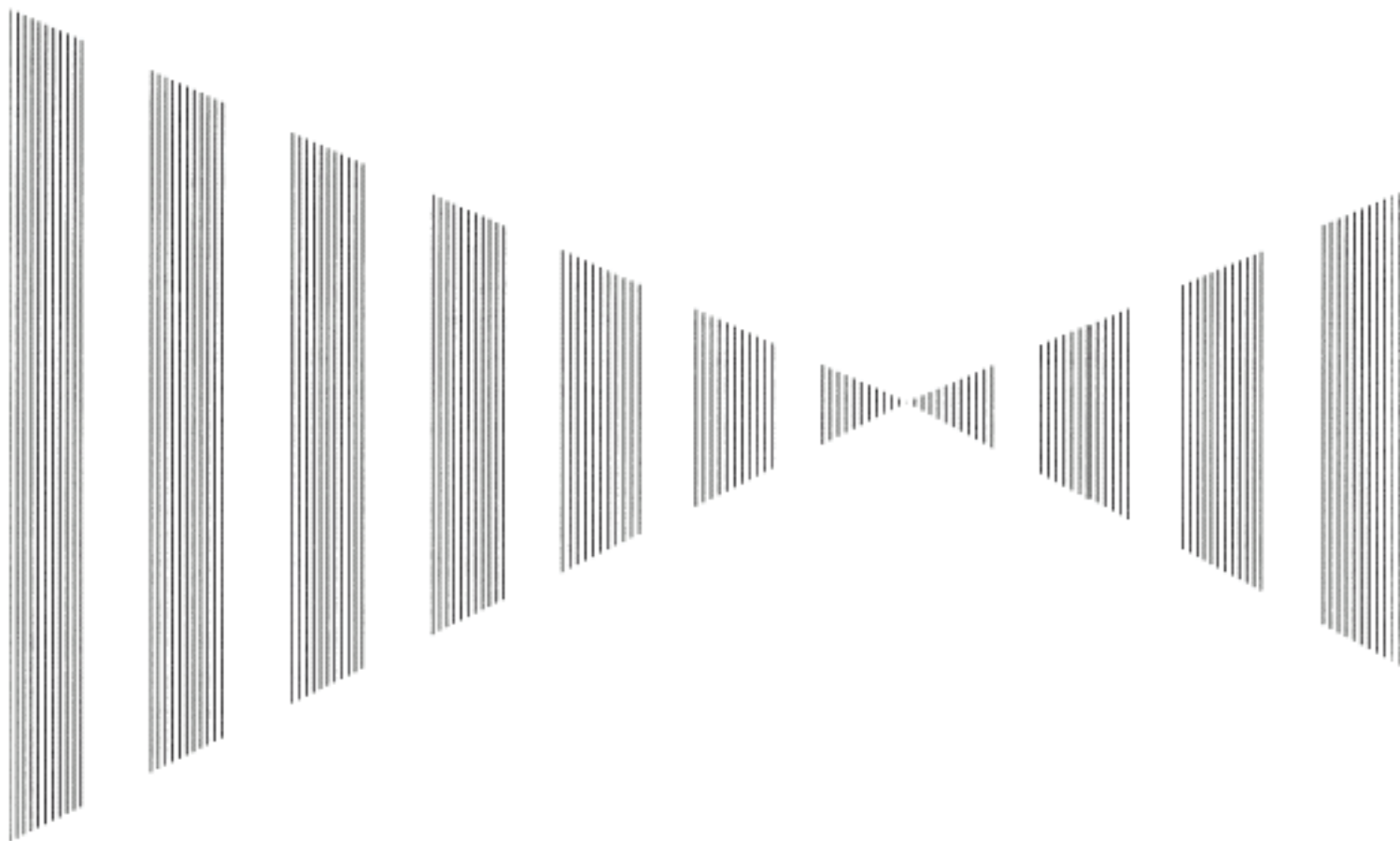


SECTION 7

TROUBLE SHOOTING



7.1	Fault Finding.....	7-3
7.2	Trouble Shooting.....	7-4
7.3	Replacement of Major Parts	7-6



WARNING



Never carry out internal inspection or repair work of the equipment by users.

Inspection or repair work by unauthorized personnel may result in fire hazard or electric shock.

Ask the nearest branch, business office or a dealer for inspection and repair.



Turn off the main power before maintenance work. Otherwise, an electric shock may result.



Turn off the main power before cleaning the equipment. Especially, make sure to turn off the indicator if a rectifier is used. Otherwise, equipment failure, or death or serious injury due to electric shock may result, because voltage is outputted from the rectifier even when the radar is not operating.

For operating the radar equipment in the good conditions, it is necessary to make the maintenance work as described below. If maintenance is made properly, troubles will reduce. It is recommended to make regular maintenance work.

Common points of maintenance for each unit are as follow:

Clean the equipment.

Remove the dust, dirt, and sea water rest on the equipment cabinet with a piece of dry cloth. Especially, clean the air vents with a brush for good ventilation.

**WARNING**

Turn off the main power source before starting maintenance.

Otherwise, an electric shock or injury may be caused.



Turn off the main power if you need to be near the scanner unit for maintenance or inspection purposes. Direct exposure to electromagnetic waves at close range in death or serious injury.



