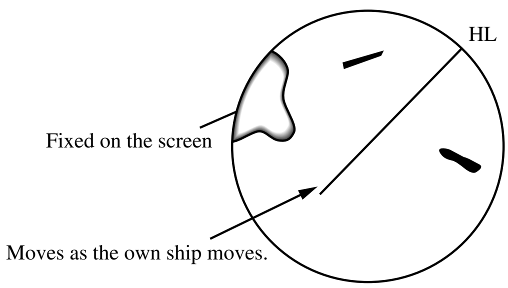
● For further information about video processing, see subsection “3.3.20 Displaying Video Processing Screen”.

<Display of True Motion (TM)>

The position of the own ship moves with true speed and course across the radar display area. Land masses and other stationary targets do not move and only targets in motion move with true speed and course. When this mode is selected, the own ship position will be offset to a position of about 65% of the radar display area in the opposite direction of the course. The own ship will start moving from the position in accordance with its speed and course. When the own ship arrives at a position of about 65% of the radar display radius on the opposite side, the own ship will automatically be set to the position where it was when the true motion display mode was selected.

Note

● True motion is not activated in the 96 and 120nm ranges.



True Motion Display (TM Display)

To reset own ship position in the true motion display (TM) mode

Press the [TM RST] key.

The own ship is reset to the position where it was when the true motion mode was selected and will start moving from the position.

Combinations of Presentation Mode and Motion Mode

- The presentation modes that can be used vary according to the motion mode.

	H-UP	N-UP	C-UP	SC-UP
RM	○	○	○	×
SRM	○	○	○	×
TM	×	○	○	×
CTM	×	○	○	○

Note

● In H-UP of RM, video processing cannot be used.

Differences Between RM and SRM

- The SRM mode was developed by improving the conventional RM mode to be able to perform accurate video processing.
- When H-UP video processing is performed in the conventional RM mode, videos of other ships may disappear. Since, in SRM mode, video processing is performed by true motion, accurate video processing is performed and problems in the conventional mode do not occur.

	RM	SRM
Own ship display	Fixed at the center	Fixed at the center
Other ships display	Relative motion display	Relative motion display
Video processing	Relative motion	True motion
Radar trail	Relative motion display	Relative motion display
Off center	Maximum 66%	Not possible
Plotter composite display	Not possible	Not possible

Differences Between TM and CTM

- The CTM modes displays images in TM mode by constantly fixing the own ship at the center.
- Both the CTM and TM modes allow composite display with a plotter.

	TM	CTM
Own ship display	True motion	Fixed at the center
Other ships display	True motion display	Relative motion display
Video processing	True motion	True motion
Radar trail	True motion display	True motion display
Off center	Maximum 66%	Not possible
Plotter composite display	Possible	Possible

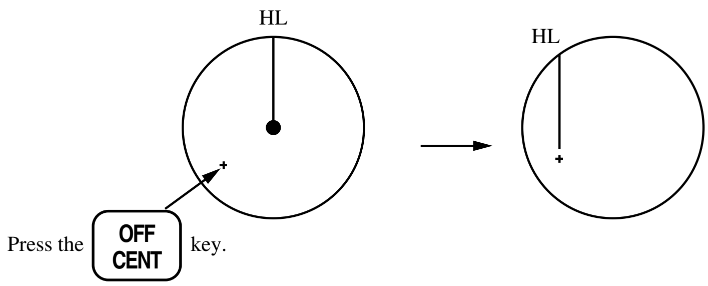
3.3.9 Changing Own Ship Display Position [OFF CENT]

The OFF CENT key is used to offset own ship in any direction up to 65% of the radar display radius. This function is convenient when watching a direction in a wide range.

<u>This function cannot be used in the range scale of 96 and 120nm.</u>

Procedures

1. **Move the cross cursor mark (own ship display position) to a desired position using the trackball (it cannot be moved beyond about 65% of the radar display radius from the center).**
2. **Press the OFF CENT key.**
3. **The own ship position moves to the cross cursor mark and is fixed there.**



Cancellation **Keep pressing the OFF CENT key for a while.**

The own ship returns to the center of the radar display area.

3.3.10 Displaying Other Ship's Trails [TRAILS]

Movements and speeds of other ships can be checked from lengths and directions of their trails as well as synthetic afterglow, which helps avoid collisions of ships. Trail length can be changed over to eight levels of 1min, 3min, 6min, 12min, 15min, 30min, 60min and continuous.

Procedures

1. **Press the TRAILS key to display the radar trail.**

   The trail length currently set appears on the upper right of the screen.

Exit

2. **Press the TRAILS key.**

To Change Radar Trail Interval

Procedures

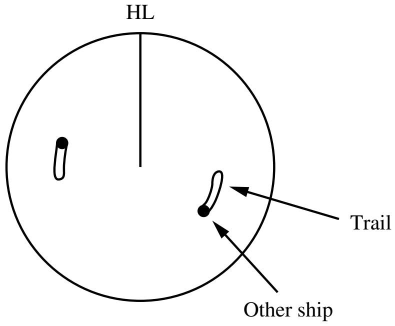
1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 1 key to open the RADAR #1 menu.**
3. **Press the 3 key to open the RADAR TRAILS menu.**
4. **Press the 1 key to select "RADAR TRAILS INTERVAL".**
5. **Press the 1 key to select the trail interval and press the ENT key.**

Exit

6. **Press the SUB MENU key.**

Radar Trails

RADAR TRAILS					0. PREV
1. RADAR TRAILS INTERVAL	1MIN	3MIN	6MIN	10MIN	
	15MIN	30MIN	60MIN	CONT	
2. RADAR TRAILS REF LEVEL	LEVEL1	LEVEL2	LEVEL3	LEVEL4	
3. RADAR TRAILS REDUCTION	OFF	LEVEL1	LEVEL2	LEVEL3	
4. RADAR TRAILS PROCESS	OFF	ON			
5. RADAR TRAILS SMOOTHING	OFF	ON			



Motion of Radar Trails

◎ When the radar Trails display is turned off, the memory for the Trails which has been displayed is cleared.

◎ The radar Trails memory is also cleared when the TM mode is automatically or manually reset, the range is switched, or the off-center function is used.

◎ In the stabilized course-up display (SCUP) mode, the radar Trails interval "CONT" functions as "12MIN".

Displaying thin or plain radar trails

The items from “2. RADAR TRAILS REF LEVEL” to “5. RADAR TRAILS SMOOTHING” are used to display the thin or plain radar trails.
See the clauses [Page 4] in the section “3.4 Using Function Key [FUNC]”.

3.3.11 Displaying Fixed Range Ring [RR]

This key is used to display fixed range rings. The brilliance of range rings can be charged by subsection “3.2.6 Adjusting Brilliance”.

Procedures **Press the RR key.**

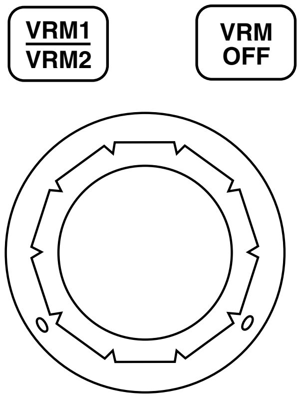
A fixed range ring appears on the screen. The interval between rings is displayed on the upper left of the screen.

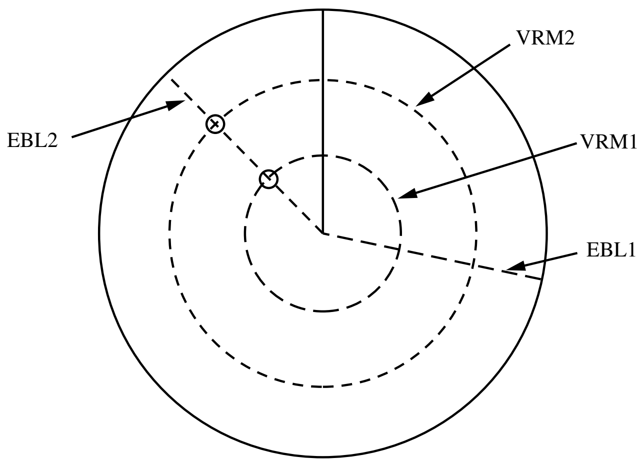
Cancellation **Press the RR key again.**

The display of the fixed range ring is canceled.

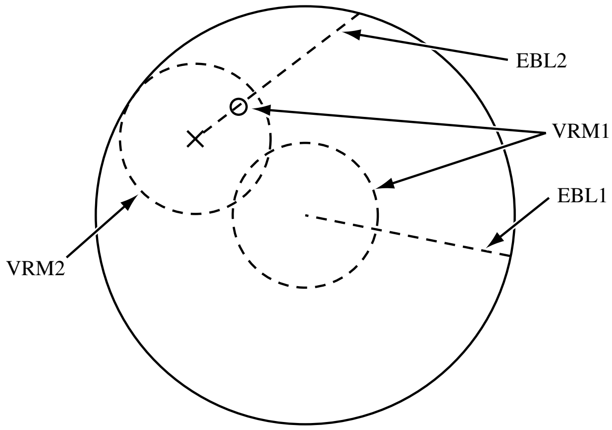
3.3.12 Displaying Variable Range Markers [VRM1 ／ VRM2]

The button is used to display and set variable range markers. Variable range markers are divided into two types: variable range marker 1 which is displayed as a ring made up of long dashes and variable range marker 2 which is displayed as a ring made up of short dashed on dotted line. When EBL2 is displayed, VRM marks are also displayed on the EBL2.

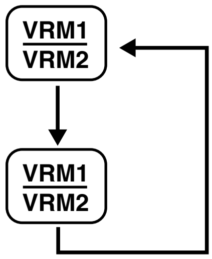




When EBL2 is used in the floating mode

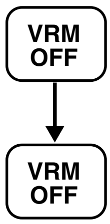


Displaying VRM



The VRM currently selected is displayed in a box on the lower left of the screen.
Pressing the [VRM1／VRM2] key once displays (selects) VRM1.
Pressing it again displays (selects) VRM2.

Clearing VRM



Pressing the [VRM OFF] switch once clears the VRM outside a box on the lower left of the screen.
Pressing it again clears the other VRM.

Bearing Display of VRM

◎ The numerical bearings of VRM1 and VRM2 currently displayed on the PPI is displayed on the lower left of the screen. Also, VRM1 or VRM2 currently activated is displayed in a box above the range data.

Motion of VRM

◎ Variable range markers are displayed around the own ship. Turn the VRM control clockwise to increase the scale or counterclockwise to decrease it.

3.3.13 Using Alarm [ALARM]

In this section the alarm function is explained as the optional ATA unit is not installed.
Guard zones can be set in order to watch out entries of other ships or targets into the Guard zones.

To set radar alarm function

Specify whether to use the function for outputting an alarm using the set Guard zone or not.

3

Procedures

1. **Press the [GZ MENU] key to open RADAR ALARM menu.**
2. **Press the [1] key to select "FUNCTION".**
3. **Press the [1] key to select "OFF" or "RADAR ALARM".**
4. **Press the [ENT] key to confirm the setting.**

Exit

5. **Press the [GZ MENU] key.**

RADAR ALARM

RADAR ALARM					
1. FUNCTION	OFF	RADAR ALARM			
2. RADAR ALARM MODE	IN	OUT			
3. RADAR SECTOR ZONE					
4. RADAR SENSITIVITY LEVEL	1	2	3	4	
5. AUDIBLE RADAR ALARM	OFF	ON			

To set the radar alarm zone

Procedures

1. **Press the GZ MENU key to open RADAR ALARM menu.**
2. **Press the 3 key to select "RADAR SECTOR ZONE".**
3. **Pressing the ENT key clears the menu and displays the radar screen.**
4. **Turn the EBL and VRM controls to set the radar alarm range and press the ENT key.**

   Use EBL1 to set the originating point of the angle, EBL2 to set the end point of the angle or VRM1 to set the range.

   Note

   ● The width of the radar alarm range is fixed.
   Do not use the floating EBL for EBL2 being set.

Motion for radar alarm set zone

◎ There are two modes, namely, "IN" mode in which an alarm goes off when a target enters the set circular radar alarm zone and "OUT" mode in which an alarm goes off when a target goes out of the zone.

◎ The radar alarm set zone is displayed only in the radar transmission mode. Note that it is not displayed in the standby mode.

To set the alarm mode

Specify whether to output an alarm when a target enters or goes out of the radar alarm set zone.

Procedures

1. **Press the GZ MENU key to open RADAR ALARM menu.**
2. **Press the 2 key to select "RADAR ALARM MODE".**
3. **Press the 2 key to select "IN" or "OUT".**
4. **Press the ENT key to confirm the setting.**

Exit

5. **Press the GZ MENU key.**

3

To set the alarm sound

Specify whether to output alarm sound in case of an alarm or not.

Procedures

1. **Press the [GZ MENU] key to open RADAR ALARM menu.**
2. **Press the [5] key to select "AUDIBLE RADAR ALARM".**
3. **Press the [5] key to select "OFF" or "ON".**
4. **Press the [ENT] key to confirm the setting.**

Exit

5. **Press the [GZ MENU] key.**

To set the alarm detection level

Set the signal level for outputting an alarm.

Procedures

1. **Press the [GZ MENU] key to open RADAR ALARM menu.**
2. **Press the [4] key to select "RADAR SENSITIVITY LEVEL".**
3. **Press the [4] key to select the level between "1" and "4".**
4. **Press the [ENT] key to confirm the setting.**

Exit

5. **Press the [GZ MENU] key.**

3.3.14 Stopping Alarm

An alarm by characters or buzzer will be generated when any abnormality in input signal or fault in the processing circuit should occur.
When an alarm has been generated, information of errors occurred will be displayed in the lower left corner of the screen in turn at intervals of 1 sec.

When the ALARM ACK key is pressed the error information displayed at that time becomes the object of stopping and then the display of error information will be deleted and the alarm sound will stop.

When there are information of more than one errors, press the ALARM ACK key for each of the alarms generated.

Information of these error is registered to the error logging in subsection "8.1.2.7 Error Logging", so it can be checked later.

There are the following types of error information

Type of error	Display
Azimuth pulse error	ANT (ROTATION)
Bow pulse error	ANT (HEAD)
Trigger pulse error	TRIGGER
Gyro compass error	NSK (GYRO), NSK (DATA)
Speed information error	NSK (LOG), NSK (DATA), DLOG (DATA)
Position information error	NAV (DATA)
Video signal error	VIDEO
Fan motor error	FAN

3.3.15 Setting Alarm Sound Level

Alarm sound levels are set as follows:

To set alarm sound level

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 9 key to open the INIT SET #1 menu.**
3. **Press the 5 key to select "BUZZER VOLUME".**
4. **Press the 5 key to select "OFF", "LOW", "MIDDLE" or "HIGH".**
   Alarm volume can be set in 3 levels.
5. **Press the ENT key to confirm the alarm volume.**

Exit

6. **Press the SUB MENU key.**

Init set #1

INIT SET #1						0. PREV 9. NEXT
1.						
2. SPEED EQUIPMENT		MANUAL	LOG	GPS	2AXIS／WT	2AXIS／BT
3. MANUAL SPEED		0.0KT				
4. FUNCTION MENU						
5. BUZZER VOLLUME		OFF	LOW	MIDDLE	HIGH	
6. DRIFT	SET	0.0°				
	DRIFT	0.0KT				
7.						
8.						

3.3.16 Enhancing Target

- Expands a target to the display size.
- By expanding a target, the visibility of a small target is improved, thereby improving the sensitivity.
- However, if a target is expanded, the bearing and distance resolution deteriorate.
- The use of "EXP2" is recommended instead of "EXP1".
- The operation characteristics of the target expansion function are as follows.

OFF	: The target expansion function is not used. Use this mode when a high resolution is required.
EXP1	: Expands the target display size to the distance direction. Expands also the bearing direction in the center of the screen. Effective for searching small targets by using Video "PROC3". Note that the screen may be filled with emphasized noise if Video "PROC2" is used concurrently.
EXP2	: Expands the target display size to the vertical and horizontal directions. Can be used regardless of the Video processing. Use this mode when the sea clutter is strong.
EXP3	: Mode that sets "EXP1" and "EXP2" concurrently. Use this mode for detecting small targets such as radio buoy.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [1] key to open the RADAR #1 menu.**
3. **Press the [1] key to select "TARGET EXPANSION".**
4. **Press the [1] key to select "OFF", "EXP1", "EXP2" or "EXP3".**
   Pressing the key selects "EXP1" – "EXP3" and expands the targets on the PPI screen.
5. **Press the [ENT] key to confirm the setting.**

Exit

6. **Press the [SUB MENU] key.**

Radar #1

RADAR #1					0. PREV
1. TARGET EXPANSION	<u>OFF</u>	EXP1	EXP2	EXP3	
2. RADAR VIDEO MENU					
3. RADAR TRAILS MENU					
4. ZOOM	<u>OFF</u>	ON			
5.					
6.					
7. DISPLAY COLOR MENU					

3.3.17 Setting Cross Cursor Length and Fixing Cursor Position

This function is used to set the length of the cross cursor or to select the mode for fixing the cursor.

To set the length of the cross cursor

Procedures

1. **Press the [SUB MENU] to open the SUB MENU.**
2. **Press the [2] key to open the RADAR #2 menu.**
3. **Press the [5] key to open the CURSOR menu.**
4. **Press the [1] key to select "CURSOR LENGTH".**
5. **Press the [1] key to select "SHORT" or "LONG".**
6. **Press the [ENT] key to confirm the setting.**

Exit

7. **Press the [SUB MENU] key.**

Cursor

CURSOR				0. PREV
1. CURSOR LENGTH	SHORT	LONG		
2. FIXED CURSOR	X/Y AXIS	X AXIS	Y AXIS	

To set the cross cursor fixing mode

Procedures

1. **Follow procedures 1 to 3 for setting the cursor length to open the CURSOR menu.**
2. **Press the [2] key to select "FIXED CURSOR".**
3. **Press the [2] key to select "X/Y AXES", "X AXIS" or "Y AXIS".**
4. **Press the [ENT] key to confirm the setting.**

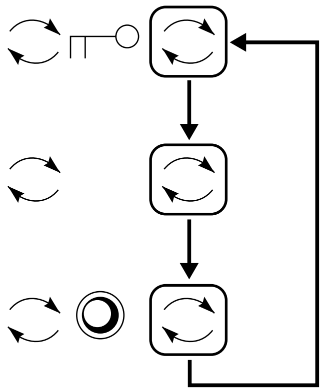
Exit

5. **Press the [SUB MENU] key.**

Motion of Fixed Cursor

◎ In order to fix the cursor, press the key.

Screen display



Pressing the key once fixes the cursor in the direction of the axis selected on the menu.

Pressing it again clears the numerical display of the cursor position.

Pressing it again allows the cursor to move freely.

3.3.18 Displaying Ship's Stern Marker

Procedures

1. Press the [SUB MENU] key to open the SUB MENU.
2. Press the [2] key to open the RADAR #2 menu.
3. Press the [6] key to select "STERN FLASH".
4. Press the [6] key to select "OFF" or "ON".
5. Press the [ENT] key to confirm the setting.

Exit

6. Press the [SUB MENU] key.

Radar #2

RADAR #2			0. PREV
1. GYRO	0.0°		
2. EBL BEARING	TRUE	RELATIVE	
3. PARALLEL INDEX LINE	OFF	ON	
4.			
5. CURSOR MENU			
6. STERN FLASH	OFF	ON	
7. KM／NM VRM1	KM	NM	
8. KM／NM VRM2	KM	NM	

3.3.19 Setting Range Unit in KM

This function is used to switch the range from the own ship to the cursor or the VRM 1/2 range unit to km or nm.
The cursor is selected by VRM1.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [2] key to open the RADAR #2 menu.**
3. **Press the [7] key to select "KM ／ NM VRM1".**

   In case of VRM2, press the [8] key to select "KM ／ NM VRM2".
4. **Press the [7] key to select "KM" or "NM" on VRM1.**

   In case of VRM2, press the [8] key to select "KM" or "NM" on VRM2.
5. **Press the [ENT] key to confirm the setting.**

Exit

6. **Press the [SUB MENU] key**

Radar #2

RADAR #2			0. PREV
1. GYRO	0.0°		
2. EBL BEARING	TRUE	RELATIVE	
3. PARALLEL INDEX LINE	OFF	ON	
4.			
5. CURSOR MENU			
6. STERN FLASH	OFF	ON	
7. KM ／ NM VRM1	KM	NM	
8. KM ／ NM VRM2	KM	NM	

3.3.20 Displaying Video Processing Screen

Attention

- If you'll watch the RADAR BECON and the SART, Set process as follows
  PROCESS OFF
- If you'll use this function on RM mode, sellect NORTH-UP bearing or COURSE-UP bearing. This function can't be used on RM mode selected HEAD-UP.

Unnecessary targets are reduced to enhance the intended target(s).

Procedures

1. **Press the [MAIN MENU] key to open the MAIN MENU.**
2. **Press the [5] switch to select "PROCESS".**
3. **Press the [5] switch to select "PROC1", "PROC2" or "PROC3".**
   Selecting "OFF" returns the video to the normal display.
4. **Press the [ENT] key to confirm the setting.**

Exit

5. **Press the [MAIN MENU] key.**

Motion of Video Processing

- Video processing performs correlation processing for each scan.
- Video processing suppresses random undesired clutter and displays targets only.
- Accurate true bearing signals and speed signals are necessary.
- In SRM/TM/CTM mode, high processing precision can be achieved since processing is performed in true motion.
- In RM mode, processing precision deteriorates due to the moving or traversing of own ship since processing is performed in relative motion.
- When a target moves at a high speed and "PROC1" or "PROC2" is used, the image may be blurred or disappear. In this case, set the processing to "OFF" or use "PROC3".
- Operation characteristics of "PROC1" to "PROC3" are as follows:

OFF	:	Does not perform correlation processing between scans. At monitoring a near range such as within a bay, monitoring a target moving at a high speed, or when a true bearing sensor is not connected.
PROC1	:	Suppresses general undesired clutter and displays targets in natural gradation.
PROC2	:	Suppresses random undesired clutter and displays a target by emphasizing it. Use this processing for detecting small targets hidden by undesired clutter.
PROC3	:	Displays unstable targets of low detection probability. Use this processing when searching for small targets such as radio buoy in an area free from sea clutter.

Main menu

MAIN MANU					
1.	RADAR ／ TRACK BRILL	●	[DAY1]		
2.	RR ／ VRM ／ EBL BRILL	●	[DAY1]		
3.	ATA BRILL	●	[DAY1]		
4.	GRAPHIC DATA BRILL	●	[DAY1]		
5.	PROCESS	<u>OFF</u>	<u>PROC1</u>	PROC2	PROC3
6.	IR	OFF	<u>IR1</u>	IR2	IR3
7.	FLOATING EBL	<u>OFF</u>	ON		
8.	VECTOR	<u>TRUE</u>	RELATIVE		
9.	GRAPHIC DATA DISP OFF				

3.3.21 Zooming Display

This function is used to display the radar video in the double range scale. The available motion modes are HUP, CUP and NUP only in the RM mode.

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 1 key to open the RADAR #1 menu.**
3. **Press the 4 key to select "ZOOM".**
4. **Press the 4 key to select "OFF" or "ON".**
5. **Press the ENT key to confirm the setting.**
6. **Move the cross cursor mark (own ship display position) to your desired position using the trackball (it cannot be moved beyond about 65% of the radar display radius from the center).**
7. **Press the ENT key to zoom display.**

Cancellation

8. **Press the minus (-) side of the + RANGE – key or plus (+) side of the + RANGE – key.**

Radar #1

RADAR #1					0. PREV
1. TARGET EXPANSION	OFF	EXP1	EXP2	EXP3	
2. RADAR VIDEO MENU					
3. RADAR TRAILS MENU					
4. ZOOM	OFF	ON			
5.					
6.					
7. DISPLAY COLOR MENU					

3.3.22 Selecting Display Mode [MAP]

This function is used to select the radar, R+P (radar + plotter) or plotter (optional) mode.

Procedures

Press the MAP key to select the radar, radar + plotter or plotter mode.

The R+P (radar + plotter) mode cannot be selected unless both GPS and gyro are installed.
The available motion modes in R+P mode are NUP and CUP only in the TM/CTM mode.
The plotter mode cannot be selected unless the plotter is installed and transmission is stopped.

3.3.23 Using Electronic Plot (EPA)

Attention

The EPA is used for a radar without the ATA function.
It stores and displays the target course and speed in the form of vector.
Up to 10 ships (plot No. 0 to 9) can be specified.
It also calculates the CPA and TCPA and outputs an alarm.
The plotting memory is cleared when the power is turned off.
The previous plot is not displayed.

3.3.23.1 Plotting Target

Attention

A vector is displayed by plotting a target twice.
The plot moves according to the course and speed calculated from the two plotted positions.
The plot can be modified.
The plot No. is not displayed when the plot No. display function is turned off.

Procedures

1. **Put the cross cursor mark on the target and press the ACQ switch to start the first plotting.**
2. **Enter the plot No. using a numeric key (0 to 9).**
3. **Press the ENT key to complete the first plotting.**
   The acquisition symbol ( ) and the plot No. are displayed at the plotting position.
4. **30 seconds to 15 minutes after the first acquisition, put the cross cursor mark at the position to which the target has been moved and start the second plotting by following procedures 1 to 3 above. For the plot No., input the same one as the first plotting. After the second plotting is completed, the symbol and plot No. displayed after the first plotting is completed are cleared and a symbol (vector) and the plot No. are displayed at the second plotting position.**
5. **The plot (symbol and plot No.) moves according to the fixed course and speed calculated from the two plotting positions. In this status, the CPA and TCPA at the moving position of the plot are calculated and an alarm is output when the plot enters the alarm range.**

3

3.3.23.2 Modifying Plot

Attention

This function is used to delete the display of the specified plot.
Until the plot is cleared and reacquired, the plot immediately before moved to the position to be cleared is displayed.

Procedures

1. **Press the TGT DATA key.**
2. **Enter the plot No. to be modified using a numeric key (0 to 9).**
3. **Press the CLR key.**
   At this time, the previously-updated status is displayed and "M", standing for "modification", appears near the mark.
4. **Put the cross cursor mark at the position to be modified for reacquisition. At this time, specify the plot No. input in procedure 2.**
   ACQ , 0 to 9 , ENT

3.3.23.3 Deleting Plot

Attention

This function is used to delete the display of the specified plot.
The deleted plot cannot be reproduced.

Procedures

1. **Press the TGT DATA key to enable the plot No. to be entered.**
2. **Enter the plot No. using a numeric key (0 to 9).**
3. **Press the TGT CNCL key to delete the plot with the specified plot No.**

To delete all plots

Procedures **Keep pressing the TGT CNCL key more than 2 seconds.**

3.3.23.4 Displaying Plot Numerical Data

Attention

The following data is displayed for the specified plot.

Plot No:	Target No.
Elapsed time:	In 0.1 minute
Target bearing:	In 1 degree
Distance to target:	In 0.01nm
Target true course:	In 1 degree
Target true speed:	In 0.1KT
CPA:	In 0.01nm
TCPA:	In 0.1 minute

The TCPA of the plot leaving from the own ship is displayed with "–".

Procedures

1. **Press the TGT DATA key to enable the plot No. to be entered.**
2. **Enter the plot No. using a numeric key (0 to 9).**
3. **Press the key to display the data of the specified plot.**

   The symbol of the target whose data is displayed turns to " □ ".

To delete data display

Procedures

1. **Press the TGT DATA key.**
2. **Press the key to delete the numerical data.**

Note 1

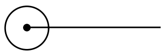
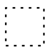
- The vector time and vector mode information are always displayed on the screen.

Note 2

- "U" is displayed near the mark of the target for which the plot has not been updated for more than 10 minutes and an alarm for requesting update goes off.
- The target which has not been updated for more that 15 minutes is automatically deleted.

3.3.23.5 Plot Symbol

Meanings of Symbols

Vector/symbol	Meanings	Remarks
	Safety target	
	Dangerous target	An alarm character (CPA／TCPA) appears. An alarm sounds. The vector and symbol blink in red.
	Initial acquisition mark	Displayed from the first to ten second plotting.
□	Target whose numerical data is displayed.	The target symbol turns to □ after the numerical data display is specified.
M	Plot under modification	Displayed near the symbol whose plot is being modified. The position of the previous plotting is displayed.
U	Plot update request	Displayed for the plot which has not been updated for 10 minutes. The plot is cleared 5 minutes after if not being updated (the target which has not been updated for 15 minutes is automatically cleared). In this case, an alarm for requesting update goes off.
+	Trackball cursor mark	Used for manually acquiring or clearing targets and specifying them in the numeral display mode.

3.3.23.6 Setting Vector Display

Attention

This function is used to set the plot display mode (true/relative).
The default setting is the true vector mode.
In the true vector mode, the own ship vector is displayed with a thick line.
The vector mode information is always displayed on the scree.

Procedures

1. **Press the [MAIN MENU] key to open the MAIN MANU.**
2. **Press the [8] key to select "VECTOR".**
3. **Press the [8] key to select "TRUE" or "RELATIVE".**
4. **Press the [ENT] key to confirm the setting. The vector display changes to the true or relative mode.**
5. **Press the [MAIN MENU] key.**

or

Procedures **Press the [VECT TRK] key to select "TRUE" or "RELATIVE".**
The vector display changes to the true or relative mode.

Main menu

MAIN MANU					
1.	RADAR／TRACK BRILL	●	[DAY1]		
2.	RR／VRM／EBL BRILL	●	[DAY1]		
3.	ATA BRILL	●	[DAY1]		
4.	GRAPHIC DATA BRILL	●	[DAY1]		
5.	PROCESS	OFF	PROC1	PROC2	PROC3
6.	IR	OFF	IR1	IR2	IR3
7.	FLOATING EBL	OFF	ON		
8.	VECTOR	TRUE	RELATIVE		
9.	GRAPHIC DATA DISP OFF				

3.3.23.7 Setting Vector Time

Attention

This function is used to set the vector length.
The default setting is 6 minutes.
The vector time information is always displayed on the screen.

Procedures

1. **Press the [SUB MENU] key to open the SUBMENU.**
2. **Press the [3] key to open the RADAR #3 menu.**
3. **Press the [3] key to open the EPA menu.**
4. **Press the [1] key to select VECTOR TIME.**
5. **Press the [1] key to enable the vector time to be entered.**
6. **Enter the vector time (0 to 60 minutes) using numeric keys ([0] to [9]).**
7. **Press the [ENT] key to confirm the setting.**

Exit

8. **Press the [SUB MENU] key.**

or

Procedures

Press the [VECT+ ↓] or [VECT− DEST] key to increase or decrease the vector time every minute.

EPA

EPA				0. PREV
1. VECTOR TIME		6MIN	(0-60 MIN)	
2. PLOT NUMBER		OFF	ON	
3. LIMITS	CPA	1NM	(0.1-9.9 NM.)	
	TCPA	15MIN	(1-99 MIN)	
4. AUDIBLE WARNING		OFF	ON	
5. DISPLAY OF CPA RING		OFF	ON	

3.3.23.8 Displaying ／ Clearing Plot No.

Attention

This function is used to select whether the plot No. is displayed or not.
The plot No. is not displayed at the default setting.
The number is not displayed when "OFF" is selected.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [3] key to open the REDAR #3 menu.**
3. **Press the [3] key to open the EPA menu.**
4. **Press the [2] key to select "PLOT NUMBER".**
5. **Press the [2] key to select "OFF" or "ON".**
6. **Press the [ENT] key to confirm the setting.**

Exit

7. **Press the [SUB MENU] key.**

To display or cleare directly

Procedures **Keep pressing the [TGT DATA] key more than 2 seconds.**

EPA

EPA				0. PREV
1. VECTOR TIME		6MIN	(0-60 MIN)	
2. PLOT NUMBER		OFF	ON	
3. LIMITS	CPA	1NM	(0.1-9.9 NM.)	
	TCPA	15MIN	(1-99 MIN)	
4. AUDIBLE WARNING		OFF	ON	
5. DISPLAY OF CPA RING		OFF	ON	

3.3.23.9 Setting CPA／TCPA

Attention

This function is used to set the CPA/TCPA for detecting danger targets.
The CPA is set in the range between 0.1 to 9.9nm and the TCPA between 1 and 99 minutes.
The default settings are 1.0nm for the CPA and 15 minutes for the TCPA.

3

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [3] key to open the RADAR #3 menu.**
3. **Press the [3] key to open the EPA menu.**
4. **Press the [3] key to select "LIMITS".**
5. **Press the [3] key to enable the CPA data to be entered.**
6. **Enter the CPA data using numeric keys ([0] to [9]).**
7. **Press the [ENT] key to confirm the setting.**
   The TCPA data becomes enabled to be entered.
8. **Enter the TCPA data using numeric keys ([0] to [9]).**
9. **Press the [ENT] key to confirm the setting.**

Exit

10. **Press the [SUB MENU] key.**

EPA

EPA				0. PREV
1. VECTOR TIME		6MIN	(0-60 MIN)	
2. PLOT NUMBER		OFF	ON	
3. LIMITS	CPA	1NM	(0.1-9.9 NM.)	
	TCPA	15MIN	(1-99 MIN)	
4. AUDIBLE WARNING		OFF	ON	
5. DISPLAY OF CPA RING		OFF	ON	

Danger Target Alarm : CPA ／ TCPA

⚠ CAUTION

Since an error may be included in an alarm according to the plotting status, the operator himself must finally judge whether evacuation is necessary or not.

This system displays targets in two levels, safe and danger ships, according to the hazard degree. Since the hazard degree can be checked at a glance on the screen, the operator can easily judge to which target he must pay attention.
The classification and contents of the alarms are as follows:

Dangerous Target Alarm

Status	Symbol on CRT	Alarm character	Buzzer	Conditions
Safety target	○ Symbol color : White	(Not display)	(OFF)	• CPA > MIN CPA • 0 > TCPA • TCPA > MIN TCPA
Dangerous target	△ Symbol color : Red (Blinking) *	CPA/TCPA	Beeping Resettable *	• CPA ≦ MIN CPA, 0 ≦ TCPA ≦ MIN TCPA

MIN CPA, MIN TCPA : The setting value

* Pressing the ALARM ACK switch stops an alarm sound and blinking.

3.3.23.10 Turning Alarm Sound On／Off

Attention

This function is used to whether to turn the alarm sound on or off against danger targets.
The sound is turned on at the default setting.
Setting it at "OFF" does not cause the sound to go off although the alarm detecting function remains turned on.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [3] key to open the RADAR #3 menu.**
3. **Press the [3] key to open the EPA menu.**
4. **Press the [4] key to select "AUDIBLE WARNING".**
5. **Press the [4] key to select "OFF" or "ON".**
6. **Press the [ENT] key to confirm the setting.**

Exit

7. **Press the [SUB MENU] key.**

EPA

EPA				0. PREV
1. VECTOR TIME		6MIN	(0-60 MIN)	
2. PLOT NUMBER		OFF	<u>ON</u>	
3. LIMITS	CPA	1NM	(0.1-9.9 NM.)	
	TCPA	15MIN	(1-99 MIN)	
4. AUDIBLE WARNING		OFF	<u>ON</u>	
5. DISPLAY OF CPA RING		OFF	<u>ON</u>	

3.3.23.11 Displaying／Clearing CPA Ring

Attention

This function is used to select whether the CPA ring is displayed or not.
The ring is displayed at the default setting.
In the true vector mode, the CPA ring is not displayed even when this function is set at "ON".

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 3 key to open the RADAR #3 menu.**
3. **Press the 3 key to open the EPA menu.**
4. **Press the 5 key to select "DISPLAY OF CPA RING".**
5. **Press the 5 key to select "OFF" or "ON".**
6. **Press the ENT key to confirm the setting.**

Exit

7. **Press the SUB MENU key.**

EPA

EPA			0. PREV
1. VECTOR TIME		6MIN	(0-60 MIN)
2. PLOT NUMBER		OFF	ON
3. LIMITS	CPA	1NM	(0.1-9.9 NM.)
	TCPA	15MIN	(1-99 MIN)
4. AUDIBLE WARNING		OFF	ON
5. DISPLAY OF CPA RING		OFF	ON

3.3.24 Displaying Date and Time

The date and time can be displayed only when the GPS is connected.
The date and time can not be displayed when the radar mode is selected.

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 9 key three times to open the INIT SET #3 menu.**
3. **Press the 5 key to select "DATE ／ TIME".**
4. **Press the 5 key to select "OFF", "UTC" or "LOCAL" and press the ENT key.**

   The date and time are displayed on the center bottom of the screen.

Exit

5. **Press the SUB MENU key.**

Init set #3

INIT SET #3				0. PREV 9. NEXT
1. SHIFT COAST LINE #1	SETTING	DELETE		
2. SHIFT COAST LINE #2	N 0.000’			
	E 0.000’			
3. LAT ／ LON CORRECTION	N 0.000’			
	E 0.000’			
4. CHART CENTER POSITION	N 0˚ 00.000’			
	E 0˚ 00.000’			
5. DATE ／ TIME	OFF	UTC	LOCAL	
6.				

3.3.25 Displaying the Plain Radar Screen

This system has the functions that the screen using auto/manual suppressing sea clutter or rain clutter and the screen using video processing (for further information, see subsection “3.3.20 Displaying Video Processing Screen”) is more plainer.
Each function can be also set individually by following procedures, but these can be called by pressing the [FUNC] key.
For further information, see “1. VIDEO LATITUDE, 2. VIDEO NOISE REJECTION, 6. AUTOMATIC DR CONTROL (AUTO DR CONT)” of the clauses [Page 3] and “1. PROCESS SWITCHING, 2. PROCESS (PROC) SWITCH RANGE” of the clauses [Page 5] in section “3.4 Using Function Key [FUNC]”.

1. **VIDEO LATITUDE**
   Select the gradation for displaying received signals on a screen.
2. **VIDEO NOISE REJECTION**
   Eliminates signals that are assumed to be noise and clutter from radar videos.
3. **AUTOMATIC DR CONTROL (AUTO DR CONT)**
   Automatically controls video latitude (dynamic range) when automatic STC or FTC is used.
4. **PROCESS SWITCHING**
   Set a boundary distance and switch the video processing mode to be used between the inside and outside of the boundary.
5. **PROCESS (PROC) SWITCH RANGE**
   Set a boundary distance and switch the video processing mode to be used between the inside and outside of the boundary.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [1] key to open the RADAR #1 menu.**
3. **Press the [2] key to open the RADAR VIDEO menu.**
4. **Press the [1] to [5] key to select a setting item.**
5. **Press the [1] to [5] key to select a setting value and press the [ENT] key.**

Exit

6. **Press the [SUB MENU] key.**

Radar video

RADAR VIDEO				0. PREV
1. VIDEO LATITUDE	<u>NARROW</u>	WIDE		
2. VIDEO NOISE REJECTION	OFF	<u>LEVEL1</u>	LEVEL2	
3. AUTO DR CONT	<u>OFF</u>	ON		
4. PROCESS SWITCHING	<u>OFF</u>	ON		
5. PROC SWITCH RANGE	3.0 NM			

3.3.26 Operation of the Performance Monitor

Procedures

1. Press the MAP key to set the radar mode.

2. Press the SUB MENU key to open the SUB MENU.

3. Press the 3 key to open the RADAR #3 menu.

4. Press the 7 key to select "PAFORMANCE MONITOR".

5. Press the ENT key.

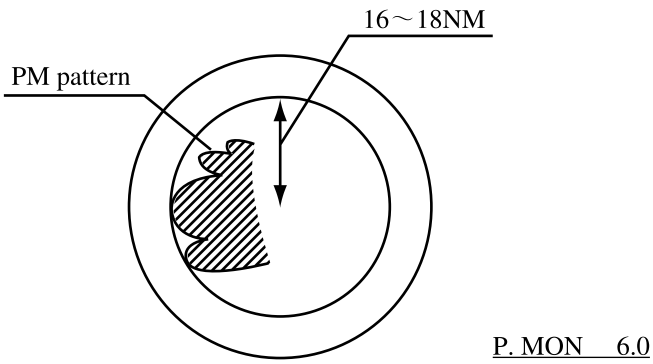
Then the Performance Monitor screen will be displayed.
The radar will be set to relative motion (RM), relative display (HUP), off-center DFF, and 24NM range automatically.
The characters and numerals of “Displaying PERFORMANCE MONITOR” and “P. NON” will blink for approx. 30 sec. When the blinking of the character and numeral of “P. NON” has stopped, use that numeral for checking the receiving power. Further, use the maximum distance of the PM pattern at this time for checking the receiving system.

Exit

6. Pressing the ENT key.

Note

- When a function mode is used, you cannot use the Performance Monitor.
  If you want to use the Performance Monitor, set function mode "OFF" by pressing the FUNC key.



An example of the display of PM pattern

Check of the transmission system

The value of [P. MON] displayed in the lower right corner of the screen represents the transmission power. If the current values is extremely smaller than the value recorded during the initial check, the transmission system requires inspection by a service engineer.

