JMA-9933-SA/9932-SA
JMA-9923-7XA/9XA
JMA-9922-6XA/9XA

MARINE RADAR EQUIPMENT

INSTRUCTION MANUAL

JRC Japan Radio Co., Ltd.

PREFACE

Thank you very much for purchasing the JRC marine radar equipment, JMA-**9900** ARPA series.
This equipment is a marine radar equipment designed to obtain safe operation of marine ships.
This equipment consists of a radar signal transmitter-receiver unit, a **LCD** display unit and a scanner unit as its main units.

- Before operating the equipment, be sure to read this instruction manual carefully for correct operation.
- Maintain this instruction manual so that operators can refer to it at anytime.
- Refer to this manual when any inconvenience or diffect occur.

● Before Operation ●

Pictorial Indication

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

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

Examples of Pictorial Indication

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

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

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

Warning Label

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

● Cautions to be Used during Operation ●

⚠WARNING

Do not touch the insides of the scanner, transmitter-receiver and display unit.

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

Since the scanner radiator rotates, do not approach it.

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

SCANNER RADIATION HAZARD

Never look up the antenna from which radiation is being output from a distance less than the following.

Injury may result from exposure to radiation produced by the antenna (particularly effects to the eyes) at a distance from the central front face of the antenna less than:

0.6 meter for NKE-**1087/1089** (Radiation power density of 10 W/m^2)

1.1 meter for**NKE-1079/1075A** (Radiation power density of 10 W/m^2)

25 cm for**NKE-1079/1075A** (Radiation power density of 100 W/m^2)

Install the scanner at any place higher than any person.

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

When approaching the scanner for maintenance or inspection, set the power switch of the display unit to the "OFF" or "STBY" position.

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

⚠CAUTION

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

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

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

◆◆◆◆PRECAUTIONS BEFORE OPERATION◆◆◆◆

■ Cautions for high voltage

High voltages from hundreds volts to tens of thousands volts are to be applied to the electronic equipment such radio and radar devices. You do not face any danger during normal operation, but sufficient cares are required for maintenance, inspection and adjustment of their internal components. (Maintenance, check-up and adjustment of the inside of the equipment are prohibited except by maintenance specialists.)

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

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

■ What to do in case of electric shock

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

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

◆◆◆◆◆◆◆◆FIRST-AID TREATMENTS◆◆◆◆◆◆◆◆

☆First-aid treatments

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

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

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

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

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

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

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

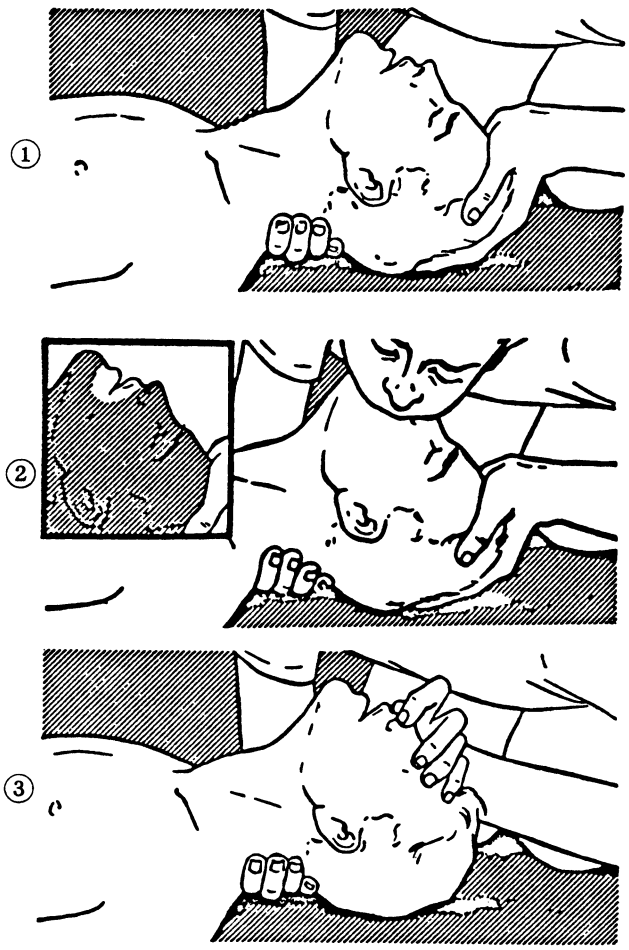
(7) Then, wipe his mouth so that foaming mucus does not accumulate inside.

☆When pulse is beating but breathing has stopped

(Mouth-to-mouth respiration) Fig.1

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

Method of mouth-to-mouth respiration by raising head



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

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

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

Fig.1 Mouth-to-mouth respiration

☆When both pulse and breathing have stopped

Perform the (Cardiac massage) Fig.2 and (Mouth-to-mouth respiration) Fig.1

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

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

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

(3) Examine his pupils and his pulse sometimes. When the both have returned to normal, stop the artificial respiration, serve him with a cup of hot coffee or tea and keep him warm and calm while watching him carefully. Commit the victim to a medical specialist depending on his condition. (Never give him alcoholic drinks.) To let him recover from the mental shock, it is necessary for persons concerned to understand his situations and the necessary treatments.

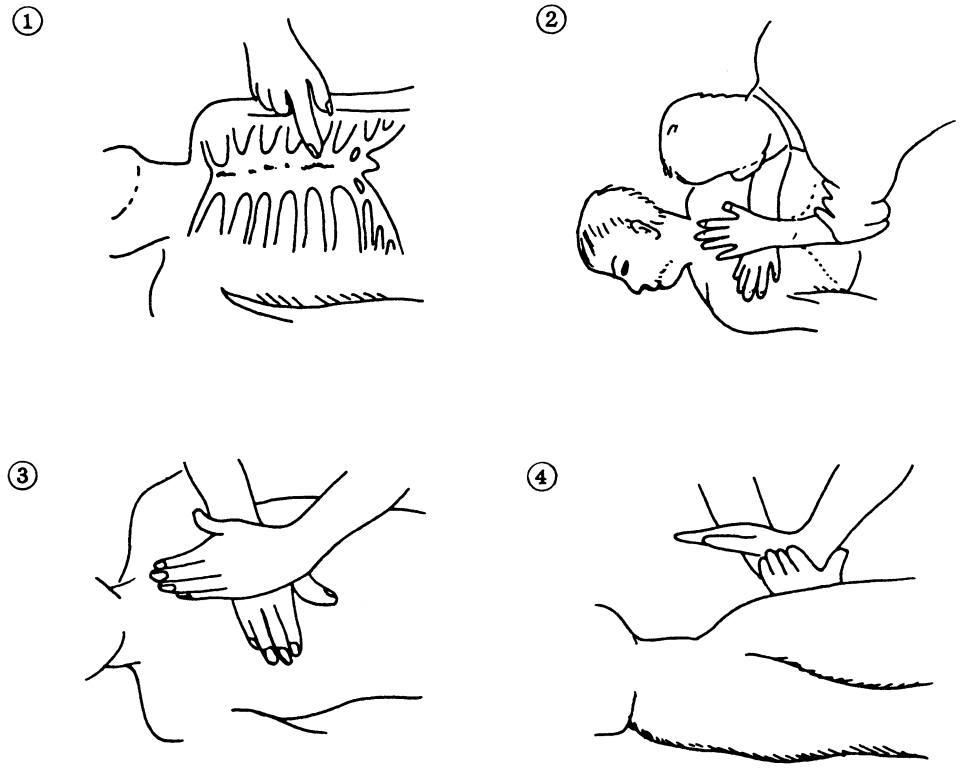
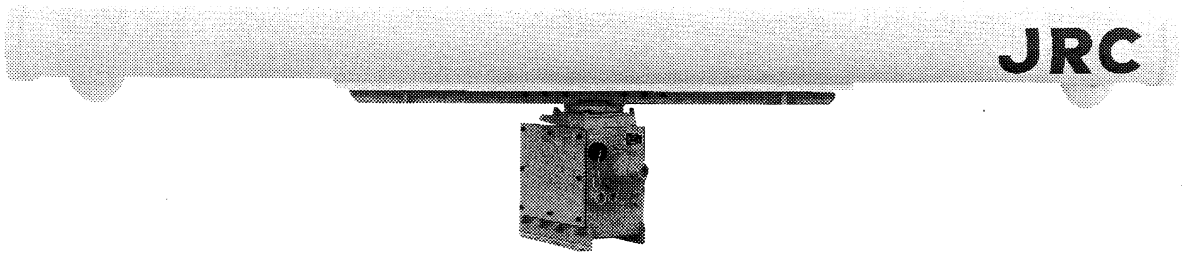
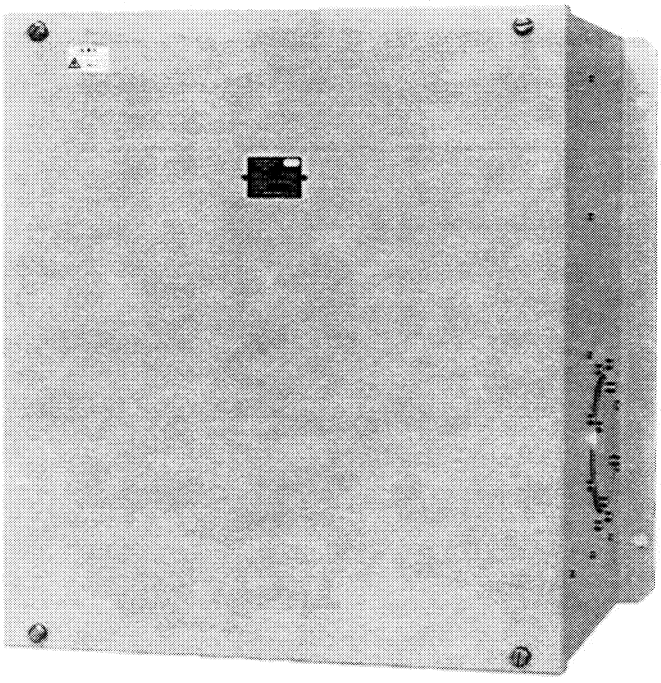


Fig.2 Cardiac massage

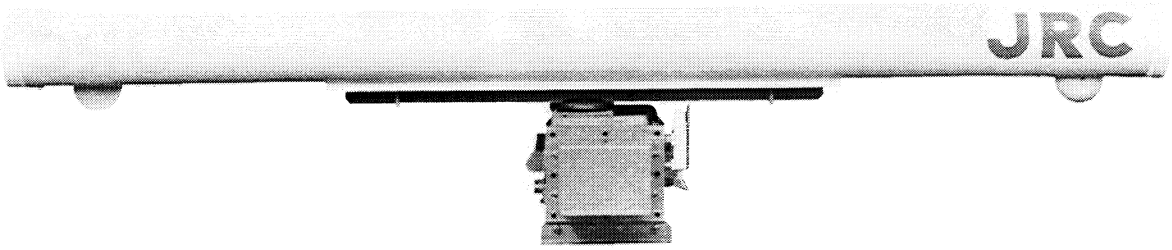
EQUIPMENT APPEARANCE



Scanner Unit Type NKE-1079 (12 feet)



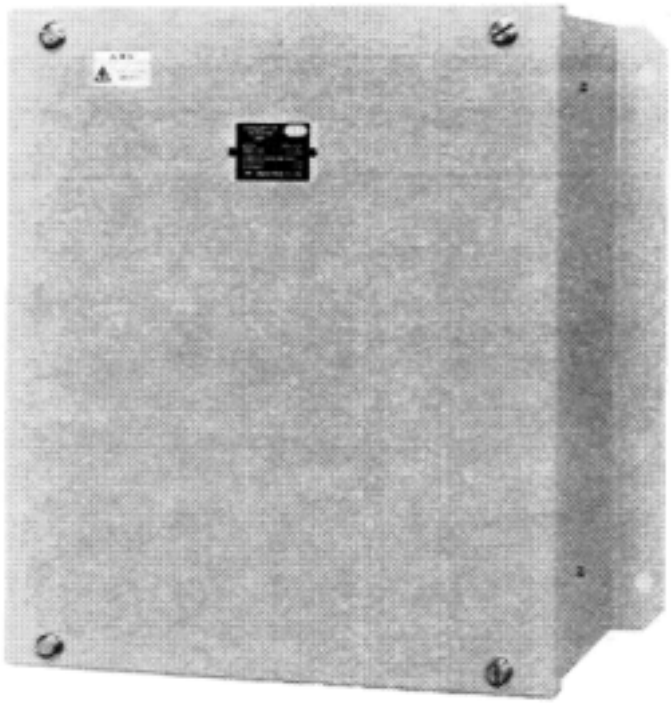
Transmitter-receiver Unit Type NTG-3037/3037A



Scanner Unit Type NKE-1075/1075A (12 Feet)

Scanner Unit Type **NKE-1089-7(7 Feet)**

Scanner Unit Type NKE-1089-9(9 Feet)



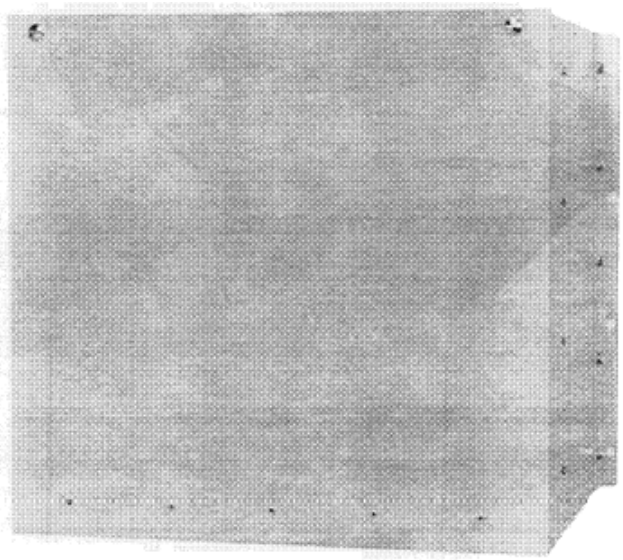
Transmitter-receiver Unit Type **NTG-3028**

Scanner Unit Type NKE-1087-6 (6 Feet)

Scanner Unit Type **NKE-1087-9 (9 Feet)**

Display Unit Type NCD-4263(Self-standing Type)

Monitor Unit Type NWZ-158T (Desktop Type) (Option)



Control Unit Type NDC-1279T (Desktop Type) (Optyon)

Keyboard Unit Type NCE-7721T (Desktop Type) (Option)

Display Unit Type NCD-4263T (Desktop Type) (Option)

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4. MEASUREMENT OF RANGE AND BEARING

5. OPERATION OF ARPA AND AIS

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GLOSSARY

This section describes the main terms used for this equipment and general related maritime terms.

ARPA:
Automatic Radar Plotting Aid

AZI MODE (Azimuth Stabilization MODE):
Bearing display mode

Anti-clutter rain (FTC):
Rain/snow clutter suppression

Anti-clutter sea (STC):
Sea clutter suppression

BCR (Bow Cross Range):
Bow crossing range

BCT (Bow Cross Time):
Bow crossing time

BRG (Bearing):
Bearing

CPA (Closest Point of Approach):
The closest point of approach from own ship, which can be set by the observer.

COG (Course Over Ground):
Course relative to the ground.

CUP (Course-Up):
Own ship's course is pointed to the top center of the radar display.

DRIFT:
The current velocity for manual correction or the current speed on the horizontal axis of the 2-axis log is displayed.

EBL (Electronic Bearing Line):
An electronic bearing line originated from own ship's position.

ENH (Enhance):
A target can be enlarged.

Floating EBL (Floating Electronic Bearing Line):
Floating electronic bearing line originated from an arbitrary point.

GND:
Stabilization relative to the ground.

GPS (Global Positioning System):
The position of a GPS receiver can be determined by the signals from GPS satellites.

Guard Zone:
Alarm ring against intrusion

HDG (Heading):
Own ship's heading bearing.
The display ranges from 000 to 360 degrees as scanned clockwise.

HL (Heading Line):
Ship's heading line

HUP (Head-Up):
Own ship's heading line is always pointed to the top center of the radar display.

IMO:
International Maritime Organization

Interswitch:
A device to switch over two or more radar display units and two or more antennas.

IR (Interference Rejection):
Radar interference reflector

MRK (Mark):
Use as a temporary marker

NM (Nautical Mile):
1 NM = 1852 m

NSK (North Stabilization Kit):
True bearing unit

NUP (North-Up):
The north is always pointed to the top center of the radar display.

OWN TRACK:
Display function of own ship's track

Performance Monitor:
An additional unit to monitor the transmitted power and the receiving sensitivity of radar equipment.

PI (Parallel Index Line):
Parallel index line

PIN (Personal Access Code):
Information set by the user (personal code)

PROC (Process):
Target processing function

Relative Vector:
A target's movement predicted relative to own ship.

RR (Range Rings):
Fixed range ring

RM (Relative Motion):
Relative motion presentation
Own ship's position is fixed and other targets move relative to own ship.

S/X Band:
Radio frequency bands
S: 3 GHz band, X: 9 GHz band

SCANNER:
Antenna

SEA:

Sea clutter suppression

SET:

The current direction for manual correction or the current speed on the horizontal axis of the 2-axis log is displayed.

SOG (Speed Over Ground):

Speed relative to the ground.

STAB (Stabilization):

Stabilization

TCPA (Time to Closest Point of Approach):

The time to approach the closest point from own ship.

TM (True Motion):

True motion presentation

A presentation in which own ship and any other target move depending on their individual movements.

TRAILS:

Function of displaying tracks of other ships.

TRIAL:

Trial maneuvering

True Vector:

A target's true movement predicted as the result of entering own ship's direction and speed.

VRM (Variable Range Marker):

Variable range marker

WATER

Stabilization relative to the water

SECTION 1
GENERAL AND EQUIPMENT COMPOSITION

1.1 FUNCTIONS

This equipment is a high-performance radar equipment consisting of a scanner unit, a transmitter-receiver unit and a **23.1 inch color raster-scan LCD display unit**
This radar complies with the current performance standards of the IMO.

1.1.1 Functions of This System

The JMA-**9900** ARPA series is a color radar system designed to comply with the international standards of the IMO. The main functions include; sea clutter and rain/snow clutter suppression, sensitivity adjustment, interference reflector, bearing and range measurement using a trackball, fixed/variable range markers, and electronic bearing line, and ARPA functions (automatic/manual target acquisition and tracking, vector and trail displays, alarm displays and trial maneuvering).
In addition, the equipment has the functions of color display setting (4 views), own track display, NAV line and marker displays, TM (True Motion) presentation, Self-diagnostic facilities, and radar
In addition, a radar switching function (interswitch) can be added to switch between two, four or eight eight radar units. However, in order to this function for four or eight units, an external switching box is necessary.

1.1.2 ARPA Functions

The ARPA functions that the JMA-9900 series incorporates will be outlined below.

[I] First Stage: Target Detection from Radar Information

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

[II] Second Stage: Target Tracking

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

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

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

[Ⅳ] Fourth Stage: Indication

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

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

1.2 FEATURES

Target Detection by Latest Signal Processing Technology

The system employs the latest adaptive clutter suppression technology to eliminate undesired clutter from the radar video signals that are obtained from the receiver with a wide dynamic range, thus improving the target detection.

Key Arrangement for Higher Operability

The basic and main functions of the radar can be operated with the minimum necessary keys, ensuring quick action even in case of emergency. Other various useful functions are also available by the use of **the soft button on a screen and screen menu.**
In the case that two or more operators operate the radar equipment, each operator can register the operating conditions that are most favorable to him/her and can be recalled and set momentarily (Personal code function is built-in).

Advanced Technology Based ARPA Functions Provided as Standard

The ARPA target acquisition and tracking performance is enhanced by the use of the most advanced radar signal processing and tracking technologies, ensuring stable operation in target tracking under clutter.

- Acquisition and tracking of 50 targets
- Hazardous conditions are represented by shapes and colors of symbols as well as sounds.
- Trial maneuvering functions provided
- Simultaneous indication of other ships' data

Improved Day/Night Mode

Two types of background colors are available in each Day/Night mode (total 4 background colors).
Each background color can be reproduced to be suited for the user's operating environment by simple key operation. The radar echoes and a variety of graphics can also be represented in different colors, ensuring easy-to-see displays.

Various Functions

- TRAILS (Other ship's track display)
- NAV lines
- TM (True Motion display)
- Head-up/North-up/Course-up display
- Own ship's track display
- Guard Zone function

Compact Design and Low Power Consumption

The radiator structure making the most of wind power contributes to the substantial reduction in size and power consumption of the S band scanner unit.

Self-diagnostic Program Incorporated

The Self-diagnostic program always monitors all the functions of the system. If any function deteriorates, an alarm message will appear on the radar display and an alarm sounds at the same time. Even when the system is operating, the functionality test can be carried out. (except on some functions)

Performance Monitor

The radar performance (transmitted output power and receiving sensitivity) can appear on the radar display.

Easy Interswitch Operation (Option)

By additionally installing an interswitch PC board, up to 3-units of the JMA-9900 series radar equipment can be combined and switched over by simple operation.

1.3 CONFIGURATION

Scanners and Transmitted Output Powers

Radar Model	Scanner Type	Transmitted Output Power	Band
JMA-9933-SA	12 ft slot antenna	30 kW	S
JMA-9932-SA	12 ft slot antenna	30 kW	S
JMA-9923-7XA	7 ft slot antenna	25 kW	X
JMA-9923-9XA	9 ft slot antenna	25 kW	X
JMA-9922-6XA	6 ft slot antenna	25 kW	X
JMA-9922-9XA	9 ft slot antenna	25 kW	X

Radar Configuration and Ship's Mains

Radar Model	Scanner Unit	Performance Monitor	Transmitter-receiver Unit	Display Unit	Ship's Mains
JMA-9933-SA	NKE-1079 (*)	NJU-63	NTG-3037 NTG-3037A	NCD-4263	230 V AC, 50/60 Hz, 3ø 100/230V AC, 50/60 Hz, 1ø
JMA-9932-SA	NKE-1075 (*) NKE-1075A (*)	NJU-63	———		
JMA-9923-7XA	NKE-1089-7(*)	NJU-64	NTG-3028		
JMA-9923-9XA	NKE-1089-9(*)				
JMA-9922-6XA	NKE-1087-6(*)	NJU-64	———		
JMA-9922-9XA	NKE-1087-9(*)				

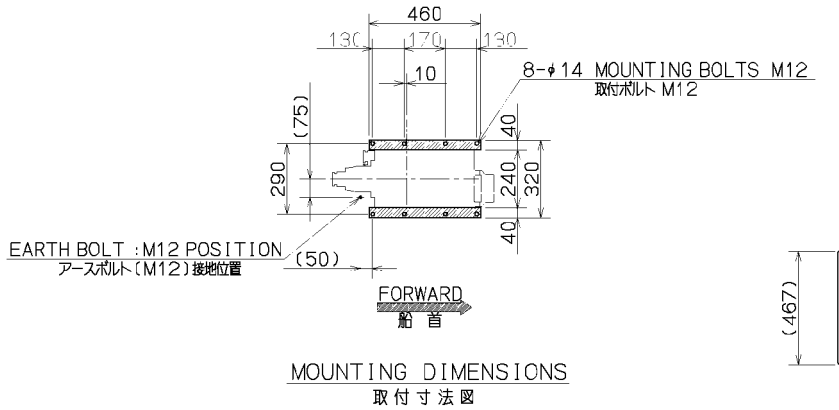
Note: JMA-9933-SA, 230 V AC, 50/60 Hz, 1Ø ··· MED only

Notes:

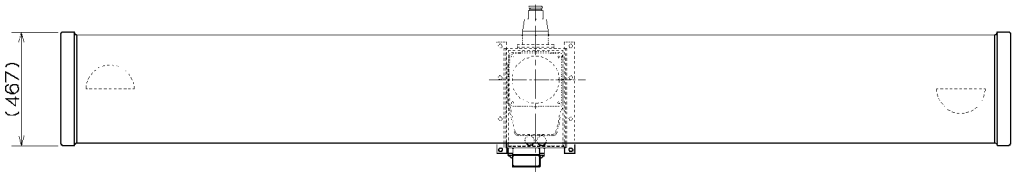
1. The drive motor for the scanner unit is available in 230 V AC (three-phase) type and 100/110/230 V AC (single-phase) type.
2. The scanner unit can be equipped with a deicing heater as an option marked with (*), in stead of which "-D" shall be suffixed to the type name.
3. When using the ship's mains of 440 V AC as the radar power source, a step-down transformer shall be used.
4. The name plates for the radar components indicate as follows:

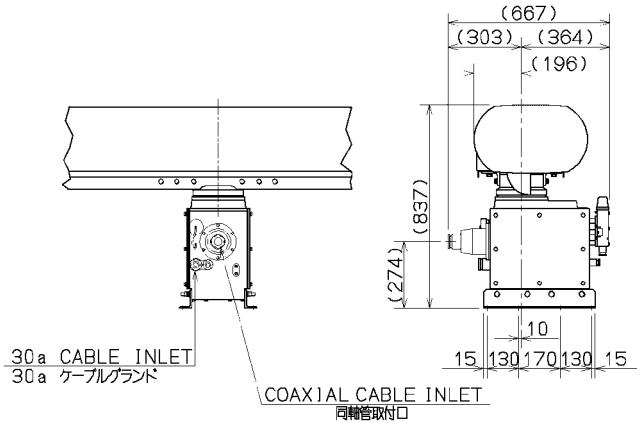
   Scanner Unit: SCANNER UNIT
   Transmitter-receiver Unit: TRANSMITTER-RECEIVER UNIT
   Display Unit: DISPLAY UNIT

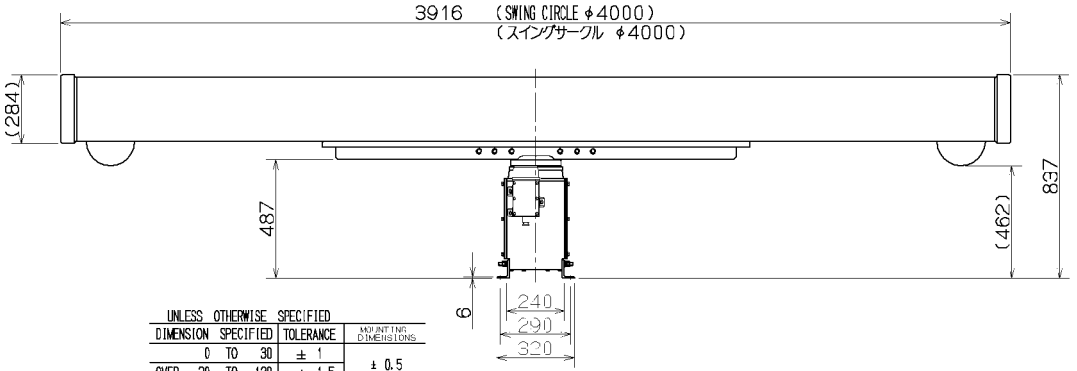
1.4 EXTERIOR DRAWING



MOUNTING DIMENSIONS
取付寸法図







UNLESS OTHERWISE SPECIFIED DIMENSION SPECIFIED	TOLERANCE	MOUNTING DIMENSIONS
0 TO 30	± 1	± 0.5
OVER 30 TO 120	± 1.5	
OVER 120 TO 400	± 2.5	± 1
OVER 400 TO 1000	± 4	± 2
OVER 1000 TO 2000	± 6	± 3
OVER 2000 TO 3000	± 8	

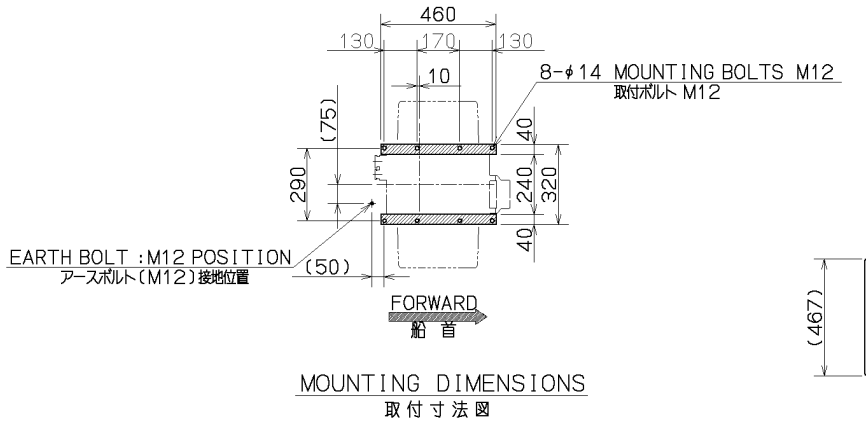
標準許容差

区分	外形寸法	取付穴位置寸法
30以下	±1	±0.5
30を超え 120以下	±1.5	
120を超え 400以下	±2.5	±1
400を超え 1000以下	±4	±2
1000を超え 2000以下	±6	±3
2000を超え 3000以下	±8	

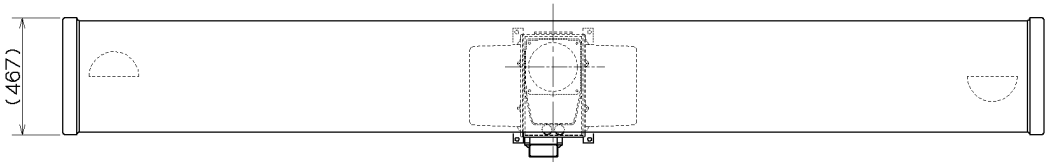
MASS	APPROX. 142kg
COLOR	ARRAY WHITE
	PEDESTAL GRAY
Unit	mm