Set the safety switch for stopping the scanner unit to the OFF position.

Otherwise, an accidental contact with the rotating scanner unit may cause injury.

7.1 FAULT FINDING

In case of semiconductor circuits, it is deemed that there are few cases in which the used semiconductor devices have inferior quality or performance deterioration except due to insufficient design or inspection or by other external and artificial causes. In general, the relatively many causes are disconnection in a high-value resistor due to moisture, a defective variable resistor and poor contact of a switch or relay.

Some troubles are caused by defective parts, imperfect adjustment (such as tuning adjustment) or insufficient service (such as poor cable contact). It will also be effective to check and readjust these points.

Melted fuses are caused by any clear cause. When a fuse is replaced, it is necessary to check the related circuits even if there is no trouble. In checking, note that there is some dispersion in the fusing characteristics.

Table 7-1 shows a list of alarm message displayed on the screen.

Table 7-1 Alarm message list

ALARM TYPE	MESSAGE	REASON
SYSTEM FAILURE	TRX(SSW OFF)	SCANNER SAFETY SWITCH OFF
	TRX(AZI)	SCANNER azimuth pulse error
	TRX(MHV)	TRANSMITTER high voltage error
	TRX(TRIGGER)	TRANSMITTER trigger error
	PANEL	CONTROL PANEL communication error
	DOCKING	No docking data
	GPS	No GPS input
	GPS(DATA)	GPS data error
	GPS(STATUS)	GPS status error
	PROC(INT)	PROCESSOR interrupt error
	PROC(AZI)	PROCESSOR detects no azimuth pulse
	PROC(HL)	PROCESSOR detects no heading pulse
	PROC(REVERSE)	PROCESSOR detects SCANNER rotating in reverse.
	ASIC1 TO RADAR	Interrupt, form ASIC1 to RADA, error
	PROC(VIDEO)	PROCESSOR detects no radar video.
	PROC(TRIGGER)	PROCESSOR detects no trigger
	COM1	Serial port 1 error
	COM2	Serial port 2 error
	COM3	Serial port 3 error
	COM4	Serial port 4 error
	HEADING	No heading data
	DEPTH	No depth data
	DEPTH(DATA)	Depth data error
	FAN	Fan error
	RUDDER	No rudder data
	AUTOPILOT	No autopilot data
	ROT	No rate of turn data
	TRIP	No trip data
GENERAL WARNING	CAN'T TRANSMIT	Attempted to select TRANSMIT while it is not allowed.
	NO HEADING DATA	SHM OFFSET attempted with no heading data.
	NOT ALLOWED	Function attempted while not allowed.
	POSN RESET	L/L sentence is switched.

Table 7-2 shows a list of fuses used in the equipment.

Table 7-2 Fuse List

Location	Parts No.	Current Rating	Protection Circuit	Type
Transmitter-receiver Unit	F401	5A	Scanner unit without motor	ST4-5AN1
Motor Unit	F402	8A	Motor (CBP-169)	ST6-8AN1

7.2 TROUBLE SHOOTING

As this radar equipment includes complicated circuits, it is necessary to request a specialist engineer for repair or instructions for remedy if any circuit is defective.

There are also troubles by the following causes, which should be referred to in checking or repair work.

1 Poor Contact in Terminal Board of Inter-Unit Cables

- Poor contact in terminal board
- The cable end is not fully connected, that it, contacted with earthed another terminal.
- Disconnected cable wire

2 Poor Contact of Connector within Unit

Reference: This radar equipment is provided with 7-3 standard spares.

Table 7-3 Spares (7ZXRD0020, JMA-610)

7ZXRD0020

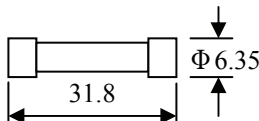
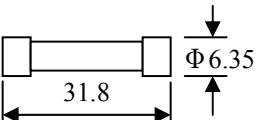
Name	Type/Code	Shape (mm)	In use	Spare	Parts No.	Location
Fuse	ST4-5AN1 (5ZFCA00050)		1	3	F401	Inside processing unit
Fuse	ST6-8AN1 (5ZFCA00052)		1	3	F402	Inside processing unit

Table 7-4 Special Parts

[I] JMA-610-7

Parts No.	Name	Type	Manufacturer	Location	Code
V101	Magnetron	MSF11562B	NewJRC	Scanner	5VMAA????
A101	Circulator	FCX68R	Toshiba	Scanner	6AJRD00001
A102	Diode Limiter	NJS6930	NewJRC	Scanner	5EZAA00024

Table 7-5 Circuit Block to be Repaired (JMA-610)

Location	Circuit Block	Type	Remarks
Scanner	Motor with gear	CBP-169	DC brush less motor (ordinary)
Scanner	Modulator	CPA-276-1	Excluding Magnetron
Scanner	Receiver	NRG-237	
Scanner	Power supply circuit	CBD-1783	
Scanner	Terminal board circuit	CQD-2186	
Scanner	Revolwtior control circuit		
Scanner	Filter circuit	CFR-193R	
Processor	Radar processing circuit	CDC-1371	
Processor	Terminal board circuit	CQD-2185	
Processor	Power circuit	CBD-1655	
Processor	DC-DC convertor	CBD-1701	
Operation panel unit	Operation circuit	CCK-892A	
Operation panel unit	Track ball	CHG-198	



7.3 REPLACEMENT OF MAJOR PARTS



CAUTION



Turn off the main power source before replacing parts. Otherwise, an electric shock or trouble may be caused.