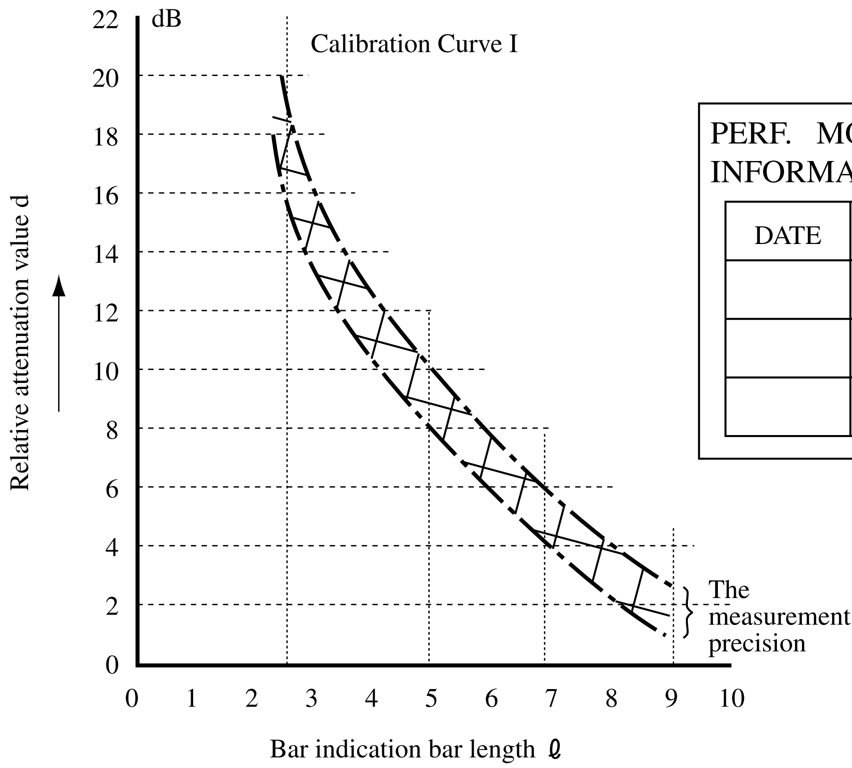
Checking procedures:

① Read the current value.

② Using calibration curve I, obtain the value of relative attenuation d(B) corresponding to the initial value B recorded on the Information Label.

③ Using calibration curve I, obtain the value of relative attenuation d(A) corresponding to A, then d(A) - d(B) represents the attenuation of the current transmission poser as compared with the initial state.

④ When the attenuation expresses by d(A) - d(B) has exceeded 10 dB (due to the life of the magnetron), the transmission system requires inspection by a service engineer.



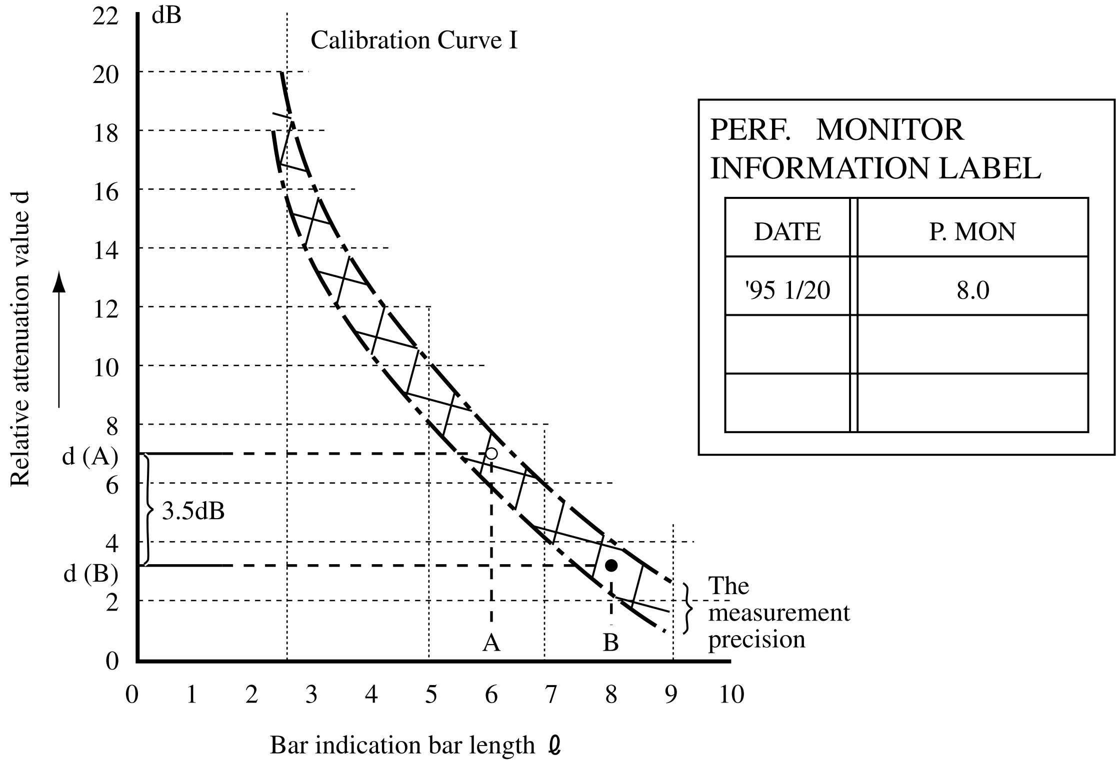
PERF. MONITOR
INFORMATION LABEL

DATE	P. MON

Example : If it is assumed that initial value B is 8.0 and current value A is 6.0, d(B) = 3.5 dB and d(A) = 7 dB can be obtained from calibration curve I. Therefore, d(A) - d(B) is 3.5 dB, which shows that the current transmission power is a result of approx. 3.5 dB of attenuation.

Example of checking the transmission system

P.MON 6.0 Current value A = 6.0
Initial value B = 8.0



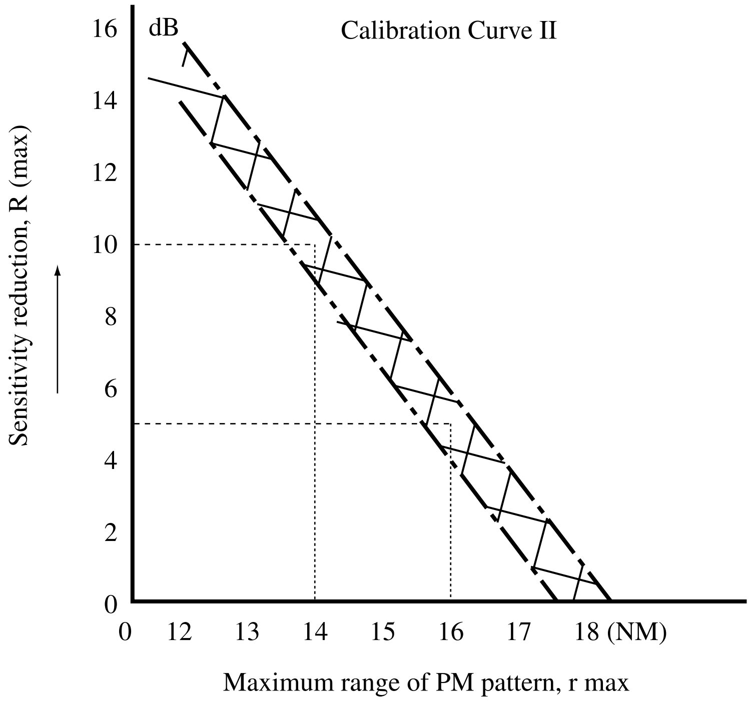
Check of the receiving system

The maximum range of the PM pattern displayed on the screen represents the decrease in sensitivity of the receiving system.

Checking procedures:

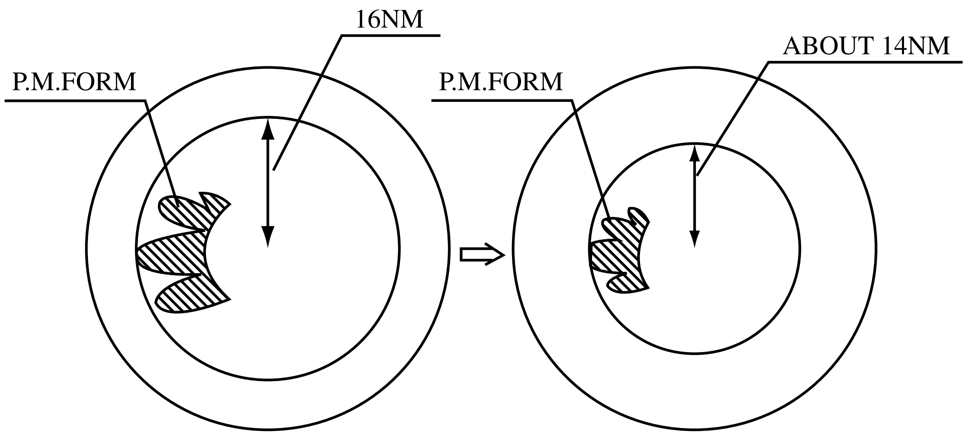
① With regard to the PM pattern displayed on the screen, the maximum range rmax from the PPI center using VRM.

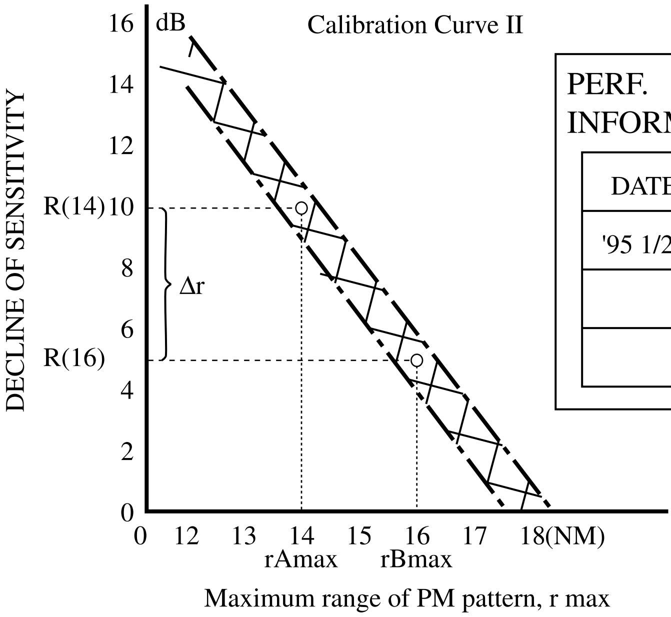
② Using calibration curve II, decrease in sensitivity corresponding to rmax, R (rmax), then the value of R (rmax) represents the current decrease in sensitivity of the receiving system.



Example : If it is assumed that the maximum range of the initial PM pattern, rBmax, recorded in the Information Label is 16 NM and the maximum range of the current PM pattern, rAmax, is 14 NM, the value of decrease, △r(max) = 5 dB, can be obtained from calibration curve II, which shows that the sensitivity of the receiving system has lowered by approx. 5 dB.

Example of checking the receiving system





PERF. MONITOR
INFORMATION LABEL

DATE	P. MON
'95 1/20	8.0

3.4 Using Function Key [Func]

3.4.1 Overview

The "Radar function setting" enables users to constantly obtain the optimum radar video by storing the settings of complicated radar signal processing functions in the optimum state for each purpose and calling the required setting according to the use condition.
The contents are set when the radar is delivered from the factory according to the general usage condition.
The setting contents can be adjusted in detail through menu operations.
The following four function modes can be used. The modes are set as follows at delivery from the factory.

Function 1 : COAST
Function 2 : DEEP SEA
Function 3 : BUOY
Function 4 : STORM

Note

- When a function mode is used, you cannot use the Performance Monitor.
  If you want to use the Performance Monitor, set function mode "OFF" by pressing [FUNC] key.

3.4.2 Operation Method

(1) Calling a function

- Whenever the [FUNC] key is pressed, the function is switched in the order of Function Off → Function 1 → Function 2 → Function 3 → Function 4 → Function Off.
- The name of the function mode that is currently being called is displayed on the top-left corner of the screen.

(2) Changing a Setting (Temporary Change)

- When the setting of the radar signal processing is changed using the MAIN MENU or SUB MENU while one of the functions from Function 1 to Function 4 is called, the change is reflected in the operation state temporarily.
- However, since the stored contents are not changed, the change is cancelled as soon as some other function setting is called. (When the function setting is called again, the operation is set according to the stored contents.)

(3) Changing a Setting (Changing the Stored Contents)

- When changing the stored contents of one of the functions from Function 1 to Function 4, press the [SUB MENU], [9], [4] keys to open the SET FUNC menu and select a required function number.
- The function setting items cover five pages and the pages can be scrolled by using the [0] and [9] keys.
- To store the current operation status in the function number, select "6. SAVE PRESENT STATE" of the function setting item page 1. Use this function when a required setting is found and the status is to be stored.
- To reset the stored contents to the status set at factory delivery, select "6. INITIALIZE" of the function setting item page 5. Use this function when the function changes that were made are too complicated to return to the original state.

3.4.3 Function Setting Items

See below for the menu structure of the function setting items.

Page 1

1. MODE	(Select the name to be used)			
2. PROCESS	OFF	PROC1	PROC2	PROC3
3. IR	OFF	IR1	IR2	IR3
4. AUTO STC/FTC	OFF	AUTO STC	AUTO FTC	
5. TGT EXPANSION	OFF	EXP1	EXP2	EXP3
6. SAVE PRESENT STATE				

Page 2

1. PULSE WIDTH 0.75NM	SP	MP	
2. PULSE WIDTH 1.5NM	SP	MP	LP
3. PULSE WIDTH 3NM	SP	MP	LP
4. PULSE WIDTH 6NM	SP	MP	LP
5. PULSE WIDTH 12NM	SP	MP	LP

Page 3

1. VIDEO LATITUDE	NORMAL	WIDE	NARROW
2. VIDEO NOISE REJECTION	OFF	LEVEL1	LEVEL2
3. GAIN OFFSET	± NUMERIC VALUE		
4. XMIT REPETITION FREQUENCY			
	NORMAL	HIPOWER	ECONOMY
5. SMALL BUOY DETECTION	OFF	ON	
6. AUTO DR CONT	OFF	ON	

Page 4

1. RADAR TRAILS INTERVAL	1MIN	3MIN	6MIN	12MIN
	15MIN	30MIN	60MIN	CONT
2. RADAR TRAILS REF LEVEL	LEVEL1	LEVEL2	LEVEL3	LEVEL4
3. RADAR TRAILS REDUCTION	OFF	LEVEL1	LEVEL2	LEVEL3
4. RADAR TRAILS PROCESS	OFF	ON		
5. RADAR TRAILS SMOOTHING	OFF	ON		

Page 5

1. PROCESS SWITCHING	OFF	ON
2. PROC SWITCH RANGE	NUMERIC VALUE	
3.		
4.		
5.		
6. INITIALIZE		

3.4.4 Operation Outline of the Function Setting Items

See below for the operation outline of each function setting item.

[Page 1] 1. MODE

- Select the name of the function displayed on the top-left corner of the screen when the function mode is selected.
- When the mode is reset to the mode set at factory delivery, the initial value of the selected mode is called.
- The following eleven modes are available.

COAST : Use this mode for monitoring a comparatively near range where there are many ships such as a bay or a coastal line. (Emphasizes resolution)

DEEP SEA : Use this mode for monitoring a comparatively far range such as open sea. (Emphasizes a far range sensitivity)

FISH NET : Use this mode for searching for small targets hidden by sea clutter such as net edges. (Emphasizes sea clutter suppression; the sensitivity of moving target deteriorates slightly)

STORM : Use this mode when there are many rain/snow clutter or sea clutter due to strong wind and rain. (Emphasizes suppression of rain/snow clutter or sea clutter; the sensitivity deteriorates slightly)

CALM : Use this mode when there are few rain/snow clutters or sea clutter.

RAIN : Use this mode when there are many rain clouds although the sea clutter is low. (Emphasizes rain/snow clutter suppression; the sensitivity deteriorates slightly)

BIRD : Use this mode for searching a flock of several tens of sea birds flying low at a near range or for searching for a flock of several hundreds of sea birds flying high at a far range.

LONG : Use this mode for monitoring a comparatively far range on an open-sea in order to search for small targets.

BUOY : Use this mode for searching small targets such as radio buoy outside of the sea clutter. (Displays targets of low detection probability)

USER 1 : General-purpose mode. Use this mode when the mode is not applicable to any of the nine modes indicated above.

USER 2 : General-purpose mode. Use this mode when the mode is not applicable to any of the nine modes indicated above.

Page 1

1. MODE	(Select the name to be used)			
2. PROCESS	OFF	PROC1	PROC2	PROC3
3. IR	OFF	IR1	IR2	IR3
4. AUTO STC/FTC	OFF	AUTO STC	AUTO FTC	
5. TGT EXPANSION	OFF	EXP1	EXP2	EXP3
6. SAVE PRESENT STATE				

[Page 1] 2. PROCESS

- Video processing performs correlation processing for each scan.
- Video processing suppresses random undesired clutter and displays targets only.
- Accurate true bearing signals and speed signals are necessary.
- In SRM/TM/CTM mode, high processing precision can be achieved since processing is performed in true motion.
- In RM mode, processing precision deteriorates due to the moving or traversing of own ship since processing is performed in relative motion.
- When a target moves at a high speed and "PROC1" or "PROC2" is used, the image may be blurred or disappear. In this case, set the processing to "OFF" or use "PROC3".
- Operation characteristics of "PROC1" to "PROC3" are as follows:

  OFF : Does not perform correlation processing between scans.
  At monitoring a near range such as within a bay, monitoring a target moving at a high speed, or when a true bearing sensor is not connected.

  PROC1 : Suppresses general undesired clutter and displays targets in natural gradation.

  PROC2 : Suppresses random undesired clutter and displays a target by emphasizing it.
  Use this processing for detecting small targets hidden by undesired clutter.

  PROC3 : Displays unstable targets of low detection probability.
  Use this processing when searching for small targets such as radio buoy in an area free from sea clutter.

[Page 1] 3. IR

- Eliminates the interference by radio waves transmitted by other radar equipment.
- The interference elimination effect increases as the number increases such as IR1 → IR2 → IR3, however, the sensitivity deteriorates.
- Sensitivity deterioration can be prevented by selecting processing of as smaller number as possible.
- By pressing the [BRILL] control, the transmission repetition frequency can be changed sensitively. Interference waves can be eliminated effectively by using this function concurrently.
- The interference wave elimination circuit suppresses transceiver noise also. By increasing the processing number, the noise displayed can be reduced. When the maximum sensitivity is required, adjust by turning the [GAIN] control clockwise until a required noise level is displayed.

Page 1

1. MODE	(Select the name to be used)			
2. PROCESS	OFF	PROC1	PROC2	PROC3
3. IR	OFF	IR1	IR2	IR3
4. AUTO STC/FTC	OFF	AUTO STC	AUTO FTC	
5. TGT EXPANSION	OFF	EXP1	EXP2	EXP3
6. SAVE PRESENT STATE				

[Page 1] 4. AUTO STC/FTC

- Detects undesired clutter such as rain/snow clutter and sea clutter and performs suppression processing automatically.
- Performs suppression processing automatically according to the condition even if the sea condition or weather condition changes.
- However, this is not fully automated processing and the user must adjust the degree of remaining undesired clutter.
- Use the [SEA CLUTTER] control for adjustment of the degree of remaining sea clutter.
- Use the [RAIN CLUTTER] control for adjustment of the remaining rain/snow clutter.
- In an area of a low undesired clutter density, undesired clutter may be judged as targets and remain. Therefore, when using the automatic clutter suppression function, use "PROC1" or "PROC2".
- The operation features of the automatic clutter suppression function are as follows.

OFF : The automatic clutter suppression function is not used.
Use this mode for a bay with low rain/snow clutter or sea clutter or a calm day.

AUTO STC : Detects a sea clutter intensity automatically and performs the optimum sea clutter suppression processing.
The optimum processing effect can be achieved even if the sea clutter intensity varies according to the wind direction.
Since there is no signal attenuation in the area without sea clutter, a land such as an island in which the far range sensitivity is enhanced can be displayed naturally.
However, since this mode recognizes rain clouds in areas outside of the sea clutter range, there is no rain cloud suppression effect.

AUTO FTC : Automatically detects the rain/snow clutter intensity and performs rain/snow clutter suppression processing in addition to automatic STC.
When rain clouds exist sparsely, this mode performs rain/snow clutter suppression processing for the rain cloud area only.
However, since this mode recognizes the land as a rain cloud also, the image of the land becomes weak.

Page 1

1.	MODE	(Select the name to be used)			
2.	PROCESS	OFF	PROC1	PROC2	PROC3
3.	IR	OFF	IR1	IR2	IR3
4.	AUTO STC/FTC	OFF	AUTO STC	AUTO FTC	
5.	TGT EXPANSION	OFF	EXP1	EXP2	EXP3
6.	SAVE PRESENT STATE				

[Page 1] 5. TARGET (TGT) EXPANSION

- Expands a target to the display size.
- By expanding a target, the visibility of a small target is improved, thereby improving the sensitivity.
- However, if a target is expanded, the bearing and distance resolution deteriorate.
- The use of "EXP2" is recommended instead of "EXP1".
- The operation characteristics of the target expansion function are as follows.

OFF	:	The target expansion function is not used. Use this mode when a high resolution is required.
EXP1	:	Expands the target display size to the distance direction. Expands also the bearing direction in the center of the screen. Effective for searching small targets by using "PROC3". Note that the screen may be filled with emphasized noise if "PROC2" is used concurrently.
EXP2	:	Expands the target display size to the vertical and horizontal directions. Can be used regardless of the Video processing. Use this mode when the sea clutter is strong.
EXP3	:	Mode that sets "EXP1" and "EXP2" concurrently. Use this mode for detecting small targets such as radio buoy.

Page 1

1. MODE	(Select the name to be used)			
2. PROCESS	OFF	PROC1	PROC2	PROC3
3. IR	OFF	IR1	IR2	IR3
4. AUTO STC/FTC	OFF	AUTO STC	AUTO FTC	
5. TGT EXPANSION	OFF	EXP1	EXP2	EXP3
6. SAVE PRESENT STATE				

[Page 2] 1 to 5. PULSE WIDTH

- Sets a pulse width to be used for the target in each range.
- When the function mode is called, the width is set as the pulse width of the range.
- When a pulse width is changed on the operator panel after the function mode is called, the pulse width is changed temporarily. However, when the device is set to a preparation state or some other function mode is called, the value is reset to the value that is stored.
- Use the SET FUNC menu to change the pulse width to be stored.
- Normally, use "MP". Use "LP" to improve the far range sensitivity, and "SP" to improve the clutter suppression performance due to bad sea or weather condition.

  SP : The range resolution is higher than that of "MP".
  The clutter suppression performance is higher than that of "MP".
  The sensitivity is lower than that of "MP".

  MP : Standard pulse width in the range.

  LP : The sensitivity is higher than that of "MP".
  The range resolution is lower than that of "MP".
  The clutter suppression performance is lower than that of "MP".

Page 2

1. PULSE WIDTH 0.75NM	SP	MP	
2. PULSE WIDTH 1.5NM	SP	MP	LP
3. PULSE WIDTH 3NM	SP	MP	LP
4. PULSE WIDTH 6NM	SP	MP	LP
5. PULSE WIDTH 12NM	SP	MP	LP

[Page 3] 1. VIDEO LATITUDE

- Select the gradation for displaying received signals on a screen.
- Use "NORMAL" as the standard condition and select "WIDE" in rainy weather.
- In "NARROW" mode, images of a close range are displayed in strong contrast.

NORMAL : Setting in the standard use.
The display dynamic range varies according to the range.
Short range setting > medium range setting > long range setting

WIDE : Setting when the radar is used in rainy weather.
The range is approximately doubled from that of "NARROW" in each range.

NARROW : Obtains images of strong contrast by narrowing the dynamic range of a near range.

[Page 3] 2. VIDEO NOISE REJECTION

- Eliminates signals that are assumed to be noise and clutter from radar videos.
- Select "OFF" when displaying radar videos in analog mode.
- Select "LEVEL1" or "LEVEL2" when suppressing display of noise and clutter.
- Select "LEVEL1" or "LEVEL2" when using "BLUE" as the background color.

OFF : Sets noise elimination to Off and displays all the signal levels.
Displays images in analog signal mode by floating echoes in the noise.

LEVEL 1 : Completely eliminates signals that are assumed to be undesired clutter (noise, rain/snow).
Displays signals that cannot be definitely defined to be signals or undesired clutter.

LEVEL 2 : Completely eliminates signals (noise and clutter) that are assumed to be undesired clutter (noise, rain/snow).
Eliminates signals that cannot be definitely defined to be signals or undesired clutter.
Displays signals that can be definitely defined as signals.

Page 3

1. VIDEO LATITUDE	NORMAL	WIDE	NARROW
2. VIDEO NOISE REJECTION	OFF	LEVEL1	LEVEL2
3. GAIN OFFSET	± NUMERIC VALUE		
4. XMIT REPETITION FREQUENCY			
	NORMAL	HIPOWER	ECONOMY
5. SMALL BUOY DETECTION	OFF	ON	
6. AUTO DR CONT	OFF	ON	

[Page 3] 3. GAIN OFFSET

- Corrects the sensitivity in the state where the function mode is called.
- Delicate adjustments of sensitivity are necessary to achieve the optimum sensitivity since the noise level that is displayed changes according to the combination of video processing and radar interference processing.
- The gain offset function enables achievement of constant optimum sensitivity without having to operate the [GAIN] control at switching of the function mode by storing the [GAIN] control correction value in each function mode.
- Set the value to "+" to increase the sensitivity.
- Set the value to "-" to reduce the sensitivity.
- For radar interference processing, set the gain offset value to "+" side, since the noise level decreases as the value increases.
- When "PROC1" or "PROC2" is used, set the gain offset value to the "+" side since the noise level decreases.
- When "PROC3" is used, set the gain offset value to "-" side since noise remains on the screen exceeding the image processing threshold value.
- When "TGT EXPANSION" is used, set the gain offset value to the "-" side since noise is emphasized.

[Page 3] 4. TRANSMISSION (XMIT) REPETITION FREQUENCY

- Select one of three transmission repetition frequency types.
- The transmission repetition frequency relates to the sensitivity and power consumption (life span of magnetron).
- When the transmission repetition frequency is high, the sensitivity improves, however, the power consumption also increases, reducing the life span of the magnetron.
- When the transmission repetition frequency is low, the power consumption decreases, increasing the magnetron life span, however, the sensitivity deteriorates.
- The radar trails reduction processing demonstrates the effect when the transmission repetition frequency is "ECONOMY".

NORMAL : Balanced setting for the sensitivity and the life span of the magnetron.

HIPOWER : Hipower setting; use for detecting small targets.
However, the life span of the magnetron is reduced.

ECONOMY : Economy setting. The maximum life span of the magnetron can be increased.
However, the sensitivity deteriorates slightly.
Use this mode at radar trail fine line processing.
When the fales echoes appear by anomalous propagation, using this mode reduces those fales echoes.
See section “6.4 [V] Anomalous Propagation”.

Page 3

1.	VIDEO LATITUDE	NORMAL	WIDE	NARROW
2.	VIDEO NOISE REJECTION	OFF	LEVEL1	LEVEL2
3.	GAIN OFFSET	± NUMERIC VALUE		
4.	XMIT REPETITION FREQUENCY			
		NORMAL	HIPOWER	ECONOMY
5.	SMALL BUOY DETECTION	OFF	ON	
6.	AUTO DR CONT	OFF	ON	

[Page 3] 5. SMALL BUOY DETECTION

- In this mode, the signal processing circuit loss is low when small buoy are detected.

OFF : Normal signal processing setting.

ON : The radar interference processing circuit is switched to small buoy detection processing.

Low loss IR processing → IR1 of small buoy detection
Normal IR1 → IR2 of small buoy detection
Normal IR2 → IR3 of small buoy detection
However, the interference elimination performance of low loss IR processing is lower than that of normal IR processing.

[Page 3] 6. AUTOMATIC DR CONTROL (AUTO DR CONT)

- Automatically controls "VIDEO LATITUDE" (dynamic range) when automatic STC or FTC is used.
- At automatic STC, this mode expands the dynamic range only for the area with strong sea clutter and reduces the dynamic range for the area without sea clutter, enhancing the sensitivity.
- At automatic FTC, the mode expands the dynamic range of the area with strong sea clutter and rain/snow clutter and reduces the dynamic range of other areas, enhancing the sensitivity.
- When automatic FTC is used, land images become weak.

OFF : DR (dynamic range) automatic control is not performed.
The dynamic range (video latitude) is the same setting as that of manual STC.

ON : Performs automatic DR control. (normal setting)

Page 3

1.	VIDEO LATITUDE	NORMAL	WIDE	NARROW
2.	VIDEO NOISE REJECTION	OFF	LEVEL1	LEVEL2
3.	GAIN OFFSET	± NUMERIC VALUE		
4.	XMIT REPETITION FREQUENCY			
		NORMAL	HIPOWER	ECONOMY
5.	SMALL BUOY DETECTION	OFF	ON	
6	AUTO DR CONT	OFF	ON	

[Page 4] 1. RADAR TRAILS INTERVAL

- Specify the radar trail length in minutes.
- The specifiable radar trail lengths are "1MIN", "3MIN", "6MIN", "12MIN", "15MIN", "30MIN", "60MIN" and "CONT".
- When "CONT" is specified, radar trailing is continued without time control for radar trail length.

[Page 4] 2. RADAR TRAILS REFERENCE (REF) LEVEL

- Select a level of the radar videos required for drawing a radar trail.
- The required radar video becomes high as the number increases such as level 1 → level 2 → level 3 → level 4.
- Set a high level when a radar trail is created with clutter and noise.
- Set a high level to create a fine radar trail.
- Reduce the level when the radar trail is not continuous.

[Page 4] 3. RADAR TRAILS REDUCTION

- Sets radar trails reduction processing.
- The effect of radar trails reduction processing increases as the number increases such as level 1 → level 2 → level 3 → level 4, making the radar trail finer.
- Radar trails reduction processing will not weaken radar videos.
- When radar trails reduction processing is used, a high fine line effect can be achieved by setting "XMIT REPETITION FREQUENCY" to "ECONOMY".

OFF : Radar trails reduction processing is not performed.
LEVEL 1 : Performs radar trails reduction processing. (Effect: low)
LEVEL 2 : Performs radar trails reduction processing. (Effect: middle)
LEVEL 3 : Performs radar trails reduction processing. (Effect: high)

Page 4

1.	RADAR TRAILS INTERVAL	1MIN	3MIN	6MIN	12MIN
		15MIN	30MIN	60MIN	CONT
2.	RADAR TRAILS REF LEVEL	LEVEL1	LEVEL2	LEVEL3	LEVEL4
3.	RADAR TRAILS REDUCTION	OFF	LEVEL1	LEVEL2	LEVEL3
4.	RADAR TRAILS PROCESS	OFF	ON		
5.	RADAR TRAILS SMOOTHING	OFF	ON		

[Page 4] 4. RADAR TRAILS PROCESS

- Select whether video processing is performed for radar signals to create a radar trail.
- When radar trails process is set to "ON", a radar trail may not be created due to clutter and noise and a radar trail of the target moving at a high speed may not be created.
- When radar trails process is set to "OFF", a radar trail may be created by clutter and noise and a radar trail of the target that moves at a high speed can be created.

OFF : Video processing is not performed for the radar signals that create a radar trail.
ON : Video processing is performed for the radar signals that create a radar trail.

[Page 4] 5. RADAR TRAILS SMOOTHING

- Select whether a radar trail is smoothed for display.
- When a radar trail is not continuous, the radar trail is smoothed by connecting the disconnected sections when displayed.
- When radar trail smoothing is used, the radar trails become slightly thicker. Set smoothing to "OFF" to make the radar trail finer.
- Since smoothing processing is performed at the display stage of a radar trail, the radar trail storage data will not be changed. (When smoothing is set to "OFF" after it is set to "ON", the data is reset to the original state immediately.)

OFF : Radar trails smoothing processing is not performed.
ON : Radar trails smoothing processing is performed.

Page 4

1.	RADAR TRAILS INTERVAL	1MIN	3MIN	6MIN	12MIN
		15MIN	30MIN	60MIN	CONT
2.	RADAR TRAILS REF LEVEL	LEVEL1	LEVEL2	LEVEL3	LEVEL4
3.	RADAR TRAILS REDUCTION	OFF	LEVEL1	LEVEL2	LEVEL3
4.	RADAR TRAILS PROCESS	OFF	ON		
5.	RADAR TRAILS SMOOTHING	OFF	ON		

[Page 5] 1. PROCESS SWITCHING

- Set a boundary distance and switch the video processing mode to be used between the inside and outside of the boundary.
- Video processing outside of the boundary is set to "PROC3".
- Video processing inside of the boundary is set to the video processing mode that is set in the menu. (PROC1 to 3)
- Use the process switching function when "PROC3" is to be used for a far range, however, "PROC2" is to be used inside of the boundary due to the sea clutter at the center such as buoy search.
- Set the process switch range of this function in "2. PROC SWITCH RANGE" of the function setting item page 5.

  OFF : Process switching is not performed.
  ON : Process switching is performed.

[Page 5] 2. PROCESS (PROC) SWITCH RANGE

- Set a boundary distance and switch the video processing mode between the inside and outside of the boundary.
- Set a boundary distance in this item.
- The boundary distance can be set within the range from 0.1 to 25.5nm in 0.1nm units.
- After a menu is selected, the menu screen is cleared and the boundary distance setting screen is displayed.
- Use the [VRM] control to adjust a distance. After determining a distance, press the ENT key and define the setting value.
- The storage value of VRM1 becomes the boundary distance value as a result of distance adjustment operation.

[Page 5] 6. INITIALIZE

- Resets the selected function mode settings to the factory delivery state.
- All the settings that were changed in pages 1 to 4 of the SET FUNC menu are lost.
- Use this function to reset to the standard video when the video became unnatural due to too many changes.

Page 5

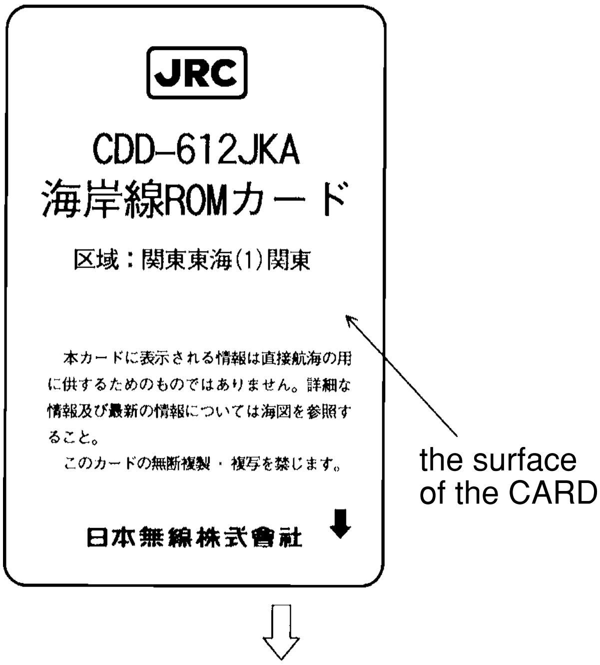
1. PROCESS SWITCHING	OFF	ON
2. PROC SWITCH RANGE	NUMERIC VALUE	
3.		
4.		
5.		
6. INITIALIZE		

3.5 Displaying the Chart

By using the shoredine ROM card made by JRC and ERC card (issued by Maritime Safty Agency), shoreline is displayed both in radar+plotter made and in plotter mode (optional).
By using C-MAP card, shoreline is displayed only in plotter mode (optional).
For displaying C-MAP card, see NDB-33 plotter instruction manual.

3.5.1 Displaying the Shoreline ROM Card Made by JRC

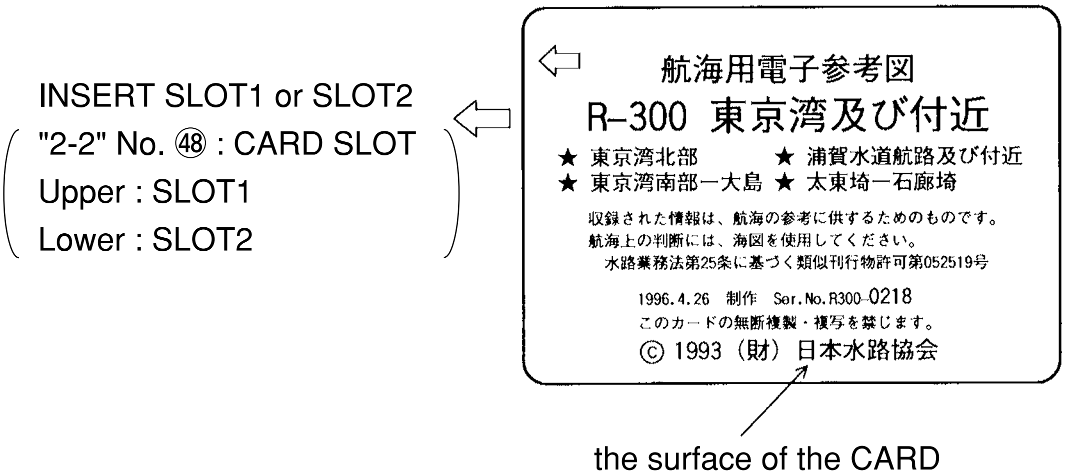
- As the shoreline ROM card is inserted into card slot 1 or card slot 2, the shoreline is displayed automatically.
- The shoreline ROM card can be inserted 2 cards into card slot 1 and 2, but the card in card slot 2 has the card in card slot 1 over.
- The shoreline ROM card made by JRC can't be inserted into card slot with ERC card or C-MAP card.
- As the card is inserted into card slot, the surface of the card is upper side.



INSERT SLOT1 or SLOT2
("2-2" No. ㊽ : CARD SLOT
Upper : SLOT1
Lower : SLOT2)

3.5.2 Displaying the ERC Card

- As the ERC card is inserted into card slot 1 or card slot 2, the coast line is displayed automatically.
- The ERC card can be inserted 2 cards into card slot 1 and 2.
- The ERC card can't be inserted into card slot 1 and 2 with JRC card or C-MAP card.
- As the card is inserted into card slot, the surface of the card is upper side.



3.5.3 Display the JRC Chart

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 4 key to open the RADAR #4 menu.**
3. **Press the 9 and 2 key to open the JRC CARD menu.**
4. **Press the 1 key to select "FILL LAND AREA", and press the 1 key to select "OFF" or "ON", and Press the ENT key to confirm the setting.**
5. **Press the 2 key to select "ERC DISP REQUEST", and press the 2 key to select "OFF" or "ON", and press the ENT key to confirm the setting.**

Exit

6. **Press the SUB MENU key.**

JRC CARD

JRC CARD		0. PREV
1. FILL LAND AREA	OFF <u>ON</u>	
2. ERC DISP REQUEST	<u>OFF</u> ON	

3.5.4 Displaying the Contour of the Shoreline ROM Card by JRC

This function is used to display and select depth and color of contour of JRC card.

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 4 key to open the RADAR #4 menu.**
3. **Press the 9 and 3 key to open the CONTOUR menu.**
4. **Press the numeric keys (1 to 9) to select contour number.**
5. **Press the numeric key (1 to 9) pressed in procedure 4 again, the depth of the contour number is selected.**

   Enter the depth of the contour number by using numeric key (0 to 9), and press the ENT key to confirm the setting.
6. **Press the numeric key (1 to 9) pressed in procedure 4 again, the color of the contour number is selected.**

   Press the same numeric key (1 to 9) to select color, and press the ENT key to confirm the setting.
7. **By procedure 4 to 6, the depth of contour of JRC card can be selected 8 patterns.**

Exit

8. **Press the SUB MENU key.**

CONTOUR

CONTOUR									0. PREV
1.	10M	OFF	SKY	GRN	YEL	PNK			
2.	20M	OFF	WHT	SKY	BLU	GRN	YEL	PNK	RED
3.	30M	OFF	WHT	SKY	BLU	GRN	YEL	PNK	RED
4.	40M	OFF	WHT	SKY	BLU	GRN	YEL	PNK	RED
5.	50M	OFF	WHT	SKY	BLU	GRN	YEL	PNK	RED
6.	60M	OFF	WHT	SKY	BLU	GRN	YEL	PNK	RED
7.	70M	OFF	WHT	SKY	BLU	GRN	YEL	PNK	RED
8.	80M	OFF	WHT	SKY	BLU	GRN	YEL	PNK	RED
9.	OTHER	OFF	WHT	SKY	BLU	GRN	YEL	PNK	RED

3.6 Displaying Own Ship Track

The own ship track can be displayed only in the R+P (radar + plotter) or plotter mode (option NDB-33). The display is not available in the radar mode.

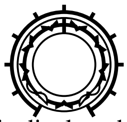
3.6.1 Changing Track Color [When equipped with the plotter]

White, sky, blue, green, yellow, pink and red are available for the track color. The track is not displayed or stored when "OFF" is selected.

Procedures

1. **Press the [MAP] key to select R+P or plotter mode.**
2. **Press the [OWN TRK] key twice.**

   Check that the track color is displayed in a box on the bottom of the screen.

3. **Turn the COLOR  control to select the track color.**

   The track is displayed with the selected color.

Note

● If plotter (NDB-33) isn't combined, the track color can be displayed only sky in R+P mode.

3.6.2 Selecting Track Storing Interval

The range and time for storing the track can be selected from 3, 5, 10 and 30 seconds, 1, 3, 5, 10, 30 and 60 minutes, and 1, 3, 5 and 10 nm. Up to 20,000 track (with mark) can be stored.

