
7.4.5 Update of Character String Data (String Data Update)

The system is designed to transfer and display external character strings as the second language display. The second language is factory-set to "Japanese."

Ask our agent or sales department for the supply of character strings to be updated.

To update character strings, the flash memory card (option) containing the character string file must be inserted in card slot 2.

Procedures

1. Open the Serviceman Menu.
2. Perform the following menu open procedure to open the String Data Update menu.

3. Maintenance Menu

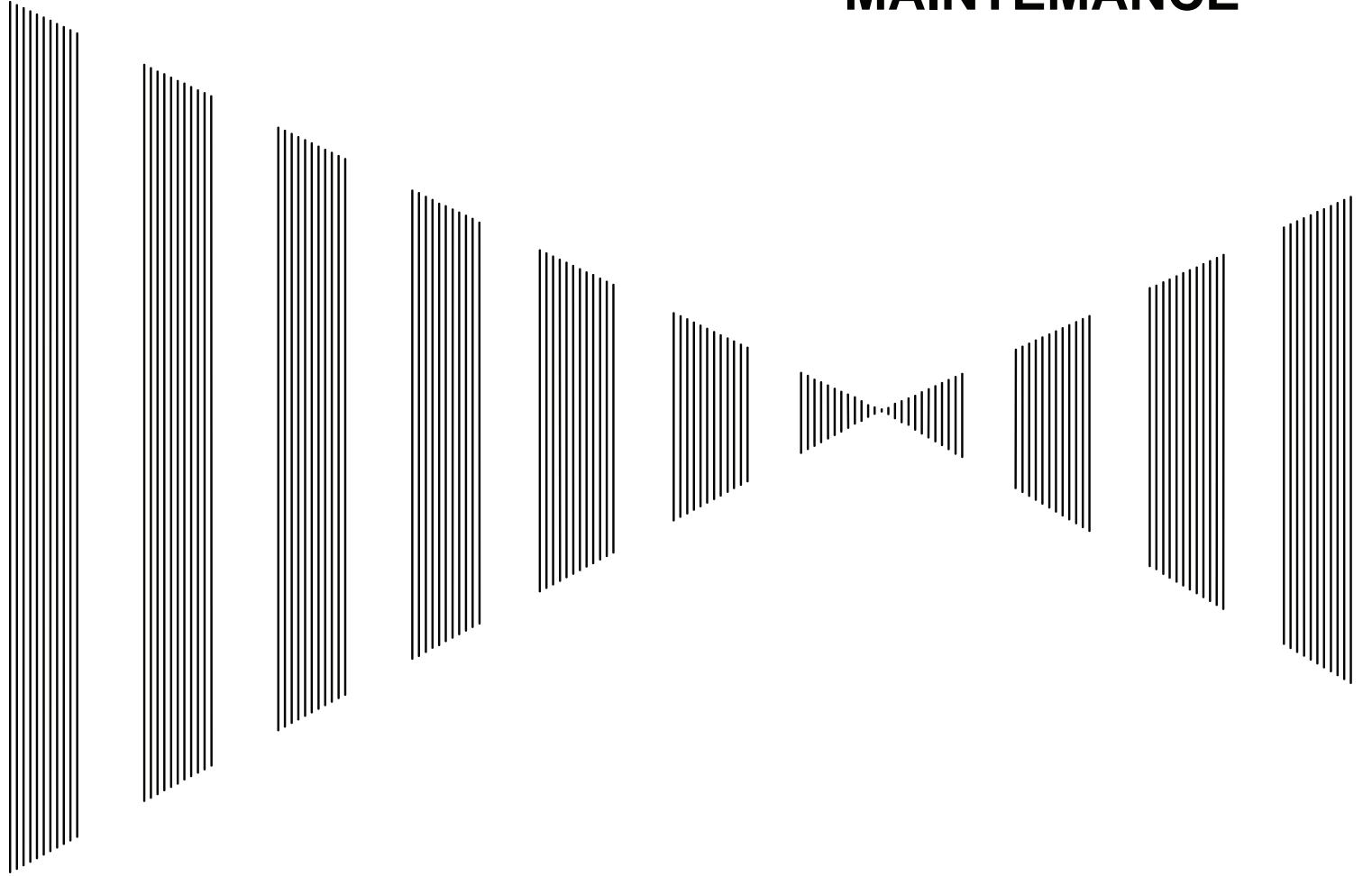
→ 6. String Data Update

3. Select **Yes** in the Confirmation Window.

The character string file on the flash memory card is read into the system, and the second language area is updated.

To display the read character strings in the second language, select **Other** in the menu shown in Section 7.2.6.

SECTION 8 MAINTENANCE



8.1	ROUTINE MAINTENANCE	8-1
8.2	MAINTENANCE ON EACH UNIT	8-2
8.3	PERFORMANCE CHECK	8-6
8.4	REPLACEMENT OF MAJOR PARTS	8-11

8.1 ROUTINE MAINTENANCE



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.

8.2 MAINTENANCE ON EACH UNIT

8.2.1 Scanner Unit NKE-1130/2103/2254

WARNING

-  Turn off the main power source before starting maintenance.
Otherwise, an electric shock or injury may be caused.
-  Turn "OFF" the safety switch to stop the scanner unit. (Refer to pages 1-6 to 1-10.)
Otherwise, you may be injured if touching the rotating scanner unit by accident.
-  Do not touch the radiator. Even if the power is turned off, the radiator may be rotated by the wind.

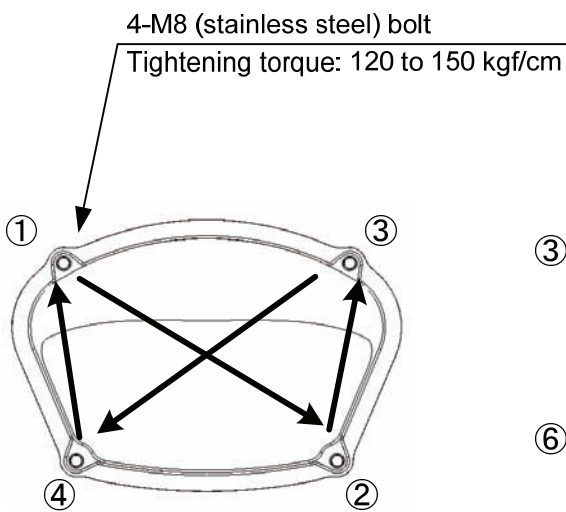
After the work, turn "ON" the scanner unit safety switch.

Precautions in Mounting the Cover

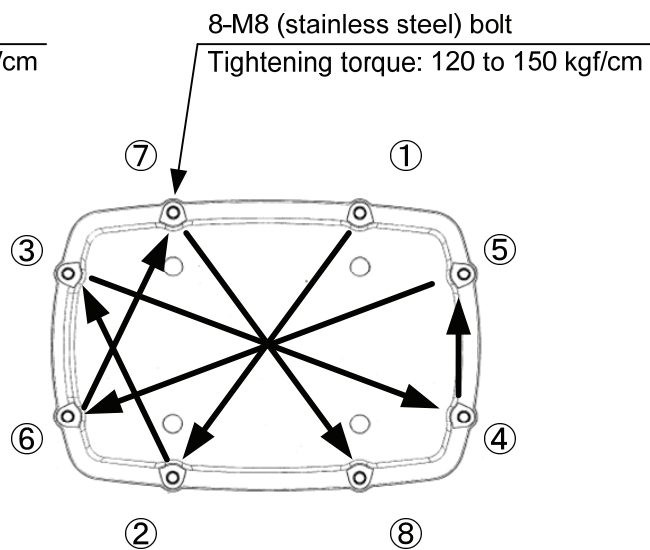
When the cover is removed for regular checkup and replacement of parts and refitted after such work, the procedures of fastening bolts shall be taken with the following precautions:

- The proper fastening torque of the fitting bolts (M8) is 1176 to 1470 N•cm (120 to 150kgf•cm) (which makes the inside water-tight and protects the packings against permanent compressive strain).
The packings start producing from the cover at a torque of approximately 1470N•cm (150kgf•cm).
Do not fasten the bolts with a torque exceeding the specified value. Otherwise, the screws may be broken.
- Use an offset wrench of 11 mm × 13 mm or a double-ended wrench of 13 mm × 17 mm (not longer than 200 mm).
- Screw all the bolts by hand first to prevent them playing, then fasten them evenly in order not to cause one-sided fastening. (Fasten the bolts with 25% of the required torque at the first step.)

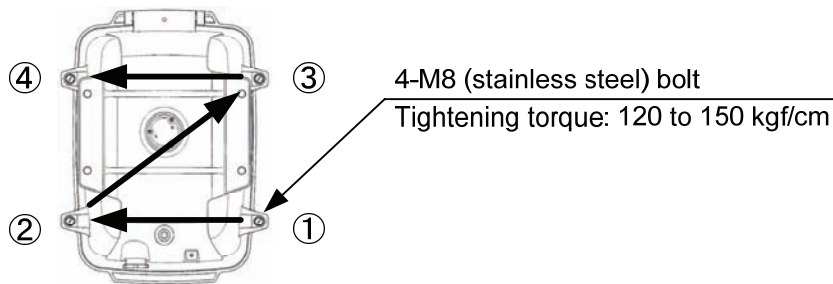
*: Fasten the bolts in the diagonal order.



Bolt Tightening Procedure of
NKE-1125/2254 Cover



Bolt Tightening Procedure of
NKE-1130 Cover



Bolt Tightening Procedure of
NKE-2103 Cover

(1) Radiator

Attention

- **If the radiator front face (radiation plane) is soiled with smoke, salt, dust, paint or birds' droppings, wipe it with a piece of soft cloth wetted with alcohol or water and try to keep it clean at all times. Otherwise, radar beam radiation may attenuate or reflect on it, resulting in deterioration of radar performance.**
- **Never use solvents of gasoline, benzine, trichloroethylene and ketone for cleaning.**

Check up and clean the radiator.

(2) Rotating section

(a) Supply Oil Seal

An scanner unit with a grease nipple needs grease supply. Remove the cap of the grease nipple on the front of the radiator support, and supply grease with a grease gun. Make the oiling every six months. The oil quantity shall be approximately 100 g, which is as much as the grease comes out of the oil seal. Use the grease of Mobilux 2 of Mobil Oil.

(b) Oiling gears

Apply grease evenly to the tooth surfaces of the main shaft drive gear and the encoder drive gear with a spreader or brush. Oiling in short intervals is more effective to prevent the gears from wear and tear and extend their service life, but oil at least every six months. Use Mobilux2 of Mobile Oil.

(c) Mounting legs

Check the mounting legs and mounting bolts of the scanner unit case for corrosion at intervals and maintain them to prevent danger. Apply paint to them once a half year because painting is the best measure against corrosion.

8.2.2 Display Unit NCD-4530



WARNING



When cleaning the screen, do not wipe it too strongly with a dry cloth. Also, do not use gasoline or thinner to clean the screen. Otherwise the screen surface may be damaged.

Dust accumulated on the screen will reduce clarity and darken the video. For cleaning it, wipe it with a piece of soft cloth (flannel or cotton). Do not wipe it strongly with a piece of dry cloth nor use gasoline or thinner.

8.3 PERFORMANCE CHECK

Make operational check on the radar equipment regularly and if any problem is found, investigate it immediately. Pay special attention to the high voltage sections in checking and take full care that no trouble is caused by any error or carelessness in measurement. Take note of the results of checking, which can be used effectively in the next check work.

Operational check shall be made in accordance with Table 8-1 Function Check List in the order as specified in it.

Table 8-1 Check List

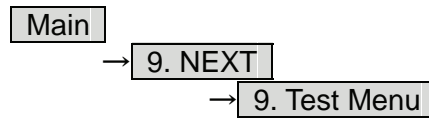
Equipment	Item to be checked	Criteria	Remarks
Transmitter-receiver Unit	Tuning LED of Receiver	The LED is lighting during operation	48NM range
Display Unit	Video and echoes on the screen Sensitivity LCD brilliance can be controlled correctly Various markers Various numerical indications Lighting	Can be correctly controlled	
	Memory	See section 8.3.1 [I]-[1].	
	Communications Lines	See section 8.3.1 [I]-[3].	
	Power Supply, Backup Battery	See section 8.3.1 [I]-[4].	
	Monitor	See section 8.3.1 [II].	
	Operation Unit	See section 8.3.1 [III].	
	System Alarm Log Display	See section 8.3.1 [V].	
	System Information Display	See section 8.3.1 [VI].	
	Magnetron current	See section 8.3.1 [VII].	
	Target Tracking	See section 5.2.7.	
Scanner Unit	Signals from the Scanner Unit	See section 8.3.1 [I]-[2].	
	Performance Monitor	See section 8.3.1 [IV].	

8.3.1 Check Performance on Test Menu

The radar operating state can be checked by opening the Test Menu.

Procedures

1. Perform the following menu open procedure to open the Test Menu.



2. Select the items to be checked.

The list of check items will appear.

1. Self Test	[I] Self-diagnostic function
2. Monitor Test	[II] Monitor check
3. Keyboard Test	[III] Operation unit check
4. MON Display	[IV] Performance monitor
5. System Alarm Log	[V] Error log display
6. System Information	[VI] System information display
Magnetron Current	[VII] Indication of magnetron current

3. Select the items to be checked.

The list of check items will appear.

[I] Self-diagnosis function (Self Test)

Check of memory, scanner unit, and communications Lines

1. Memory Test	[1] Memory check
2. TXRX Test	[2] Scanner check
3. Line Test	[3] Communication line check
4. Supply Voltage	[4] Supply voltage check

[1] Memory Test

Checks for the performance of built-in memory.

1. SDRAM	[1] SDRAM check
2. SRAM	[2] SRAM check
3. FLASH ROM	[3] Flash ROM check
4. GRAPHIC	[4] Graphic check

When no abnormality is found, OK is displayed.

When an abnormality is found, NG is displayed.

[2] TXRX Test

Checks for signals from the scanner.

Safety Switch	Scanner's safety switch check
AZI Pulse	Scanner rotation signal check
HL Pulse	Heading line signal check
MH Current	Check on the load current of high voltage in the modulator
Trigger	Radar trigger signal check
Video	Radar video check

When no abnormality is found, OK is displayed.

When an abnormality is found, NG is displayed.

In standby, ** will appear.

[3] Check of Communication Lines (Line Test)

Check the status of communications with options.

TXRX	Check on connection with the transmitter-receiver
SIG.PROC	Check on connection with the signal processing circuit
TT	Check on connection with the target tracking unit
GYROO I/F	Check on connection with the GYRO I/F unit
GPS Compass	Check on connection with the GPS compass
ISW	Check on connection with the interswitch
Plotter Key	Check on connection with the plotter option

When no abnormality is found, OK is displayed.

When an abnormality is found, NG is displayed.

The status display field of equipment not connected is left blank.

[4] Supply Voltage

Check the voltage of internal power supply.

Item	Normal value
12V	11.00 to 12.20V
5V	4.75 to 5.25V
3.3V	3.14 to 3.46V
Battery	2.50V or more

[III] Monitor Test

Checks for the display.

The test pattern will be shown on the display.

Pattern 1	All colors are filled with white.
Pattern 2	A white box is displayed on the black background of 1280 × 1024 dots.
Pattern 3	Displays rectangle × 2, circle × 2, and cross-shape × 13 (white lines on the black background).
Pattern 4	Displays “H” of 9 dots × 9 dots on the entire screen (white character on the black background).
Pattern 5	Gray scale display (16 levels)
Pattern 6	Displays a color bar.
Pattern 7	Displays the VDR test pattern.
Pattern 8	Displays the specified color.

To return to the normal display, press any key.

If errors occur in the monitor, no test pattern will appear.

[IIII] Keyboard Test (Operation Unit Test)

Checks for the controls and switches of the operation panel.

1. Key Test	[1] Key check
2. Buzzer Test	[2] Buzzer check
3. Light	[3] Control panel light check

[1] Key Test

Checks for the controls and switches of the operation panel.

Each key on the operation panel on the display is shown in reverse video at the same time the key is pressed, and the name of the pressed key is displayed.

[2] Buzzer Test

Checks for the operation panel buzzer.

The buzzer will sound.

The buzzer automatically stops after it sounds for a specified length of time.

[3] Light Test

Checks for the control panel light.

The brightness of the operation panel is gradually intensified at four levels.

[IV] Check of the Performance Monitor (MON Display)

Displays the performance monitor status.

* Transmitter System	Transmitter system attenuation value check.
Attenuation Value	
* Receiver System	Receiver system attenuation value check.
MON Pattern Range	
Attenuation Value	

Turn the [VRM] dial to make adjustments so that the farthest point of the performance monitor pattern. The attenuation value of receiver system is displayed.

[V] System Alarm Log display

Displays previously occurred system errors with the dates and times when they occurred.
The current error is displayed at the lower right of the radar display. For details, refer to Chapter 9.



The Error log display button (2-29P Alarm) is clicked, in the same way as that one.
To erase the alarm logs, press the **All Clear** button in the log display window.

[VI] System INFO

Displays the current system information.

Indicator
TXRX
System No.
TX Time

X-Band
S-Band
Motor Time
TXRX Total Time

Total Time

Processor software version information
Scanner software version information
System number
Total magnetron transmitting time (Total time during which radar was transmitted)

Total operating time (Total power-on time)
Total operating time of the scanner unit (Total power-on time of the antenna unit)
Total operating time of the display unit (Total power-on time of the display unit)

[VII] Magnetron Current

Displays the Magnetron Current bar indicating the magnetron current to check.
When a 48 NM range is set, the magnetron current is normal if the Magnetron Current bar reads the value below.

10 kW: 4 to 7 scale marks
25/30 kW: 5 to 8 scale marks

8.4 REPLACEMENT OF MAJOR PARTS

The system includes parts that need periodic replacement. The parts should be replaced as scheduled. Use of parts over their service life can cause a system failure.

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.

8.4.1 Parts Required for Periodic Replacement

Here are parts required for periodic replacement

Part name	Interval	Radar model	Part type	Part code
1. Magnetron	4000 hours	JMA-5312-6/6HS	MAF1565N	5VHAA00102
		JMA-5322-7/9/6HS	M1568BS	5VMAA00106
		JMA-5332-12	M1555	5VMAA00104
2. Motor	10000 hours	JMA-5312-6/6HS	7BDRD0048	7BDRD0048
		JMA-5322-7/9	7BDRD0044A	7BDRD0044A
		JMA-5322-6HS	7BDRD0045A	7BDRD0045A
		JMA-5332-12	MDBW10823	MDBW10823
3. Fan (Scanner Unit)	20000 hours		7BFRD0002	7BFRD0002
4. LCD PANEL	50000 hours		CML-771	CML-771
5. Monitor fan	20000 hours		CBP-173A	CBP-173A
6. Fan (Radar Process Unit)	20000 hours		7BFRD0005	7BFRD0005
7. Backup battery	5 years		5ZBCJ00012	5ZBCJ00012

8.4.2 Replacement of Magnetron

Caution: Replacement of magnetron must be made by specialized service personnel. For details, refer to Service Manual.

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

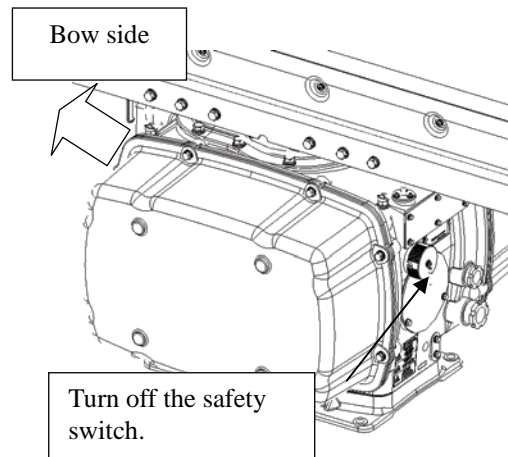
The magnetron that has been kept in storage for a long time may cause sparks and operate unstably when its operation is started. Perform the aging in the following procedures:

- (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.

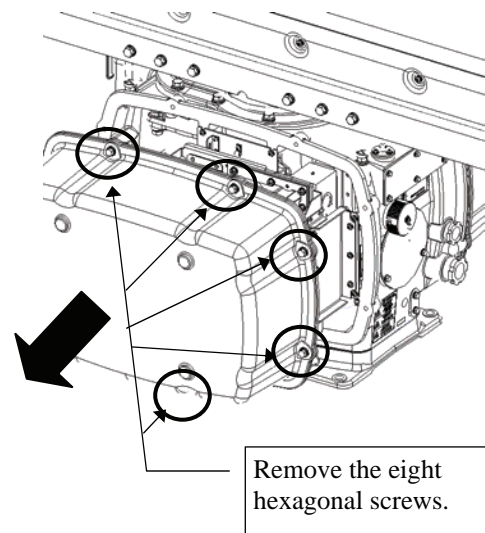
Magnetron Replacement Procedure for Scanner Unit NKE-1130

- (1) Before starting part replacement work, turn off the safety switch of the scanner unit.

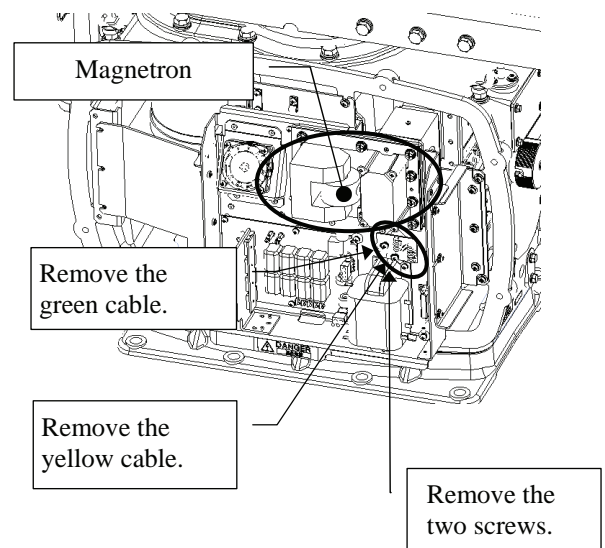
The safety switch is located on the rear (stern) side. Remove the cover and turn off (to the lower side) the safety switch.




- (2) Loosen the hexagonal bolts and remove the cover on the left (port) side




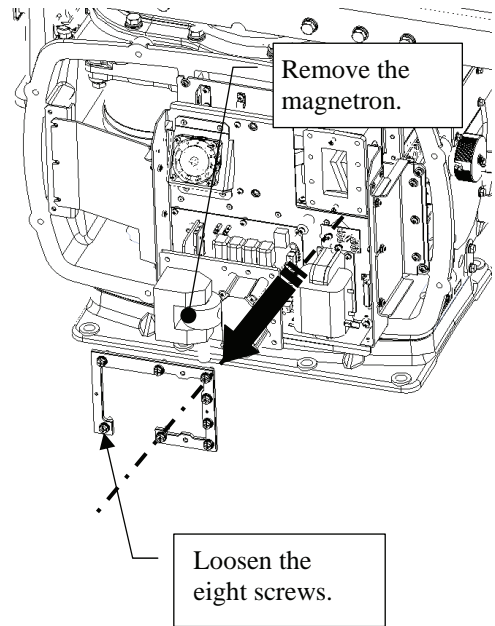
- (3) Check that there is no remaining electric charge in the modulation high-voltage circuit board. Remove the two screws (M4) holding the magnetron cables (both yellow and green).



- (4) Remove the eight screws (M6) to remove the fixture holding the magnetron. The screws cannot be removed from the fixture, so loosen the all eight screws and remove the magnetron together with the fixture.

 The magnetron is held by a hook, but be careful not to let it fall.

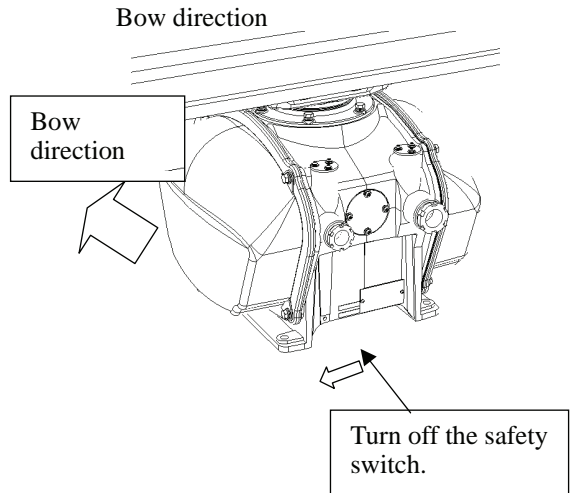
 Use a shielded screwdriver. If the magnetron comes into contact with any metal (tool), its performance may deteriorate.



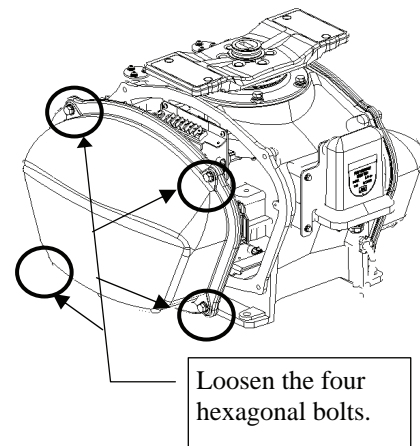
- (5) Install the new magnetron together with the fixture and tighten the screws to hold the cables. Follow the removal procedure in the reverse order. Do not forget to tighten the screws and connect the cables.

Magnetron Replacement Procedure for Scanner Unit NKE-2254

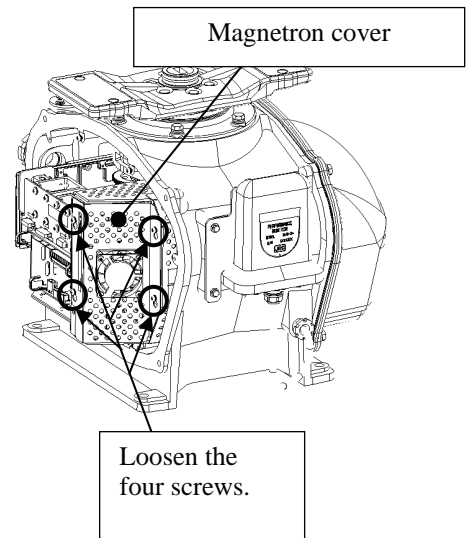
- (1) Before beginning work, turn off the safety switch located on the bottom of the stern side of the scanner unit.




- (2) Loosen the hexagonal bolts and remove the cover on the right (starboard) side.

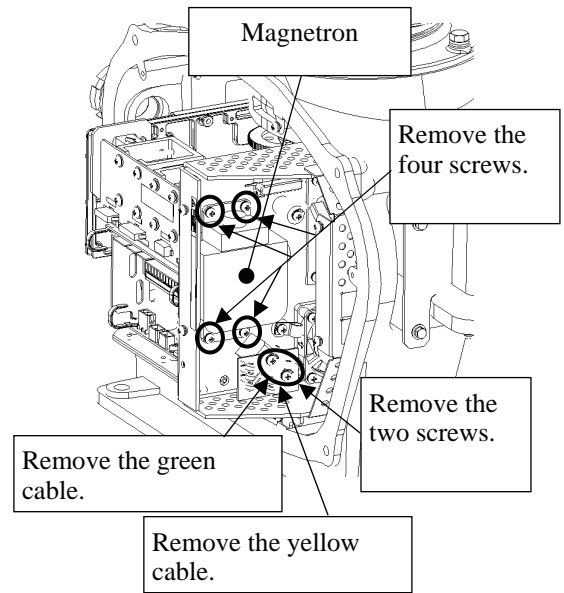


- (3) Loosen the screws (four M4 screws) to remove the magnetron cover.




- (4) Make sure there is no charge remaining in the modulation high-voltage circuit board, and then remove the screws (two M4 screws) holding the magnetron cables (yellow and green) in place.
- (5) Remove the screws (four M4 screws) holding the magnetron in place, then replace the magnetron after cutting the leads (yellow and green) for the replacement magnetron to an appropriate length.

 Use a shielded screwdriver because the contact of the metal tool with the magnetron causes deterioration of its performance.