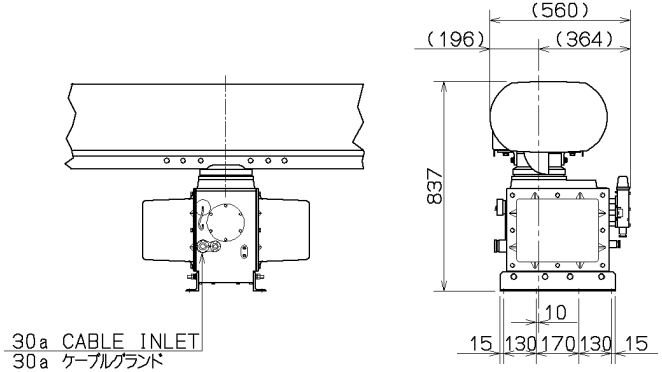
質量	約 142kg	
色	輻射部	白
	筐体部	灰色
単位	mm	

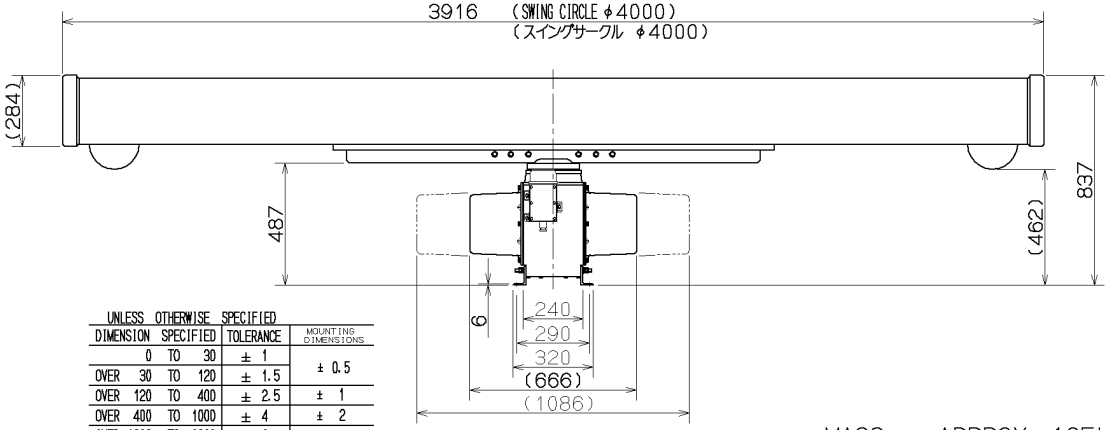
Fig.1.1 EXTERIOR DRAWING OF SCANNER UNIT,TYPE NKE-1079



MOUNTING DIMENSIONS
取付寸法図







UNLESS OTHERWISE SPECIFIED DIMENSION SPECIFIED	TOLERANCE	MOUNTING DIMENSIONS
0 TO 30	± 1	± 0.5
OVER 30 TO 120	± 1.5	
OVER 120 TO 400	± 2.5	± 1
OVER 400 TO 1000	± 4	± 2
OVER 1000 TO 2000	± 6	± 3
OVER 2000 TO 3000	± 8	

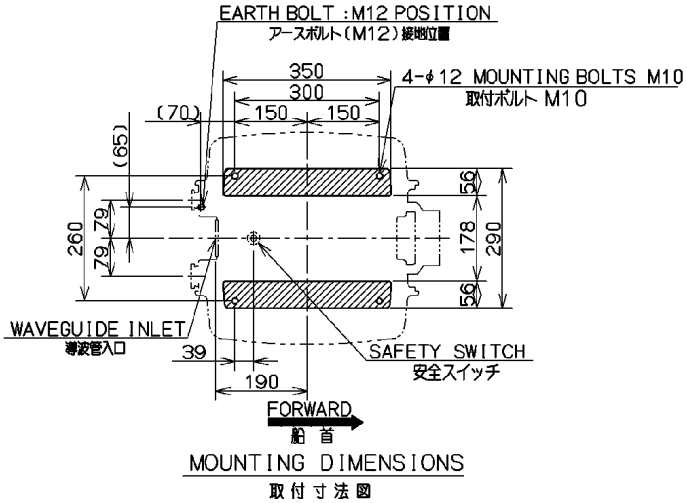
標準許容差

区分	外形寸法	取付穴位置寸法
30以下	±1	±0.5
30を越え 120以下	±1.5	
120を越え 400以下	±2.5	±1
400を越え 1000以下	±4	±2
1000を越え 2000以下	±6	±3
2000を越え 3000以下	±8	

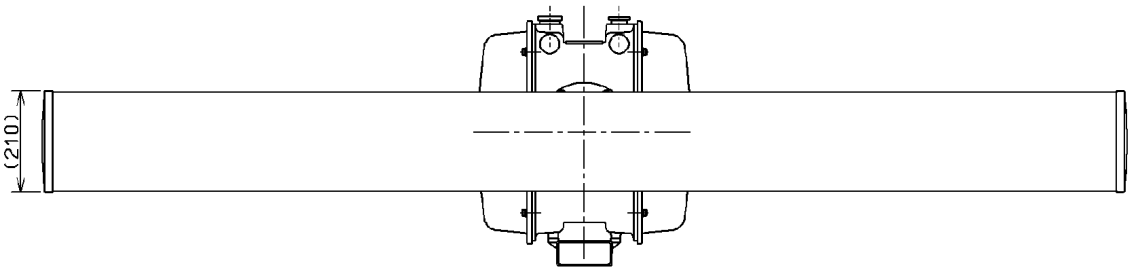
MASS	APPROX. 165kg
COLOR	ARRAY WHITE
	PEDESTAL GRAY
Unit	mm

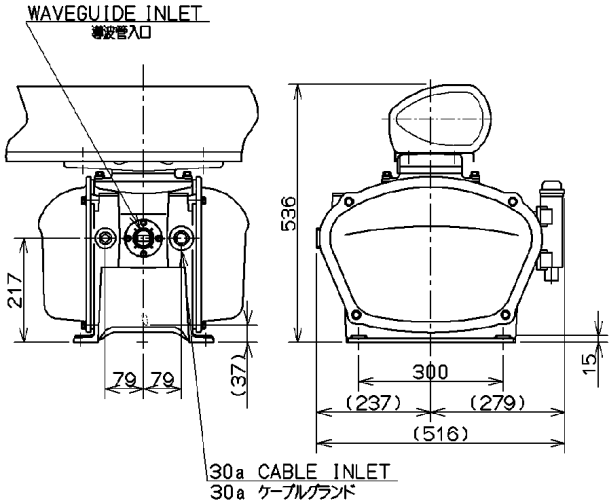
質量	約 165kg
色	輻射部 白
	筐体部 灰色
単位	mm

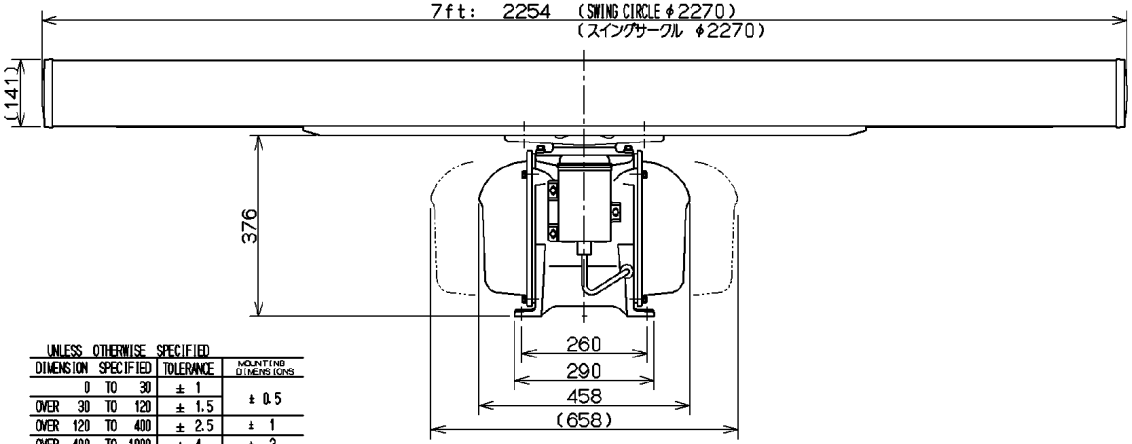
Fig.1.2 EXTERIOR DRAWING OF SCANNER UNIT, TYPE NKE-1075



MOUNTING DIMENSIONS
取付寸法図







UNLESS OTHERWISE SPECIFIED		
DIMENSION SPECIFIED	TOLERANCE	MOUNTING DIMENSIONS
0 TO 30	± 1	± 0.5
OVER 30 TO 120	± 1.5	
OVER 120 TO 400	± 2.5	± 1
OVER 400 TO 1000	± 4	± 2
OVER 1000 TO 2000	± 6	± 3
OVER 2000 TO 3000	± 8	

標準許容差		
区分	外形寸法	取付穴位置寸法
30以下	±1	±0.5
30を超え 120以下	±1.5	
120を超え 400以下	±2.5	±1
400を超え 1000以下	±4	±2
1000を超え 2000以下	±6	±3
2000を超え 3000以下	±8	

(注)ケーブルグランド径は変更できません。
NOTE : Diameter of cable gland is not able to change.

MASS APPROX. 51kg
COLOR WHITE
Unit mm

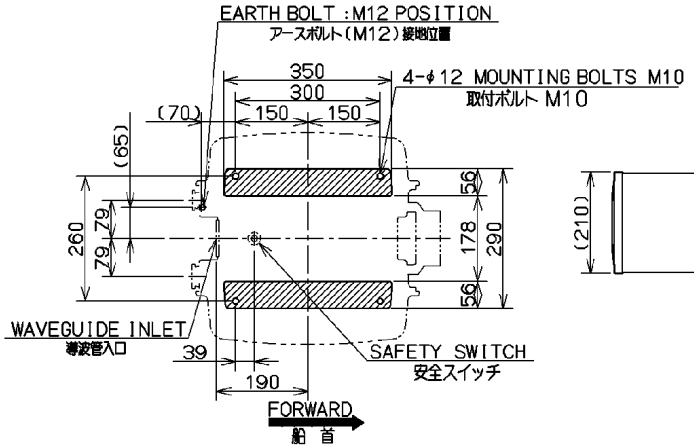
質量 約51kg
筐体色 白
単位 mm

SCANNER UNIT OUTLINE DRAWING

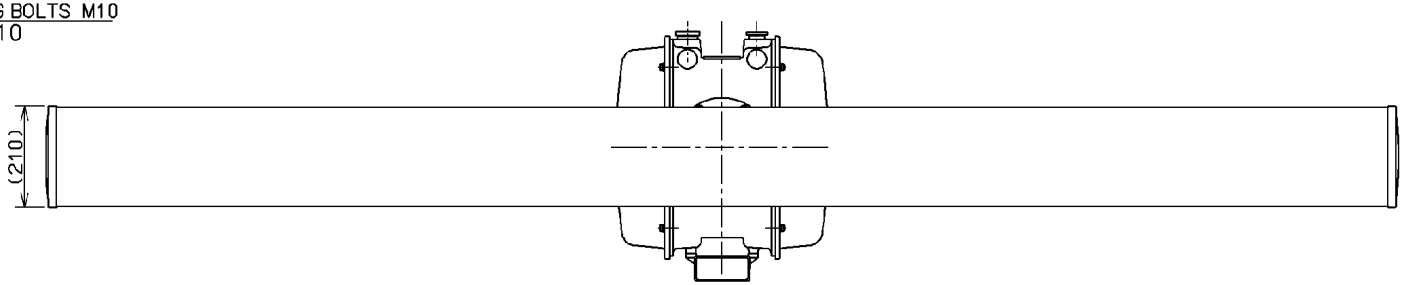
NKE-1089-7

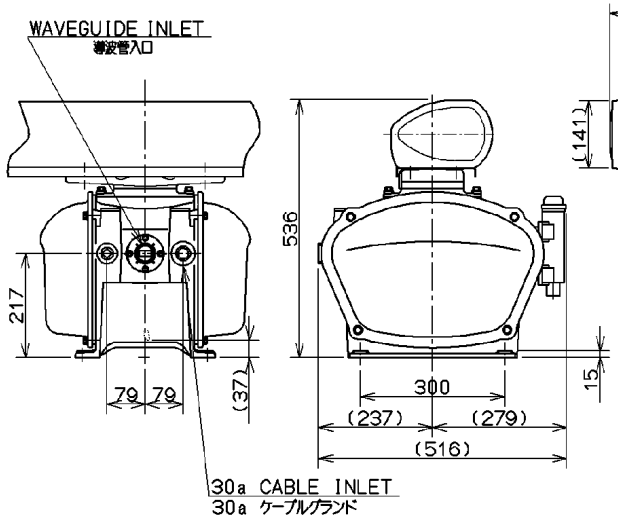
SCNKE5248

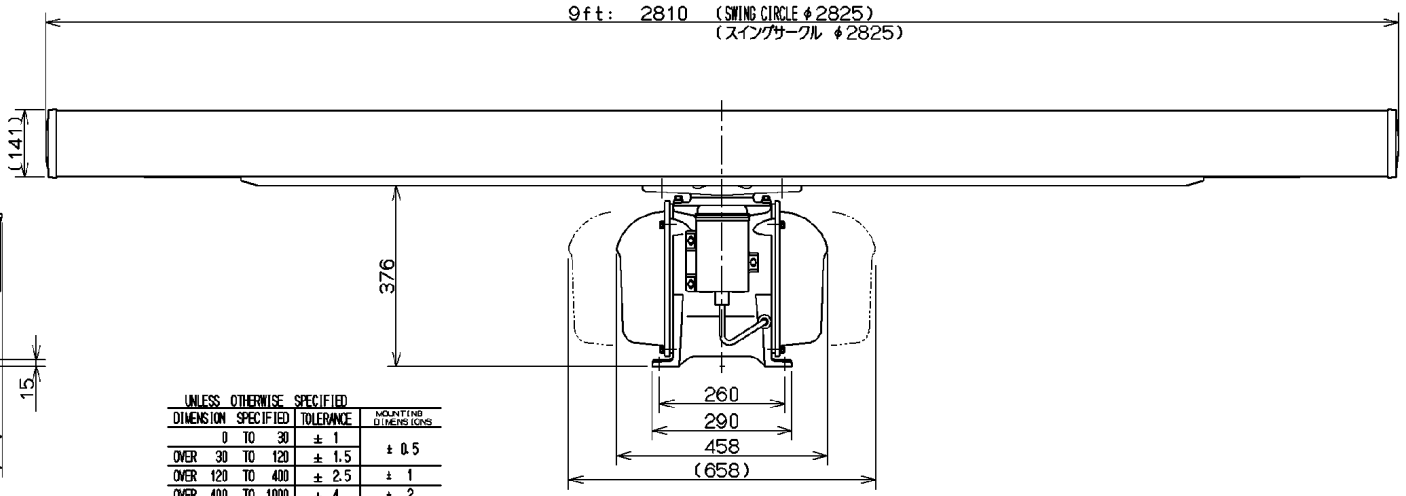
Fig.1.3 EXTERIOR DRAWING OF SCANNER UNIT,TYPE NKE-1089-7



MOUNTING DIMENSIONS
取付寸法図







UNLESS OTHERWISE SPECIFIED DIMENSION SPECIFIED	TOLERANCE	MOUNTING DIMENSIONS
0 TO 30	± 1	± 0.5
OVER 30 TO 120	± 1.5	
OVER 120 TO 400	± 2.5	± 1
OVER 400 TO 1000	± 4	± 2
OVER 1000 TO 2000	± 6	± 3
OVER 2000 TO 3000	± 8	

標準許容差 区分		外形寸法	取付穴位置寸法
	30以下	±1	±0.5
30を超え	120以下	±1.5	
120を超え	400以下	±2.5	±1
400を超え	1000以下	±4	±2
1000を超え	2000以下	±6	±3
2000を超え	3000以下	±8	

(注)ケーブルグランド径は変更できません。
NOTE : Diameter of cable gland is not able to change.

MASS APPROX. 53kg
COLOR WHITE
Unit mm

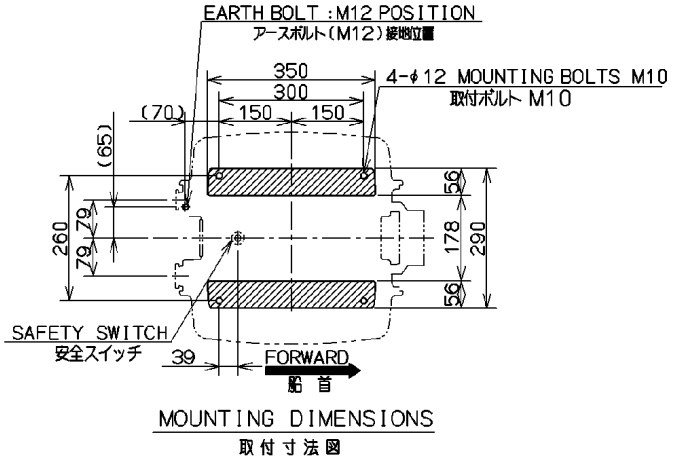
質量 約53kg
筐体色 白
単位 mm

SCANNER UNIT OUTLINE DRAWING

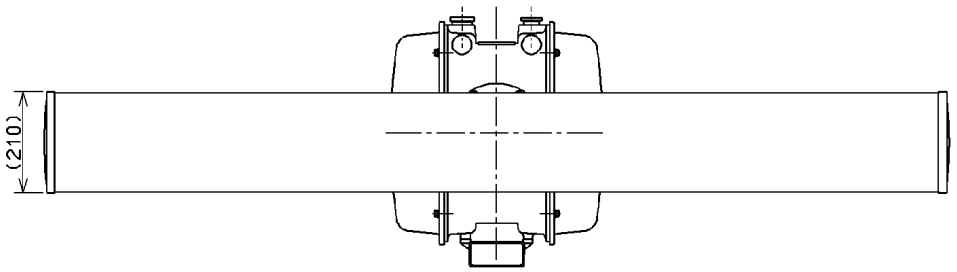
NKE-1089-9

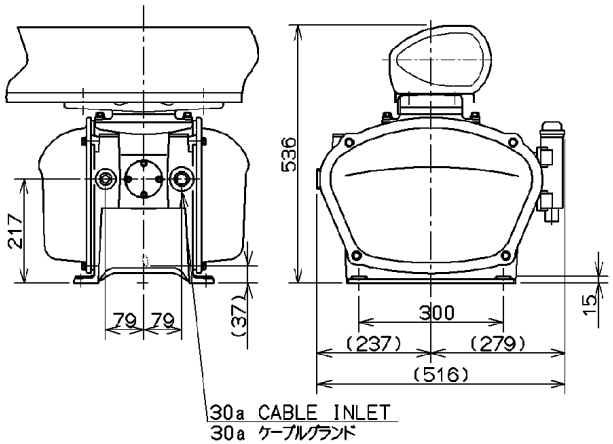
SCNKE5246

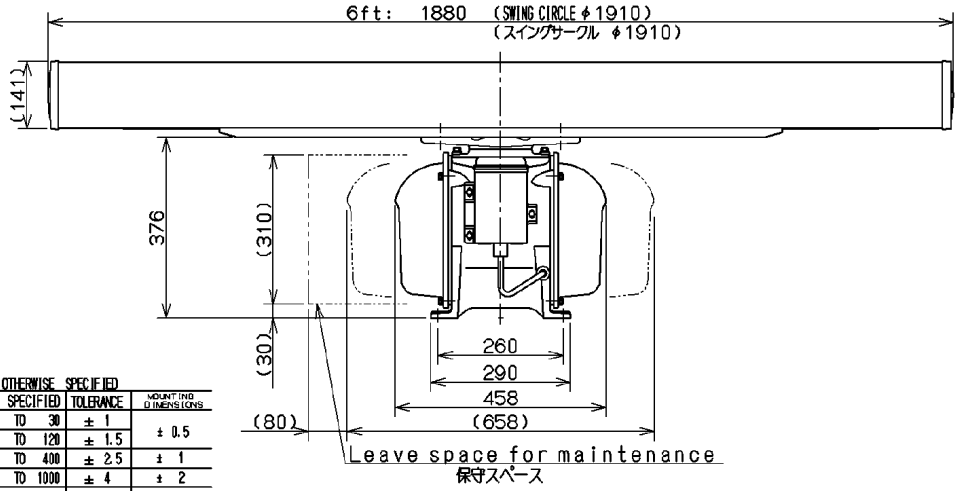
Fig.1.4 EXTERIOR DRAWING OF SCANNER UNIT,TYPE NKE-1089-9



MOUNTING DIMENSIONS
取付寸法図







UNLESS OTHERWISE SPECIFIED		
DIMENSION SPECIFIED	TOLERANCE	MOUNTING DIMENSIONS
0 TO 30	± 1	± 0.5
OVER 30 TO 120	± 1.5	
OVER 120 TO 400	± 2.5	± 1
OVER 400 TO 1000	± 4	± 2
OVER 1000 TO 2000	± 6	± 3
OVER 2000 TO 3000	± 8	

標準許容差		
区分	外形寸法	取付穴位置寸法
30以下	±1	±0.5
30を超え 120以下	±1.5	
120を超え 400以下	±2.5	±1
400を超え 1000以下	±4	±2
1000を超え 2000以下	±6	±3
2000を超え 3000以下	±8	

(注)ケーブルグランド径は変更できません。
NOTE : Diameter of cable gland is not able to change.

MASS APPROX. 55kg
COLOR WHITE
Unit mm

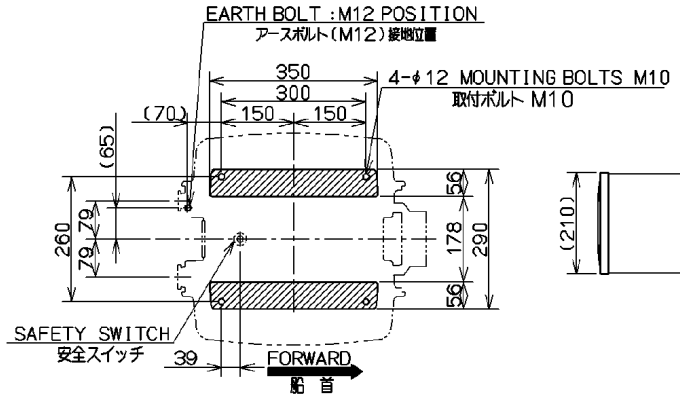
質量 約55kg
筐体色 白
単位 mm

Fig.1.5 EXTERIOR DRAWING OF SCANNER UNIT, TYPE NKE-1087-6

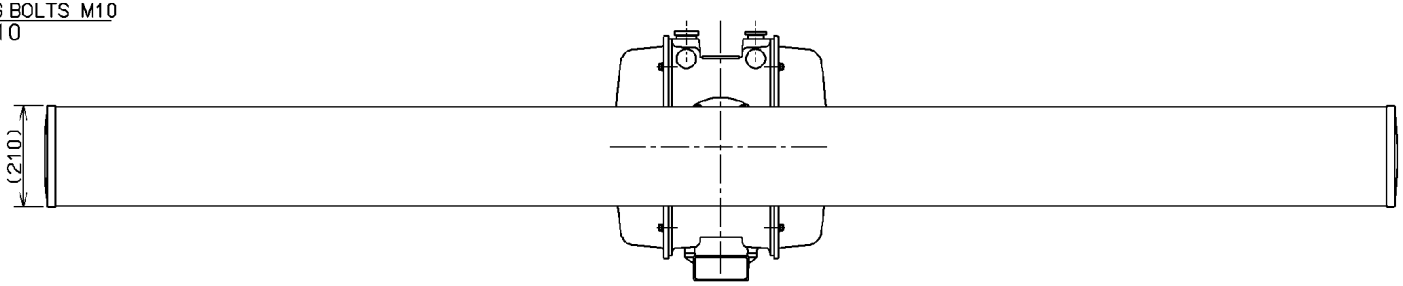
SCANNER UNIT OUTLINE DRAWING NKE-1087-6

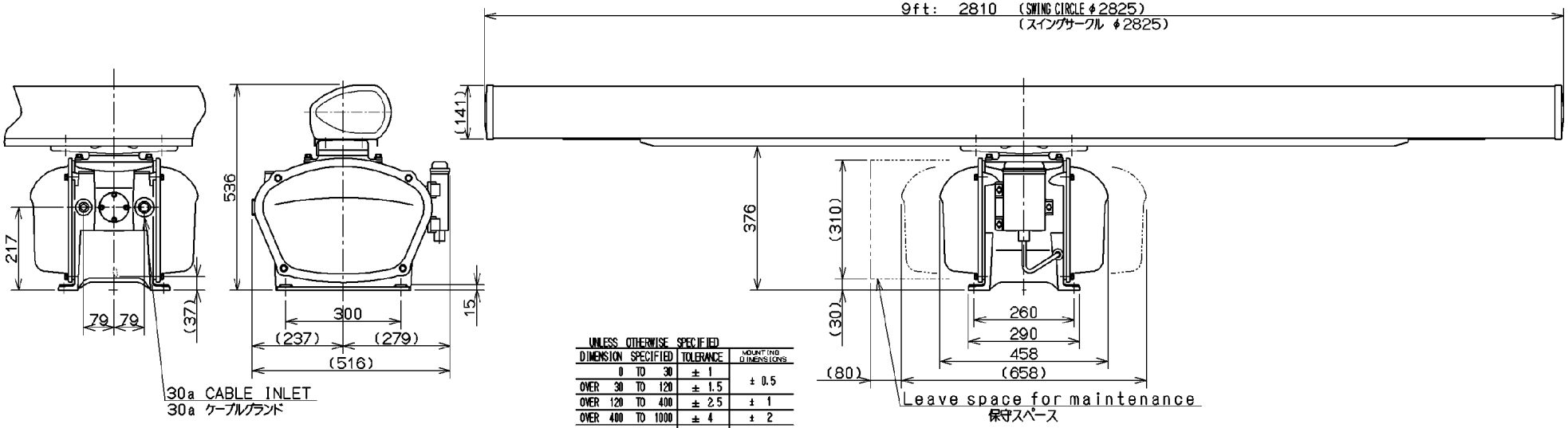
SCNKE5242

Fig.1.6 EXTERIOR DRAWING OF SCANNER UNIT, TYPE NKE-1087-9



MOUNTING DIMENSIONS
取付寸法図





UNLESS OTHERWISE SPECIFIED DIMENSION SPECIFIED	TOLERANCE	MOUNTING DIMENSIONS
0 TO 30	± 1	± 0.5
OVER 30 TO 120	± 1.5	
OVER 120 TO 400	± 2.5	± 1
OVER 400 TO 1000	± 4	± 2
OVER 1000 TO 2000	± 6	± 3
OVER 2000 TO 3000	± 8	

標準許容差 区分	外形寸法	取付穴位置寸法
30以下	±1	±0.5
30を超え 120以下	±1.5	
120を超え 400以下	±2.5	±1
400を超え 1000以下	±4	±2
1000を超え 2000以下	±6	±3
2000を超え 3000以下	±8	

(注)ケーブルグランド径は変更できません。
NOTE : Diameter of cable gland is not able to change.