Procedures

1. **Press the [MAP] key to select R+P (radar + plotter) or plotter mode.**
2. **Press the [OWN TRK] key to open the OWN TRACK menu.**

   (or press the [SUB MENU] and [4] keys to open the RADAR #4 menu.)

3. **Press the [2] key to select "OWN TRK MEM INTERVAL".**

   (or press the [1] key on the RADAR #4 menu to select "OWN TRK MEM INTERVAL".)

4. **Press the [2] key to select "3SEC", "5SEC", "10SEC", "30SEC", "1MIN", "3MIN", "5MIN", "10MIN", "30MIN", "60MIN", "1NM", "3NM", "5NM" or "10NM".**

   (or press the [1] key on the RADAR #4 menu.)

5. **Press the [ENT] key to confirm the setting.**

Exit **6. Press the OWN TRK key.**

(or press the SUB MENU key to close the RADAR #4 menu.)

Note

- If plotter (NDB-33) isn't combined, the OWN TRACK menu will not be opened. You will select "OWN TRK MEM INTERVAL" on the RADAR #4 menu.

OWN TRACK

OWN TRACK							9. NEXT
1. DELETE OWN TRACK	RED						
2. OWN TRK MEM INTERVAL	3SEC	5SEC	10SEC	<u>30SEC</u>	1MIN	3MIN	
5MIN	10MIN	30MIN	60MIN	1NM	3NM	5NM	10NM
3. OWN TRACK MEMORY	OFF	<u>ON</u>					

RADAR #4

RADAR #4							0. PREV 9. NEXT
1. OWN TRK MEM INTERVAL	3SEC	5SEC	10SEC	<u>30SEC</u>	1MIN	3MIN	
5MIN	10MIN	30MIN	60MIN	1NM	3NM	5NM	10NM
2. DELETE OWN TRACK	RED						
3. OWN TRACK MEMORY	OFF	<u>ON</u>					
4. DISP OWN TRACK COLOR							
<u>ALL</u>	WHT	SKY	BLU	GRN	YEL	PNK	RED
5. CLEAR OWN TRACK COLOR							
ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED

3.6.3 Stopping Track Storing

This operation is stopped track storing. After stopping storing the track, the track remains displayed although is cleared by enhancing or reducing the screen.

Procedures

1. **Press the [MAP] key to select R+P (radar + plotter) or plotter mode.**
2. **Press the [OWN TRK] key to open the OWN TRACK menu.**

   (or press the [SUB MENU], [4] keys to open the RADAR #4 menu.)
3. **Press the [3] key to select "OWN TRACK MEMORY".**

   (or press the [3] key on the RADAR #4 menu to select "OWN TRACK MEMORY".)
4. **Press the [3] key to select "OFF" or "ON".**

   (or press the [3] key on the RADAR #4 menu.)
5. **Press the [ENT] key to confirm the setting.**

Exit

6. **Press the [OWN TRK] key.**

   (or press the [SUB MENU] key to close the RADAR #4 menu.)

OWN TRACK

OWN TRACK									9. NEXT
1.	DELETE OWN TRACK		RED						
2.	OWN TRK MEM INTERVAL		3SEC	5SEC	10SEC	30SEC	1MIN	3MIN	
		5MIN	10MIN	30MIN	60MIN	1NM	3NM	5NM	10NM
3.	OWN TRACK MEMORY		OFF	ON					

RADAR #4

RADAR #4									0. PREV 9. NEXT
1.	OWN TRK MEM INTERVAL		3SEC	5SEC	10SEC	30SEC	1MIN	3MIN	
		5MIN	10MIN	30MIN	60MIN	1NM	3NM	5NM	10NM
2.	DELETE OWN TRACK		RED						
3.	OWN TRACK MEMORY		OFF	ON					
4.	DISP OWN TRACK COLOR								
		ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED
5.	CLEAR OWN TRACK COLOR								
		ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED

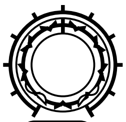
3.6.4 Deleting Track by Color (Using the [COLOR] Control)

Track can be cleared by color. Clearable tracks are limited to those currently displayed on the screen.

Procedures

1. **Press the [MAP] key to select R+P (radar + plotter) or plotter mode.**
2. **Press the [OWN TRK] key to open the OWN TRACK menu.**

   (or press the [SUB MENU], [4] keys to open the RADAR #4 menu.)
3. **Press the [1] key to select "DELETE OWN TRACK".**

   (or press the [2] key to select "DELETE OWN TRACK".)
4. **Turn the** COLOR  **control to select the color.**
5. **Press the [ENT] key to confirm the setting.**
6. **After the display for confirming deleting appears, press the [ENT] key to delete the track or the [CLR] key to cancel deleting.**

Exit

7. **Press the [OWN TRK] key.**

   (or press the [SUB MENU] key to close the RADAR #4 menu.)

OWN TRACK

OWN TRACK		9. NEXT

1. DELETE OWN TRACK		RED						
2. OWN TRK MEM INTERVAL		3SEC	5SEC	10SEC	<u>30SEC</u>	1MIN	3MIN	
	5MIN	10MIN	30MIN	60MIN	1NM	3NM	5NM	10NM
3. OWN TRACK MEMORY		OFF	<u>ON</u>					

RADAR #4

RADAR #4		0. PREV 9. NEXT

1. OWN TRK MEM INTERVAL		3SEC	5SEC	10SEC	<u>30SEC</u>	1MIN	3MIN	
	5MIN	10MIN	30MIN	60MIN	1NM	3NM	5NM	10NM
2. DELETE OWN TRACK		RED						
3. OWN TRACK MEMORY		OFF	<u>ON</u>					
4. DISP OWN TRACK COLOR								
	<u>ALL</u>	WHT	SKY	BLU	GRN	YEL	PNK	RED
5. CLEAR OWN TRACK COLOR								
	ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED

3.6.5 Deleting Track by Color (Using Menu)

The function for clearing tracks by color using menus is available only in the plotter mode.
Among the stored tracks, only those in the specified color can be deleted. The intenal memory can be saved by deleting unnecessary tracks by color.

Procedures

1. **Press the [MAP] key to select plotter mode.**
2. **Press the [SUB MENU] key to open the SUB MENU.**
3. **Press the [6] key to open the PLOTTER menu.**

   (or press the [4] key to open the RADAR #4 menu.)
4. **Press the [3] key to open the DISPLAY／DELETE OF TRACK／MARK IN DISTINCTION COLOR menu.**
5. **Press the [3] key to select "CLEAR OWN TRACK COLOR".**

   (or press the [5] key to select "CLEAR OWN TRACK COLOR" on the RADAR #4 menu.)
6. **Press the [3] key to select deleting color.**

   (or press the [5] key on the RADAR #4 menu.)
7. **Press the [ENT] key to confirm the setting.**
8. **After the display for confirming deleting appears, press the [ENT] key to delete the track or the [CLR] to cancel deleting.**

Exit

9. **Press the [SUB MENU] key.**

DISPLAY ／ DELETE OF TRACK ／ MARK IN DISTINCTION COLOR

DISPLAY ／ DELETE OF TRACK ／ MARK IN DISTINCTION COLOR
Press an item number key.

0. PREVIOUS MENU										
1. DISP OWN TRK COLOR		ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED	
2. DISP MARK COLOR ／ TYPE										
	TYPE	ALL					X	Y	⓪ ~ ⑨	人
			--------		————	–·–·–·–	⌛	＋		
	COLOR	ALL	WHT	SKY	BLU	GEN	YEL	PNK	RED	
3. CLEAR OWN TRK COLOR		ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED	
4. CLEAR MARK COLOR ／ TYPE										
	TYPE	ALL					X	Y	⓪ ~ ⑨	人
			--------		————	–·–·–·–	⌛	＋		
	COLOR	ALL	WHT	SKY	BLU	GEN	YEL	PNK	RED	

5.
6.
7.
8.
9.

To close this menu, Press (SUB MENU) key.

RADAR #4

RADAR #4								0. PREV 9. NEXT
1. OWN TRK MEM INTERVAL		3SEC	5SEC	10SEC	30SEC	1MIN	3MIN	
	5MIN	10MIN	30MIN	60MIN	1NM	3NM	5NM	10NM
2. DELETE OWN TRACK		RED						
3. OWN TRACK MEMORY		OFF	ON					
4. DISP OWN TRACK COLOR								
	ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED
5. CLEAR OWN TRACK COLOR								
	ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED

3.6.6 Displaying or Hiding Track by Color

The tracks in your desired color can be displayed or hidden. Even when the tracks in your desired color are displayed, those in other colors are not hidden. Selecting "ALL" displays all tracks irrespective of the colors.

Procedures

1. **Press the [MAP] key to select R+P (radar + plotter) or plotter mode.**
2. **Press the [SUB MENU] key to open the SUB MENU.**
3. **Press the [6] key to open the PLOTTER menu.**

   (or press the [4] key to open the RADAR #4 menu.)
4. **Press the [3] key to open the DISPLAY／DELETE OF TRACK／MARK IN DISTINCTION COLOR menu.**
5. **Press the [1] key to select "DISP OWN TRK COLOR".**

   (or press the [4] key to select "DISP OWN TRK COLOR" on the RADAR #4 menu.)
6. **Press the [1] key to select displayed color.**

   (or press the [4] key to select displayed color on the RADAR #4 menu.)
7. **Press the [ENT] key to confirm the setting.**

Exit

8. **Press the [SUB MENU] key.**

DISPLAY ／ DELETE OF TRACK ／ MARK IN DISTINCTION COLOR

DISPLAY ／ DELETE OF TRACK ／ MARK IN DISTINCTION COLOR
Press an item number key.

0. PREVIOUS MENU										
1. DISP OWN TRK COLOR		ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED	
2. DISP MARK COLOR ／ TYPE										
	TYPE	ALL					X	Y	⓪～⑨	人
							⌛	＋		
	COLOR	ALL	WHT	SKY	BLU	GEN	YEL	PNK	RED	
3. CLEAR OWN TRK COLOR		ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED	
4. CLEAR MARK COLOR ／ TYPE										
	TYPE	ALL					X	Y	⓪～⑨	人
							⌛	＋		
	COLOR	ALL	WHT	SKY	BLU	GEN	YEL	PNK	RED	
5.										
6.										
7.										
8.										
9.										

To close this menu, Press (SUB MENU) key.

RADAR #4

RADAR #4		0. PREV 9. NEXT

1. OWN TRK MEM INTERVAL		3SEC	5SEC	10SEC	30SEC	1MIN	3MIN	
	5MIN	10MIN	30MIN	60MIN	1NM	3NM	5NM	10NM
2. DELETE OWN TRACK		RED						
3. OWN TRACK MEMORY		OFF	ON					
4. DISP OWN TRACK COLOR								
	ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED
5. CLEAR OWN TRACK COLOR								
	ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED

3.7 Displaying Navigation Information

This function enables to create, display, modify, and delete navigation lines, coast lines, contour lines, navigation marks, and so on.
This function can be used only in R+P mode and plotter mode (option).

3.7.1 Creating the Navigation Information (Navigation Lines)

When creating a navigation line, it is convenient for later references if a destination is created and then making it identifiable by entering the measurement system and the name of navigation information to the comment area for that destination. The navigation line can be created as a line from that destination.

Procedures

To input a destination

1. **Press the [SUB MENU], [4], [9], and [4] keys in this order to open the NAV INFO menu.**
2. **Press the [1] key to select "SETTING WPT/CANCELLATION WPT".**
3. **Press the [1] or [ENT] key.**
   The menu will disappear and the destination setting screen will be displayed.
4. **Move the cursor to the destination using the track ball, input the destination number by numeral keys, and press the [ENT] key.**
   The destination will be displayed by a symbol and number. (The destination number will not be displayed when the destination comment number display is set to OFF on the navigation information display menu.)

To delete a destination

1. **Press the [SUB MENU], [4], [9], and [4] keys in this order to open the NAV INFO menu.**
2. **Press the [1] key to select "SETTING WPT/CANCELLATION WPT".**
3. **Press the [ENT] key.**
   The menu will disappear and the destination number will be displayed on the screen.
4. **Press numeric key ([0] to [9]) to input the number and press the [CLR] key.**

Or

1. Press the [SUB MENU], [4], [9], and [4] keys in this order to open the NAV INFO menu.

2. Press the [1] key to select "SETTING WPT/CANCELLATION WPT".

3. Press the [ENT] key.

The menu will disappear and the destination number will be displayed on the screen.

4. Move the cursor to the destination number mark and press the [CLR] key.

3

NAV INFO

NAV INFO		0. PREV 9. NEXT

1. SETTING WPT／CANCELLATION WPT
2. WAYPOINT INPUT　　LAT／LON　　COMMENT

00　N　0°　00.000'　XXXXXXXXXX
　　E　0°　00.000'　XXXXXXXXXX

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9　＋－，．＃ （） ￥@＊；'" ／

Caution　:　When the destination is used for setting a navigation line, a message of "Currently Used" will be displayed and it cannot be deleted.

<u>To input comments for the destination</u>

- Comments can be input using alphabet characters, numerals, and special characters.
- A total of 20 characters can be input in two lines with each 10 charters per line.
- Input the number of geodetic datum using the first two characters. (Refer to the list of geodetic data on page 8-37.)
- Input an arbitrary name for identification using the third and succeeding characters.

Procedures

1. Press the [SUB MENU], [4], [9], and [4] keys in this order to open the NAV INFO menu.

2. Press the [2] key to select "WAYPOINT INPUT", press the minus (-) side of the [+ RANGE −] key or plus (+) side of the [+ RANGE −] key to select the destination number that was input on the destination input item, and press the [ENT] or [2] key to move to the input item.

3. **Input the latitude of the destination by numeral keys and press the ENT key. (When not changed, press the ENT key alone.)**
4. **Input the longitude of the destination by numeral keys and press the ENT key. (When not changed, press the ENT key alone.)**

   (Switching of North/Sough Longitude and East/West Latitude is effected by the key.)
5. **Then the comment input screen appears. Select a character from the list using the track ball and press the ENT key to fix it.**
6. **To input the next character, repeat procedure 5.**

   (If the CLR key is pressed during operation, the immediately preceding character can be deleted. Further, for a space, press the ENT key in a position where there is no letter.)
7. **To input for a different destination number, repeat procedures 2 to 6.**

To create a navigation line

Procedures

1. **Press the MARK MENU key to select the mark key on the screen and then select the color using the [COLOR] control.**
2. **Move the cursor to the start point of the navigation line and press 9 key. (Use the destination input on the destination input item for the start point.)**
3. **Move the cursor to the next turning point and press the 0 key.**
4. **Repeat procedure 3.**
5. **When the end point is reached, press the 0 key and press the 9 key twice.**

   A navigation line will be drawn.
6. **If the cursor is moved to the start point, a turning point, or the end point and the CLR key is pressed, the line containing that point will be deleted.**

3.7.2 Creating the Navigation Information (Coast Lines and Contour Lines)

To create a coast line or contour line, a line is drawn in the similar manner as for the navigation line.

Procedures

1. **Press the MARK MENU key to select the mark key on the screen and then select the color using the [COLOR] control.**
2. **Move the cursor to the start point of the navigation line and press 9 key. (Use the destination input on the destination input item for the start point.)**
3. **Move the cursor to the next turning point and press the 0 key.**
4. **Repeat procedure 3.**
5. **When the end point is reached, press the 0 key and press the 9 key twice.**
   A navigation line will be drawn.
6. **If the cursor is moved to the start point, a turning point, or the end point and the CLR key is pressed, the line containing that point will be deleted.**

3.7.3 Creating/Deleting the Navigation Information (Navigation Marks)

Input a navigation mark at an arbitrary position on the radar screen.
- White, sky, blue, green, yellow, pink and red are available for the mark color.
- The following five shapes are available for the mark shape.
- Up to 20,000 marks can be input together with navigation lines.

Procedures

1. **Press the [MARK MENU] key to select the mark on the screen.**
2. **Move the cursor to the desired position to input the mark.**
3. **Select the color using the [COLOR] control.**
4. **Select the desired shape of mark by numerical keys ([4] to [8]) and press the key.**

   Pressing the [8] key enters each number in the following sequence :

   ⓪ → ① …… ⑨ → ⓪ → ① …… .
5. **To delete a mark, move the cursor to the mark and press the [CLR] key.**

3.7.4 Tuning On or Off Display of Destination Marks, Number and Comments

- This function enables to set the display of destination marks to ON and OFF.
- This function enables to set the display of the destination number and comments displayed beside each destination mark to ON and OFF.

Procedures

1. **Press the [SUB MENU], [4], [9], [4], and [9] keys in this order to open the DISP NAV INFO menu.**
2. **Press the [1] key to select "DISP WPT".**
3. **Press the [1] key to select "OFF" or "ON" and press the [ENT] key.**
   The display of destination marks can be set to ON/OFF.
4. **Press the [2] key to select "DISP WPT NUMBER/COMMENT".**
5. **Press the [2] key to select "OFF" or "ON" and press the [ENT] key.**
   The display of destination number/comment can be set to ON/OFF.

DISP NAV INFO

DISP NAV INFO		0. PREV 9. NEXT

1. DISP WPT　　OFF　ON
2. DISP WPT NUMBER／COMMENT　　OFF　ON
3. DISP MARK COLOR／TYPE
   TYPE　ALL　X　Y　⓪～⑨
   COLOR　ALL　WHT　SKY　BLU　GRN　YEL　PNK　RED

3.7.5 Tuning On or Off Display of Marks and Lines by Specifying Color or Shapes

- This function enables to display the marks with the desired color and shape. Further, display can be set to OFF.
- If the marks with the desired color and shape are displayed, the marks with other colors and shapes will not be deleted.
- When "ALL" is selected, marks will all colors and shapes will be displayed.

Procedures

1. **Press the SUB MENU, 4, 9, 4, and 9 keys in this order to open the DISP NAV INFO menu.**
2. **Press the 3 key to select "DISP MARK COLOR/TYPE".**
3. **Press the 3 key to select the shape and press the ENT key. (Multiple shapes can be selected.)**

   The selected mark will be underlined and the marks with the desired shape will be displayed.
4. **Press the 3 key over again, then the reverse display moves to colors, so select a color and press the ENT key. (Multiple colors can be selected.)**

- **When not displaying the marks, put the already selected mark shape or mark color to reverse display and press the ENT key.**

DISP NAV INFO

DISP NAV INFO		0. PREV 9. NEXT

1. DISP WPT　　OFF　ON
2. DISP WPT NUMBER ／ COMMENT　　OFF　ON
3. DISP MARK COLOR ／ TYPE

TYPE　ALL　X　Y　⓪ ~ ⑨　人

COLOR　ALL　WHT　SKY　BLU　GRN　YEL　PNK　RED

3.7.6 Deleting a Mark or Line by Specifying a Color or Shape

This function enables to delete the marks of specific colors and shapes from the marks stored.
Unnecessary marks as classified by color and shape can be deleted to save the area in the internal memory.
Procedures

Procedures

1. **Press the [SUB MENU], [4], [9], [4], [9], and [9] keys in this order to open the CLEAR NAV INFO menu.**
2. **Press the [1] key to select "CLEAR MARK COLOR/TYPE".**
3. **Press the [1] key to select the shape, and press the [ENT] key to fix it.**
4. **Press the [1] key over again to select the color, and press the [ENT] key to fix it.**
5. **When the message to confirm the deletion is displayed, press the [ENT] key to delete or press the [CLR] key to cancel.**

CLEAR NAV INFO

CLEAR NAV INFO		0. PREV

1. CLEAR MARK COLOR／TYPE

TYPE ALL X Y ⓪～⑨ 人

COLOR ALL WHT SKY BLU GRN YEL PNK RED

3.7.7 Displaying Geodetic Datum

When displaying navigation information, check if its geodetic datum is the same as that used by the navigation equipment by referring to the comment at the time when the destination was created.
If the geodetic datum does not accord, the navigation information on the radar screen will be displaced, it is important to use the same geodetic datum as that for the navigation equipment.

To look at the geodetic datum and the name of navigation information

Procedures

1. **Press the [SUB MENU], [4], [9], and [4] keys in this order to open the NAV INFO menu.**
2. **Press the [2] key to select "WAYPOINT INPUT".**
3. **To select the destination number at the time when navigation information was created , press the minus (-) side of the [+ RANGE −] key or plus (+) side of the [+ RANGE −] key to select it.**

   The first two numerals displayed in the comment section represent the number of geodetic datum characters. (Refer to the list of geodetic data on page 8-37 for the name of geodetic datum.)
4. **Press the [SUB MENU] key to end the operation.**

4

MEASUREMENT

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4.2 Measurement with Fixed Range Rings 4-2
4.3 Measurement with Electronic Cursor
and Variable Range Marker 4-3
4.4 Measurement between Two Optional Points
of Target 4-4

4.1 Measurement with Trackball

Procedures

1. **Check the picture of targets on the screen.**

2. **Use the trackball and bring the cursor mark to a target.**

   The range and bearing of the target is displayed on the lower left of the screen. The range is the one from the own ship.

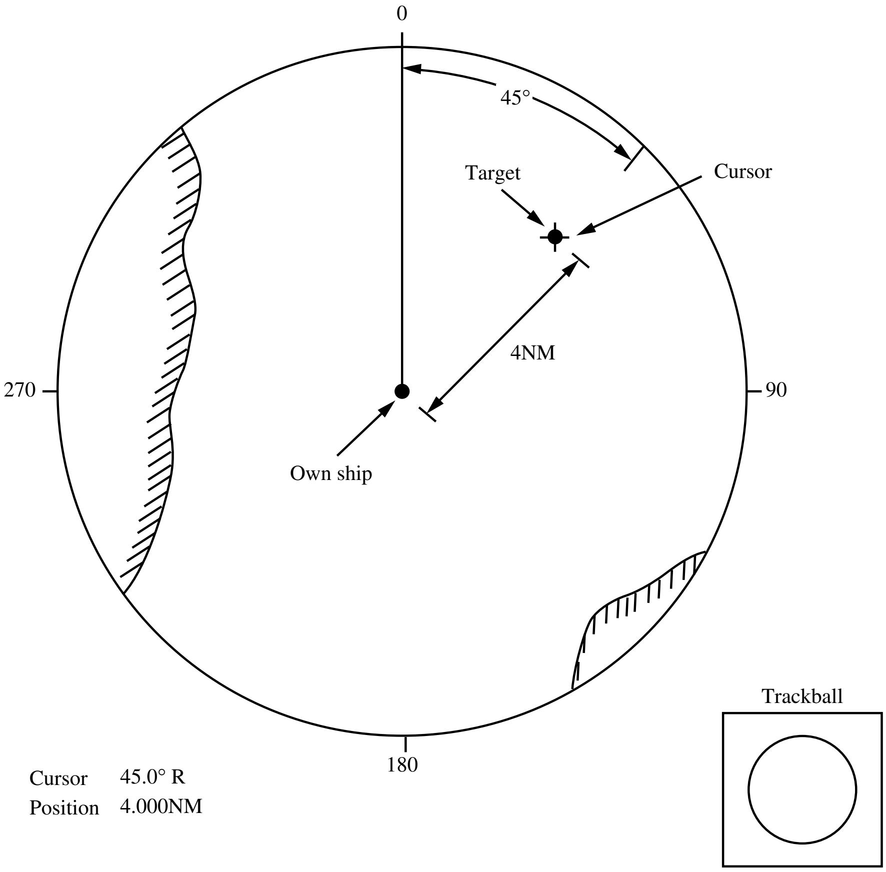


Fig. 4.1

4.2 Measurement with Fixed Range Rings

Procedures **Press the RR key.**

The fixed range rings appear.

Range is judged from the percentage of target to the fixed range ring spacing.

(The fixed range ring spacing is displayed on the upper left of the screen.)

4.3 Measurement with Electronic Cursor and Variable Range Marker

Procedures

1. **Press the [EBL1/EBL2] key and select display and motion of EBL1.**
   (See subsection "3.3.2 Using EBL (Electronic Cursor) [EBL1 ／ EBL2]".)
   EBL1 on the lower left is displayed in a box and EBL1 is displayed by a short dashes line on the PPI screen.
2. **Turn the EBL control and bring EBL1 to a target.**
   The bearing of EBL1 is displayed on the lower left of the screen.
   The bearing of EBL1 is the one of the target.
3. **Press the [VRM1/VRM2] key and select display and motion of VRM1.**
   (See subsection "3.3.12 Displaying Variable Range Markers [VRM1 ／ VRM2]".)
   VRM1 on the lower left of the screen is displayed in a box and VRM1 is displayed by a short dashes line on the PPI screen.
4. **Turn the VRM control to bring VRM1 indicated by a short dashes line to a target.**
   The range of VRM1 from the own ship is displayed on the lower left of the screen.
   The range of VRM1 is the one from the own ship to the target.

See Fig. 4.2, in which the range from the own ship to the target and the bearing are as follows: Range: 4.0nm, Bearing: 45.0°

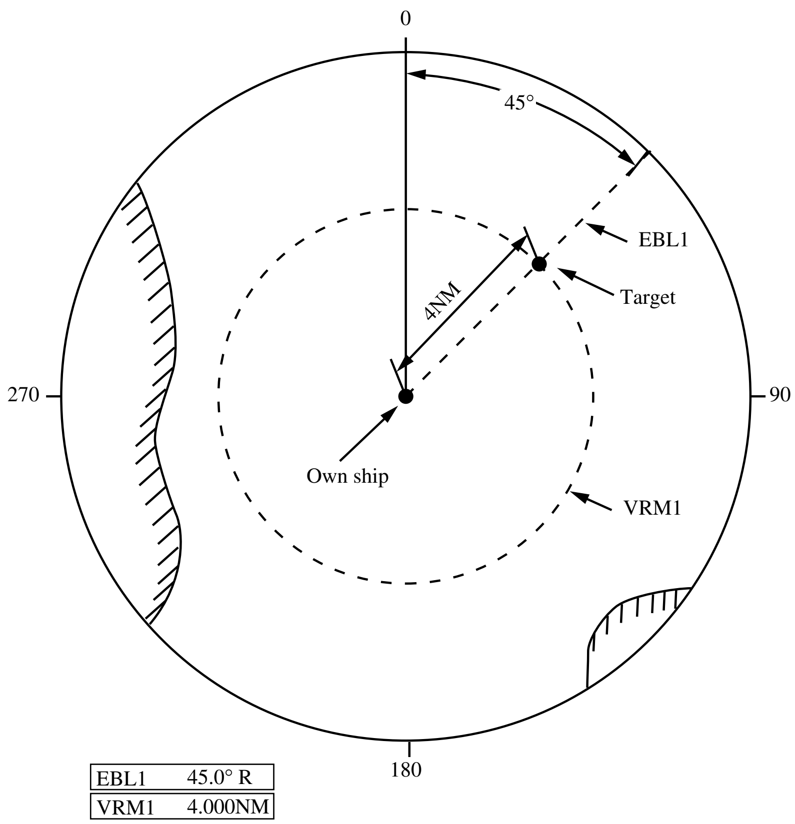
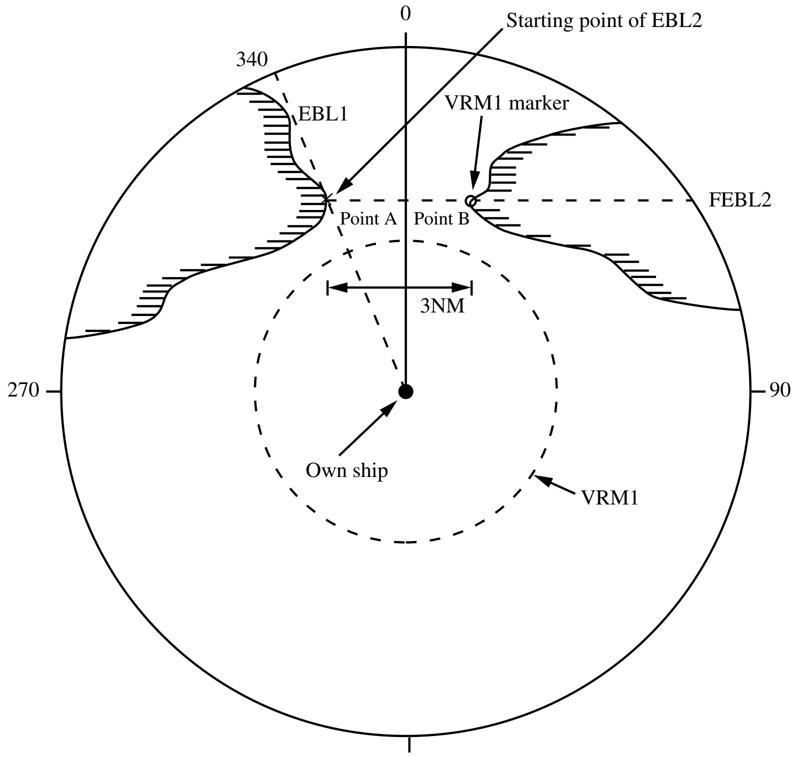


Fig. 4.2

4.4 Measurement between Two Optional Points of Target

Procedures

1. **Press the [EBL1/EBL2] key to display EBL1 and to select motion of EBL1.**
   EBL1 is displayed in a box on the lower left of the screen.
2. **Turn the EBL control and bring EBL1 (short dashes line) to Point A.**
   (See Fig. 4.3.)
   2a. Press the [EBL1/EBL2] key to Display EBL2.
   2b. Either open Main Menu to select floating EBL mode or press the [F EBL] key on display.
3. **Open the main menu to select the floating EBL mode.**
   EBL2 is displayed in a box on the lower left of the screen.
   (See subsection "3.3.2 Using EBL (Electronic Cursor) [EBL1 ／ EBL2]".)
4. **Use the trackball and bring the starting point of FEBL to Point A.**
5. **Turn the EBL control and bring FEBL to the other point (Point B). (See Fig. 4.3.)**
6. **Press the [VRM1/VRM2] key to display VRM1 or VRM2 and to select its motion.**
   (See subsection "3.3.12 Displaying Variable Range Markers [VRM1 ／ VRM2]".)
   When VRM1 is selected, ○ (VRM marker) appears on FEBL2, and when VRM2 is selected, a circle appears there.
7. **Turn the VRM control to move the VRM marker on FEBL to Point B.**
   The range between the two points and the bearing are displayed in the "VRM" and "EBL" columns on the lower left of the screen.
   (When VRM is movable, its range is displayed in the VRM column.)



EBL1	340.0° R
EBL2	90.0° R
VRM1	3.000NM

Fig. 4.3

5

OPERATIONS OF ATA (OPTION)

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⚠ CAUTION

Target acquisition and tracking function with ATA are limited as follows:

[I] Resolution between adjacent targets and swapping during automatic tracking

Depending on the particular distance and echo size, resolution between adjacent targets during automatic tracking usually ranges somewhere between 0.03 and 0.05 nm. If multiple targets approach each other, resolution will become about 0.03 nm and this may cause the system to regard them as one target and thus to swap them or lose part of them. Such swapping or loss of targets may also occur if the picture of the target being tracked is affected by rain/snow clutter returns or sea clutter returns or moves very close to land.

[II] Echo Intensity and Tracking Function

Echo intensity and tracking function are mutually related, and if no echo is detected for six scans or more in succession, targets may be lost.

In such a case, it is necessary to help detecting targets by increasing radar gain. If radar gain is increased too much, the radar may detect and track sea clutters and noises as targets and may sound false alarms. In such a case, radar gain should be reduced and noises should be eliminated. (The target to which 0 to 9 were appended is lost in over 200 scans.)

[III] Influence of Error Sources on Automatic Tracking

The [GAIN], [SEA] and [RAIN] controls on the radar should be properly adjusted so that targets to be acquired and tracked are clearly displayed on the screen. Unless they are properly adjusted, the tracking accuracy reliability will be reduced.

5.1 Initialization

This sub-section explains how to initialize ATA before operation.

5.1.1 Setting Collision Judgment Conditions : SAFE LIMIT

Attention

Values of collision judgment conditions should be properly set according to type of tracking ship, particular waters, weather and sea conditions. (For relations between the judgment conditions and alarms, see section “5.6 Alarm Display”.)

Before operation, be sure to set and check collision judgment conditions.

[I] Setting the CPA LIMIT (distance of safety limit) ／ TCPA LIMIT (time of safety limit)

Procedures

1. Press the [SUB MENU] key to open the SUB MENU.
2. Press the [5] key the ATA #1 menu.
3. Press the [5] key to select "LIMITS".
4. Press the [5] key.
5. Press the [0] to [9] keys to enter a numeric value.
6. Press the [ENT] key to fix the CPA LIMIT.
7. Press the [0] to [9] keys to enter a numeric value.
8. Press the [ENT] key to fix the TCPA LIMIT.

Exit

9. Press the [SUB MENU] key.

ATA #1

ATA #1					0. PREV 9. NEXT
1. ATA	SYMBOL		OFF	ON	
	TAGET DATA		OFF	ON	
2. VECTOR TIME			5MIN	(0-60MIN)	
3. PAST POSITION			OFF	ON	
4. PAST POSITION TIME			30 SEC	1 MIN 2 MIN 4 MIN	
5. LIMITS		CPA	5. 0NM	(0.1-9.9NM)	
		TCPA	15MIN	(1-99MIN)	

[II] Displaying the ring of the CPA (range of safety limit)

The CPA ring is displayed only in the relative vector mode. It is not displayed in the true vector mode. (Refer to subsection “5.4.1 Vector Display”.)

Procedures

1. Press the SUB MENU key to open the SUB MENU.

2. Press the 5 and 9 key to open the ATA #2 menu.

3. Press 2 key to select "DISPLAY OF CPA RING".

4. Press the 2 key and then press the ENT key.

The CPA ring is set to ON. The CPA ring is displayed on the screen. To erase the display of the CPA ring, press the 2 key and ENT key again.

Exit

5. Press the SUB MENU key.

ATA #2

ATA #2		0. PREV

1. AUDIBLE WARNING					
	CPA／TCPA	OFF	ON		
	LOST TARGET	OFF	ON		
2. DISPLAY OF CPA RING		OFF	ON		
3. ATA TEST MENU					
4. SIMULATION		OFF	STOP	NEAR	FAR

[III] Setting the gate size

The gate indicates "the area where the radar computer monitors a target which is being tracked." When the gate size is too large, the target will not be lost, but the target might swap to another adjacent target.

When the gate size is set to SMALL, target swap is less likely to occur but there is a risk that the target may not be tracked and therefore be lost.

Usually, the gate size is set to "NORMAL".

The gate size should only be set to "SMALL" when there are may tergets close together (for example - within the approaches of a port) and the risk of target swap is high.

ATA TEST

ATA TEST				0. PREV
1. TEST VIDEO	VDG	VDH	VDL	
2. VECTOR CONST	7			
3. VIDEO TD LEVEL	2 4			
4. VIDEO HIGH LEVEL	1 8			
5. VIDEO LOW LEVEL	6			
6. GATE SIZE	NORMAL	SMALL		
7. ATA NOISE LEVEL	220			
8. ATA FTC LEVEL	214			

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 5 key to open the ATA #1 menu.**
3. **Press 9 key to open the ATA #2 menu.**
4. **Press the 3 key to open the ATA TEST menu.**
5. **Press the 6 key to select "GATE SIZE".**
6. **Press the 6 key to select "NORMAL" or "SMALL".**
7. **Press the ENT key to set the gate size.**

Exit

8. **Press the SUB MENU key.**

5

[IV] Activating automatic aquisition

Use the guard zone to automatically acquire ship.

Attention

This function cannot be used simultaneously with the radar alarm function.

Procedures

1. **Press the [GZ MENU] key to open the RADAR ALARM menu.**
2. **Press the [1] key to select "FUNCTION".**
3. **Press [1] key to select "ATA ALARM".**
4. **Press the [ENT] key to set the function.**

   When changing the setting of the guard zone, set it according to the "[V] Setting the guard zone" described on next page.

Exit

5. **Press the [GZ MENU] key.**

Deactivating automatic acquisition

Set OFF or a radar alarm in the operation procedure 3 for deactivating automatic acquisition. The automatic acquisition does not function and only the manual acquisition functions.
The guard zone will disappear from the screen.

[V] Setting the guard zone

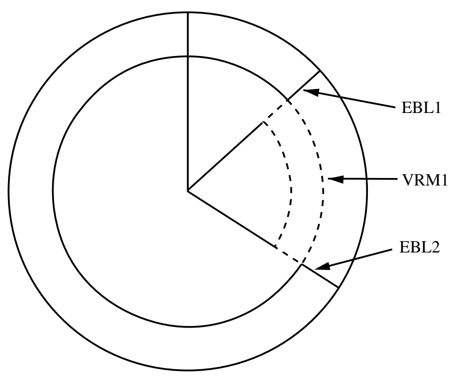
To watch for the invasion of another ship and a target or to automatically acquire another ship which invaded, the guard zone can be set.

RADAR ALARM

RADAR ALARM		
1. FUNCTION	OFF	ATA ALARM
2. AUDIBLE ATA ALARM	OFF	ON
3. ATA SECTOR ZONE (AUTO ACQ)		

Procedures

1. **Display the EBL1, EBL2, and first variable range scale.**
   For the operation method, refer to subsection "3.3.2 Using EBL (Electronic Cursor) [EBL1／EBL2]" and subsection "3.3.12 Displaying Variable Range Markers [VRM1／VRM2]". (ATA ALARM must be selected.)
2. **Press the GZ MENU key to open the RADAR ALARM menu.**
3. **Press 3 key to select "ATA SECTOR ZONE".**
4. **When pressing the 3 key or ENT key, the menu will disappear and the radar screen will appear.**
5. **Align the EBL1, EBL2, and VRM1 to the position where the guard zone is to be set as shown in the following figure and press the ENT key.**
   The shape of the guard zone is set.
   (The guard zone width is fixed to 0.5 NM.)



   The guard zone can be set at an arbitrary position of 0.5 to 32 NM.
6. **Press the GZ MENU key to close the display.**

Operation of the guard zone

- If there is a target in the fan-shaped area of the guard zone, an alarm is sounded and the ▽ mark is displayed on the target.
- If the start and end points of the guard zone are within ±3° when creating the guard zone, a circular guard zone is applied.
- The guard zone is displayed only at radar transmission. Note that the guard zone is not displayed at standby.

5.1.2 Automatically Set Mode (at Activation)

Table 5.1 lists the mode that is automatically set at activation.

Table 5.1 Mode Setting at Activation

Mode Names	Modes to be Initialized	Location of Detailed Explanation of Function
DISPLAY MODE	RM (relative motion display)	subsection 3.3.8 or 5.2.1

5.1.3 Setting a Range Scale

The ATA function is operated in all range scales, and usually the scale is set to any range of 1.5 to 24 NM according to the sea area to be used.

5.2 Display Mode

5.2.1 Setting the Motion Display Mode [TM ／ RM]

Press the [TM/RM] key to set the motion display mode to either true motion display TM or relative motion display RM. However, the mode is set to RM at activation.

5.2.2 Setting the Bearing Display Mode [AZI MODE]

Press the [AZI MODE] key to set the bearing display mode.

5

5.3 Target Acquisition

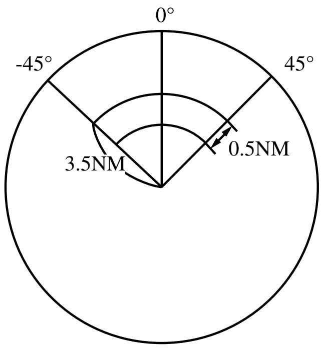
Attention

For automatic acquisition, please adjust the [SEA] or [GAIN] control properly to prevent pickup such as sea clatter as much as possible.

For the method for target acquisition of this equipment, automatic and manual modes are available, but both modes can be used at the same time.

5.3.1 Automatic Acquisition

Procedures



Automatic acquisition uses the preset guard zone as a acquisition zone to automatically acquire a target. The guard zone is set arbitrarily.
The target which entered the guard zone is acquired automatically. The [▽] mark is appended to the acquired target. The mark is moved together with the target and a vector is displayed within one minute. The target within the guard zone is displayed using the ▽ symbol and the target outside the guard zone is displayed with a normal ATA symbol.
For the setting method, refer to subsection "5.1.1 [V] Setting the guard zone".

5.3.2 Manual Acquisition

Attention

When the target which is being tracked has already reached the maximum number of targets and then is manually acquired, the distant target which is becoming more distant from the own ship at the rear is erased.

Procedures **Align the + cursor mark to the target to be acquired and press the ACQ key.**

The [ ] mark is appended to the target and a vector is displayed within one minute.

Use both mode

When using automatic acquisition and manual acquisition at the same time, a target to which special attention is to be paid is manually acquired and other targets are automatically acquired. When a new target is entered exceeding the maximum number of targets, the manually acquired target is erased from the target which is becoming more distant from the own ship at the rear if the automatically acquired target is not available. The automatically acquired target is erased sequentially from the rear one. Great advantages are to be able to maintain the manual acquisition function and to automatically acquired a new target, thereby eliminating the need for manually acquired it.

5

5.3.3 Setting ／ Deleting a Target Number

This function sets ／ deletes a number to ／ from the target which is being tracked.

Setting a target number

Procedures

1. **Press the TGT DATA key.**
2. **Align the + cursor to the target to which a number is to be assigned and press the 0 to 9 keys, then press the ENT key.**

   The number which was set near a target is displayed.

Note

- When a number which had already been used was specified, an error occurs. After deleting the number used, set a new number again.