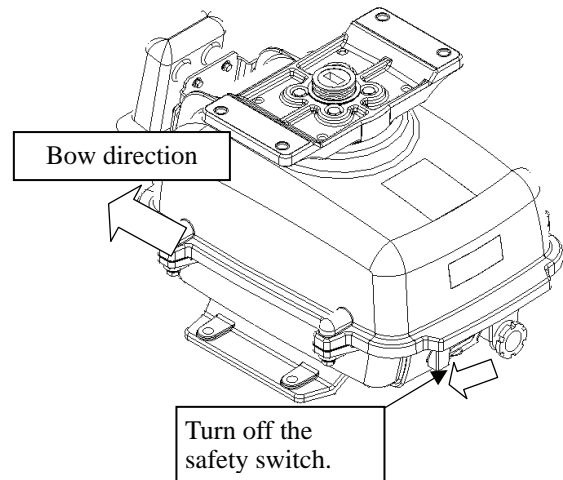


- (6) After having replaced the magnetron, reassemble the unit by following the disassembly procedure in the reverse order.
Do not forget to tighten the bolts and screws, and do not forget to reconnect the cables.


 Extreme care should be taken to connect the leads (yellow and green) to the magnetron for prevention of contact with other parts or the casing. Contact may cause them to discharge.

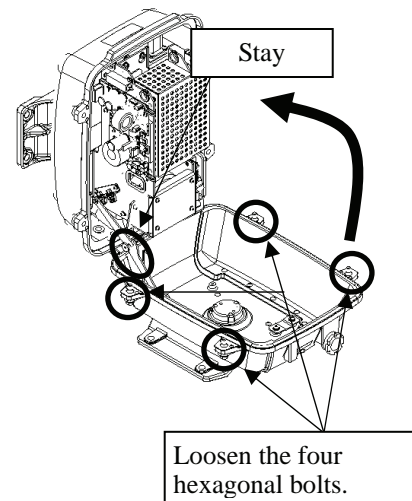
Magnetron Replacement Procedure for Scanner Unit NKE-2103

- (1) Before beginning work, turn off the safety switch on the bottom of the scanner unit.

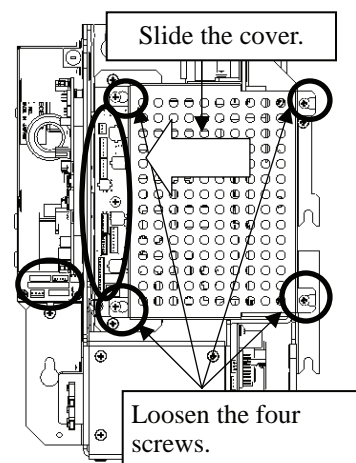


- (2) Loosen the hexagonal bolts (four bolts) and open the upper cover until the stopper of the stay operates.

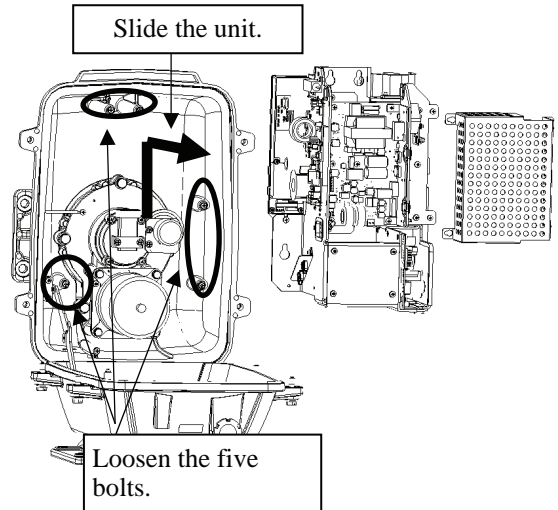
 When closing the upper cover, release the stay stopper and then tighten the cover.



- (3) Loosen the screws (four M4 screws), remove the transmitter-receiver unit cover, and remove the cables connected to the transmitter-receiver unit (ten cables). Slide the cover of the transmitter-receiver unit to remove it.



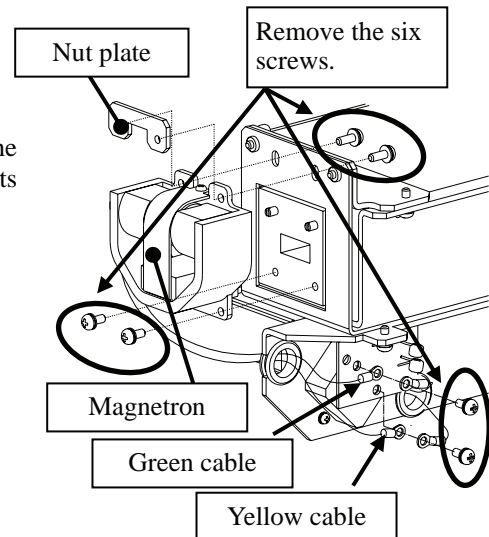
- (4) Loosen the bolts (five M5 bolts) and remove the transmitter-receiver unit. Slide the transmitter-receiver unit upward to remove it.



- (5) Remove the screws (six M4 screws) holding the magnetron in place and replace the magnetron.



Use a shielded screwdriver because the contact of the metal tool with the magnetron causes deterioration of its performance.



- (6) Cut the leads (yellow and green) for the replacement magnetron to an appropriate length, then tighten the screws and fix the cables in place.
After having replaced the magnetron, reassemble the unit by following the disassembly procedure in the reverse order.
Do not forget to tighten the bolts and screws, and do not forget to reconnect the cables.



Extreme care should be taken to connect the leads (yellow and green) to the magnetron for prevention of contact with other parts or the casing. Contact may cause them to discharge.

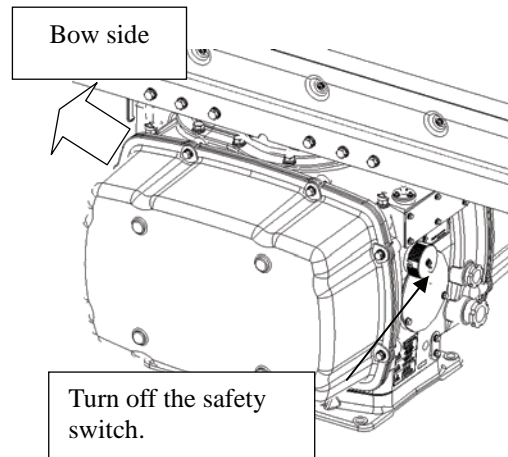
8.4.3 Replacement of Motor

Caution: Replacement of motor must be made by specialized service personnel.
For details, refer to Service Manual.

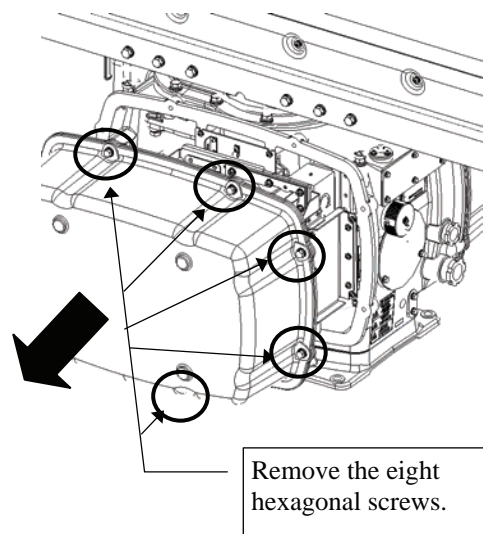
Motor Replacement Procedure for Scanner Unit NKE-1130

- (1) Before starting part replacement work, turn off the safety switch of the scanner unit.

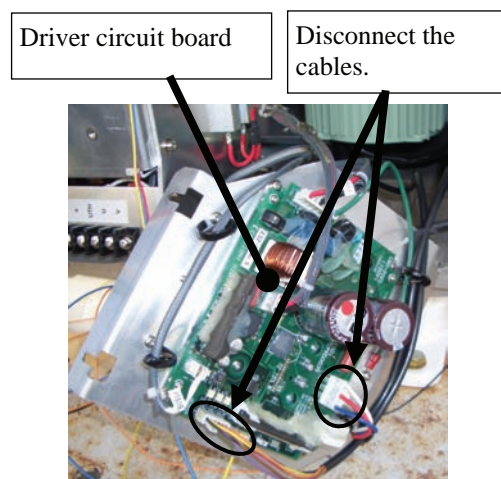
The safety switch is located on the rear (stern) side. Remove the cover and turn off (to the lower side) the safety switch.



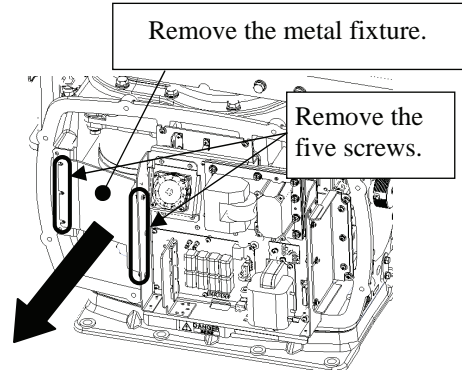
- (2) Loosen the hexagonal bolts and remove the cover on the both sides



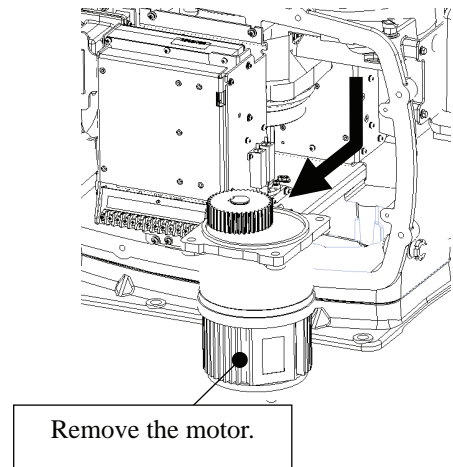
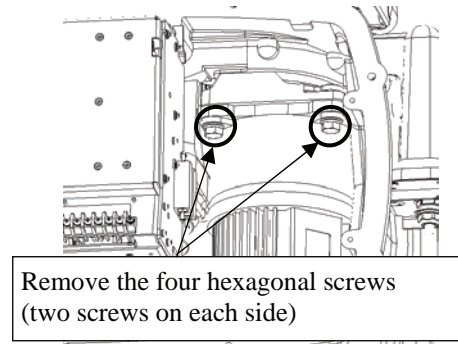
- (3) Remove the cover on the right (starboard) side and loosen the four screws (M4) to remove the driver unit, which has the motor driver circuit board on its back side. Disconnect the cables connecting the motor to the motor driver circuit board.



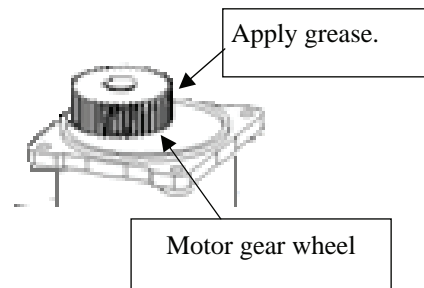
- (4) Remove the cover on the left (port) side and remove the five screws (M5) to remove the fixture.



- (5) Remove the four hexagonal screws (M10x40, SW10, and W10) that hold the motor from both the right and left sides to remove the motor.



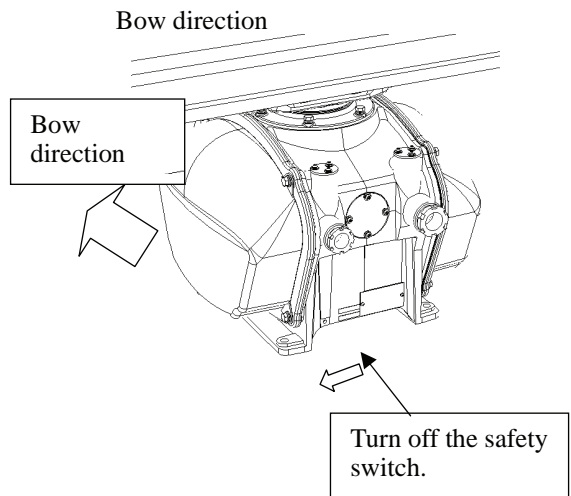
- (6) Apply grease to the gear wheel of the new motor.



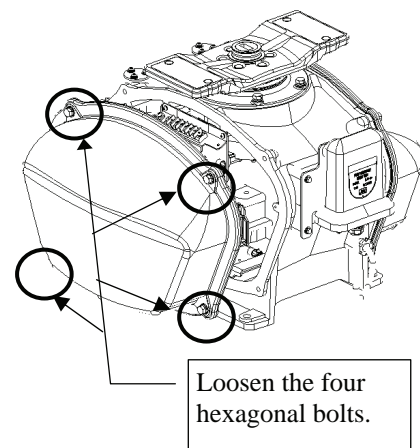
- (7) Install the new motor in the scanner unit and secure it using the hexagonal screws. Tighten the screws with the specified torque (380 kgf-cm).
- (8) After replacing the motor, assemble the unit in the reverse order of the disassembly procedure. Do not forget to tighten the screws and connect the cables.

Motor Replacement Procedure for Scanner Unit NKE-2254

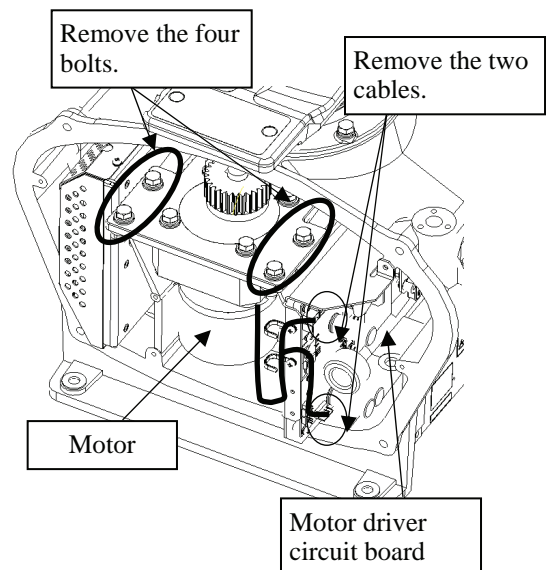
- (1) Before beginning work, turn off the safety switch located on the bottom of the stern side of the scanner unit.



- (2) Loosen the hexagonal bolts and remove the cover on the **left** (port) side.

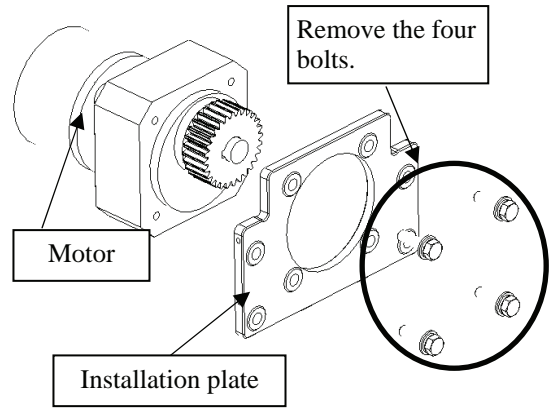


- (3) Remove the cables connected to the motor driver circuit board.
- (4) Remove the hexagonal bolts (four M8 bolts) and remove the motor.

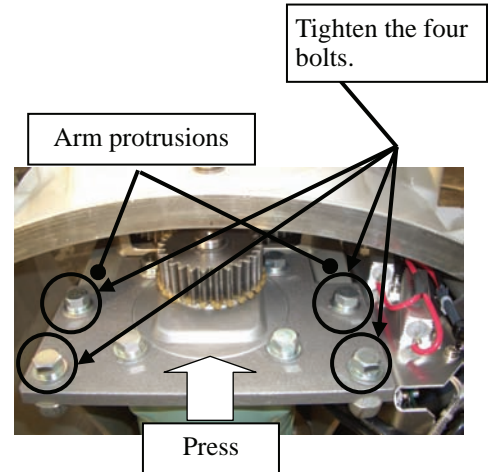


(5) Remove the hexagonal bolts (four M8 bolts) and remove the installation plate from the motor.

(6) Attach the installation plate to the replacement motor. Do not forget to tighten the hexagonal bolts to an appropriate torque (210 kgf-cm) so they are free of looseness.

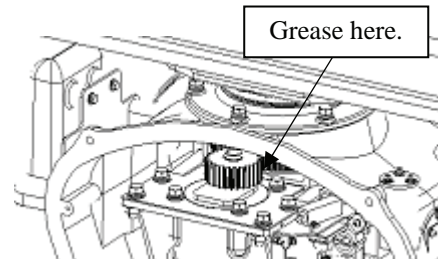


(7) Install the motor into the scanner unit. Press the motor against the protrusions of the arm fixed to the motor on which the arm extends through the wall of the casing, adjust it to minimize backlash, and fix it in place. Do not forget to tighten the hexagonal bolts, to an appropriate torque (140 kgf-cm) so they are free of looseness.



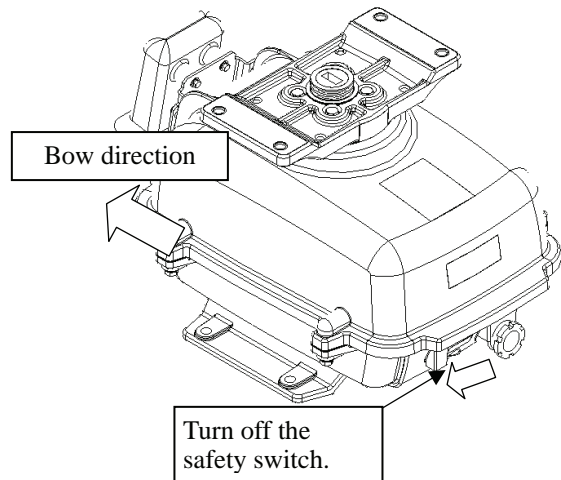
(8) After having installed the motor, grease the gear wheel.

(9) After having replaced the motor, reassemble the unit by following the disassembly procedure in the reverse order. Do not forget to tighten the bolts and screws, and do not forget to reconnect the cables.




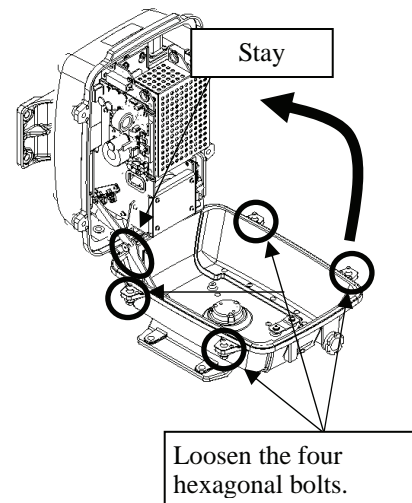
Motor Replacement Procedure for Scanner Unit NKE-2103

- (1) Before beginning work, turn off the safety switch on the bottom of the scanner unit.

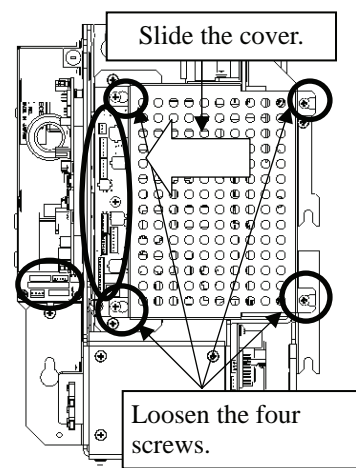


- (2) Loosen the hexagonal bolts (four bolts) and open the upper cover until the stopper of the stay operates.

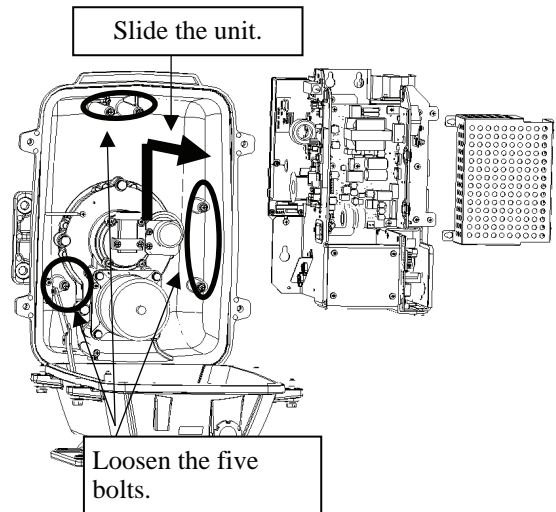
 When closing the upper cover, release the stay stopper and then tighten the cover.



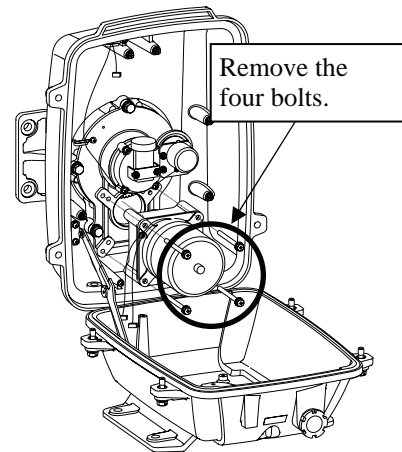
- (3) Loosen the screws (four M4 screws), remove the transmitter-receiver unit cover, and remove the cables connected to the transmitter-receiver unit (ten cables). Slide the cover of the transmitter-receiver unit to remove it.




- (4) Loosen the bolts (five M5 bolts) and remove the transmitter-receiver unit. Slide the transmitter-receiver unit upward to remove it.



- (5) Remove the hexagonal bolts (four M6 bolts) and remove the motor. Grease the gear wheel of the replacement motor and place it in the casing. Do not forget to tighten the hexagonal bolts to an appropriate torque (72 kgf-cm) so they are free of loose



- (6) After having replaced the motor, reassemble the unit by following the disassembly procedure in the reverse order.

 Do not forget to tighten the bolts and screws, and do not forget to reconnect the cables. Clamp the cables so they do not interfere with the rotation of the motor's rotors.

8.4.4 Replacement of LCD Monitor

Caution: Replacement of LCL Monitor must be made by specialized service personnel.
For details, refer to Service Manual.

Attention

- **When replacing the LCD monitor, which is easily broken by a little impact, handle it carefully and do not hit any article against it or put it on a hard article.**

- (1) Disconnect the cables from the connectors “VIDEO” and “VIDEO DC OUT” on the rear of the processor.
- (2) Softly place the LCD monitor on a desk covered with a soft cloth.
- (3) Attach a new LCD monitor in the reverse sequence as described above.

8.4.5 Replacement of Backup Battery

Caution: Replacement of backup battery must be made by specialized service personnel.
For details, refer to Service Manual.

A coin-cell battery maintains radar system configuration, date, and time information while power off condition. radar system configuration is saving to non-volatile memory at fixed intervals.

About the Battery Alarm

If **Battery Low** is appeared at the lower-right of the display when start up the radar system, the battery has not enough time left to live. We recommend to replace the battery.

If **Battery Dead** is appeared at the lower-right of the display when start up the radar system, the battery has no time left to live. There is a necessary to replace the battery. In This condition, this radar system is restored configuration information from flash memory and normal operation is available. However, you turned of the radar system before saving to flash memory, the configuration information is maybe lost. In this case, you must setup the configuration again.

If **No Battery** is appeared at the lower-right of the display when start up the radar system, the battery has not inserted. There is a necessary to insert the battery.

Note: About disposal of used battery, refer to Section 10.2.

How to Replacement of Backup Battery

1. Remove the Coin-Cell Battery from the Holder

Be careful, don't break holder.

3. Fix the Coin-Cell Battery in the Holder

Turn up + surface.
Battery type : CR2032

SECTION 9 TROUBLESHOOTING AND AFTER-SALES SERVICE

9.1	FAULT FINDING	9-1
9.2	TROUBLE SHOOTING.....	9-6
9.3	AFTER-SALES SERVICE	9-11

9.1 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.

9.1.1 List of Alarms and other Indications

The system automatically recognizes an internal alarm and displays the alarm message. If an event which is not trouble but must be reported to the operator occurs, the system notifies the operator of the event.

This section gives the list of alarms displayed by the system and other display lists.

ALR No : Unique alarm number in ALR sentence and ACK sentence.

Table 9-1 List of System Error Message

Message	Description	ALR No.
TXRX (SSW Off)	Scanner: Safety switch OFF.	308
TXRX (AZI)	Scanner: BP error.	311
TXRX (HL)	Scanner: HL error.	312
TXRX (MHV)	Scanner: Modulator's high voltage alarm.	315
TXRX (Data)	Scanner: No communication, communication mismatched, checksum error, or collision.	326
TXRX (Heater)	Scanner: Magnetron heater voltage error.	314
TXRX (Reverse)	Scanner: Reverse rotation.	313
TXRX (Video)	Scanner: VIDEO error.	309
TXRX (Trigger)	Scanner: TRIGGER error..	310
TXRX (Fan 1)	Scanner: FAN 1 error.	317
TXRX (Fan 2)	Scanner: FAN 2 error.	317
Keyboard (Data)	Operation unit: Communication error or checksum error.	325
Keyboard2 (Data)	Second operation unit: Communication error or checksum error.	325
GYRO I/F (Data)	GYRO I/F: No communication or checksum error.	324
GYRO I/F (GYRO)	GYRO I/F: GYRO error (error bit detected).	110
GYRO I/F (Log)	GYRO I/F: Log error (error bit detected).	111
GPS (Status)	GPS status error.	103
Position (Data)	Latitude / longitude data: No communication or data error.	102
Date (Data)	Date data: No communication or data error.	112
Speed (Log)	1-axis log: No communication or data error.	114
Speed (2AXW)	2-axis log (speed over water): No communication or data error.	114
Speed (2AXG)	2-axis log (speed over ground): No communication or data error.	114
Speed (GPS)	GPS speed: No communication or data error.	114
PROC (Interrupt)	Process unit: Interrupt error.	962
PROC (AZI)	Process unit: AZI error.	305



PROC (HL)	Process unit: HL error.	306
ASIC1 to RADAR	Error during interrupt from ASIC1 to RADAR DSP.	963
PROC (Video)	VIDEO error.	303
PROC (Trigger)	Trigger error.	304
Heading (Data)	Heading data: No communication or data error.	113
Depth (Data)	Water depth: No communication or data error.	115
TEMP (Data)	Water temperature: No communication or data error.	117
Wind (Data)	Wind direction/velocity: No communication or data error.	118
Current (Data)	Tidal current: No communication or data error.	119
ROT (Data)	Rate of Turn: No communication or data error.	120
RSA (Data)	Rudder Sensor Angle: No communication or data error.	121
Autopilot (Data)	APB: No communication or data error.	101
Fan (LCD)	LCD monitor: Fan error.	955

Table 9-2 List of Notification

Message	Description	ALR No.
CCRP Changed	CCRP is automatic changed.	
Weather INFO	Weather information is received.	
Copying	Display is capturing to file.	
Set GYRO	Requires setting of true bearing.	
TM Reset	Use care of resetting TM.	
POSN Reset	Change the latitude and longitude sentence.	

Table 9-3 List of Target Tracking Alarms and AIS Function Critical Alarms

Message	Description	ALR No.
CPA/TCPA	There is a dangerous target.	301

Table 9-4 List of RADAR Alarm, Target Tracking Alarms and AIS Function Alarms

Message	Description	ALR No.
CPA/TCPA	There is a dangerous target.	301
RADAR Alarm (In)	Targets have entered the radar alarm range.	
RADAR Alarm (Out)	Targets have left the radar alarm range.	
CPA/TCPA	There is a dangerous target.	301
Trial	There is a dangerous target, when trial maneuver is active.	
New Target	Acquisition or activation of a target in the automatic acquisition / activation zone.	335
Lost	Failure in tracking the target that has been under tracking. Failure in receiving AIS target data for a specified time.	
REF Target	Decrease in the reference target accuracy.	
MAX Target	The maximum number of targets is under acquisition.	
95% Capacity	Over 95% of the maximum number of targets to be tracked.	
AIS Max Target	Maximum number of AIS targets.	333
AIS 95% Capacity	Over 95% of the maximum number of AIS targets.	
AIS ACT MAX	Maximum number of AIS targets to be activated.	

AIS ACT 95% Capacity	Over 95% of the maximum number of AIS targets to be activated.	
TT (Boot)	Target tracking unit start failure.	323
TT (Data)	The target tracking unit is malfunctioning..	323
AIS (Data)	AIS: No communication or communication error.	116
AIS PROC (Data)	AIS processing circuit: No communication or communication error.	328
AIS ALARM ***	AIS alarm (Up to 10 alarm messages can be displayed.).	