MASS APPROX. 60kg
COLOR WHITE
Unit mm

質量 約60kg
筐体色 白
単位 mm

SCNKE5244

SCANNER UNIT OUTLINE DRAWING

NKE-1087-9

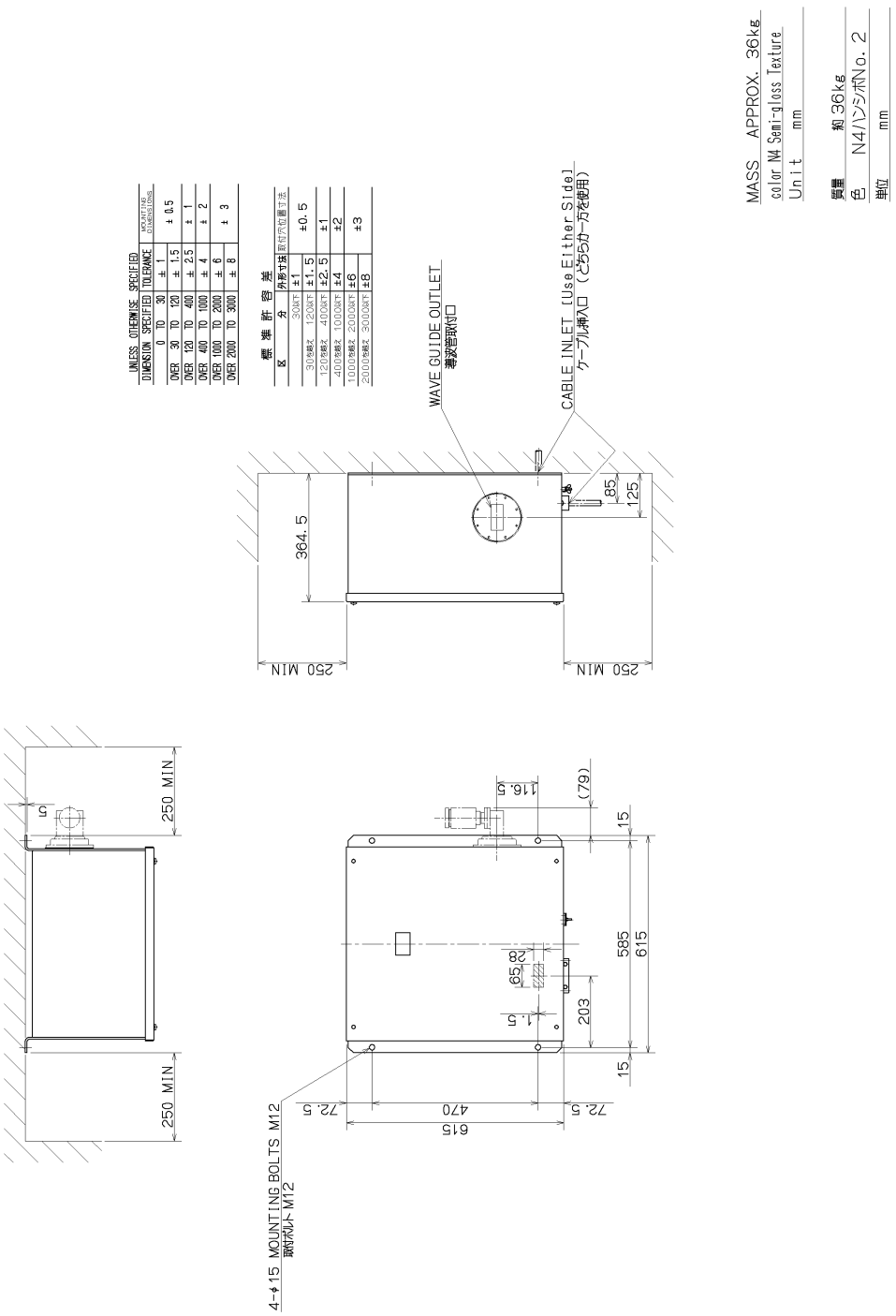


Fig.1.7 EXTERIOR DRAWING OF TRANSMITTER-RECEIVER UNIT,TYPE NTG-3037/3037A

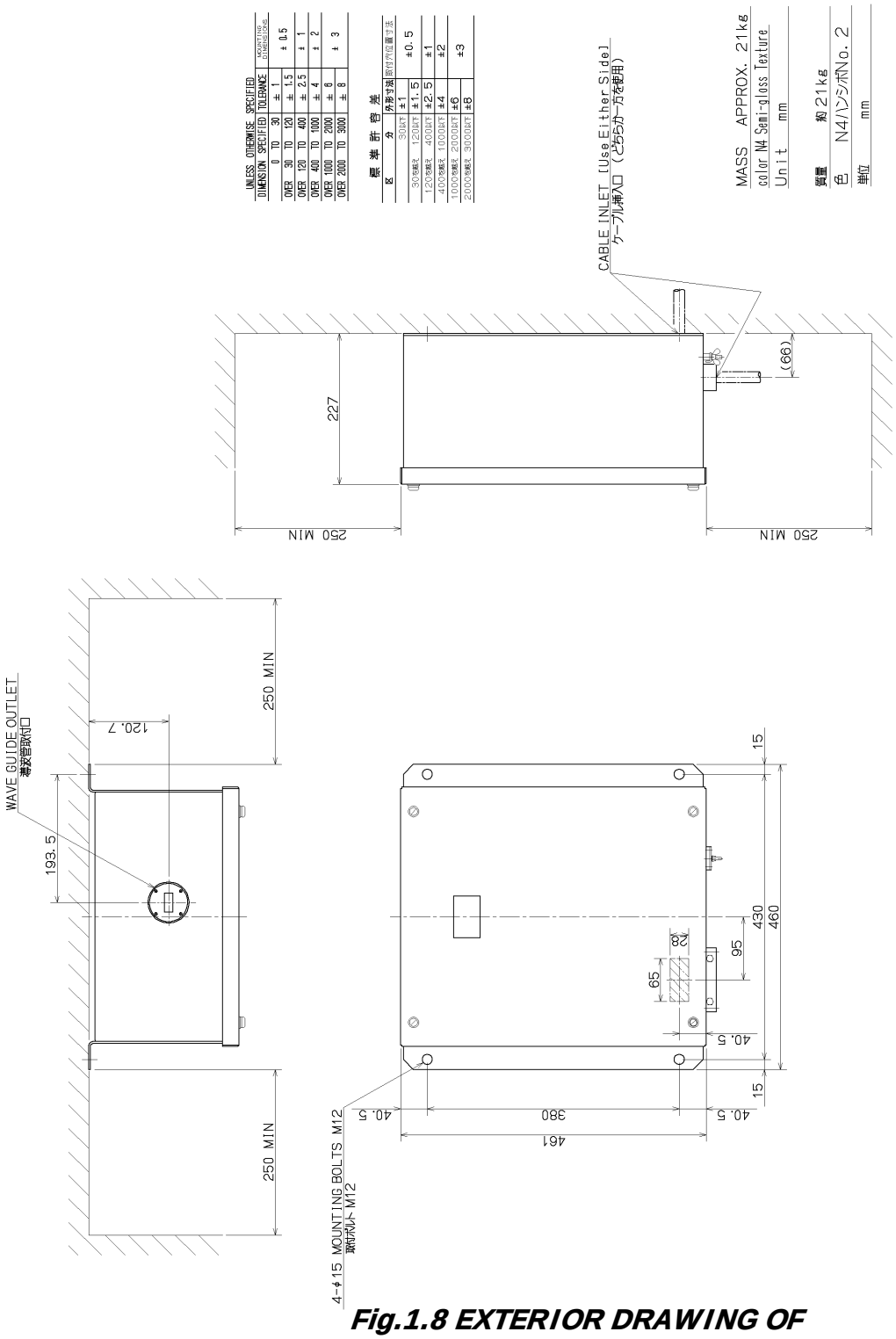
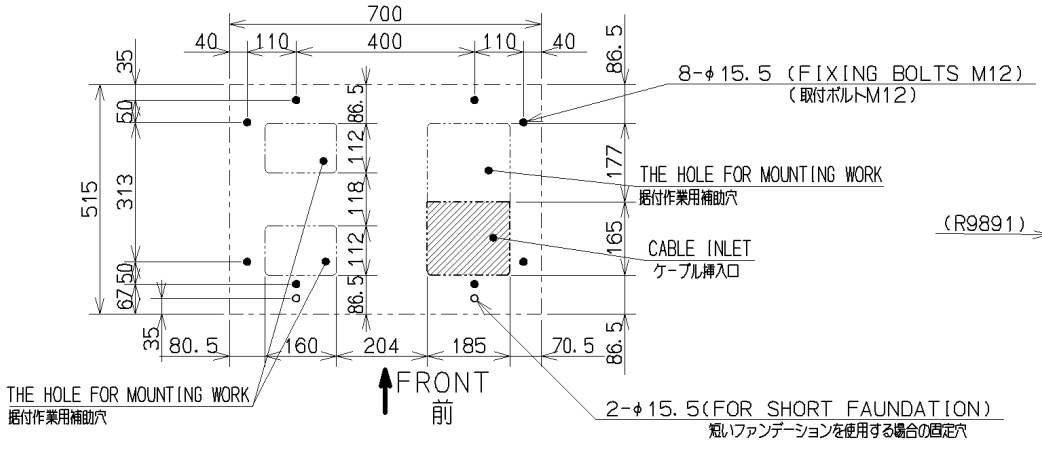
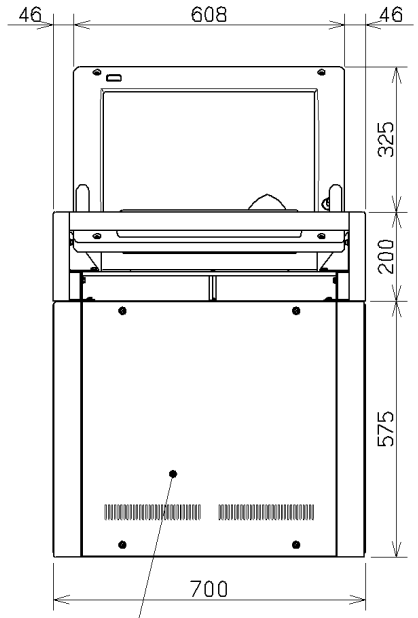


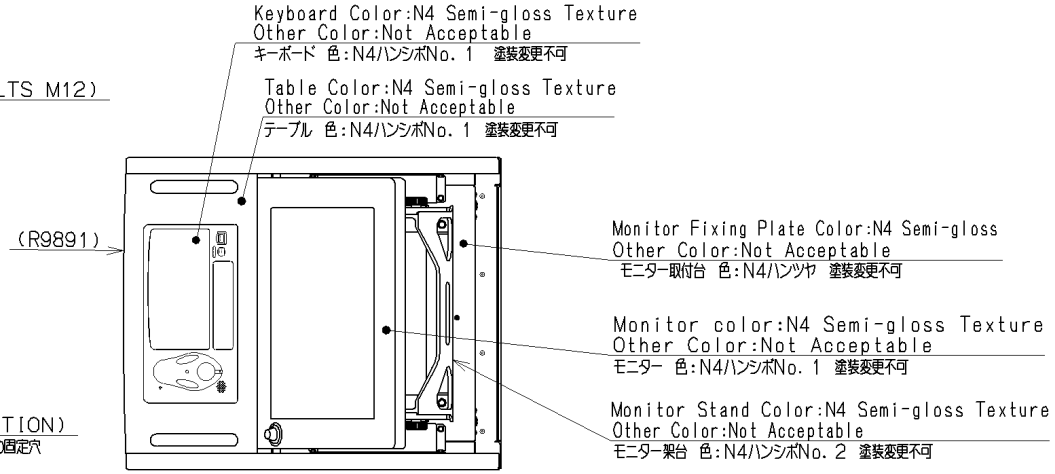
Fig.1.8 EXTERIOR DRAWING OF TRANSMITTER-RECEIVER UNIT,TYPE NTG-3028

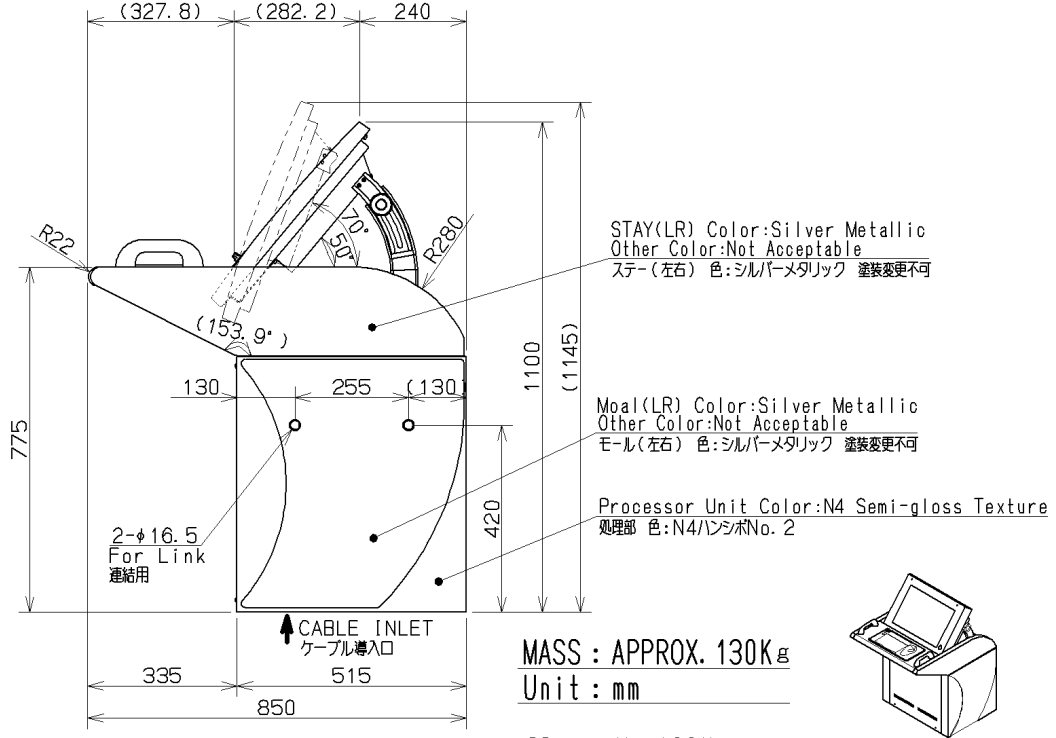


MOUNTING DIMENSIONS
取 付 寸 法 図



Stand Cover Color:N4 Semi-gloss Texture
架台カバー(前後) 色:N4ハンシボNo. 2





MASS : APPROX. 130Kg
Unit : mm

質量 : 約 130Kg
単位 : mm

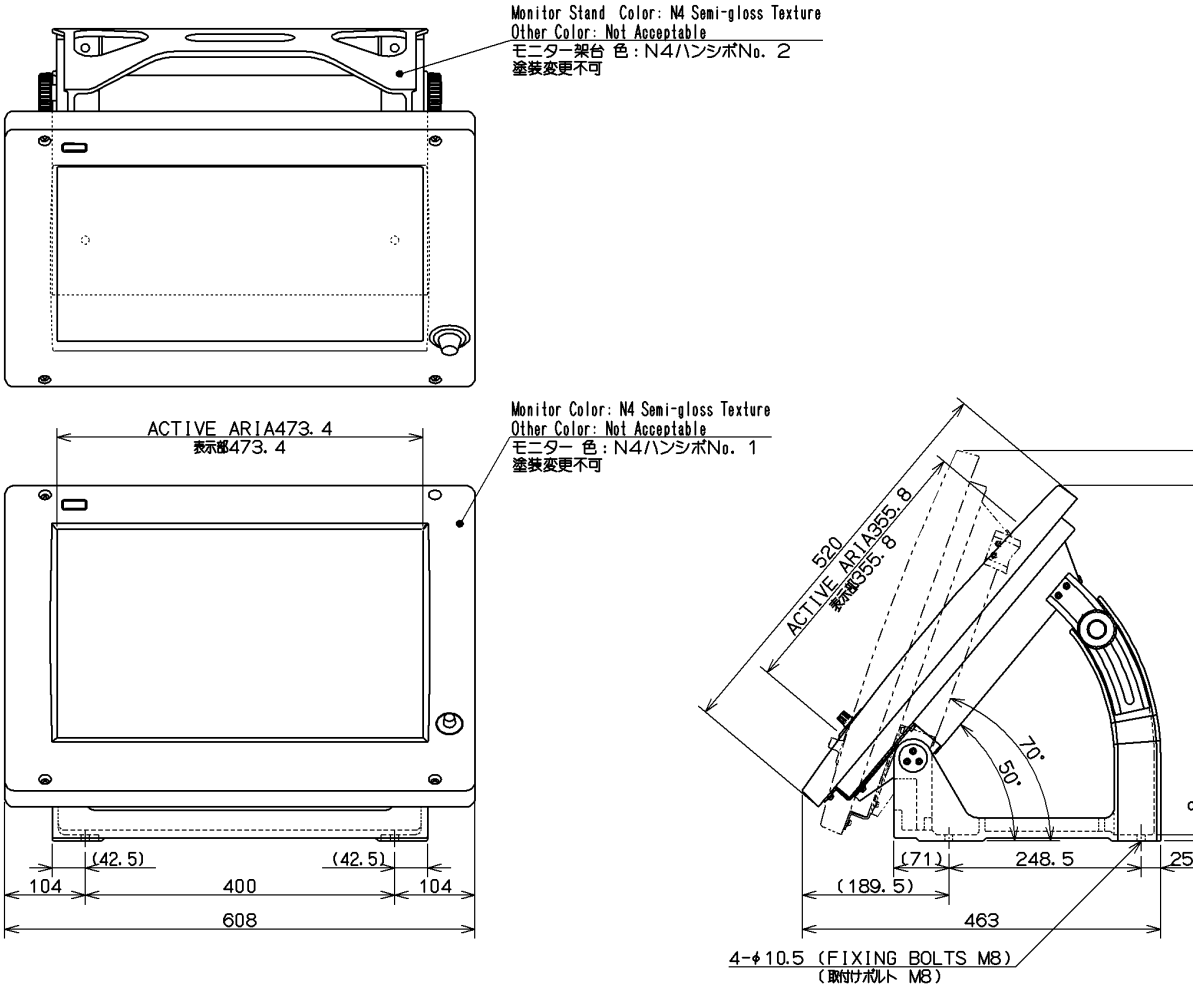
UNLESS OTHERWISE SPECIFIED

DIMENSION RANGE, IN.	TOLERANCE	
	OUTLINE DIMENSIONS	MOUNTING DIMENSIONS
0 TO 30	± 1	± 0.5
OVER 30 TO 120	± 1.5	
OVER 120 TO 400	± 2.5	± 1
OVER 400 TO 1000	± 4	± 2
OVER 1000 TO 2000	± 6	± 3

標 準 許 容 差

寸法区分		外形寸法	取付穴位置
を超え	以下	許容差	寸法許容差
-	30	± 1	± 0.5
30	120	± 1.5	
120	400	± 2.5	± 1
400	1000	± 4	± 2
1000	2000	± 6	± 2

Fig.1.9 EXTERIOR DRAWING OF DISPLAY UNIT, TYPE NCD-4263(SELF-STANDING TYPE)



PROX. 25Kg

25Kg

23 inch mo
23インチモニター

h a stand.

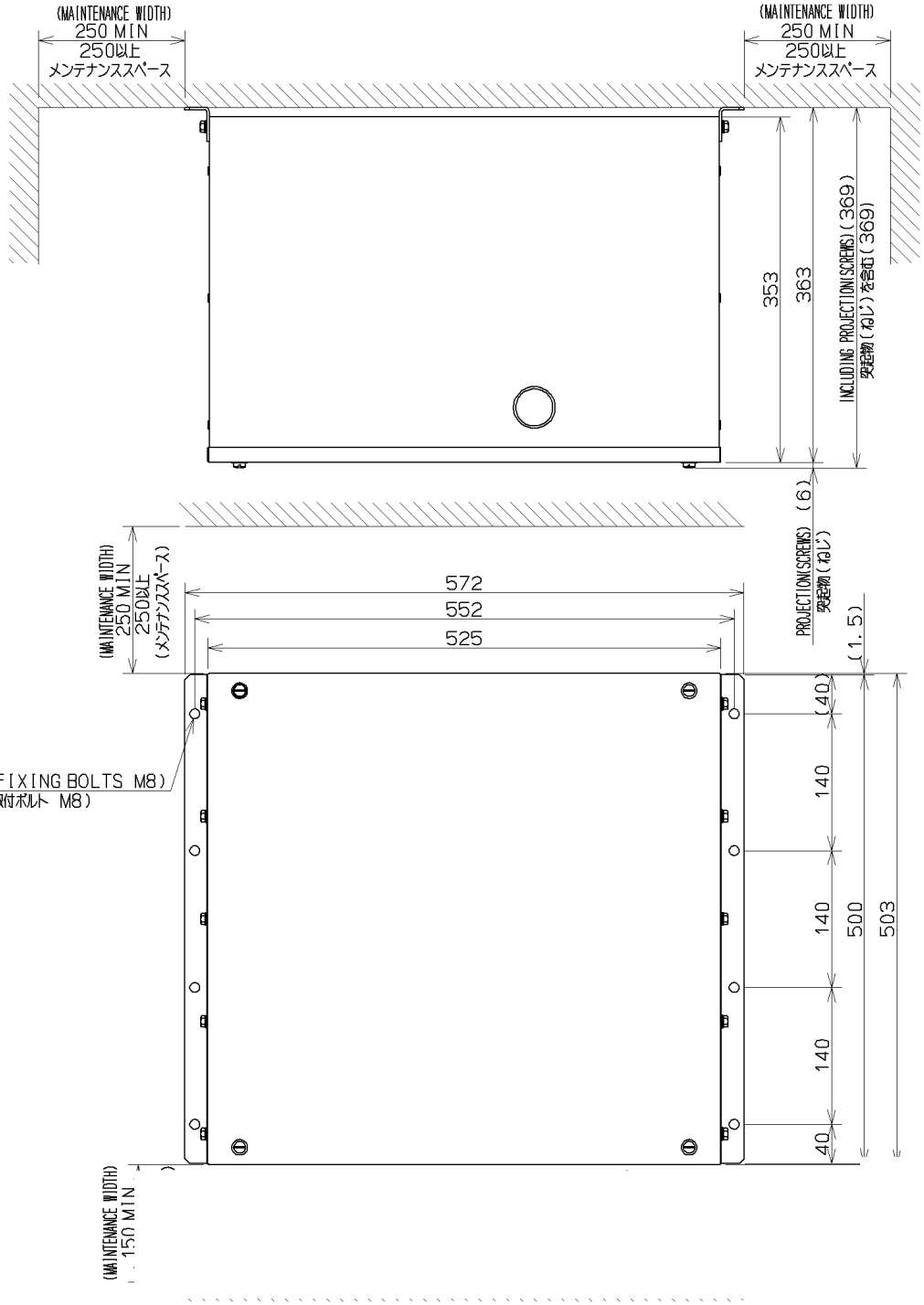
UNLESS OTHERWISE SPECIFIED

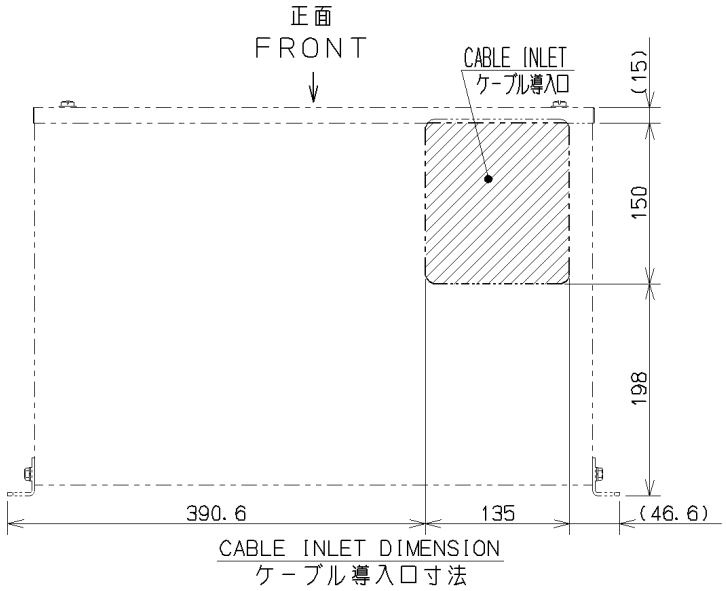
DIMENSION RANGE, IN.		TOLERANCE	
OVER	TO	OUTLINE DIMENSIONS	MOUNTING DIMENSIONS
0	30	± 1	± 0.5
30	120	± 1.5	
120	400	± 2.5	± 1
400	1000	± 4	± 2
1000	2000	± 6	± 3
2000	3000	± 8	

標 準 許 容 差

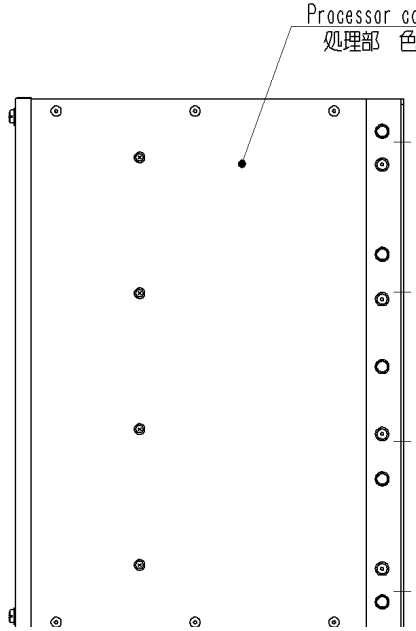
寸法区分		外形寸法	取付穴位置
を越え	以下	許容差	寸法許容差
-	30	± 1	± 0.5
30	120	± 1.5	
120	400	± 2.5	± 1
400	1000	± 4	± 2
1000	2000	± 6	± 3
2000	3000	± 8	

Fig.1.10 EXTERIOR DRAWING OF MONITOR UNIT, TYPE NWZ-158 (DESKTOP TYPE)(OPTION)





CABLE INLET DIMENSION
ケーブル導入口寸法



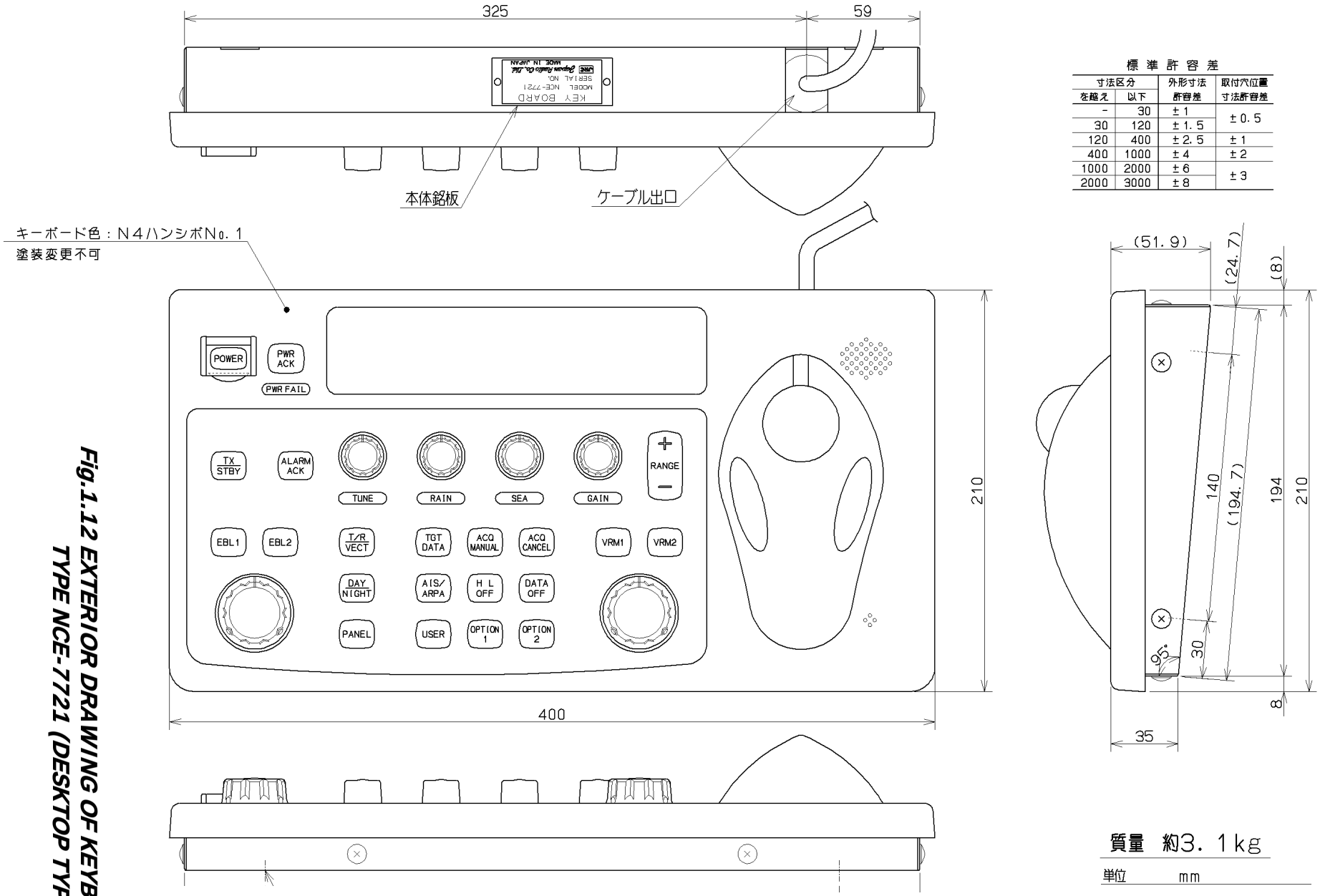
UNLESS OTHERWISE SPECIFIED DIMENSION SPECIFIED	TOLERANCE	MOUNTING DIMENSIONS
0 TO 30	± 1	±0.5
OVER 30 TO 120	± 1.5	
OVER 120 TO 400	± 2.5	± 1
OVER 400 TO 1000	± 4	± 2
OVER 1000 TO 2000	± 6	± 3
OVER 2000 TO 3000	± 8	

標準許容差

区分	外形寸法	取付穴位置
30以下	±1	± 0.5
30を越え 120以下	±1.5	
120を越え 400以下	±2.5	± 1
400を越え 1000以下	±4	± 2
1000を越え 2000以下	±6	± 3
2000を越え 3000以下	±8	

MASS: APPROX. 40Kg
Unit: mm

Fig.1.11 EXTERIOR DRAWING OF CONTROL UNIT, TYPE NDC-1279 (DESKTOP TYPE)(OPTION)



標準許容差

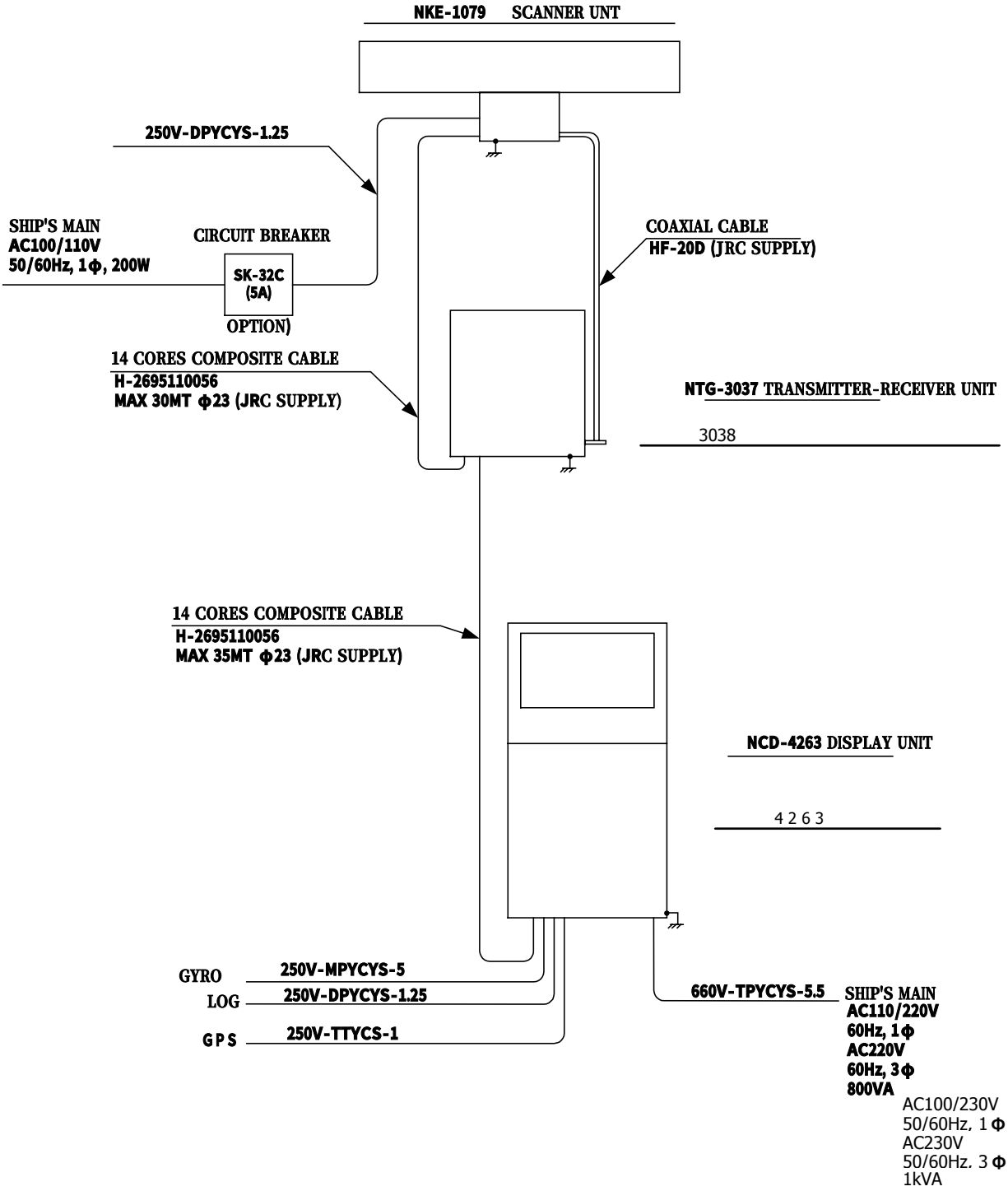
寸法区分		外形寸法	取付穴位置
を超え	以下	許容差	寸法許容差
-	30	±1	±0.5
30	120	±1.5	
120	400	±2.5	±1
400	1000	±4	±2
1000	2000	±6	±3
2000	3000	±8	