Deleting a target number

Procedures

1. **Press the TGT DATA key.**
2. **Align the + cursor to the target from which a number is deleted and press the CLR key.**

   Otherwise, press the 0 to 9 keys and specify a number, then press the CLR key.

5.4 Displaying the ATA Data

5.4.1 Vector Display

Attention

When a target and the own ship were veered or when a new target was acquired, the displayed vector might reach the specified accuracy only when three minutes or more elapsed after acquired or veering. The vector might contain errors according to the state of tracking even after three minutes or more elapsed.

For the vector which indicates the forecast position of a target, there are two modes of true vector (TRUE) and relative vector (RELATIVE), and each length can arbitrarily be changed from 0 to 60 minutes.

[I] Selecting the vector modes

Select the true vector display/relative vector display using the [MAIN MENU] key.

Procedures

1. **Press the [MAIN MENU] key to open the MAIN MENU.**
2. **Press the [8] key to select "VECTOR".**
3. **Press the [8] key to select "TRUE" or "RELATIVE" and then the [ENT] key.**

or

1. **Press the [VECT/TRK] key.**

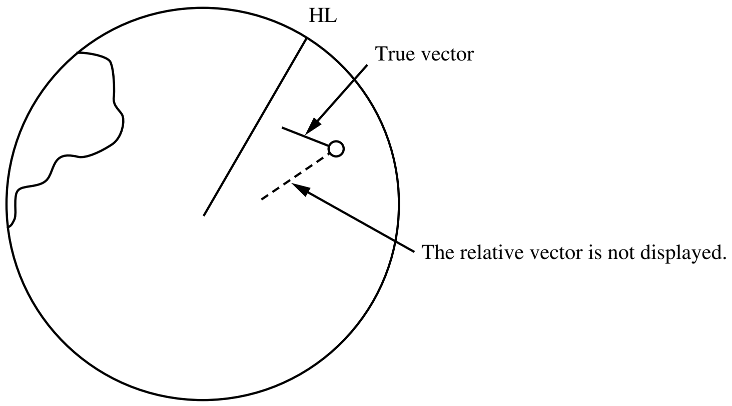
   Whenever it is pressed, TRUE/RELATIVE is changed.
   The current vector mode is displayed at the lower right side of the screen. "T_VECT" is displayed for the true vector display and "R_VECT" is displayed for the relative vector display.

Main menu

MAIN MANU				
1. RADAR/TRACK BRILL	●	[DAY1]		
2. RR/VRM/EBL BRILL	●	[DAY1]		
3. ATA BRILL	●	[DAY1]		
4. GRAPHIC DATA BRILL	●	[DAY1]		
5. PROCESS	OFF	<u>PROC1</u>	PROC2	PROC3
6. IR	OFF	<u>IR1</u>	IR2	IR3
7. FLOATING EBL	<u>OFF</u>	ON		
8. VECTOR	<u>TRUE</u>	RELATIVE		
9. GRAPHIC DATA DISP OFF				

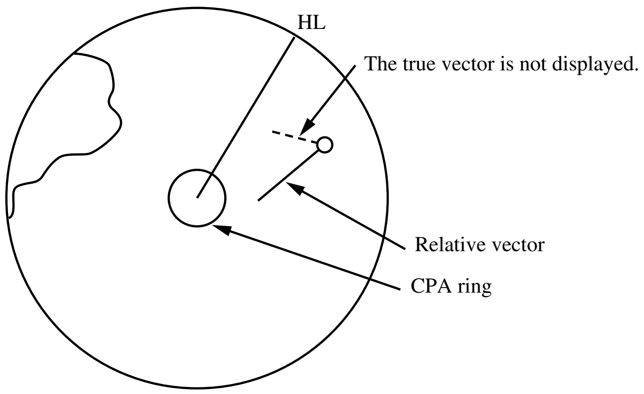
(1) True Vector Display

In the true vector mode, the direction of the target vector becomes the length proportional to the true speed of the target true course, length target.
The vector of the own ship is also displayed as shown in the figure.
By using this mode, the motion of ships around the own ship can accurately and easily be grasped.
In this mode, the CPA ring cannot be displayed.



(2) Relative vector display

The relative vector displays the relative relationship with the own ship instead of displaying the true motion of the target. In other words, the target in which this relative vector faces to the direction of the own ship (passes through the CPA ring) is dangerous.
In the relative mode, the place where the CPA (closest point of approach) of the target is located can be known at a glance.

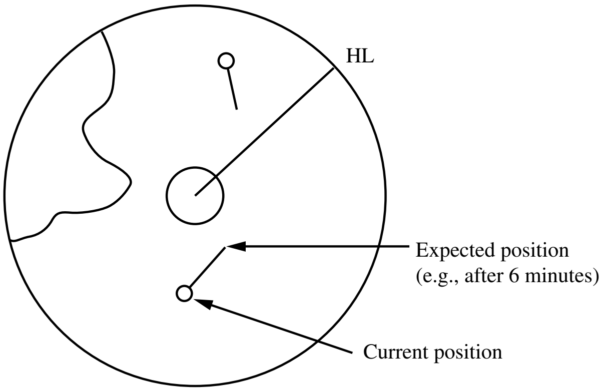


Therefore, each mode can be used properly according to the purpose. For example, the true vector is used to grasp the true motion of the target and the relative vector is used to grasp the closest point of approach of the target.

[II] Vector Length

The vector length becomes the length proportional to the speed of the target and the length can be switched from 1 to 60 minutes.

The example shown in the following diagram shows the case where the vector length is six minutes, and the vector tip becomes the forecast position after six minutes.



Setting the vector length

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [5] key to open the ATA #1 menu.**
3. **Press the [2] key twice to select "VECTOR TIME".**
4. **Press the [0] to [9] keys to set the time of the vector length.**
5. **Press the [ENT] key.**

   The vector time is fixed. The time of the vector is displayed on the lower right of the screen.

Exit

6. **Press the [SUB MENU] key.**

or

Procedures

1. **Whenever the [VECT+ / ↓] key is pressed, the vector time is increased in units of one minute.**
2. **Whenever the [VECT– / DEST] key is pressed, the vector time is decreased in units of one minute.**

ATA #1

ATA #1		0. PREV 9. NEXT

1. ATA SYMBOL	OFF	ON			
TAGET DATA	OFF	ON			
2. VECTOR TIME	5MIN	(0-60MIN)			
3. PAST POSITION	OFF	ON			
4. PAST POSITION TIME	30 SEC	1 MIN	2 MIN	4 MIN	
5. LIMITS CPA	5. 0NM	(0.1-9.9NM)			
TCPA	15MIN	(1-99MIN)			

5

5.4.2 Past Position Display

Display the position of a target using the [SUB MENU] key.

Up to four past position can be displayed. The track mode displays the true or relative track together with the vector mode.

The relative vector mode displays the relative track of a target.

The true vector mode displays the true track.

Displaying the past position

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [5] key to open the ATA #1 menu.**
3. **Press the [3] key to select "PAST POSITION".**
4. **Press the [3] key to select "OFF" or "ON".**
5. **Press the [ENT] key to set the past position.**

Setting the past position interval

6. **Press the [4] key in the procedure 3 for displaying the past position to select "PAST POSITION TIME".**
7. **Press the [4] key several times to select "30SEC", "1MIN", "2MIN" or "4MIN".**
8. **Press the [ENT] key to set the past position interval.**

Exit

9. **Press the [SUB MENU] key.**

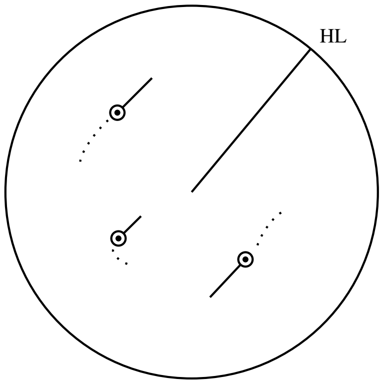


Fig. 5.1 shows a display example of the screen and Table 5.2 gives an explanation of the symbols on the screen.

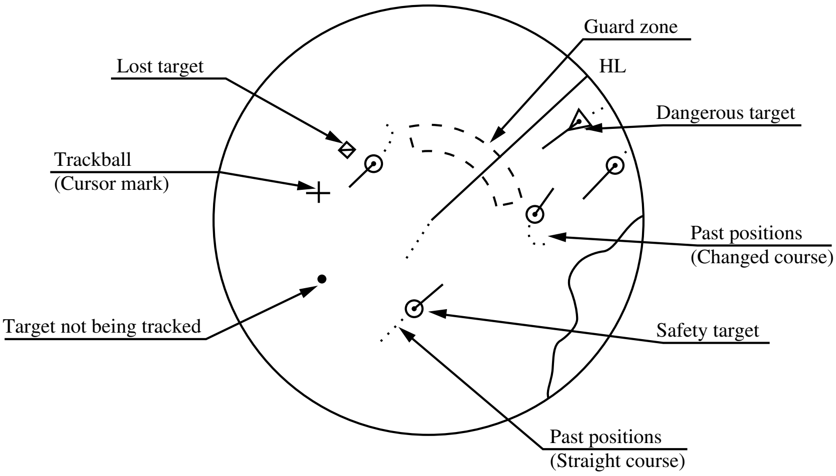


Fig. 5.1 EXAMPLE OF SCREEN DISPLAY
(FOR NORTH UP, TRUE VECTOR MODE)

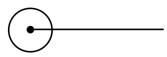
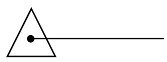
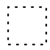
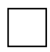
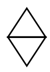
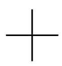
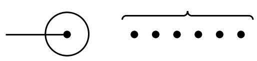
Besides, the fixed ／ variable range marker, EBL, etc. are displayed.

ATA #1

ATA #1		0. PREV 9. NEXT

1.	ATA SYMBOL		OFF	ON		
	TAGET DATA		OFF	ON		
2.	VECTOR TIME		5MIN (0-60MIN)			
3.	PAST POSITION		OFF	ON		
4.	PAST POSITION TIME		30 SEC	1 MIN	2 MIN	4 MIN
5.	LIMITS	CPA	5. 0NM (0.1-9.9NM)			
		TCPA	15MIN (1-99MIN)			

Table 5.2 Meanings of Symbols

Vectors and Symbols	Meanings	Remarks
	Safety target	
	Dangerous target	An alarm character (CPA/TCPA) appears. An alarm sounds. The vector and symbol blink (in red).
	Initial acquisition mark	After the acquisition, this mark is displayed until the vector is displayed.
	Target whose data readouts have been displayed.	When the data reading target is designated using the trackball, the symbol of the target will change to □ and the target ID is displayed. In case of lost targets and dangerous targets, however, ⟠ and △ are displayed respectively instead of □.
	Lost target (This symbol appears when a target comes not to be tracked for some reason.)	An alarm character (LOST) appears and an alarm sounds. No vector is displayed, and the symbol blinks.
	Target which has entered the guard zone	An alarm character (GZ) appears and an alarm sounds. The symbol blinks.
	Trackball cursor mark	This symbol is used to designate a target when acquiring it by manual, erasing it or displaying its numerical data readouts.
	Past positions of target	The symbols are displayed only when "PAST POSITION" is ON. The interval can be set to 30 SEC, 1, 2 or 4 minutes.

5.5 Data Reading

Attention

When a target under tracking or the own ship steers away from the course, or when the radar acquires a new target, its vector may not reach the required accuracy until 3 minutes passes after the acquisition or the change of course. Even 3 minutes later, the vector may include some errors depending on the tracking condition.

5.5.1 Types of Data Readouts to be Displayed

Target Data

Target ID (TARGET)	:	ID of target being displayed.
True bearing (T BRG)	:	In units of 1°
Range (RNG)	:	In units of 0.1 NM
True course (T CSE)	:	In units of 1°
True speed (T SPD)	:	In units of 0.1 knot
Closes point of approach (CPA)	:	In units of 0.1 NM
Time to closest point of approach (TCPA)	:	In units of 1 minute

For the data reading target, the symbol "□" and the ID are displayed to distinguish it from other targets.

Note

● When the symbol □ whose numerical data have been displayed is not found on the screen, the target is outside the screen (the display range).

5

5.5.2 Displaying Method of Numerical Data Readouts [TGT DATA]

Procedures

1. **Press the [TGT DATA] key.**
2. **Operate the track ball to align the + cursor mark to the target that is to be numerically displayed (target that is being tracked at present) and press the [ACQ] key.**

 For the target whose ID has already been displayed. Press [0] to [9] keys to enter the number of the target which has already been displayed and press the [ACQ] key.

 The numeric data of the specified target are displayed at the lower right side of the screen, a symbol is changed to □, and the target ID is displayed near the symbol. Subsequently, they are continuously displayed until the target is lost and a vector disappears or another target is specified. ("A" is displayed for the target without its number.)

 Besides, when specifying the target which is being initially acquired (target to which the [□] mark is appended), only the true bearing (T BRG) and range (RNG) of the target are displayed until the vector is displayed.

Erasing the numeric data display

Procedures

1. **Press the [TGT DATA] key.**
2. **Press the [ACQ] key.**

Note

- The cursor must not be positioned on the target.

5.6 Alarm Display

The following alarms are available on the ATA system:

Dangerous target alarm (CPA ／ TCPA)
Guard zone entry alarm (GZ)
Lost target alarm (LOST)

5.6.1 Dangerous Target Alarm : CPA ／ TCPA

⚠ **CAUTION**

Since the alarm may include some errors depending on target tracking situations, the operator should make the final decision for maneuvering the ship by himself.

For the system, targets are divided into two types: safety target and dangerous target . The degree of danger can be easily recognized at a glance of the screen. So, the operator can easily judge which ship he should pay special attention to.
Types of target and alarm are as follows:

Dangerous Target Alarm

Status	Symbol on CRT	Alarm character	Buzzer	Conditions
Safety target	○ Symbol color : White	(Not displayed)	(OFF)	• CPA > MIN CPA • 0 > TCPA • TCPA > MIN TCPA
Dangerous target	△ Symbol color : Red Blinks *	CPA/TCPA	Beep Resettable *	• CPA ≦ MIN CPA, 0 ≦ TCPA ≦ MIN TCPA

MIM CPA, MIN TCPA : The setting value

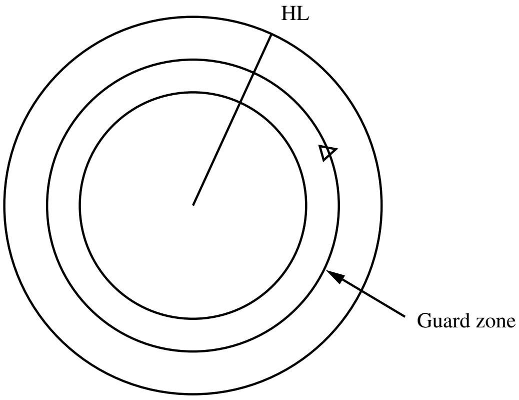
* Pressing the [ALARM ACK] switch stops an alarm sound and blinking.

5.6.2 Guard Zone Alarm

Attention

It is very important that, when guard zone is set, the radar tuning gain, sea clutter suppression and rain/snow clutter suppression should be adjusted so that optimum pictures of targets can be displayed on the screen. The guard zone alarm does not occur against targets which the radar does not detect.

The guard zone function sets a ring at a certain distance and issues an alarm when the target was invaded into this ring.



For the setting method of the guard zone, refer to subsection "5.1.1 [V] Setting the guard zone".

Guard Zone Alarm

Status	Symbol on CRT	Alarm character	Buzzer	Conditions
Guard zone alarm	▽ Blinking *	GZ (Red character)	Intermittent "beep," Resettable *	This alarm occurs when a target is located between the ring.

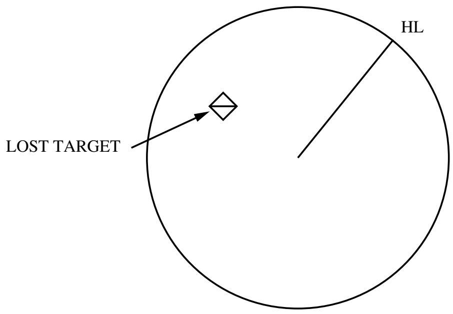
* When pressing the ALARM ACK switch, an alarm sound is not sounded and the symbol ⬚ changes to ○.

5.6.3 Lost Target Alarm

> **Attention**
>
> Unless radar tuning, gain sea clutter suppression, rain/snow clutter suppression, etc. have been properly adjusted, the lost target alarm is apt to occur.

The LOST TARGET ALARM will occur when a target acquired and having been tracked comes not to be tracked any more for some reason. Typical causes are as follows among others:

- Target echo is very weak.
- The target under tracking is on the other side of the land or a large ship and so the target echo is not returned.
- Target echo has been blurred by sea clutter returns.



Lost Target Alarm

Status	Symbol on CRT	Alarm character	Buzzer	Conditions
Lost target	Blinking *	LOST	Beep Resettable	The alarm will sound once when a lost target symbol is displayed.

* Pressing the ALARM ACK switch stops blinking.

5.6.4 Stopping Alarm

When any of the alarms in subsections “5.6.1” to “5.6.3” is generated, the corresponding alarm information will be displayed in the lower right corner of the screen.
When multiple alarms are generated, their information will be displayed in turn at intervals of 1 sec.
When the ALARM ACK key is pressed, the alarms to that the highest priority order is given will be selected and their alarm information will be erased and the alarm sound will stop.
The highest priority order will be given to dangerous target alarms followed by guard zone invasion alarms and lost target alarms.
Multiple alarms of the same type, e.g. guard zone invasion alarms, generated simultaneously, will be stopped when the ALARM ACK key is pressed once.
When system error information is displayed on the lower left corner of the screen, the highest priority will be given to the stopping of that error information.

5.7 Erasing an Unnecessary Target

When the target on which the vector and symbol are displayed needs not to be tracked or when the number of vectors is reduced from the screen to easily see the target, an unnecessary target can be erased one by one. When acquition is resumed from the beginning for all target, all target can also be erased.

5.7.1 Erasing a Target per Target

Procedures

1. **Align the + cursor mark to the target to be erased.**
2. **Press the [TGT CNCL] key.**

   The target vector and symbol disappear and only the radar image remains.

Specifying and erasing a target number

Procedures

1. **Press the [TGT DATA] key.**
2. **Press the [0] to [9] keys to specify a target number.**
3. **Press the [TGT CNCL] key.**

   The vector and symbol of the specified target disappear and only the radar image remains.

5.7.2 Erasing All Targets

Attention

When erasing all targets, the tracking of all the targets must be stopped and new automatic or manual acquisition must be resumed. So use this function only when necessary.

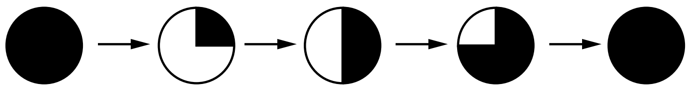
Procedures **Continue pressing the [TGT CNCL] key for two seconds or more.**

All vectors and symbols are erased.

5.8 Adjusting Intensity

Procedures

1. **Press the MAIN MENU key.**
2. **Press the 3 key to select "ATA BRILL".**
3. **Whenever the 3 key is pressed, the intensity is increased at four stages as shown in the following stages.**



These preset types of intensity are stored according to the DAY ／ NIGHT mode.

MAIN MENU

MAIN MANU				
1. RADAR ／ TRAIL BRILL	●	[DAY1]		
2. RR ／ VRM ／ EBL BRILL	●	[DAY1]		
3. ATA BRILL	●	[DAY1]		
4. GRAPHIC DATA BRILL	●	[DAY1]		
5. PROCESS	OFF	PROC1	PROC2	PROC3
6. IR	OFF	IR1	IR2	IR3
7. FLOATING EBL	OFF	ON		
8. VECTOR	TRUE	RELATIVE		
9. GRAPHIC DATA DISP OFF				

5.9 Function Check

5.9.1 Vector Constant Setting (ATA)

Do not change the set point carelessly.

Attention

The vector constant is generally set to 7. If the constant is set to a larger value, target vectors can be followed up easily when targets or the own ship change(s) their or its course or speed. On the contrary, the vector accuracy is degraded.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [5] key to open the ATA #1 menu.**
3. **Press the [9] key to open the ATA #2 menu.**
4. **Press the [3] key to open the ATA TEST menu.**
5. **Press the [2] key twice to select "VECTOR CONST".**
6. **When changing the vector constant, use the data entry key to enter the value to be changed and fix this setting using the [ENT] key.**

Exit

7. **Press the [SUB MENU] key.**

ATA TEST

ATA TEST		0. PREV
1. TEST VIDEO	VDG VDH VDL	
2. VECTOR CONST	7	
3. VIDEO TD LEVEL	2 4	
4. VIDEO HIGH LEVEL	1 8	
5. VIDEO LOW LEVEL	6	
6. GATE SIZE	NORMAL SMALL	
7. ATA NOISE LEVEL	220	
8. ATA FTC LEVEL	214	

5.9.2 Video Level Setting

Do not change the set point carelessly.

> **Attention**
>
> The video level is for deciding the minimum input signal level for the ATA's target detection circuit.
> The video level can be set to the range from 1 to 63.
> Unless the level is set to a proper value, the acquiring and tracking functions of ATA will be degraded.

Setting the video TD level

The video TD level is the signal level of target acquisition in the guard zone. As the setting value is smaller, a weaker echo is acquired.

If the setting is too small, the echo is acquired even due to the sea clutter returns. In that case, increase the setting value.

5

Procedures

1. **Set**

RANGE:	**3 NM**
TUNE:	**Optimum**
GAIN:	**Maximum**
SEA CLUTTER:	**Optimum**
RAIN CLUTTER:	**Optimum**

.

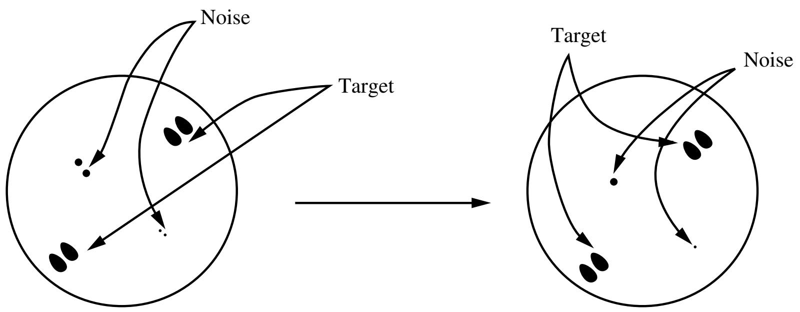
2. **Press the [SUB MENU] key to open the SUB MENU.**
3. **Press the [5] key to open the ATA #1 menu.**
4. **Press the [9] key to open the ATA #2 menu.**
5. **Press the [3] key to open the ATA TEST menu.**
6. **Press the [3] key twice to select "VIDEO TD LEVEL".**
7. **When changing the setting value of the video level, press the [0] to [9] keys to enter the value of the video level and press the [ENT] key to fix this setting.**

Determining the setting value

Set the range to 3 to 6 miles and increase the video level watching the test video on the screen. Then check the video level in which the test video (VDG) is not issued due to noise. Finally, set the video level to a larger value by 4 or 5 than the video level that was checked in the above operation procedure as an appropriate video level so that the test video cannot be issued due to noise. For example, when the video level is 20, set 20 + 4 = 24 as an optimum video level.

Exit

8. Press the SUB MENU key.



Test videos (VDG) caused by sea clutter or noise appear.

Test videos are seen only far away from targets.

ATA TEST

ATA TEST		0. PREV
1. TEST VIDEO	VDG VDH VDL	
2. VECTOR CONST	7	
3. VIDEO TD LEVEL	2 4	
4. VIDEO HIGH LEVEL	1 8	
5. VIDEO LOW LEVEL	6	
6. GATE SIZE	NORMAL SMALL	
7. ATA NOISE LEVEL	220	
8. ATA FTC LEVEL	214	

Setting the video HIGH level

The video HIGH level is a signal level used for tracking a target in the near distance.
As the setting value is smaller, the target with a weaker signal becomes easy to track, but if it is too small, the sea clutter return and the like are tracked.

Procedures

1. **Press the [4] key twice in the procedure 6 of "Setting the video TD level" to select "VIDEO HIGH LEVEL".**
2. **Press the [0] to [9] keys to enter the value of the video level and press the [ENT] key to fix this setting.**

Exit

3. **Press the [SUB MENU] key.**

Setting the video LOW level

The video LOW level is a signal level used for tracking a target in the far distance. When a weak target in the far distance is difficult to track, decrease the setting value.
When the level is increased exceedingly, the noise is tracked.

Procedures

1. **Press the [5] key twice in the procedure 6 of "Setting the video TD level" to select "VIDEO LOW LEVEL".**
2. **Press the [0] to [9] keys to enter the value of the video level and press the [ENT] key to fix this setting.**

Exit

3. **Press the [SUB MENU] key.**

5.9.3 Checking the ATA Operation

ATA test video

For the target which is being acquired or tracked, it can be inspected that video signals are normally input to the target detection circuit and processed.

Procedures

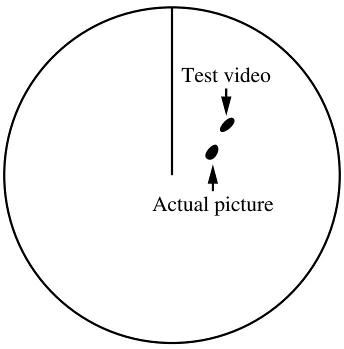
1. **Set**

RANGE:	**3 NM**
TUNE:	**Optimum**
GAIN:	**Maximum**
SEA CLUTTER:	**Optimum**
RAIN CLUTTER:	**Optimum**

2. **Press the SUB MENU key to open the SUB MENU**
3. **Press the 5 key to open the ATA #1 menu.**
4. **Press the 9 key to open the ATA #2 menu.**
5. **Press the 3 key to open the ATA TEST menu.**
6. **Press the 1 key to select "TEST VIDEO".**
7. **Press the 1 key and then press the ENT key to select "VDH".**

Confirm that the test video is displayed on the PPI screen at 0.1 mile far in the distance direction from the actual image and a target is tracked.
When the test video is not displayed and the target is tracked, the setting of the video level is assumed to be inappropriate and the fault of the ATA target detection circuit PC4403 is assumed.

(Usually, use VDH to execute the test video.)



Exit

8. **Press the ENT key.**

The test video disappears.

ATA TEST

ATA TEST		0. PREV
1. TEST VIDEO	VDG VDH VDL	
2. VECTOR CONST	7	
3. VIDEO TD LEVEL	2 4	
4. VIDEO HIGH LEVEL	1 8	
5. VIDEO LOW LEVEL	6	
6. GATE SIZE	NORMAL SMALL	
7. ATA NOISE LEVEL	220	
8. ATA FTC LEVEL	214	

5.10 Target Past Track

Target past track function cannot be used in the radar mode.
Use it in the composite mode (a plotter option is required.)

Setting the composite mode

Procedures **When pressing the MAP key, the mode sequentially changes into the radar mode, composite mode (R+P), and plotter mode (the NDB-33 plotter option is provided).**
The composite mode is selected.

Attention

The past track of a target which is tracked by the ATA is stored and displayed.
The tracking target with its target number (Other ship's track number) is set so that target past track can be displayed.

5.10.1 Setting Target Past Track Function

Attention

Setting this function to ON stores and displays up to 10 target past tracks.
Setting it to OFF does not store and display target past track.
If target past track is not erased, this function holds the storage of target past track even while it is set to OFF.

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 7 key to open the ATA TRACK menu.**
3. **Press the 1 key to select "TRACK FUNCTION".**
4. **Press the 1 key to select "OFF" or "ON".**
5. **Press the ENT key.**

Exit

6. **Press the SUB MENU key to close the ATA TRACK menu.**

ATA TRACK

ATA TRACK		0. PREV 9. NEXT

1.	TRACK FUNCTION			OFF	ON								
2.	TRACK COLOR												
		ALL	0	1	2	3	4	5	6	7	8	9	OTHER
			WHT	SKY	BLU	GRN	YEL	PNK	RED	WHT	WHT	WHT	WHT
3.													
4.	TRK DISPLAY	ALL	0	1	2	3	4	5	6	7	8	9	OTHER
5.	TRK MEM INTERVAL	OFF	10SEC		30SEC		1MIN		3MIN		5MIN		10MIN

5.10.2 Specifying Target Past Track

Attention

This setting is valid when target past track function is ON.
It can specify up to 10 target past tracks.
Even when target past track is released, the tracking of a target is continued.

Specifying target past track

Procedures

1. **Press the [TGT DATA] key.**
2. **Press the [0] to [9] keys to enter target past track ID.**
3. **Align the + cursor to the target being tracked for which target past track is not displayed and press the [ENT] key.**

Releasing target past track

Procedures

1. **Press the [TGT DATA] key.**
2. **Align the + cursor to the target being tracked for which target past track specification is to be released and press the [CLR] key.**

   Besides, use the [0] to [9] keys to enter target past track number to be released and press the [CLR] key.

5.10.3 Setting Target Past Track Color

Attention

This setting is valid when target past track function is ON.
Seven colors (white, sky, blue, green, yellow, pink, and red) are used to specify individual target past tracks (duplicate colors allowed).
If all colors are specified, the color that is individually set to target past track numbers 0 to 9 is invalidated.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [7] key to open the ATA TRACK menu.**
3. **Press the [2] key to select "TRACK COLOR".**
4. **Press the [2] key to select target past track number.**
5. **Turn the [COLOR] control to select a color.**
6. **Press the [ENT] key to fix this setting.**

   The color of target past track with the specified target past track number is switched to a new setting.

Exit

7. **Press the [SUB MENU] key to close the ATA TRACK menu.**

ATA TRACK

ATA TRACK		0. PREV 9. NEXT

1. TRACK FUNCTION OFF ON
2. TRACK COLOR

	ALL	0	1	2	3	4	5	6	7	8	9	OTHER
		WHT	SKY	BLU	GRN	YEL	PNK	RED	WHT	WHT	WHT	WHT

3.
4. TRK DISPLAY ALL 0 1 2 3 4 5 6 7 8 9 OTHER
5. TRK MEM INTERVAL OFF 10SEC 30SEC 1MIN 3MIN 5MIN 10MIN

5.10.4 Setting Target Past Track Display

Attention

This setting is valid when target past track function is ON.
This function continues storing target past track irrespective of this setting.
It sets the display ／ non-display of target past track (up to 10 target) with the specified target past track number.
If all are set, the display／non-display of the track that is individually set to target past track numbers 0 to 9 are invalidated.

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 7 key to open the ATA TRACK menu.**
3. **Press the 4 key several times to select "TRK DISPLAY".**
4. **Press the 4 key to select target past track number.**
5. **Press the ENT key for fix this setting.**

   The display／non-display of target past track with the specified target past track number is switched. (The item indicated by an underline is displayed.)

Exit

6. **Press the SUB MENU key to close the ATA TRACK menu.**

ATA TRACK

ATA TRACK													0. PREV 9. NEXT
1.	TRACK FUNCTION		OFF	ON									
2.	TRACK COLOR												
		ALL	0	1	2	3	4	5	6	7	8	9	OTHER
			WHT	SKY	BLU	GRN	YEL	PNK	RED	WHT	WHT	WHT	WHT
3.													
4.	TRK DISPLAY	ALL	0	1	2	3	4	5	6	7	8	9	OTHER
5.	TRK MEM INTERVAL	OFF	10SEC	30SEC	1MIN	3MIN	5MIN	10MIN					

5.10.5 Setting the Storage Interval

Attention

This setting is valid when target past track function is ON.
Setting this function to OFF does not store target past track. In this case, the display of target past track is continued until the screen is rewritten by changing the range, etc.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [7] key to open the ATA TRACK menu.**
3. **Press the [5] key to select "TRK MEM INTERVAL".**
4. **Press the [5] key to select an interval.**
5. **Press the [ENT] key to fix this setting.**

Exit

6. **Press the [SUB MENU] key to close the ATA TRACK menu.**

ATA TRACK

ATA TRACK													0. PREV 9. NEXT
1. TRACK FUNCTION	OFF	<u>ON</u>											
2. TRACK COLOR													
	ALL	0	1	2	3	4	5	6	7	8	9	OTHER	
		WHT	SKY	BLU	GRN	YEL	PNK	RED	WHT	WHT	WHT	WHT	
3.													
4. TRK DISPLAY	<u>ALL</u>	0	1	2	3	4	5	6	7	8	9	OTHER	
5. TRK MEM INTERVAL	OFF	10SEC	30SEC	<u>1MIN</u>	3MIN	5MIN	10MIN						

5.10.6 Erasing the Storage of Target Past Track by Specifying a Color

Attention

This setting is valid when target past track function is ON.
This function erases the storage of target past track with the specified target past track color.
The erased target past track is not reproduced.

Erasing target past track

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 7 key to open the ATA TRACK menu.**
3. **Press the 9 key to open the CLR TRACK menu.**
4. **Press the 1 key to select "CLEAR TRACK COLOR".**
5. **Press the 1 key to select target past track color.**
6. **When pressing the ENT key, the confirmation display of erase will appear.**
7. **Press the ENT key to erase the storage of target past track.**

Exit

8. **Press the SUB MENU key to close the CLR TRACK menu.**

Canceling erase

Press the CLR key instead of the ENT key in the operation procedure 7 of erasing target past track to stop the erase of target past track.

CLR TRACK

CLR TRACK		0. PREV

1. CLEAR TRACK COLOR ALL WHT SKY BLU GRN YEL PNK RED
2. CLEAR TRACK NUMBER ALL 0 1 2 3 4 5 6 7 8 9 OTHER
3. CARD 2 TRACK DISP 0

5.10.7 Erasing the Storage of Target Past Track by Specifying a Number

Attention

This setting is valid when target past track function is ON.
This function erases the storage of target past track with the specified target past track number.
The erased target past track is not reproduced.

Erasing target past track

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [7] key to open the ATA TRACK menu.**
3. **Press the [9] key to open the CLR TRACK menu.**
4. **Press the [2] key to select "CLEAR TRACK NUMBER".**
5. **Press the [2] key to select the confirmation display of erase.**
6. **When pressing the [ENT] key , the confirmation display of erase will appear.**
7. **Press the [ENT] key to erase the storage of target past track.**

Exit

8. **Press the [SUB MENU] key to close the CLR TRACK menu.**

Canceling erase

Press the [CLR] key instead of the [ENT] key in the operation procedure 7 for erasing target past track to stop the erase of target past track.

CLR TRACK

CLR TRACK		0. PREV
1. CLEAR TRACK COLOR	ALL WHT SKY BLU GRN YEL PNK RED	
2. CLEAR TRACK NUMBER	ALL 0 1 2 3 4 5 6 7 8 9 OTHER	
3. CARD 2 TRACK DISP	0	

5.10.8 Reading Taget Past Track from Card 2

Attention

This setting is valid when target past track function is ON and is set in the composite mode and plotter mode.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [7] key to open the ATA TRACK menu.**
3. **Press the [9] key to open the CLR TRACK menu.**
4. **Press the [3] key to select "CARD 2 TRACK DISP".**
5. **When pressing the [3] key, input of a file number is enabled.**
6. **Press the [0] to [9] keys to enter a file number.**
7. **Press the [ENT] key to fix this setting.**

   The track with the specified file number is displayed.

Exit

8. **Press the [SUB MENU] key close the CLR TRACK menu.**

CLR TRACK

CLR TRACK		0. PREV

1. CLEAR TRACK COLOR	ALL	WHT	SKY	BLU	GRN	YEL	PNK	RED					
2. CLEAR TRACK NUMBER	ALL	0	1	2	3	4	5	6	7	8	9	OTHER	
3. CARD 2 TRACK DISP	0												

5

5.10.9 Writing Target Past Track to Card 2

Attention

This setting is valid when target past track function is ON and is set in the composite mode and plotter mode.
Write target past track by entering 4-digit file number that is not stored on the memory card.

Procedures

1. Press the [SUB MENU] key to open the SUB MENU.
2. Press the [6] key to open the PLOTTER menu.
3. Press the [5] key to select "MEM CAPACITY ／ COPY MEM MENU".
4. Insert the memory card to the slot of card 2.
5. Press the [2] key twice to select "COPY INSIDE → Card 2".
6. Press the [0] to [9] keys to enter a 4-digit file number.
7. Press the [ENT] key.
8. For writing confirmation, press the [ENT] key to execute writing.

   To stop writing, press the [CLR] key for the writing confirmation.

Exit

9. Press the [SUB MENU] key.

5.11 Turning ON and OFF the ATA Display

For the target which is acquired or tracked, this function sets the display／non-display of the ATA symbol and numeric data.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [5] key to open the ATA #1 menu.**
3. **Press the [1] key to select "ATA SYMBOL/TARGET DATA".**
4. **Press the [1] key to select the display "OFF" or "ON" regarding the ATA symbol.**
5. **Press the [ENT] key to fix this setting.**
6. **Press the [1] key to select the display "OFF" or "ON" regarding target data.**
7. **Press the [ENT] key to fix this setting.**

Exit

8. **Press the [SUB MENU] key.**

Note

● The vector time and vector mode information are always displayed on the screen.

ATA #1

ATA #1				0. PREV 9. NEXT
1. ATA	SYMBOL	OFF <u>ON</u>		
	TAGET DATA	OFF <u>ON</u>		
2. VECTOR TIME		5MIN (0-60MIN)		
3. PAST POSITION		<u>OFF</u> ON		
4. PAST POSITION TIME		30 SEC <u>1 MIN</u> 2 MIN 4 MIN		
5. LIMITS	CPA	5. 0NM (0.1-9.9NM)		
	TCPA	15MIN (1-99MIN)		

5

5.12 Turning On and OFF the Alarm Sound of Dangerous and Lost Targets

When the target which is acquired or tracked was changed to a dangerous target or when the target failed in tracking and was lost, this function sets the ON ／ OFF of an alarm sound to be generated.

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 5 key to open the ATA #1 menu.**
3. **Press the 9 key to open the ATA #2 menu.**
4. **Press the 1 key to select "AUDIBLE WARNING".**
5. **Press the 1 key to select the display "OFF" or "ON" of an AUDIBLE WARNING regarding a dangerous target.**
6. **Press the ENT key to fix this setting.**
7. **Press the 1 key to select the display "OFF" or "ON" of an AUDIBLE WARNING regarding a lost target.**
8. **Press the ENT key to fix this setting.**

Exit

9. **Press the SUB MENU key.**

ATA #2

ATA #2						0. PREV
1. AUDIBLE WARNING						
	CPA ／ TCPA	OFF	<u>ON</u>			
	LOST TARGET	OFF	<u>ON</u>			
2. DISPLAY OF CPA RING		OFF	<u>ON</u>			
3. ATA TEST MENU						
4. SIMULATION		<u>OFF</u>	STOP	NEAR	FAR	

5.13 Simulation (Checking the ATA according to a Pseudo Target)

To check the ATA, this function displays a pseudo target on the screen.

Procedures

1. **Set GAIN to the minimum.**
2. **Press the SUB MENU key to open the SUB MENU.**
3. **Press the 5 key to open the ATA #1 menu.**
4. **Press the 9 key to open the ATA #2 menu.**
5. **Press the 4 key to select "SIMULATION".**
6. **Press the 2 key to select "OFF", "STOP", "NEAR" or "FAR.**
7. **Press the ENT key to fix this setting.**

   The radar image will disappear, a pseudo target is displayed in the zero degree direction, and the XX character will appear under the screen.

Exit

8. **Press the SUB MENU key.**

   A target is displayed in 3 miles for STOP, 4 miles for NEAR, and 2 miles for FAR. Selecting OFF returns to the normal radar image.

ATA #2

ATA #2					0. PREV
1. AUDIBLE WARNING					
CPA／TCPA	OFF	<u>ON</u>			
LOST TARGET	OFF	<u>ON</u>			
2. DISPLAY OF CPA RING	OFF	<u>ON</u>			
3. ATA TEST MENU					
4. SIMULATION	<u>OFF</u>	STOP	NEAR	FAR	

6

TRUE AND FALSE ECHOES ON DISPLAY

6.1 Radar Line-of-sight Range ········ 6-1
6.2 Strength of Reflection from Target ········ 6-3
6.3 Sea Clutters ········ 6-3
6.4 False Echoes ········ 6-3
6.5 Display of Radar Transponder ········ 6-6

The role of the radar operator is to analyze pictures on the screen and to help maneuvering the ship as much as possible.

For the purposes, the operator have to fully understand the merits and demerits of the radar before observing the screen.

To analyze pictures on the screen, it is important to get many experiences of comparing targets in sight with their pictures on the screen by operating the radar on sunny days.

The radar is mainly used to monitor courses of the own ship and other ships in open sea, to check buoys and other navigation marks when entering ports, to measure own ship position in coastal waters on the chart to take distances to and bearings of land and island and to observe positions and motions of targets appeared on the screen in heavy rain. Explanations on radar screen will follow hereunder:

6.1 Radar Line-of-sight Range

Radar wave has the characteristic to propagate along the curved surface of the earth. This characteristic varies with the character of air layer through which the wave propagates. In the normal propagation, the radar line-of-sight range (D) can be expressed as follows though the distance is generally said about 10% longer than the distance to the optical line-of-sight range (see Fig. 6.1).

$$D = 2.23 \left(\sqrt{h_1} + \sqrt{h_2} \right) \text{(nm)}$$

h1 : Height of radar scanner above sea level (m)

h2 : Height of target above sea level (m)

Fig. 6.2 shows how to radar line-of-sight range in normal wave propagation.