Table 9-5 List of Route Error Messages and Warnings

Message	Description	ALR No.
Arrival	Arrive at way point.	
Break Off (WPT)	Out of the way point.	
Approach	Approach the route.	
Cross Track Error	Go off the route.	

Table 9-6 List of Operational Error Messages and Warnings

Message	Description	ALR No.
No Position Data	Mark or line input when the latitude and longitude is invalid.	
No Heading Data	Target tracking operation or TM selection when bearing data is invalid.	
Out of Range	Out of target acquisition range.	
Invalid Range	TM selection due to TM-disabled range (96 nm). Zooming in a ZOOM-disabled range (0.125 nm).	
MAX Point	Tried to enter navigation information beyond the specified.	
Can't Transmit	Tried to transmit within 5 second after standby or when the transmitter-receiver has any trouble.	
Invalid Data	Tried to enter any data beyond its range.	
Invalid Connection	The operator set performance monitor to on without selecting straight.	
No Card	Card not detected yet.	
Card Full	Card capacity insufficient.	
Format Card	Unformatted card.	
Invalid Card	Invalid card.	
Read Failed	Read failure.	
Write Failed	Write failure.	
Delete failed	Deletion failure.	
Format Failed	Format failure.	
Copy Failed	Copy failure.	
Not Allowed	General operation error.	
No Object	No object at the cursor-specified position.	
Slave Mode	Operation of a menu for the scanner unit when the slave mode is active.	

**Table 9-7 List of Conditions Messages**

Message	Description	ALR No.
GPS (HDOP)	The HDOP level is increased (Decrease in the GPS accuracy.).	
MON Test	Performance monitor is active.	
Scanner Rotating	The scanner is rotating (When transmitter is standby state.).	
Battery Low	The battery is weakening.	
Battery Dead	The battery is dead.	
No Battery	The battery had removed.	

Table 9-8 List of Interswitch Alarms and Messages

Message	Description	ALR No.
Master Range CHG	The range of the own display unit has changed due to change in the range of the master display unit.	
ISW Complete	The switchover of the Interswitch ended normally.	
ISW Busy	Access to the ISW menu was made during interswitching.	
TXRX Standby	The scanner unit is in the standby mode.	
ISW Straight	Failed in straight connection when the Interswitch system stops operating.	
ISW Standby	The Interswitch recovered normally.	
ISW Time Out	Failed in switching.	
ISW Error	The interswitch is disabled.	
Pattern CHG Failed	Connection change failed.	
Connection Masked	Inhibition of control / connection is set.	
Master Standby	The master display unit does not transmit any signals.	
ISW (Data)	ISW: No communication, data mismatched, or checksum error.	327
Update ISW Software	Tried to enter new TXRX function, when interswitch software used old version.	

Message set off in a failure of the monitor fan

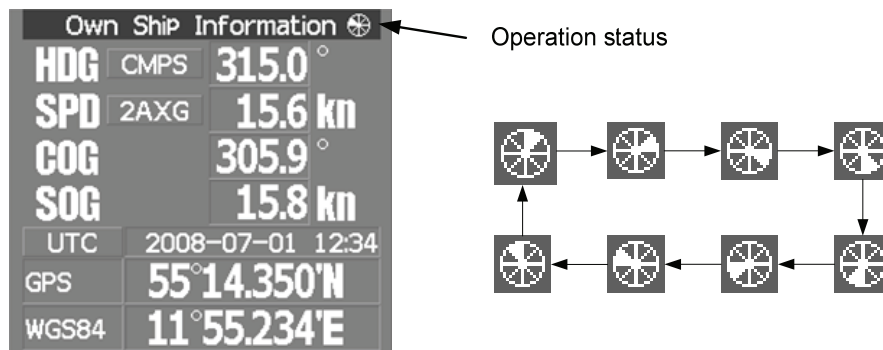


When a failure has occurred in the monitor fan, the LCD monitor displays **LCD FAN FAILURE** at the center. This display will disappear by pressing the BRIGHTNESS knob on the LCD monitor. In order to replace the monitor fan, contact our service department, or the distributor.

9.1.2 Operation Checking

When the system is operating, the operation status (located at the upper right of the screen) is changing pictures.

If picture freeze occurred, turn off the system and restart the system.



9.1.3 Fuse Checking

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 9-8 shows a list of fuses used in the equipment.

Table 9-9 Fuse List

Location	Parts No.	Current Rating	Protection Circuit	Type
Radar process unit (JMA-5312-6/6HS)	F2	5A	I/F circuit PC410	ST4-5AN1
	F3	10A		ST6-10AN1
Radar process unit (JMA-5322-7/9/6HS, JMA-5332-12)	F2	10A	I/F circuit PC410	ST6-10AN1
	F3	10A		ST6-10AN1
GYRO I/F circuit	F1 to F4	0.5A	GYRO I/F circuit PC4201	MF51NR-0.5A



9.2 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

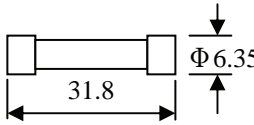
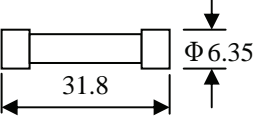
- a) Poor contact in terminal board
- b) The cable end is not fully connected, that it, contacted with earthed another terminal.
- c) Disconnected cable wire

2 Poor Contact of Connector within Unit

Reference: This radar equipment is provided with 9-9 standard spares.

Table 9-10 Spares (7ZXRD0026, JMA-5312-6/6HS, 7ZXRD0015, JMA-5322-7/9/6HS, JMA-5332-12)

7ZXRD0026

Name	Type/Code	Shape (mm)	In use	Spare	Parts No.	Location
Fuse	ST4-5AN1 (5ZFCA00050)		1	3	F2	Inside process unit
Fuse	ST6-10AN1 (5ZFCA00053)		1	3	F3	Inside process unit

7ZXRD0015

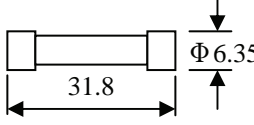
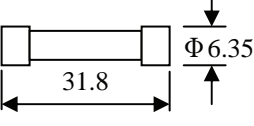
Name	Type/Code	Shape (mm)	In use	Spare	Parts No.	Location
Fuse	ST6-10AN1 (5ZFCA00053)		1	3	F2	Inside process unit
Fuse	ST6-10AN1 (5ZFCA00053)		1	3	F3	Inside process unit

Table 9-11 Special Parts

[I] JMA-5312-6/6HS

Parts No.	Name	Type	Manufacturer	Location	Code
V101	Magnetron	MAF1565N	NJRC	Scanner unit	5VHAA00102
A101/A102	Circulator	FCX68R	Toshiba	Scanner unit	5AJIX00027
A103	Dummy	NJC4002	NJRC	Scanner unit	5ANDF00001
A104	Filter	NJC9952	NJRC	Scanner unit	5AWAX00002
A301	Diode Limiter	NJS6930	NJRC	Scanner unit	5ATBT00006

[II] JMA-5322-7/9/6HS

Parts No.	Name	Type	Manufacturer	Location	Code
V101	Magnetron	M1568BS	NJRC	Scanner unit	5VMAA00106
A101/A102	Circulator	NJC3901M	NJRC	Scanner unit	5AJBV00007
A103	Dummy	NJC4002	NJRC	Scanner unit	5ANDF00001
A104	Filter	NJC9952	NJRC	Scanner unit	5AWAX00002
A301	Diode Limiter	NJS6930	NJRC	Scanner unit	5ATBT00006

[III] JMA-5332-12

Parts No.	Name	Type	Manufacturer	Location	Code
V101	Magnetron	M1555	NJRC	Scanner unit	5VMAA00104
A101	Circulator	NJC3316	NJRC	Scanner unit	5AJBV00008
A301	Diode Limiter	NJS6318	NJRC	Scanner unit	5ATBT00005



Table 9-12 Circuit Block to be Repaired (JMA-5312-6/6HS)

Location	Circuit Block	Type	Remarks
Scanner unit	Geared motor	7BDRD0048	DC brushless motor
Scanner unit	Motor control power circuit	CBD-1779	
Scanner unit	Encoder	CHT-71A	
Scanner unit	Fan	7BFRD0002	
Scanner unit	Performance Monitor	NJU-85	
Scanner unit	Modulator	CME-363	Excluding Magnetron
Scanner unit	Receiver	NRG-610	Including CAE-529-1
Scanner unit	Power supply circuit	CBD-1783	
Process unit	Radar processing circuit	CDC-1332	
Process unit	ARPA process circuit	NCA-877WA	
Process unit	ATA process circuit	NCA-877A	
Process unit	AIS process circuit	NQA-2103	
Process unit	GYRO/LOG I/F circuit	CMJ-304D	
Process unit	Terminal board circuit	CQD-1937A	
Process unit	I/F circuit	NQA-2123	
Process unit	Power circuit	NBD-818A	
Process unit	Fan	7BFRD0005	
Operation unit	Operation unit	CCK-979	
Operation unit	PS2 connector circuit	CQC-1204	
Operation unit	Trackball	CCK-1000	
LCD Monitor	Monitor fan	CBP-173A	
LCD Monitor	Interface circuit	CMH-2227	
LCD Monitor	Inverter circuit	CBF-38	
LCD Monitor	Brilliance circuit	CCK-989	
LCD Monitor	LCD Panel	CML-771	

Table 9-13 Circuit Block to be Repaired (JMA-5322-7/9/6HS)

Location	Circuit Block	Type	Remarks
Scanner unit	Geared motor	7BDRD0044A	DC brushless motor (normal speed)
Scanner unit	Geared motor	7BDRD0045A	DC brushless motor (high speed)
Scanner unit	Motor control power circuit	CBD-1779	
Scanner unit	Encoder	CHT-71A	
Scanner unit	Heater control circuit	CHG-216	Option (AC100V)
Scanner unit	Fan	7BFRD0002	
Scanner unit	Performance Monitor	NJU-85	
Scanner unit	Modulator unit	NMA-550	Including CPA-264 Including CMB-404 Including CFR-229 Excluding Magnetron
Scanner unit	Modulator circuit	CPA-264	
Scanner unit	Receiver unit	NRG-162A	Including CMA-866A
Scanner unit	T/R control circuit	CMC-1205R	
Scanner unit	Power supply circuit	CBD-1682A	
Process unit	Radar processing circuit	CDC-1332	
Process unit	ARPA process circuit	NCA-877WA	
Process unit	ATA process circuit	NCA-877A	
Process unit	AIS process circuit	NQA-2103	
Process unit	GYRO/LOG I/F circuit	CMJ-304D	
Process unit	Terminal board circuit	CQD-1937A	
Process unit	I/F circuit	NQA-2123	
Process unit	Power circuit	NBD-818A	
Process unit	Fan	7BFRD0005	
Operation unit	Operation unit	CCK-979	
Operation unit	PS2 connector circuit	CQC-1204	
Operation unit	Trackball	CCK-1000	
LCD Monitor	Monitor fan	CBP-173A	
LCD Monitor	Interface circuit	CMH-2227	
LCD Monitor	Inverter circuit	CBF-38	
LCD Monitor	Brilliance circuit	CCK-989	
LCD Monitor	LCD Panel	CML-771	

**Table 9-14 Circuit Block to be Repaired (JMA-5332-12)**

Location	Circuit Block	Type	Remarks
Scanner unit	Geared motor	MDBW10823	DC brushless motor
Scanner unit	Motor driver circuit	7EPRD0034	220VAC
Scanner unit	Motor driver circuit	7EPRD0035	110VAC
Scanner unit	Encoder	CHT-71A	
Scanner unit	Heater control circuit	CHG-215	Option (AC100V)
Scanner unit	Brake control circuit	CCB-655	
Scanner unit	Fan	7BFRD0002	
Scanner unit	Performance Monitor	NJU-84	
Scanner unit	Modulator unit	NMA-551	Including CPA-264 Including CMB-406 Including CFR-229 Excluding Magnetron
Scanner unit	Modulator circuit	CPA-264	
Scanner unit	Receiver unit	NRG-229	Including CAE-499 Including CAF-595
Scanner unit	T/R control circuit	CMC-1205R	
Scanner unit	Power supply circuit	CBD-1682A	
Scanner unit	Relay filter circuit	CSC-656	
Process unit	Radar processing circuit	CDC-1332	
Process unit	ARPA process circuit	NCA-877WA	
Process unit	ATA process circuit	NCA-877A	
Process unit	AIS process circuit	NQA-2103	
Process unit	GYRO/LOG I/F circuit	CMJ-304D	
Process unit	Terminal board circuit	CQD-1937A	
Process unit	I/F circuit	NQA-2123	
Process unit	Power circuit	NBD-818A	
Process unit	Fan	7BFRD0005	
Operation unit	Operation unit	CCK-979	
Operation unit	PS2 connector circuit	CQC-1204	
Operation unit	Trackball	CCK-1000	
LCD Monitor	Monitor fan	CBP-173A	
LCD Monitor	Interface circuit	CMH-2227	
LCD Monitor	Inverter circuit	CBF-38	
LCD Monitor	Brilliance circuit	CCK-989	
LCD Monitor	LCD Panel	CML-771	

9.3 AFTER-SALES SERVICE

9.3.1 Keeping period of maintenance parts

Keeping period of maintenance parts is ten years from the production is discontinued.

9.3.2 When you Request for Repair

If you suppose the product may be out of order, read the description in Section 9 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 9-10.)
- ☆ Name of company/organization, address and telephone number

9.3.3 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.



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 product (refer to Section 9.1.2 and 9.2).

(3) Check the items (4) to (17) while the transmission (TX) is ON.

*Functions mentioned in the items (14), (15) and (17) may be optional, answer is not necessary.

No.	Check Item	Result	
		YES	NO
(1)	Power can be turned on. (The lamp on the Operation unit is lit)	YES	NO
(2)	A few minutes after powering-on, it will become standby status .	YES	NO
(3)	When powering-on (or TX ON), LCD monitor something is lit.	YES	NO
(4)	The antenna 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 6 NM 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 SEA and RAIN minimum, GAIN maximum, IR-OFF and range 48 NM.	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)	Target tracking function works normally.	YES	NO
*(17)	If equipped with an interswitch, when switching from the straight mode (II) to (X), the failures (items marked NO) in the above (1) to (16), are switched over to the other unit.	YES	NO

(18) Others (Error message, etc.) _____

SECTION 10 DISPOSAL

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10.1 DISPOSAL OF THE UNIT

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

10.2 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-1332): BT1 (Maxell: CR2032)

- 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.

10.3 DISPOSAL OF USED MAGNETRON

Magnetron is used in the Scanner (NKE—1130/2103/2254)

- 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.



10.4 ABOUT THE CHINA ROHS

有毒有害物质或元素的名称及含量

(Names & Content of toxic and hazardous substances or elements)

形式名(Type): JMA-5300MK2 Series

名称(Name): RADAR

部件名称 (Part name)	有毒有害物质或元素 (Toxic and Hazardous Substances and Elements)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
雷达天线单元 (Scanner Unit)	×	×	○	×	×	×
收发信单元 (Transmitter-receiver Unit)	×	×	×	×	×	×
主船内装置 (Inboard Unit) · 显示装置 (Display Unit) · 键盘装置 (OperationUnit) · 信号处理装置 (RADAR Process Unit)	×	×	×	×	×	×
外部设备 (Peripherals) · 选择 (Options) · 电线类 (Cables) · 手册 (Documentts)	×	×	×	×	×	×
<p>○: 表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11306-2006 标准规定的限量要求以下。 (Indicates that this toxic, or hazardous substance contained in all of the homogeneous materials for this part is below the requirement in SJ/T11363-2006.)</p> <p>×: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006 标准规定的限量要求。 (Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T 11363-2006.)</p>						

SECTION 11

SPECIFICATIONS

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11.1

JMA-5312-6/6HS TYPE RADAR

- | | |
|---------------------------------------|---|
| (1) Class of emission | P0N |
| (2) Display | Color Raster Scan |
| (3) Screen | 19-inch Color LCD
Effective diameter of radar display, more than 250 mm |
| (4) Range Scale | 0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96NM |
| (5) Range Resolution | Less than 30m |
| (6) Minimum Detectable Range | Less than 40m |
| (7) Range Accuracy | Less than 1% of the maximum distance of the range scale in use or less than 15m whichever is larger |
| (8) Bearing Accuracy | Less than 1° |
| (9) Bearing Indication | Relative Motion mode: Head-up/Course-up/North-up
True Motion mode: Course-up/North-up |
| (10) Ambient Condition | According to IEC60945-4
Temperature
Scanner: -25 to +55°C
(Storage Temperature: -25 to +70°C)
Other Unit except Scanner: -15 to +55°C
Relative Humidity 93% at +40°C
Vibration 2 to 13.2Hz, amplitude ±1mm ±10%
13.2 to 100Hz, Gravity acceleration 7m/s ²
Velocity of the wind 51.5m/s(100kt) |
| (11) Power Supply Input | +24VDC (Display Unit)
+24VDC (Scanner)
* Display Unit correspond to 100/110/115/220/230/240VAC
when use NBA-5111. |
| (12) Power Consumption | Approx. 620W (In maximum wind resistant velocity) |
| (13) Power Supply Voltage Fluctuation | +24VDC -10/+50% (Display Unit)
+24VDC -10/+50% (Scanner Unit) |
| (14) Pre-heating Time | Approx. Within 1min30sec |



11.2 JMA-5322-7/9/6HS TYPE RADAR

(1) Class of emission	P0N
(2) Display	Color Raster Scan
(3) Screen	19-inch Color LCD Effective diameter of radar display, more than 250 mm
(4) Range Scale	0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96NM
(5) Range Resolution	Less than 30m
(6) Minimum Detectable Range	Less than 40m
(7) Range Accuracy	Less than 1% of the maximum distance of the range scale in use or less than 15m whichever is larger
(8) Bearing Accuracy	Less than 1°
(9) Bearing Indication	Relative Motion mode: Head-up/Course-up/North-up True Motion mode: Course-up/North-up
(10) Ambient Condition	According to IEC60945-4 Temperature Scanner: -25 to +55°C (Storage Temperature: -25 to +70°C) Other Unit except Scanner: -15 to +55°C Relative Humidity 93% at +40°C Vibration 2 to 13.2Hz, amplitude $\pm 1\text{mm} \pm 10\%$ 13.2 to 100Hz, Gravity acceleration 7m/s^2 Velocity of the wind 51.5m/s (100kt)
(11) Power Supply Input	+24VDC (Display Unit) +24VDC (Scanner) * Display Unit correspond to 100/110/115/220/230/240VAC when use NBA-5111.
(12) Power Consumption	Approx. 700W (In maximum wind resistant velocity)
(13) Power Supply Voltage Fluctuation	+24VDC $-10/+50\%$ (Display Unit) +24VDC $-10/+50\%$ (Scanner Unit)
(14) Pre-heating Time	Approx. Within 3min

11.3 JMA-5332-12 TYPE RADAR

(1) Class of emission	P0N
(2) Display	Color Raster Scan
(3) Screen	19-inch Color LCD Effective diameter of radar display, more than 250 mm
(4) Range Scale	0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96NM
(5) Range Resolution	Less than 30m
(6) Minimum Detectable Range	Less than 40m
(7) Range Accuracy	Less than 1% of the maximum distance of the range scale in use or less than 15m whichever is larger
(8) Bearing Accuracy	Less than 1°
(9) Bearing Indication	Relative Motion mode: Head-up/Course-up/North-up True Motion mode: Course-up/North-up
(10) Ambient Condition	According to IEC60945-4 Temperature Scanner: -25 to +55°C (Storage Temperature: -25 to +70°C) Other Unit except Scanner: -15 to +55°C Relative Humidity 93% at +40°C Vibration 2 to 13.2Hz, amplitude ±1mm ±10% 13.2 to 100Hz, Gravity acceleration 7m/s ² Velocity of the wind 51.5m/s(100kt)
(11) Power Supply Input	+24VDC (Display Unit) 100/110/120/220/230/240VAC, 1 Φ, 50/60Hz (Scanner) * Display Unit correspond to 100/110/115/220/230/240VAC when use NBA-5111.
(12) Power Consumption	Approx. 240W +1600VA (In maximum wind resistant velocity)
(13) Power Supply Voltage Fluctuation	+24VDC -10/+50% (Display Unit) 100/110/115/220/230/240VAC ±10% (Scanner Unit)
(14) Pre-heating Time	Approx. Within 3min



11.4 SCANNER (NKE-2103-6)

(1) Dimensions	Height 457mm×Swing Circle 1910mm
(2) Mass	Approx. 40kg
(3) Polarization	Horizontal Polarization
(4) Directional Characteristic	Horizontal Beam Width: 1.2° (-3dB width) Vertical Beam Width: 20° (-3dB width) Sidelobe Level: Below -26dB (within ±10°) Below -30dB (outside ±10°)
(5) Revolution	Approx. 27rpm (Normal)
(6) Peak Power	10kW±50%
(7) Transmitting Frequency	9410 ±30MHz
(8) Transmitting Tube	Magnetron [MAF1565N]
(9) Pulse width/Repetition Frequency	SP1:0.08uS/2250Hz MP1:0.25uS/1700Hz,MP2:0.5uS/1200Hz LP1:0.8uS/750Hz,LP2:1.0uS/650Hz 0.125NM SP1 0.25NM SP1 0.5NM SP1 0.75NM SP1 / MP1 1.5NM SP1 / MP1 / MP2 3NM MP1 / MP2 / LP1 6NM MP1 / MP2 / LP1 / LP2 12NM MP1 / MP2 / LP1 / LP2 24NM MP2 / LP1 / LP2 48NM LP2 96NM LP2
(10) Duplexer	Circulator + Diode Limiter
(11) Mixer	MIC Front End
(12) Intermediate Frequency Amplifier	Intermediate Frequency: 60MHz Band Width: 20MHz(0.08μS) 6MHz(0.25μS,0.5μS) 3MHz(0.8μS, 1μS) Gain: More than 90dB Amplifying Characteristics: Logarithmic Amplifier
(13) Overall Noise Figure	7.5dB(Average)

11.5 SCANNER (NKE-2254-7/9)

- | | | |
|------|----------------------------------|---|
| (1) | Dimensions | 25kW-7ft: Height 536mm×Swing Circle 2270mm
25kW-9ft: Height 536mm×Swing Circle 2825mm |
| (2) | Mass | 25kW-7ft: Approx. 58 kg
25kW-9ft: Approx. 60 kg |
| (3) | Polarization | Horizontal Polarization |
| (4) | Directional Characteristics | Horizontal Beam Width: 1.0° (7ft, -3dB width)
0.8° (9ft, -3dB width)
Vertical Beam Width 20° (7/9ft, -3dB width)
Sidelobe Level: Below -26dB
(7/9ft, within ±10°)
Below -30dB
(7/9ft, outside ±10°) |
| (5) | Revolution | 24rpm (7/9ft, Normal) |
| (6) | Peak Power | 25kW ±50% |
| (7) | Transmitting Frequency | 9410 ±30MHz |
| (8) | Transmitting Tube | Magnetron [M1568BS] |
| (9) | Pulse Width/Repetition Frequency | SP1:0.07uS/2250Hz
MP1:0.2uS/2250Hz,MP2:0.3uS/1900Hz,MP3:0.4uS/1400Hz
LP1:0.8uS/750Hz,LP2:1.0uS/650Hz,LP3:1.2uS/510Hz
0.125NM SP1
0.25NM SP1
0.5NM SP1
0.75NM SP1 / MP1
1.5NM SP1 / MP1 / MP2 / MP3
3NM MP1 / MP2 / MP3 / LP1
6NM MP1 / MP2 / MP3 / LP1 / LP2
12NM MP1 / MP2 / MP3 / LP1 / LP2
24NM MP3 / LP1 / LP2
48NM LP2
96NM LP3 |
| (10) | Duplexer | Circulator + Diode Limiter |
| (11) | Mixer | MIC Front End |
| (12) | Intermediate Frequency Amplifier | Intermediate Frequency: 60MHz
Band Width: 25MHz(0.07μS)
8MHz(0.2μS, 0.3μS, 0.4μS)
3MHz(0.8μS, 1μS, 1.2μS)
Gain: More than 90dB
Amplifying Characteristics: Logarithmic Amplifier |
| (13) | Overall Noise Figure | 7.5dB(Average) |



11.6 SCANNER (NKE-1130)

(1) Dimensions	Height 791mm×Swing Circle 4000mm
(2) Mass	Approx. 180kg
(3) Polarization	Horizontal Polarization
(4) Directional Characteristics	Horizontal Beam Width 12ft: 1.9° Vertical Beam Width 12ft: 25° Sidelobe Level: Below -26dB (within ±10°) Below -30dB (outside ±10°)
(5) Revolution	24rpm (60/50Hz)
(6) Peak Power	30kW ±50%
(7) Transmitting Frequency	3050 ±20MHz
(8) Transmitting Tube	Magnetron M1555
(9) Pulse Width/Repetition Frequency	SP1:0.07uS/2250Hz MP1:0.2uS/2250Hz,MP2:0.3uS/1900Hz,MP3:0.4uS/1400Hz LP1:0.8uS/750Hz,LP2:1.0uS/650Hz,LP3:1.2uS/510Hz 0.125NM SP1 0.25NM SP1 0.5NM SP1 0.75NM SP1 / MP1 1.5NM SP1 / MP1 / MP2 / MP3 3NM MP1 / MP2 / MP3 / LP1 6NM MP1 / MP2 / MP3 / LP1 / LP2 12NM MP1 / MP2 / MP3 / LP1 / LP2 24NM MP3 / LP1 / LP2 48NM LP2 96NM LP3
(10) Duplexer	Circulator + Diode Limiter
(11) Mixer	MIC Front End
(12) Intermediate Frequency Amplifier	Intermediate Frequency: 60MHz Band Width: 25MHz(0.07uS) 8MHz(0.2μS, 0.3μS, 0.4μS) 3MHz(0.8μS, 1.0μS, 1.2μS) Gain: More than 90dB Amplifying Characteristics: Logarithmic Amplifier
(13) Overall Noise Figure	7.5dB(Average)

11.7 SCANNER (NKE-2103-6HS)

(1) Dimensions	Height 457mm×Swing Circle 1910mm
(2) Mass	Approx. 40kg
(3) Polarization	Horizontal Polarization
(4) Directional Characteristic	Horizontal Beam Width: 1.2° (-3dB width) Vertical Beam Width: 20° (-3dB width) Sidelobe Level: Below -26dB (within ±10°) Below -30dB (outside ±10°)
(5) Revolution	Approx. 48rpm
(6) Peak Power	10kW±50%
(7) Transmitting Frequency	9410 ±30MHz
(8) Transmitting Tube	Magnetron [MAF1565N]
(9) Pulse width/Repetition Frequency	SP1:0.08uS/2250Hz MP1:0.25uS/1700Hz,MP2:0.5uS/1200Hz LP1:0.8uS/750Hz,LP2:1.0uS/650Hz 0.125NM SP1 0.25NM SP1 0.5NM SP1 0.75NM SP1 / MP1 1.5NM SP1 / MP1 / MP2 3NM MP1 / MP2 / LP1 6NM MP1 / MP2 / LP1 / LP2 12NM MP1 / MP2 / LP1 / LP2 24NM MP3 / LP1 / LP2 48NM LP2 96NM LP2
(10) Duplexer	Circulator + Diode Limiter
(11) Mixer	MIC Front End
(12) Intermediate Frequency Amplifier	Intermediate Frequency: 60MHz Band Width: 20MHz(0.08μS) 6MHz(0.25μS,0.5μS) 3MHz(0.8μS, 1μS) Gain: More than 90dB Amplifying Characteristics: Logarithmic Amplifier
(13) Overall Noise Figure	7.5dB(Average)