質量　約3.1kg

単位　mm

Fig.1.12 EXTERIOR DRAWING OF KEYBOARD UNIT, TYPE NCE-7721 (DESKTOP TYPE)(OPTION)

1.5 GENERAL SYSTEM DIAGRAM



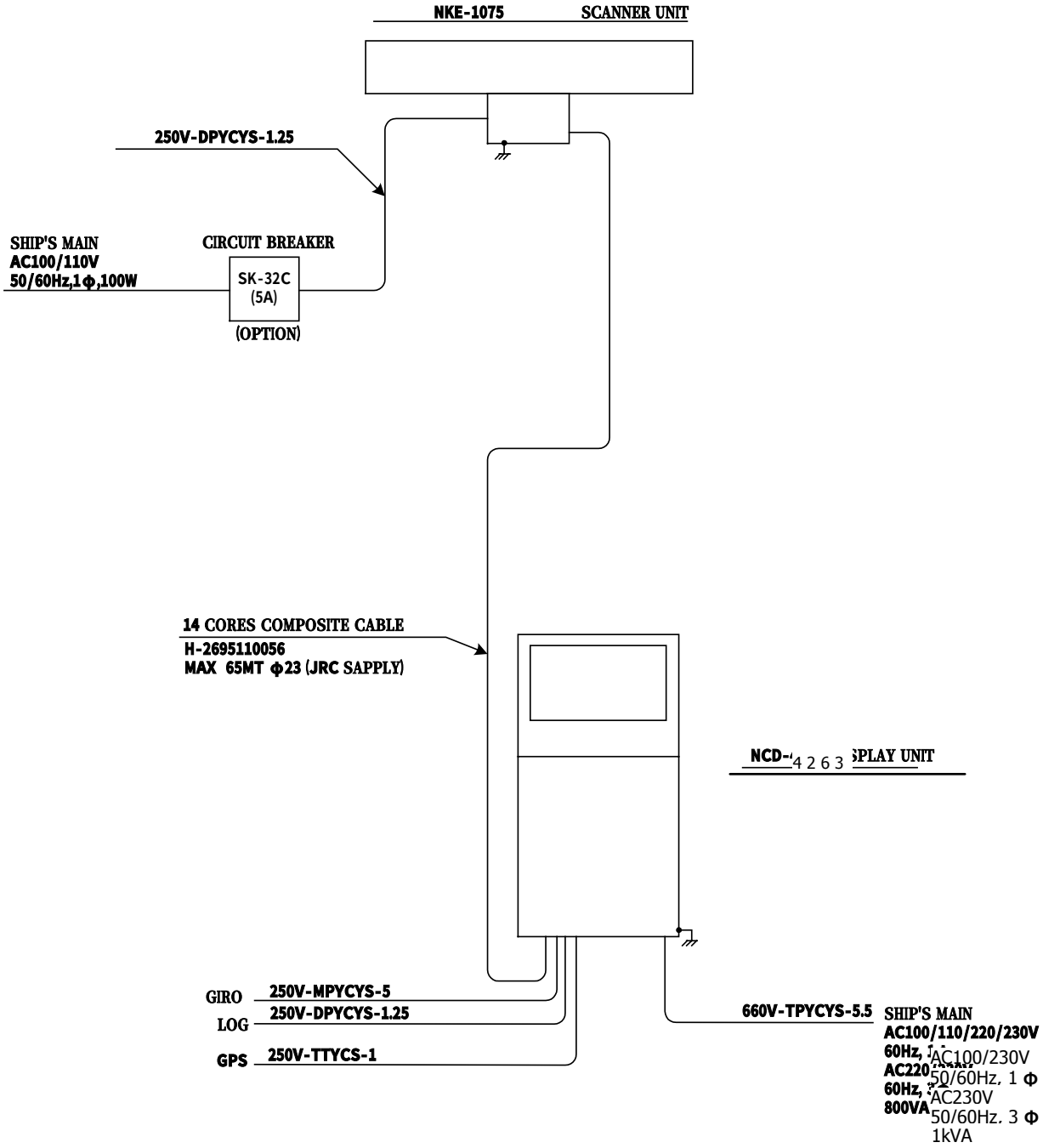
Note: Eliminating the interference on frequencies used for marine communications and navigation due to operation of the radar.

All cables of the radar are to be run away from the cables of radio equipment.

(Ex. Radiotelephone. Communications receiver and direction finder. etc)

Especially inter-wiring cables between scanner unit and display unit of the radar should not run parallel with the cables of radio equipment.

Fig.1.13 GENERAL SYSTEM DIAGRAM OF RADAR, TYPE JMA-9933-SA



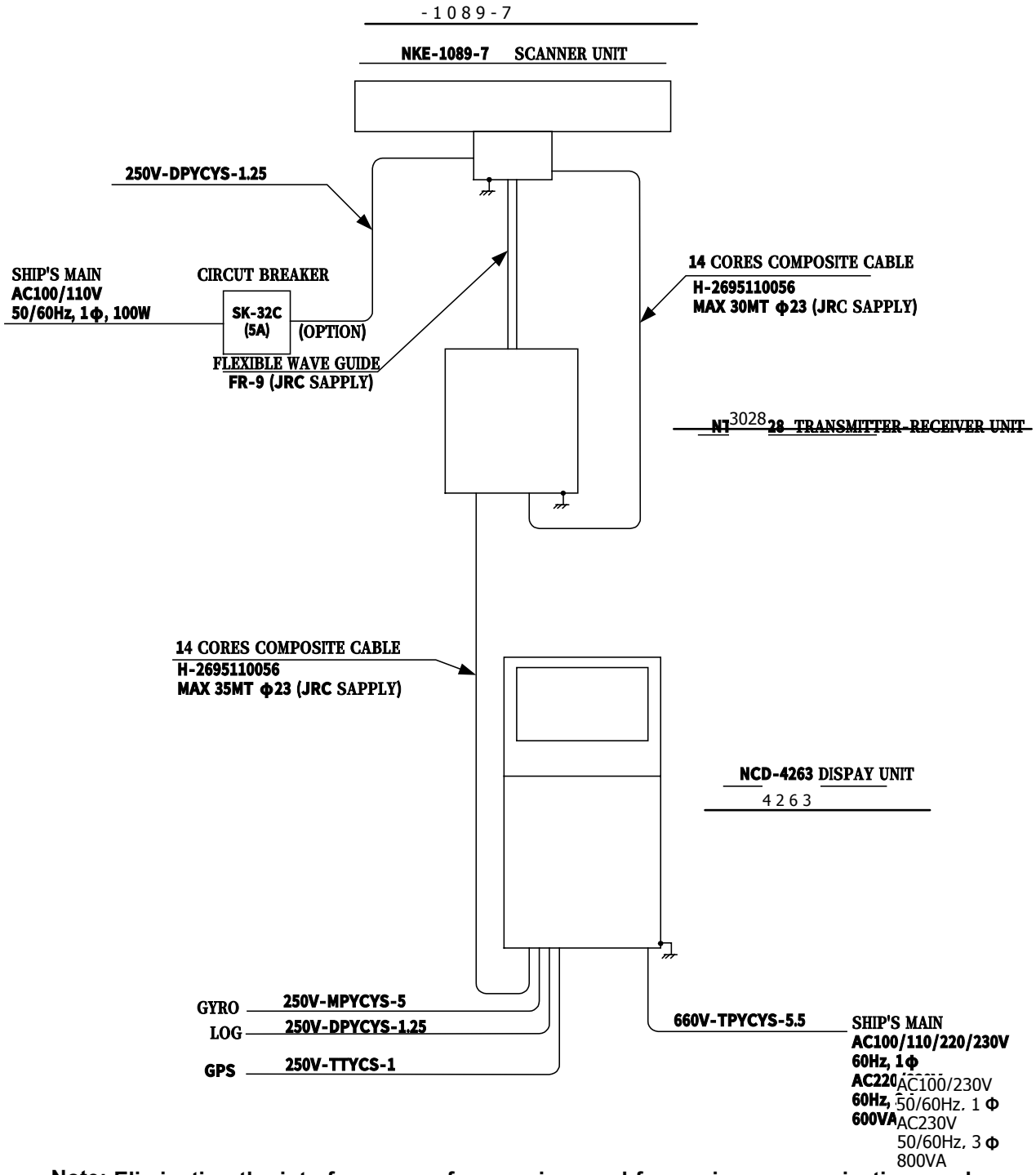
Note: **Eliminating the interference on frequencies used for marine communications and navigation due to operation of the radar.**

All cables of the radar are to be run away from the cables of radio equipment.

(Ex. Radiotelephone. Communications receiver and direction finder. etc)

Especially inter-wiring cables between scanner unit and display unit of the radar should not run parallel with the cables of radio equipment.

Fig.1.14 GENERAL SYSTEM DIAGRAM OF RADAR, TYPE JMA-9932-SA



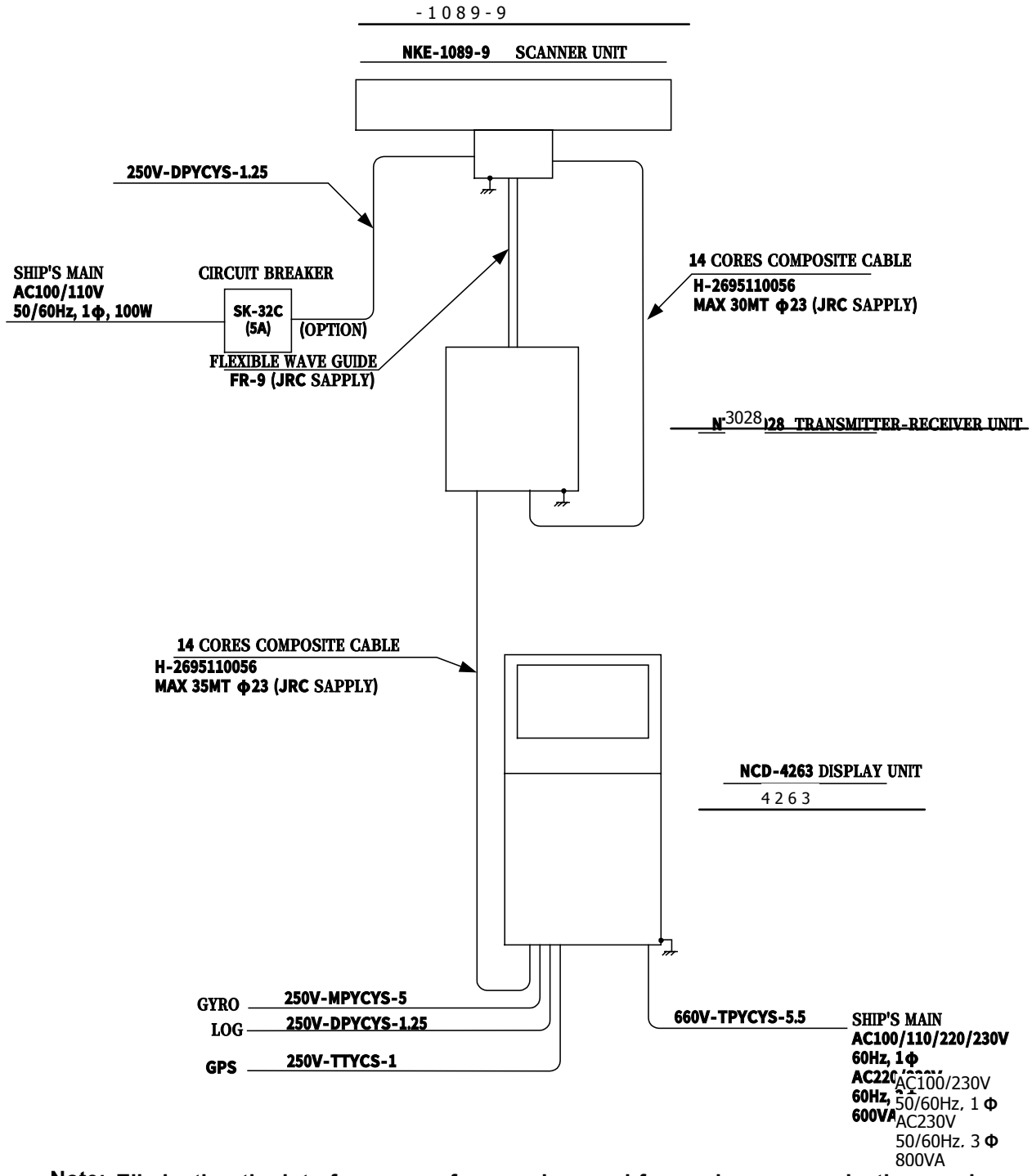
Note: Eliminating the interference on frequencies used for marine communications and navigation due to operation of the radar.

All cables of the radar are to be run away from the cables of radio equipment.

(Ex. Radiotelephone. Communications receiver and direction finder. etc)

Especially inter-wiring cables between scanner unit and display unit of the radar should not run parallel with the cables of radio equipment.

Fig.1.15 GENERAL SYSTEM DIAGRAM OF RADAR, TYPE JMA-9923-7XA



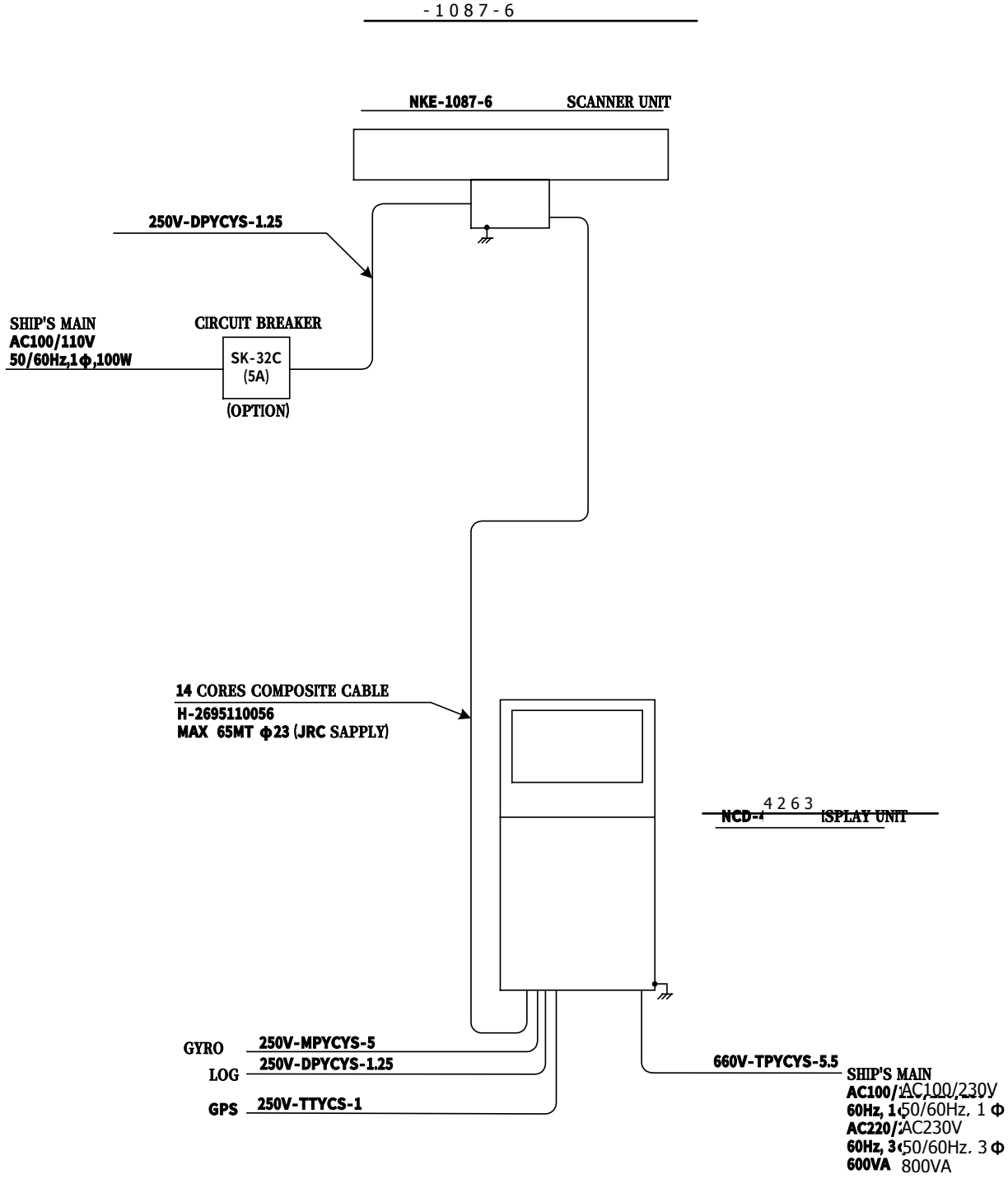
Note: **Eliminating the interference on frequencies used for marine communications and navigation due to operation of the radar.**

All cables of the radar are to be run away from the cables of radio equipment.

(Ex. Radiotelephone. Communications receiver and direction finder. etc)

Especially inter-wiring cables between scanner unit and display unit of the radar should not run parallel with the cables of radio equipment.

Fig.1.16 GENERAL SYSTEM DIAGRAM OF RADAR, TYPE JMA-9923-9XA



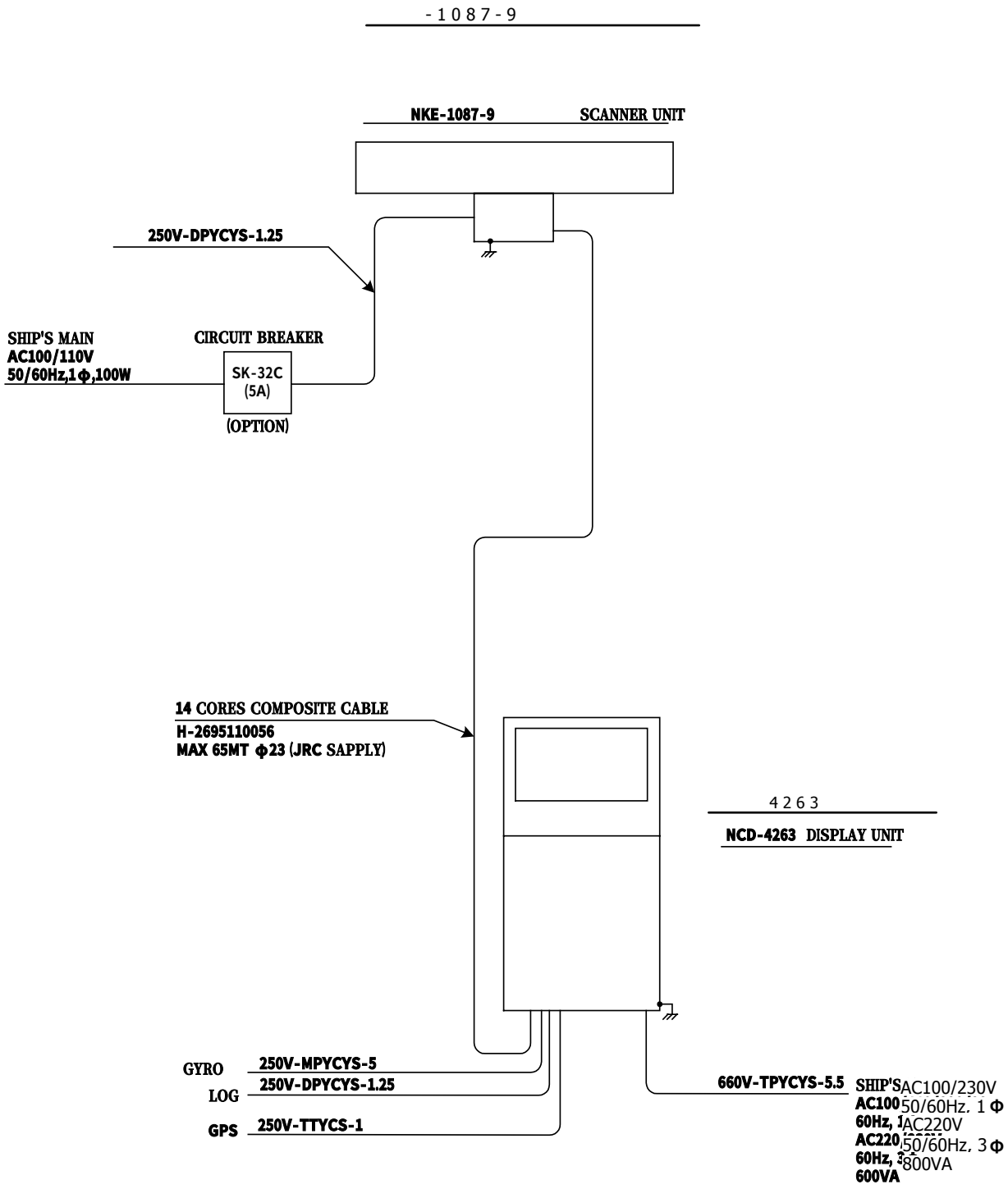
Note: Eliminating the interference on frequencies used for marine communications and navigation due to operation of the radar.

All cables of the radar are to be run away from the cables of radio equipment.

(Ex. Radiotelephone. Communications receiver and direction finder. etc)

Especially inter-wiring cables between scanner unit and display unit of the radar should not run parallel with the cables of radio equipment.

Fig.1.17 GENERAL SYSTEM DIAGRAM OF RADAR, TYPE JMA-9922-6XA



Note: Eliminating the interference on frequencies used for marine communications and navigation due to operation of the radar.

All cables of the radar are to be run away from the cables of radio equipment.

(Ex. Radiotelephone. Communications receiver and direction finder. etc)

Especially inter-wiring cables between scanner unit and display unit of the radar should not run parallel with the cables of radio equipment.

Fig.1.18 GENERAL SYSTEM DIAGRAM OF RADAR, TYPE JMA-9922-9XA

1.6 COLLISION AVOIDANCE

.....Problems of Collision Avoidance in Navigation .....

Marine collision avoidance is one of the problems that have been recognized from of old. Now, it will be described briefly who the collision avoidance is positioned among the navigational aid problems.
The navigation pattern of all mobile craft constitues a system with some closed loops regardless of the media through which the mobile craft travels, whether air, water, the boundary between air and water, or space. This pattern consists of two closed loops in principle, one of which is a collision with another mobile craft and the other is a loop of finding a right and safe way to reach a predeterminate destination. Fig.1.19 shows the conceptual diagram of navigation pattern by MR. E.W. Anderson. The closed loop of collision avoidance is shown on the left side and the closed loop of finding a right course on the right side.

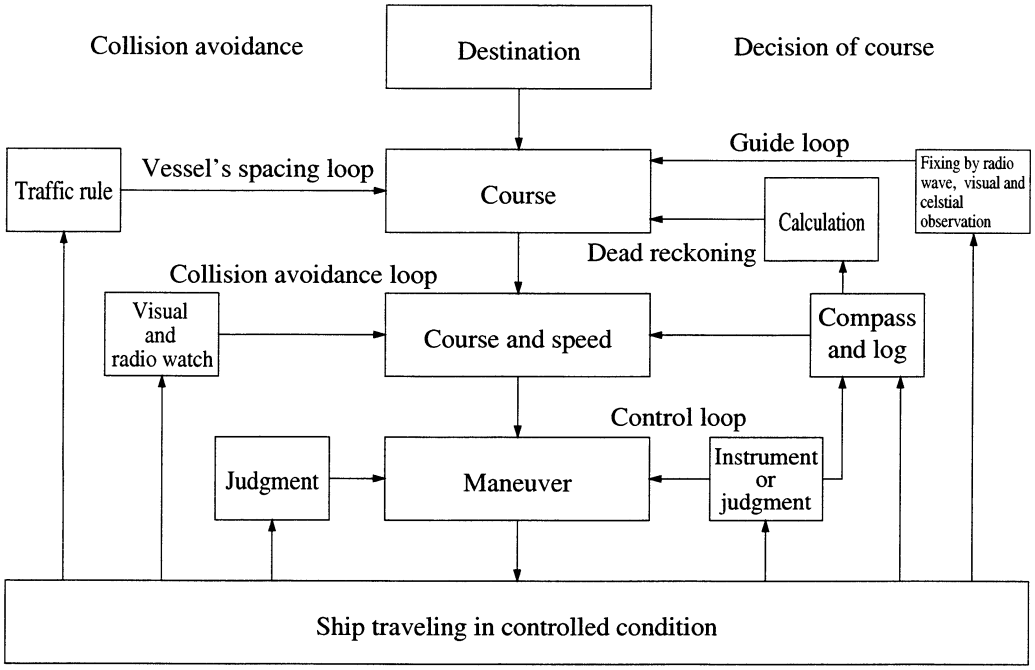


Fig.1.19 Navigation Pattern

.....Marine Accidents and Collisions .....

Among marine accidents, collision accidents have been highlighted as the tonnages and speeds of ships become higher along with the increase in traffic at sea. If a tanker carrying dangerous articles such as crude oil collides with any other vessel, then not only the vessels involved with the accident but other vessels in the vicinity, port facilities, inhabitants in the coastal area as well as marine resources may also suffer immeasurable damages and troubles. Collision accidents have a high percentage of the marine accidents that have occurred in recent years. To cope with these problems, any effective measures are needed and some equipment to achieve collision avoidance requirements have been developed at rapid strides.

.....Basic Concept of Collision Avoidance .....

There are two aspects in collision avoidance: collision prediction and avoidance. Collision prediction is to predict that two or more vessels will happen to occupy the same point at the same time, while collision avoidance is to maneuver vessels not to occupy the same point at the same time.
In practical operation of vessels, a spot of collision has to be deemed to be a single point but a closed zone. This closed zone is conceptually defined as a CPA (Closest Point of Approach). In collision prediction, the time to be taken until a ship reaches the CPA is defined as a TCPA (Time to CPA). Fig.1.20 shows a diagram called "Collision Triangle".

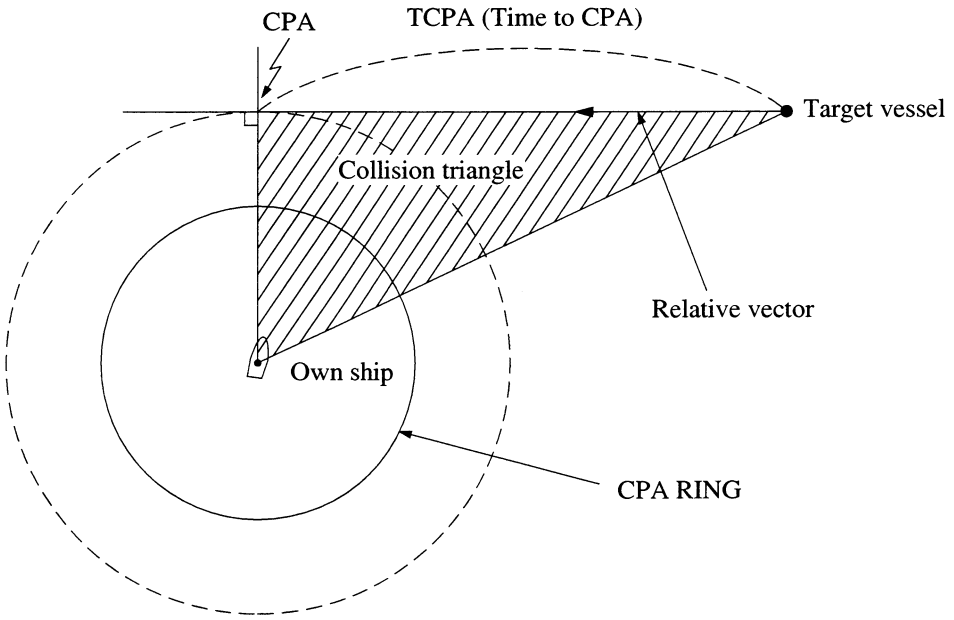


Fig.1.20 Collision Triangle

.....Relative Vector and True Vector .....