Before replacing the magnetron, turn off the main power source and wait for 5 minutes or more until the high voltage circuits are discharged.

Otherwise, an electric shock may be caused.



Take off your wrist watch when bringing your hands close to the magnetron.

Otherwise, your watch may be damaged because the magnetron is a strong magnet.



Two or more persons shall replace the liquid crystal monitor.

If only one person does this work, he may drop the LCD, resulting in injury.



Even after the main power source is turned off, some high voltages remain for a while.

Do not contact the inverter circuit in the LCD with bare hands. Otherwise, an electric shock may be caused.

Parts Required for Periodic Replacement

Here are parts required for periodic replacement

Part name	Interval
1. Magnetron	4000 hours
2. Motor	10000 hours
3. Fan motor	20000 hours
4. Backup battery	3 years

Replacement of magnetron (V101)

Remove the shield cover of the modulator and check that no charge remains in the high-voltage modulator circuit. Then, remove the socket of the magnetron. The magnetron can be demounted by removing the screws fixing it. When mounting a new magnetron, do not touch the magnet with a screwdriver or put it on an iron plate. After replacement, connect the lead wire correctly.

Handling of Magnetron under Long-Time Storage

The magnetron that has been kept in storage for a long time may cause sparks and operate unstably when its operation is started. Perform the aging in the following procedures:

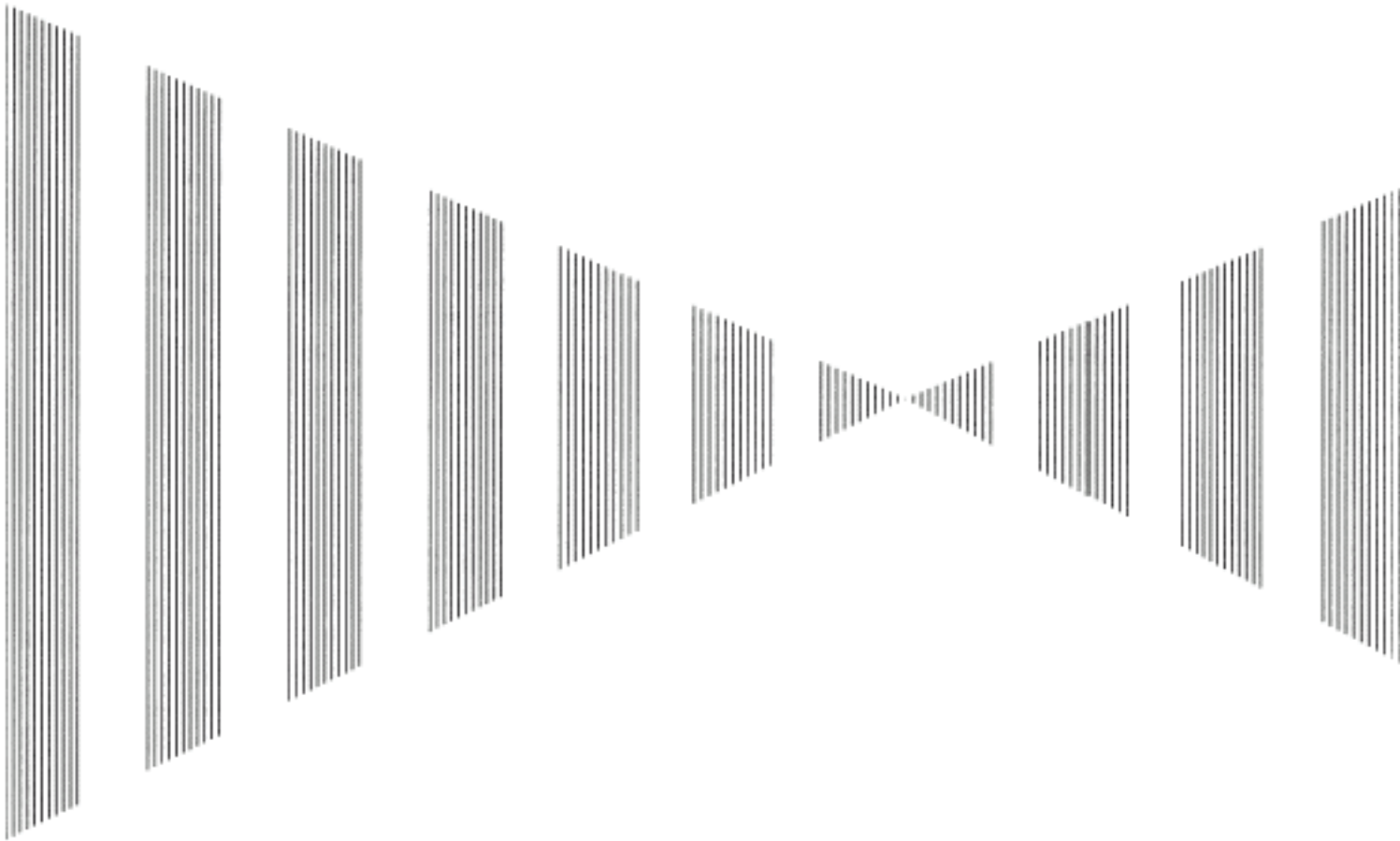
- (1) Warm up the cathode for a longer time than usually. (20 to 30 minutes in the STBY state.)
- (2) Start the operation from the short pulse range and shift it gradually to the longer pulse ranges. If the operation becomes unstable during this process, return it to the standby mode immediately. Keep the state for 5 to 10 minutes until the operation is restarted.