11.8 SCANNER (NKE-2254-6HS)

(1) Dimensions	25kW-6ft: Height 536mm×Swing Circle 1910mm																						
(2) Mass	Approx. 55 kg																						
(3) Polarization	Horizontal Polarization																						
(4) Directional Characteristics	<table border="0"> <tr> <td>Horizontal Beam Width:</td> <td>1.2°</td> </tr> <tr> <td>Vertical Beam Width</td> <td>20° (-3dB width)</td> </tr> <tr> <td>Sidelobe Level:</td> <td>Below -26dB (within ±10°) Below -30dB (outside ±10°)</td> </tr> </table>	Horizontal Beam Width:	1.2°	Vertical Beam Width	20° (-3dB width)	Sidelobe Level:	Below -26dB (within ±10°) Below -30dB (outside ±10°)																
Horizontal Beam Width:	1.2°																						
Vertical Beam Width	20° (-3dB width)																						
Sidelobe Level:	Below -26dB (within ±10°) Below -30dB (outside ±10°)																						
(5) Revolution	48rpm (Normal)																						
(6) Peak Power	25kW ±50%																						
(7) Transmitting Frequency	9410 ±30MHz																						
(8) Transmitting Tube	Magnetron [M1568BS]																						
(9) Pulse Width/Repetition Frequency	<p>SP1:0.07uS/2250Hz MP1:0.2uS/2250Hz,MP2:0.3uS/1900Hz,MP3:0.4uS/1400Hz LP1:0.8uS/750Hz,LP2:1.0uS/650Hz,LP3:1.2uS/510Hz</p> <table border="0"> <tr><td>0.125NM</td><td>SP1</td></tr> <tr><td>0.25NM</td><td>SP1</td></tr> <tr><td>0.5NM</td><td>SP1</td></tr> <tr><td>0.75NM</td><td>SP1 / MP1</td></tr> <tr><td>1.5NM</td><td>SP1 / MP1 / MP2 / MP3</td></tr> <tr><td>3NM</td><td>MP1 / MP2 / MP3 / LP1</td></tr> <tr><td>6NM</td><td>MP1 / MP2 / MP3 / LP1 / LP2</td></tr> <tr><td>12NM</td><td>MP1 / MP2 / MP3 / LP1 / LP2</td></tr> <tr><td>24NM</td><td>MP3 / LP1 / LP2</td></tr> <tr><td>48NM</td><td>LP2</td></tr> <tr><td>96NM</td><td>LP3</td></tr> </table>	0.125NM	SP1	0.25NM	SP1	0.5NM	SP1	0.75NM	SP1 / MP1	1.5NM	SP1 / MP1 / MP2 / MP3	3NM	MP1 / MP2 / MP3 / LP1	6NM	MP1 / MP2 / MP3 / LP1 / LP2	12NM	MP1 / MP2 / MP3 / LP1 / LP2	24NM	MP3 / LP1 / LP2	48NM	LP2	96NM	LP3
0.125NM	SP1																						
0.25NM	SP1																						
0.5NM	SP1																						
0.75NM	SP1 / MP1																						
1.5NM	SP1 / MP1 / MP2 / MP3																						
3NM	MP1 / MP2 / MP3 / LP1																						
6NM	MP1 / MP2 / MP3 / LP1 / LP2																						
12NM	MP1 / MP2 / MP3 / LP1 / LP2																						
24NM	MP3 / LP1 / LP2																						
48NM	LP2																						
96NM	LP3																						
(10) Duplexer	Circulator + Diode Limiter																						
(11) Mixer	MIC Front End																						
(12) Intermediate Frequency Amplifier	<p>Intermediate Frequency: 60MHz Band Width: 25MHz(0.07μS) 8MHz(0.2μS, 0.3μS, 0.4μS) 3MHz(0.8μS, 1μS, 1.2μS)</p> <p>Gain: More than 90dB Amplifying Characteristics: Logarithmic Amplifier</p>																						
(13) Overall Noise Figure	7.5dB(Average)																						

11.9 DISPLAY UNIT (NCD-4530)

- | | |
|----------------------------|--|
| (1) Structure | Desk Top Type
(LCD Monitor/Operation Unit/Processor Unit Separation Structure) |
| (2) Screen | 19-inch Color LCD 1280x1024 dot (SXGA)
Viewing Distance: 1m from the center of Display |
| (3) Display mode | Radar mode
Synthesis mode (Synthesis Radar echo and Coastline)
Plotter mode (Require Plotter Unit (option)) |
| (4) Range Scale | 0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96NM |
| (5) Range Marker | 0.025, 0.05, 0.1, 0.25, 0.25, 0.5, 1, 2, 4, 8, 16NM |
| (6) Bearing Indication | Rader mode/Synthesis mode
Relative motion: North-up, Course-up, Head-up
True motion: North-up, Course-up
True motion (Plotter mode (Option)): N-up, C-up |
| (7) Variable Range Maker | 2VRM (Digital Display)
VRM unit of Display: NM
VRM Range:0.000 to 100.2NM |
| (8) Electric Bearing lines | 2EBL(Digital Display)
Each EBL can be floating displayed.
EBL unit of Display: 0.1°
EBL Range: 0.000° to 359.9°
Bearing Indication: Relative bearing and True bearing can be switched. |
| (9) Cursor | Target Range, Bearing and Latitude presentation can be possible to move with trackball. |



11.10 PROCESSOR UNIT (NDC-1417)

- | | |
|----------------------------------|--|
| (1) Structure | Desk Top Type (Horizontal putting and length putting using combined) |
| (2) Dimensions | Height 170mm×Width 300mm×Depth 320mm |
| (3) Mass | Approx. Below 10kg |
| (4) Tune Method | AUTO/MANUAL(Bar-graph indicate) |
| (5) STC (SEA) | AUTO/MANUAL |
| (6) FTC (RAIN) | AUTO/MANUAL |
| (7) Radar Interference Rejection | Built-in (The effect can be adjusted by three stages.) |
| (8) Scan Correlation | Function1/2/3, 2 Peak Hold Processing1/2
Automatic change of processing method.
(Target range synchronize/Clutter synchronize) |
| (9) Bearing Marker | 360° in 1° digit.
Relative motion: Fixation
True motion: Rewrite at a position correct in every scan. |
| (10) Heading Line | Electronic (Stern Line can be displayed.) |
| (11) Radar Alarm | Invasion, Seccession, OFF can be selected.
With buzzer sound.(Possible to output to external buzzer.)
Ring.
Automatically acquisition by target tracking described in Section "TARGET TRACKING". |
| (12) Off Center | Within 66% of the radius of any range. (Except 96NM)
Can be operated in all mode in relative motion.
Trail is succeed at Off Center mode. |
| (13) True motion Unit | Built-in (Except 96NM) |
| (14) True motion reset position | 66% of radius of any range.
Possible to manual reset. |
| (15) Twice zoom | The zoom center is 66% radius of any range. (Except 0.125NM) |

-
- (16) Radar trails indication
- True motion mode:(Only true motion trails
Relative motion mode:
True motion trails and relative motion trails can be selected.
Trail time length:
15 sec/30 sec/1 min/3 min/6 min/10 min/15 min/30 min/60
min/Continuous/OFF
Arbitrary trail time length can be displayed at any time.
Possible to display time series trail and continuous trail by color
classification.
Built-in Trail thinning process.
Trail function can be use at true motion reset.
When range is changed, Trail function can be use.
Trail function can be use at Off Center. (Relative motion)
When motion indication and bearing indication changed, Trail
function can be use.(Only true motion trails indication.)
- (17) Variety of Pulse width
- SP1/MP1/MP2/LP1/LP2(NKE-2103)
SP1/SP2/MP1/MP2/MP3/LP1/LP2/LP3(NKE-2254/NKE-1130)
- (18) Target enhance
- 3 stages can be changed.
- (19) Correct position
- When synthesis Radar and Coastline is displayed, position can be
corrected by manually.
- (20) Display color
- Radar echo: 16 stages (Yellow, Green, Amber, Purple, Red)
Radar trails: 16 stages (White, Cyan, Green)
Fixed Maker: 4 colors (White, Cyan, Green, Amber)
VRM1/2,EBL1/2,PI: 4 colors (White, Cyan, Green, Amber)
Character/Bearing Marker: 5 colors (White, Green, Amber, Black,
Red)
Cursor: 4 colors (White, Cyan, Green, Amber)
Heading Line/Vector: 4 colors (Cyan, Green, Amber, Black)
Own Ship's track/Another Ship's track: 7 colors
Coastline/Isobaths: 16 colors
Mark/Line: 7 colors



11.11

TARGET TRACKING FUNCTION (OPTION)

Radar mode, synthesis mode

- | | |
|--------------------------------|--|
| (1) Available range scale | All range |
| (2) Acquisition | MANUAL/AUTO (by two automatic acquisition/activation zone) |
| (3) Tracking | Normal edition type NCA-877A: 30 target
High performance type NCA-877WA: 100 target
Maximum tracking range: 32NM (Available all range scale) |
| (4) Display | Tracking data: 4 at the same time. (Can be scroll.)
Naming function: Possible to name by the alphabet up to 8 characters to each target.
The range, bearing, CPA, TCPA, true course, true speed, BCR, BCT of target can be displayed. (When naming is displayed, BCR/BCT can't be displayed.)
Vector display: True/Relative Past position |
| (5) Alarm | Automatic acquisition/activation zone
Danger ship: Depends on CPA/TCPA setting. |
| (6) Trial Maneuver (NCA-877WA) | Input parameter: Course, Speed, Vector time, Time to Maneuver, Reach, Turn Radius, Acceleration, Deceleration |

Synthesis mode

- | | |
|------------------------|--|
| (7) Another ship track | 20 targets. 1500 point per one target can be displayed. (Own ship track and marks are another.)
Display color: 7 colors (The display color of each target can be set.)
(The display color of all targets can be set by the batch. In this case, the display color is one color.)
Interval of save: 3/5/10/30 sec, 1/3/5/10/130/160 min, 1/3/5/10 NM
Possible to storage in memory card (Option). |
|------------------------|--|

Note: ARPA Process Unit (NCA-877WA) or ATA Process Unit (NCA-877A) must be fitted on ships compliant to IMO.

11.12 AIS UNIT (NQA-2103) (OPTION)

Radar mode, synthesis mode

- (1) Activation 100 target
MANUAL/AUTO(by two automatic activation/activation zone)
- (2) Display 300 target (sleeping target and activated target)
AIS data: 2 at the same time. (simple display)
The ship's name, call sign, MMSI, course, speed, CPA, TCPA of target can be displayed. (simple display item)
The ship's name, call sign, MMSI, course, speed, CPA, TCPA, bearing, range, ship's heading bearing, rate of turn, latitude, longitude, destination, navigation status of target can be displayed. (detail display item)
Vector display: True/Relative
Past position
The message can be displayed. (broadcast message, addressed message)
- (3) Alarm Automatic activation/activation zone
Danger ship: Depends on CPA/TCPA setting.

Synthesis mode

- (4) Another ship track 20 targets. 1500 point per one target can be displayed.
(Own ship track and marks are another.)
Display color: 7 colors
(The display color of each target can be set.)
(The display color of all targets can be set by the batch. In this case, the display color is one color.)
Interval of save: 3/5/10/30 sec, 1/3/5/10/130/160 min, 1/3/5/10 NM
Possible to storage in memory card (Option).

Note: AIS Process Unit must be fitted on ships compliant to IMO.



11.13 PLOTTER

(1) Plotter (Normal) (Synthesis mode)

Projection:	Mercator projection (Latitude 85 degree or less.)
Scale:	Radar synchronize range scale
Own ship track:	1 color(Cyan) Interval of save 3/5/10/30 sec, 1/3/5/10/30/60 min or every 0.1/0.2/0.3/0.5/1/3/5/10 NM and Off Capacity 7,000 point
Cursor mark:	7 colors Capacity of cursor mark: 2,000 point Variety of cursor Mark: 29
Line:	7 colors Capacity of line: Include in cursor mark Variety of line: Solid line, broken line, alternate long and short dash line
Coastline data:	Coastline ROM Card (Option) (ERC, JRC, C-Map NT+) One selected depth contour can be displayed.
External memory:	Memory card (Option)
Position correction:	Latitude / Longitude correction Radar video synchronize range scale coast line by manual. (Synthesis mode)

(2) Plotter (Option NDB-34A) (Synthesis mode, Plotter mode)

Projection:	Mercator projection (Latitude 70 degree or less.)
Scale:	Synchronize range scale
Own ship track:	7 colors. Interval of save: 3/5/10/30 sec, 1/3/5/10/30/60 min or every 0.1/0.2/0.3/0.5/1/3/5/10 NM and Off Capacity of own ship track: 7,000 point
Cursor mark:	7 colors Capacity of cursor mark: 20,000 point Variety of cursor Mark: 29
Line:	7 colors Capacity of line: Include in cursor mark Variety of line: Solid line, broken line, alternate long and short dash line
Coast line data:	Coast line ROM card (Option)(ERC, JRC, C-Map NT+) Selected one depth contour can be displayed.
External memory:	Memory card (Option)
Waypoint and route:	Waypoint can be set up to 999 point. Information of waypoint: Azimuth, distance and the time to required destination. Setting of sea route: 10 sea routes. (20 destination for one route can be set.) Alarm of route: Waypoint arrival / break off, Route arrival / break off
Position correction:	Latitude / Longitude correction Radar video synchronize range scale coast line by manual. (Synthesis mode)

11.14

OPERATION UNIT (NCE-5171)

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



11.15 PERFORMANCE MONITOR (NJU-84) (OPTION)

- | | |
|-------------------------|-------------------------------------|
| (1) Dimensions | Height 130mm×Width 180mm×Depth 70mm |
| (2) Mass | Approx. 1.2kg |
| (3) Operating Frequency | 3050±30MHz |

Note: Performance monitor must be fitted on ships compliant to IMO.

11.16 PERFORMANCE MONITOR (NJU-85) (OPTION)

- | | |
|-------------------------|-------------------------------------|
| (1) Dimensions | Height 130mm×Width 149mm×Depth 70mm |
| (2) Mass | Approx. 1.2kg |
| (3) Operating Frequency | 9410±30MHz |

Note: Performance monitor must be fitted on ships compliant to IMO.

11.17

AVAILABLE INPUT SIGNAL

Receive capability Port: .NAV1, NAV2, GPS port at terminal board TB4303. NMEA Connector at rear of the process unit (D-Sub 9 PIN)

- (1) Navigation equipment: IEC61162-1/2
Longitude/Latitude: GGA>RMC>RMA>GNS/GLL
Waypoint: RMB>BWC>BWR
COG/SOG: RMC>RMA>VTG
SPEED: VBW
Day/Time information: ZDA
Alarm acknowledge: ACK

Rate of Turn : ROT

Rudder : RSA
- (2) Bearing signal: GYRO-SYNC: 360X, 180X, 90X, 30X. (GYRO I/F Unit)
GYRO-STEP: 360X, 180X, 90X, 30X. (GYRO I/F Unit)
JRC-NSK format (JLR-10,20,30) (COMPASS Connector at rear of the process unit)
IEC61162-2 38400bps: THS>HDT (over 40Hz) (COMPAS port at terminal board TB4303).
IEC61162-1 4800bps: HDT>HDG>HDM>VHW (COMPAS port at terminal board TB4303). ※Can't be use for target tracking.
- (3) Speed signal: LOG-SYNC: 360X, 180X,90X, 30X. (GYRO I/F Unit)
LOG-PULSE: 800, 400, 200, 100. (GYRO I/F Unit)
- (4) External event mark: Contact input (EVENT port at terminal board TB4303).
- (5) Radar buoy: Negative input (RBVD port at terminal board TB4302).
- (6) Depth: DPT>DBS>DBT>DBK, JRC format
- (7) Water temperature: MTW, JRC format
- (8) Tendency: CUR, JRC format
- (9) Direction of wind, velocity of wind: MWV, MWD
- (10) AIS: VDM, VDO

Note: The Speed measuring accuracy of speed sensor shall confirm to IMO Resolution MSC.96(72).
The measuring accuracy of GPS shall confirm to IMO Resolution MSC.112(73).



11.18

AVAILABLE OUTPUT SIGNAL

- | | | |
|-----|------------------------|--|
| (1) | Slave video | Radar video: TIY, VD, BP(2048p), BZ (Terminal board TB4302) |
| (2) | Navigation information | Send capability Port: .NAV1, NAV2, GPS port at terminal board TB4303.
NMEA Connector at rear of the process unit (D-Sub 9 PIN). IEC61162-1/2
Radar system data: RSD
Own ship data: OSD
Tracking target data: TTM, TLL, TTD, TLB, JRC-ARPA
AIS target data: TTM, TLL, TTD, TLB
Alarm: ALR
Auto pilot: APB
Bearing of destination: BOD
Latitude/Longitude data: GGA, GLL, RMC
Waypoint data: RMB, BWC
COG/SOG data: VTG
Cross track error: XTE
Heading data: HDT, THS |
| (3) | External alarm | Default setting: normally closed contact
Maximum current: 200mA
(SYSALM, ARPAALM port at terminal board TB4303). |
| (4) | External monitor | Multi scan monitor, Analog RGB, HD15pin Connector |

11.19

STANDARD CONFIGURATION

- | | | |
|-----|-------------------------|--|
| (1) | Scanner | 1 |
| (2) | Display unit | 1 (Process unit, LCD unit, Operation unit) |
| (3) | Equipment cable | 10/25kW
Standard:20m
30kW
Display unit to junction box Standard:10m
Junction box to scanner Standard:20m |
| (4) | Equipment reserve parts | 1 |
| (5) | Instruction manual | 1 (Japanese or English) |

11.20

EQUIPMENT DISTANCE BETWEEN OTHER INSTRUMENTS

	Maximum	Standard
(1) LCD monitor to processor unit	5m	5m
(2) Keyboard unit to processor unit	5m	5m
(3) Scanner to display unit (10/25kw)	65m	20m
(4) Scanner to junction box (30kW)	50m ^{*1}	20m
(5) Junction box to display unit(30kW)	30m ^{*1}	10m

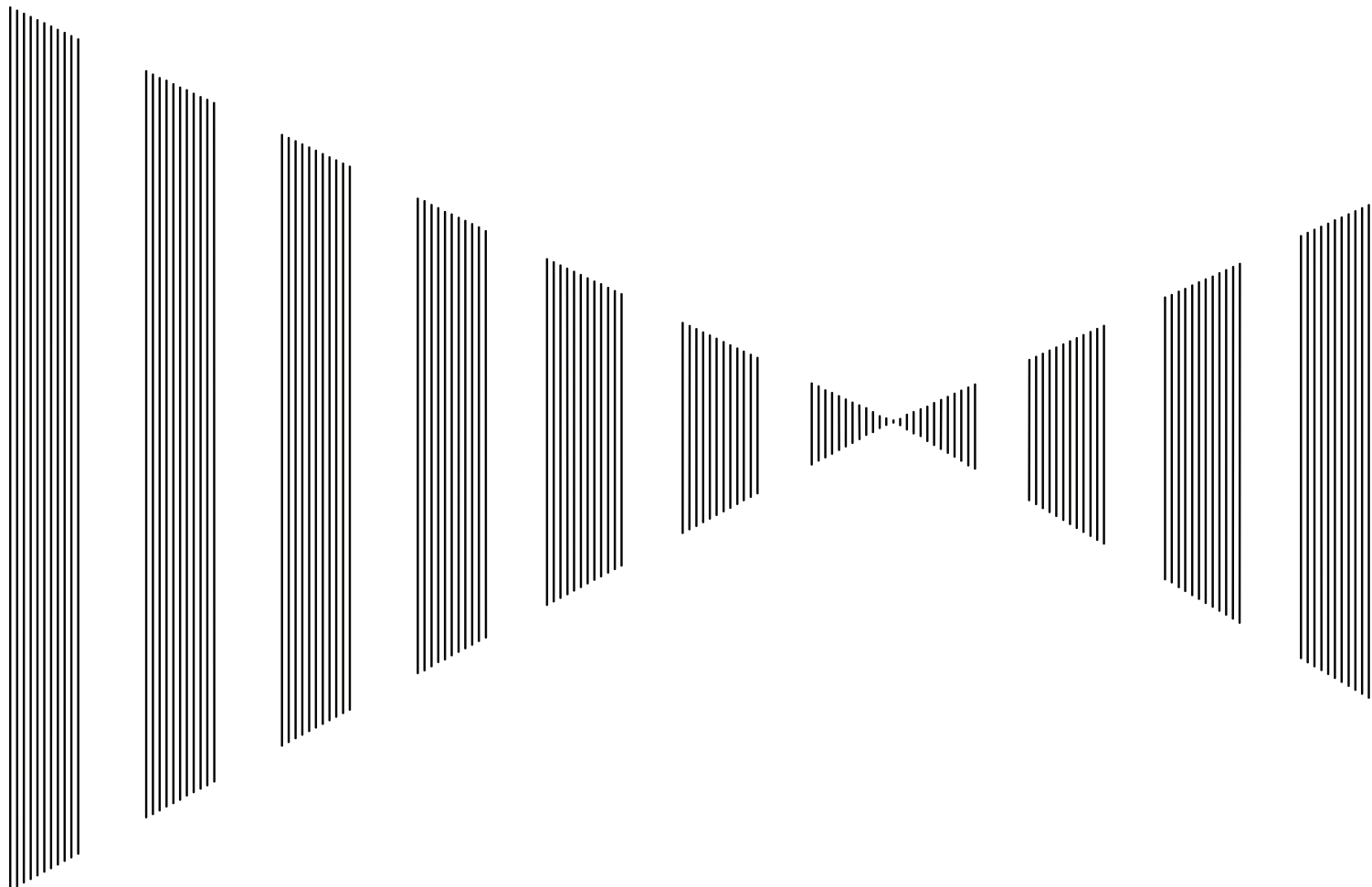
*1 Total distance between scanner and display unit must be 65m or less.

11.21

OTHERS (OPTION)

- Coast line ROM card
- Memory card
- Interswitch unit (NQE-3141)
- Rectifier unit (NBA-5111)

APPENDIX

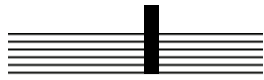


INTERSWITCH (OPTION)

NQE-3141

INSTRUCTION MANUAL

I	OVERVIEW.....	A-1
	I-I OVERVIEW	A-1
	I-II INTERSWITCH SETUP	A-1
II	INTERSWITCH OPERATION	A-2
	II-I OPERATION FLOW.....	A-2
	II-II INTER SWITCH MENU.....	A-3
	II-III CHANGE OF CONNECTION PATTERN (WITH 2 DISPLAY UNITS)	A-6
	II-IV CHANGE OF CONNECTION PATTERN (WITH 3 OR MORE DISPLAY UNITS)	A-6
	II-V OPERATING CONNECTION PATTERN FILES (FILE OPERATIONS)	A-7
	II-VI NAMES OF DISPLAY UNITS AND SCANNER UNITS.....	A-8
III	REFERENCE.....	A-9



OVERVIEW

I-i Overview

Interswitch NQE-3141 is equipment that enables free changeover between radar display units installed on the bridge and antenna units having different characteristics.

If display unit is turned off or malfunctioned, the scanner unit can be controlled by other display unit.

If interswitch unit had malfunctioned, the radar system is switched to standalone mode.

Up to 8 units can be changed over.

When the connected scanner is changed, following setting values are automatically loaded.

Tune Adjustment	(See the section 7.1.3)
Bearing Adjustment	(See the section 7.1.4)
Range Adjustment	(See the section 7.1.5)
Antenna Height	(See the section 7.1.8)
Antenna installation location	(See the section 7.1.9)
Sector Blank	(See the section 7.2.2)
TNI Blank	(See the section 7.2.3)
Performance monitor adjustment	(See the section 7.2.4)
PRF Fine Tuning	(See the section 3.8.3)

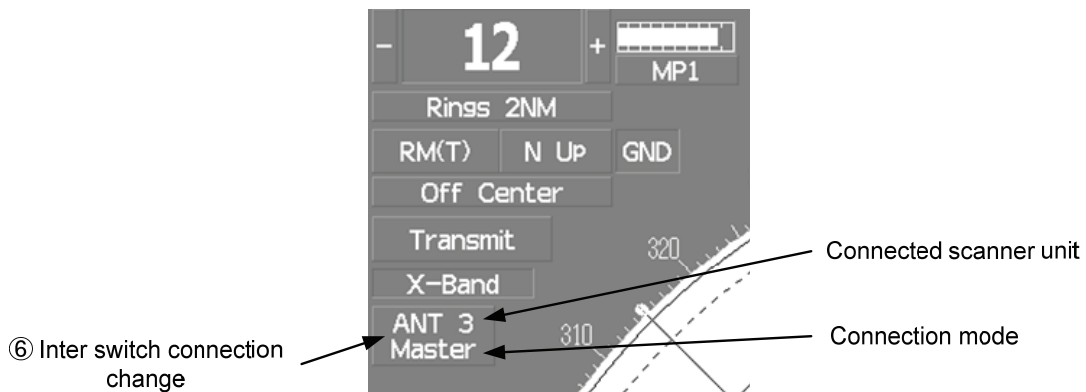
I-ii Interswitch Setup

Connection modes can be changed simply by changing the interswitch connection (upper left of the display ⑥ on page 2-16).

Note: A master display unit is always necessary for establishing a slave connection.

Before a slave display unit can be placed in transmission state, the master display unit must be placed in transmission state.

upper left of the display



The upper stand indicates the number of the connected scanner unit.

The lower stand indicates the connection mode.

Master : Mode in which the scanner unit can be controlled by the display unit.

Slave : Mode in which the scanner unit cannot be controlled.

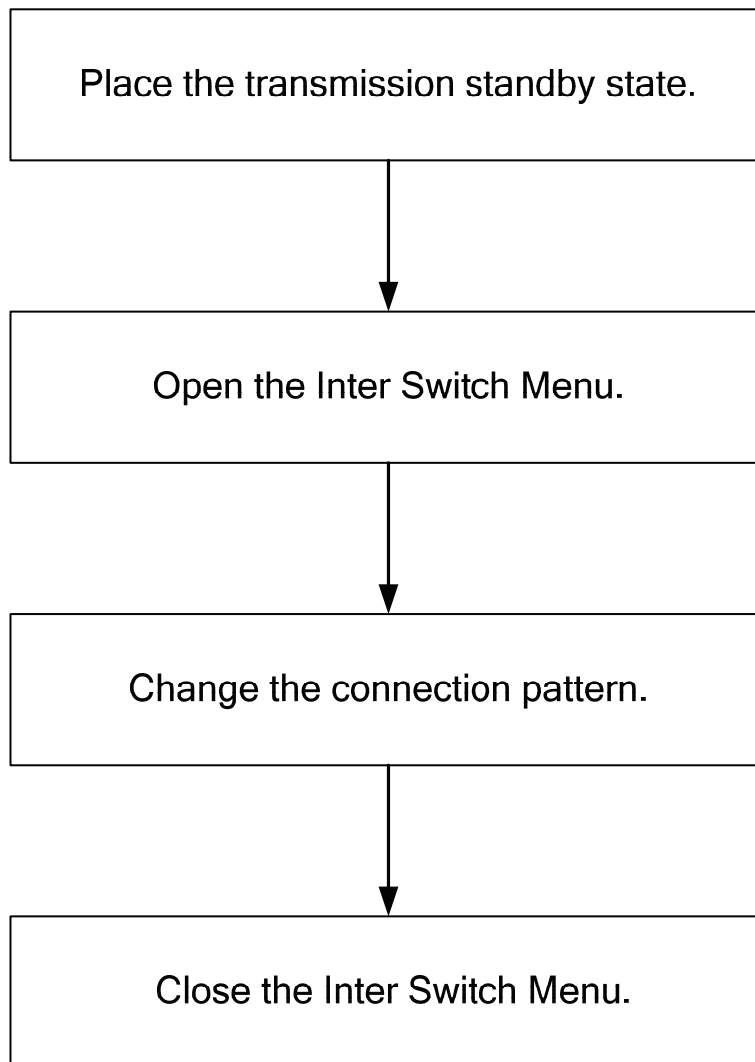
When **Slave** is selected, transmission / standby and pulse length cannot be changed. The available range is also limited.



INTERSWITCH OPERATION

Follow the flowchart below to change the current interswitch connection pattern.

II-i Operation Flow



II-ii Inter Switch Menu

The Inter Switch Menu can be opened only when the transmission standby state.

Procedures

1 Press the [STBY] key.

The transmission standby state will be placed.

2 Move the cursor onto the Interswitch connection change (upper left of the display ⑥ on page 2-16), and press the [ENT] key.