From two points of view, collision prediction and avoidance, it is necessary to obtain the relative vector of other ship for prediction and the true vector of other ship for collision avoidance in order to grasp other ship's aspect. The relationship between the relative vector and true vector is shown in Fig.1.21.
Both rough CPA and TCPA can be obtained easily from the relative speed vector of other ship. This method has an advantage that the risks of collision with all other ships within the radar range can be seen at a glance. On the other hand, the course and speed of other ship can easily be obtained from its true speed vector, enabling other ship's aspect to be seen at a glance. Thus, the aspects of other ships (transverse, outsail, parallel run, reverse run, etc.) as described in the Act of Prevention of Collision at Sea can be readily grasped. If there is a risk of collision with other ship, the operator can determine which rule to be applied and how to operate own ship.

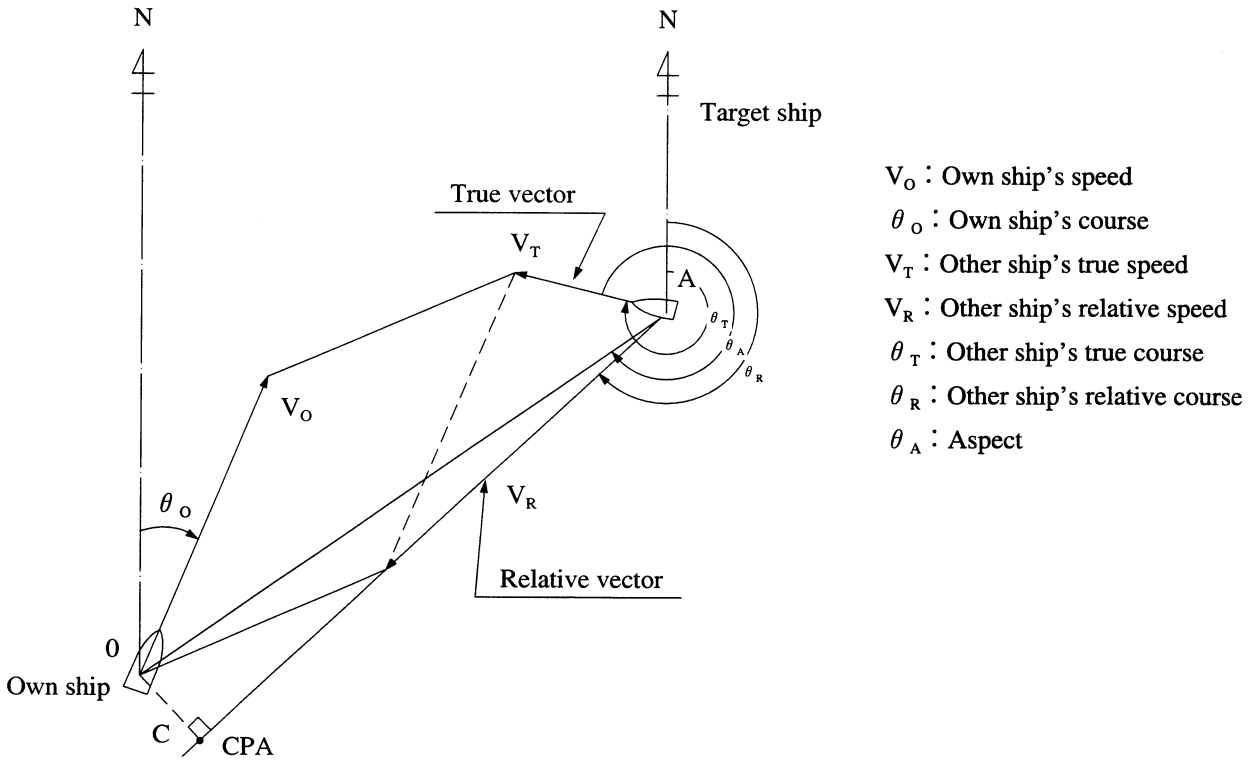
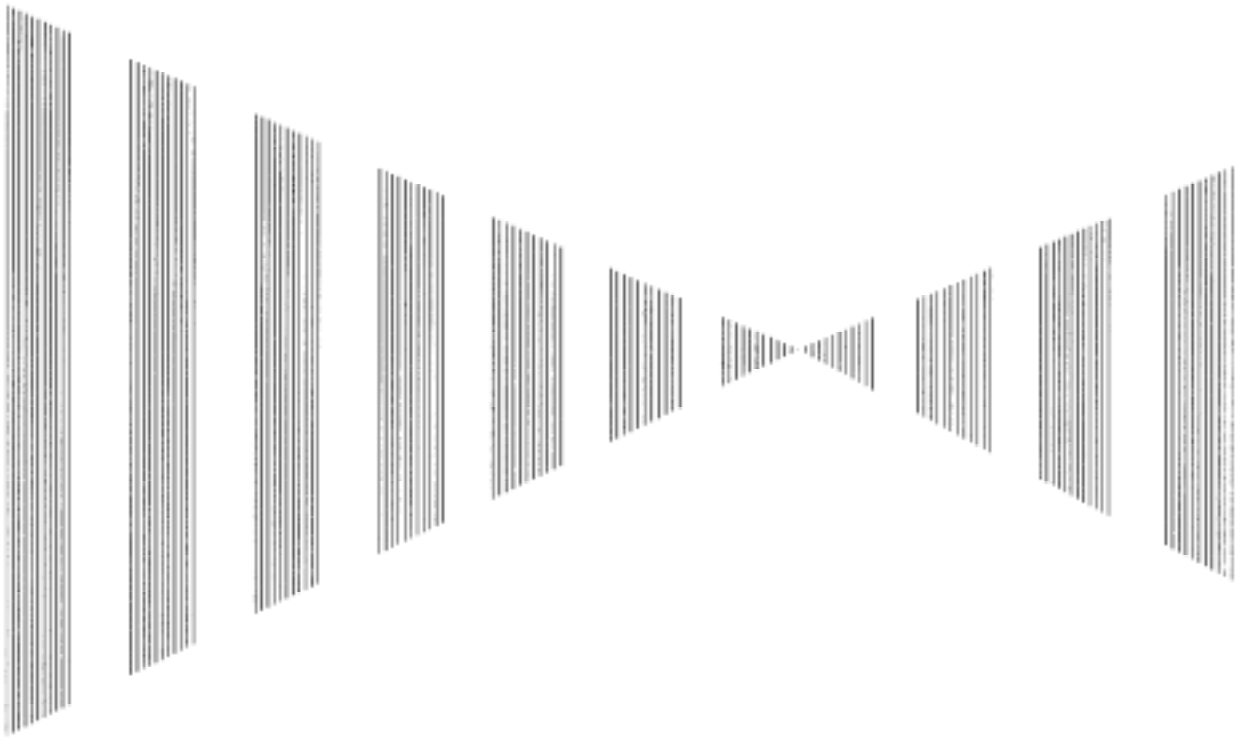


Fig.1.21 Relative Vector and True Vector

.....Radar and Collision Avoidance .....

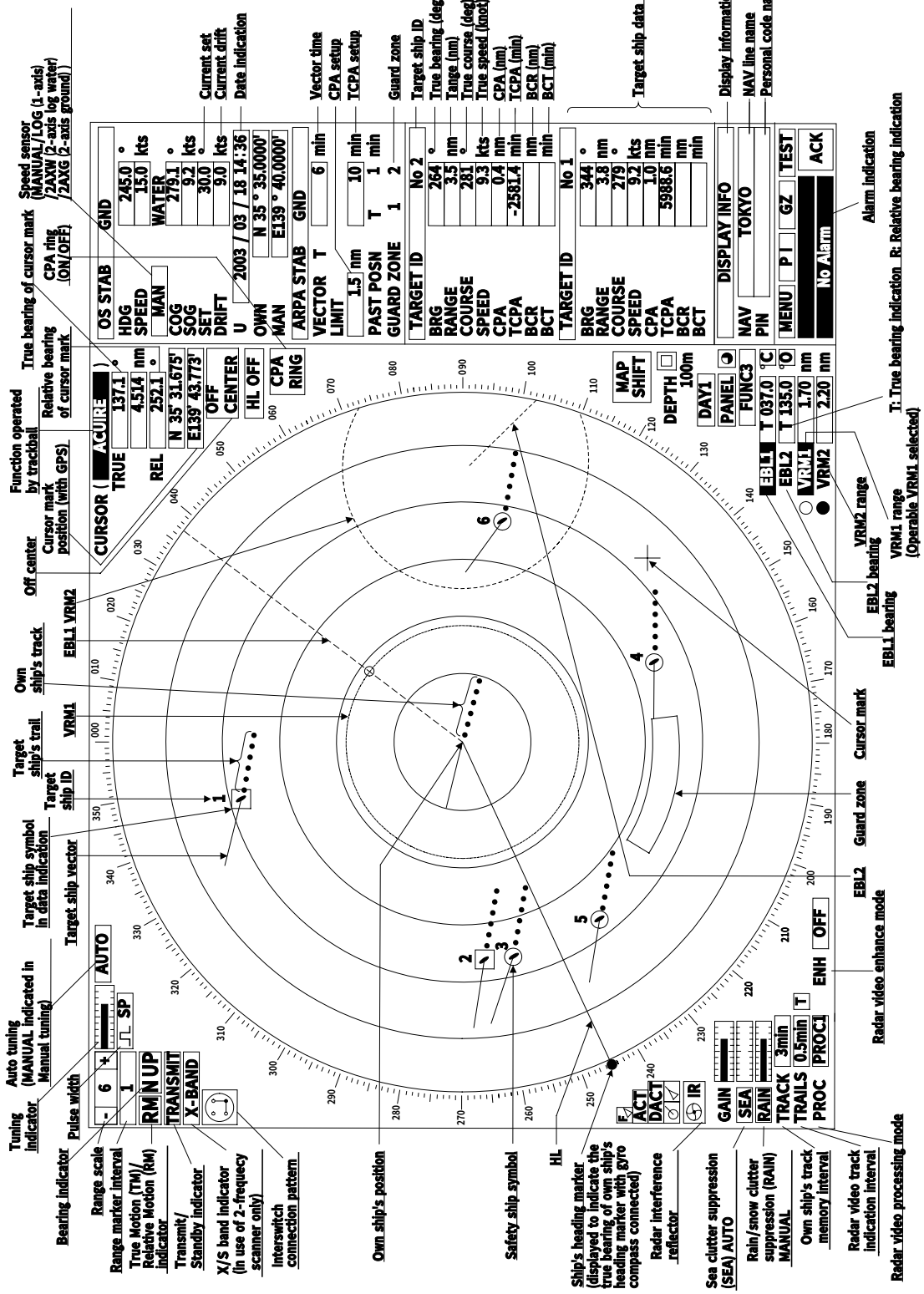
Radar is still playing an important roll for collision prevention and positioning. A plotter is used to further enhance the radar functionality. The plotter is capable of plotting other positions of other ships in 3 to 6 minute intervals to monitor their movements. The plots of other ships represent their tracks relative to own ship, and it is shown whether there is a risk of collision, namely CPA and TCPA can be obtained. This method using a plotter is fairly effective, but the number of target ships, which are manually plotted, is limited and it takes several minutes to measure those.

SECTION 2
NAME AND FUNCTION OF CONTROL PANEL SWITCHES AND FUNCTION OF SOFTWARE BUTTONS

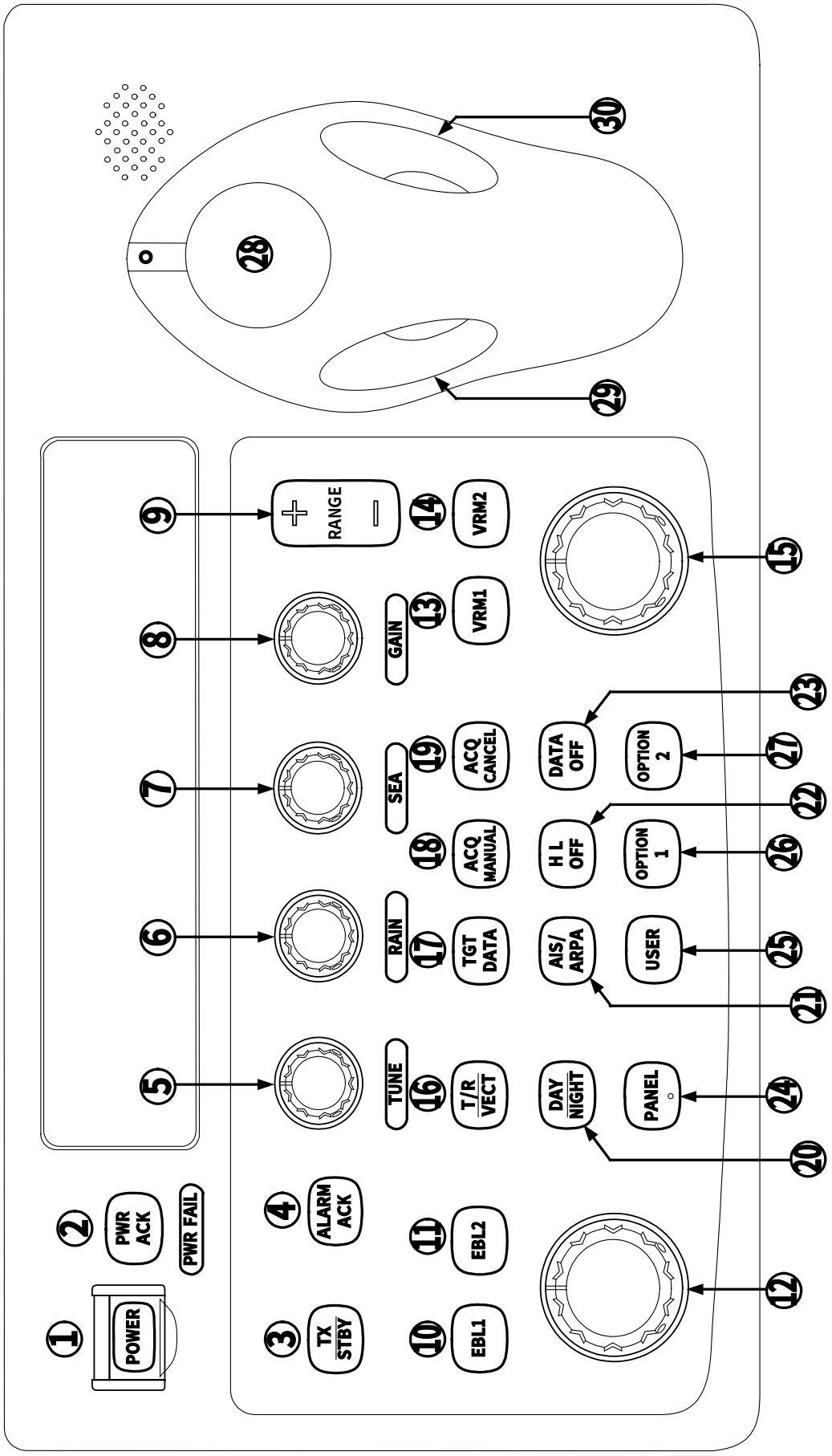


NAME AND FUNCTION OF CONTROL PANEL SWITCHES

Screen Display Example



Name and Function of Control Panel Switches



① [POWER] (Power Supply) Switch

This switch is used to turn the power on and off. The lamp lights when this switch is on.
When the power is on and it cannot be turned off for some reason, depressing this switch for five seconds will force the power off.

② [PWR ACK] (Power Alarm Acknowledgment) Switch

When this switch is set to ON, the lamp lights to start the system.
In order for this key to work, an external battery is required (normally a power supply separate from the AC unit).

③ [TX/STBY] (Operation) Switch

The 「STANDBY」 will appear at the upper left of the radar display about 3 minutes after the [PWR] switch is set to ON. Then, press this switch, and transmission will be started.
Pressing the switch during transmission sets the equipment to the standby state.

④ [ALARM ACK] (Alarm Acknowledgment) Switch

Press this switch to acknowledge a failure, approach of a target, or collision alarm.

⑤ [TUNE] (Turning) Control

Tunes the target signals to display the targets most clearly on the radar display.
Switching between AUTO and MANUAL can be done by pressing the knob.

⑥ [RAIN] (Rain/Snow Clutter Suppression) Control

Reduces the clutter echo caused by rain and snow.
Be careful not to set this adjustment too high. Setting this adjustment too high may cause the target to be erased. Switching between AUTO and MANUAL can be done by pressing the knob.

⑦ [SEA] (Sea Clutter Suppression) Control

Reduces the clutter echo caused by the surface of the sea.
Be careful not to set this adjustment too high. Setting this adjustment too high may cause the target to be erased. Switching between AUTO and MANUAL can be done by pressing the knob.

⑧ [GAIN] (Receiving Sensitivity) Control

Controls the radar receiving sensitivity.
Adjust the GAIN to a point where the background static does not interfere with operation.

⑨ [RANGE +/-] (Range Scale Select) Switch

Selects a range scale from 0.125 to 96 (or 120) nautical miles.

⑩ [EBL1] (Electric Bearing Line 1) Switch

Selects and displays EBL1. Switches between ON and OFF, and the function for which this switch if valid. When depressed for two seconds or longer, this switch selects ON/OFF for the floating setting.

⑪ [EBL2] (Electric Bearing Line 2) Switch

Selects and displays EBL2. Switches between ON and OFF, and the function for which this switch if valid. When depressed for two seconds or longer, this switch selects ON/OFF for the floating setting.

⑫ [EBL] (Electric Bearing Line) Control

Rotates the bearing of the EBL that is selected by EBL1 and 2.

⑬ [VRM1] (Variable Range Marker 1) Switch

Selects and displays VRM1.

Switches between ON and OFF, and the function for which this switch if valid.

⑭ [VRM2] (Variable Range Marker 2) Switch

Selects and displays VRM2.
Switches between ON and OFF, and the function for which this switch if valid.

⑮ [VRM] (Variable Range Marker) Control

Changes the range of the VRM that is selected by VRM1 and 2.

⑯ [T/R VECT] (TM/RM Mode Select) Switch

Selects the ARPA vector display in the TM or RM mode.

⑰ [TGT DATA] (Target Data Setup) Switch

This switch is used to display numeric data of ARPA being tracked and AIS being displayed.
When this switch is depressed for two seconds, the numeric display next to symbols will be turned on and off.

⑱ [ACQ MANUAL] (Manual Acquisition) Switch

This switch turns on and off manual acquisition of ARPA targets.
When this key is pressed, the cursor mode is changed to the manual acquisition setting mode.

⑲ [ACQ CANCEL] (Acquisition Cancel) Switch

This switch cancels the symbol and vector of an ARPA target being tracked, and stops tracking the target.
If depressed for two seconds or longer, that tracking of all targets will be cancelled. (ARPA display)
When using with AIS, pressing this for two seconds, all targets will be paused and displayed.

⑳ [DAY/NIGHT] (Day/Night Mode Select) Switch

Switches the screen color and brilliance according to the DAY, DAY2, NIGHT1 and NIGHT2 setting.

㉑ [AIS/ARPA]

Selects whether to use the ACQ MANUAL and ACQ CANCEL keys with ARPA or AIS.

㉒ [HL OFF] (Heading Line Off) Switch

The ship's heading line (HL) can be cancelled as long as this switch is depressed.

㉓ [DATA OFF]

While this switch is depressed, graphics other HL, the range ring, EBL and VRM will be deleted temporarily.

㉔ [PANEL] (Operation Panel Brightness) Switch

Controls the brightness of the controls and switches on the operation panel.

㉕ [USER]

The registered function is called. Also, if an option is connected, then this is used to operate that option.
At the time of factory shipments, it is set as ON of the function which switches the vector length of "ARPA" in 60 minutes, and OFF.

㉖ [OPTION1]

The registered function is called. Also, if an option is connected, then this is used to operate that option.
The call of a MENU is assigned at the time of factory shipments.

㉗ [OPTION2]

The registered function is called. Also, if an option is connected, then this is used to operate that option.
The call of a TEST is assigned at the time of factory shipments.

㉘ [Trackball]

The trackball is used to move the cursor to arbitrary locations on the screen. It is used to make settings in the various modes.
It is used to specify the center position of floating EBLs and specify the off center position.

㉙ [Left Trackball Button]

This button Is used to select various modes and confirm numeric input.
In the MARK mode, it is used to confirm the screen mark. During manual acquisition of ARPA, it is used to confirm acquisition.

㉚ [Right Trackball Button]

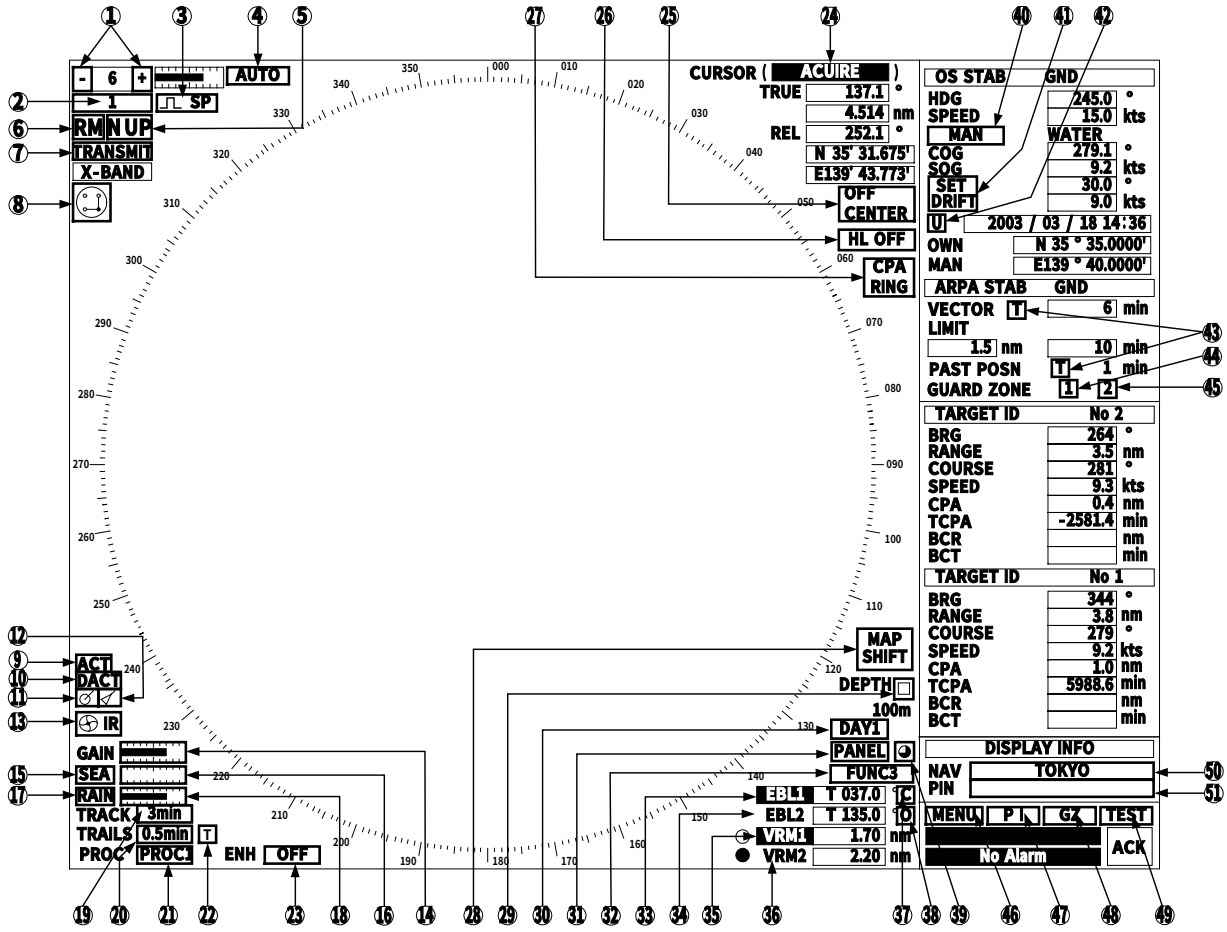
In the MARK mode, this button is used to delete screen marks.
During manual acquisition of ARPA, it is used to release acquisition.

㉛ [BRILL] Control

Controls the brilliance of the entire display panel.
Brilliance knob is located right-hard if a screen.

FUNCTION OF SOFTWARE BUTTONS

This radar provides software buttons on the screen which can be used to set important functions directly and swiftly without opening a menu.



By positioning the arrow cursor on the buttons indicated by ⑤① to ⑤① in the figure above and then pressing the left trackball button, the settings can be changed in the ways described below.

① Range selection

Changes the radar range.
"+": Increases the range by one step. (The maximum range is 96 or 120 nautical miles.)
"-": Decreases the range by one step. (The minimum range is 0.125 nautical mile.)

② RINGS indicator selection

Turns on and off the fixed distance scale display. When this is turned on, the intervals of the range rings will be displayed. When this is turned off, then "OFF" will be displayed.

③ Pulse width selection

Select the pulse width. There are three pulse widths: Short pulse (SP), middle pulse (MP) and long pulse (LP). The pulse widths that can be used depend on the range being used. If a change cannot be made, then nothing will be displayed. This setting is stored for each range.

④ Tuning indicator mode

Sets the tuning mode to MANUAL or AUTO.

MANUAL → **AUTO**

(Manual tuning) → (Automatic tuning)

⑤ Bearing mode selection

This has the same function as the [AZI MODE] switch. It switches between North-up (true bearing), Head-up (relative bearing) and Course-up. Each time this button is clicked it will step through the settings in the following order: "N UP" ⇒ "C UP" ⇒ "H UP"

⑥ Motion mode selection

The screen display is changed between the True Motion (TM) and Relative Motion (RM) displays. Clicking this button will switch between "TM" and "RM." (R) indicates a relative trail. (T) indicates a true trail.

⑦ Transmission/Standby selection

About three minutes after the [PWR] switch is turned on, the "PREHEAT" indication on the upper left of the screen will change to "STANDBY."

STANDBY: Indicates that the unit is in the standby state. Clicking the switch at this time will change the unit to the transmission state.

TRANSMIT: Indicates that the unit is in the transmission state. Clicking the switch at this time will change the unit to the standby state.

⑧ Change Interswitch connection

This is displayed if Interswitch is connected. The indicator shows the connected scanner and the connection status of the indicator. When this switch is pressed, a menu to change the connection states of the scanner and indicator will be displayed. The scanner and indicator connection states cannot be changed, unless the master indicator is in the standby state.

⑨ AIS target refreshed (ACT)

When this switch is pressed, the AIS target will be activated.

⑩ AIS target deactivated (DACT)

When this switch is pressed, the activated AIS target is paused.

⑪ ARPA symbol indicator selection

Turns the ARPA symbol indicator on or off. The setting is changed each time this button is clicked.

⑫ AIS symbol indicator selection

Turns the AIS symbol indicator on or off. The setting is changed each time this button is clicked.

⑬ **Radar interference reflector function selection**
Turns on and off the radar interference reflector (IR). The IR is turned on or off each time this switch is clicked.

⑭ **Radar reception scale (GAIN)**
This indicates the degree the knob has been turned.

⑮ **Sea clutter suppression function (SEA) selection**
Selects either manual or automatic sea clutter suppression. The bar on the right indicates the position in the manual mode.

⑯ **Sea scale**
This indicates the amount the knob has been turned in manual mode. When in auto mode,"AUTO"will be displayed.

⑰ **Rain/snow clutter suppression function (RAIN) selection**
Selects either manual or automatic rain/snow clutter suppression. The bar on the right indicates the position in the manual mode.

⑱ **Rain scale**
This indicates the amount the knob has been turned in manual mode. When in auto mode, "AUTO"will be displayed.

⑲ **Own ship's trail indication interval function (TRACK) selection**
Turns on and off the own ship's trail indication interval.

⑳ **Radar trail indicator function (TRAILS) selection**
Sets the time intervals for radar trails. OFF, 0.5MIN, 1MIN, 3MIN, or 6MIN can be selected.

㉑ **Image processing function (PROC) selection**
Sets the image processing mode. OFF, PROC1, PROC2 or PROC3 can be selected.

㉒ **Radar trail mode selection**
Sets true trail or relative trail when operating the radar trail function.
"T" is displayed when true trails are used and "R" is displayed for relative trails.
This setting is also limited by the radar bearing mode.
When the North-up (N UP) mode is used, switching between "T" and "R" is possible.
When the Course-up (C UP) mode is used, only "T" is set.
When the Head-up (H UP) mode is used, only "R" is set.

㉓ **Radar image enhance (ENH) function selection**
Turns on and off the radar image enhance function. It is turned on or off each time this switch is clicked.

㉔ **Cursor mode selection**
Sets the cursor mode. Clicking this button will display a pull-down menu. After setting the mode, the cursor can be moved and the left trackball button used to make various settings.
Because all the modes are to be used during radar transmission, a mode may not operate properly if it is selected in the standby state.

㉕ **Off center mode selection**
This has the same function as the [OFF CENT] switch. Shifts the own ship position within the screen (within 60% of the scope's radius) to display a wider range in an arbitrary direction.
When this button is pressed when the system is already in the off center mode, then the off center function will be turned off.

㉖ **Heading line off setting**
Has the same function as the [HL OFF] key. While this switch is clicked, the heading lines (HL) display will be turned off.

㉗ **CPA RING indicator selection**
Turn on and off the CPA RING display.
When the vector mode is TRUE, the CPA RING cannot be turned on.

㉘ **MAP SHIFT**
This is used to mode maps made by users.

㉙ **DEPTH**
This displays the depth received from external devices.
The □ button can be used to turn on and off the depth graph display.