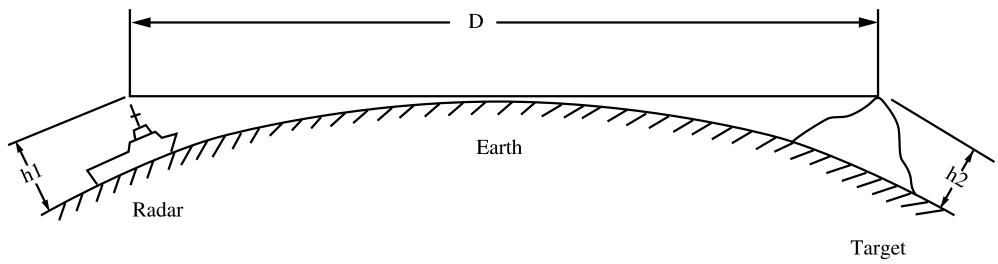


Fig. 6.1

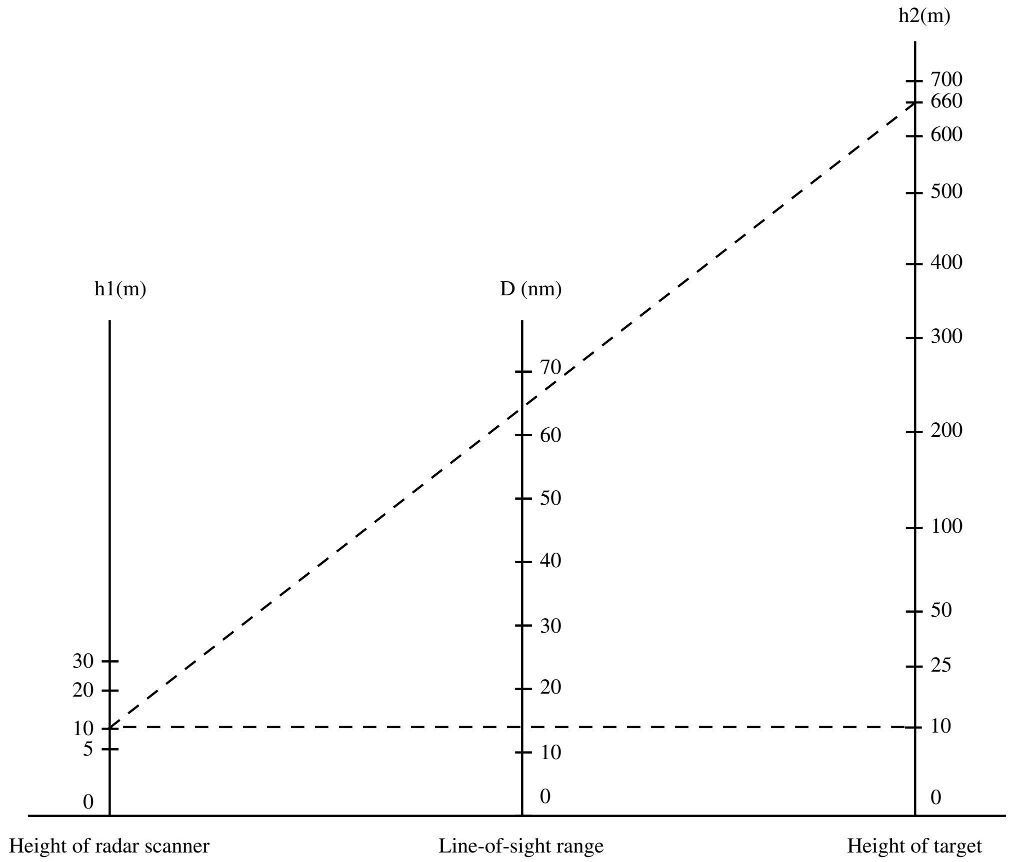


Fig. 6.2

When the height of own ship's antenna is 10m, for example,

a) When the radar line-of-sight range is 64nm, the height of a target to be observed on the radar screen have to be 660m or more.

b) When the height of a target is 10m, the radar line-of-sight range is 15nm. But the maximum radar range varies with size of target and weather condition, and the range may increase or decrease.

6.2 Strength of Reflection from Target

The strength of target echo returns depends on component materials and shape of the target as well as height and size of the target, and the echo returns from a high and large target is not always strong in general.
In particular, coastal lines on the screen are affected by land forms, and, when a low land coastal line continues, only inland mountain echo returns are displayed on the screen. So the distance to a coastal line should be measured very carefully.

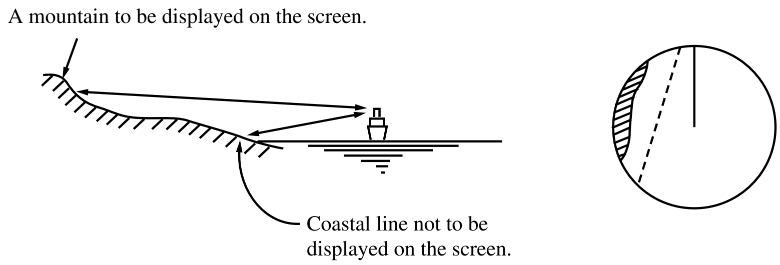


Fig. 6.3

6.3 Sea Clutters

When the sea is rough, a bright and wide picture appears in the center of the screen. The higher the waves are, the stronger echo returns. Swirling current is sometimes displayed as smooth as coastal line.

6.4 False Echoes

Pictures of targets which do not exist actually may bother the observer sometimes. The following are supposed to be causes of such false echoes:

[I] Shadow Effect

When the scanner is located in some area, radar waves are reflected with funnel or mast in the vicinity and targets in the direction may not appear on the screen. To check if there exists any shadow area, observe where sea clutters are thin and do not exist on the screen. Such shadow area may appear in the same direction all the time, if any. In this case, you should memorize the direction.

[II] Influence of Side Lobe

An ark with an broken line may appear in the same distance as the video by the scanner beam main lobe. Such false echo is relatively easier to be detected when the target is isolated (see Fig. 6.4).

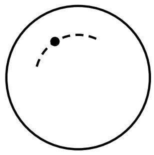


Fig. 6.4

[III] False Echo by Secondary Reflection

When a target exists near the own ship, two echoes, true echo and indirect echo of the same target may appear. The true echo is caused by direct reflection from the target, and the indirect echo is caused by secondary reflection from mast or funnel as shown in Fig. 6.5. The indirect echo appears in the direction of the mast or funnel.

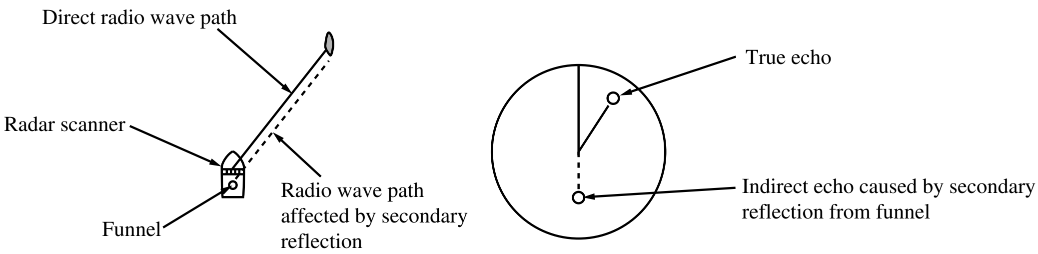


Fig. 6.5

[IV] Indirect Echo by Multiple Reflection

When there is a building or a large ship having a large vertical surface as shown in Fig. 6.6, evenly spaced echoes caused by multiple reflection may be displayed. In this case, nearest echo is the true echo of the target.

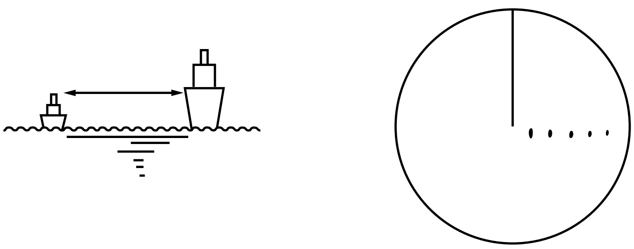


Fig. 6.6

[V] Anomalous Propagation

The maximum radar range depends on the heights of the antenna and target as explained in section "6.1 Radar Line-of-sight Range". If duct occurs on the sea surface in certain atmospheric conditions, however, a transmitted beam of enery will be abnormally propagated and targets far away from the own ship may be detected.

For example, when the radar has been set to the range of 6nm short pulse (with repetition frequency of 1560Hz), the first pulse is reflected from a target about 52nm or more away and is received at the time of next pulse repetition and its false echo is formed at a place about 52nm shorter than the actual distance.

Should a false echo appears 5nm away on the screen, the true distance of the target is 5+52=57nm.

When the radar has been set to the range of 1.5 nm short pulse or medium pulse (with the repetition pulse of 2080Hz), a false echo may appear at a place about 39nm shorter than the actual distance.

This kind of false echo can be judged in observing distance changes of echoes by changing the range scale (the repetition frequency).

When those false echoes always appear on the screen, set "ECONOMY" mode of transmission repetition frequency.

See subsection "8.5.3.6 Setting Transmission Repetition Furequency" or section "3.4 Using Function Key [FUNC]".

[VI] Radar Interference

When a radar of the same frequency band is near the own ship, a radar interference pattern will appear on the screen. This interference causes various patterns consisting of many spots. Since these spots do not appear at same places, they can be distinguished from target echoes. (see Fig. 6.7).

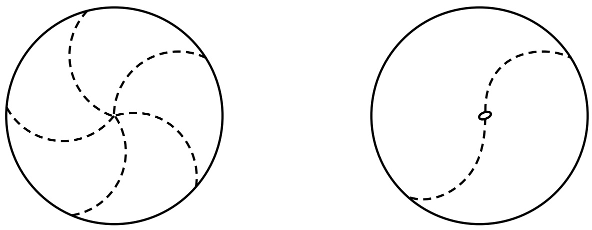


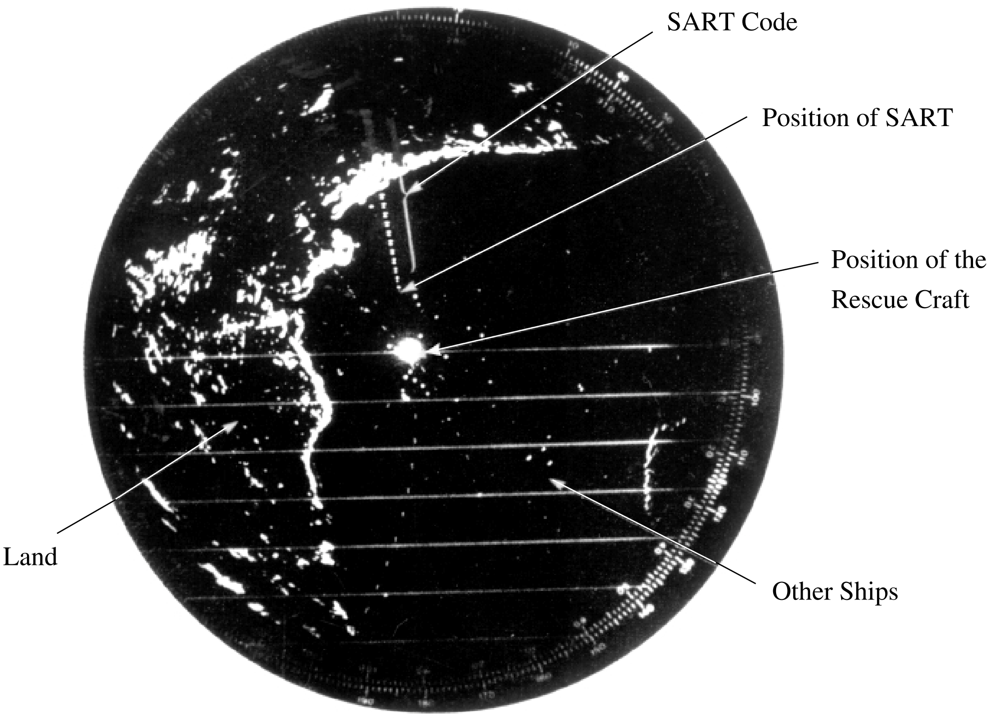
Fig. 6.7

6.5 Display of Radar Transponder

SART (Search and Radar Transponder) is life preserving device approved by GMDSS which is used for locating survivors in the event of a disaster or distress. SART operates in the 9GHz frequency band. When it receives a radar signal (interrogating radio wave) of 9GHz transmitted by a rescue ship or aircraft radar, SART transmits a series of respouse signals to the searchers to indicate the distress position.

In order to see the SART or radar beacon mark on the radar screen.

① RANGE SCALE	:	Select 6 or 12 nm
② SEA control	:	Set to minimum
③ AUTO SEA	:	OFF
④ TUNE	:	DETUNED to reduce the clutter
⑤ IR	:	Set IR OFF
⑥ PROCESS	:	Set PROCESS OFF



Attention

When above settings ① to ⑥ are made to display SART signals, objects around the own ship will not appear on the radar screen, so perform thorough visual monitoring of the sea area around the own ship to avoid any collision or stranding.
Further, when more than one radar systems are mounted, while using a 9GHz band radar for searching SART signals, be sure to use another radar as an ordinary radar to perform monitoring of objects around the own ship to avoid any collision, check of the position of the own ship to avoid any stranding, and so on.
Need to return the set for normal operation on completeion.

7
MAINTENANCE

7.1 Routine Maintenance 7-1
7.2 Maintenance of Each Unit 7-2

7.1 Routine Maintenance

⚠ CAUTION

Internal inspection and maintenance must be conducted by our special maintenance personnel, otherwise fire or an electric shock may occur.
Ask our sales department, nearest office or your local distributor for internal inspection and maintenance.

Be sure to turn the main power source off before maintenance, otherwise an electric shock may occur.

⚠ CAUTION

Do not use any organic solvent such as thinner or benzine when cleaning the surface. Otherwise the surface coating may be damaged. For cleaning of the surface, remove dirt and dust and wipe it with a clean, dry cloth.

Maintenance as described below is required for keeping the radar in a good condition. Since appropriate maintenance reduces failure, it is recommended to maintain the radar regularly.

7.1.1 Cleaning

7.1.1.1 Cleaning of the Radar

Clear the radar body of dust, soil or seawater as much as possible with a dry cloth. In particular, completely clean the air duct using a brush so as to allow sufficient air to go through it.

7.1.1.2 Cleaning of the ATA

When sea water of fresh water is sprinkled on this equipment, wipe it immediately.
It might cause a fault and an incorrect operation.
Softly wipe the dirt of this equipment by soaking a detergent in a soft cloth in such a degree that the detergent cannot be dropped.

7.2 Maintenance of Each Unit

7.2.1 Scanner unit NKE-1055 ／ 1056

⚠ WARNING
Before starting maintenance of the scanner unit, be sure to turn off the main power source, otherwise you may get an electric shock or be injured.
Be sure to set the safety switch for stopping the scanner unit to "OFF", otherwise you may be injured.

After maintenance, set the safety switch for stopping the scanner unit to "ON" (see Figs. 7.1 and 7.2).

1) Front Radiating Window

If the front radiating window is soiled with soot, salt, dust, paint or bird's dropping, radarbeam will be attenuated or reflected and radar performance will be degraded.

Check the radiating window, and if it is soiled, wipe it with a soft cloth wetted with alcohol or water and try to keep it clean all the time.
Never use solvents of gasoline, benzine, trichloroethylene or ketone for cleaning, otherwise the radiant plane will be deteriorated.

2) Scanner Unit Mechanism

(1) Oiling to Gear

Apply grease evenly to the main shaft driving gear and the encoder driving gear by using a spreader or brush. Greasing at short intervals is effective to prevent gears from wear and to extend the service life. Make it a rule to grease them every six months at least.
Use Mobilux 2 of Mobile Oil.

(2) Mounting Legs

Check the Mounting legs and mounting bolts of the scanner frame at a certain interval for corrosion and keep them in order. Apply paint to them every six month because painting is the best measure against corrosion.

(3) Motor

Check the brush and commutator contact every 200 operating hours and replace it if the brush extremely wears (a spare is attached). The brush service life is approximately 3,000 hours. Replace the brush when it has worn to the notch at the two-thirds of the total length (see Fig. 7.3).

Fig. 7.1 NKE-1055 Scanner unit (Rear)

Fig. 7.2 NKE-1056 Scanner unit (Rear)

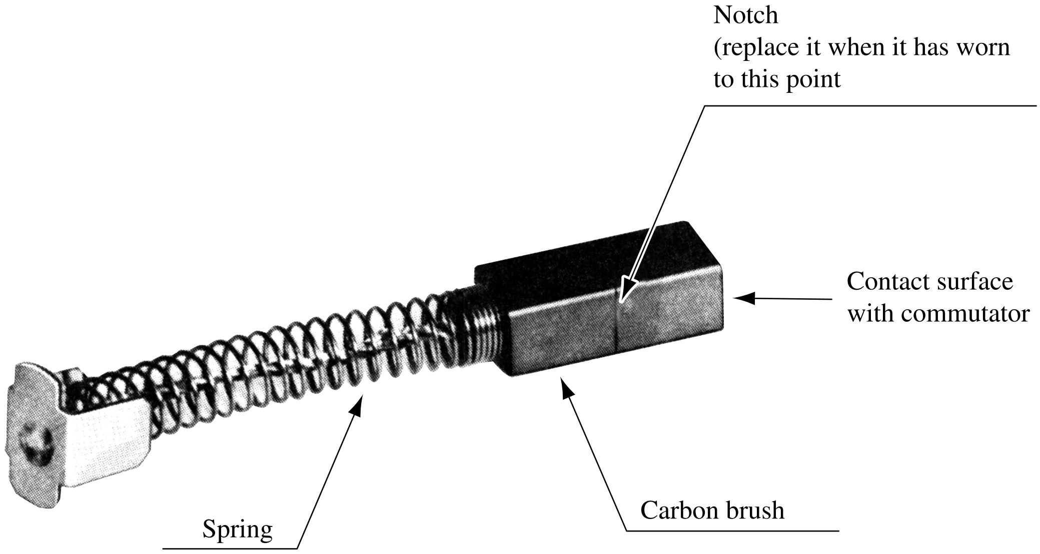


Fig. 7.3 Carbon Brush

7.2.2 Display Unit NCD-3901-2

Cleaning of CRT Surface

Dusts accumulated on the CRT surface will reduce clarity and darken pictures.
For cleaning, wipe it with a soft cloth (flannel or cotton) wetted with water. Do not wipe it strongly with a dry cloth nor use gasoline or thinner.

⚠ CAUTION

When cleaning the CRT, do not wipe it strongly with a dry cloth nor use gasoline or thinner, otherwise it will be damaged or deteriorated.

8

COUNTERMEASURES FOR TROUBLE AND ADJUSTMENT

8.1 Function Check 8-1

8.2 Failure Check 8-8

8.3 Troubleshooting 8-10

8.4 Replacement of Major Parts 8-14

8.5 Adjustment and Setting 8-19

8.1 Function Check

8.1.1 Function Check

Regularly check the radar and whenever abnormalities being found, investigate the cause of trouble. In checking, pay special attention to the high voltage circuits and take care not to cause any trouble by error or carelessness during the measurement. Take note of the results of check, which would be very effective for inspection in the future.
Conduct the function checks in accordance with Table 8.1 and in the order as specified in the table.

Table 8.1 Function Check List

Equipment to be checked	Check item	Criteria	Remark
Scanner	Receiver's tuning LED	The LED is on during operation.	48 nm range
Display unit	Pictures on the screen Sensitivity Brilliance of CRT Various markers Various numerical indications Illumination	Can be controlled correctly.	
	Magnetron current	Refer to subsection 8.1.2.8.	

8.1.2 Testing Functions with Menu

This radar enables to open the diagnosis menu to check functions.

Diagnostic 1

DIAGNO STIC 1		0. PREV
1. SENSOR TEST 2. LINE TEST 3. ATA STATUS 4. ROM VERSION 5. ERROR LOGGING MAG. I. ■■■□□□□□ RUNNING TIME XXXX HR TX TIME XXXX HR		

Diagnostic 2

DIAGNO STIC 2		0. PREV
1. MEMORY TEST (STBY) 2. KEY SWITCH TEST (STBY)		

8.1.2.1 Memory Test

This test is used to check the operating status of the built-in memory.

Procedures

1. **Press the [SUB MENU] key.**
2. **Press the [9] key four times to open the INIT SET #4 menu.**
3. **Press the [3] key to open the DIAGNOSTIC 2 menu.**
4. **Press the [1] key to select "MEMORY TEST".**
5. **Press the [1] to [6] keys to start checking.**

   "OK" appears on the normally operated items.

Exit

6. **Press the [SUB MENU] key.**

Memory Test

MEMORY TEST

		GRAPHIC	RAM
		G0	OK
		G1	OK
0. PREVIOUS MENU		G1'	OK
1. SRAM	OK	G2	OK
2. GRAPHIC RAM		G3	OK
3. FLASH ROM	OK	G4	OK
4. ATA COMMON RAM	OK	G5	OK
5. CARD 1	OK	G5'	OK
6. CARD 2	OK	G6	OK
		G7	OK
		G7'	OK
		G8	OK
		G9	OK
		G9'	OK
		G10	OK
		G11	OK

To close this menu, press (SUB MENU) key.

8

8.1.2.2 Key Switch Test

This test is used to check the operating status of each knob/switch.

Procedures

1. **Follow procedures 1 to 3 in subsection 8.1.2.1.**

   The DIAGNOSTIC 2 menu appears.

2. **Press the [2] key to open the KEY SWITCH TEST menu.**

3. **Press controls or keys according to the menu item to check them.**

   They normally operate if the numeral displays change. "255" is displayed when the control is turned to the maximum and "0" when to the minimum.

4. **Press the [0] key.**

Exit

5. **Press the [SUB MENU] key.**

Key Switch Test

KEY SWITCH TEST

0. PREVIOUS MENU

KEY		xxxxx
TRACK BALL	X	42
	Y	38
VOLUME	GAIN	255
	TUNE	126
	STC	0
	FTC	0
	BRILL	250
SHAFT ENCODER	EBL	0
	VRM	255
ROTARY SWITCH	RED	
	1 8	
DIPSW1	0 0 0 0 0 0 0 0	
DIPSW2	0 0 0 0 1 0 0 0	

To close this menu, Press (SUB MENU) key.

8.1.2.3 Sensor Test

This test is used to check signals from the scanner unit.

Procedures

1. **Follow procedures 1 to 2 in subsection 8.1.2.1.**
2. **Press the 2 key to open the DIAGNOSTIC 1 menu.**
3. **Press the 1 key to open the SENSOR TEST menu.**
   "OK" is displayed when the bearing pulses (BP and BZ) are input in the display unit.

Exit

4. **Press the SUB MENU key.**

Sensor Test

SENSOR TEST		0. PREV
SAFETY KEY	OK	
BEARING PULSE (BP)	OK	
BEARING PULSE (BZ)	OK	

8.1.2.4 Line Test

This test is used to check the communication status with optional equipment.

Procedures

1. **Follow procedures 1 to 2 in subsection 8.1.2.3.**
   The DIAGNOSTIC 1 menu appears.
2. **Press the 2 key to open the LINE TEST menu.**
   "ON" appears when communication or connection has been established.

Exit

3. **Press the SUB MENU key.**

Line Test

LINE TEST		0. PREV
NSK	ON	
UART1	ON	
UART2	OFF	
ATA	ON	

8

8.1.2.5 ATA Status

This test is used to check the acquiring status of the ATA. The display is available only when the ATA (NCA-843) is used.

Procedures

1. **Follow procedures 1 to 2 in subsection 8.1.2.3.**
   The DIAGNOSTIC 1 menu appears.
2. **Press the [3] key to open the ATA STATUS.**
   When the ATA is not installed, "**" appears.

Exit

3. **Press the [SUB MENU] key.**

ATA Status

ATA STATUS		0. PREV
TRACKING NUMBER TD INTERRUPT NUMBER GZ NUMBER		

8.1.2.6 ROM Version

This test is used to check the versions of the software.

Procedures

1. **Follow procedures 1 to 2 in subsection 8.1.2.3.**
   The DIAGNOSTIC 1 menu appears.
2. **Press the [4] key to open the ROM VERSION.**
   The versions of MAIN CPU, NSK, ATA CPU and ATA TD are displayed.

Exit

3. **Press the [SUB MENU] key.**

ROM Version

ROM VERSION			0. PREV
MAIN CPU	V 1.01	21/09/1998	
NSK	V 1.0		
ATA CPU	V 1.0		
ATA TD	V 1.0		

8.1.2.7 Error Logging

This test is used to display the history of the errors occurred.

Procedures

1. **Follow procedures 1 to 2 in subsection 8.1.2.3.**
   The DIAGNOSTIC 1 menu appears.
2. **Press the 5 key to open the ERROR LOGGING.**
   Refer to subsection “3.3.14 Stopping Alarm” for the contents of error information.

Exit

3. **Press the SUB MENU key.**

Error Logging

ERROR LOGGING		0. PREV
	XXXXXXXXXXXX XXXXXXXXXXXX XXXXXXXXXXXX XXXXXXXXXXXX XXXXXXXXXXXX XXXXXXXXXXXX XXXXXXXXXXXX XXXXXXXXXXXX XXXXXXXXXXXX	

8.1.2.8 Magnetron Current, Running and Transmission Time

This test is used to check the magnetron current by displaying the magnetron current bar.

Procedures

1. Follow procedures 1 to 2 in subsection 8.1.2.3.

The DIAGNOSTIC 1 menu appears.

The magnetron current bar, the totals of the running and transmission times are displayed.

RANGE	JMA-7725	JMA-7710
0.125 to 0.75nm	1 to 3 scales	1 to 2 scales
1.5nm	5 to 8 scales	3 to 5 scales
3nm	5 to 8 scales	3 to 5 scales
6 to 96 and 120 nm	5 to 8 scales	3 to 5 scales

Exit

2. Press the SUB MENU key.

The running time indicates the time when the power has been turned on and the transmission time indicates the total time when transmission has actually been conducted.

Diagnostic 1

DIAGNO STIC 1		0. PREV

1. SENSOR TEST
2. LINE TEST
3. ATA STATUS
4. ROM VERSION
5. ERROR LOGGING

MAG. I. ■■■□□□□□

RUNNING TIME XXXX HR

TX TIME XXXX HR

8.2 Failure Check

For semiconductor circuits, most troubles are considered to hardly occur without improper design, insufficient inspection, other external or artificial factors. Causes of most troubles are disconnection of high value resistor by humidity, defective variable resistor and imperfect contacts of buttons and relays.
Since troubles may also be caused by defective parts, improper adjustment (mostly improper adjustment of the tuning) and insufficient service (mostly imperfect contact of cable), further inspections and adjustments will be effective by taking the above into account (refer to Table 8.2 Failure Check List).
Since there must be some cause for fusing, be sure to investigate it even if no failure occurs after replacement. At the same time, keep in mind that each fuse have prearching time-current characteristics. Table 8.3 shows fuses in use.

Table 8.2 Failure Check List

No.	Failure status	Probable cause
1	No display on CRT	a. Power failure. Check the power LED (on when it normally operates). b. Fuse F5001 or 5002 (10A each) is fused. c. Monitor failure. Check that the heater is turned on. d. CPU control circuit PCB (PC4401) failure. e. Low ship's power.
2	The scanner unit does not rotate.	a. Fuse F5003 or 5004 (7A time lag) is fused. b. Rotation control circuit (I ／ F circuit PCB PC101) failure. c. Driving motor B101 failure. d. Scanner safety switch S101 failure. e. The motor control signal (C2) is disconnected.
3	No radar video appears although the scanner unit rotates (letters and markers are displayed).	a. Receiver failure. b. Time base circuit PCB (PC4402) failure. c. CPU control circuit PCB (PC4401) failure. d. Shaft encoder B102 failure.
4	The control switch is disabled.	a. CPU control circuit PCB (PC4401) failure if it is still disabled even after the power is turned on again.
5	No radar video appears although some noise occurs (letters and markers are displayed).	a. Fuse F5005 (0.5A) is fused. b. Modulator or magnetron failure. c. Power failure. Check the modulating high voltage (HV). d. Time base circuit (PC4402) PCB failure. Check the transmission trigger (TI).
6	No letter or marker appears although radar video does.	a. CPU control circuit (PC4401) PCB failure.
7	Poor sensitivity	a. Magnetron deterioration ／ failure. b. Modulator or pulse width switching failure. c. Receiver ／ MIC failure. d. Water leakage from radiating window or wave guide (soil, ice or snow on the window, or corrosion inside the wave guide). e. Tuning voltage failure. f. The pulse width switching signal (PW) is fused.

8

Table 8.2 (Continued)

No.	Failure status	Probable cause
8	Distorted display	a. Monitor failure or adjustment error. b. The horizontal (HS) or vertical (VS) synchronous signal is fused. c. CPU control circuit PCB (PC4401) failure.
9	No display appears even after pressing the fixed or variable range marker, electronic cursor or panel lighting key.	a. The marker brilliance is adjusted to the lowest. (See section “3.2 Preparation”) b. CPU control circuit PCB (PC4401) failure.
10	The screen returns to the default during operation.	a. Low ship's power. b. CPU control circuit PCB (PC4401) failure. c. Power (PC5101) failure.
11	No alarm occurs.	a. CPU control circuit PCB (PC4401) failure.
12	Radar tracking does not function.	a. CPU control circuit PCB (PC4401) failure. b. Time base circuit PCB (PC4402) failure. c. Low video brilliance.
13	The NUP or CUP display cannot be selected.	a. "SYNC" or "STEP" is not properly set on the NSK (PC4201).
14	"FAN" appears on the lower of the screen.	a. FAN failure. (B1)

⚠ **CAUTION**

In case of fan failure, radar unit will fail.
If fan failure occures, turn off the power at once, you should change the fan.

Table 8.3 List of Fuses in Use

Location		Parts No.	Rated current	Protection circuit	Type
Display unit	Inner	F5001 to F5002	10A	AC100V	MF60NR-10A
	Inner	F5001 to F5002	5A	AC220V	MF60NR-5A
	Inner	F5003 to F5004	7A	Time lag	MF61-TS7
	Inner	F5005	0.5A		MF60NR-0.5A
	Power supply	F1,F3,F5	3.15A		MF51NN-3.15A
	Power supply	F2	10A		MF51NN-10A
	Power supply	F4	0.5A		MF51NN-0.5A
	NSK	F1 to F4	0.5A	PC4201	MF51NN-0.5A

8.3 Troubleshooting

8.3.1 Troubleshooting for the Radar

When this radar has gotten out of order, ask our sales department or your local distributor for repair.
Refer the following failure causes when inspection or repairing the radar.

1. Imperfect contact of cables between equipment at terminal boards

a) Imperfect contact at terminal board
b) Improper cable terminal treatment - Earth or contact with other terminal.
c) Disconnection of cable

2. Imperfect contact of connectors inside equipment

The parts listed in Table 8.4 are attached to the radar as the standard spare parts.

Table 8.4 Spare Parts 6ZXRD00194

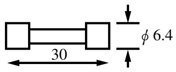
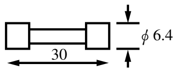
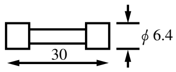
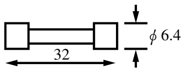
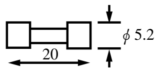
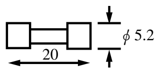
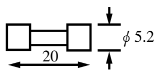
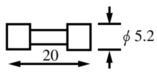
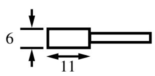
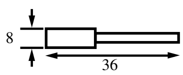
No.	Parts Name	Type/Code	Shape (Unit : mm)	In use	Spare	Parts No.	Location
1	Fuse	MF60NR-10A (5ZFAD00018)		2	6	F5001 to F5002	Inner display unit AC100V
2	Fuse	MF60NR-5A (5ZFAD00017)		2	6	F5001 to F5002	Inner display unit AC220V
3	Fuse	MF60NR-0.5A (5ZFAD00013)		1	3	F5005	Inner display unit
4	Fuse	MF61-TS7 (5ZFAD00447)		2	6	F5003 to F5004	Inner display unit
5	Fuse	MF51NN-3.15A (5ZFAD00227)		3	9	F1,F3,F5	Display unit Power supply circuit
6	Fuse	MF51NN-10A (5ZFAD00457)		1	3	F2	Display unit Power supply circuit
7	Fuse	MF51NN-0.5A (5ZFAD00041)		4	12	F1 to F4	Display unit NSK circuit
8	Fuse	MF51NN-0.5A (5ZFAD00041)		1	3	F4	Display unit monitor power supply circuit
9	Brush	S00152-5C-70 (BRXP00918)		1	2		Scanner unit (NKE-1055)
10	Brush	54511-03 (BRXP05082)		1	2		Scanner unit (NKE-1056)

Table 8.5 Special Parts

Parts No.	Parts Name	Type	Maker	Location	Code
V201 (10 kW)	Magnetron	MSF1425B	New JRC	Scanner unit	5VMAA00051
V201 (25 kW)	Magnetron	M1437 (A)	New JRC	Scanner unit	5VMAA00074
A101	Circulator	FCX68	Toshiba	Scanner unit	5AJAA00004
A103	Diode limiter	NJS6928	New JRC	Scanner unit	5EZAA00019
A102	Pin attenuator	NJS6926	New JRC	Scanner unit	5ENAC00019

Table 8.6 Circuit Blocks for Repair

Location	Circuit block name	Type	Remark
Scanner unit (10 kW)	Motor with gear	MPEM30076	
Scanner unit (25 kW)	Motor with gear	MPEM30078	
Scanner unit (10 kW)	Modulator	NMA-469A	Including PC201 (CME-261A)
Scanner unit (25 kW)	Modulator	NMA-470-1	Including PC210 (CPA-209) and excluding magnetron.
Scanner unit	Receiver	NRG-210A	PC301 (CAE-344-3)
Scanner unit	Interface circuit	CMH-1562A	PC101
Display unit	Power supply unit	NBL-267	Including CBD-1448 and CBA-313
Display unit	Power supply circuit	CBD-1448	PC5101
Display unit	Power converter	CBA-313	PC5102
Display unit	NSK circuit	CMJ-304C	PC4201
Display unit	CPU control circuit	CMC-1055B	PC4401
Display unit	Time base circuit	CED-44B	PC4402
Display unit	Panel circuit-1	CCK-816	PC4501
Display unit	Panel circuit-2	CCK-817	PC4502
Display unit	Panel circuit-3	CCK-790E	PC4503
Display unit	ATA circuit	CDC-1013	PC4403 (optional)
Display unit	Mother unit		
	Main control circuit	CMC-1076	
	Video circuit-1	CAD-241	
	Video circuit-2	CAD-242	
	Degauss circuit	CSC-582	
	Panel circuit	CMD-787	

8.3.2 ATA Troubleshooting

When the operation of this equipment is incorrect, check the operation based on the following items. Since the cause and action are described every item, follow the instruction.
Nevertheless, if an incorrect operation is not restored or when incorrect locations are detected in the items other than the following items, contact our agency or your nearer branch office, branch shop, sales office, and own office of our company.

Symptom	Cause and action
The ATA symbol is not displayed	CAUSE: On the MAIN MENU, the setting of "ATA BRILL" is low. (ACTION) On the MAIN MENU, increase "ATA BRILL". CAUSE: On the ATA #1 menu, "SYMBOL" is OFF. (ACTION) On the ATA #1 menu, set "SYMBOL" to ON. CAUSE: Faulty (ACTION) Contact the sales company.
The ATA numeric display is disabled.	CAUSE: On the ATA #1 menu, "TARGET DATA" is OFF. (ACTION) On the ATA #1 menu, set "TARGET DATA" to ON. CAUSE: Faulty (ACTION) Contact the sales company.
A target cannot be acquired.	CAUSE: On the MAIN MENU, the setting of "ATA BRILL" is low. (ACTION) On the MAIN MENU, increase "ATA BRILL". CAUSE: On the ATA #1 menu, "SYMBOL" is OFF. (ACTION) On the ATA #1 menu, set "SYMBOL" to ON. CAUSE: An attempt is being made to acquire a target far from the maximum tracking range 32 NM. (ACTION) Acquire the target within 32 NM. CAUSE: The setting of sensitivity and sea clutter suppression (STC) is inappropriate. (ACTION) Readjust the sensitivity and sea clutter suppression (STC) so that a target can clearly be displayed. CAUSE: Faulty (ACTION) Contact the sales company.

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Symptom	Cause and action
The guard zone cannot be set	CAUSE In "FUNCTION" on the RADAR ALARM menu, "ATA ALARM" is not selected. (ACTION) In "FUNCTION" on the RADAR ALARM menu, select "ATA ALARM". CAUSE Faulty (ACTION) Contact the sales company.
Dangerous ship and lost symbols are displayed, but an alarm sound is not sounded	CAUSE On the ATA #2 menu, "CPA/TCPA" or "LOST TARGET" of "AUDIBLE WARNING" are OFF. (ACTION) On the ATA #2 menu, set the corresponding item to ON.
When a target ship is veered, the tracking of a vector is slow.	CAUSE On the ATA TEST menu, the value of "VECTOR CONST" is small. (ACTION) Increase the value of "VECTOR CONST".
The vector of an accompanying ship fluctuates.	CAUSE On the ATA TEST menu, the value of "VECTOR CONST" is large. (ACTION) Slightly reduce the value of "VECTOR CONST".

8.4 Replacement of Major Parts

⚠ WARNING

- Before replacing parts, be sure to turn off the main power supply, otherwise you will get an electric shock and replaced parts will get out of order.
- Before replacing the magnetron, discharge the high voltage circuit, otherwise you will get an electric shock.
- When bringing your hand(s) close to the magnetron, remove your wrist watch, otherwise your wrist watch will break because the magnetron is a strong magnet.
- Let two or more workers replace the CRT.
  It is heavy, dropping it may injure you.
- When removing wiring of the high voltage pack from the CRT, never touch the core wire (metal parts) of the CRT anode cap with your bare hands, otherwise you will get an electric shock.

Attention

- When removing wiring, touch the terminal with the metal part of a screwdriver while keeping the terminal in contact with the frame.

[Replacement of Magnetron V201 (10kW : NKE-1055)]

Replace the magnetron as follows:

(1) Loosen the four A scanner unit screws (see Fig. 8.1).

(2) Lift the scanner unit to open the pedestal (see Fig. 8.1).

(3) Loosen the four B screws fixing the transceiver unit (see Fig. 8.1).

(4) Move the transceiver upward to remove it from the pedestal.

(5) Remove the four C screws and loosen the two D screws to remove the sender from the transceiver (Fig. 8.2).

(6) Loosen the five E sender screws to remove the sender cover (see Fig. 8.2).

(7) Loosen the four F screws and remove the pulse transformer cover (see Fig. 8.4).

(8) Remove the cable G between the pulse transformer and magnetron from the transformer side using a soldering iron (see Fig. 8.4).

(9) Remove the four H screws fixing the magnetron, the seven I screws fixing the PCB and the four J screws fixing the IC to remove the magnetron (see Fig. 8.3).

(10) For remounting the magnetron, follow the opposite procedure.
In this case, properly connect the lead wires.