Replacement of Diode Limiter (A102)(JMA-610-7)

Remove the 4 screws fixing the receiver. Remove the 4 screws fixing the diode and the limiter, and remove diode limiter. When mounting the diode limiter, take care of the mounting direction and mount it in the arrow direction facing it the receiver.

Connect the wiring in the same way as before the replacement.

SECTION 8
AFTER-SALES SERVICE





..... **When you Request for Repair**

If you suppose the product may be out of order, read the description in Section 8 carefully and check the suspected point again.

If it is still out of order, you are recommended to stop operation of the equipment and consult with the dealer from whom you purchased the product, or our branch office in your country or district, the sales department in our main office in Tokyo.

- **Repair within the Warranty Period**

If any failure occurs in the product during its normal operation in accordance with the instruction manual, the dealer or JRC will repair free of charge. In case that any failure is caused due to misuse, faulty operation, negligence or force major such as natural disaster and fire, the product will be repaired with charges.

- **Repair after the Warranty Period**

If any defective function of the product is recoverable by repair, the repair of it will be made at your own charge upon your request.

- **Necessary Information for Repair**

- ☆ Product name, model, manufacturing date and serial number
- ☆ Trouble conditions (as detailed as possible. Refer to “Radar Failure Check List” in page 8-2.)
- ☆ Name of company/organization, address and telephone number

..... **Recommended Maintenance**

The performance of the product may deteriorate due to the secular change of the parts used in it, though such deterioration depends upon the conditions of operation.

So checkup and maintenance is recommendable for the product in addition to your daily care.

For maintenance, consult with the near-by dealer or our sales department.

Such maintenance will be made with charges.

For further details of after-sale service, contact the JRC Offices in the list at the end of this manual.



Radar Failure Check List

When placing an order for repair of the product, it is requested that you could confirm the check items and fill the results and sent the sheet to our contact.

If there is any unclear items, contact the ship on which the product is installed, and give the 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 (18), others.
- (2) If any of the items (1) to (5) is marked as NO, check the fuse of the NDC-1486.
- (3) Check the items (4) to (15) while the transmission (TX) is ON.

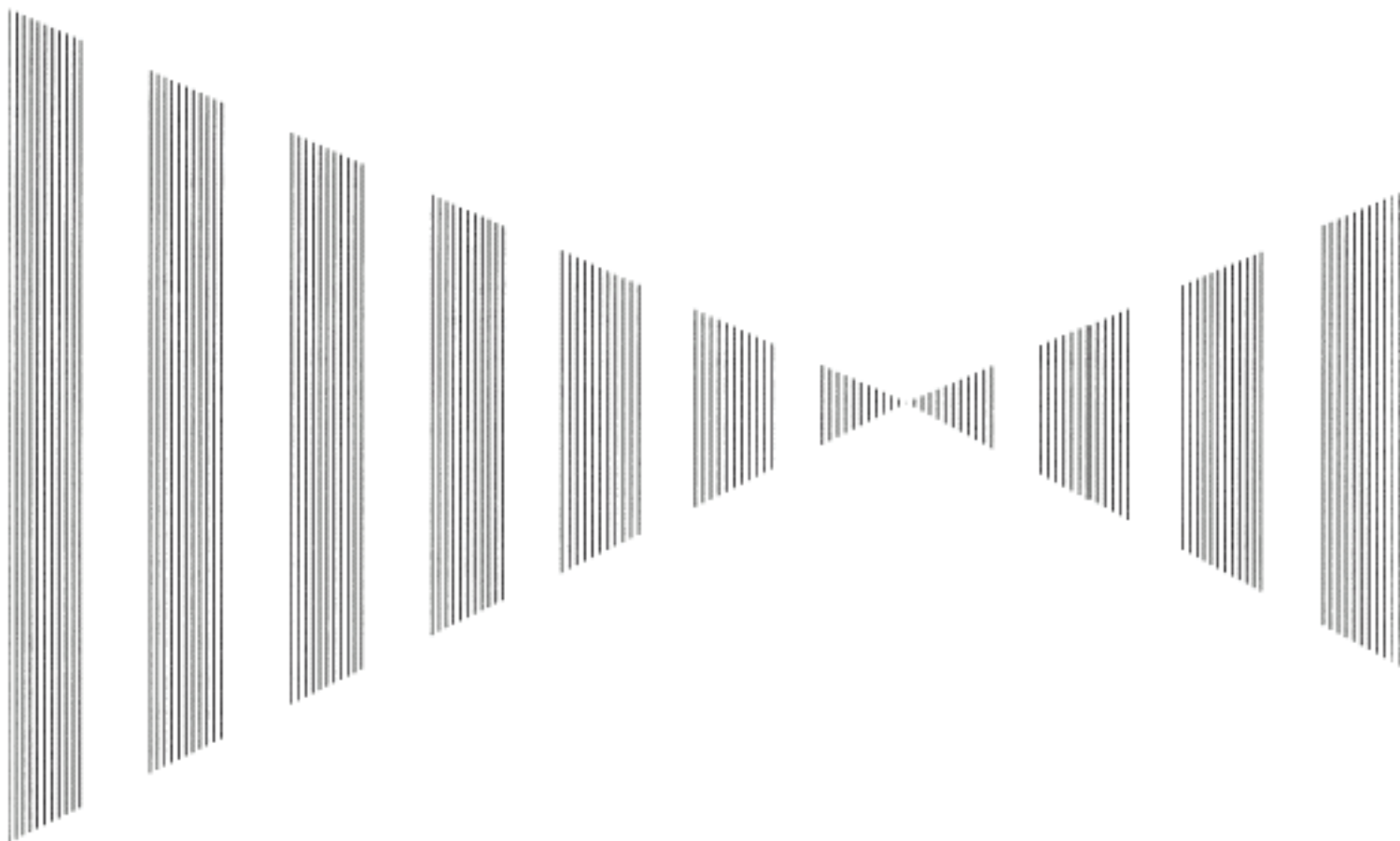
* Functions mentioned in the items (14), and (15) may be optional, answer is not necessary.