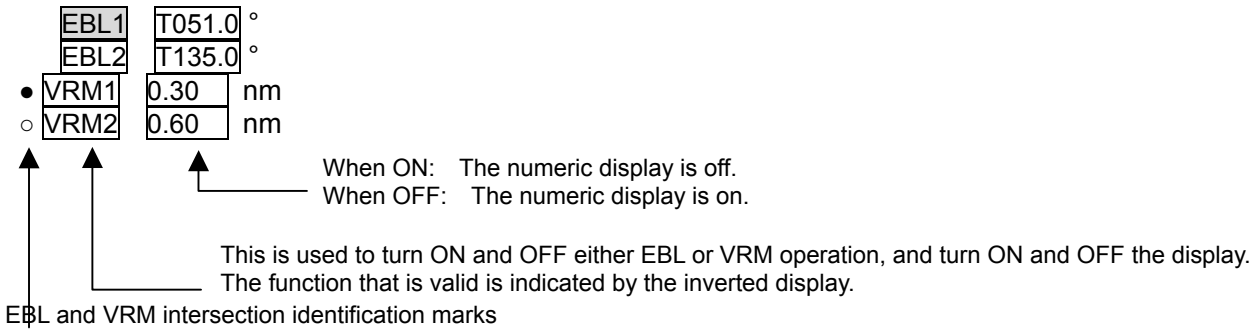
㉚ **DAY/NIGHT setting**
This button selects the day or night mode. The mode changes each time this button is clicked.
There are four settings: DAY1→ DAY2 → NIGHT1 → NIGHT2.

㉛ **PANEL/BRILL VIDEO/BRILL ARPA setting**
The modes PANEL, VIDEO, and ARPA which adjust luminosity are switched.
The mode changes each time this button is clicked.
There are three settings: PANEL→VIDEO→ARPA.

㉜ **Brilliance adjustment**
Each time this switch is clicked, it will go to the next of four (BRILL VIDEO) or five (PANEL, BRILL ARPA) brilliance settings.

㉝ **Process setting function (FUNC) selection**
Sets the process setting mode. OFF, FUNC1, FUNC2, FUNC3, FUNC4, or FUNC5 can be selected.

㉞ , ㉟ ,㊱ , ㊲ : **EBL and VRM settings**
The EBL1, EBL2, VRM1, and VRM2 switches are used to acquire operation rights.
They function in the same way as the EBL1 and 2 and VRM1 and 2 switches on the control panel.
The numeric indicator switches are used to turn on and off the various EBLs and VRMs.
When a numeric indicator displays “OFF,” that means the corresponding indicator in the PPI is off.
The switches on the control panel are used to move the EBLs and VRMs.



㊳ **EBL1 starting point mode**
Sets whether the EBL1 starting point is placed at the center of the own ship or at an arbitrary position on the radar screen. This has the same function as depressing the EBL1 switch on the control panel for a long period.

C: CENTER Indicates that the EBL1 starting point is at the own ship position.
O: OFFSET Indicates that the EBL1 starting point is not at the own ship position.
In this state, the starting point may be at the cursor position or it may be fixed at an arbitrary position on the screen. When the button is clicked, the starting point will move with the cursor position, then when the left button is clicked the starting point will be fixed at the cursor location.
L: After moving the L/L FIX EBL1 starting point, the starting point is fixed by the latitude and longitude values.
If the starting point moves out of the screen, then it will be reset automatically so that the starting point is at the own ship position.

Note: When the EBL1 starting point moves, the mode O or L is indicated by the position selected among the EBL OFFSET ORIGIN menu.

㊴ EBL2 starting point mode
Sets whether the EBL2 starting point is placed at the center of the own ship or at an arbitrary position on the radar screen.
Everything else is the same as that for the EBL2 starting point mode.

㊵ Speed unit setting
Sets the speed unit.
Clicking this button will open a pull-down menu. A unit can be selected from one of the following. An alarm is activated if the selected speed unit is not connected to the radar.
Options: MANUAL, LOG (1-axis log), 2AXW (2-axis over water), 2AXG (2-axis over ground), GPS

If the speed unit setting is “MANUAL,” then placing the cursor over the numeric section and left clicking will allow numeric input.

㊶ SET/DRIFT
Turns on and off SET/DRIFT correction.
If CORRECTION is on for this setting, then “CORR” will be displayed next to the button. The number displayed next to “CORR” at this time will be valid. Also, correction can only be set when the speed unit is in the MANUAL or LOG (1-axis log) modes.
SET setting
Placing the cursor over the numeric section and left clicking will allow numeric input. This setting is only valid if CORRECTION is ON.
DRIFT setting
Placing the cursor over the numeric section and left clicking will allow numeric input. This setting is only valid if CORRECTION is ON.

㊷ Date display mode
Sets the date mode to be displayed on the screen.
: Turns off the time display.
U : Global time display (UCT).
L : Local time display (LOCAL).

㊸ ARPA, PAST POSN vector mode setting
These set the vector display mode.
T: True vector
R: Relative vector
These settings work concurrently.

㊹ **Guard zone 1 ON/OFF function setting**
Turns the guard zone 1 function on or off.

㊺ **Guard zone 2 ON/OFF function setting**
Turns the guard zone 2 function on or off.

㊻ **MAIN MENU setting**
This button has the same functions as the MENU switch on the control panel.
Clicking this button will display the “MAIN MENU.”

㊼ **PI menu setting**
Clicking this button will open the “PI” menu.
This menu is used to set and display parallel index lines (PI).

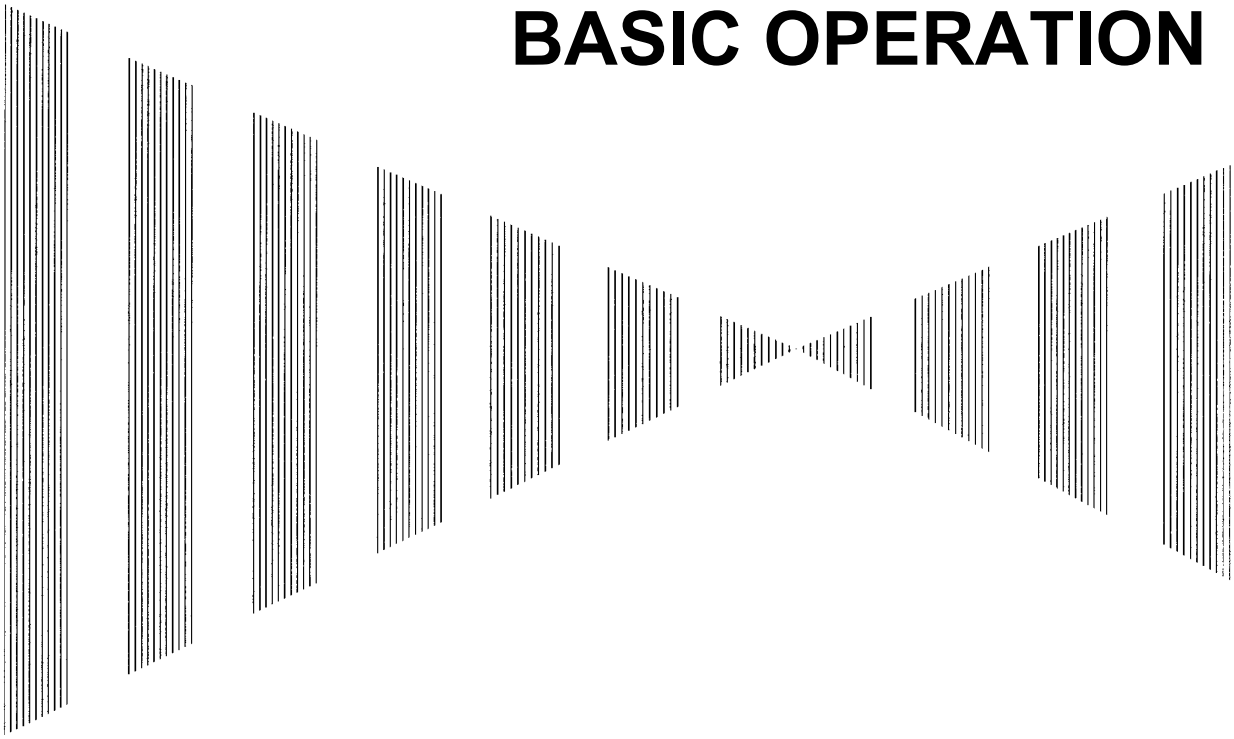
㊽ **GZ menu setting**
Clicking this button will open the “GZ” menu.
This menu will turn on and off the range settings for guard zone 1 and 2.

㊾ **TEST menu setting**
Clicking this button will open the “TEST” menu.
Checks the operational status of the radar equipment.

㊿ **Navigation information readout (NAV)**
Opens a list of navigation information files stored in the NAV/MAP INFO Menu.

(51) **Personal code name (PIN)**
Opens a list of personal code files in the PIN Menu.

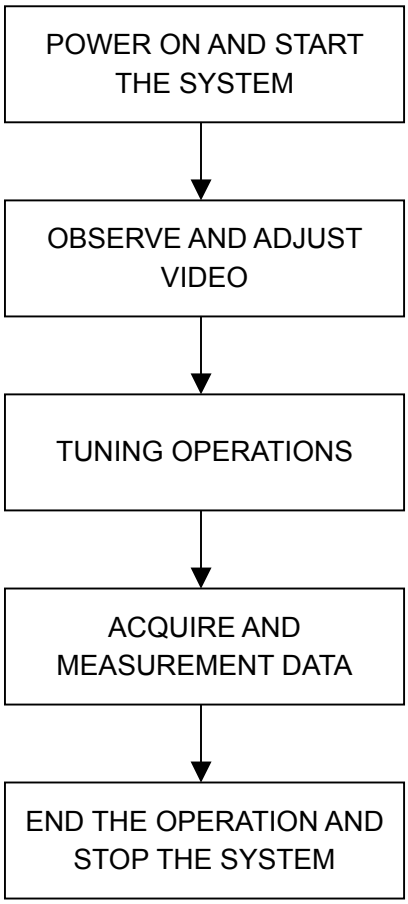
SECTION 3
BASIC OPERATION



3.1 FLOW OF OPERATION

Attention

- Do not put anything on the operation panel. If you put anything hot on it, it may be deformed.
- Do not apply sudden force to the operation panel, trackball and controls. Otherwise, some failure or damage may result.



Each operation will be described in detail below.

Power ON and Start the System

Attention

- Wait approximately 10 seconds before turning on the power again.
- A malfunction may occur if the power in the ship is suddenly interrupted during operation of the radar. In this case, the power should be turned on again.
- Immediately after the radar is installed, if the system is not used for a long time, or after the magnetron is replaced, warm-up the equipment in the standby mode for 20 to 30 minutes before setting it to the transmit mode.
- If the warm-up time is short, the magnetron may cause sparks, resulting in an unstable oscillation.
  Start transmission on a short-pulse range and then send long pulses sequentially. If the transmission is unstable in the meantime, reset the system to the standby mode immediately and maintain it in the standby mode for 5 to 10 minutes before restarting the operation. Repeat these steps until the operation is stabilized.

Procedures

1 Check that the ship's mains are turned on.

2 Press 

.

Orange lamp on 

→

The warm-up time will appear.

3

3 Wait for completion of warm-up

When the warm-up time expires, the warm-up time screen disappears and the PREHEAT display on the upper-left corner of the radar display is changed to STANDBY.

4 Press 

.

The radar transmission and the scanner start rotating.
The STANDBY on the upper-left corner on the radar display is changed to TRANSMIT.

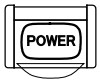
Attention: Even if 

is pressed before STANDBY is displayed, radar transmission is not performed.

The method of transmission in case of emergency.

Procedures

1 Check that the ship's mains are turned on.

2 Press . 

Orange lamp on → 

The warm-up time will appear.

3 A push of the 

5 seconds or more vanishes the display of warm-up time.

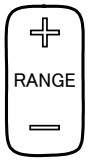
The radar transmission and the scanner start rotating.
The STANDBY on the upper-left corner on the radar display is changed to TRANSMI

Note:

In the moment sag of a power supply, and the case of an unusual operation outbreak, it can transmit, immediately after rebooting the power supply.
Please do not use emergent transmitting operation except the above.
The life of a magnetron will be shortened if the warm-up is not completed.

Observe and Adjust Video

Procedures

1 Press 

to set the range to the scale required for target observation.

2 Turn the 

or monitor brilliance knob.

Adjust to obtain the clearest targets.

Attention

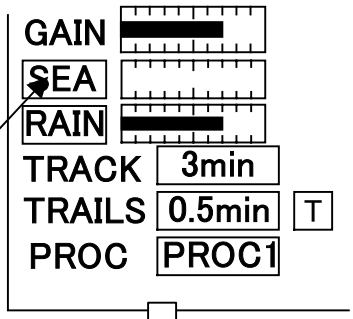
- In the AUTO SEA mode, there are cases in which the targets are not displayed because the sea clutter returns are suppressed in a simple way.
  Use the normal [SEA] control during sailing under normal conditions.
- In the AUTO RAIN mode, there are cases in which the targets are not displayed because the rain/snow clutter returns are suppressed in a simple way.
  Use the manual [SEA control during sailing under normal conditions.
- The AUTO SEA and AUTO RAIN mode cannot be used concurrently. If one is set to AUTO mode, the other will be set to MANUAL mode.

In case of Using AUTO SEA/SEMI AUTO:

AUTO

1 Press SEA. Or, when the SEA button on the screen is pressed, AUTO is set.

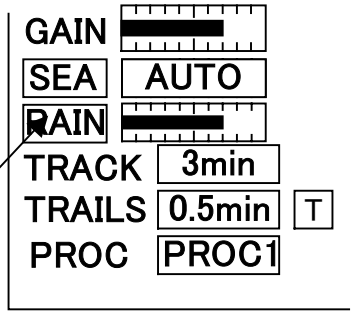
The AUTO Menu will appear.
SEA AUTO is displayed at the lower left of the radar screen.

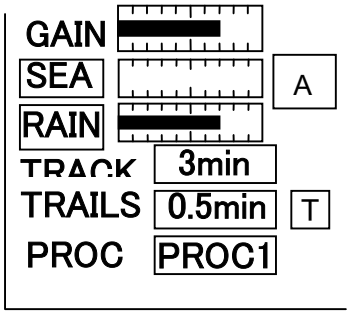


SEMI AUTO

1 Press SEA. Or, when the SEA button on the screen is pressed,SEMI AUTO is set.

The SEMI AUTO Menu will appear.
SEA A is displayed at the lower left of the radar screen.





Cancellation

1 Press SEA. Or, press the SEA button on the screen .

AUTO is released.

Note: When setting AUTO SEA / SEMI AUTO, the AUTO RAIN is set to the MANUAL mode. Both AUTO SEA and AUTO RAIN cannot be set at the same time.

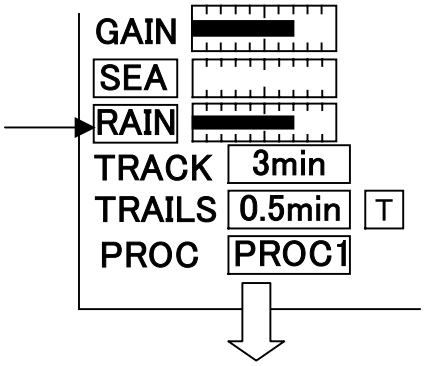
In case of Using AUTO RAIN:

Procedures

1 Press  **. Or, press the SEA**

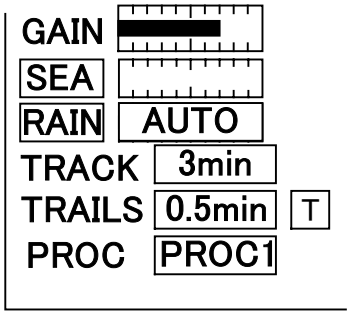
button on the screen .

RAIN AUTO is displayed on the radar screen.



Cancellation

1 AUTO is released using the same procedure that was used to set it.



3

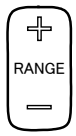
Tuning Operations

Attention

- When the receiver is detuned, the best video may not be obtained even if the maximum bar graph is displayed on the AUTO TUNE tuning indicator. In this case, adjust the [TUNE] control manually so that the best video is presented.

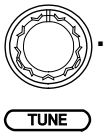
3

Procedures

1 Press 

and select any range scale from 0.125 to 96 (or 120) NM. (The current range scale is displayed at the upper left of the radar display.)

The range scale becomes shorter by pressing and longer by pressing

2 ROTATE 

.

Adjust the video to present the clearest targets.
If there is no adequate target, adjust [TUNE] control to indicate the maximum bar graph on the turning indicator at the upper left of the radar display.

In case of Using AUTO TUNE:

Procedures

1 Press 

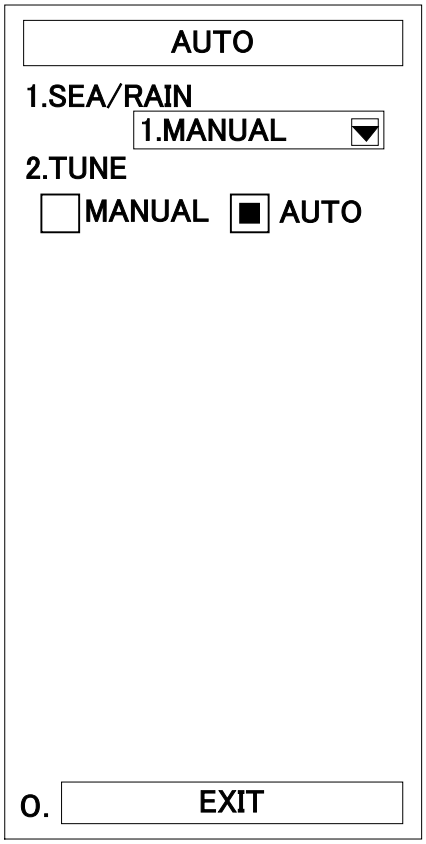
. Or, press MANUAL button.

"AUTO" in "2.TUNE" will be set and "AUTO" will appear at the upper left of the radar display.

Cancellation

1 Repeat the procedures up to step 2 in case of using AUTO TUNE.

"MANUAL"in"2.TUNE"will be set and"AUTO"at the upper left of the radar display will change to"MANUAL"and AUTO TUNE mode will be cancelled.



Acquire and Measurement Data

For detailed operations for data acquisition and measurement, refer to Section 3.4 “BASIC OPERATIONS” and Section 4 “MEASUREMENT OF RANGE AND BEARING”.

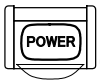
End the Operation and Stop the System

Exit

1 Press TX/STBY **.**

The radar transmission will end and the scanner will stop rotating.
The indication TRANSMIT will be changed to STANDBY.

Maintain the “STANDBY” mode if radar observation is restarted in a relatively short time. Observation can be restarted simply by pressing the [TX/STBY] switch..

2 Press 

.

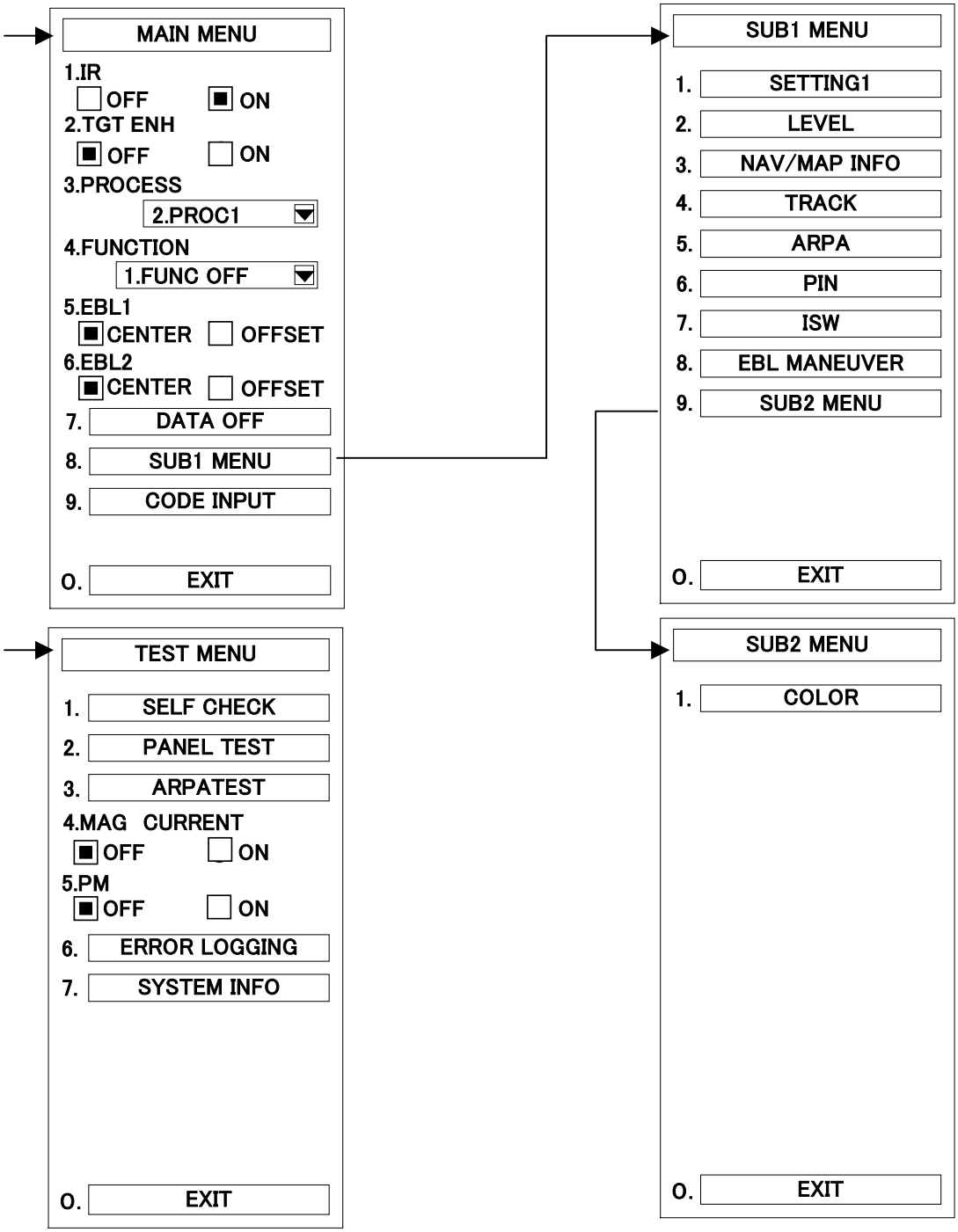
The power will be turned off. Orange lamp Off → 

Note: When "PWR" is lit, data is being written to internal memory, so do not open the shipboard breaker.
Also, when turning on the power supply again, be sure that the green PWR switch lamp is off before pressing "PWR".

3.2 MENU COMPOSITION

The Menu system of this radar equipment consists of the Main menu, Sub1 menu, Sub2 menu and Test menu.

Click MENU button on the screen.



The Main menu consists of the items of signal processing functions and EBL control, and other functions are included in the Sub1 menu. The video color setting is included in the Sub2 menu.The Test menu consists of the items of input monitoring and Self-diagnostic functions.

Note: When the unit is shipped from the factory, this is set in "OPTION2" or the "MENU" key.

A. Main menu

1 Displaying the Main menu.

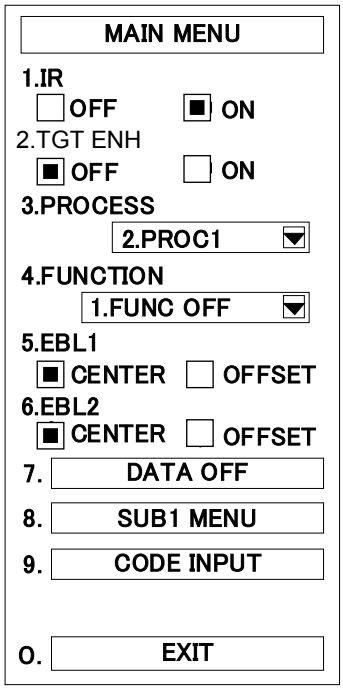
Click the MENU button on the screen.

The main menu will appear.

2. Ending the Main menu.

Click the EXIT button on the screen.

The MAIN Menu will be closed.



B. Sub1 menu

1 Displaying the Sub1 menu.

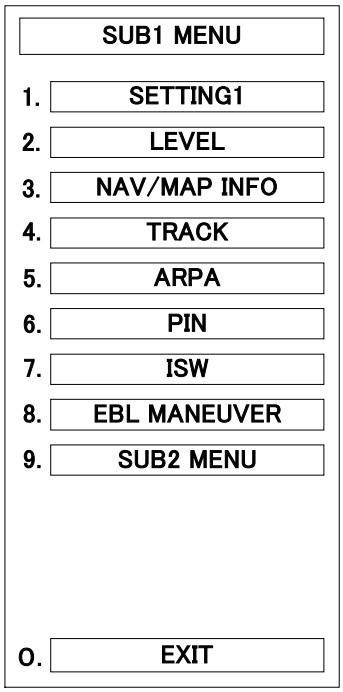
Click the SUB1 MENU button on the screen.

The SUB1 Menu will appear.

2 Ending the Sub1 menu.

Click the EXIT button on the screen.

The SUB1 Menu will be closed.



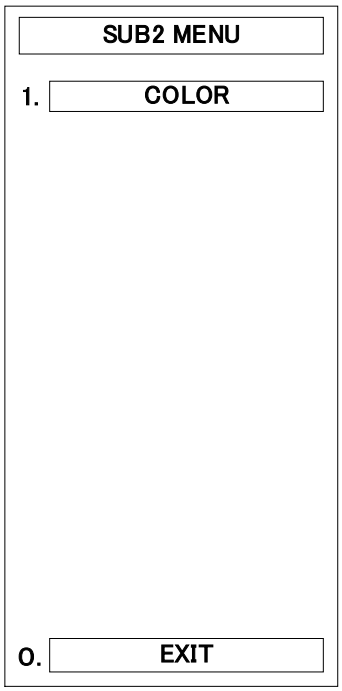
Note: When the unit is shipped from the factory, this is set in "OPTION2" or the "MENU" key.

C. Sub2 Menu

1 Displaying the Sub2 menu.

Press MENU, then SUB1 MENU and SUB2 MENU or press MENU, then MENU and MENU.

The TEST Menu will appear.



2. Ending the Sub2 menu.

Press EXIT or MENU.

The Sub2 Menu will be closed.

D. Test menu

1 Displaying the Test menu.

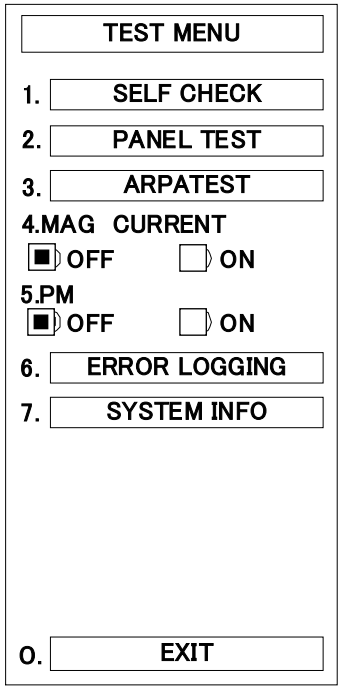
Click TEST .

The TEST Menu will appear.

2 Ending the Sub1 menu.

Click EXIT or MENU.

The Sub2 Menu will be closed.



3.3 PREPARATION

Tuning [TUNE]

This control is used to tune the receiver.
If the receiver is detuned from the best level, the receiving sensitivity falls, and the targets on a long range or the small targets on a short range may be overlooked.
In manual tuning, rotate the [TUNE] control clockwise or anticlockwise and adjust so that the target echoes are the clearest. If no suitable target is present, adjust the control so that the tuning indicator bar graph at the upper left of the radar display is maximized.
After setting the radar to the TRANSMIT mode, it take about 10 minutes until the oscillation frequency of the magnetron is stabilized. Therefore, tune the receiver once again after about 10 minutes.
For automatic tuning, set “TUNE” to “ON” in the AUTO Menu. (Refer to page 3-8).

Sensitivity Control [GAIN]

This control is used to control the radar receiving sensitivity.
Clockwise rotation of the [GAIN] control increases receiving sensitivity and extends the radar observation range. If the sensitivity is too high, the receiver noise will increase to reduce the contrast of the targets with the background video and make the targets obscure on the display. To observe densely crowded targets or the targets on a short range, rotate the [GAIN] control anticlockwise to reduce the sensitivity so that the targets are easy to observe. Be careful not to overlook small and important targets.

Display Brilliance Control

This control is used to adjust the brilliance of the entire display.
Clockwise rotation of the [BRILL] control increases the brilliance of the entire display. Adjust the [BRILL] control to obtain the best-to-see display with optimum brilliance.

Contrast Control [BRILL VIDEO]

The contrast of the radar video display can be adjusted in four levels. Press the PANEL button on the screen, then select [BRILL VIDEO]. Each time the brilliance button is clicked, the screen will switch to VIDEO → → → . The current mode is displayed on the lower right of the radar screen. (The VIDEO indication will change to the PANEL indicated in several second.) Adjust the [BRILL VIDEO] switch to obtain the best-to-see video with optimum contrast.

3

Attention

- In the AUTO SEA mode, there are cases in which the targets are not displayed because the sea clutter returns are suppressed in a simple way.
  Use the manual [SEA] control during sailing under normal conditions.
- In the AUTO RAIN mode, there are cases in which the targets are not displayed because the rain/snow clutter returns are suppressed in a simple way.
  Use the manual [SEA] control during sailing under normal conditions.

Sea Clutter Suppression [SEA]

This control is used to reduce the receiving sensitivity on a short range to suppress the sea clutter returns.
Clockwise rotation of the [SEA] control can suppress sea clutter returns more effectively. Be careful not to suppress sea clutter excessively. Otherwise, small buoys and boats may disappear from the radar display.
When setting “SEA” to “SEA AUTO” , sea clutter returns can be suppressed depending on their intensity levels. This setting is used for the case in which the sea clutter returns are different in their directions.
Switching between manual and auto is done by clicking the“SEA AUTO” / “SEMI AUTO”button on the lower left of the screen, or pressing the“SEA”knob.

Note: It is not allowed to use both the AUTO / SEMI AUTO SEA mode and the AUTO RAIN mode at the same time.