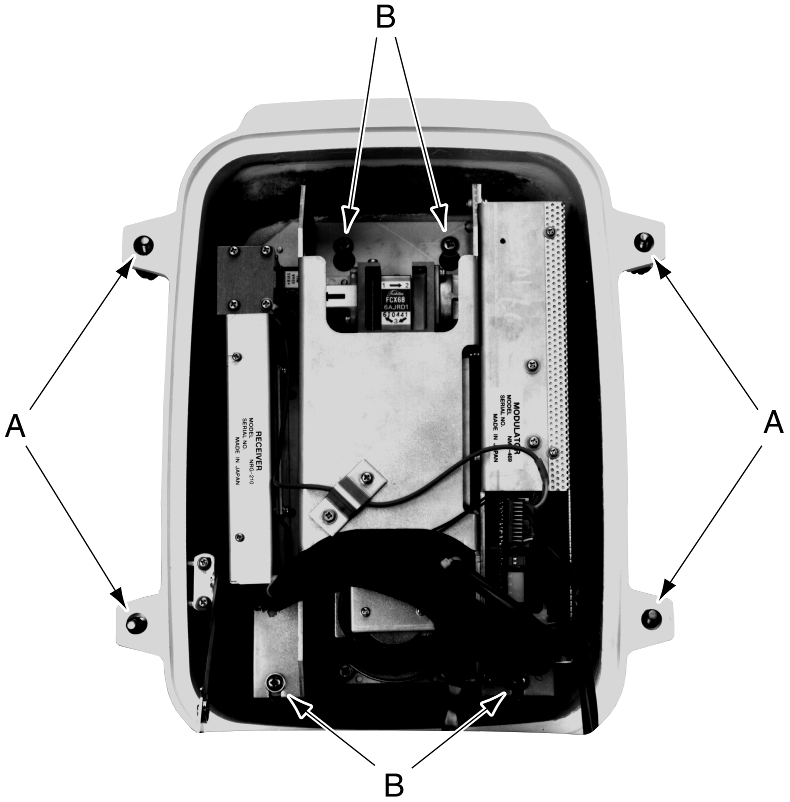


Fig. 8.1 Internal View of 10kW Scanner Unit NKE-1055

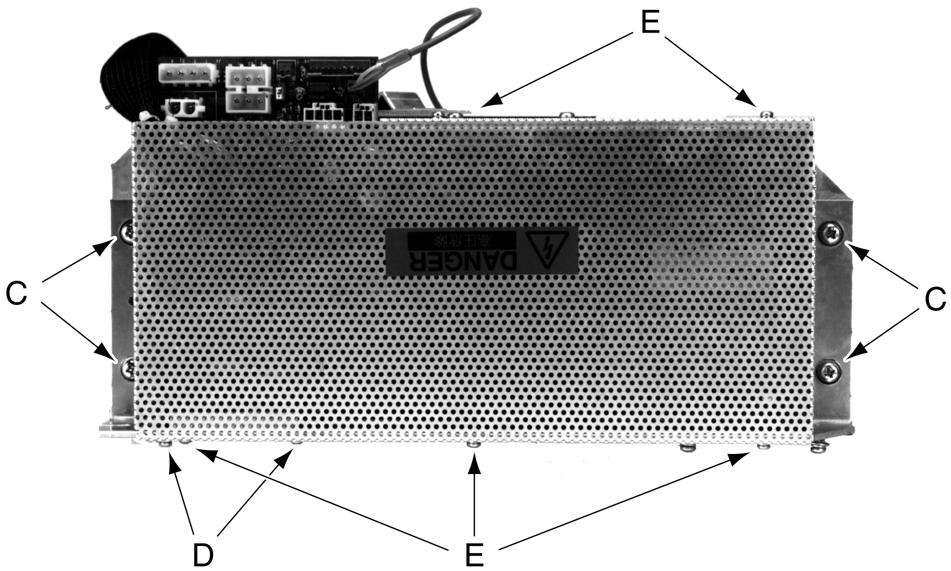


Fig. 8.2 Transmitter Unit of 10kW Scanner Unit NKE-1055

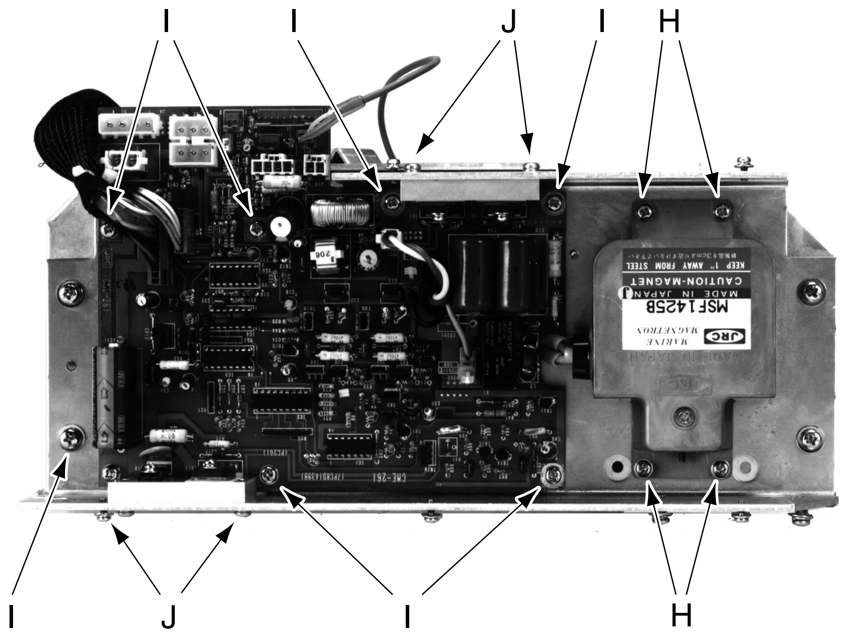


Fig. 8.3 Internal View of Sender of 10kW Scanner Unit NKE-1055

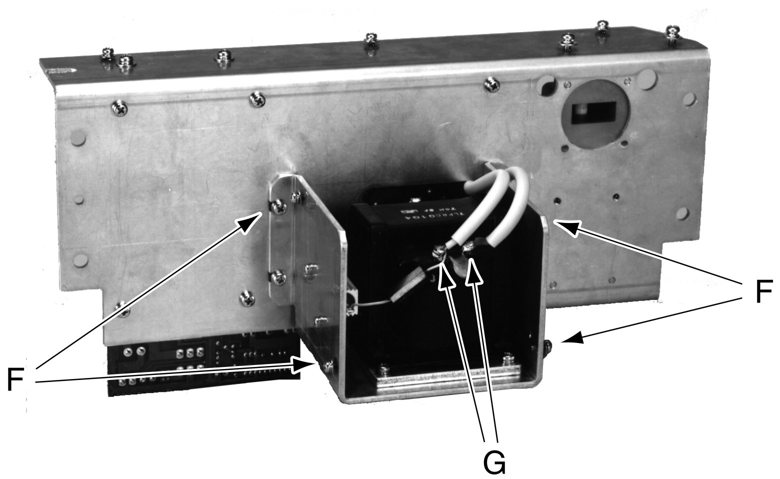


Fig. 8.4 Pulse Transformer of 10kW Scanner Unit NKE-1055

[Replacement of Magnetron V201 (25kW : NKE-1056)]

Replace the magnetron as follows:

(1) Loosen the four A screws from the cover on the left side (when the scanner unit is viewed from the cable ground) to remove the cover (see Fig. 8.5).

(2) Remove the three modulator cover B screws and loosen the seven C screws to remove the cover (see Fig. 8.6).

(3) Make sure that the modulating high voltage circuit has been discharged before removing the magnetron socket (see Fig. 8.7).

(4) Remove the six D screws fixing the magnetron to remove the magnetron (see Fig. 8.7).

(5) For remounting the magnetron, follow the opposite procedure.
In this case, properly connect the lead wires.

Handling of magnetron which had been stored for a long time

Since the magnetron which had been stored for a long time may cause spark and become unstable after you start using it, age it as follows:

(1) Make the cathode pre-heating time longer than usual (for 20 to 30 minutes in the standby mode).

(2) Start the operation from the short pulse range and gradually change it to the long pulse range. If the operation becomes unstable during the process, return it to the standby mode immediately. Leave it as it is for 5 to 10 minutes and operate it again.

(3) Set the range to 24nm or more, and put the radar into the transmission mode for about 15 minutes and adjust the tuning.

(4) Adjust RV1 in the receiver so that the [TUNE] bar indicator of the display unit reaches 10 without saturation.

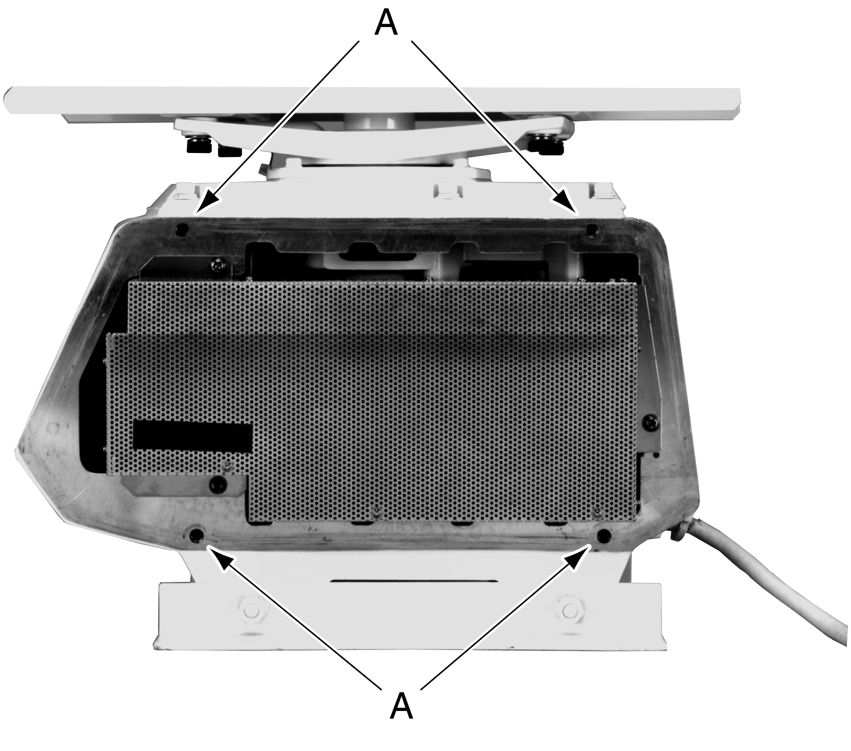


Fig. 8.5 Internal View of 25kW Scanner Unit NKE-1056

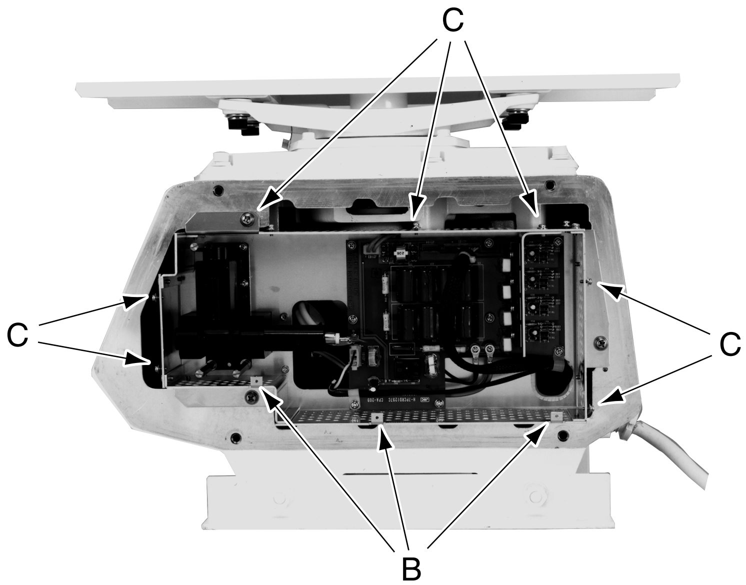


Fig. 8.6 Internal View of Modulator of 25kW Scanner Unit NKE-1056

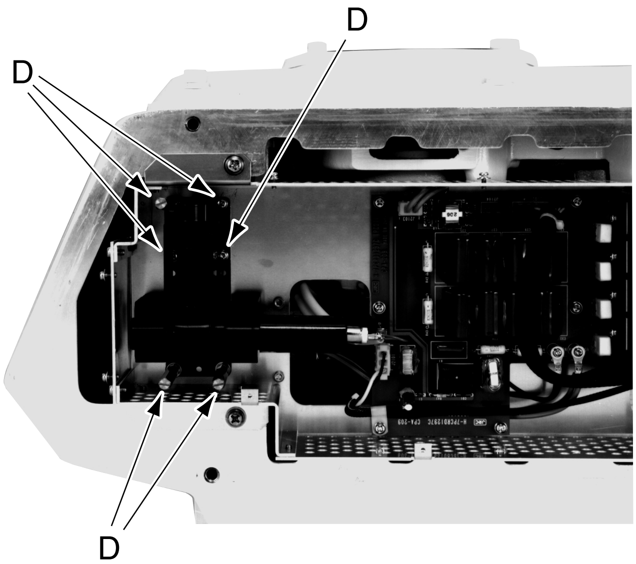


Fig. 8.7 Internal View of Modulator of 25kW Scanner Unit NKE-1056

[Replacement of Diode Limiter (A102)]

Remove the four screws fixing both the receiver and the PIN attenuator. Remove the four screws fixing the diode limiter and another four screws fixing both the diode limiter and the PIN attenuator to take off the diode limiter. When installing the new diode limiter, pay attention to its direction so that the arrow faces in the direction of the receiver.

[Replacement of PIN Attenuator (A103)]

Remove the four screws fixing the PIN attenuator in the same way as for replacing the diode limiter and remove the PIN attenuator.

8.5 Adjustment and Setting

Although each component of the radar has completely been adjusted in the factory, the adjustments as described in subsection 8.5.1 to 8.5.3 are required after installation.

8.5.1 NSK Unit Adjustment

The NSK unit of the radar can be applied to almost all types of gyrocompasses just by changing the settings of keys (step motor type of 24VDC to 100VDC and synchro motor type with primary exciting voltages of 50VAC to 115VAC).
Before turning the power on, follow the procedures below to set switches S1, S2 and S5, and jumper JP1 on the NSK circuit (PC4201) to make them suitable to the type of the gyrocompass.
Since the gyro selection keys on the NSK circuit is set to the 360X synchrogyro before shipment, adjust the keys as follows to suit it to the gyrocompass fitted on the ship. For details, see "Appendix 12 Setting Table of the Gyro Compass and Gyro Select Switches".

(1) Before turning on the system, set the keys and jumper pin on the NSK unit (PC4201) as follows:

S1 : Select the switch to [OFF].

S2 : Gyrocompasses output stepper or synchro signal. So, be sure to check the type of the gyrocompass fitted on the ship before setting S2.
Synchronizing signal········ Set S2 to the [SYNC] position.
Stepper signal··················· Set S2 to the [STEP] position.

S5 : Set S5 to suite the applicable gyro in accordance with the S5 setting table.

S5-1 : Type
Synchronizing signal····················· [OFF]
Stepper signal································ [ON]

S5-2, -3 : Gyro ratio

	360X	180X	90X	36X
S5-2	OFF	OFF	ON	ON
S5-3	OFF	ON	OFF	ON

S5-4 : Gyro direction
Normal (clockwise) .... [OFF]
Reverse (counterclockwise) .... [ON]

S5-5 : Log type
Pulse signal .... [OFF]
Synchronizing signal .... [ON]

S5-6 : Not used

S5-7, -8 : Log ratio

	Pulses/nm (Pulse signal)			
	800	400	200	100
	Rotations/nm (Synchro signal)			
	360X	180X	90X	36X
S5-7	OFF	OFF	ON	ON
S5-8	OFF	ON	OFF	ON

S6 : Log test
Select the switch to [NORML] position.

S7 : BSH (IMO) spec
Select the switch to [BSH] position.

JP1 : Gyro type
Synchro signal ... Select the [SYNC] position.
Stepper signal ... Select the [STEP] position.

(2) Connect the gyro signal and log signal cables to the NSK circuit (PC4201).

(3) Set S1 to [ON].

* If radar echoes and the own ship's true bearing indications are displayed in reverse direction after the power is turned on, set S5-4 to [ON].

Table 8.7 Gyro Log Selection Switches (DIP switch S5)

			1	2	3	4	5	6	7	8
Gyro signal (GYRO SIG.)	SYNC		0							
Gyro signal (GYRO SIG.)	STEP		1							
Gyro signal (GYRO SIG.)	360X			0	0					
Gyro signal (GYRO SIG.)	180X			0	1					
Gyro signal (GYRO SIG.)	90X			1	0					
Gyro signal (GYRO SIG.)	36X			1	1					
Gyro signal (GYRO SIG.)	Gyrational direction (DIRECTION)	Normal (NOR)				0				
Gyro signal (GYRO SIG.)	Gyrational direction (DIRECTION)	Reverse (REV)				1				
Log signal (LOG SIG.)	Type	PULSE					0			
Log signal (LOG SIG.)	Type	SYNCRO					1			
Log signal (LOG SIG.)	Pulse number (PULSES/NM)							0		
Log signal (LOG SIG.)	Pulse number (PULSES/NM)	800P/360X							0	0
Log signal (LOG SIG.)	Pulse number (PULSES/NM)	400P/180X							0	1
Log signal (LOG SIG.)	Pulse number (PULSES/NM)	200P/90X							1	0
Log signal (LOG SIG.)	Pulse number (PULSES/NM)	100P/30X							1	1

8.5.2 Adjustment and Setting at Installation

8.5.2.1 Adjusting Tuning

Procedures

1. **Set the range at 24nm or more to adjust the [TUNE] control at the center.**
2. **Press the [SUB MENU] key to open the SUB MENU.**
3. **Press the [9] key twice to open the INIT SET #2 menu.**
4. **Press the [3] key to select "TUNE ADJUSTMENT".**
5. **Press the [ENT] key to clear the menu and display the radar screen.**

   "Adjusting TUNE" will be displayed in the lower right corner of the screen.
6. **Press the minus (-) side of the [+ RANGE −] key or plus (+) side of the [+ RANGE −] key to make the turning indication of the lower left of the screen the longest and press the [ENT] key.**

Init set #2

INIT SET #2				0. PREV 9. NEXT
1. BEARING ADJUSTMENT				
2. RANGE ADJUSTMENT				
3. TUNE ADJUSTMENT				
4. SETTING OF PRF	23			
5. PM ADJUSTMENT				
6. DATA INPUT FORMAT	<u>183</u>	JRC	180	
7. INITIALIZING GPS MENU (STBY)				
8. SETTING DGPS MENU (STBY)				

8

8.5.2.2 Adjusting Bearing

Adjust the system so that the target measured by the ship compass corresponds to the bearing of the video displayed on the radar PPI screen.

Procedures

1. **Press the AZI MODE key to select the HUP display.**
2. **Measure the bearing of an appropriate target (e.g. stationary ship, break water, buoy) against the bow using the ship compass (a target at 25° is assumed here as an example) .**
3. **Press the SUB MENU key to open the SUB MENU.**
4. **Press the 9 key twice to open the INIT SET #2 menu.**
5. **Press the 1 key to select "BEARING ADJUSTMENT".**
6. **Press the ENT key to clear the menu and display the radar screen.**
   "Adjusting BEARING" will be displayed in the lower right corner of the screen.
7. **After EBL1 appears, turn the EBL control to adjust EBL1 to the target selected in procedure 2 and press the ENT key.**
   (adjust the bearing to 25° by following the example in procedure 2).
8. **If the bearing does not completely match, repeat procedure 3 and after.**

Init set #2

INIT SET #2		0. PREV 9. NEXT
1. BEARING ADJUSTMENT 2. RANGE ADJUSTMENT 3. TUNE ADJUSTMENT 4. SETTING OF PRF 23 5. PM ADJUSTMENT 6. DATA INPUT FORMAT 183 JRC 180 7. INITIALIZING GPS MENU (STBY) 8. SETTING DGPS MENU (STBY)		

8.5.2.3 Adjusting Range

Adjust the range of the target on the screen so that it is properly displayed.

Procedures

1. **Find a target whose range is known on the PPI screen.**
2. **Press the [SUB MENU] key to open the SUB MENU.**
3. **Press the [9] key twice to open the INIT SET #2 menu.**
4. **Press the [2] key to select "RANGE ADJUSTMENT".**
5. **Press the [ENT] key to clear the menu and display the radar screen.**

   "Adjusting RANGE" will be displayed in the lower right corner of the screen.
6. **Press the minus (-) side of the [+ RANGE −] key or plus (+) side of the [+ RANGE −] key to adjust the range and press the [ENT] key.**
7. **If the range does not completely match, repeat procedure 3 and after.**

Init set #2

INIT SET #2		0. PREV 9. NEXT
1. BEARING ADJUSTMENT		
2. RANGE ADJUSTMENT		
3. TUNE ADJUSTMENT		
4. SETTING OF PRF	23	
5. PM ADJUSTMENT		
6. DATA INPUT FORMAT	183 JRC 180	
7. INITIALIZING GPS MENU (STBY)		
8. SETTING DGPS MENU (STBY)		

8

8.5.2.4 Setting Antenna Height

Adjust by the radar scanner unit height. Be careful to select scanner unit antenna height as the selection affects the effect of STC control.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [9] key four times to open the INIT SET #4 menu.**
3. **Press the [1] key to open the MAINTENANCE MENU.**
4. **Press the [1] key to select "ANTENNA HEIGHT".**
5. **Press the [1] key to select "UP to 5m", "5 - 10m", "10 - 20m" or "MORE 20m".**
6. **Press the [ENT] key to confirm the setting.**

Exit

7. **Press the [SUB MENU] key.**

Maintenance Menu

```
MAINTENANCE MENU
Press an item number key.

0.  PREVIOUS MENU
1.  ANTENNA HEIGHT          UP to 5M    5–10M    10–20M    MORE 20M
2.
3.  ANTENNA SWITCH              TRANSFER     DISCARD
4.  PARTIAL MASTER RESET
5.  ALL MASTER RESET
6.  INTERNAL SETTING to CARD 2
7.  CARD 2 to INTERNAL SETTING
8.  MEMORIZE USER SETTING
9.  RESTORE USER SETTING

To close this menu, Press (SUB MENU) key.
```

Note

- This function cannot be used with the radar mode is selected.

8.5.3 Various Setting

8.5.3.1 Setting Own Ship Speed Equipment

This function is used to select the equipment for inputting the own ship course.
The selection should be made in accoradance with section "3.2 Preparation".

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 9 key to open the INIT SET #1 menu.**
3. **Press the 2 key to select "SPEED EQUIPMENT".**
4. **Press the 2 key to select "MANUAL", "LOG", "GPS", "2AXIS/WT" or "2AXIS/BT".**
5. **Press the ENT key to confirm the setting.**

Exit

6. **Press the SUB MENU key.**

Init set #1

INIT SET #1						0. PREV 9. NEXT
1.						
2. SPEED EQUIPMENT		MANUAL	LOG	GPS	2AXIS/WT	2AXIS/BT
3. MANUAL SPEED		0.0KT				
4. FUNCTION MENU						
5. BUZZER VOLUME		OFF	LOW	MIDDLE	HIGH	
6. DRIFT	SET	0.0°				
	DRIFT	0.0KT				
7.						
8.						

8

8.5.3.2 Setting True Bearing

This function is used to set the system so that the master gyro indication corresponds to that of the radar. You don't need to set that again after power on unless you turn off the power of the master gyro once you set that, because the inner electronic circuit is supplied the power from the gyro.

After turning on the system

When you turn on the system for the first time after installation, or when the master gyro is turned off, the alarm of gyro setting appear on the bottom of screen to prompt to enter a number. At this time, press the plus (+) side of the [+ RANGE −] key or minus (-) side of the [+ RANGE −] key according to the bearing of the compass, and press the [ENT] key.

And, after pressing the [ENT] key, you can also enter this with numeric keys ([0] to [9]) as the following procedures.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [2] key to open the RADAR #2 menu.**
3. **Press the [1] key to select "GYRO".**
4. **Press the [ENT] or [1] key to set the system in the numerical value entry mode.**
5. **Press numeric keys ([0] to [9]) according to the bearing of the compass and press the [ENT] key (359.9° max.).**

Exit

6. **Press the [SUB MENU] key.**

Radar #2

RADAR #2		0. PREV

1.	GYRO	0.0°	
2.	EBL BEARING	<u>TRUE</u>	RELATIVE
3.	PARALLEL INDEX LINE	<u>OFF</u>	ON
4.			
5.	CURSOR MENU		
6.	STERN FLASH	<u>OFF</u>	ON
7.	KM／NM VRM1	KM	<u>NM</u>
8.	KM／NM VRM2	KM	<u>NM</u>

Setting the true bearing using system

When you adjust true bearing using system, press the AZI MODE key for 2 seconds. The number entering window for gyro setting appear on the bottom of screen.

At this time, press the plus (+) side of the + RANGE – key or minus (-) side of the + RANGE – key according to the bearing of the compass, and press the ENT key.

8.5.3.3 Setting Ship Speed

This function is used to manually set the ship speed.

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 9 key to open the INIT SET #1 menu.**
3. **Press the 3 key to select "MANUAL SPEED".**
4. **Press the ENT or 3 key to set the system in the numerical value entry mode.**
5. **Set the speed using numeric keys (0 to 9) and press the ENT key (99.9 max.)**

Exit

6. **Press the SUB MENU key.**

After data is entered, the following letters appear on the top of the screen.

Entered by GPS	:	GPS
Entered by DGPS	:	DGPS
Entered by LORAN	:	LOR
Entered by other	:	NMEA Talker ID is displayed. Ask the manufacturer for the ID (see page 8-33).

Init set #1

INIT SET #1						0. PREV 9. NEXT
1.						
2. SPEED EQUIPMENT		MANUAL	LOG	GPS	2AXIS/WT	2AXIS/BT
3. MANUAL SPEED		0.0KT				
4. FUNCTION MENU						
5. BUZZER VOLLUME		OFF	LOW	MIDDLE	HIGH	
6. DRIFT	SET	0.0°				
	DRIFT	0.0KT				
7.						
8.						

8

8.5.3.4 Setting Drift

This function is used to manually set the drift.

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 9 key to open the INIT SET #1 menu.**
3. **Press the 6 key to select "DRIFT".**
4. **Press the ENT or 6 key to set the system in the numerical value entry mode.**
5. **Set the direction of the drift using numeric keys (0 to 9) and press the ENT key.**
6. **Set the speed of the drift using numeric keys (0 to 9) and press the ENT key (9.9 max.).**

Exit

7. **Press the SUB MENU key.**

Init set #1

INIT SET #1							0. PREV 9. NEXT
1.							
2.	SPEED EQUIPMENT		MANUAL	LOG	GPS	2AXIS ／ WT	2AXIS ／ BT
3.	MANUAL SPEED		0.0KT				
4.	FUNCTION MENU						
5.	BUZZER VOLLUME		OFF	LOW	MIDDLE	HIGH	
6.	DRIFT	SET	0.0°				
		DRIFT	0.0KT				
7.							
8.							

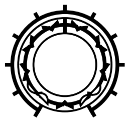
8.5.3.5 Setting PRF

This function is used to change the repetition frequency to reduce mutual interference.
Whenever the radar interference is not disappeared on the screen by using IR function (subsection “3.2.9 Rejecting Radar Interference”), set PRF according with this section.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [9] key twice to open the INIT SET #2 menu.**
3. **Press the [4] key twice to select "SETTING OF PRF".**
4. **Press the minus (-) side of the [+ RANGE −] key or plus (+) side of the [+ RANGE −] key or**

BRILL



control to select number. (0-39)

5. **Press the [ENT] key to confirm the setting.**

Exit

6. **Press the [SUB MENU] key.**

Note

- This function cannot be used in the plotter mode.

Init set #2

INIT SET #2				0. PREV 9. NEXT
1. BEARING ADJUSTMENT				
2. RANGE ADJUSTMENT				
3. TUNE ADJUSTMENT				
4. SETTING OF PRF	23			
5. PM ADJUSTMENT				
6. DATA INPUT FORMAT	<u>183</u>	JRC	180	
7. INITIALIZING GPS MENU (STBY)				
8. SETTING DGPS MENU (STBY)				

Note

- By pushing the [BRILL] control the pulse repetition frequency is directly changed without opening the SUB MENU.

8

8.5.3.6 Setting Transmission Repetition Frequency

- Select one of three transmission repetition frequency types.
- The transmission repetition frequency relates to the sensitivity and power consumption (life span of magnetron).
- When the transmission repetition frequency is high, the sensitivity improves, however, the power consumption also increases, reducing the life span of the magnetron.
- When the transmission repetition frequency is low, the power consumption decreases, increasing the magnetron life span, however, the sensitivity deteriorates.
- The radar trails reduction processing demonstrates the effect when the transmission repetition frequency is "ECONOMY".

NORMAL : Balanced setting for the sensitivity and the life span of the magnetron.
HIPOWER : Hipower setting; use for detecting small targets.
However, the life span of the magnetron is reduced.
ECONOMY : Economy setting. The maximum life span of the magnetron can be increased.
However, the sensitivity deteriorates slightly.
Use this mode at radar trail fine line processing.
When the fales echoes appear by anomalous propagation, using this mode reduces those fales echoes.
See section “6.4 [V] Anomalous Propagation”.

Procedures

1. Press the SUB MENU key to open the SUB MENU.

2. Press the 3 key to open the RADAR #3 menu.

3. Press the 4 key to select "XMIT REPETITION FREQUENCY".

4. Press the 4 key to select "NORMAL", "HIPOWER" or "ECONOMY".

5. Press the ENT key.

Exit

6. Press the SUB MENU key.

8.5.3.7 Connecting Navigation Equipment

This function is used to connect and set the GPS.

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 9 key twice to open the INIT SET #2 menu.**
3. **Press the 6 key to select "DATA INPUT FORMAT".**
4. **Press the 6 key several times to select either "183", "JRC" or "180".**
5. **Press the ENT key to confirm the setting.**

Exit

6. **Press the SUB MENU key.**

When "183" is selected, the talker ID is displayed on the bottom of the screen in the plot mode after data is received from the navigation system. Ask the navigation system manufacturer for the ID.

Initial set #2

INIT SET #2				0. PREV 9. NEXT
1. BEARING ADJUSTMENT				
2. RANGE ADJUSTMENT				
3. TUNE ADJUSTMENT				
4. SETTING OF PRF	23			
5. PM ADJUSTMENT				
6. DATA INPUT FORMAT	<u>183</u>	JRC	180	
7. INITIALIZING GPS MENU (STBY)				
8. SETTING DGPS MENU (STBY)				

Talker Identifier Mnemonics

Talker device		Identifier
Autopilot:	general	AG
	magnetic	AP
Communication:	digital selective calling (DSC)	CD
	data receiver	CR
	satelite	CS
	radio-telephone (MF/HF)	CT
	radio-telephone (VHF)	CV
	scanning receiver	CX
DECCA navigator		DE
Direction finder		DF
Electronic chart display and information system (ECDIS)		EC
Emergency position indicating radio beacon (EPIRB)		EP
Engine room monitoring systems		ER
Global positioning system (GPS)		GP
Heading sensor:		
	compass, magnetic	HC
	gyro, north seeking	HE
	gyro, non-north seeking	HN
Integrated instrumentation		II
Integrated navigation		IN
LORAN:	LORAN-A	LA
	LORAN-C	LC
OMEGA navigation system		OM
Proprietary code		P
Radar and/or ATA		RA
Sounder, depth		SD
Electronic positioning system, other/general		SN
Sounder, scanning		SS
Turn rate indicator		TI
TRANSIT navigation system		TR
Velocity sensor:	Doppler, other/general	VD
	speed log, water, magnetic	VM
	speed log, water, mechanical	VW
Transducer		YX
Timekeepers, time/date:	atomic clock	ZA
	chronometer	ZC
	quarts	ZQ
	radio update	ZV
Weather instruments		WI

8.5.3.8 Adjustment of the Performance Monitor Operation

Procedures

1. **Press the MAP key to set the Radar Mode.**
2. **Press the VRM1/VRM2 key to display VRM1 and set the range of VRM1 to 18 NM.**
3. **Press the SUB MENU key to open the SUB MENU.**
4. **Press the 9 key twice to open the INIT SET #2 menu.**
5. **Press the 5 key to select "PM ADJUSTMENT".**
6. **Press the ENT key to display performance monitor screen.**

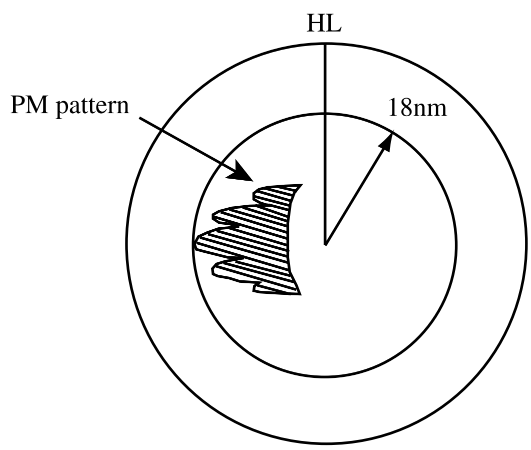
   A small menu will open in the lower right corner of the screen and the characters of "During Performance Monitor Adjustment" and the character and numeral of "P. NON" will blink in it for approx. 30 sec.

   The radar will be set automatically to relative motion, relative azimuth, off-center OFF, and 24 NM.
7. **When the blinking of the character and numeral of "P. NON" has stopped, press the minus (-) side of the + RANGE − key or plus (+) side of the + RANGE − key to adjust the outer edge of the PM pattern so that it is aligned with the setting in Procedure 2.**

Exit

8. **Press the ENT key.**

   The menu will disappear and the LVR setting value on the Performance Monitor will be stored.
9. **Remove the information label from the performance monitor and paste it to the indicator panel at an appropriate position.**
10. **Fill the information label with the value of P.MON displayed in the lower right corner of the screen with the date of check.**



Adjustment in Procedure 7

8.5.4 GPS Initial Setting／Receiving Status

8.5.4.1 GPS Initial Setting

Set the GPS receiver at the default values. Although GPS receiver starts measuring without setting the default values, it may take more than 10 minutes to start receiving after installation.

- Items to be set

Own ship position:	Approximate latitude and longitude (in minute) work sufficiently.
Exclusion satellite:	Using a disabled satellite may deteriorate the accuracy. The disabled satellite whose number has been input cannot be used for measurement.
Geodetic system:	The own ship position and the coastal line may shift if the geodetic system in the radar is different from that of the coastal line ROM card in use. Enter the appropriate geodetic system number described on page 8-37. The number for Japan is 02.
Antenna height:	Enter the height from the sea surface to the antenna.
Fixed mode:	Since the antenna height is constant in the case of a ship, 2D (2 dimensional) measurement is more stable.
DOP level:	In order to use accurate measurement results only, select "UP to 10" or "UP to 5".
Average position:	Select "LONG" to reduce the position deviation, which delays the response. Select "SHORT" to improve the response, which increases the deviation.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [9] key twice to open the INIT SET #2 menu.**
3. **Press the [7] key to open the INITIALIZE GPS／GPS STATUS menu.**
4. **Press the numeric key ([1] to [7]) select an appropriate GPS initial setting item, and press the numeric key ([0] to [9])to enter the setting.**
5. **In order to change the contents of it, press the same numeric key ([1] to [7]).**
   In order to enter a numerical value, press the same numeric key ([0] to [9]).
6. **After all setting is completed, press the [8] key to select "SEND DATA".**
7. **Press the [8] key to wait to send data.**

8. Press the ENT key to transmit the settings to the sensor.

- After transmission the display for indicating that transmission is completed appears.
- If transmission fails, the display for indicating that transmission error occurs appears. In this case, check the sensor and cales.

Exit **9. Press the SUB MENU key.**

Initializing GPS ／ GPS status

INITIALIZE GPS / GPS STATUS
Press an item number key.

0. PREVIOUS MENU

1. POSITION N xx° xx. xxx'
   Exxx° xx. xxx'
2. EXCLUSION SAT x x x x x x
3. GEODETIC xx
   (xxxxxxxxxxx)
4. ANTENNA HEIGHT xxx M
5. FIX MODE 2D 3D <u>AUTO</u>
6. DOP LEVEL UP to 5 UP to 10 <u>UP to 20</u>
7. POSN AVERAGE LONG MIDDLE <u>SHORT</u>
8. SEND DATA
9.

GPS STATUS

GPS RCV TIME-—:—
N xx° xx. xxx' Exxx° xx. xxx'
xx ALT xxxxxM DOP xx

RCV SAT	31	15	28	22	–	–	–	–
FIX	USE	USE	–	–	–	–	–	–
AZIMUTH	354	202	306	126	–	–	–	–
ELEVATE	65	47	23	15	–	–	–	–
LEVEL	52	53	00	00	–	–	–	–
STATUS	D	D	T	S	–	–	–	–

To close this menu, Press (SUB MENU) key.

Geodetic System List

00 = WGS-84

01 = WGS-72

02 = Japan

03 = North American 1927 (U.S.)

04 = North American 1927 (Canada & Alaska)

05 = European 1950 (Europe)

06 = Australian geodetic 1966 (Australia)

07 = Ordnance Survey of Great Britain (England)

08 = NAD-83

11 = ADINDAN (Ethiopia & Sudan)

12 = ARC 1950 (Botswana)

13 = AUSTRALIAN GEODETIC 1984 (Australia)

14 = BERMUDA 1957 (the Bermudas)

15 = BOGOTA OBSERVATORY (Columbia)

16 = CAMPO INCHAUSPE (Argentine)

17 = CHATHAM 1971 (Chatham Island)

18 = CHUA ASTRO (Paraguay)

19 = CORREGO ALEGRE (Brazil)

20 = DJAKARTA (VATAVIA) (Sumatra)

21 = EUROPEAN 1979 (Europe)

22 = GEODETIC DATUM 1949 (New Zealand)

23 = GUAM 1963 (Guam)

24 = HAYFORD 1910 (Finland)

25 = HJORSEY 1955 (Iceland)

26 = INDIAN (India & Nepal)

27 = IRELAND 1965 (Ireland)

28 = KERTAU 1948 (West Malaysia)

29 = L.C.5 ASTRO (Cayman Black Island)

30 = LIBERIA 1964 (Liberia)

31 = LUZON (Philippines)

32 = MERCHICH (Morocco)

33 = MINNA (Cameroon)

34 = NAHRWAN (Oman)

35 = NAPARIMA, BWI (Trinidad and Tobago)

36 = OLD EGYPTIAN (Egypt)

37 = OLD HAWAIIAN (the Hawaii Islands)

38 = PICO DELAS NIEVES (the Canary Islands)

39 = PROVISIONAL SOUTH AMERICAN 1956 (South America)

40 = PROVISIONAL SOUTH CHILEAN 1963 (Southern Chile)

41 = PUERTO RICO (Puerto Rico and Virgin Islands)

42 = QORNOQ (South Greenland)

43 = RT90 (Sweden)

44 = SANTA BRAZ (Sao Maguel, santa Maria Islands)

45 = SOUTH AMERICAN 1969 (South American)

46 = SOUTHWEST BASE (Faial, Graciosa, Pico, Sao Jorge and Terceira Island)

47 = TIMBALAI 1948 (Brunei and East malaysia)

8.5.4.2 Checking GPS Receiving Status

Check the GPS receiving status.

- Item

Own ship position:	Displays the longitude and latitude of the own ship after measurement.
Built-in GPS time:	Displays the universal time measured by the GPS receiver.
Elevation:	Displays the elevation of the own ship. When "2D" is selected for the fixed mode, however, the antenna height input as the default is displayed.
DOP:	Displays the accuracy of the measurement results. GPS letters blink when it is 20 or lower, indicating a poor accuracy.
Receiving satellite:	Displays the satellite number currently available for measurement.
Azimuth and elevation:	Displays the azimuth and elevation angle of the receiving satellite.
Signal level:	Displays the signal level of the receiving satellite. The signal with an intensity of 20 or lower may not be used for measurement.
Receiving status:	Search = Status when the satellite is being searched. Tracking = Status when the satellite is being tracked. Demodulation = Status when the data from the satellite is being demodulated. Use = Status when the satellite is being used for measurement.

- The GPS receiving status is displayed only when a sensor-type GPS receiver such as JLR-4310 is connected.
  It is not displayed when an external navigation system is used.

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 9 key twice to open the INIT SET #2 menu.**
3. **Press the 7 key to open the INITIALIZE GPS/GPS STATUS menu.**
   The GPS receiving status appears.

Exit

4. **Press the SUB MENU key.**

Initializing GPS ／ GPS status

INITIALIZE GPS / GPS STATUS
Press an item number key.

0. PREVIOUS MENU

1. POSITION N xx° xx. xxx'
   Exxx° xx. xxx'
2. EXCLUSION SAT x x x x x x
3. GEODETIC xx
   (xxxxxxxxxxx)
4. ANTENNA HEIGHT xxx M
5. FIX MODE 2D 3D AUTO
6. DOP LEVEL UP to 5 UP to 10 UP to 20
7. POSN AVERAGE LONG MIDDLE SHORT
8. SEND DATA
9.

GPS STATUS

GPS RCV TIME-—:—
N xx° xx. xxx' Exxx° xx. xxx'
xx ALT xxxxxM DOP xx

RCV SAT	31	15	28	22	–	–	–	–
FIX	USE	USE	–	–	–	–	–	–
AZIMUTH	354	202	306	126	–	–	–	–
ELEVATE	65	47	23	15	–	–	–	–
LEVEL	52	53	00	00	–	–	–	–
STATUS	D	D	T	S	–	–	–	–

To close this menu, Press (SUB MENU) key.

8.5.5 Setting DGPS ／ Checking DGPS Receiving Status

8.5.5.1 Setting DGPS

Setting the beacon receiver is required for accurate measurement using the DGPS.

- Setting

  Mode: Manual = Set the frequency and baud rate of the beacon receiver. This mode enables quick DGPS receiving. Beacon cannot be received, however, when the own ship is outside the transmission area of the beacon receiver.

  Auto = Automatically searches the beacon transmitting station and receives beacon. In this mode, however, a longer time is required for searching.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [9] key twice to open the INIT SET #2 menu.**
3. **Press the [8] key to open the SETTING DGPS／DGPS STATUS menu.**
4. **Press the [1] key to select "MODE".**
5. **Press the [1] key to select "AUTO" or "MANUAL".**
6. **Press the [ENT] key to confirm the setting.**
7. **<u>In the AUTO mode</u>**

   Set the search step at 1 kHz for JAPAN.

   After pressing the [4] key to select "SET DATA", press the [4] key to select 1 kHz , and press the [ENT] key.

   <u>In the MANUAL mode</u>

   Transmission starts after the frequency and baud rate of the beacon transmitting station inside the receiving area are set.

   - After pressing the [2] key to select "FREQUENCY", press the numeric key ([0] to [9]) and [ENT] key to select frequency. The frequency is as follows.
     Daio-saki: 288 kHz , Tsurugi-saki: 309 kHz
   - After pressing the [3] key to select "BAUD RATE", press the [3] key to move the underline to the baud rate at 200 bauds for Japan and press the [ENT] key to set it.
8. **After entering the setting, press the [5] key to select "SEND DATA".**

9. Press the 5 key to wait to send data.

10. Press the ENT key to send data.

After the setting is properly transmitted to the beacon receiver, the display for indicating that transmission is completed appears.
If transmission fails, the display for indicating that transmission error occurs appears. In this case, check the beacon receiver and cables.