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 standby status (TX Ready).	YES	NO
(3)	When powering-on (or TX ON), LCD displays something (LCD 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 the instruction manual)	YES	NO
(6)	Turning is enabled. (Check with the range of 8 km or more)	YES	NO
(7)	Fixed marker is displayed.	YES	NO
(8)	VRM is displayed.	YES	NO
(9)	While noise is displayed while set at STC and FTC minimum, GAIN maximum, IR-OFF and range 32km.	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) Others (Error message, etc.) _____



SECTION 9 DISPOSAL



9.1	DISPOSAL OF THE UNIT	9-1
9.2	DISPOSAL OF USED BATTERIES	9-2
9.3	DISPOSAL OF USED MAGNETRON	9-3

DISPOSAL

9.1 DISPOSAL OF THE UNIT

When disposing of this unit, be sure to follow the local laws and regulations for the place of disposal.



9.2

DISPOSAL OF USED BATTERIES



WARNING



When disposing of used lithium batteries, be sure to insulate the batteries by taping the $\oplus$ and $\ominus$ terminals. Otherwise, heat generation, explosion or a fire may occur.

In this unit, Lithium batteries are used for the following parts:
Radar Processing circuit (CDC-1371): BT1 (Maxell: CR3032)

- Do not store used lithium batteries. Dispose of them in accordance with regulations of local government.
- When disposing of used lithium batteries be sure to insulate the batteries by taping the $\oplus$ and $\ominus$ terminals. For disposal of batteries, be sure to follow the local laws and regulations. For detail, consult with the dealer you purchased the product our business office, or local government.

9.3

DISPOSAL OF USED MAGNETRON

Magnetron is used in the Scanner (NKE—316)

- When the magnetron is replaced with a new one, return the used magnetron to our dealer or business office.
For detail, consult with our dealer or business office.

SECTION 10

SPECIFICATIONS

10.1	JMA-610 TYPE RADAR	10-1
10.2	SCANNER (NKE-316)	10-2
10.3	CONTROL UNIT(NDC-1486)	10-3
10.4	INPUT SIGNAL	10-4
10.5	OUTPUT SIGNAL	10-5
10.6	STANDARD EQUIPMENT COMPOSITION	10-5
10.7	DISTANCE BETWEEN UNITS	10-5

10.1 JMA-610 TYPE RADAR

(1) Type of Emission	P0N
(2) Display type	PPI method, vertically long display
(3) Display panel	Radar video effective diameter of 270mm (min)
(4) Range Scale	0.15, 0.3, 0.5, 0.8, 1.2, 1.6, 2, 4, 8, 16 and 32km
(5) Range Resolution	Less than 15m
(6) Minimum Detective Range	Less than 15m
(7) Range Accuracy	Within $\pm 1.5\%$ of range in use or $\pm 5m$
(8) Bearing Accuracy	Less than 1°
(9) Bearing Indication	Relative Motion mode: Head-up/Course-up/North-up
(10) Ambient Condition	According to IEC60945 Temperature Scanner: -25 to +55°C (Storage Temperature: -25 to +70°C) Other Unit except Scanner: -15 to +55°C Relative Humidity 93% at +40°C Vibration 2 to 13.2Hz, amplitude $\pm 1mm$ $\pm 10\%$ 13.2 to 100Hz, Gravity acceleration $0.7m/s^2$ Velocity of the wind 27.8m/s(54kt)
(11) Power Supply Input	+24VDC (Display Unit) +24VDC (Scanner) * Display Unit and Scanner correspond to 100VAC/220VAC when use NBA-3308.
(12) Power Consumption	Approx. 400W (In maximum wind velocity)
(13) Power Supply Voltage Fluctuation	+24VDC $-10/+30\%$ (Display Unit) +24VDC $-10/+30\%$ (Scanner Unit)
(14) Pre-heating Time	Approx. Within 1min30sec