Rain/Snow Clutter Suppression [RAIN]

This control is used to suppress rain or snow clutter returns. Clockwise rotation of the [RAIN] control makes clearer those targets that may be hidden among rain/snow clutter returns. Be careful not to overlook small targets in the clutter. This control also has the effect of reducing sea clutter, so that it is more effective to use this control together with the [SEA] control.
Rotate the control anticlockwise to the maximum in the normal condition.
When setting SEA/RAIN to AUTO RAIN in the AUTO Menu, rain/snow clutter can be suppressed depending upon the intensity level. When setting SEA/RAIN to MANUAL in the AUTO Menu, the mode is changed into the MANUAL mode.
Switching between manual and auto is done by clicking the "RAIN AUTO" button on the lower left of the screen, or pressing the "RAIN" knob.

Note: It is not allowed to use both the AUTO RAIN mode and AUTO SEA mode at the same time.

Brilliance Control

Press PANEL Or press the right side of "PANEL" on the screen.

The BRILLIANCE switches [PANEL], [BRILL VIDEO], and [BRILL ARPA] are used to adjust the brilliance of the panel, video and ARPA markers. Each time a switch is pressed, the brilliance is increased by one level up to 4 or 5 levels. When the maximum level is reached, the brilliance is reset to the original panel.

[PANEL] Adjusts the lighting for the characters on the controls and switches on the operational panel.
When PANEL on the screen is pressed, the adjustment status of "BRILL VIDEO" and "BRILL ARPA" are changed.
Then, each of the levels can be set if the brilliance level button on the right is pressed.

[BRILL VIDEO] Adjusts the brilliance of radar display.
[BRILL ARPA] Adjusts the brilliance of ARPA information

Brilliance Control by Menu Operation
[RANGE RINGA] Adjusts the brilliance of the fixed range scale.
[VRM] Adjusts the brilliance of the variable range scale (VRM1 and VRM2).
[EBL] Adjusts the brilliance of electronic bearing cursor (EBL1 and EBL2).
[CHARACTER] Adjusts the brilliance of characters.

Procedures

1 Click the MENU on the screen. Or press the OPTION2 button .

The Main Menu will appear.

2 Click SUB1 MENU .

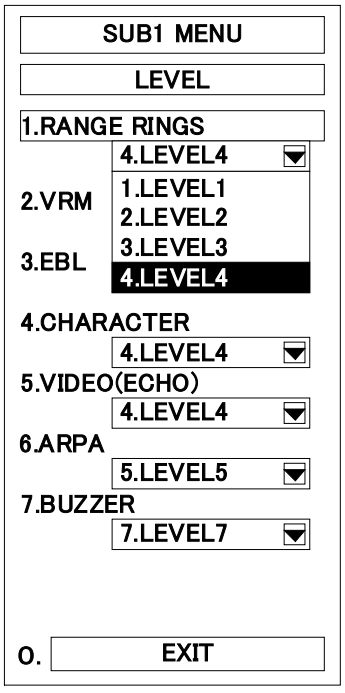
The Sub1 Menu will appear.

3 Click LEVEL.

The LEVEL Menu will appear.

4 Click the level setting section of RANGE RINGS .

1.RANGE RINGS will be selected and the following pull-down menu will appear.

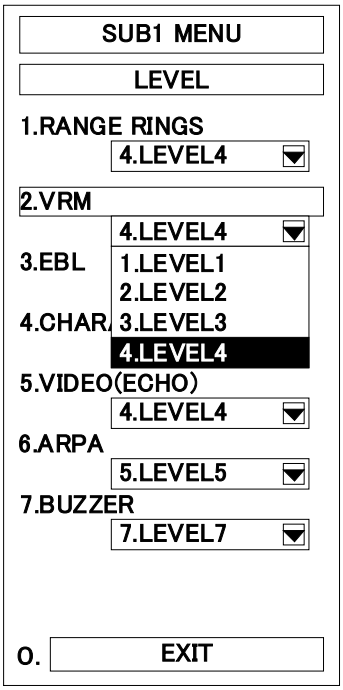


5 Select any level from 1 to 4 for RANGE RINGS brilliance in the pull-down menu and press it.

The default value is set to 4.LEVEL4.

6 Click the level setting section of VRM .

2.VRM will be selected and the following pull-down menu will appear.

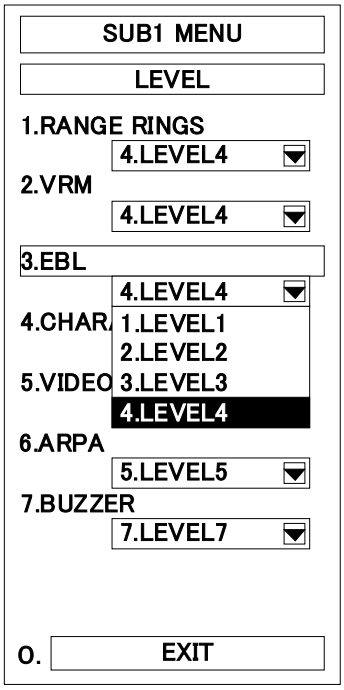


7 Select any level from 1 to 4 for VRM (VRM1 and VRM2) brilliance in the pull-down menu and press it.

The default value is set to 4.LEVEL4.

8 Click the level setting section of EBL .

3.EBL will be selected and the following pull-down menu will appear.

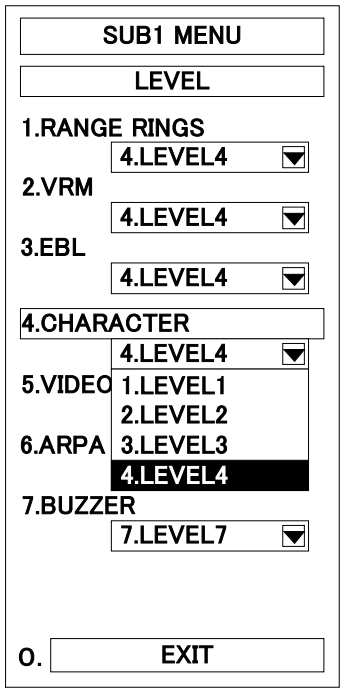


9 Select the brightness of the electronic cursor (EBL1, EBL2) from the pull-down menu, select 1 through 4 with the trackball, then click.

The default value is set to 4.LEVEL4.

10 Click the level setting section of CHARACTER .

4.CHARACTER will be selected and the following pull-down menu will appear.

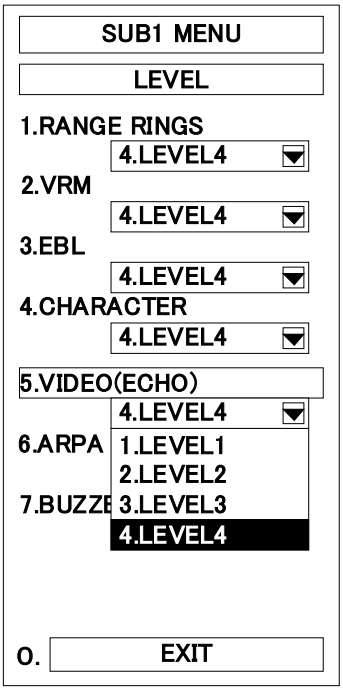


11 Select the character brightness from the pull-down menu, and set 1 through 4.

The default value is set to 4.LEVEL4.

12 Click the level setting section of VIDEO .

5.VIDEO (ECHO) will be selected and the following pull-down menu will appear.

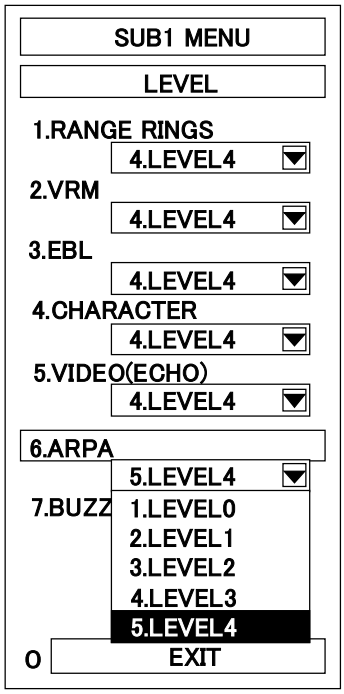


13 Select the echo brightness from the pull-down menu, and set 1 through 4.

The default value is set to 4.LEVEL4.

14 Click the level setting section of ARPA .

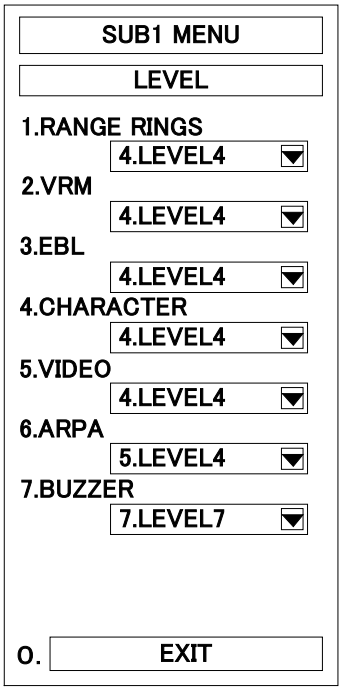
6.ARPA will be selected and the following pull-down menu will appear.



15 Select the ARPA brightness from the pull-down menu, and set 1 through 5.

The default value is set to 5.LEVEL4.

After the brilliance levels are adjusted, the following menu will appear.



The menu display after adjustment shows the level values set for the indiviual brilliance items.

Exit

1 Click EXIT.

The Sub1 Menu will reappear.

2 Click EXIT.

The Sub1 Menu will be closed.

These set brilliance levels are saved depending upon the Day/Night mode.

Day/Night Mode Selection [DAY/NIGHT]

Whenever the [DAY/NIGHT] switch is pressed, the mode is changed over from DAY1 → DAY2 → NIGHT1 → NIGHT2 and the current mode is indicated at the lower right of the radar display. The brilliance levels selected for each mode are saved. For brilliance adjustment, refer to page 3 -12. For selection of DAY/NIGHT mode by menu operation, refer to “Color Setting” on the next page.

Color Setting [COLOR]

The colors of the Day/Night mode [Day1, 2/NIGHT1, 2], system, background color outside the bearing scale, background color inside the bearing scale, echoes, characters, dials, own ship’s track, and radar trails are set up.

Color Adjustment by Menu Operation

[DAY/NIGHT]	Register of DAY/NIGHT mode
[SYSTEM]	System color adjustment
[OUTER PPI]	Adjustment of the background color outside the bearing scale
[INNER PPI]	Adjustment of the background color inside the bearing scale
[CHARACTER]	Adjustment of character colors
[DIAL]	Adjustment of dial color
[ECHO]	Adjustment of echo colors
[TRAILS]	Adjustment of the color of radar trails
[OWN TRACK]	Adjustment of the color of own ship’s track

Procedures

1 Click the MENU on the screen.

The Main Menu will appear.

2 Click SUB1 MENU.

The Sub1 Menu will appear.

3 Click SUB2 MENU.

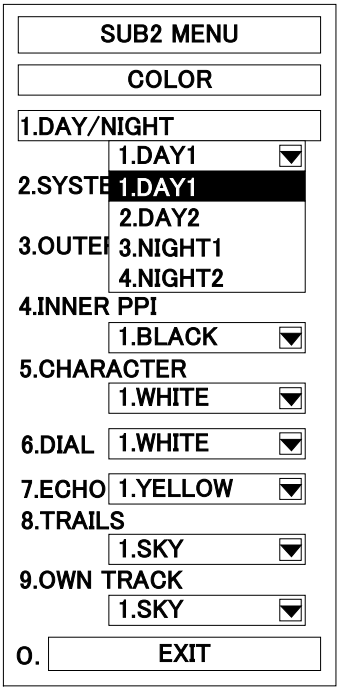
The Sub2 Menu will appear.

4 Click COLOR.

The COLOR Menu will appear.

5 Left-click the selection section (combo box) of DAY/NIGT.

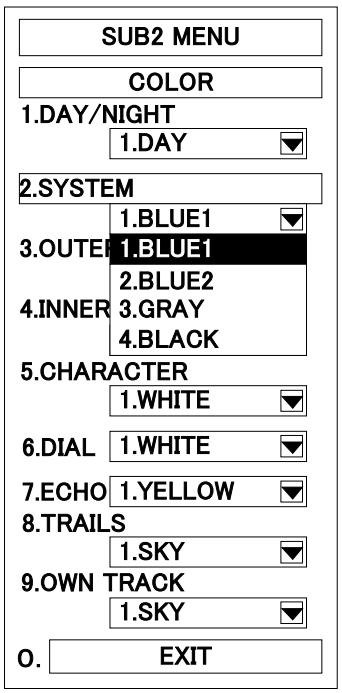
1.DAY/NIGHT will be selected and the following pull-down menu will appear.



6 Select the Day/Night mode from the pull-down menu, select 1 through 4 with the trackball, then left-click.

7 Left-click the selection section (combo box) of SYSTEM.

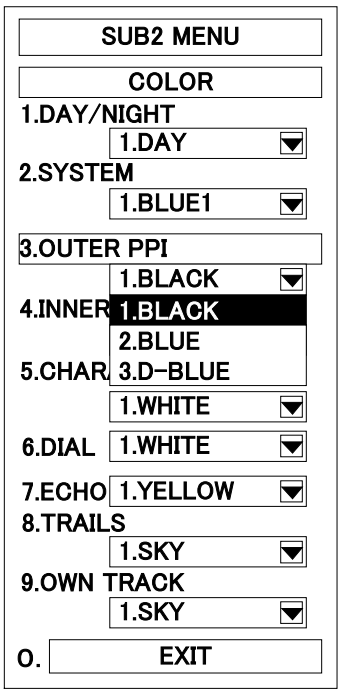
2.SYSTEM will be selected and the following pull-down menu will appear.



8 Select the System color from the pull-down menu, select 1 through 4 with the trackball, then left-click.

9 Left-click the selection section (combo box) of OUTER PPI.

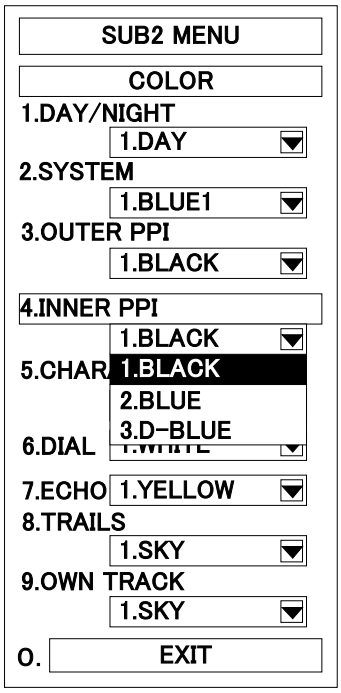
3.OUTER PPI will be selected and the following pull-down menu will appear.



10 Select the background color outside the bearing scale from the pull-down menu, select 1 through 3 with the trackball, then left-click.

11 Left-click the selection section (combo box) of INNER PPI.

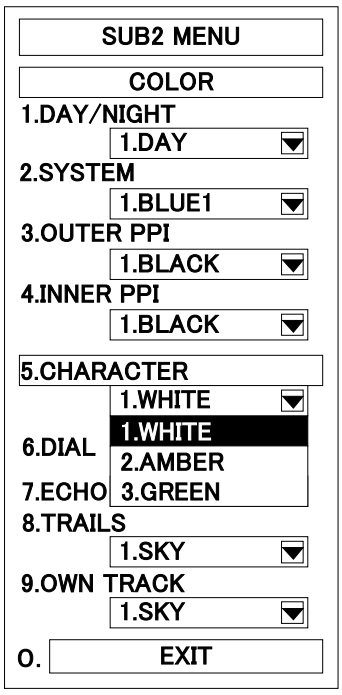
4.INNER PPI will be selected and the following pull-down menu will appear.



12 Select the background color inside the bearing scale from the pull-down menu, select 1 through 3 with the trackball, then left-click.

13 Left-click the selection section (combo box) of CHARACTER.

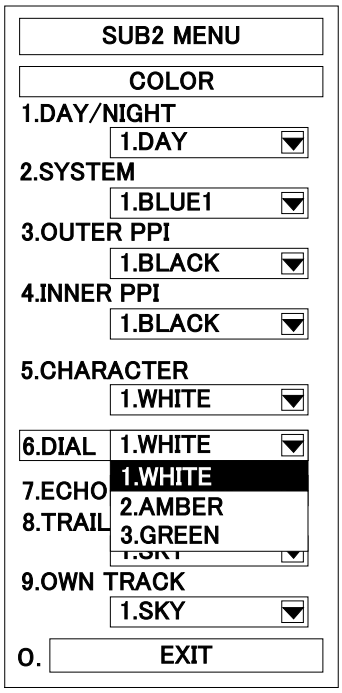
5.CHARACTER will be selected and the following pull-down menu will appear.



14 Select the character color from the pull-down menu, select 1 through 3 with the trackball, then left-click.

15 Left-click the selection section (combo box) of DIAL.

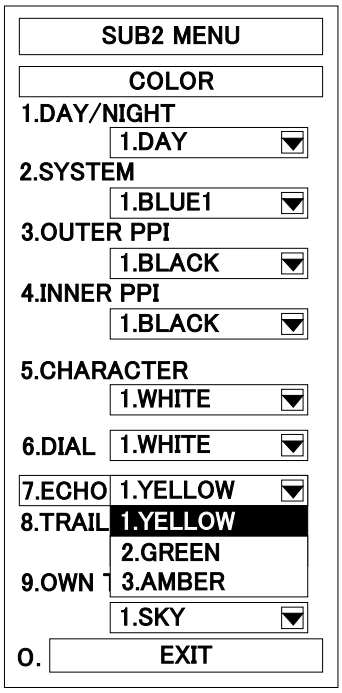
6.DIAL will be selected and the following pull-down menu will appear.



16 Select the dial color from the pull-down menu, select 1 through 3 with the trackball, then left-click.

17 Left-click the selection section (combo box) of ECHO.

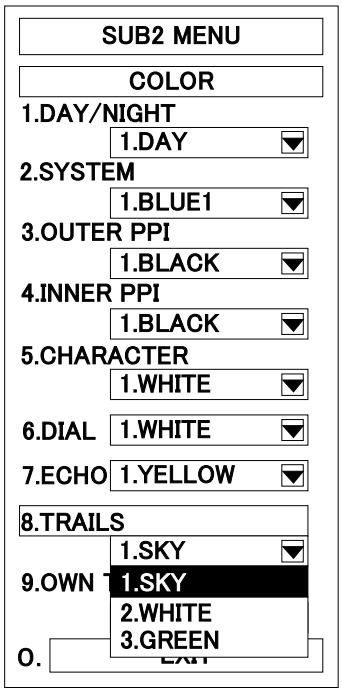
7.ECHO will be selected and the following pull-down menu will appear.



18 Select the echo color from the pull-down menu, select 1 through 3 with the trackball, then left-click.

19 Left-click the selection section (combo box) of TRAILS.

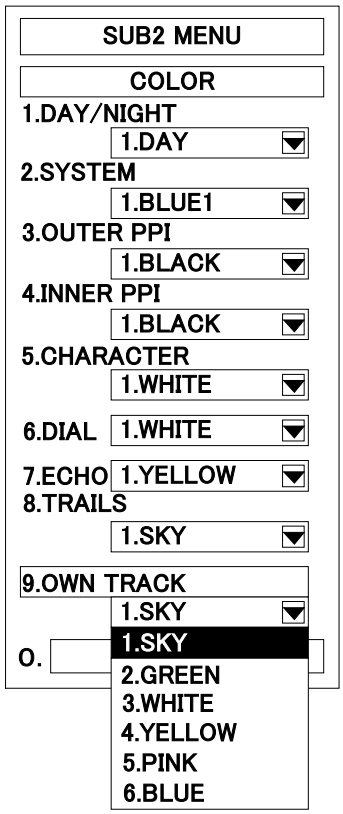
8.TRAILS will be selected and the following pull-down menu will appear.



20 Select the radar trails colors from the pull-down menu, select 1 through 3 with the trackball, then left-click.

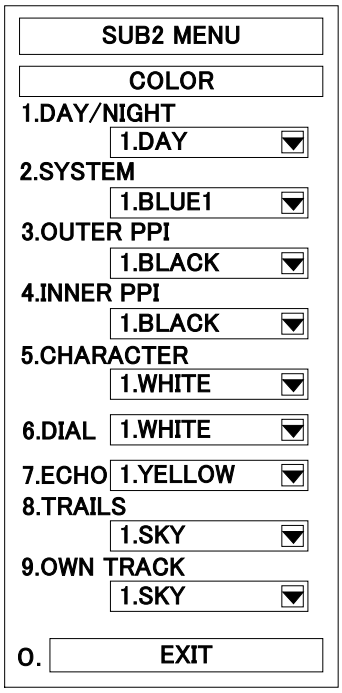
21 Left-click the selection section (combo box) of OWN TRACK.

9.OWN TRACK will be selected and the following pull-down menu will appear.



22 Select the own track colors from the pull-down menu, select 1 through 6 with the trackball, then left-click.

After the colors are adjusted, the following menu will appear.



The menu display after adjustment shows the colors set for indiviual items.

Exit

1 Click EXIT.

The Sub2 Menu will reappear.

2 Click EXIT.

The Sub2 Menu will be closed.

.....Radar Interference Rejection【IR】

Procedures **Left-click the IR. This switch selects ON/OFF.**

○ **When setting from the menu**

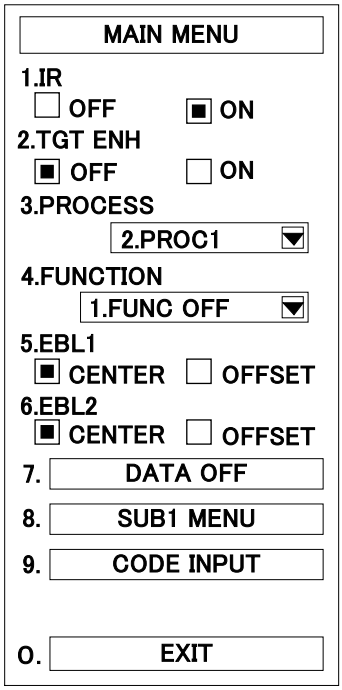
1 Click MENU .

The Main Menu will appear.

2 Click "ON" radio button of IR .

"ON"in"1.IR"will be set.

Then, the mark IR at the lower left of the radar display will be shown and the radar interference in turned on.



Cancellation **1 Click "OFF" radio button of IR .**

"OFF"in"1.IR"is set and the radar interference rejector turned off.

Exit **1 Click EXIT .**

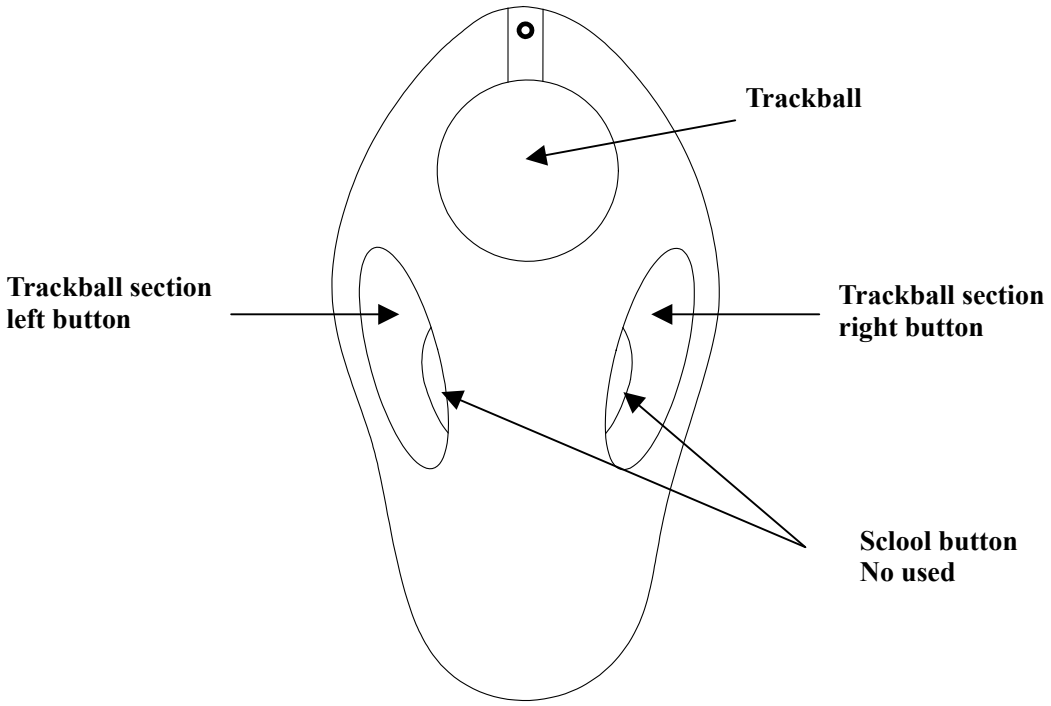
The Main Menu will be closed.

Attention

- When watching a radar beacon or a SART signal, set the following parameter to suppress the video.
  IR OFF (Interference Rejecter OFF).

3.4 BASIC OPERATIONS

Move Cross Cursor Mark [+] by Trackball



The cross cursor mark [+] is used for position designation and other purposes in various operating procedures. The cross cursor mark [+] moves in conjunction with the trackball. If the trackball is rotated up and down or left and right, the cross cursor mark follows the movements of the trackball. The distance and bearing between own ship and the cross cursor mark [+] are indicated on the upper right of the radar display. Before operating other controls and switches, the operator must be familiar with manipulation of the trackball and the movements of the cross cursor mark. When rotating the trackball, the cross cursor mark [+] will not move if the palm is apart from the hand sensor section. Approach the palm to the hand sensor section and operate the trackball.

When making a menu or button selection, the "+" cursor will change to  .

Click: In this manual, "clicking" refers to pressing the trackball button.
Left-button = This is called "left-clicking".

Methods for Setting Menu Items with the Trackball

In addition to the method for setting menu items with the switches, the trackball can also be used to set menu items in almost the same manner as with the control panel.
There are several methods for setting an item in a menu with the trackball.

[I] Change the Setting of Radio Button Type

When an item has alternative selections, for example, ON and OFF, radio buttons are provided to set the item in many menu items.

①  ON  OFF

When the current item is set in the OFF position as shown in Figure ①,

②  ON  OFF

Move the arrow cursor to the ON position with the trackball.

③  ON  OFF

With the arrow cursor on the ON position, press the left button of the trackball.

④  ON  OFF

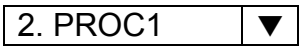
The Setting will change from OFF to ON.

When changing from ON to OFF, operate in the same manner.

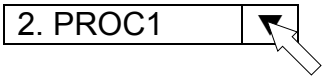
[Ⅱ] Changing the Setting of Pull-down Menu

This method is used when there are three or more selections:

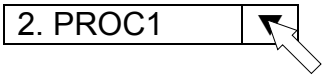
① When PROC1 is set as shown below:



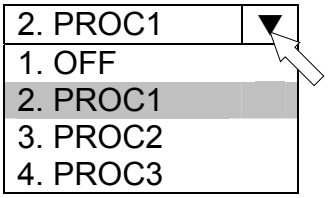
② Move the arrow cursor to the position that is shown below (downward triangle).



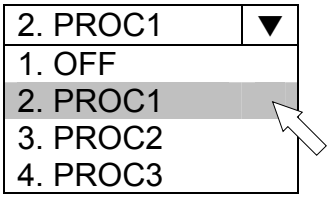
③ Set the arrow cursor on the position in Figure □ as shown below and press the left button on the trackball.



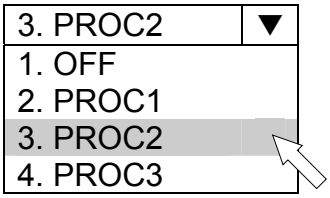
④ The pull-down menu will appear and selection items are displayed in the menu.



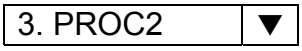
⑤ Move the cursor with the trackball.



⑥ Set the cursor on the item to be selected and press the left-button on the trackball.



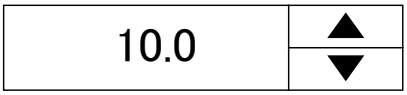
⑦ The pull-down menu will be closed and the setting is established.



[Ⅲ] Changing the Setting of Pull-down Menu

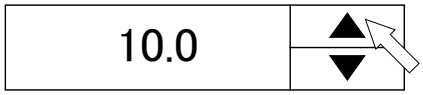
This method can be used in most of boxes where a numeric value is to be entered.

① **0.0-100.0kts**



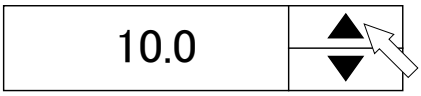
When the value is set as shown in the figure ①:
The minimum and maximum (min-max) are displayed on the left side and the unit is also displayed if present.

② **0.0-100.0kts**



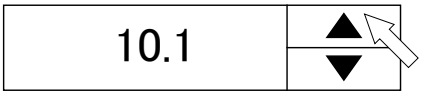
To increase the value, move the arrow cursor to the position in the figure ② (upward triangle) with the trackball.

③ **0.0-100.0kts**



With the arrow cursor on the position in the figure ②, click the trackball section left button once.

④ **0.0-100.0kts**



The value will be increase in the minimum step.

⑤ To increase the value continuously:

Hold down th trackball section left button in the figure ③.

⑥ To decrease the value:

Move the arrow cursor to the downward triangle in the figure ②.
The following procedures are the same as for increasing.

[Ⅳ] Changing the Setting of Pull-down Menu

This method is used when a number of items have alternative selections of ON and OF in one menu. (In this case, only one item is presented.)

①  NAV LINE

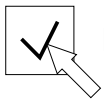
The status in the figure ① means that the item is OFF.

②  NAV LINE

Move the arrow cursor to the position in the figure ② withe the trackball.