Exit **11. Press the SUB MENU key.**

Setting DGPS ／ DGPS Status

SETTING DGPS ／ DGPS STATUS

Press an item number key.

0. PREVIOUS NEMU

1. MODE — AUTO　MANUAL
2. FREQUENCY — xxx. x kHz
3. BAUD RATE (BPS) — 50　100　200
4. SET DATA — 1kHz　500Hz
5. SEND DATA
6.
7.
8.
9.

STATUS　BEACON RCV CONNECT

FREQUENCY	——— kHz
BAUD RATE	—— BAUD
RSSI	——

To close this menu, Press (SUB MENU) key.

8.5.5.2 Checking DGPS Receiving Status

Checking the DGPS receiving status. When no beacon receiver is connected, or receiver or cable failure occurs, the message "BEACON RCV NONCONNECT" appears.

- Items

Frequency:	Displays the frequency of the beacon station currently received.
Baud rate:	Displays the baud rate of the beacon station currently received.
RSSI:	Displays the receiving intensity of the beacon station currently received. When it is 100 or lower, the beacon may not be received.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [9] key twice to open the INIT SET #2 menu.**
3. **Press the [8] key to open the SETTING DGPS／DGPS STATUS menu.**

Exit

4. **Press the [SUB MENU] key.**

Setting DGPS ／ DGPS Status

SETTING DGPS ／ DGPS STATUS

Press an item number key.

0. PREVIOUS NEMU

1. MODE	AUTO	MANUAL	
2. FREQUENCY	xxx. x kHz		
3. BAUD RATE (BPS)	50	100	200
4. SET DATA	1kHz	500Hz	
5. SEND DATA			
6.			
7.			
8.			
9.			

STATUS BEACON RCV CONNECT

FREQUENCY	———— kHz
BAUD RATE	—— BAUD
RSSI	——

To close this menu, Press (SUB MENU) key.

8.5.6 Maintenance Menu

The maintenance menu is used only by our service personnel during installation. Users are requested not to change the setting (bold faced items).

Maintenance Menu

MAINTENANCE MENU					
Press an item number key.					
0. PREVIOUS MENU					
1. ANTENNA HEIGHT	UP to 5M	5–10M	10–20M	MORE 20M	
2.					
3. ANTENNA SWITCH	TRANSFER	DISCARD			
4. PARTIAL MASTER RESET					
5. ALL MASTER RESET					
6. INTERNAL SETTING to CARD 2					
7. CARD 2 to INTERNAL SETTING					
8. MEMORIZE USER SETTING					
9. RESTORE USER SETTING					
To close this menu, Press (SUB MENU) key.					

8.5.6.1 Antenna Switch

"DISCARD" is set on regular shipment.
Transmission can be enabled while the rotation of the scanner unit is stopped.

Procedures

1. **Press the [SUB MENU] key to open the SUB MENU.**
2. **Press the [9] key four times to open the INIT SET #4 menu.**
3. **Press the [1] key to open the MAINTENANCE MENU.**
4. **Press the [3] key to select "ANTENNA SWITCH".**
5. **Press the [3] key to select "TRANSFER" or "DISCARD".**
   When "TRANSFER" is selected, transmission is enabled while the rotation of the scanner unit is stopped.
6. **Press the [ENT] key to confirm the setting.**

Exit

7. **Press the [SUB MENU] key.**

8.5.6.2 Partial Master Reset

This function is used to set the same settings as on shipment. Since the contents set by the user are cleared, only our service personnel is allowed to use this function.

Procedures

1. **Follow procedures 1 to 3 in subsection 8.5.6.1 to open the MAINTENANCE MENU.**
2. **Press the [4] key to select "PARTIAL MASTER RESET".**
3. **Press the [4] key to set the system in the partial master reset standby mode.**
4. **Press the [ENT] key to reset or the [CLR] key not to reset according to the direction on the screen.**
   After resetting, the screen which appears after turning the power on is displayed.

Exit

5. **Press the [SUB MENU] key.**

8.5.6.3 Total Master Reset

This function is used by our service personnel after the software is written. Users are requested never to use this function.

8.5.6.4 Internal Setting to Card 2

This function is used to write the contents internally set into card 2. Use this function after inserting a memory card for writing to the lower side of the card slot.

Procedures

1. **Follow procedures 1 to 3 in subsection 8.5.6.1 to open the MAINTENANCE MENU.**
2. **Press the [6] key to select "INTERNAL SETTING to CARD 2".**
3. **Press the [6] key to set the system in the standby mode.**
4. **Press the [ENT] key to write or the [CLR] key not to write according to the direction on the screen.**
   After writing, a message informing the completion of writing appears.

Exit

5. **Press the [SUB MENU] key.**

Maintenance Menu

MAINTENANCE MENU Press an item number key. 0. PREVIOUS MENU 1. ANTENNA HEIGHT UP to 5M 5–10M 10–20M MORE 20M 2. **3. ANTENNA SWITCH** TRANSFER DISCARD **4. PARTIAL MASTER RESET** **5. ALL MASTER RESET** **6. INTERNAL SETTING to CARD 2** **7. CARD 2 to INTERNAL SETTING** **8. MEMORIZE USER SETTING** **9. RESTORE USER SETTING** To close this menu, Press (SUB MENU) key.

8.5.6.5 Card 2 to Internal Setting

This function is used to set the contents written in the card to the internal memory. Use this function after inserting the card to the lower side of the card slot.

Procedures

1. **Follow procedures 1 to 3 in subsection 8.5.6.1 to open the MAINTENANCE MENU.**
2. **Press the [7] key to select "CARD 2 to INTERNAL SETTING".**
3. **Press the [7] key to set the system in the standby mode.**
4. **Press the [ENT] key to set or the [CLR] key not to set according to the direction on the screen.**
   After setting, the screen which appears after turning the power on is displayed.

Exit

5. **Press the [SUB MENU] key.**

8

8.5.6.6 User Memory

This function is used to write the contents currently displayed into the internal memory. The written contents are not cleared by master resetting.

Procedures

1. **Follow procedures 1 to 3 in subsection 8.5.6.1 to open the MAINTENANCE MENU.**
2. **Press the [8] key to select "MEMORIZE USER SETTING".**
3. **Press the [8] key to set the system in the user memory standby mode.**
4. **Press the [ENT] key to write or the [CLR] key not to write according to the direction on the screen.**
   After writing, a message informing the completion of writing appears.

Exit

5. **Press the [SUB MENU] key.**

8.5.6.7 Restoring User Memory

This function is used to read the contents written in the internal memory. After reading, the system assumes the transmission standby status.

Procedures

1. **Follow procedures 1 to 3 in subsection 8.5.6.1 to open the MAINTENANCE MENU.**
2. **Press the [9] key to select "RESTORE USER SETTING".**
3. **Press the [9] key to set the system in the user memory restoring standby mode.**
4. **Press the [ENT] key to restore or the [CLR] key not to restore according to the direction on the screen.**
   After restoration, the system assumes the transmission standby mode.

Exit

5. **Press the [SUB MENU] key.**

Maintenance Menu

MAINTENANCE MENU
Press an item number key.

0. PREVIOUS MENU
1. ANTENNA HEIGHT UP to 5M <u>5–10M</u> 10–20M MORE 20M
2.
3. ANTENNA SWITCH <u>TRANSFER</u> <u>DISCARD</u>
4. PARTIAL MASTER RESET
5. ALL MASTER RESET
6. INTERNAL SETTING to CARD 2
7. CARD 2 to INTERNAL SETTING
8. MEMORIZE USER SETTING
9. RESTORE USER SETTING

To close this menu, Press (SUB MENU) key.

8.5.7 Adjusting Position to Chart

Adjust the position on the video if it does not correspond to that on the chart in the R+P or plotter (optional:NDB-33) mode.

8.5.7.1 Adjusting Video and Chart Using Trackball (R+P Mode)

Procedures

1. **Press the SUB MENU key to open the SUB MENU.**
2. **Press the 9 key three times to open the INIT SET #3 menu.**
3. **Press the 1 key to select "SHIFT COAST LINE #1".**
4. **Press the 1 key to select the "SETTING".**
5. **Press the ENT key to set the system in the adjusting mode.**
6. **Move the cursor to the position to be adjusted using the trackball and press the ENT key.**
7. **Move the cursor to another position to be adjusted using the trackball and press the ENT key.**

   Perform positional adjustment. In this case, “Chart adjustment” will be displayed on the upper right corner of the screen.

Cancellation

1. **Follow procedures 1 to 4 above to select the "DELETE".**
2. **Press the ENT key.**

   Position adjustment using the trackball is enabled only in the R+P mode.

Init set #3

INIT SET #3				0. PREV 9. NEXT
1. SHIFT COAST LINE #1	SETTING	<u>DELETE</u>		
2. SHIFT COAST LINE #2	N 0.000’ E 0.000’			
3. LAT／LON CORRECTION	N 0.000’ E 0.000’			
4. CHART CENTER POSITION	N 0° 00.000’ E 0° 00.000’			
5. DATE／TIME	<u>OFF</u>	UTC	LOCAL	
6.				

8.5.7.2 Adjusting Video and Chart Position by Entering Adjustment Value (R+P and Plotter Modes)

Procedures

1. **Follow procedures 1 and 2 in subsection 8.5.7.1 to open the INIT SET #3 menu.**
2. **Press the [2] key to select "SHIFT COAST LINE #2".**
3. **Press the [2] key or [ENT] key, enter an adjustment value for N (north latitude) using numeric keys ([0] to [9]) and press the [ENT] key.**
4. **Enter an adjustment value for E (east longitude) using numeric keys ([0] to [9]) and press the [ENT] key.**

   (Use the [⟳] key for selecting the north latitade, south latitude, east longitude or west longitud.)

Cancellation

1. **Follow procedures 1 and 2 above to select "SHIFT COAST LINE #2".**
2. **Press the [2] key, enter "0" to an adjustment value for N using the [0] key and press the [ENT] key.**
3. **Enter "0" to an adjustment value for E using the [0] key and press the [ENT] key.**

   This cancels position adjustment.

Exit

5. **Press the [SUB MENU] key.**

   Position adjustment by entering adjustment values is enabled in the R+P and plotter modes.

Init set #3

INIT SET #3				0. PREV 9. NEXT
1.	SHIFT COAST LINE #1	SETTING	DELETE	
2.	SHIFT COAST LINE #2	N 0.000’		
		E 0.000’		
3.	LAT／LON CORRECTION	N 0.000’		
		E 0.000’		
4.	CHART CENTER POSITION	N 0° 00.000’		
		E 0° 00.000’		
5.	DATE／TIME	OFF	UTC	LOCAL
6.				

8

8.5.7.3 Adjusting Position by Changing Latitude ／ Longitude Information from GPS (R+P and Plotter Modes)

Since this adjustment changes such data as the stored track, only our service personnel is allowed to use this function.

Procedures

1. **Follow procedures 1 and 2 in subsection 8.5.7.1 to open the INIT SET #3 menu.**
2. **Press the [3] key to select "LAT ／ LON CORRECTION".**
3. **Press the [3] key or [ENT] key, enter an adjustment value for N (north latitude) using numeric keys ([0] to [9]) and press the [ENT] key.**
4. **Enter an adjustment value for E (east longitude) using numeric keys ([0] to [9]) and press the [ENT] key.**

   (Use the key for selecting the north latitade, south latitude, east longitude or west longitud.)

Cancellation

1. **Follow procedures 1 and 2 above to select "LAT ／ LON CORRECTION".**
2. **Press the [3] key, enter "0" to an adjustment value for N using the [0] key and press the [ENT] key.**
3. **Enter "0" to an adjustment value for E using the [0] key and press the [ENT] key.**

   This cancels position adjustment.

Exit

5. **Press the [SUB MENU] key.**

Init set #3

INIT SET #3				0. PREV 9. NEXT
1. SHIFT COAST LINE #1	SETTING	DELETE		
2. SHIFT COAST LINE #2	N 0.000’			
	E 0.000’			
3. LAT ／ LON CORRECTION	N 0.000’			
	E 0.000’			
4. CHART CENTER POSITION	N 0° 00.000’			
	E 0° 00.000’			
5. DATE ／ TIME	OFF	UTC	LOCAL	
6.				

8.5.7.4 Adjusting Position by Fixing Own Ship at Screen Center

Procedures

1. **Follow procedures 1 and 2 in subsection 8.5.7.1 to open the INIT SET #3 menu.**
2. **Press the [4] key to select "CHART CENTER POSITION".**
3. **Press the [4] key or [ENT] key, enter an center position value for N (north latitude)/S (South latitude) using numeric keys ([0] to [9]) and press the [ENT] key.**
4. **Enter an center position value for E (east longitude) W (west longitude) using numeric keys ([0] to [9]) and press the [ENT] key.**
   The data input from the GPS, if any, is prioritized.

Exit

5. **Press the [SUB MENU] key.**

Note

- Use this function can be used only when the plotter mode is selected.

Init set #3

INIT SET #3				0. PREV 9. NEXT
1. SHIFT COAST LINE #1	SETTING	DELETE		
2. SHIFT COAST LINE #2	N 0.000’			
	E 0.000’			
3. LAT ／ LON CORRECTION	N 0.000’			
	E 0.000’			
4. CHART CENTER POSITION	N 0° 00.000’			
	E 0° 00.000’			
5. DATE ／ TIME	OFF	UTC	LOCAL	
6.				

8

9

AFTER-SALES SERVICE

★ When asking for repair

When a system failure is suspended, read Chapter 6, 7, 8 carefully and re-check the abnormal part.
If it is still considered to be a failure, stop the operation at once and consult with the dealer you purchased the product, our sales department or your nearest branch or business office.

● Repair within the warranty period

If the failure occurred under proper operation in accordance with the instruction manual, the dealer or JRC shall repair the product without charging. In case of any other failure occurred due to mis-operation or natural disaster, the repair work will be charged.

● Repair after the warranty period has expired

If the product is recoverable by repairing, we will repair it upon your request.

● Items to be identified

☆ Product name, model name, manufacturing date and serial number
☆ Failure condition (as detailed as possible: see the Radar Failure Checklist on Page 9-2.)
☆ Your company/organization name, location and telephone number

★ Recommendation of maintenance inspection

Although it depends on your operating condition, the performance of the product may be lowered due to parts wear.
We recommend maintenance inspection, apart from the normal maintenance work.
For maintenance inspection, consult with the dealer you purchased the product, our sales department, or your nearest branch or business office.
Note that this maintenance inspection will be charged.

For detail of after-sale service, contact the dealer you purchased the product, our sales department, or your nearest branch or business office.

☞ Contact : See the list at the end of the manual.

Radar Failure Checklist

When ordering for repair, check the following items, fill in the sheet and send it to us. If there is any uncertain items, contact your ship and give us correct information on the product.

Ship name:____________________ Phone:____________________ Fax:____________________

Radar general model name: JMA-____________________ Serial No.:____________________

(Write the full model name correctly)

(1) Check the following items in the order of the number, and circle the applicable answer between YES or NO. If the item cannot be determined as YES or NO, explain in detail in the item (17), Others.

(2) If any of the items (1) through (5) is marked as NO, check the fuse of the product (refer to section 8.2, 8.3).

(3) Check the items (4) through (16) while the transmission (TX) is ON.

* Functions mentioned in the items (14) through (16) may be optional. If the function is optional, answer is not necessary.

No.	Check Item	Result	
(1)	Power can be turned on. (The lamp on the operation panel is lit.)	YES	NO
(2)	A few minutes after powering-on, it will become stand-by status (TX Ready).	YES	NO
(3)	When powering-on (or TX ON), the CRT displays something (CRT is lit).	YES	NO
(4)	The scanner rotates at the transmission (TX) ON. (Check the following items while transmission is ON.)	YES	NO
(5)	Current is supplied to the magnetron. (Refer to subsection 8.1.2.8.)	YES	NO
(6)	Tuning is enabled. (Check with the range of 6NM or more.)	YES	NO
(7)	Fixed marker is displayed.	YES	NO
(8)	VRM is displayed.	YES	NO
(9)	White noise is displayed while set at STC, FTC minimum, GAIN maximum, IR-OFF and range 48NM.	YES	NO
(10)	Target reflection echo is displayed.	YES	NO
(11)	Sensitivity of reflection echo is normal.	YES	NO
(12)	EBL is displayed.	YES	NO
(13)	Cursor mark moves.	YES	NO
*(14)	GYRO course can be set and normally displayed.	YES	NO
*(15)	LOG speed can be normally displayed.	YES	NO
*(16)	ATA works normally.	YES	NO

(17) Others (Error message, etc)

10 DISPOSAL

10.1 Equipment Disposal 10-1
10.2 Disposal of Used Batteries 10-2
10.3 Disposal of Used Magnetron 10-3

10.1 Equipment Disposal

Dispose of this equipment by following the ordinances or regulations of the local authorities in charge of the disposal site.

10.2 Disposal of Used Batteries

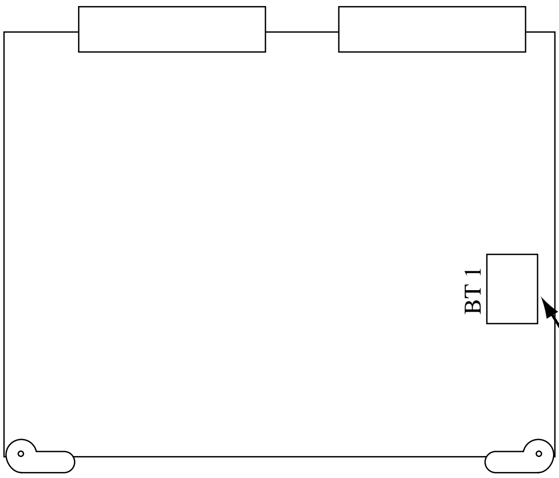
⚠ WARNING

Before disposing of used lithium batteries, insulate by affixing tape to the positive and negative terminals or by other means. Otherwise, short-circuiting may occur, resulting in heat generation, bursting or ignition.

On this equipment, lithium batteries is used for:
BT1 in the CPU control circuit (PC4401) (Maxell ER3)

Checking and Replacing the Battery

- The JMA-7700 series radar stores the tracks, marks, waypoints, and other settings in its internal lithium memory. These items of information sre lost when the internal battery is exhausted.
- Checking the Battery
  The life expectancy of the lithium battery is approximately 5 years after production. When the service life of the battery is nearing its end, check its output voltage. Replace the battery if it reads lower than 3.0 volts.
- Battery replacement procedure
  Replace the battery BT1 in the CMC-1055B CPU circuit board.
  Be careful for making short-circuit between the battrey terminal.
  The data on the memory is sustained by super-capacitance for a short period of time.



- Do not keep used lithium batteries but dispose of them immediately after as non-combustible waste.
- Before disposing of used lithium batteries, insulate by affixing tape to the positive and negative terminals or by other means. In the area where used batteries are separated from other waste, dispose of them by following the local regulations.
  For detail, consult your local distributor, our sales office or your local government.

10.3 Disposal of Used Magnetron

The scanner in this radar use a magnetron (NKE-1055 ／ 1056).

- After replacing it, return the used one to your local distributor or our sales office.
  For detail, ask your local distributor or our sales office.

11

SPECIFICATION

11.1 General Specification JMA-7710-6／
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11 Specification

11.1 General Specification JMA-7710-6 ／ JMA7725-6 ／ JMA-7725-9

1) Type of emission: P0N
2) Display type: Raster scan, PPI method, vertically long display
3) Display panel: Bright 21-inch color CRT (radar video effective diameter of 250mm min.)
4) Range scales: 0.125, 0.25, 0.5, 0.75, 1.5, 3, 6 , 12, 24, 32, 48, and 96 ／ 120nm
   Maximum range: 10kW = 96nm
   25kW = 120nm
5) Range resolution: 25m max.
6) Minimum detective range: 28m max.
7) Range scale accuracy: 1% of the maximum operating range or 30m, whichever larger.
8) Bearing accuracy: ±1 degree max.
9) Bearing resolution: 1.5 degrees (6ft)
   1.1 degrees (9ft)
10) Bearing display: Relative bearing, true bearing, course-up and stabilized course-up
11) Ambient conditions: Temperature
    Scanner: –25°C to +55°C
    (Storage: –25°C to +70°C)
    Equipment other than scanner: –15°C to +55°C
    Relative humidity
    All equipment: +40°C, 93%
    Vibration
    All equipment:
    2 to 13.2Hz with excursion of ±1mm±10%
    13.2 to 100Hz with constant maximum acceleration of 7 m/s^2
12) Power supply input: AC100 ／ 110, 220V, 50 ／ 60Hz, 1ø
13) Power consumption: 10kW = Approx. 530VA
    25kW = Approx. 550VA
14) Power supply input fluctuation: AC100 ／ 110, 220V±10%
15) Pre-heating time: 10kW = Approx. 90 sec
    25kW = Approx. 3 min
16) From standby to operation: 15 sec. max.

11.2 Scanner Unit NKE-1055-6

1) Outside dimensions: Approx. height 440 × approx. swing circle 1910 (mm)
2) Mass: Approx. 36kg
3) Plane of polarization: Horizontal polarization
4) Beam width: Horizontal beam width = 1.2 degrees
   Vertical beam width = 25 degrees
   Side lobe level
   Within ±10 degrees = –26dB max.
   Outside ±10 degrees = –30dB max.
5) Antenna rotation: Approx. 24rpm
6) Transmission output: 10kW
7) Transmission frequency: 9410±30MHz
8) Transmission tube: Magnetron MSF1425B
9) Transmission pulse length/repetition frequency:

	Short	Standard	Long
0.125nm		0.08μs ／ 2080Hz	
0.25nm		0.08μs ／ 2080Hz	
0.5nm		0.08μs ／ 2080Hz	
0.75nm		0.08μs ／ 2080Hz	0.2μs ／ 2080Hz
1.5nm	0.08μs ／ 2080Hz	0.2μs ／ 2080Hz	0.4μs ／ 1560Hz
3nm	0.2μs ／ 2080Hz	0.4μs ／ 1560Hz	0.8μs ／ 780Hz
6nm	0.4μs ／ 1560Hz	0.8μs ／ 780Hz	1.2μs ／ 520Hz
12nm	0.4μs ／ 1560Hz	0.8μs ／ 780Hz	1.2μs ／ 520Hz
24nm		1.2μs ／ 520Hz	
32nm		1.2μs ／ 520Hz	
48nm		1.2μs ／ 520Hz	
96nm		1.2μs ／ 520Hz	

10) Transmission switch: Circulator + Diode limiter
11) Mixer: MIC front end
12) Intermediate frequency amplifier: Intermediate frequency = 60MHz
    Band width = 20MHz (0.08μs)
    6MHz (0.2 and 0.4μs)
    3MHz (0.8 and 1.2μs)
    Gain = 90dB min.
    Receiver characteristic = Logarithmic receiver
13) Overall noise figure: 7.5dB (average)
14) Wind Load: 51.5m/s (100 knots) relative

11.3 Scanner Unit NKE-1056-6M ／ 9M

1) Outside dimensions: Approx. height 519 × approx. swing circle 1910 (mm) (6ft)
Approx. height 519 × approx. swing circle 2836 (mm) (9ft)

2) Mass: Approx. 42kg (6ft)
Approx. 47kg (9ft)

3) Plane of polarization: Horizontal polarization

4) Beam width:
Horizontal beam width = 1.2 degrees (6ft)
Horizontal beam width = 0.8 degrees (9ft)
Vertical beam width = 25 degrees (6ft)
Vertical beam width = 25 degrees (9ft)
Side lobe level
Within ±10 degrees = –26dB max. (6 to 9ft)
Outside ±10 degrees = –30dB max. (6 to 9ft)

5) Antenna rotation: Approx. 24rpm

6) Transmission output: 25kW

7) Transmission frequency: 9410±30MHz

8) Transmission tube: Magnetron M1437(A)

9) Transmission pulse length/repetition frequency:

	Short	Standard	Long
0.125nm		0.08µs ／ 2080Hz	
0.25nm		0.08µs ／ 2080Hz	
0.5nm		0.08µs ／ 2080Hz	
0.75nm		0.08µs ／ 2080Hz	0.2µs ／ 2080Hz
1.5nm	0.08µs ／ 2080Hz	0.2µs ／ 2080Hz	0.4µs ／ 1560Hz
3nm	0.2µs ／ 2080Hz	0.4µs ／ 1560Hz	0.8µs ／ 780Hz
6nm	0.4µs ／ 1560Hz	0.8µs ／ 780Hz	1.2µs ／ 520Hz
12nm	0.4µs ／ 1560Hz	0.8µs ／ 780Hz	1.2µs ／ 520Hz
24nm		1.2µs ／ 520Hz	
32nm		1.2µs ／ 520Hz	
48nm		1.2µs ／ 520Hz	
120nm		1.2µs ／ 520Hz	

10) Transmission switch: Circulator + Diode limiter

11) Mixer: MIC front end

12) Intermediate frequency amplifier:
Intermediate frequency = 60MHz
Band width = 20MHz (0.08µs)
6MHz (0.2 and 0.4µs)
3MHz (0.8 and 1.2µs)
Gain = 90dB min.
Receiver characteristic = Logarithmic receiver

13) Overall noise figure: 7.5dB (average)

14) Wind Load: 51.5m/s (100 knots) relative

11.4 Display Unit NCD-3901-2

1)	Structure:	Desktop type
2)	Outside dimensions:	Approx. W400 × H658 × D795 (mm) (However, the dimension of the handle is excluded from the width.)
3)	Mass:	Approx. 63 kg.
4)	Display:	Vertical 21-inch color CRT
5)	Number of pixels:	1024 × 768
6)	Display area:	Approx. 405 × 305 (mm)
7)	Color, gradation and brilliance	

Radar video

Gradation:	16 (8 in radar trail display mode)
Video color:	1 (yellow, green, orange)
Brilliance control:	4 steps

Radar track

Gradation:	1
Video color:	1 (sky, white, green)
Brilliance control:	4 steps (simultaneous control with radar video)

Fixed marker/VRM/EBL

Video color:	Cyan
Brilliance level:	4 steps

The following brilliance levels are simultaneously changed.

Letter/dial plane

Video color:	White
Brilliance level:	4 steps

SHM/cursor

Video color:	White
Brilliance level:	4 steps

8) Range/scale spacing:

Range	Scale spacing	Number of rings	
0.125nm	0.0625nm	2	
0.25nm	0.125nm	2	
0.5nm	0.25nm	2	
0.75nm	0.25nm	3	
1.5nm	0.25nm	6	
3nm	0.5nm	6	
6nm	1nm	6	
12nm	2nm	6	
24nm	4nm	6	
32nm	8nm	4	
48nm	8nm	6	
96nm	16nm	6	(10kW only)
120nm	20nm	6	(25kW only)

9)	Screen display mode:	Radar mode North-up (TM/RM/SRM/CTM), course-up (TM/RM/SRM/CTM), head-up (RM/SRM) and stabilized course-up (CTM) Composite mode North-up (TM/CTM) and course-up (TM/CTM) Plotter mode (when optional NDB-33 is installed) North-up (TM) and course-up (TM)
10)	Variable range scale:	2 (digital display) Range display unit: nm and km 0.000 to 295.0nm (0.000 to 547.0km)
11)	Electronic cursor:	2 (digital display) Second EBL can be floated (first one is fixed). Second EBL can be switched to parallel index lines. 000.0 to 359.9 degrees (in 0.1 degree unit) Can be switched between bearing display unit, relative bearing and true bearing.
12)	Cursor:	Displays the range, bearing and L／L (when GPS and GYRO are connected.) Moved using the trackball.
13)	Tuning method:	Manual and auto (tuning indication bar attached)
14)	Sea clutter restraint:	Manual and auto
15)	Rain clutter restraint:	Manual and auto
16)	Radar interference rejection:	Built-in
17)	Bearing scale:	1-degree scale, 360 degrees
18)	Bow display:	Electronic (stern marker can also be displayed)
19)	Guard zone alarm:	Can be switched between "OFF", "IN" and "OUT". Buzzer sound available. Range storing function equipped (1 sector ring)
20)	Off center:	Up to 66% of radius of any scale except 96 and 120nm
21)	TM display:	Built-in (excluding 96 and 120nm)
22)	TM reset position:	66% of radius Manually resettable
23)	Double zoom:	Within 66% of radius from the zoom center (excluding 0.125nm) * Available only when RM is selected in the radar mode.
24)	Radar trail:	TM radar trail in TM RM radar trail in RM Radar Trails interval: 1min, 3min, 6min, 12min, 15min, 30min, 60min, continuous Radar trail can automatically be cleared by switching range or resetting TM.
25)	Pulse width switch:	Long/short (0.75, 1.5, 3, 6 and 12nm)
26)	Target enhancement:	Built-in

27) Operating positions

(1) By controls

(1)	Tuning control:	TUNE
(2)	Snow/rain clutter restraining control:	RAIN
(3)	Sea clutter restraining control:	SEA
(4)	Gain adjusting control:	GAIN
(5)	Brilliance:	BRILL
(6)	VRM:	VRM
(7)	EBL:	EBL
(8)	VRM:	VRM

(2) By switch

(1)	Power supply switch:	PWR

(3) By keys

(1)	Main menu key:	MAIN MENU
(2)	Sub menu key:	SUB MENU
(3)	Enter key:	ENT
(4)	Range expanding key:	RANGE +
(5)	Range reducing key:	RANGE –
(6)	Panel light key:	PANEL
(7)	Day/night mode selecting key:	DAY/NIGHT
(8)	Range scale brilliance key:	RR
(9)	Bearing mode key:	AZI MODE
(10)	Pulse width selecting key:	PL
(11)	TM reset key:	TM RST
(12)	TM/RM key:	TM/RM
(13)	Center moving key:	OFF CENT
(14)	Ship's head marker brilliance key:	HL OFF
(15)	Alarm reset key:	ALARM ACK
(16)	VRM control key:	VRM1/VRM2
(17)	VRM control key:	VRM OFF
(18)	EBL control key:	EBL1/EBL2
(19)	EBL control key:	EBL OFF
(20)	Function selecting key:	FUNC
(21)	Guard alarm key:	GZ MENU
(22)	Transmission/standby key:	TX/STBY
(23)	Ten key 0:	0
(24)	Ten key 1:	1
(25)	Ten key 2:	2
(26)	Ten key 3:	3
(27)	Ten key 4:	4
(28)	Ten key 5:	5
(29)	Ten key 6:	6
(30)	Ten key 7:	7
(31)	Ten key 8:	8
(32)	Ten key 9:	9

(33) Clear key:	CLR
(34) Reverse key:	⟳
(35) Numerical value display key:	TGT DATA
(36) Acquisition key:	ACQ
(37) Degauss key:	DEGAUSS

(4) Special keys

(1) Floating EBL key:	F EBL
(2) Vector + key:	VECT+
(3) Vector - key:	VECT−
(4) Vector key:	VECT

[Keys that are enabled when the ATA is used]

(1) Target canceling key:	TGT CNCL

[Switches available when optional equipment is installed]

(1) Starting point key:	○—▷
(2) End point key:	—▷○
(3) Mark key:	MARK MENU
(4) Track key:	OWN TRK

11.5 ATA NCA-843 (Optional)

1)	Acquisition	:	Manual acquisition and automatic acquisition (according to the guard zone)
2)	Maximum tracking target	:	30 targets, automatic tracking
3)	Maximum tracking range	:	32 nm
4)	Tracking data display	:	One target data display Range and bearing of a target CPA and TCPA of a target True course and true speed of a target
5)	Vector display:	:	Relative or true
6)	Past point display	:	Past four points Display intervals; 30 seconds, 1 minute, 2 minutes, 4 minutes
7)	Dangerous target alarm	:	By setting the CPA ／ TCPA
8)	Another ship's track	:	10 ships; 800 points each
		:	Seven colors; Can be classified by color.
		:	Storage intervals; 10 seconds, 30 seconds, 1 minute, 3 minutes, 5 minutes, 10 minutes

11.6 Inputable Signal

1) Navigation system

Equipment capable of outputting NMEA0182/NMEA0183 (GLL, GGA, VTG, RMB and RMC) or JRC-format signals.

2) Gyro

SYNC/PULSE: 360X, 180X, 90X and 36X

3) Log
   SYNCHRO: 360X, 180X, 90X and 36X
   PULSE: 800, 400, 200, 100
4) 2-axis log
   NMEA0183 (VBW) (incompatible with electronic compass)
5) External event mark
   Key input
6) Radar buoy

11.7 Outputable Signal

1) External alarm
2) Sub display unit signal (radar adaptor and operation analyzer)
3) Remote monitor (using vertical multi-scan monitor) (CFQ-8914 connector option)

11.8 Standard Equipment Configuration

Scanner unit:	1 unit
Display unit:	1 unit
Installation cable:	Between display and scanner unit
	Typ. 15m (scanner connector)
Performance monitor:	1 unit
Cable for Performance monitor:	Typ. 15m
Installing tools:	1 set
Standard spare parts:	1 set
Hood:	1 unit
Installation manual:	1 (Japanese or English)

11.9 Installing Clearance between Equipment

	Max.	Typ.
Between scanner and display unit	30m	15m
Between performance monitor and display unit	30m	15m

11.10 Others (Optional)

ATA function (built-in):	NCA-843
Plotter function (built-in):	NDB-33
Cover made of duck:	MTT305811
Installation cable (20m):	CFQ-8681-20
Installation cable (30m):	CFQ-8681-30

APPENDIX

Appendix 1	Radar System Circuit Code List
Appendix 2	Circuit Diagram of Radar Type JMA-7710-6 and JMA-7725-6／9
Appendix 3	Terminal Board Connection Diagram of Radar Type JMA-7710-6
Appendix 4	Terminal Board Connection Diagram of Radar Type JMA-7725-6／9
Appendix 5	Primary Power Supply System Diagram of Radar Type JMA-7710-6 and JMA-7725-6／9
Appendix 6	Internal Connection Diagram of Scanner Unit Type NKE-1055
Appendix 7	Internal Connection Diagram of Scanner Unit Type NKE-1056
Appendix 8	Internal Connection Diagram of Display Unit Type NCD-3901-2
Appendix 9	Power Supply Connection Diagram of Display Unit Type NCD-3901-2
Appendix 10	NSK Log Selection Switches of Display Unit Type NCD-3901-2
Appendix 11	Setting Table of the Speed Log Select Switches of Display Unit Type NCD-3901-2
Appendix 12	Setting Table of the Gyro Compass and Gyro Select Switches of Display Unit Type NCD-3901-2

A Appendix

Appendix 1: Radar System Circuit Code List

◎ General code

JMA-7710-6: 10kW, 2 units, 6-feet scanner
JMA-7725-6: 25kW, 2 units, 6-feet scanner
JMA-7725-9: 25kW, 2 units, 9-feet scanner

◎ Scanner unit

NKE-1055 (10kW)

NMA-469A:	Modulator
NRG-210A:	Receiver
NAX-16A-6:	Radiator
CQD-1547:	Internal equipment of scanner
CQC-931:	Internal equipment of transmitter receiver
CBP-136:	Motor
CNM-200:	Internal equipment of modulator
CME-261A:	Modulator circuit PC201
CMA-662:	Internal equipment of receiver
CAE-344-3:	IF amplifier circuit PC301
CBP-143:	Moter control circuit PC101
CQD-1735:	Internal equipment of slow starter

NKE-1056 (25kW)

NMA-470:	Modulator
NRG-210A:	Receiver
NAX-16A-6/NAX-16A-9:	Radiator
CQC-959:	Internal equipment of scanner (with diode limiter)
CMH-1562A:	Interface circuit PC101
CNM-201:	Internal equipment of modulator
CPA-209:	Modulator circuit PC210
CMA-662:	Internal equipment of receiver
CAE-344-3:	IF amplifier circuit PC301
CBP-143:	Moter control circuit PC101
CQD-1736:	Internal equipment of slow starter

◎ Performance monitor

NJU-64

Appendix 1 (continued)

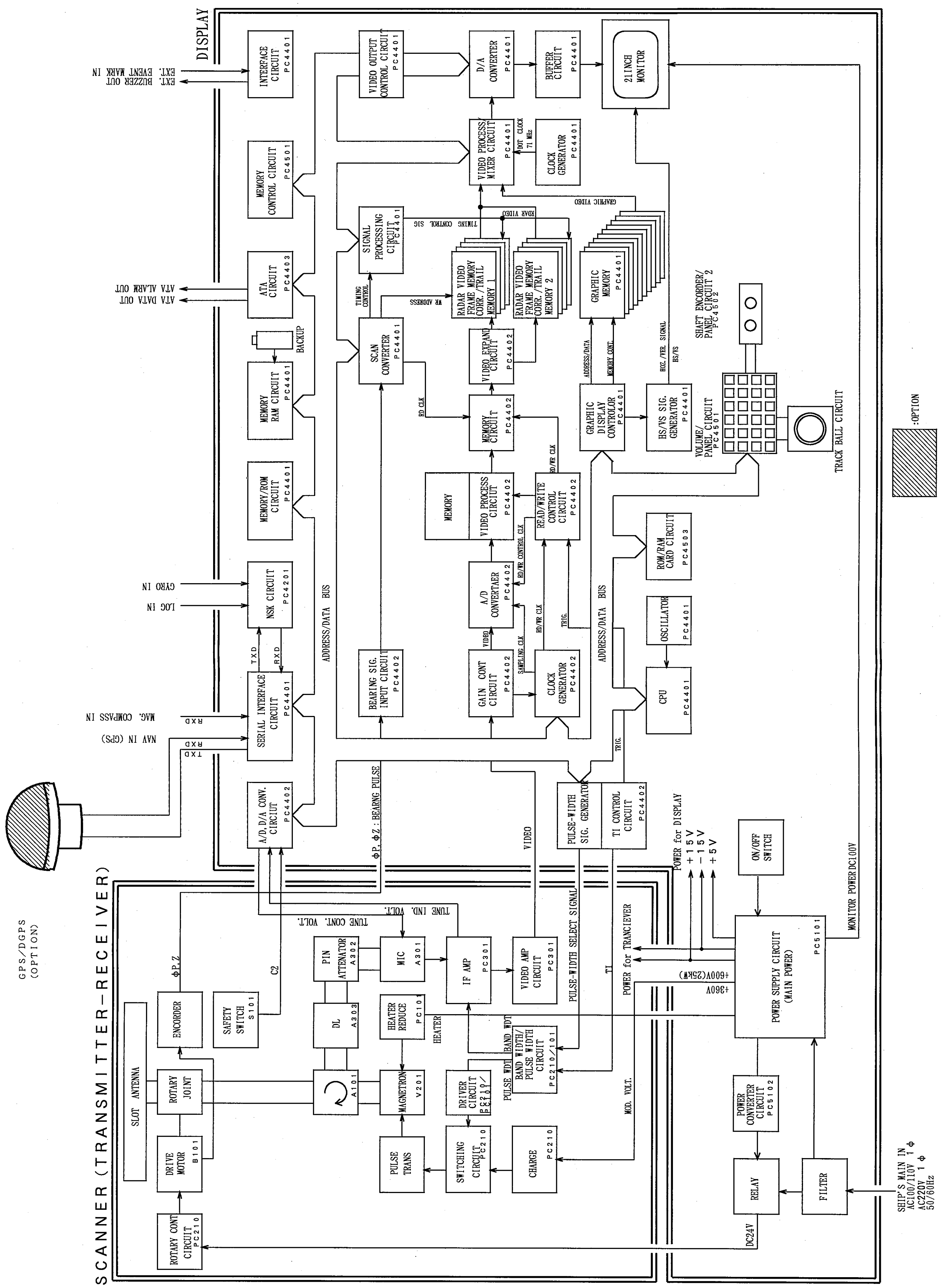
◎ Display unit

NCD-3901-2

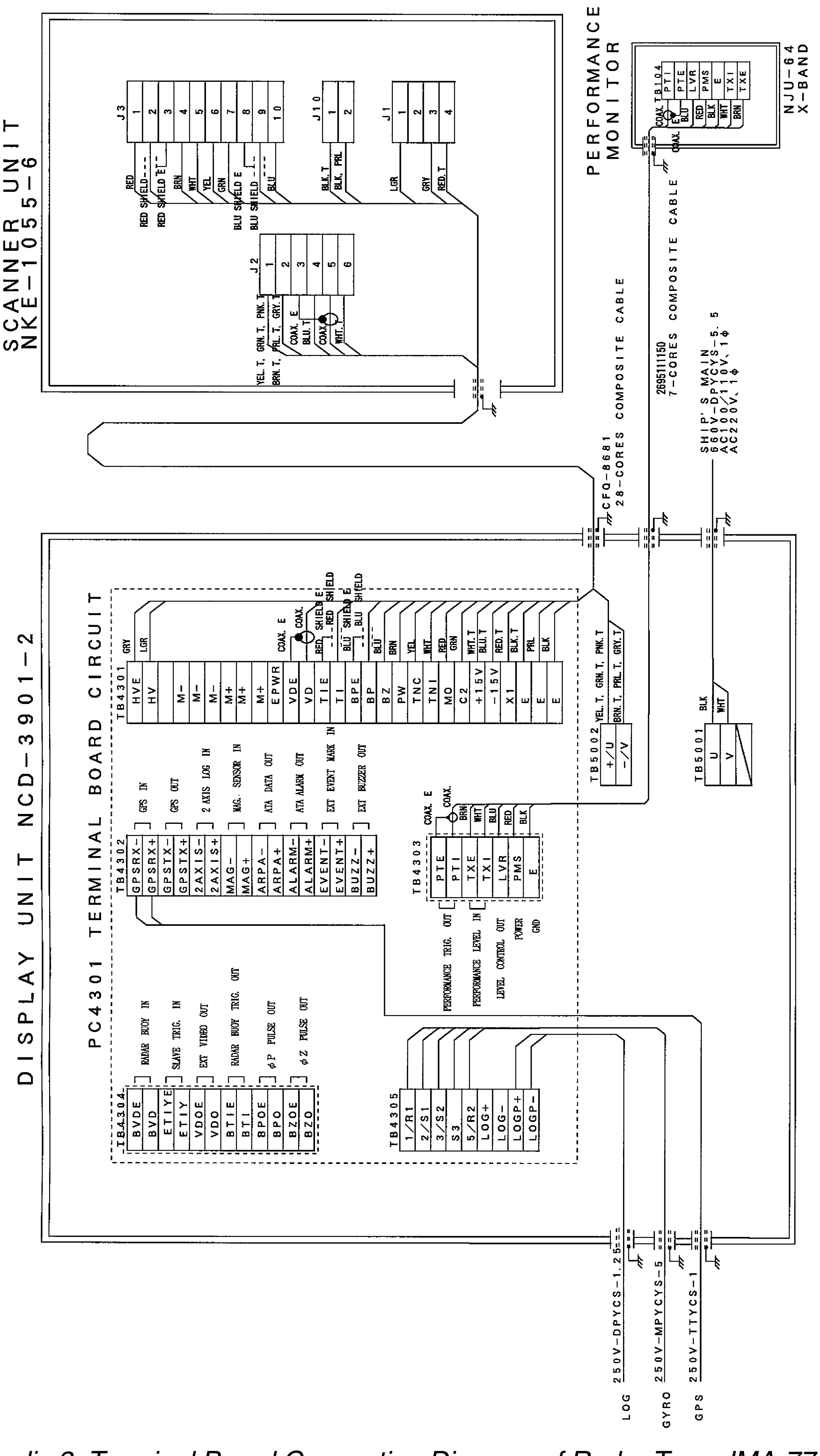
CML-576:	Internal circuit of display unit
CFQ-8945:	Mother board circuit PC4101
CMJ-304C:	NSK circuit PC4201
CQD-1651:	Terminal board circuit PC4301
CMC-1055B:	CPU control circuit PC4401
CED-44B:	Time base circuit PC4402
CCK-816:	Panel circuit 1 PC4501
CCK-817:	Panel circuit 2 PC4502
CCK-790E:	Panel circuit 3 PC4503
CBD-1448:	Power supply circuit PC5101
CBA-313:	Power converter PC5102
CSC -581:	Relay circuit PC4701
CDC-1013:	ATA circuit PC4403 (Option)