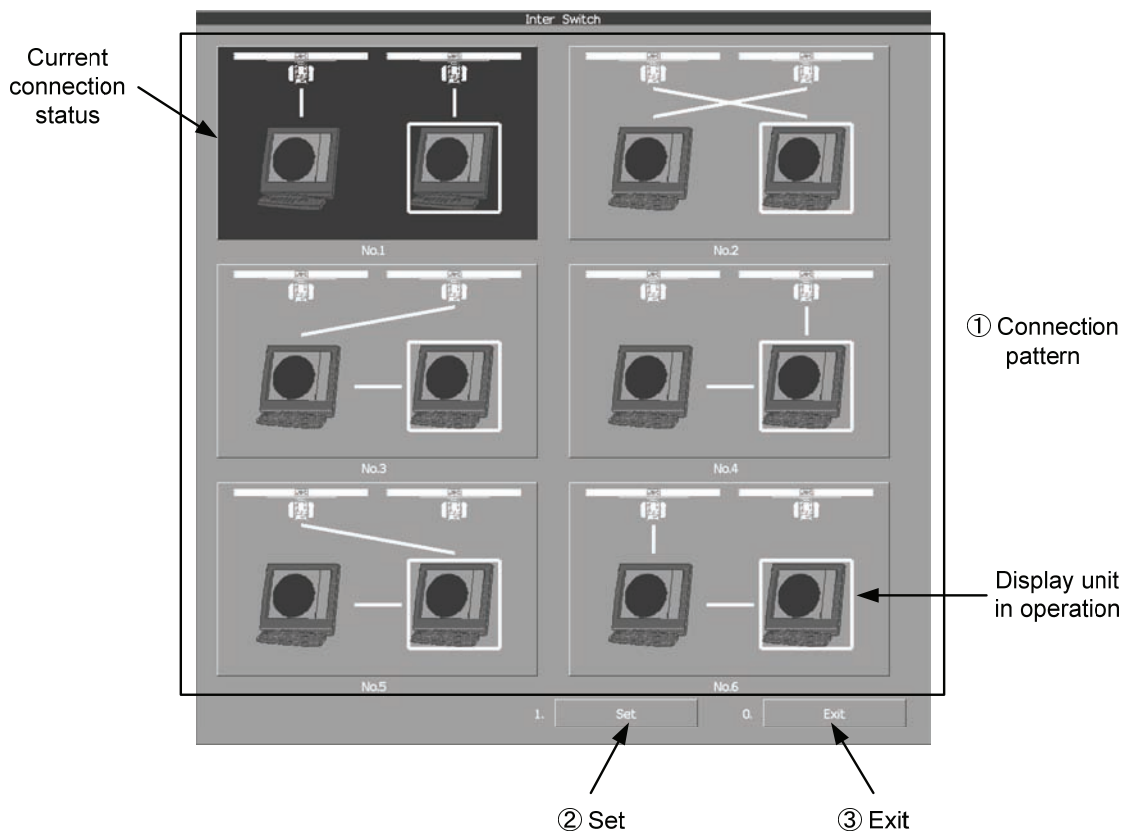
The Inter Switch Menu will appear.

Exit

1 Press the [0] key.

The Inter Switch Menu will close.

Inter Switch Menu (with 2 Display Units)



① : Connection pattern

If this button is clicked, the connection pattern is selected.
 The display unit in operation is enclosed in a square □.
 The background of the current connection pattern display is highlighted.

② : Set

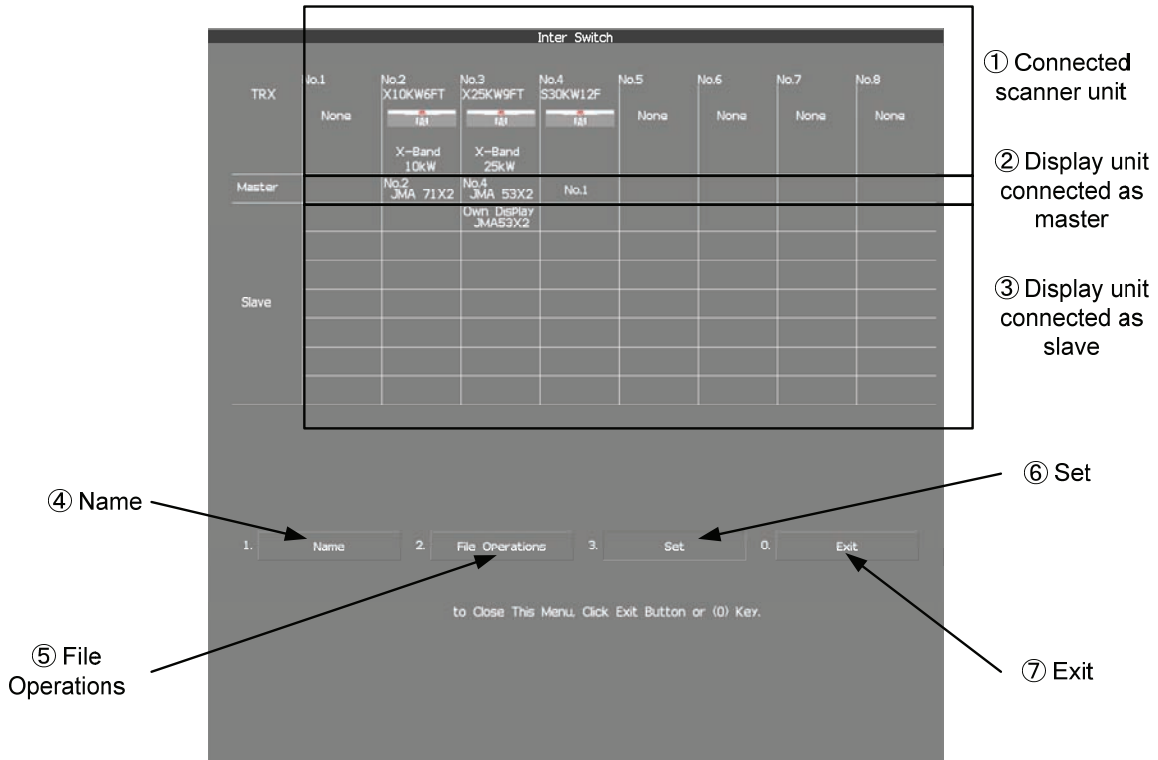
If this button is clicked, the change of connection is determined.

③ : Exit

If this button is clicked, the Inter Switch Menu is closed .

Note: If only 2 display units are installed but the interswitch is set for 3 or more display units, the Inter Switch Menu for 3 or more display units will appear.

Inter Switch Menu (with 3 or More Display Units)



① : Connected scanner unit

In mode for naming a display unit or antenna unit, clicking on a unit opens the name input window.

②, ③ : Display unit connected as master, and Display unit connected as slave

If this button is clicked, select / cancel the display unit.

If this button is clicked in the naming a display unit or scanner unit mode, the name input window is opened.

④ : Name

If this button is clicked, set to the display or scanner unit rename mode.

⑤ : File Operations

If this button is clicked, the File Operations menu is opened.

⑥ : Set

If this button is clicked, the change of connection is determined.

⑦ : Exit

If this button is clicked, the Inter Switch Menu is closed.

II-iii Change of Connection Pattern (with 2 Display Units)

If two display units are installed, a connection pattern needs to be selected.

Procedures

- 1 **Open the Inter Switch menu (with 2 Display Units).**
- 2 **Move the cursor onto the Connection pattern (Inter Switch Menu ① on page A-4) to be changed , and press the [ENT] key.**

The connection pattern will be selected, and (in Inter Switch Menu ② on page A-4) will blink.

- 3 **Press the [3] key.**

The connection pattern will be changed.

II-iv Change of Connection Pattern (with 3 or More Display Units)

If three or more display units are installed, the layout of connection patterns needs to be set.

Procedures

- 1 **Open the Inter Switch Menu (with 3 or More Display Units).**
- 2 **Move the cursor onto the display unit (Inter Switch Menu ②/③ on page A-5) to be changed , and press the [ENT] key.**

The selected display unit will be highlighted.
To deselect the display unit, press the [ENT] key again.

- 3 **Move the cursor to the change-destination display unit, and press the [ENT] key.**

The selected display unit in step 2 will be switched to the change-destination display unit, and (Inter Switch Menu ⑥ on page A-5) will blink.

If the change destination is empty, control will move and will blink.

- 4 **Press the [3] key.**

The connection pattern will be changed.

Note: A master display unit is always necessary for establishing a slave connection.

II-v Operating Connection Pattern Files (File Operations)

Frequently used connection patterns can be read easily by saving interswitch connection patterns.

[I] Loading connection patterns (Load)

Procedures

1 Open the Inter Switch Menu (with 3 or More Display Units).

2 Press the [2] key.

The File Operations menu will appear.

3 Press the [1] key.

Currently saved connection patterns in memory will be listed.

4 Press the [numeric] key corresponding to the file to be loaded.

Confirmation Window will appear.

5 Press the [1] key.

The connection pattern will be changed.

[II] Saving connection patterns (Save)

Procedures

1 Open the Inter Switch Menu (with 3 or More Display Units).

2 Press [2] key.

The File Operations window will appear.

3 Press [2] key.

The Save menu will appear.

Currently saved connection patterns in memory will be listed.

4 Press the [numeric] key corresponding to the file to be saved.

The Input File Name window will appear.

5 Enter the file name to be saved.

Up to 8 characters can be entered.

For the input method on the character input screen, see Section 3.3.4.

The connection pattern will be saved when the name is input.

[[III]] Erasing a connection pattern (Erase)**Procedures****1 Open the Inter Switch Menu (with 3 or More Display Units).****2 Press the [2] key.**

The File Operations window will appear.

3 Press the [3] key.

The Erase menu will appear.

The list of connection patterns stored in the memory will be displayed.

4 Press the [numeric] key corresponding to the file to be erased.

Confirmation Window will appear.

5 Press the [1] key.

The selected connection pattern is erased and the file name is deleted from the list.

II-vi Names of Display Units and Scanner Units

The display units and antenna units can be named.

Procedures**1 Open the Inter Switch Menu (with 3 or More Display Units).****2 Press the [1] key.**

"Name" will be highlighted, indicating that the rename mode is activated.

3 Move the cursor to the display unit or scanner unit to be renamed (Inter Switch Menu ① / ② / ③ on page A-5), and press the [ENT] key.

The Input IND Name or the Input TXRX Name window will appear.

4 Input a new unit name.

Up to 8 characters can be input as a unit name.

For the input method on the character input menu, see Section 3.3.4.

The selected display unit or antenna unit will be renamed when the new name is input.



REFERENCE

Preheat Time after Change of Connection Pattern

After the current interswitch connection pattern has been changed, operation needs to wait until the system is ready. This is because the preheat time varies depending on the previous connection of the scanner unit and display unit.

The wait time is necessary for protecting the electronic tubes that emit radio waves.

- a) When not changed to a new connection pattern : Preheating not required
- b) When changed to a new connection pattern and an scanner unit had been used before the change : Preheating not required
- c) When changed to a new connection pattern and an scanner unit had not been used before the change : Preheating required

Notes on Changing Connection Pattern

An attempt to change to another connection pattern immediately after the completion of connection pattern change may fail.

This is because internal processing still needs some preparation time upon completion of connection pattern change. Let several seconds pass between connection pattern change operations.

Notes on Connecting Slave Display Unit

Before a slave display unit can be placed in transmission state, the master display unit must be placed in transmission state. If the master display unit is moved from the transmission state to the transmission standby state, the slave display unit is forcibly placed in transmission standby state.

When they are in transmission standby state,

MTR Standby is shown in the alarm indication (Brilliance / alarm on page 2-9), and the alarm sounds.

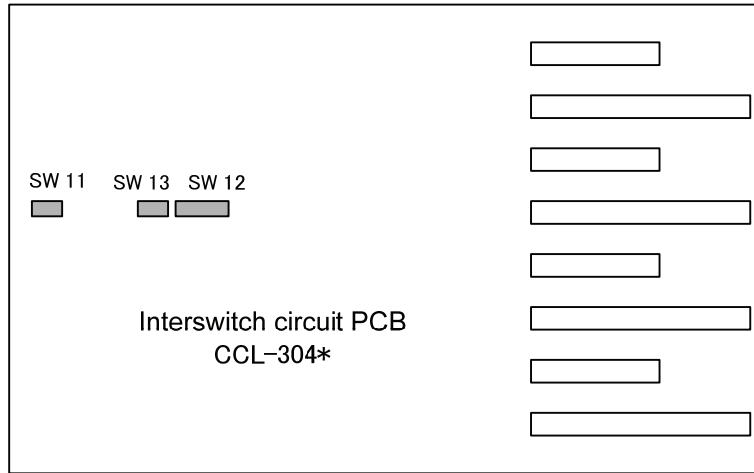
A slave display unit cannot control tune. Tune is controlled by the master display unit. Slave is shown in the transmitter pulse length (upper left of the display on page 2-2).

Range change for a slave display unit is limited by the range and pulse length / repetition frequency of the master display unit. As a rule, a greater range than the range of the master display unit cannot be set for a slave display unit. However, if the transmitter pulse length of a slave display unit is identical to the master display unit's and the repetition frequency is within the master display unit's, a greater range than the master display unit's can be selected for the slave display unit. When the master display unit narrows the range or changes the transmitter pulse length, the range of the slave display unit may be forcibly changed. In this case, Master Range CHG is shown in the alarm indication (Brilliance / alarm on page 2-9), and the alarm sounds.

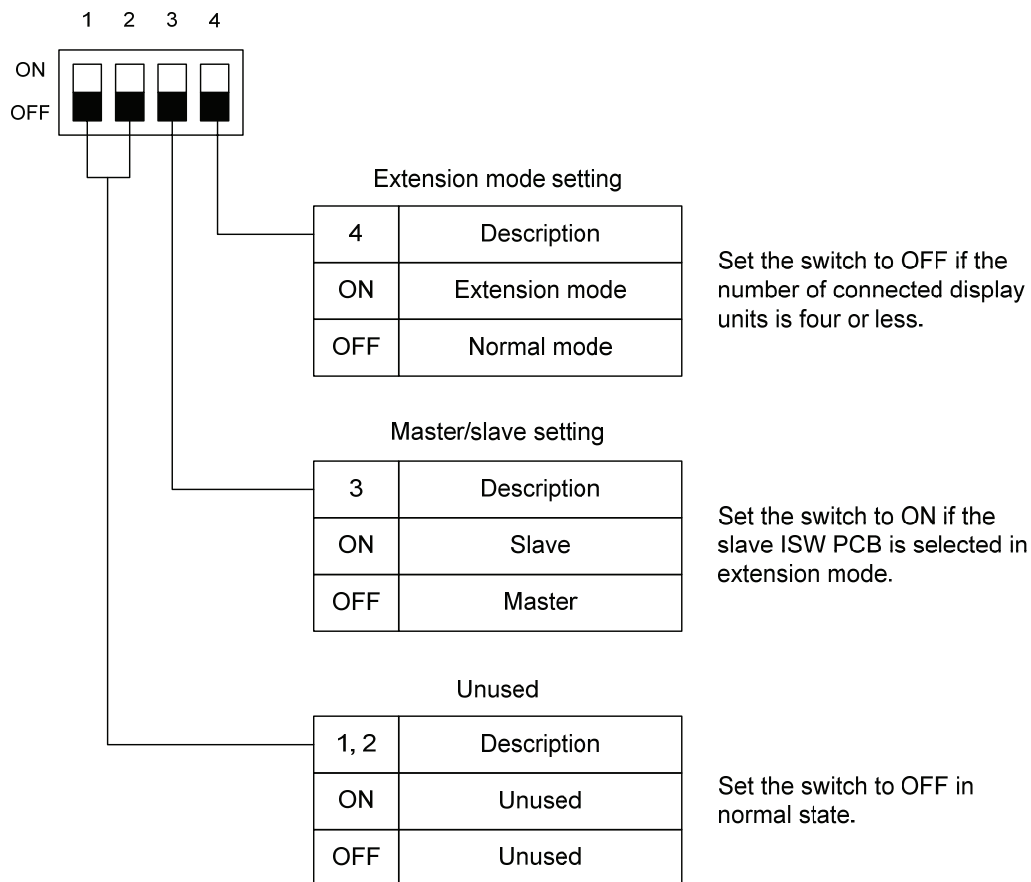
Setting at Installation

⊙ **Setting of the interswitch circuit (CCL-304*)**

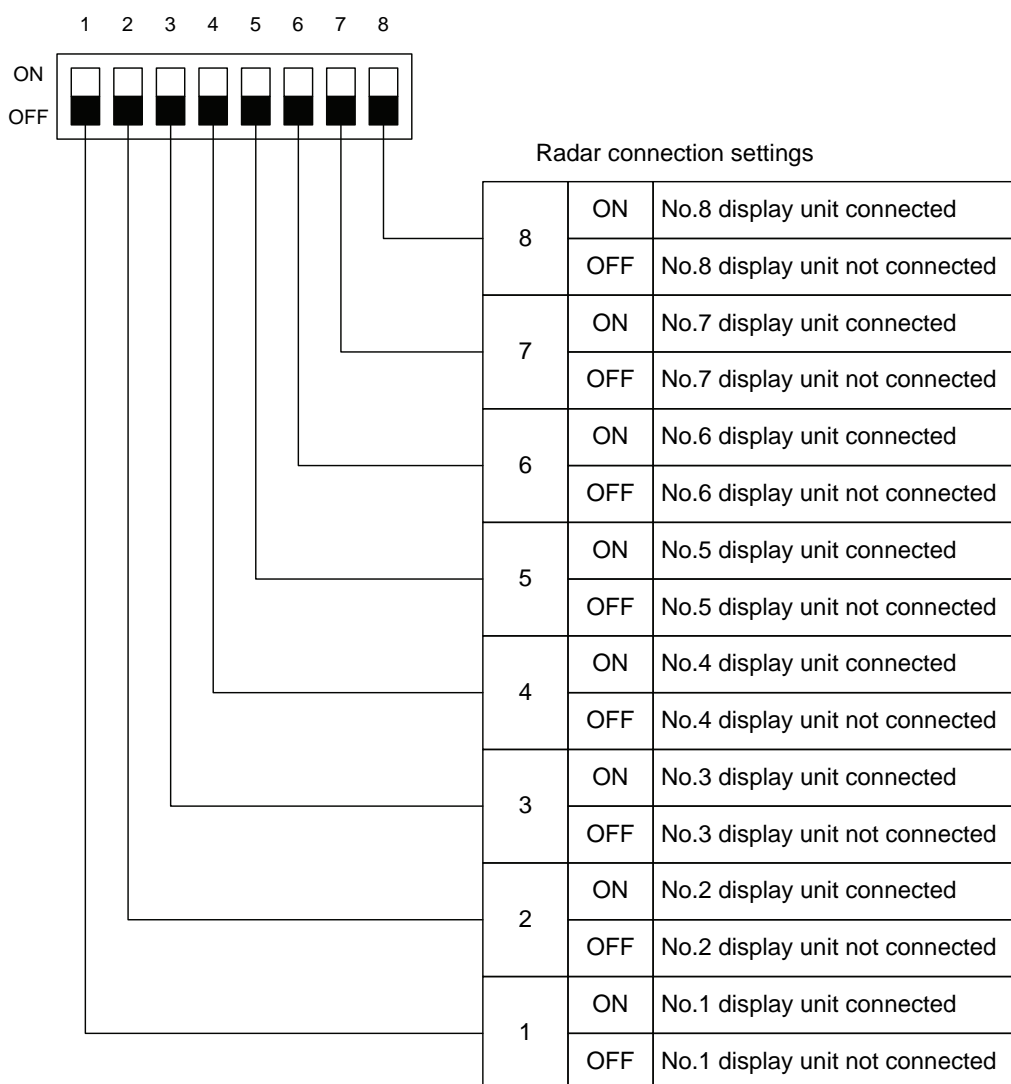
The settings of the DIP switches SW11 to SW13 are shown below.



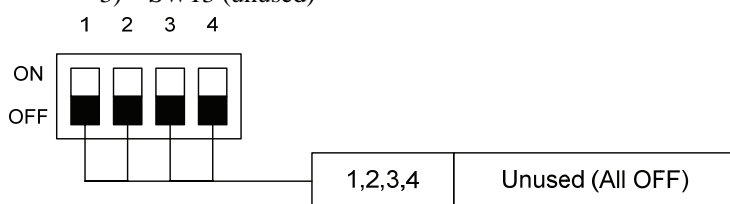
1) SW11 setting (extension mode and master/slave settings)



2) SW12 setting (radar connection settings)



3) SW13 (unused)

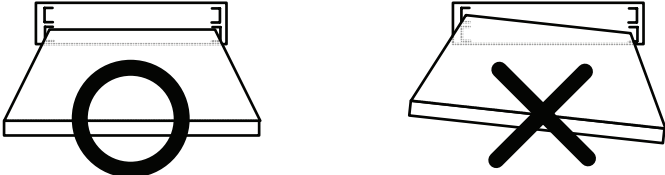


Note: Before the DIP switches of the interswitch circuit can be set, the interswitch breaker must be turned off in order to ensure safety operation.

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:

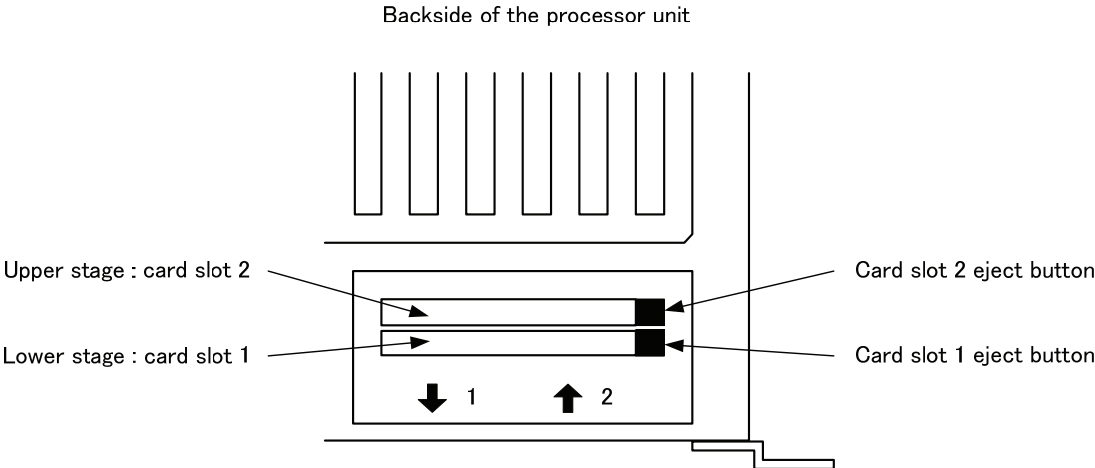
Card type	Insertion slot No.
JRC card	Either one
ERC card	Either one
C-Map NT+ detail card	Either one
Memory card	Either one

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.

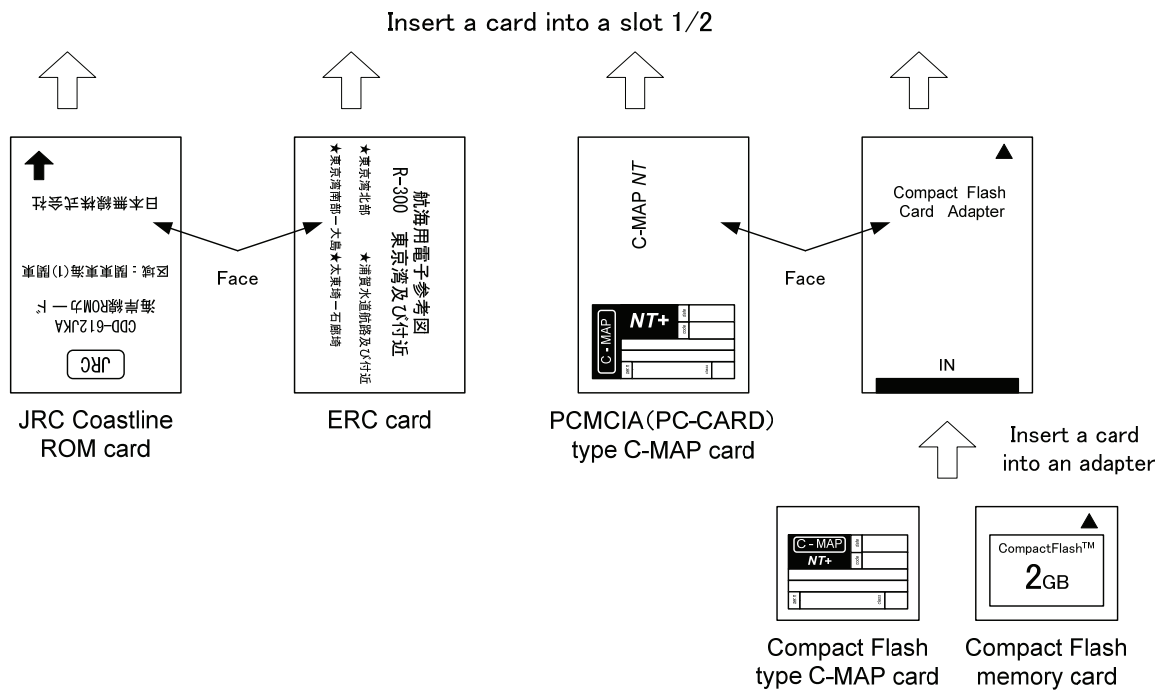
Insert a card into processor unit

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.