10.2 SCANNER (NKE-316)

(1) Dimensions	Height 458mm×Swing Circle 2270mm	
(2) Mass	Approx. 41kg	
(3) Polarization	Horizontal Polarization	
(4) Directional Characteristic	Horizontal Beam Width:	1.0° (-3dB width)
	Vertical Beam Width:	25° (-3dB width)
	Sidelobe Level:	Below -26dB (within ±10°)
		Below -30dB (outside ±10°)
(5) Revolution	Approx. 24/36/48 rpm	
(6) Peak Power	4.9kW	
(7) Transmitting Frequency	9410 ±30MHz	
(8) Transmitting Tube	MSF1562B	
(9) Pulse width/Repetition Frequency	0.15km	0.05μS/4000Hz
	0.3km	0.05μS/4000Hz
	0.5km	0.05μS/4000Hz
	0.8km	0.05μS/4000Hz
	1.2km	0.05μS/4000Hz
	1.6km	0.05μS/4000Hz
	2km	0.05μS/4000Hz
	4km	0.1μS/2000Hz
	8km	0.3μS/2000Hz
	16km	0.6μS/1000Hz
	32km	0.6μS/1000Hz
(10) Duplexer	Circulator + Diode Limiter	
(11) Mixer	MIC Front End	
(12) Intermediate Frequency Amplifier	Intermediate Frequency: 60MHz	
	Receiver characteristic = Logarithmic receiver	
(13) Overall Noise Figure	7.5dB(Average)	

10.3 CONTROL UNIT(NDC-1486)

(1) Mounting	Table mounting		
(2) Video Output	RGB, H-sync and V-sync (SXGA)		
(3) Range Scale	0.15, 0.3, 0.5, 0.8, 1.2, 1.6, 2, 4, 8, 16 and 32km		
(4) Range Ring	0.05, 0.1, 0.1, 0.2, 0.2, 0.4, 0.4, 1, 2, 4 and 8km		
(5) Variable range marker	Digital read-out on the screen (4 characters) 2 kinds of VRM		
(6) EBL	Digital read-out on the screen (4 characters) 2 kinds of EBL		
(7) Cursor	Range, Bearing, and Lat./Lon'		
(8) Dimension		Processing	Keyboard
	Height:	approx. 170mm	45mm
	Width:	approx. 360mm	290mm
	Depth:	approx. 340mm	123mm
(9) Mass		Processing	Keyboard
		approx. 21kg	1.0kg
(10) Tune mode	Auto/manual mode		
(11) STC	only manual mode		
(12) FTC	only manual mode		
(13) IR	3 kinds of IR mode		
(14) Bearing scale	360° scale graduate at intervals of 1°		
(15) Ship's heading marker	Electric flash line suppressible while pushing key Ship's stern marker can be displayed.		
(16) P-Line	2 Parallel line		
(17) Off center	3steps +60%,40%,20% of effective radius.		
(18) Trails	Relative trails / True trails Trails length: OFF//2 scans/15/30sec/1/2/3/4/5/6min and continuation. Any time possible to select the said article.		
(19) Pulse length	short/long (1.6, 2, 4, 8km)		
(20) Expansion	OFF/FAIR/STRONG		
(21) display color	Radar echo: 16 level (yellow, green, amber, white) Background (PPI): black, blue, dark gray Background (outside of PPI): black, gray, dark gray, bright blue Trails: 16 level (yellow, amber, white, bright blue, green) Character/Dial: green, amber, white, yellow, VRM1/VRM2: cyan, green Own ship make/ other ship make: cyan, gray, magenta, green, white		



10.4 INPUT SIGNAL

- (1) Navigation equipment
IEC61162-1/2

L./L:	GGA>RMC>RMA>GNS>GLL
COG/SOG:	VTG>RMC>RMA
TIME:	ZDA
TRIOP:	VLW
ROT:	ROT
RUDDER:	RSA
AUTOPILOT:	APB

- (2) signal for bearing HEADING: THS>HDT>HDG>HDM>VHW

- (3) Depth DPT>DBT>DBK>DBS

- (4) AIS ALR,VDM
INLAND AIS sentence

- (5) Rate of turn ROT 20mV/degrees: 30-0-30, 90-0-90, 300-0-300

- (6) Rudder RSA 20mV/degrees: 90-0-90

- (7) Transmit Trigger low impedance

- (8) RADAR video 50 ohm matching

- (9) Bearing pulse Open collector

- (10) Ship's heading signal Open collector



10.5 OUTPUT SIGNAL

- | | |
|-----|--|
| (1) | The signal for Slave Display TIY, VD, BP (2048 pulse), BZ |
| (2) | Navigation information RADAR system data: RSD
Own ship data: OSD |
| (3) | External alarm Point-of-contact signal normal close.
Max current : 200mA. |
| (4) | 2ND monitor Analog RGB HD 15pin connector 1pcs
(DVI connector 1pcs.) |
| (5) | AIS ACK. |
| (6) | LAN 100Mbps(100BACE-TX)
Radar screen UDP/IP Multi cast.
Sweep/quadrant /full screen/block
Radar control TCP/IP Uni cast.
All the operation except power on/off. |