◎ Installation cable

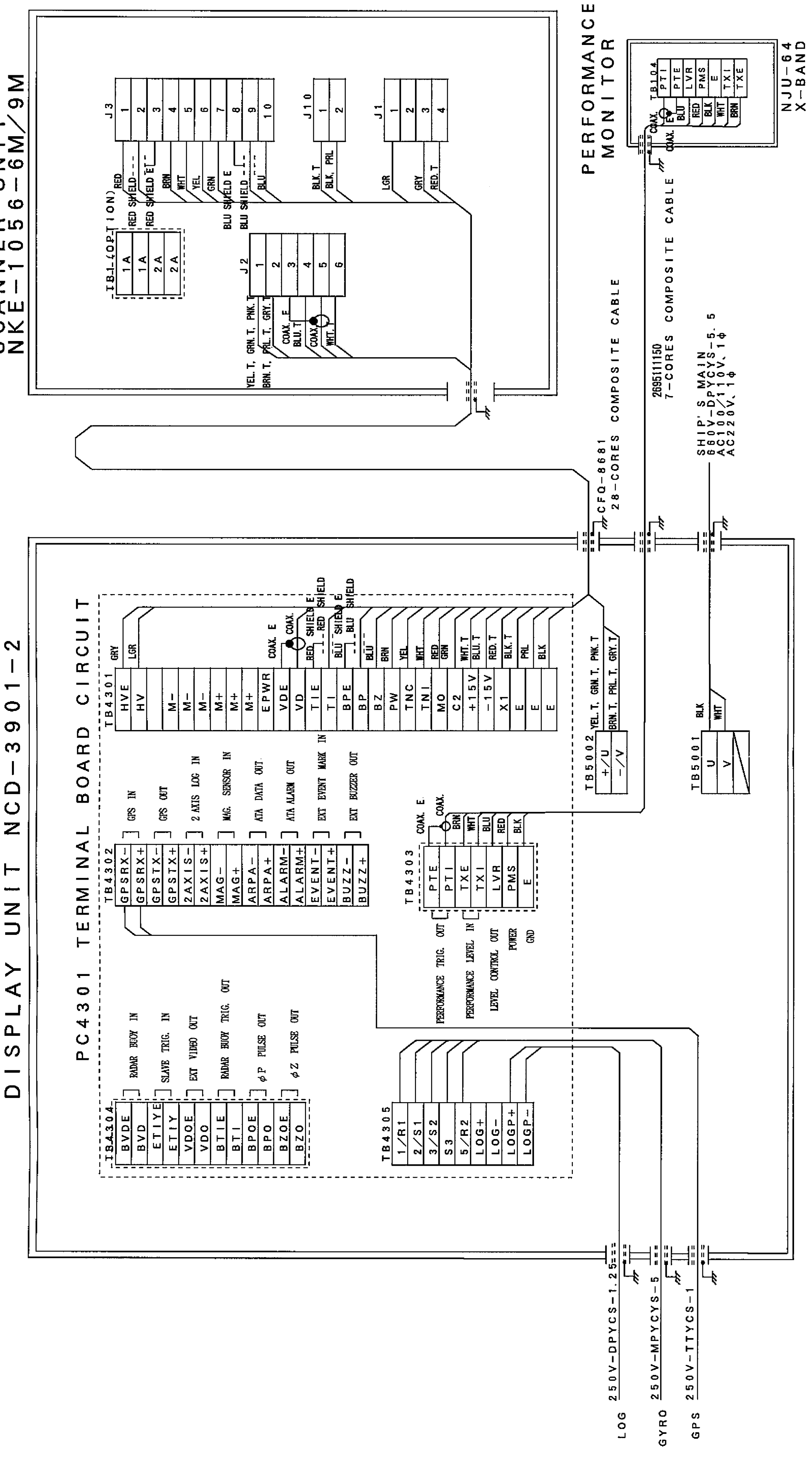
CFQ-8681-15:	Installation cable for between the display and scanner (15m)
2695111150:	Cable for performance monitor (15m standard)



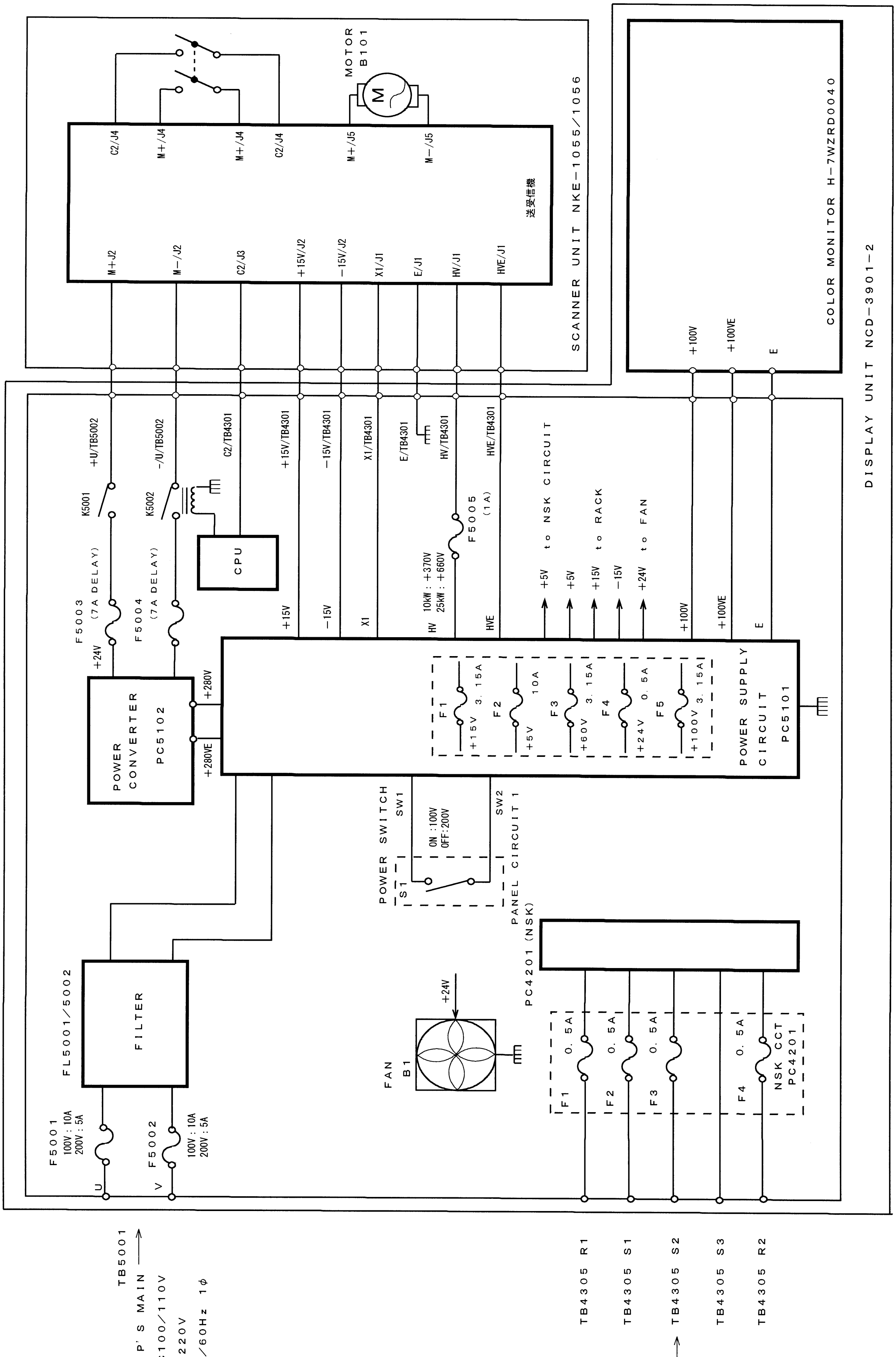
Appendix 2 Circuit Diagram of Radar Type JMA-7710-6 and JMA-7725-6/9



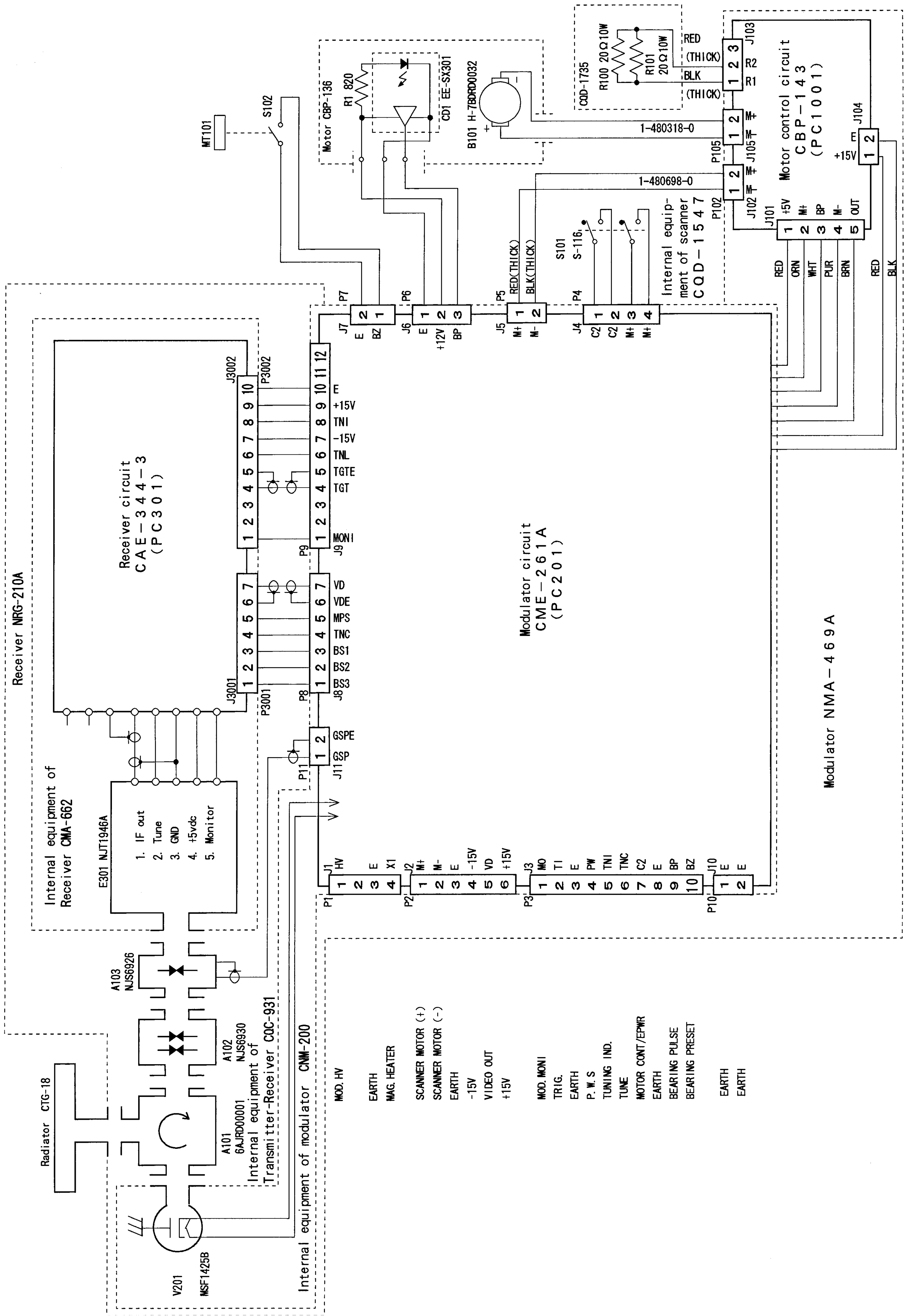
Appendix 3 Terminal Board Connection Diagram of Radar Type JMA-7710-6



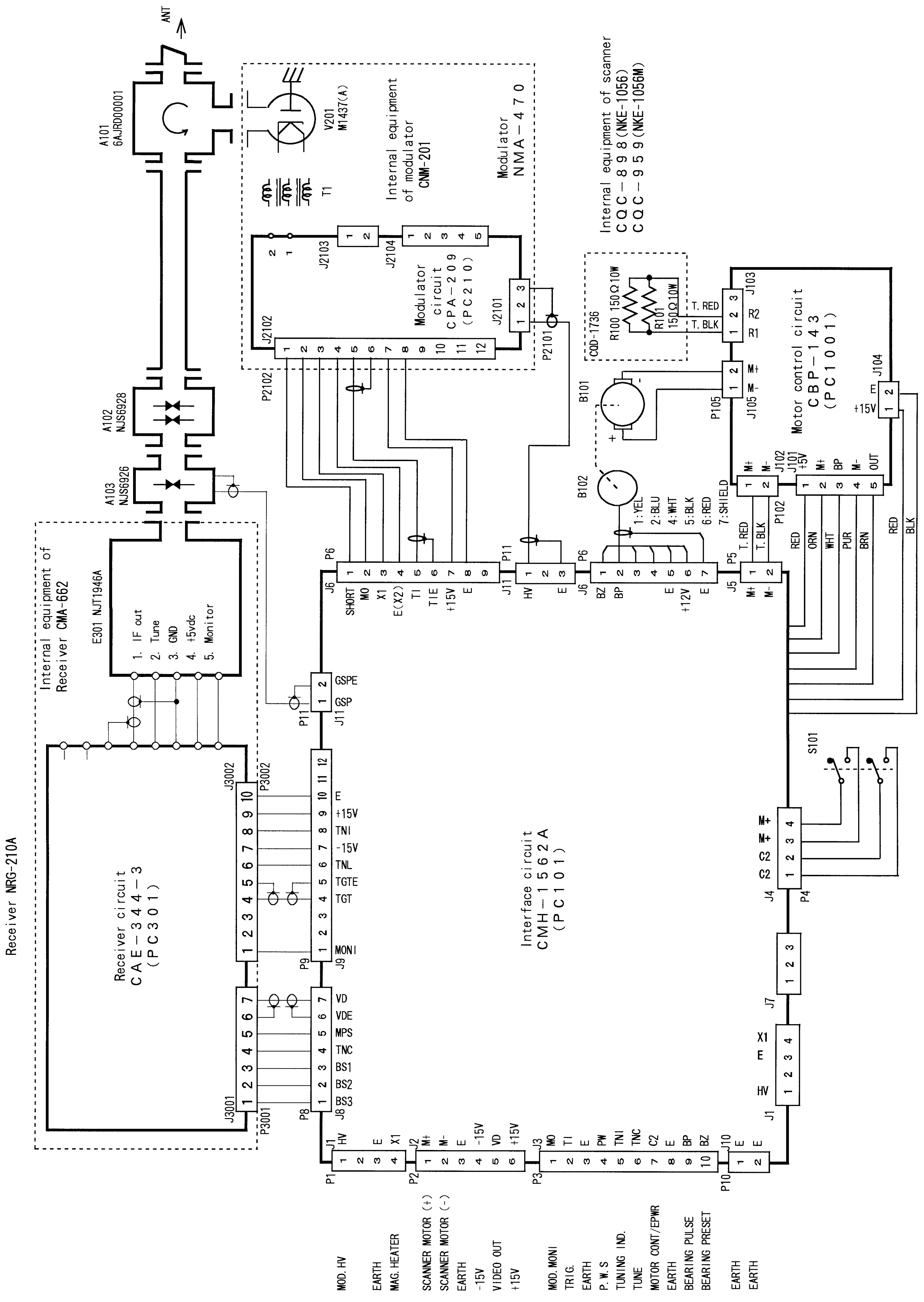
Appendix 4 Terminal Board Connection Diagram of Radar Type JMA-7725-6/9



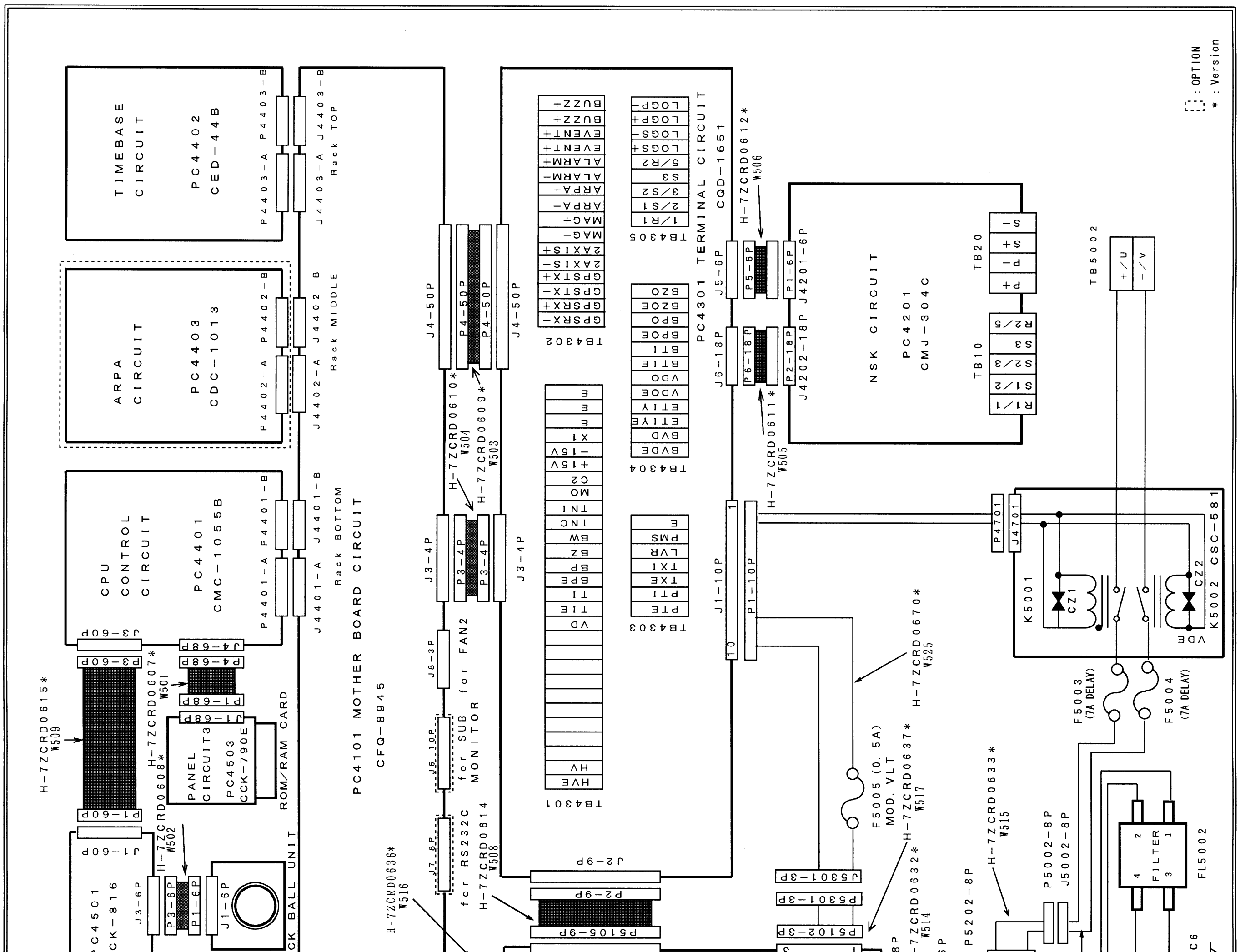
Appendix 5 Primary Power Supply System Diagram of Radar Type JMA-7710-6 and JMA-7725-6/9



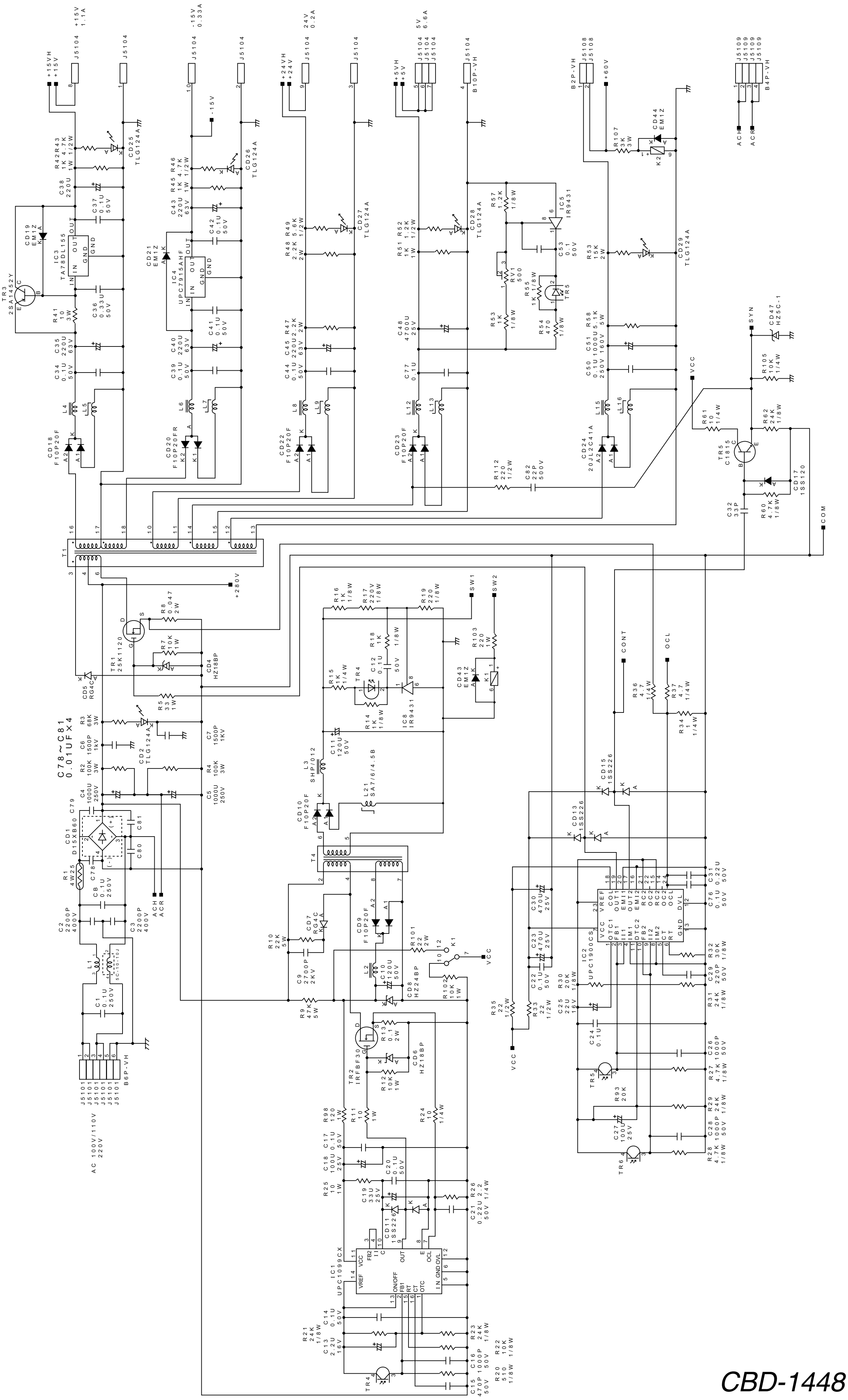
Appendix 6 Internal Connection Diagram of Scanner Unit Type NKE-1055



Appendix 7 Internal Connection Diagram of Scanner Unit Type NKE-1056

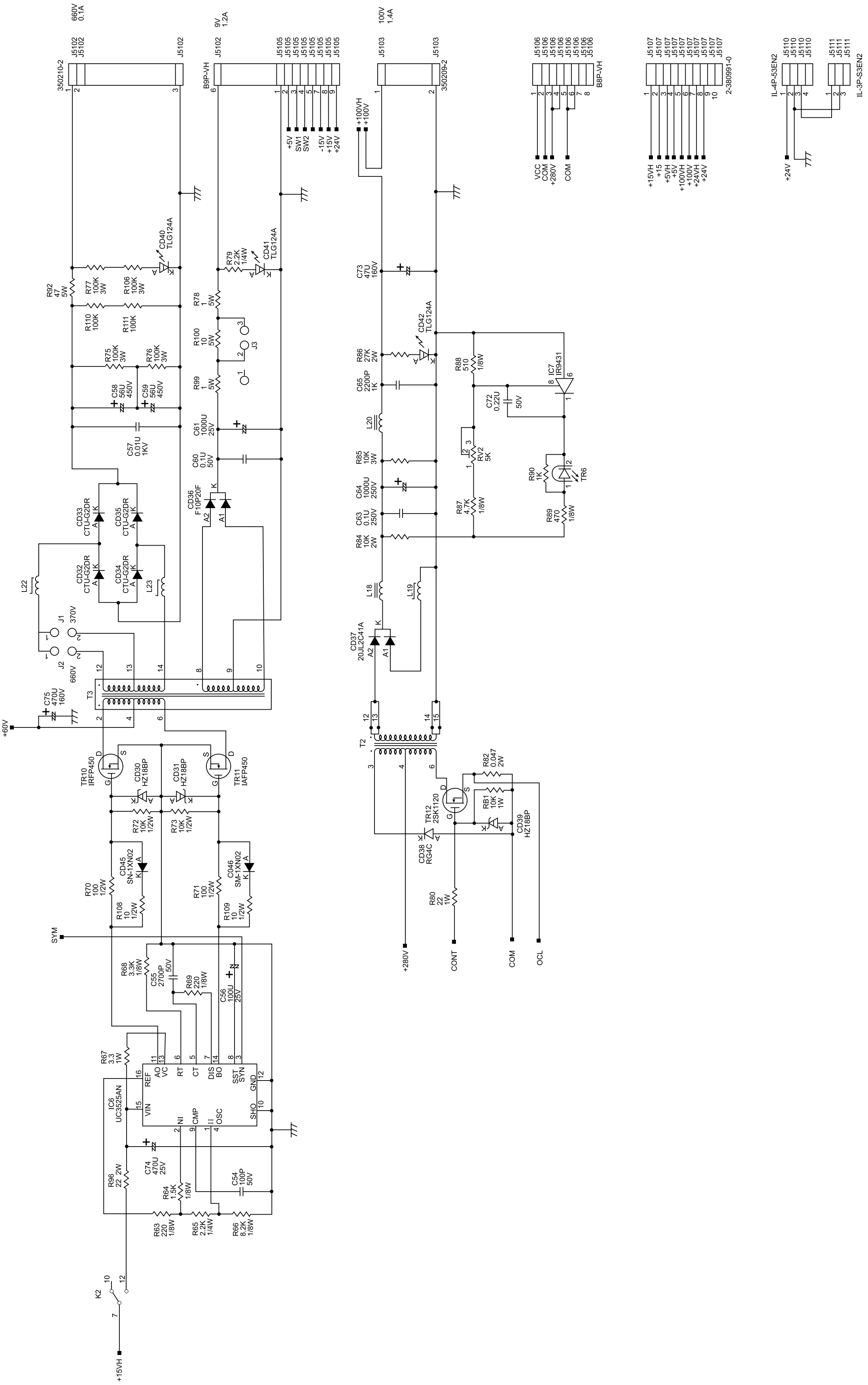


Appendix 8 Internal Connection Diagram of Display Unit Type NCD-3901-2



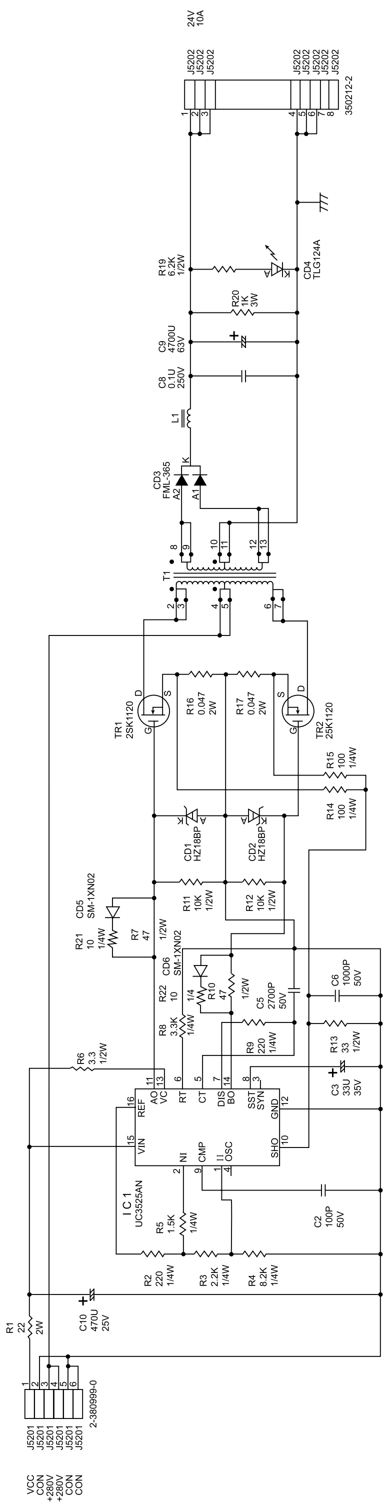
CBD-1448 (1/2)

Appendix 9.1 Power Supply Connection Diagram of Display Unit Type NCD-3901-2



CBD-1448 (2/2)

Appendix 9.2 Power Supply Connection Diagram of Display Unit Type NCD-3901-2

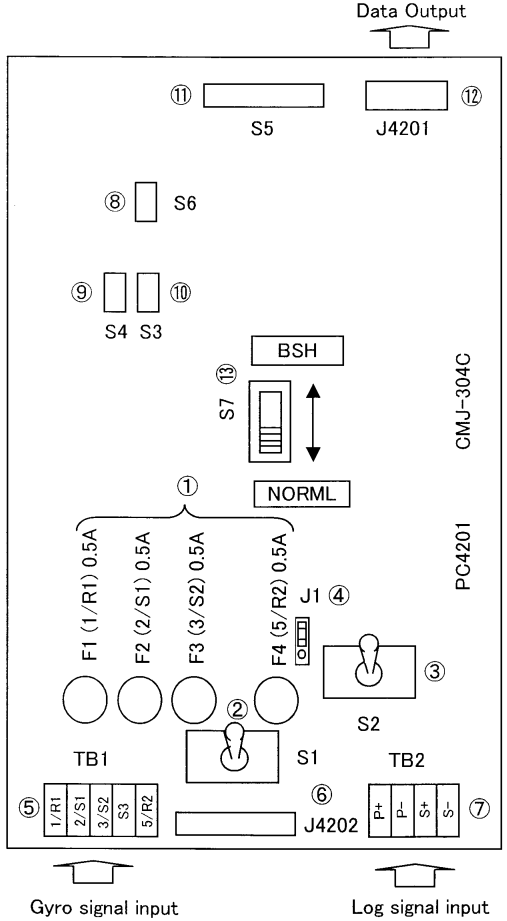


CBA-313 (1/1)

Appendix 9.3 Power Supply Connection Diagram of Display Unit Type NCD-3901-2

Appendix 10 NSK Log Selection Switches of Display Unit Type NCD-3901-2

NOTE:When removing or touching the PC4201.
Set the gyro power supply switch S1 to OFF or cut-off the gyro signal input to TB10 or J4202 in order to prevent damages to ICs and to avoid electrical shocks.



NOTE1:Do not forget to select the switch S1(②) to OFF before performing the connection of gyro.
If the switch S1(②) is set to ON without the correct setting of S2(③) fuses F1～F4(①) may burn out.
When setting the switch S1(②) to ON, following settings must be all completed.

NOTE2:Fuses are F1～F4(①) and are used in each lines of gyro signals and exterior power supply line.
When the fuse has burned out,replace with same type fuse after investigating the cause of burn out.
Fuse is MF51NN-0.5A.

NOTE3:Selector of applicable gyro.Setting of S2(③) and S5(⑪) and JP1(④) should be made correctly in accordance with the setting table.
The revolution direction(bit8) of S5(⑪)-4 after energized and if the revolution is reversed. If should be changed over.

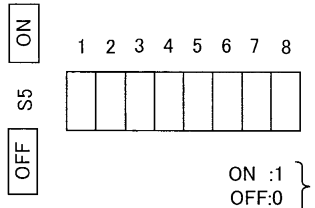
NOTE4:S5(⑪)-5～8 deawing are setting for speed log signals of the ships.

NOTE5:The electoric current for gyro signals is as follows.
Step Type 100mA(DC24V)
70mA(DC35V)
Synchro Thpe 50mA(AC100V)

NOTE6:S6(⑧) Log test switch for 18KT speed Log signal output. Usually set NORML side.

SETTING GYRO SWITCH

a.S5(⑪) Gyro/Log Type selector switch.
S5 setting to be mode according to setting table.

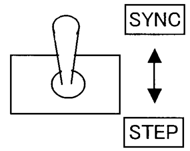


ON :1 } to be
OFF:0 } specified

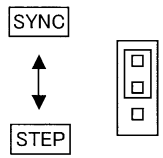
S5 SETTING TABLE

			1	2	3	4	5	6	7	8
GYRO SIGNAL	SYNC		0							
	STEP		1							
	360X			0	0					
	180X			0	1					
	90X			1	0					
	36X			1	1					
	DIRECTION	Normal(NOR)				0				
		Reverse(REV)				1				
LOG SIGNAL	TYPE	PULSE					0			
		SYNCHRO					1			
								0		
	PULSE/NM	800P/360X							0	0
		400P/180X							0	1
		200P/90X							1	0
		100P/30X							1	1

b. S2(③) Gyro Type Selector



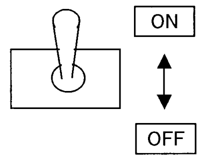
c. JP1(④) Gyro Type Selector



d. S3(⑩),S4(⑨) is used by Service person.

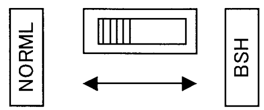
- S3(⑩) reset the CPU.
- S4(⑨) is setting for "0" degree of the bearing.

e. S1(②) Gyro power supply switch



After confirming the completion of all settings, set to ON.

f. S7(⑬)User Type selection switch.



BSH side : IMO(BSH) Type Approved RADAR

NORML side : Other Conventional RADAR

Setting the speed log switches

1. This radar uses the six types of standard speed log signals listed below.
   Pulse type: 800 pulses/NM. 400 pulses/NM, 200 pulses/NM, or 100 pulses/NM
   Synchro type: 360X/NM, 180X/NM, 90X/NM, or 30X/NM
   Set gyro select key assembly S5 (⑪) using the S5 setting table.
2. Connect the speed log signal line to, for the pulse type, the [PULSE] side, or for the synchro type, the [SYNHRO] side, of terminal block TB20 (⑦).

3. S5 (⑪): Gyro log select key assembly
   Set the key assembly in accordance with the S5 setting table.

S5 setting table

			1	2	3	4	5	6	7	8
Gyro signal (GYRO SIG.)	SYNC		0							
	STEP		1							
	360X			0	0					
	180X			0	1					
	90X			1	0					
	36X			1	1					
	Rotational direction	Normal (NORM)				0				
		Reverse (REV)				1				
Log signal (LOG SIG.)	Type	PULSE					0			
		SYNCHRO					1			
	PULSES/NM							0		
		800P/360X							0	0
		400P/180X							0	1
		200P/90X							1	0
		100P/30X							1	1

4. S6 (⑧): Log test key
   Setting this key to the [TEST] position displays 18KT.

   Usually, set the key to [NORML].

5. Light-emitting diode CD22 is provided to check pulse-type log input signals. This LED lights if the log signal level is +2 V or more (or under a non-connected status of the log signal line), or it does not light if the log signal level is +2 V or less.

Appendix 11 Setting Table of the Speed Log Select Switches of Display Unit Type NCD-3901-2

Appendix 12 Setting Table of the Gyro Compass and Gyro Select Switches of Display Unit Type NCD-3901-2

Item / Manufacturer	Gyro compasses	Repeater motors (For reference only)	PC4201 / Excitation voltage	Gyro select switches (S5, S2, and JP1 located on the PC4201): S5 setting 1	S5 setting 2	S5 setting 3	S5 setting 4	S5 setting 5	S5 setting 6	S5 setting 7	S5 setting 8	S2 setting	JP1 setting
TOKIMEC (JAPAN) Sperry (U.S.A.)	ES-2/11, GLT-100~103/105/106K/107/1104, NJZ-501 (R501)	Synchro motor INMS (TS63N7E13) (36X)	115 VAC 60 Hz	OFF	ON	ON		Speed log selection				SYNC	SYNC
	ES-11A, GM-11/11A/21/110/120, MS-2000/3000 PR-222R/226/237/237-L /1*8*/2022/2023/22**, TG-200	Synchro motor TSAN60E11 (90X)	110 VAC 60 Hz	OFF	ON	OFF						SYNC	SYNC
	GLT-201/202/203, MK-14/14T, MKE-1/14T, MOD-1/2/T, PR-500/2502/2503/2507/2507L /3507/4507/5507, SR-130/140, TG-100/5000	Step motor GA-2001G Drawing # 103590810 600 excitation (180X)	70 VDC	ON	OFF	ON						STEP	STEP
	ES-16, SR-120/220	Step motor GA-2001G Drawing # 103590820 150 excitation (180X)	35 VDC	ON	OFF	ON						STEP	STEP
	CMZ-700D, ES-140/160, PR-26**/6*6*/6*7*, SR-140/160, TG-6000		24 VDC				OFF	Note: Must be set to ON if the radar picture and the [COURSE] indication turn Reverse.					
YOKOGAWA (JAPAN)	C-1A/2/3/E, HOKUSHIN PLATH-55/C, PLATH HKRK-C3	Synchro motor YM-14 TS-19 (360X)	60 VAC 60 Hz	OFF	OFF	OFF						SYNC	SYNC
	C1JR, C-1 JUNIOR, CMZ-200A/300, D-1, IPS, IPS-2-H2/2B/2B-H2C/5, KM008, KR-053, PLATH NAVIGAT-1, PT11-H2/21/21-H2	Synchro motor PY76-N2 (360X)	100 VAC 50/60 Hz	OFF	OFF	OFF						SYNC	SYNC
ARMA BROWN (France)	1351, MK-1~7/10/20, MKL-1, MOD-4, NB23-88, SERIE, SGB-1000	Step motor BZ-2191 (180X)	50VDC	ON	OFF	ON						STEP	STEP
ANSCHUTZ (Germany)	110-301, 139-31, ANSCHUTZ-1~6/12/14/Z, GM-BH, K8051, NB23-126, Z0658U	Synchro motor NB23-91 (360X)	50 VAC 50 Hz	OFF	OFF	OFF						SYNC	SYNC
C.PLATH (Germany)	NAVIGAT 763-331E, PLATH NAVIGAT-II/III	Synchro motor YM14A (360X)	50 VAC 60 Hz	OFF	OFF	OFF						SYNC	SYNC

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