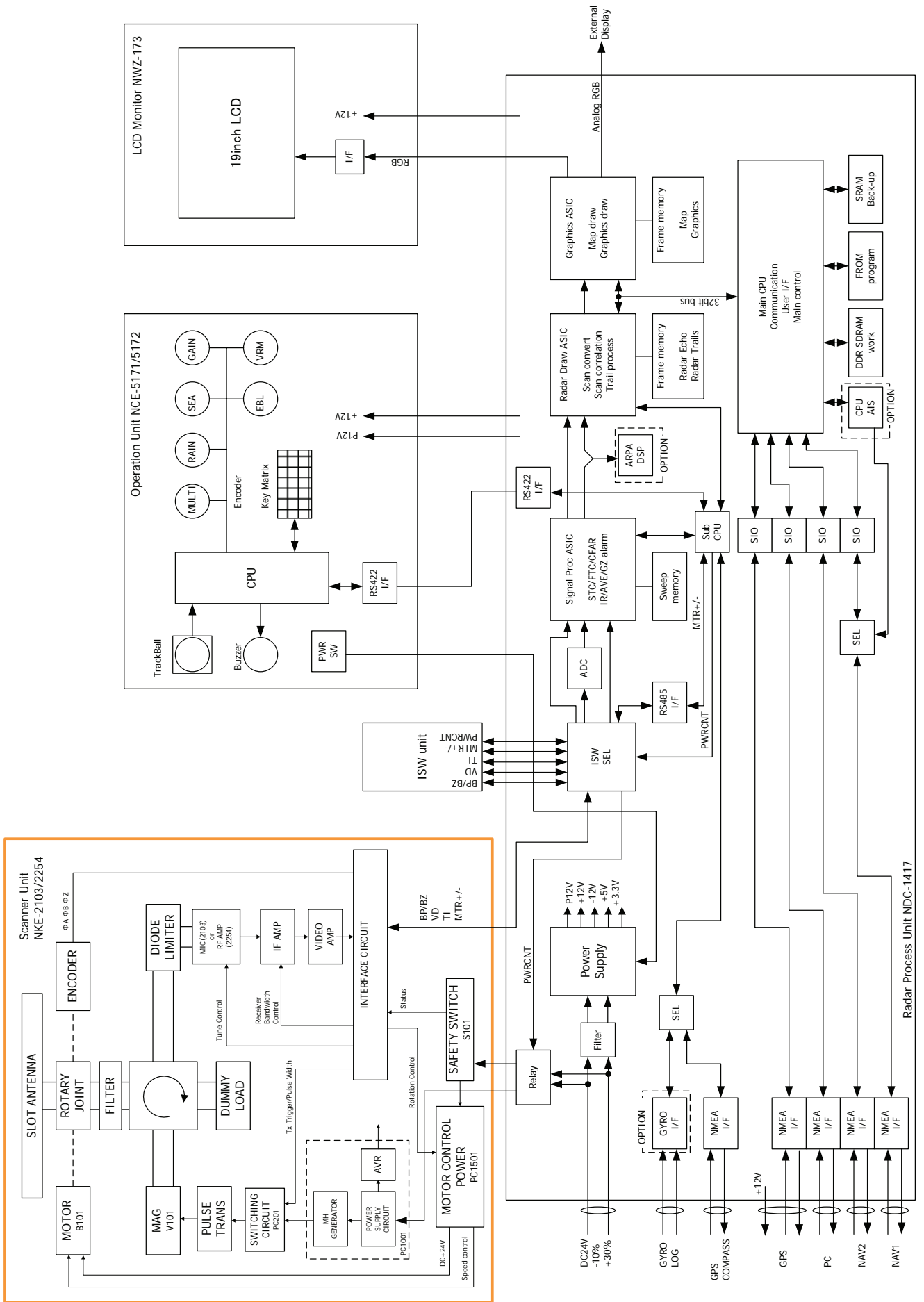


3 Insert the card until the card slot's eject button protrudes and complete the installation of a card.

Eject a card from processor unit

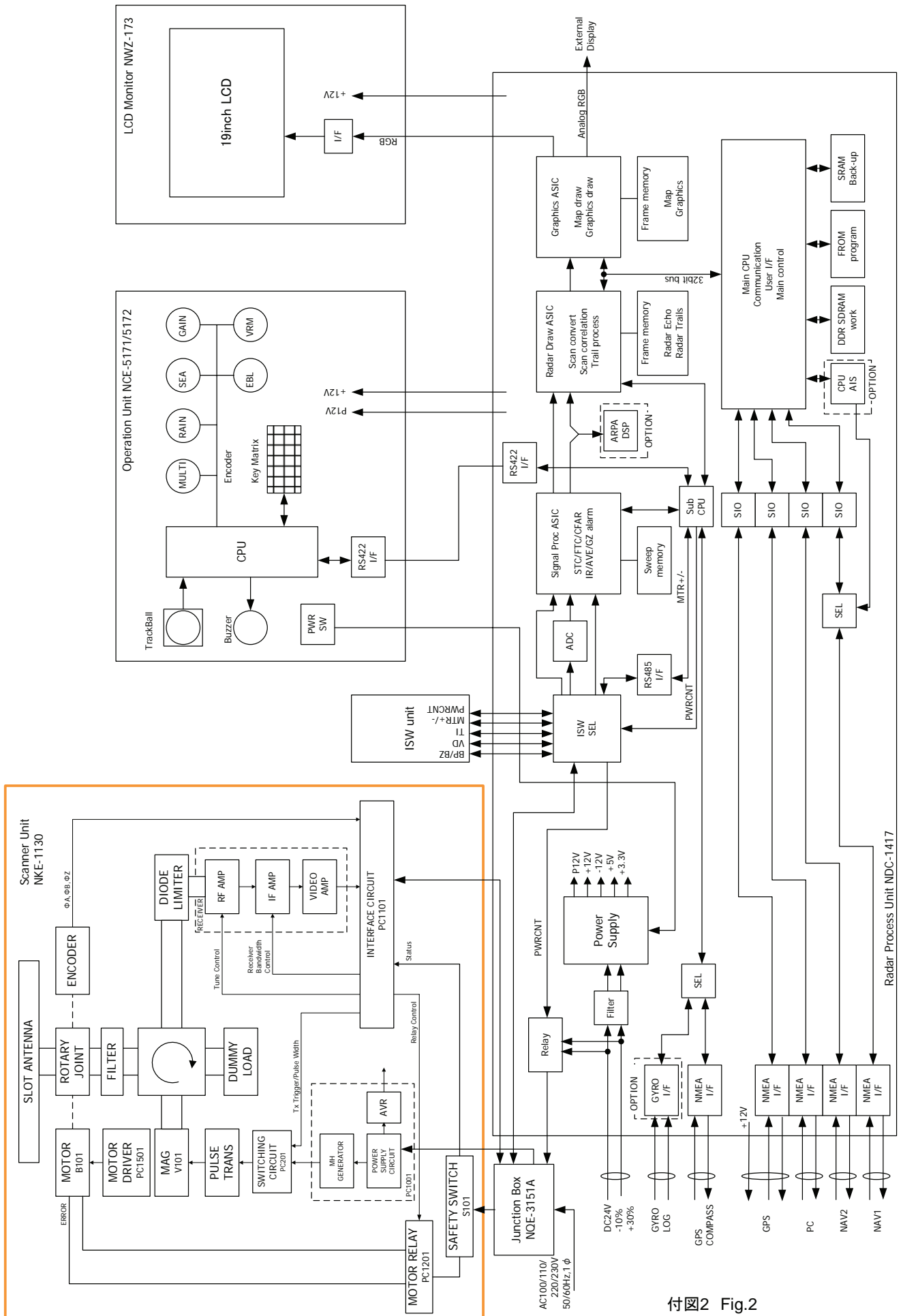
Procedures

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



NOTE: Performance monitor, ARPA/ATA Process Unit, AIS Process Unit and GYRO Interface Unit must be fitted on ships compliant to IMO.

付図1 Fig.1
 JMA-5312-6/6HS,5322-7/9
 レーダー装置回路動作説明図
 Block Diagram of RADAR

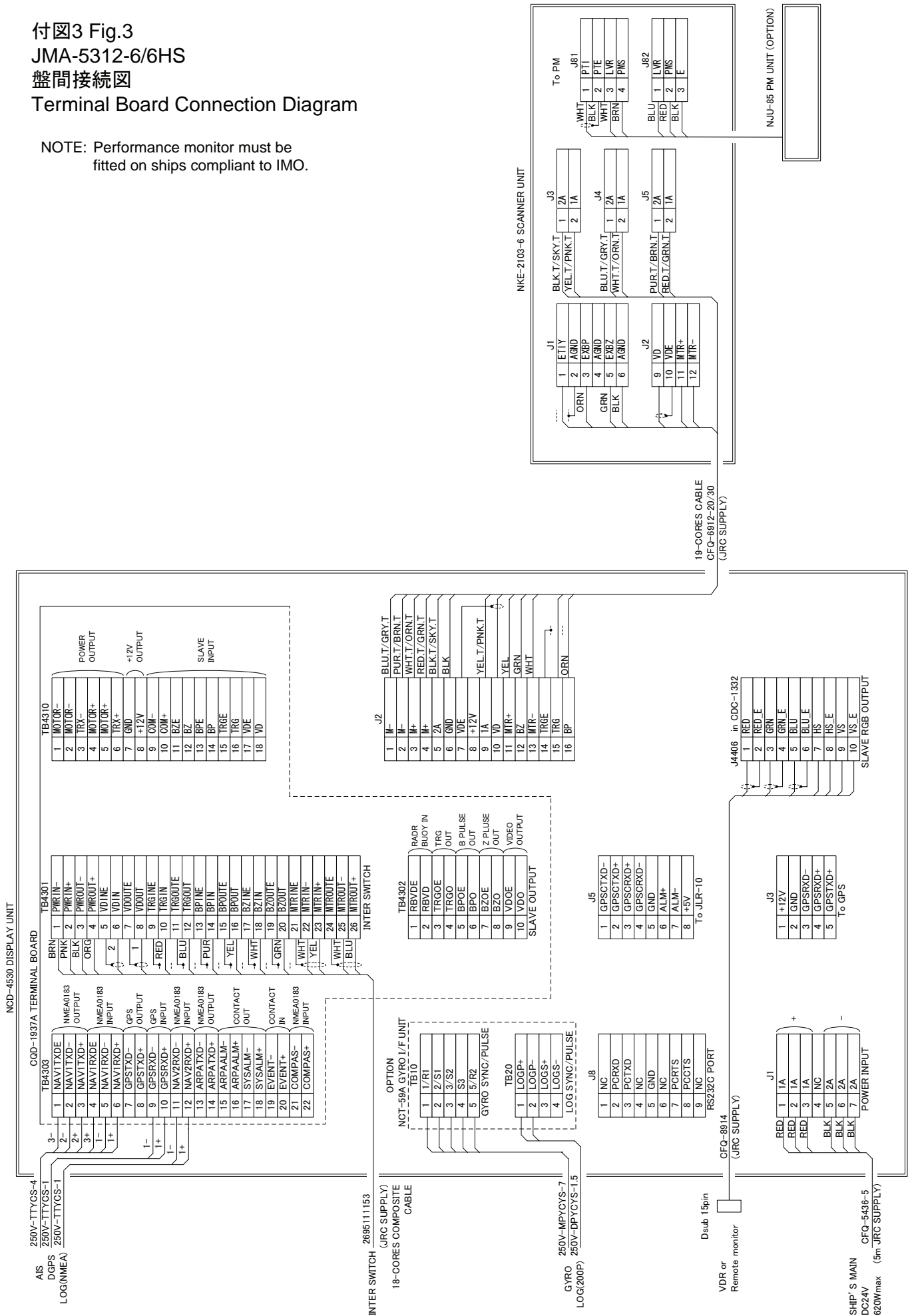


NOTE: Performance monitor, ARPA/ATA Process Unit, AIS Process Unit and GYRO Interface Unit must be fitted on ships compliant to IMO.

付図2 Fig.2
JMA-5332-12
レーダー装置回路動作説明図
Block Diagram of RADAR

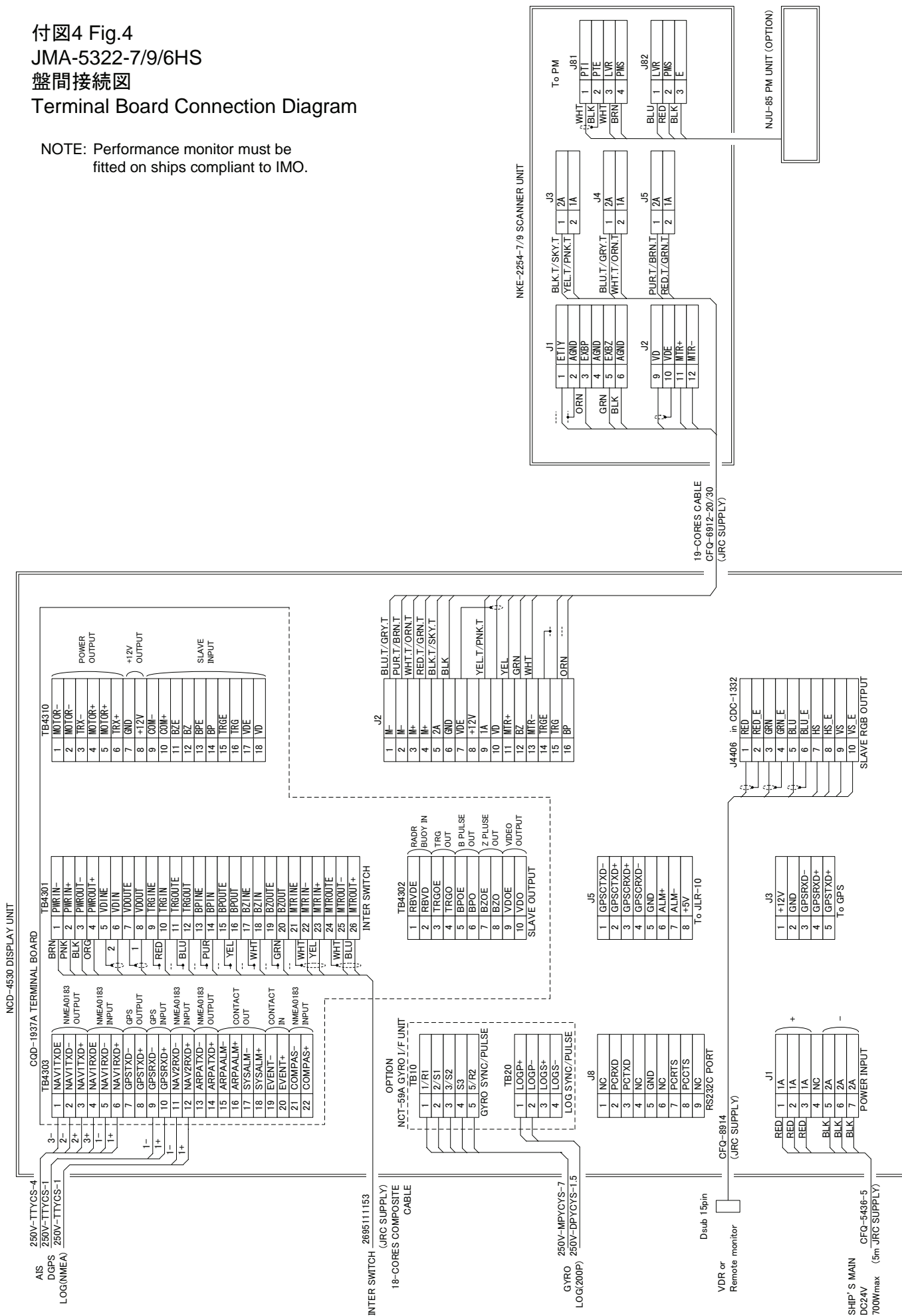
付図3 Fig.3
 JMA-5312-6/6HS
 盤間接続図
 Terminal Board Connection Diagram

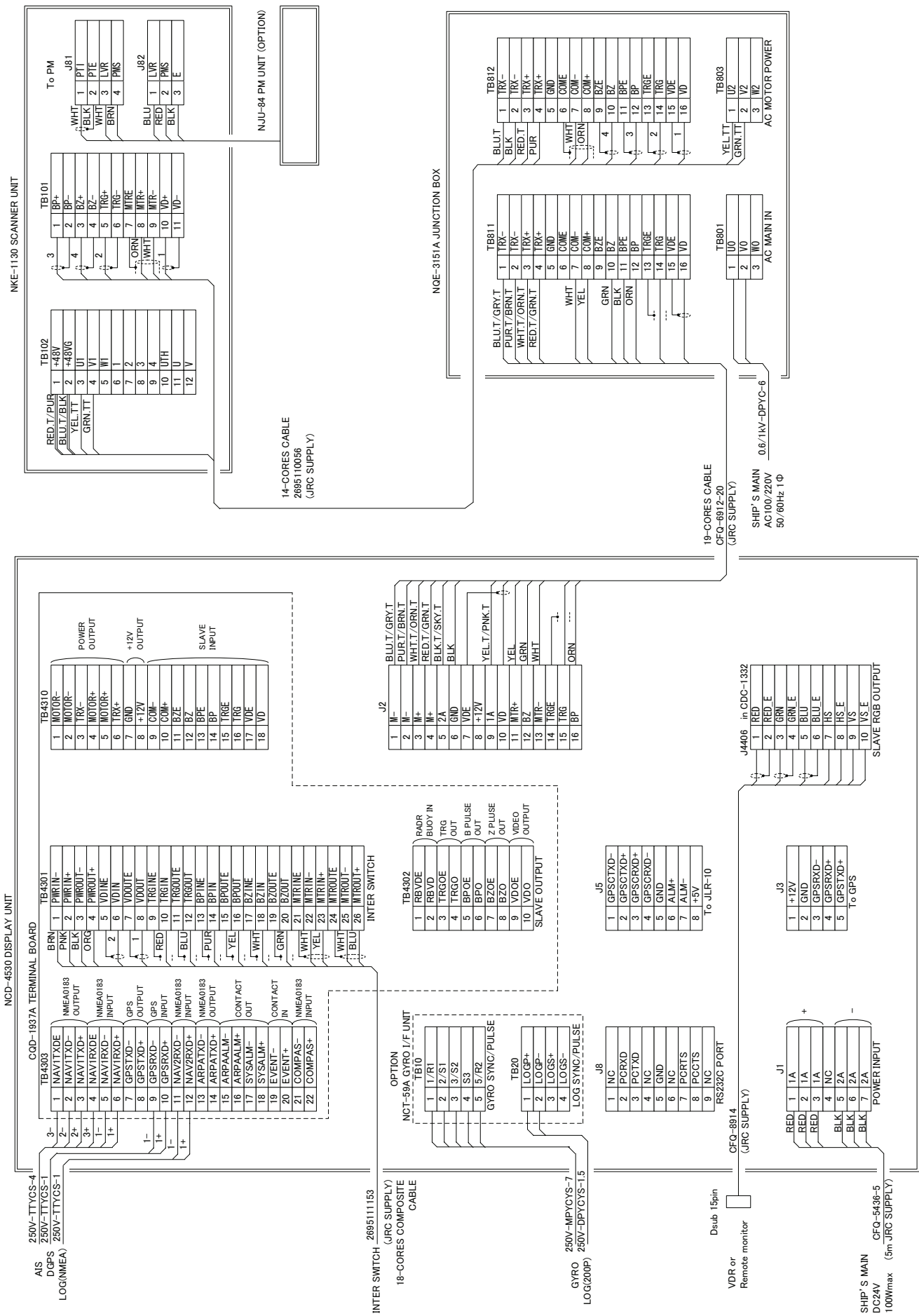
NOTE: Performance monitor must be fitted on ships compliant to IMO.



付図4 Fig.4
JMA-5322-7/9/6HS
盤間接続図
Terminal Board Connection Diagram

NOTE: Performance monitor must be fitted on ships compliant to IMO.

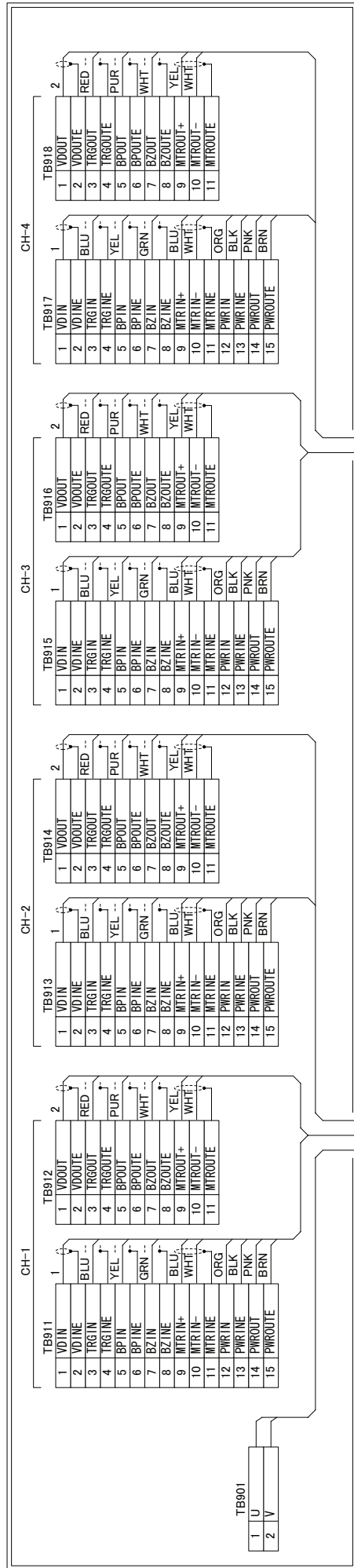




NOTE: Performance monitor must be fitted on ships compliant to IMO.

付図5 Fig.5
 JMA-5332-12
 盤間接続図
 Terminal Board Connection Diagram

NQE-3141-4A INTER-SWITCH UNIT



SHIP'S MAIN
AC100-240V
50/60Hz 1Φ
30VAmx

0.6/1KV-DPYC-1.5

269511153 (JRC SUPPLY)
18-CORES COMPOSITE CABLE

269511153 (JRC SUPPLY)
18-CORES COMPOSITE CABLE

269511153 (JRC SUPPLY)
18-CORES COMPOSITE CABLE

269511153 (JRC SUPPLY)
18-CORES COMPOSITE CABLE

JMA-5300MK2 Series RADAR

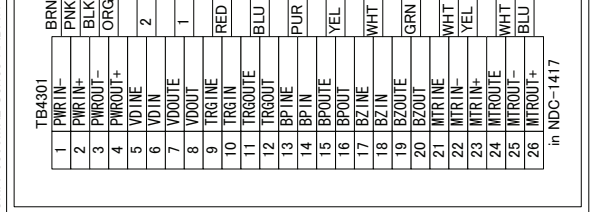
JMA-5300MK2 Series RADAR

JMA-5300MK2 Series RADAR

JMA-5300MK2 Series RADAR

JMA-5300MK2 Series RADAR

JMA-5300MK2 Series RADAR



JMA-5300MK2 Series RADAR

JMA-5300MK2 Series RADAR

JMA-5300MK2 Series RADAR

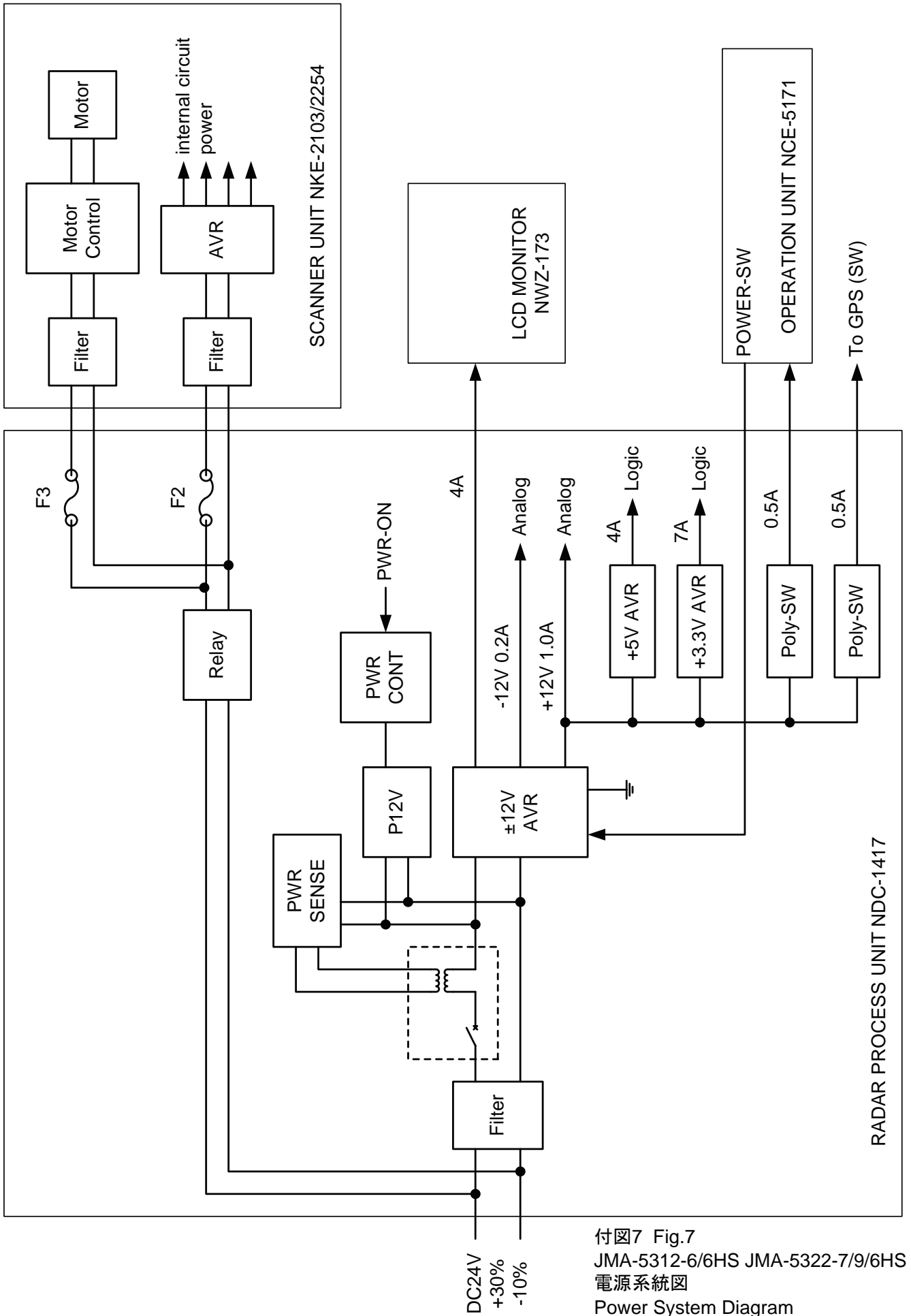
JMA-5300MK2 Series RADAR

JMA-5300MK2 Series RADAR

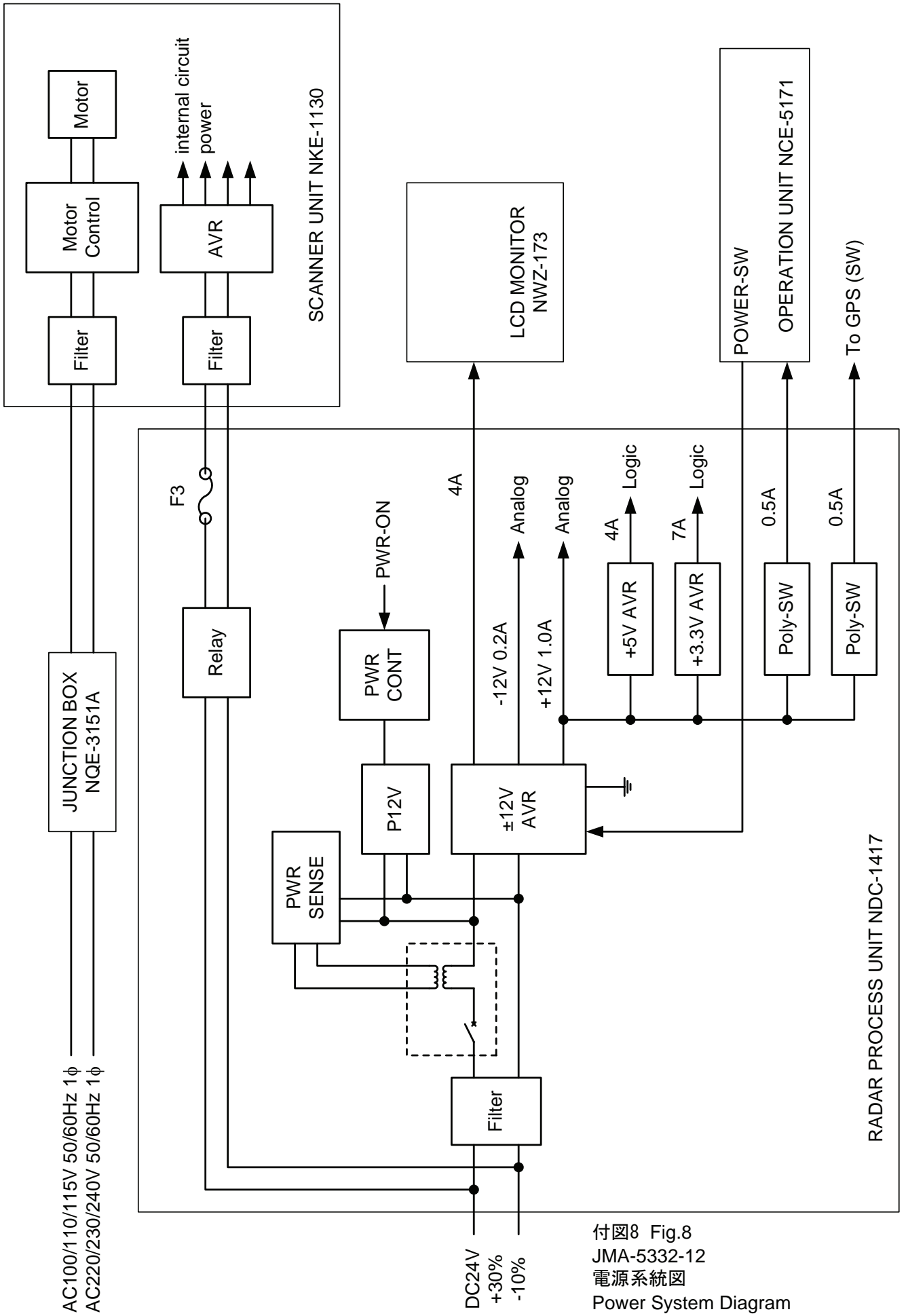
付図6 Fig.6

NQE-3141

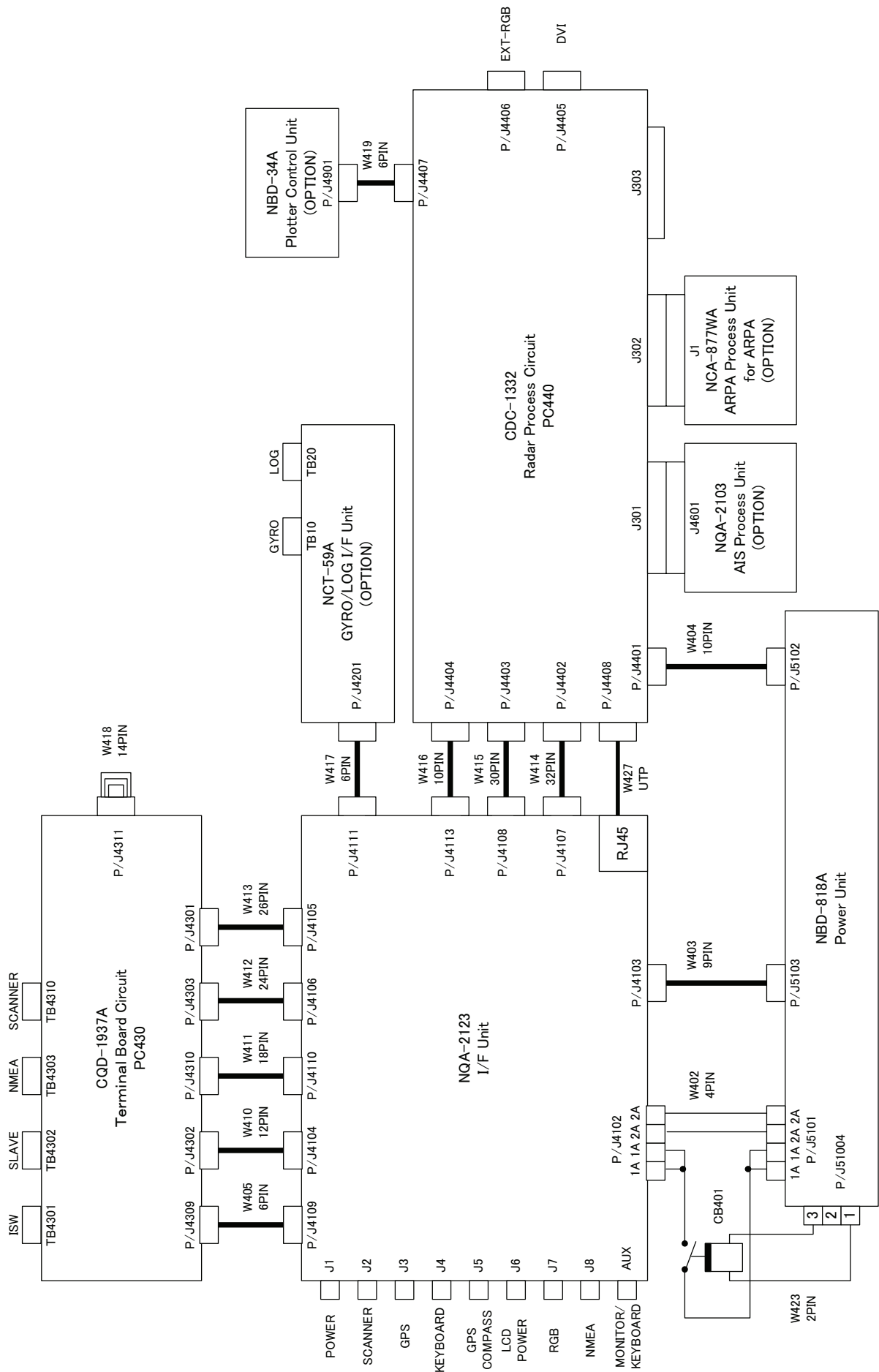
インタースイッチユニット盤間接続図
Terminal Board Connection Diagram of
Radar and Interswitch Unit