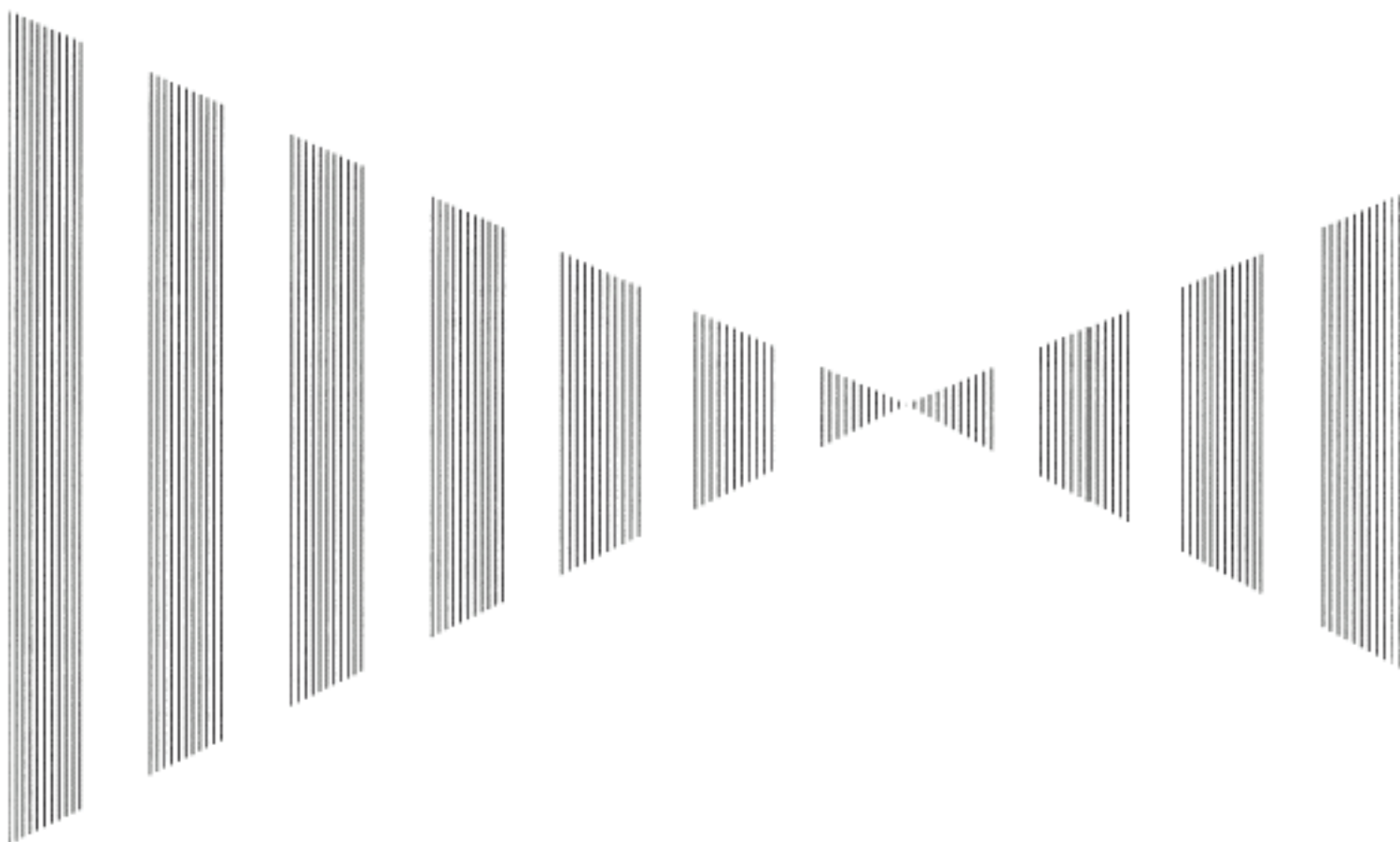
10.6 STANDARD EQUIPMENT COMPOSITION

Scanner: 1
Processor unit: 1
Keyboard: 1
Spare parts: 1
Instruction manual:1

10.7 DISTANCE BETWEEN UNITS

	Maximum	Standard
Monitor-processor unit	5m	5m
Keyboard-processor unit	7m	7m
Scanner-processor unit	300m	
Power supply unit-processor	30m	

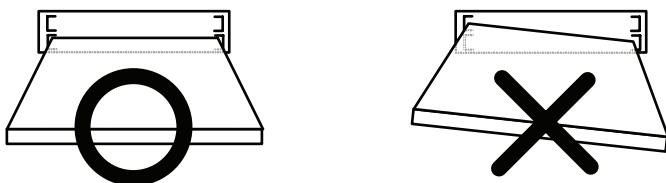
APPENDIX



HOW TO INSERT AND REMOVE A CARD

Insert or remove the JRC coastline ROM card, ERC card, C-MAP card and memory card according to the procedures below.

Note: Keep a card horizontal when inserting it into a card slot. An inclined card causes a failure.