付図7 Fig.7
 JMA-5312-6/6HS JMA-5322-7/9/6HS
 電源系統図
 Power System Diagram

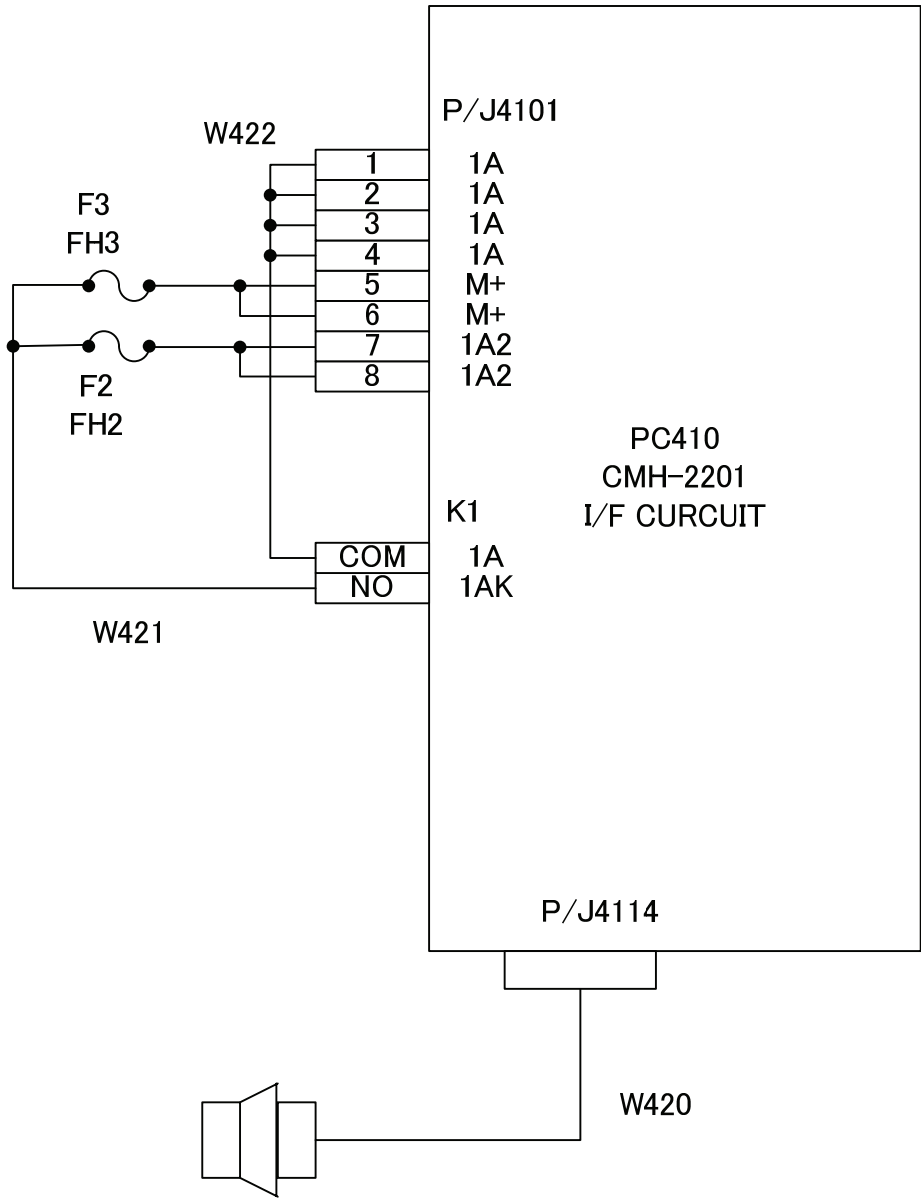


付図8 Fig.8
 JMA-5332-12
 電源系統図
 Power System Diagram

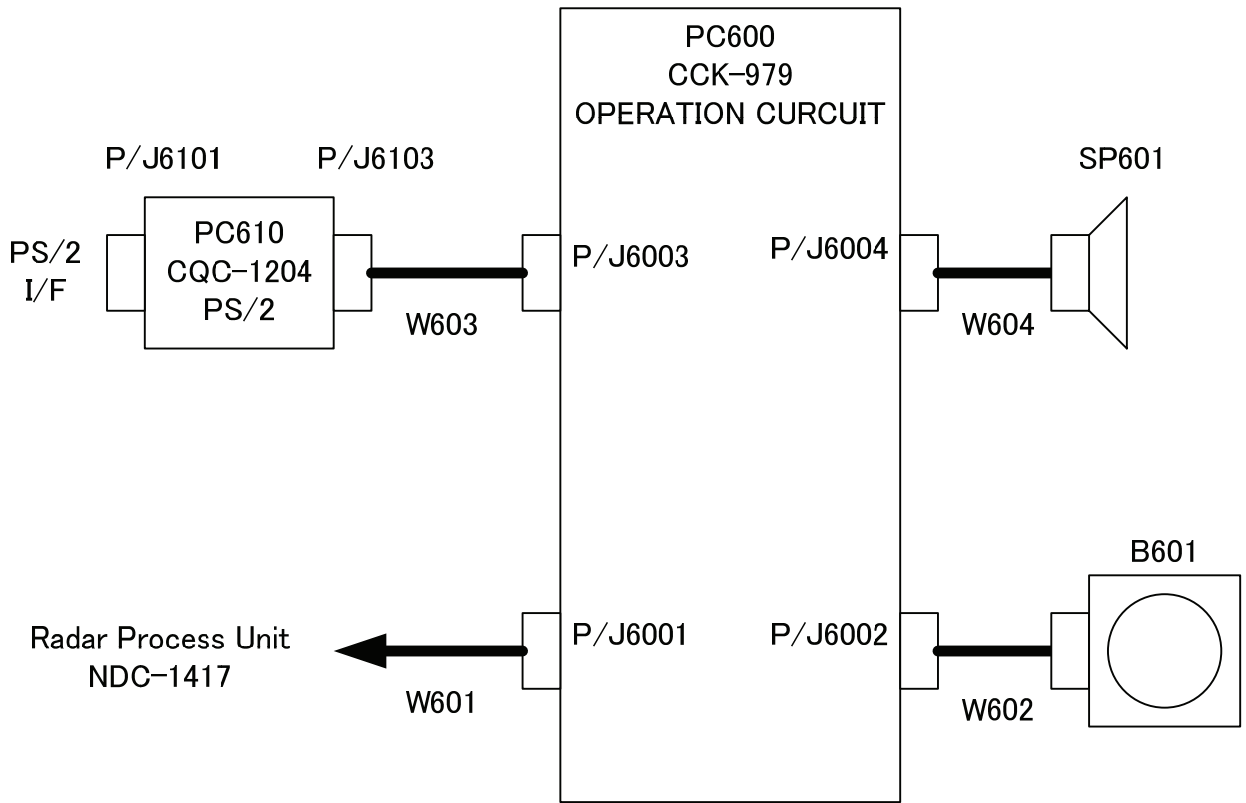


NOTE: ARPA/ATA Process Unit, AIS Process Unit and GYRO Interface Unit must be fitted on ships compliant to IMO.

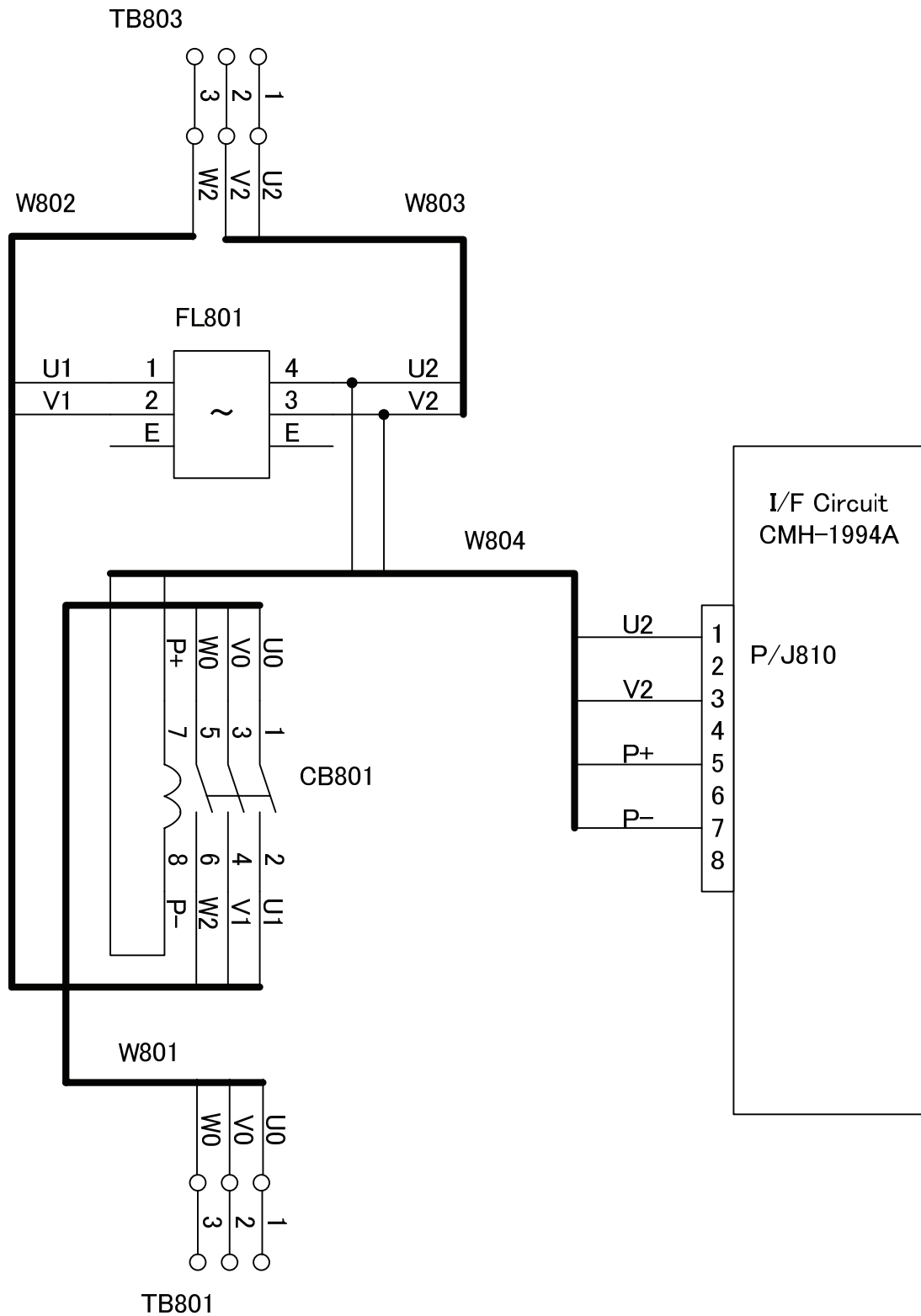
付図9 Fig.9
NDC-1417
処理部機内接続図
Interconnection Diagram of Radar Process Unit



付図10 Fig.10
 NQA-2123
 入出力部機内接続図
 Interconnection Diagram of Interface Unit

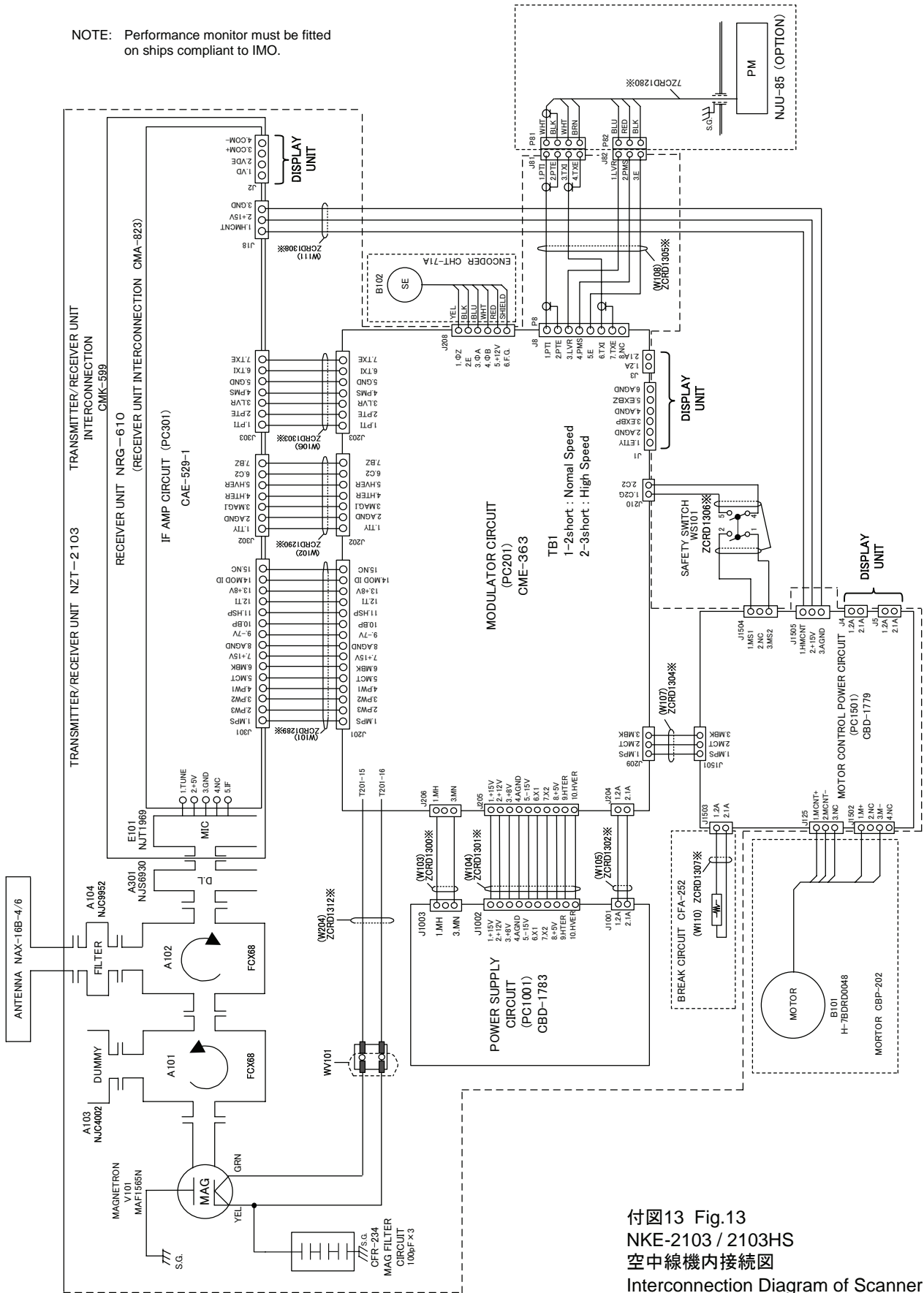


付図11 Fig.11
 NCE-5171
 操作部機内接続図
 Interconnection Diagrams of Operation Unit



付図12 Fig.12
 NQE-3151A
 接続箱機内接続図
 Interconnection Diagram of Junction Box

NOTE: Performance monitor must be fitted on ships compliant to IMO.

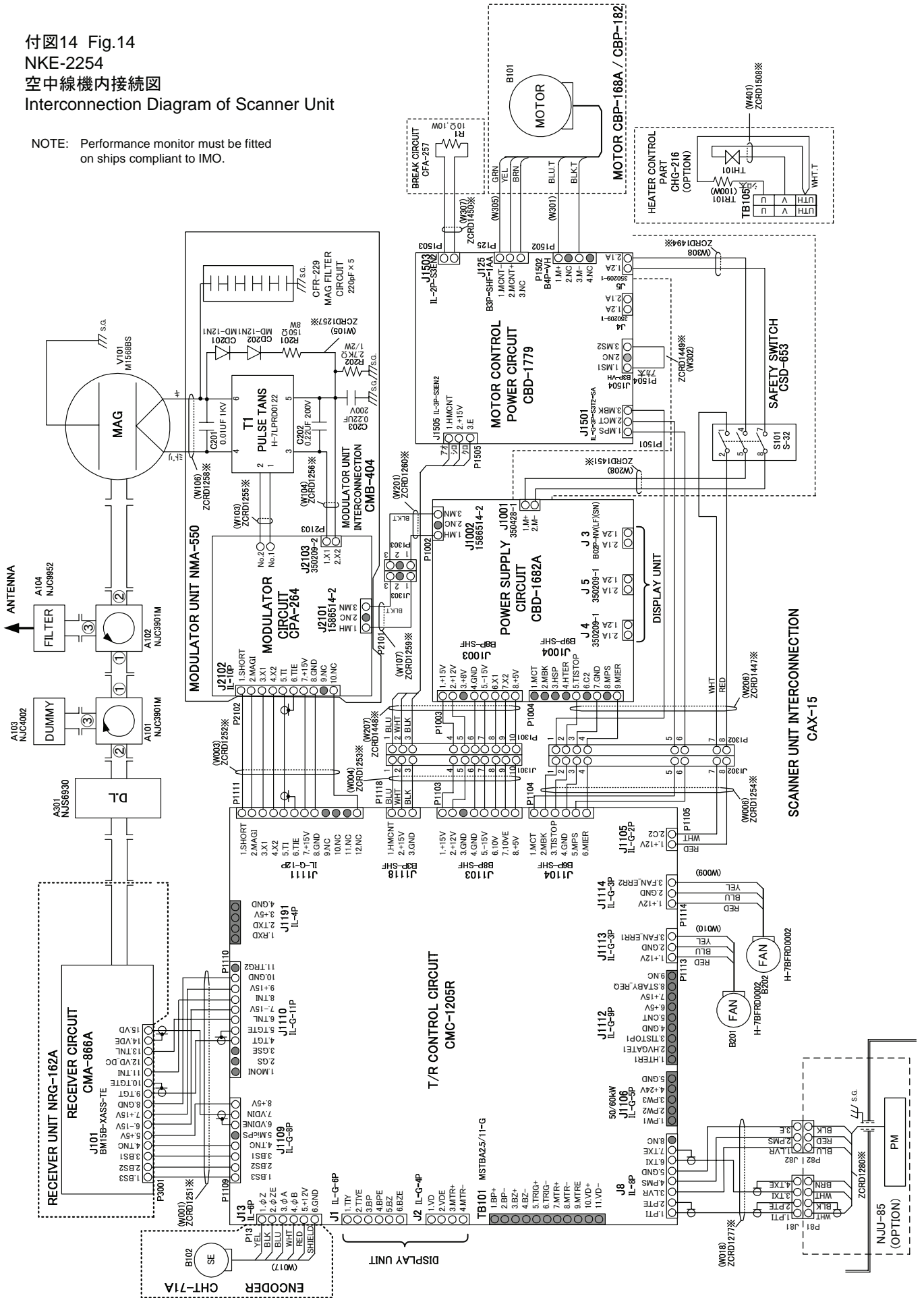


付図13 Fig.13
NKE-2103 / 2103HS
空中線機内接続図
Interconnection Diagram of Scanner Unit

SCANNER UNIT INTERCONNECTION
CAX-10

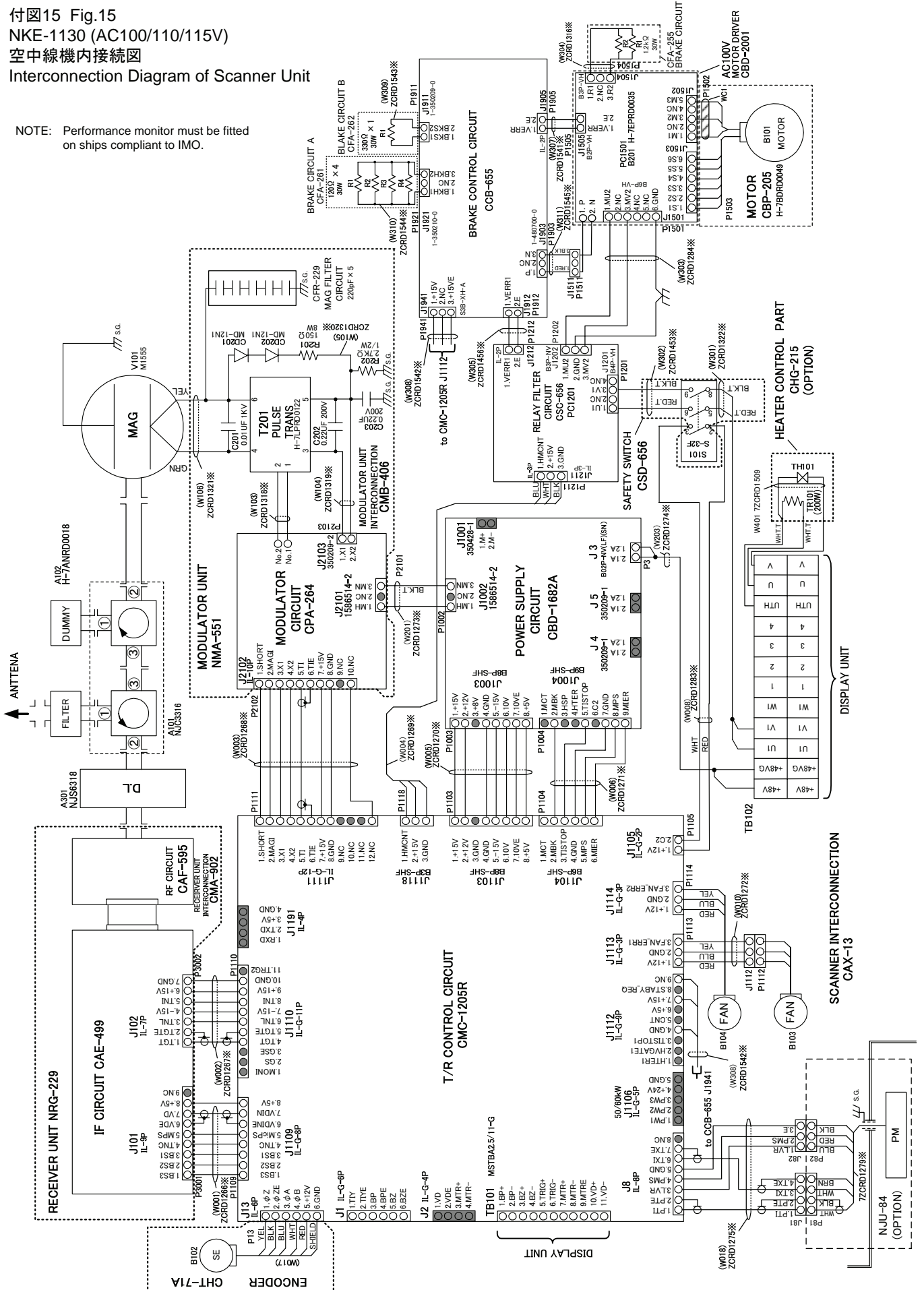
付図14 Fig.14
 NKE-2254
 空中線機内接続図
 Interconnection Diagram of Scanner Unit

NOTE: Performance monitor must be fitted on ships compliant to IMO.



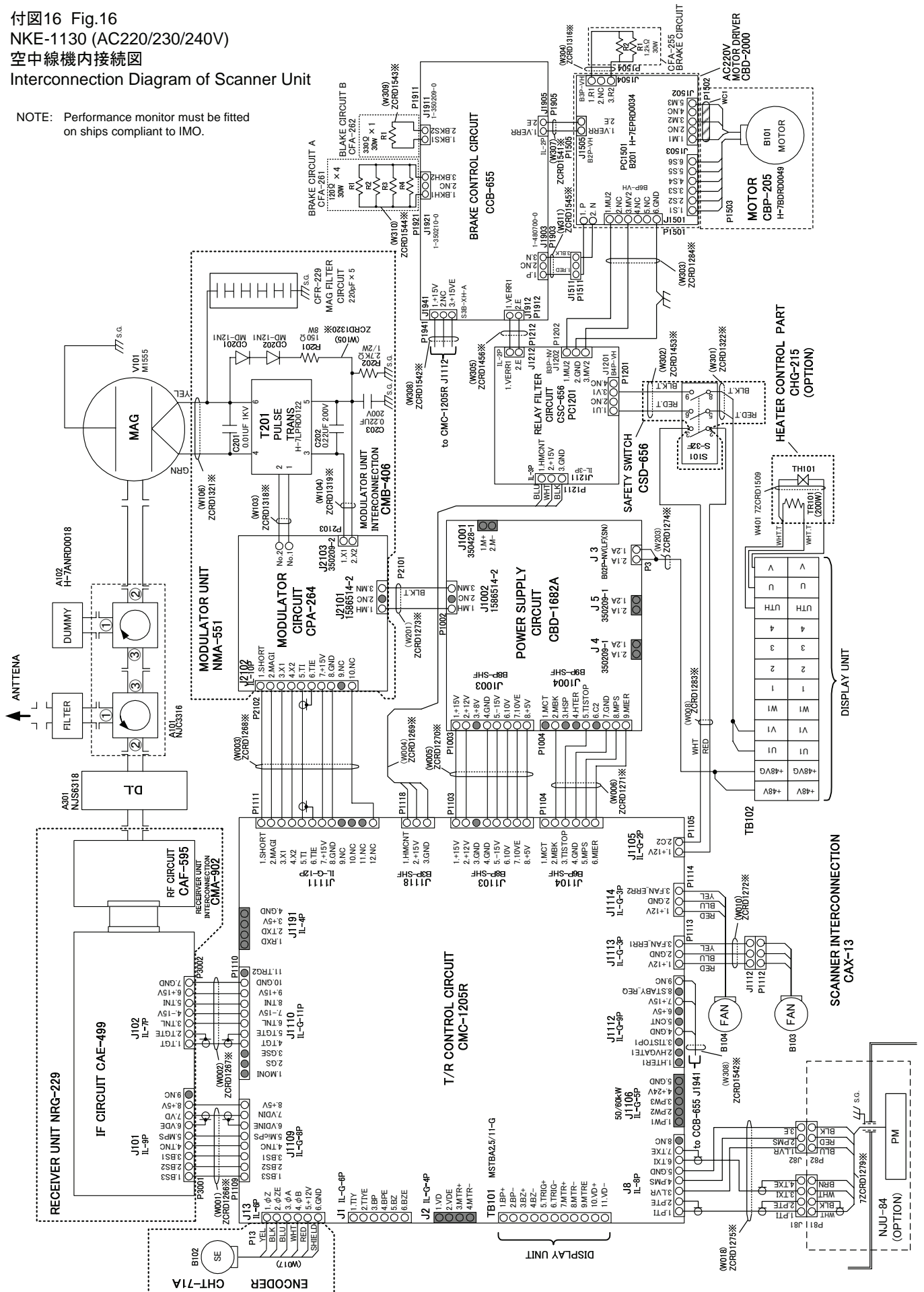
付図15 Fig.15
 NKE-1130 (AC100/110/115V)
 空中線機内接続図
 Interconnection Diagram of Scanner Unit

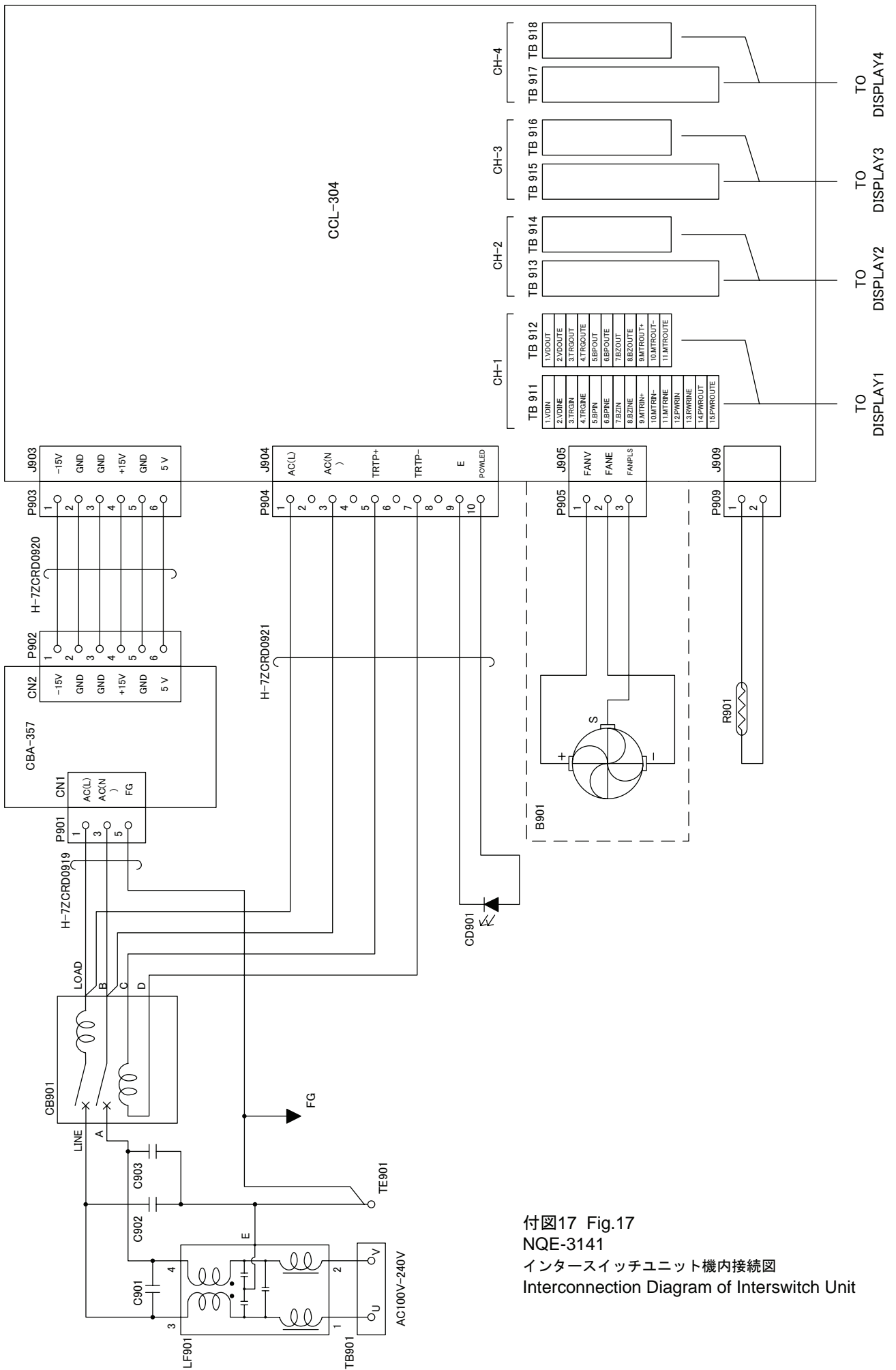
NOTE: Performance monitor must be fitted on ships compliant to IMO.



付図16 Fig.16
 NKE-1130 (AC220/230/240V)
 空中線機内接続図
 Interconnection Diagram of Scanner Unit

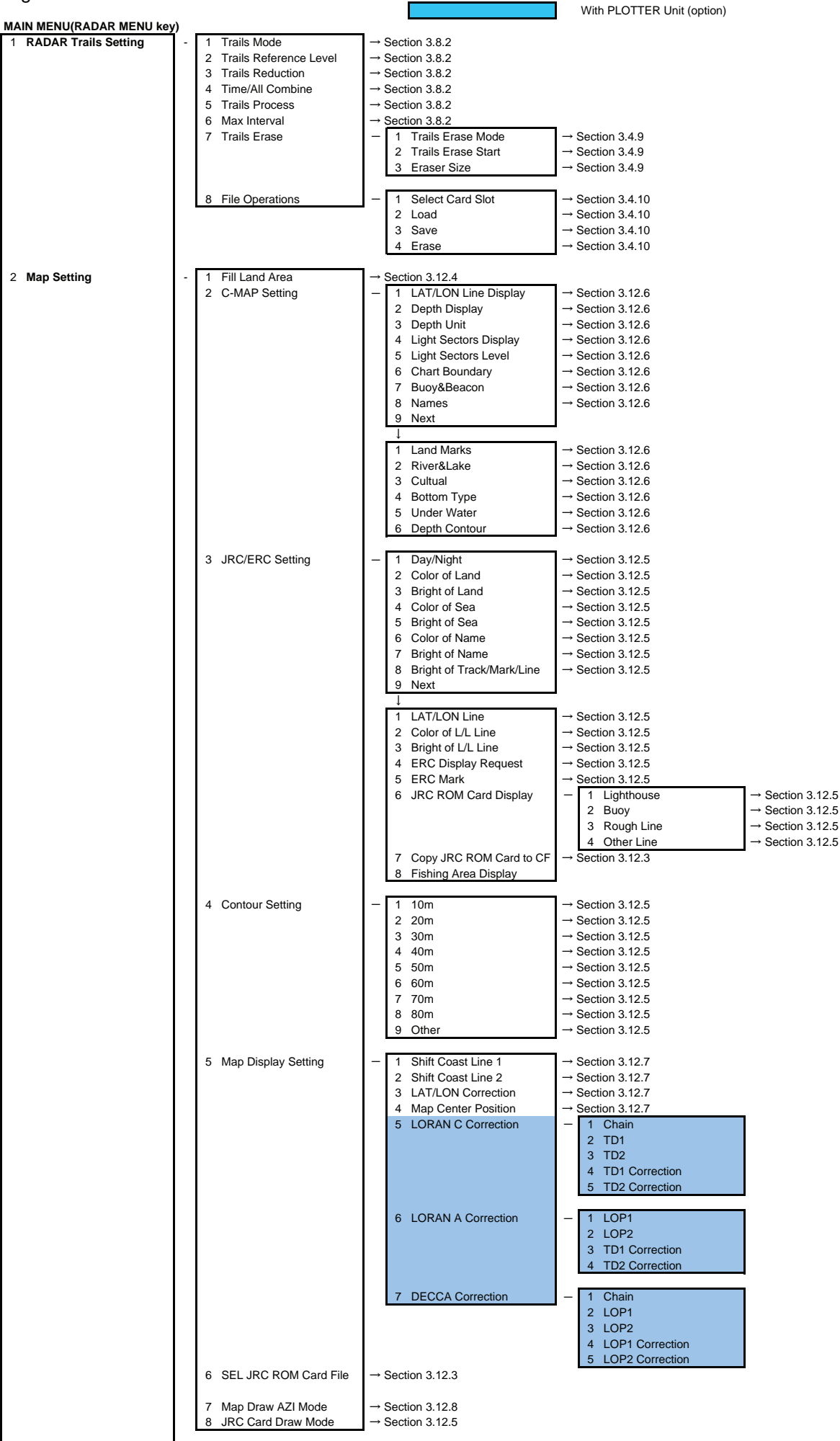
NOTE: Performance monitor must be fitted on ships compliant to IMO.





付図17 Fig.17
 NQE-3141
 インタースイッチユニット機内接続図
 Interconnection Diagram of Interswitch Unit

付図18 レーダーメニュー階層
Fig.18 Over View of RADAR Menu



3 TOOL Menu

4 TARGET TRACK Setting (T.TRK)

1 PI Menu

2 Rectangle Cursor

3 EBL Maneuver Setting

4 Trial Maneuver

1 Target Track Function
2 Target Track Color

3 Target Track Display

4 Track Memory Interval
5 Clear Track Color
6 Clear Track Number
7 File Operations

- 1 Display for All Lines → Section 4.1.5
 - 2 Operation Mode → Section 4.1.5
 - 3 Control → Section 4.1.5
 - 4 Floating → Section 4.1.5
 - 5 Heading Link → Section 4.1.5
 - 6 Next
 - PI Bearing Interval
 - 8 Press EBL Dial to Control Pl#
 - 9 Press VRM Dial to Move End Point#
- ↓
- 1 Range Scale Link → Section 4.1.5
 - 2 Reference Bearing → Section 4.1.5
 - 3 Operation Area → Section 4.1.5
 - 4 Display for Individual Line
 - PI Bearing Interval
 - 8 Press EBL Dial to Control Pl#
 - 9 Press VRM Dial to Move End Point#
- 1 Rectangle Cursor Display
 - 2 Make Rectangle Cursor
 - 3 Ent
 - 4 Unit of Distance
- 1 EBL Maneuver → Section 4.1.6
 - 2 Reach → Section 4.1.6
 - 3 Turn Mode → Section 4.1.6
 - 4 Turn Set → Section 4.1.6
- 1 Trial Function → Section 5.7
 - 2 Course(EBL) → Section 5.7
 - 3 Speed(VRM) → Section 5.7
 - 4 Vector Time → Section 5.7
 - 5 Time to Maneuver → Section 5.7
 - 6 Own Ship's Dynamic Trait
- 1 Reach → Section 5.7
 - 2 Turn Radius → Section 5.7
 - 3 Acceleration → Section 5.7
 - 4 Deceleration → Section 5.7
- ↓
- 1 All → Section 5.6.2
 - 2 Target Track No.1 → Section 5.6.2
 - 3 Target Track No.2 → Section 5.6.2
 - 4 Target Track No.3 → Section 5.6.2
 - 5 Target Track No.4 → Section 5.6.2
 - 6 Target Track No.5 → Section 5.6.2
 - 7 Target Track No.6 → Section 5.6.2
 - 8 Target Track No.7 → Section 5.6.2
 - 9 Next
- ↓
- 1 Target Track No.8 → Section 5.6.2
 - 2 Target Track No.9 → Section 5.6.2
 - 3 Target Track No.10 → Section 5.6.2
 - 4 Other → Section 5.6.2
- ↓
- 1 All → Section 5.6.2
 - 2 Target Track No.1 → Section 5.6.2
 - 3 Target Track No.2 → Section 5.6.2
 - 4 Target Track No.3 → Section 5.6.2
 - 5 Target Track No.4 → Section 5.6.2
 - 6 Target Track No.5 → Section 5.6.2
 - 7 Target Track No.6 → Section 5.6.2
 - 8 Target Track No.7 → Section 5.6.2
 - 9 Next
- ↓
- 1 Target Track No.8 → Section 5.6.2
 - 2 Target Track No.9 → Section 5.6.2
 - 3 Target Track No.10 → Section 5.6.2
 - 4 Other → Section 5.6.2
- 1 Select Card Slot → Section 5.6.2
 - 2 Load Mode → Section 5.6.2
 - 3 Load → Section 5.6.2
 - 4 Save → Section 5.6.2
 - 5 Erase → Section 5.6.2
 - 6 Card T.TRK Display → Section 5.6.2

- 1 Index Line 1 → Section 4.1.5
- 2 Index Line 2 → Section 4.1.5
- 3 Index Line 3 → Section 4.1.5
- 4 Index Line 4 → Section 4.1.5
- 5 Index Line 5 → Section 4.1.5
- 6 Index Line 6 → Section 4.1.5
- 7 Index Line 7 → Section 4.1.5
- 8 Index Line 8 → Section 4.1.5

The setting items are determined by the setting of Operation Mode

All :
Individual :
Track :
Equiangular :

The setting items are determined by the setting of Operation Mode

All :
Individual :
Track :
Equiangular :

Displayed only when "Control" is Individual.

Displayed only when "Control" is Individual.

5 AZ Menu

6 Own Track Menu (O.TRK)

- 1 AZ 1
- 2 AZ 2
- 3 Make AZ
- 4 RADAR Alarm
- 5 Set AZ Key

→ Section 5.2.1

→ Section 5.2.1

- 1 Make AZ 1
- 2 Make AZ 2
- 3 ENT

→ Section 5.2.1

→ Section 5.2.1

- 1 Sector RADAR Alarm
- 3 Make Sector Alarm
- 5 RADAR Alarm Mode
- 6 Sensitivity Level

- 1 Sector Alarm 1
- 2 Sector Alarm 2

→ Section 3.4.24

→ Section 3.4.24

- 1 Sector Alarm 1
- 2 Sector Alarm 2
- 3 ENT

→ Section 3.4.24

→ Section 3.4.24

→ Section 3.4.19

→ Section 3.4.19

- 1 AZ
- 2 Sector RADAR Alarm

- 1 AZ 1
- 2 AZ 2

→ Section 5.2.1

→ Section 5.2.1

- 1 Sector Alarm 1
- 2 Sector Alarm 2

→ Section 3.4.24

→ Section 3.4.24

- 1 DISP Own Track
- 1 DISP Own Track Color
- 2 Clear Own Track
- 2 Clear Own Track Color
- 3 Track Type
- 4 Num/Vector Display
- 5 File Operations
- 6 Water Depth Setting
- 7 Water TEMP. Setting
- 8 Current Setting

→ Section 3.5.1

- 1 All
- 2 White
- 3 Cyan
- 4 Blue
- 5 Green
- 6 Yellow
- 7 Pink
- 8 Red

→ Section 3.5.4

- 1 Select Card Slot
- 2 Load Mode
- 3 Load
- 4 Save
- 5 Erase
- 6 Card Own Track Display

→ Section 3.5.5

→ Section 3.5.5

→ Section 3.5.5

→ Section 3.5.5

→ Section 3.5.5

→ Section 3.5.5

- 1 Depth setting (MIN)
- 2 Depth setting
- 3 Depth setting
- 4 Depth setting
- 5 Depth setting
- 6 Depth setting (MAX)

- 1 Temperature setting (MIN)
- 2 Temperature setting
- 3 Temperature setting
- 4 Temperature setting
- 5 Temperature setting
- 6 Temperature setting (MAX)

- 1 Current Size
- 2 Layer A
- 3 Layer B
- 4 Layer C

7 PLOT Menu

1 Mark Setting

2 Mark Operations

1 Display Mark Type

2 Display Mark Color

3 File Operations

4 Select Mark Size

5 Comment Font Size

1 Own Ship Position

2 Edit User Map

3 Shift

4 Shift Clear

5 Mark/Line Entry

6 Mark/Line List

7 Geodetic

- 1 All → Section 3.6.2
- 2 ○ → Section 3.6.2
- 3 △ → Section 3.6.2
- 4 ▽ → Section 3.6.2
- 5 □ → Section 3.6.2
- 6 ◇ → Section 3.6.2
- 7 wreck (mark) → Section 3.6.2
- 8 △△ → Section 3.6.2
- 9 Next

- 1 ▽▽ → Section 3.6.2
- 2 △▽ → Section 3.6.2
- 3 ▽△ → Section 3.6.2
- 4 + → Section 3.6.2
- 5 x → Section 3.6.2
- 6 Y → Section 3.6.2
- 7 hand drum (mark) → Section 3.6.2
- 8 light house (mark) → Section 3.6.2
- 9 Next

- 1 trapezoid(mark) → Section 3.6.2
- 2 filled trapezoid(mark) → Section 3.6.2
- 3 hat(mark) → Section 3.6.2
- 4 ●● → Section 3.6.2
- 5 ● → Section 3.6.2
- 6 filled triangle(mark) → Section 3.6.2
- 7 ! → Section 3.6.2
- 8 anchor(mark) → Section 3.6.2
- 9 Next

- 1 slash-anchor(mark) → Section 3.6.2
- 2 circle-dotted line(mark) → Section 3.6.2
- 3 non-dangerous wreck(mark) → Section 3.6.2
- 4 ⊙ → Section 3.6.2
- 5 mariner's event mark(mark) → Section 3.6.2
- 6 · → Section 3.6.2
- 7 wavy line (mark) → Section 3.6.2
- 8 solid line (mark) → Section 3.6.2
- 9 Next

- 1 dashed-dotted line (mark) → Section 3.6.2

- 1 All → Section 3.6.2
- 2 White → Section 3.6.2
- 3 Cyan → Section 3.6.2
- 4 Blue → Section 3.6.2
- 5 Green → Section 3.6.2
- 6 Yellow → Section 3.6.2
- 7 Pink → Section 3.6.2
- 8 Red → Section 3.6.2

- 1 Select Card Slot → Section 3.6.6
- 2 Load Mode → Section 3.6.6
- 3 Load → Section 3.6.6
- 4 Unload → Section 3.6.6
- 5 Save → Section 3.6.6
- 6 Erase → Section 3.6.6
- 7 Card Mark Display → Section 3.6.6

→ Section 3.6.2

→ Section 3.6.2

- Section 3.6.3
- 1 Make with Cursor
 - 2 Make with L/L
 - 3 Move → Section 3.6.3
 - 4 Delete → Section 3.6.3
 - 5 Insert/Move Vertex → Section 3.6.3
 - 6 Delete Vertex → Section 3.6.3
 - 7 Delete by Type by Color → Section 3.6.3

- 1 Type → Section 3.6.1
- 2 Color → Section 3.6.1

- 1 Type → Section 3.6.1
 - 2 Color → Section 3.6.1
 - 3 L/L → Section 3.6.1
 - 4 Comment → Section 3.6.1
 - 5 Enter → Section 3.6.1
 - 9 New Line Input → Section 3.6.1
- ↕
- New Mark Input → Section 3.6.1

→ Section 3.6.5

→ Section 3.6.5

→ Section 3.6.4

→ Section 3.6.4

→ Section 3.6.7

- 7 PLOT Menu
- 9 Next

- 3 WPT/Route Setting (Route Type : Plotter)
- 4 WPT/Route Operation
- 5 Clear Memory
- 6 Plot Setting
- 7 NMEA Waypoint Display

- 1 Waypoint Alarm
- 2 Route Alarm
- 3 Set Route Sequence
- 4 Select Route
- 5 Waypoint Entry
- 6 Waypoint Input
- 7 Save Temporary Route
- 8 Cross Track Limit Line
- 9 Next

- 1 Select WPT Mark Size
- 2 Waypoint Vector
- 3 Status of Origin/DEST
- 4 WPT Number Display
- 5 RTE Number Display

- 1 Route Sequence
- 2 Waypoint Switch Mode
- 3 Waypoint Skip
- 4 Waypoint Back Skip
- 5 Set/Cancel Waypoint

- 1 Clear Mark/Line Data
- 2 Clear WPT/Route Data

→ Section 3.6.2

- 1 Scale/Course Up Setup
- 2 Current Position Display
- 3 Cursor Vector DISP
- 4 Cursor HL Length
- 5 Scalebar Display
- 6 AUTO Backup

- 1 Scale
- 2 Preset Scale
- 3 Course Up Data

- 1 Tolerance
- 2 Averaging
- 3 Round Speed

→ Section 3.7.1

Press RADAR MENU again

- 1 File Manager
- 2 RADAR Menu

→ Section 3.11.1

- 1 Process Setting
- 3 TXRX Setting

- 1 Video Latitude
- 2 Video Noise Rejection
- 3 AUTO Dynamic Range
- 4 Process Switch
- 5 2nd Process Mode
- 6 Process Switch Range
- 7 Fast Target Detection
- 8 User Function Setting

→ Section 3.8.1
→ Section 3.8.1
→ Section 3.8.1
→ Section 3.8.1
→ Section 3.8.1
→ Section 3.8.1
→ Section 3.8.1

- 1 Function1 Setting
- 2 Function2 Setting
- 3 Function3 Setting
- 4 Function4 Setting
- 9 SART

→ Section 6.5

- 1 Mode
- 2 IR
- 3 Process
- 4 Target Enhance
- 5 AUTO Sea/Rain
- 6 Save Present State
- 9 Next

→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3

- 1 Pulse Length 0.75nm
- 2 Pulse Length 1.5nm
- 3 Pulse Length 3/4nm
- 4 Pulse Length 6/8nm
- 5 Pulse Length 12nm
- 6 Pulse Length 16nm
- 9 Next

→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3

- 1 Video Latitude
- 2 Video Noise Rejection
- 3 AUTO Dynamic Range
- 4 Process Switch
- 5 2nd Process Mode
- 6 Process Switch Range
- 7 Fast Target Detection
- 9 Next

→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3

- 1 Trails Interval
- 2 Trails Mode
- 3 Trails Reference Level
- 4 Trails Reduction
- 5 Time/All Combine
- 6 Trails Process
- 7 Max Interval
- 9 Next

→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3

- 1 Gain Offset
- 2 PRF
- 3 Small Buoy Detection
- 4 Fishnet Detection
- 5 Antenna Height
- 8 Set Mode Default
- 9 Initialize

→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3
→ Section 3.9.3

- 1 PRF Fine Tuning
- 2 Stagger Trigger
- 4 PRF
- 5 Ice Class Standby Mode

→ Section 3.8.3
→ Section 3.8.3
→ Section 3.8.3
→ Section 3.8.3

3 Multi Window Setting	1 DIR/DIST EXP Display	→ Section 3.8.8																																																
	2 Numeric NAV INFO	→ Section 3.8.8																																																
	3 Depth Graph Setting		<table border="1"> <tr><td>1 Depth Graph Display</td><td>→ Section 3.8.8</td></tr> <tr><td>2 Depth Range</td><td>→ Section 3.8.8</td></tr> <tr><td>3 Time Range</td><td>→ Section 3.8.8</td></tr> <tr><td>4 Depth Unit</td><td>→ Section 3.8.8</td></tr> </table>	1 Depth Graph Display	→ Section 3.8.8	2 Depth Range	→ Section 3.8.8	3 Time Range	→ Section 3.8.8	4 Depth Unit	→ Section 3.8.8																																							
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	3 Time Range	→ Section 3.8.8																																																
4 Depth Unit	→ Section 3.8.8																																																	
4 Wind Graph		<table border="1"> <tr><td>1 Wind Graph Display</td><td>→ Section 3.8.8</td></tr> <tr><td>2 Wind Speed Unit</td><td>→ Section 3.8.8</td></tr> </table>	1 Wind Graph Display	→ Section 3.8.8	2 Wind Speed Unit	→ Section 3.8.8																																												
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2 Wind Speed Unit	→ Section 3.8.8																																																	
5 TEMP Graph Setting		<table border="1"> <tr><td>1 TEMP Graph Display</td><td>→ Section 3.8.8</td></tr> <tr><td>2 TEMP Graph Color</td><td>→ Section 3.8.8</td></tr> <tr><td>3 TEMP Range</td><td></td></tr> <tr><td>4 Time Range</td><td>→ Section 3.8.8</td></tr> </table> <table border="1"> <tr><td>1 Temperature setting (MIN)</td><td>→ Section 3.8.8</td></tr> <tr><td>2 Temperature setting</td><td>→ Section 3.8.8</td></tr> <tr><td>3 Temperature setting</td><td>→ Section 3.8.8</td></tr> <tr><td>4 Temperature setting</td><td>→ Section 3.8.8</td></tr> <tr><td>5 Temperature setting</td><td>→ Section 3.8.8</td></tr> <tr><td>6 Temperature setting (MAX)</td><td>→ Section 3.8.8</td></tr> </table>	1 TEMP Graph Display	→ Section 3.8.8	2 TEMP Graph Color	→ Section 3.8.8	3 TEMP Range		4 Time Range	→ Section 3.8.8	1 Temperature setting (MIN)	→ Section 3.8.8	2 Temperature setting	→ Section 3.8.8	3 Temperature setting	→ Section 3.8.8	4 Temperature setting	→ Section 3.8.8	5 Temperature setting	→ Section 3.8.8	6 Temperature setting (MAX)	→ Section 3.8.8																												
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5 Temperature setting	→ Section 3.8.8																																																	
6 Temperature setting (MAX)	→ Section 3.8.8																																																	
6 Course Bar Setting		<table border="1"> <tr><td>1 Course Bar Display</td><td>→ Section 3.8.8</td></tr> <tr><td>2 Autopilot Course</td><td>→ Section 3.8.8</td></tr> <tr><td>3 ROT Scale</td><td>→ Section 3.8.8</td></tr> </table>	1 Course Bar Display	→ Section 3.8.8	2 Autopilot Course	→ Section 3.8.8	3 ROT Scale	→ Section 3.8.8																																										
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2 Autopilot Course	→ Section 3.8.8																																																	
3 ROT Scale	→ Section 3.8.8																																																	
4 NAV Equipment Setting	1 GYRO Setting	→ Section 3.4.16 → Section 7.1.7																																																
	2 MAG Compass Setting		<table border="1"> <tr><td>1 Heading Correction</td><td>→ Section 3.4.18</td></tr> <tr><td>2 Correct Value</td><td>→ Section 3.4.18</td></tr> </table>	1 Heading Correction	→ Section 3.4.18	2 Correct Value	→ Section 3.4.18																																											
	1 Heading Correction	→ Section 3.4.18																																																
	2 Correct Value	→ Section 3.4.18																																																
	3 Set/Drift Setting		<table border="1"> <tr><td>1 Correction</td><td>→ Section 3.4.19</td></tr> <tr><td>2 Set</td><td>→ Section 3.4.19</td></tr> <tr><td>3 Drift</td><td>→ Section 3.4.19</td></tr> </table>	1 Correction	→ Section 3.4.19	2 Set	→ Section 3.4.19	3 Drift	→ Section 3.4.19																																									
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