Do not simultaneously insert a JRC coastline ROM card, an ERC card and C-MAP card into the card slot. A malfunction will occur on the display.

Insert the card into the specified slot according to the following table:

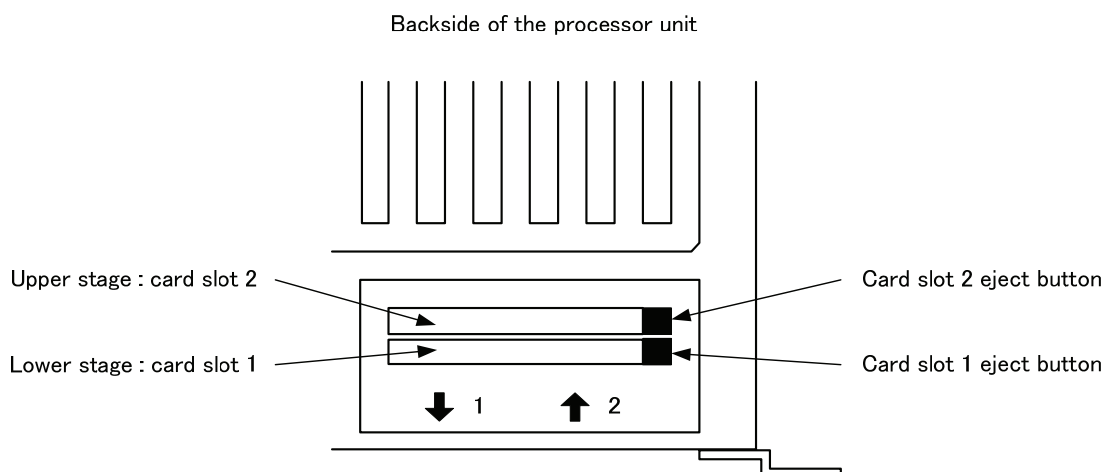
Card type	Insertion slot No.
JRC card	Either one
ERC card	Either one
C-Map NT+ detail card	Either one
Memory card	Either one

Note: The Background of C-Map has been built in, don't insert C-Map NT+ background card. If the background card is inserted, the system will malfunction.

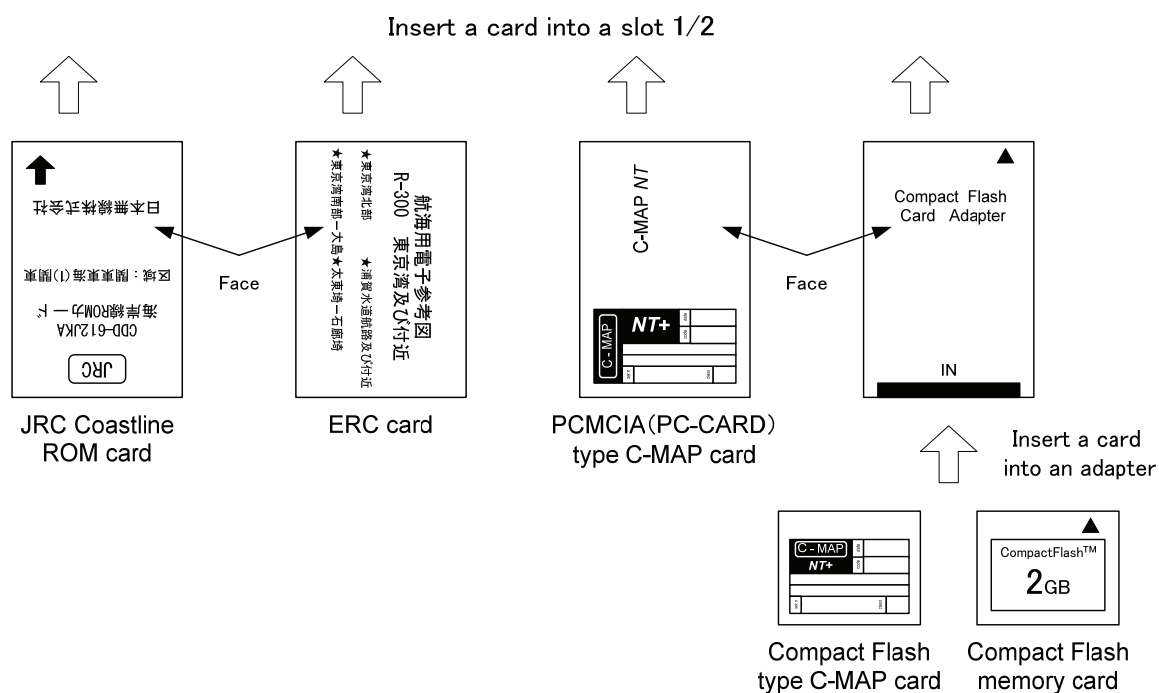
Insert a card into processor unit

Procedures

- 1 Remove the rubber packing located at the backside of the processing unit cabinet, and expose the card slot.



2 Insert the card in the direction indicated by the arrow.



3 Insert the card until the card slot's eject button protrudes and complete the installation of a card.

Eject a card from processor unit

Procedures

- 1 Push the eject button corresponding to the desired card slot.
- 2 remove a card from processor unit