③  NAV LINE

With the arrow cursor on the position in the figure ②, press the trackball section left button.

④  NAV LINE

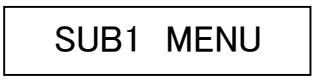
A check mark will appear in the checkbox and the funcrion will be turned on.

⑤ To turn off the function:

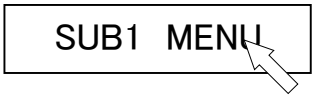
With the checkbox and arrow cursor position as shown in the fibure ④, press the trackball section left button.

[V] Switch Type

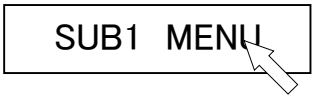
This method is used, for example, in switching the current menu to the next.

① 

A menu has an item as presented in the figure ①.

② 

Move the arrow cursor to the position in the figure ② with the trackball.

③ 

With the arrow cursor over SUB1 MENU, press the trackball section left button.

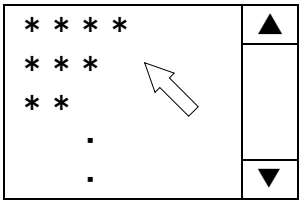
④ The Sub1 Menu will appear.

* In some selections of this type, the key color will change in the step ② entering a certain mode.
To reset the setting, select the same item again.
Example: Select NAV/MAP INFO Menu "SHIFT".
NAV SHIFT mode

[Ⅵ] Vertical Scroll Type

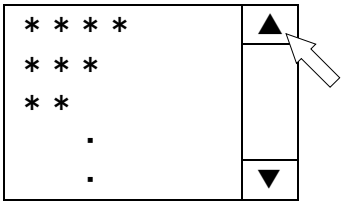
The display is scrolled vertically.
This method is mainly used for functions such as display of a stored file.

①



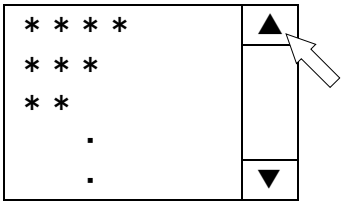
The vertical scrollbar is provided in a menu as shown in the figure ①.

②



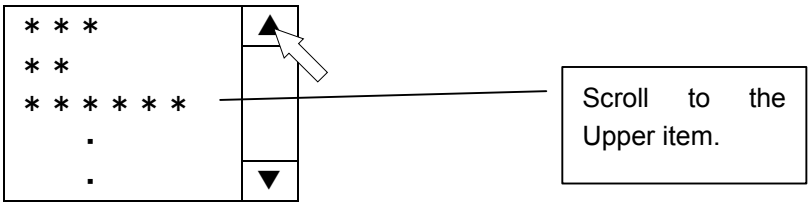
When scrolling the display, move the arrow cursor to the position in the figure (upward triangle) with the trackball.

③



With the arrow cursor on the position in the figure ②, click the trackball section left button.

④



⑤ To scroll continuously the display upward:

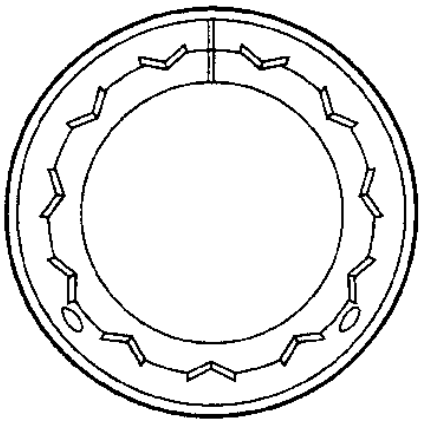
Hold down the trackball section left button on the trackball in the figure ③.

⑥ To scroll the display downward:

Move teh arrow cursor to the downward triangle in the figure ②.
The following procedures are the same as for the upward scroll.

Use EBLs (Electronic Bearing Lines)

The EBLs (Electronic Bearing Lines) are indispensable to measure distances and bearings of targets.
Before operation, the operator must become familiar with the operation of EBLs.

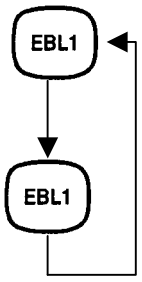


EBL1 Operation

If EBL2 is selected, press 

to select EBL1 before operation. (The currently selected EBL is indicated by selected characters in the lower right of the radar display.)

Procedures **1** **Press**



EBL1 will be displayed in reverse video.

Press

EBL1 will disappear.

EBL2 Operation

If EBL1 is selected, press EBL2 to select EBL2 before operation. (The currently selected EBL is

indicated by characters in the lower right of the radar display.)

Procedures **1** **Press** EBL2

EBL2 will be displayed in reverse video.

Press EBL2

EBL2 will disappear.

EBL Bearing Display

The bearing values of EBL1 and EBLL2 currently displayed within the PPI video are indicated at the lower right of the radar display. For the currently operable EBL, the characters EBL1 or EBL2 are displayed in reverse video.

Starting Point of EBL

The starting point of the currently operating EBL can be changed over to the center of the radar display (CENTER) or to any offset position (OFFSET).

Note: For OFFSET of the EBL's starting point, it is possible to determine whether the starting point is fixed at the specific latitude and longitude.

Set Floating EBL

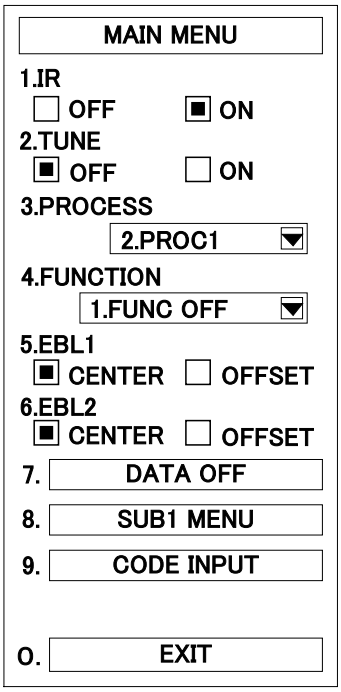
To offset the starting point of EBL1 during its operation:

EBL1 T0370°C

Click the right figure C.

- Use the trackball to move the starting point of "EBL1".
- The starting point can be fixed by clicking the left trackball button.

When adjusting from the menu,



[I] Click MENU .

The Main Menu will appear.

Click “5.EBL1”.

“OFFSET”in“5.EBL1”will be set.

Move the starting point of EBL1 with the trackball.

Click the trackball section left button to fix the starting point of EBL1.

To reset the starting point of EBL1 to the center of the radar display.

Click “5.EBL1”.

“CENTER”in“5.EBL1”will be set.

Click 0.EBL .

The Main Menu will be closed.

[II] Continue to press EBL1 also allow you to set the starting point of EBL1.

Continue to press EBL1 . “OFFSET”in“5.EBL1”will be set.

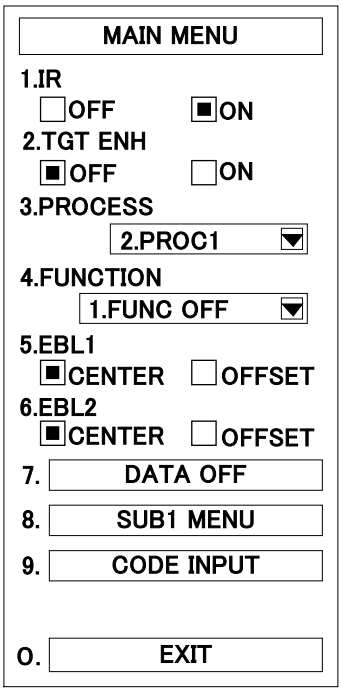
Continue to press EBL1 . “CENTER”in“5.EBL1”will be set.

Note:For OFFSET of the EBL's starting point, it is possible to determine whether the starting point is fixed at specific latitude and longitude.

To offset the starting point of EBL2 during its operation:

[Ⅰ] Click MENU .

The Main Menu will appear.



Click “6.EBL2”.

“OFFSET”in“6.EBL2”will be set.

Move the starting point of EBL2 with the trackball.

Click the trackball section left button to fix the starting point of EBL2.

To reset the starting point of EBL2 to the center of the radar display.

Click “6.EBL2”.

“CENTER”in“6.EBL2”will be set.

Click 0.EBL .

The Main Menu will be closed.

[Ⅱ] Continue to press EBL1 also allow you to set the starting point of EBL2.

Continue to press EBL2 . “OFFSET”in“6.EBL2”will be set.

Continue to press EBL2 . “CENTER”in“6.EBL2”will be set.

Set Floating EBL

When this function is turned on and the starting point of EBL is moved to a position, the starting point can be fixed at the latitude and longitude of that position. This function is effective when the bearing from a certain point is repeatedly measured.
With this function OFF, the starting point of EBL is pasted on the radar display. When own ship is moved, the starting point will remain at the same point on the display.

3

Procedures

1 Select in the following order: "MENU","MENU","SETTING1","SETTING2".

The SETTING2 Menu will appear.

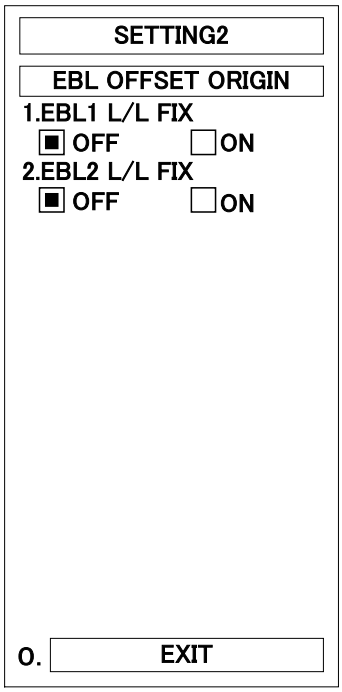
2 Click EBL OFFSET ORIGIN.

The EBL OFFSET ORIGIN menu will appear.

[I] Setting the Mode when the EBL1 Starting Point is Moved

1 Perform the operating procedure 1 .

The EBL OFFSET ORIGIN Menu will appear. "EBL1 L/L FIX" is set to the initial mode "OFF". When the EBL1 starting point is moved, the starting point of EBL1 will remain at the set position on the radar display.



2 Select the "ON" radio button.

"EBL1 L/L FIX" will switch from "OFF" to "ON". When the EBL1 starting point is moved to another position, the starting point of EBL1 will be fixed at the latitude and longitude on that position.

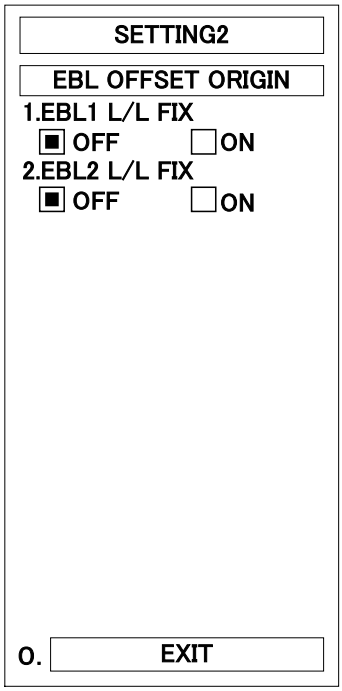
3 Select "OFF".

Place the cursor over the "OFF" radio button, and left-click.

[II] Setting the Mode when the EBL2 Starting Point is Moved

1 Perform the operating procedure 1 and 2.

The EBL OFFSET ORIGIN Menu will appear. “EBL2 L/L FIX” is set to the initial mode “OFF”. When the EBL2 starting point is moved, the starting point of EBL2 will remain at the set position on the radar display.



2 Select the "ON" radio button.

“EBL2 L/L FIX” will switch from “OFF” to “ON”. When the EBL2 starting point is moved to another position, the starting point of EBL2 will be fixed at the latitude and longitude on that position.

3 Left-click the "OFF" radio button.

The setting will switch from “ON” to “OFF”.

Exit

1 Click EXIT .

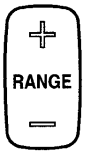
The SETTING2 Menu will reappear.

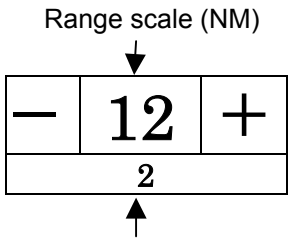
2 Click EXIT .

The SETTING2 Menu will be closed.

Notes
- **The course data and the own ship’s latitude and longitude data are required to activate this function.**
- **With this function ON, the starting point will be returned to the center if the starting point of EBL is moved to outside the radar display.**

Select Range [RANGE]





3

Any range scale is selectable from 0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, and 96 (or 120) nautical miles. Pressing [—] decreases the range and pressing [+] increases the range in each step. The selected range scale is indicated at the upper left of the display together with the range ring interval with it.

Set Maximum Range

The maximum range available may be set to 96nm or 120nm.

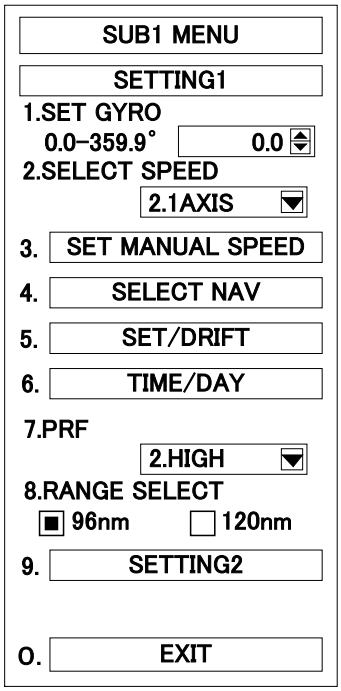
Procedures

1 Select in the following order: "MENU","MENU","1.SETTING1".

The SETTING1 menu will appear.

2 Select radio button of "8.RANGE SELECT".

Each time this switch is pressed, the maximum range is changed between 96 nm or 120 nm.



Note: When the maximum range is set to 120nm, the next range of 48nm is 120nm and so the range of 96nm cannot be selected.

Exit

1 Click EXIT .

The Sub1 Menu will reappear.

2 Click EXIT .

The Sub1 Menu will be closed.

Select Pulse Length

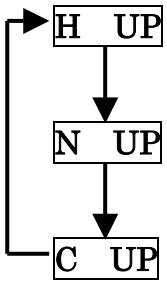
Place the cursor over the ⎍SP, and left-click.

The transmission pulse length can be changed over in three levels (『⎍SP』, 『⎍MP』, and 『⎍LP』) every time the [PL] switch is pressed. The selected pulse length is indicated at the upper left of the radar display. The pulse length can be changed only when the range is set to one of 0.75, 1.5, 3, and 6 and 12NM. If 『⎍SP』 is selected, the range resolution increases, making small targets clearer. If 『⎍LP』 is selected, the range resolution decreases, but the sensitivity increases, making small targets larger with higher definition.

Select Bearing Display Mode [AZI MODE]

The bearing presentation mode is changed over in the order of [NORTH UP] (true bearing), [HEAD UP] (relative bearing), and [COURSE UP] (course-up bearing) mode every time the [AZI MODE] switch is pressed. When the currently selected mode is North-up or Course-up, it will be changed over to Head-up by pressing this switch, and to another mode by pressing this switch once again.

(Example) RM H UP→PM N UP→RM C UP→RM H UP



The Bearing Mode [NORTH UP]

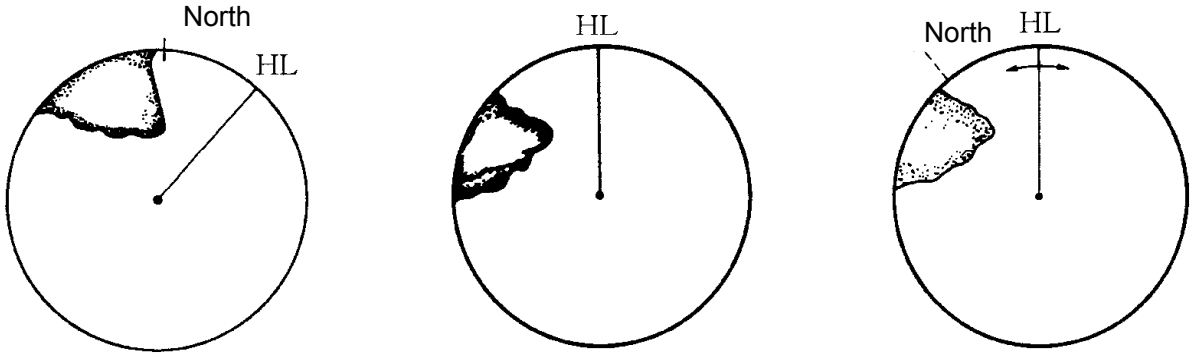
The video is displayed so that the zenith of the PPI (0° on range rings) points to the due north. Fixed targets do not flicker and are easily identified on a chart, and the true bearing of a target can readily be read out.

Relative Bearing Mode [HEAD UP]

The video is displayed so that the ship's heading line points to the zenith of the PPI (0° on range rings). Since targets are displayed in their directions relative to the ship's heading line, the operator can watch the video in the same field of view as in operating the ship at sea.
This mode is suitable for ocean sailing and for watching over other ships.

Course-Up Mode [COURSE UP]

By pressing this switch, the ship's heading line is fixed pointing to the zenith of the PPI (0° on range rings). In the same way as in the North-up mode, fixed targets do not flicker, but are stabilized even if the ship is yawing. The bearing of the heading line varies by the same shift of own ship's course. If the course is changed, the heading line can be reset to the Course-up mode by pressing the switch several times.



North-up Mode　　Head-up Mode　　Course-up Mode

Cancel Ship's Heading Line [HL OFF]

HL OFF　　H L OFF

The ship's heading line (HL) that presents the course of own ship is always displayed on the radar display. The heading line is canceled while this switch is being pressed, so that the targets on the heading lines can be seen easily.

Cancel All Display Items Except HL and Cross Cursor Mark [+] [DATA OFF]

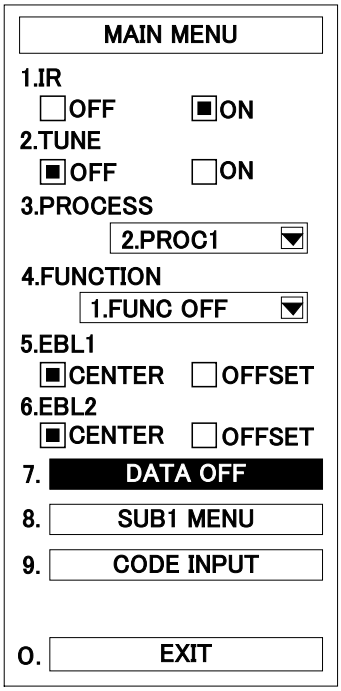
All display information such ARPA vectors, symbols and navigation data may be cancelled temporarily by the following operations, except VRMs, EBLs, HL, cross cursor mark [+] and range rings.

Procedures　**1　Click MENU on the screen.**

The MAIN Menu will appear.

2 Click DATA OFF .

All the display items except radar display, VRMs, EBLs, HL, cross cursor mark [+] and range rings will disappear from the radar display.



Cancellation

1 Click DATA OFF .

7.DATA OFF will be reset and, the information temporarily cancelled will reappear.

Exit

1 Click EXIT .

The Main Menu will be closed.

3

Display PI（Parallel Index Lines ）[PI]

Parallel index lines can be displayed in a semicircular area.

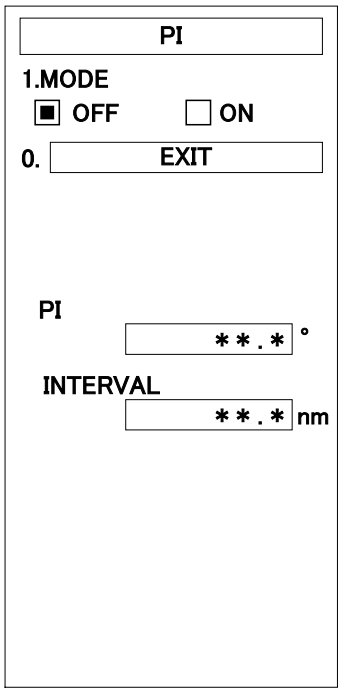
Procedures

1 Click the PI on the screen.

The PI Menu will appear.

2 Select "ON" radio button of "1.IR".

“ON” in “1.MODE” will be set and parallel index lines will appear on the radar display. The direction of PI will be changed by rotating the [EBL] control, and the line intervals will be changed by rotating the [VRM] control.



Cancellation

1 Select “OFF” of “1.MODE”.

“OFF” in “1.MODE” will be set and the PI will disappear on the radar display.

Exit

1 Click EXIT.

The PI Menu will be closed.

Note: The bearing of the parallel index lines that are displayed in the PI menu represents the true value when the bearing display of the radar reads N UP or C UP and the relative value when it reads H UP.

Operation of Parallel Index Lines

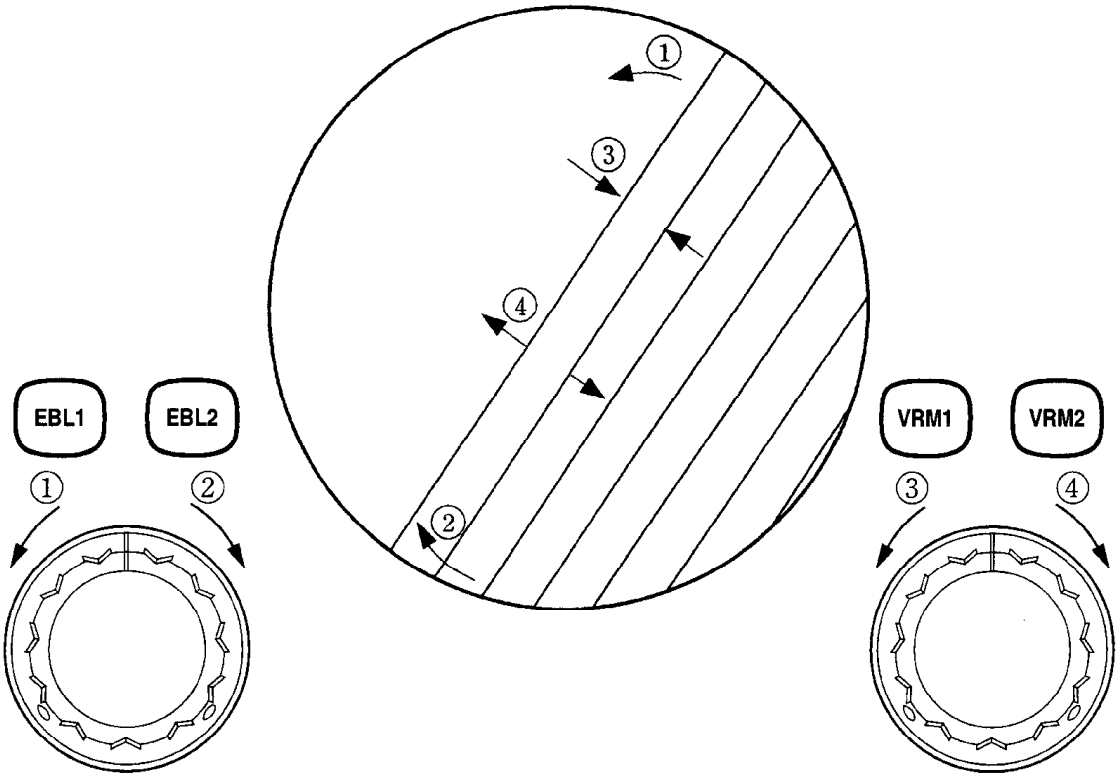
◎ Rotate the PL (Parallel Index Lines) in the same direction of rotating the [EBL] control (① and ②).

◎ The interval of the PI can be decreased as The [VRM] control is rotated anticlockwise (③ and increased as the [VRM] control is rotated anticlockwise (④).

◎ The rotation and interval of the PI are controlled effectively only from the PI Menu. When the PI Menu is closed, the parallel index lines are fixed.

◎ Repeat the above procedures from the first step to move the PI again.

Display of Parallel Index Lines



◎ Click [PI] , and the PI Menu will be closed and the PI will be fixed.

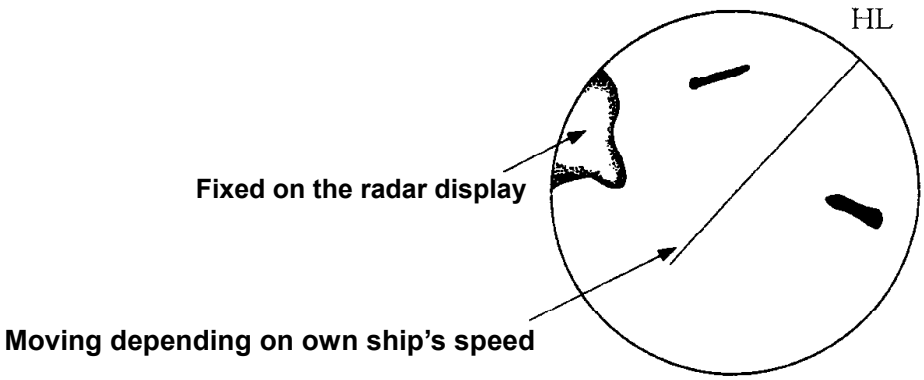
Press any of [EBL1] , [EBL2] , [VRM1] , and [VRM2] .

The PI will be fixed and the I Menu will be closed.

Change Relative Motion (RM) Mode to True Motion (TM) Mode

Procedures **1 Click the RM button on the upper left of the screen.**

The Relative Motion mode is changed to the True Motion mode. In the True Motion mode, the position of own ship on the display moves depending upon its course and speed and the influence of the current. Land and other fixed ranges are fixed on the display and only actually moving targets move on the radar display. When the True Motion mode is selected, own ship's position will be set to about 66% of the display radius in the opposite direction to its course allowing for the influence of the current. Own ship will start moving depending upon its course and speed and the influence of the tide. Subsequently, when own ship arrives at the position of about 66% of the display radius, the ship will be automatically reset to its initial position at about 65% of the display radius in the opposite direction to its course allowing for the influence of the current.



True Motion Display

Change True Motion (TM) Mode to Relative Motion (RM) Mode.

Procedures **1 Click the TM button on the upper left of the screen.**

The True Motion mode is dhange to the Relative Motion mode.
One ship nrill be reset to center position.

Move Own Ship's Display Position [OFF CENTER]

Own ship's position at the display center can be moved to an off-centered position within 66% of the display radius. This function is convenient to observe a wide coverage in any direction.

When the range is 96 (or 120)NM, this function cannot be used.

3

Procedures

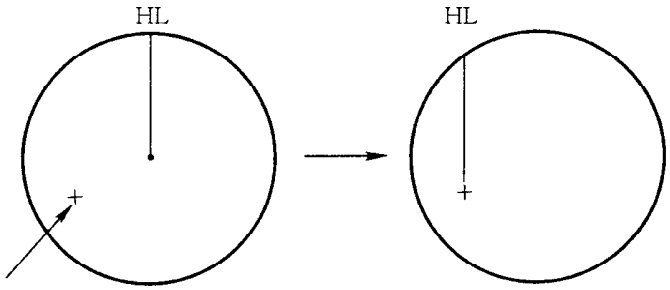
1 Click the OFF CENTER **on the upper right of the screen.**

The bold cross cursor mark [+] will appear at the position of own ship on the radar display.

2 Move the cross cursor mark [+] (own ship's position) to another position with the trackball.

3 Press the left button of the trackball.

The own ship's position will move to the position of the cross cursor mark [+], where it will be fixed.



Press the left button of the trackball .

Return Own Ship's Position to the Center

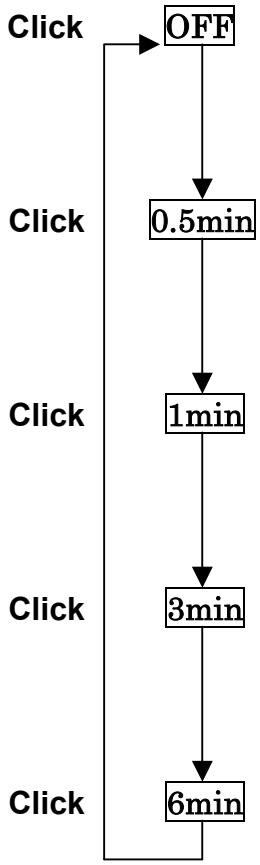
Procedures

1 Click the OFF CENTER **on the upper right of the screen.**

Display Other Ship's Trails [TRAILS]

Other ship's movement and speed can be monitored from the length and direction of its trail, serving for collision avoidance. The trail length can be changed over 4 levels of 0.5 min, 1 min, 3 min, and 6 min.

Procedures



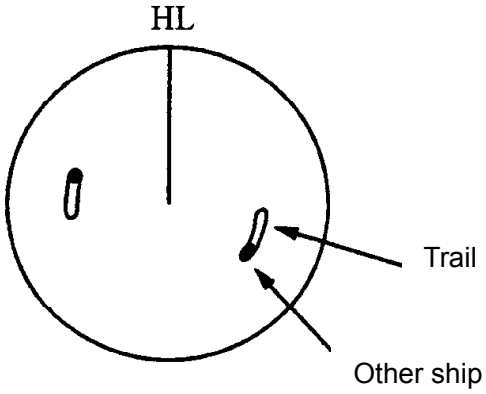
The level 0.5min will be selected and "TRAIL 0.5min" will appear at the lower left of the radar display.
The trails (of 0.5 min long) will appear after other ship's symbols.

The level 1min will be selected and "TRAIL 1min" will appear at the lower left of the radar display.
The trails (of 1 min long) will appear after other ship's symbols.

The level 3min will be selected and "TRAIL 3min" will appear at the lower left of the radar display.
The trails (of 3 min long) will appear after other ship's symbols.

The level 6min will be selected and "TRAIL 6min" will appear at the lower left of the radar display.
The trails (of 6 min long) will appear after other ship's symbols.

"TRAIL OFF" will appear at the lower left of the radar display and the trails of other ships will disappear.



Display Own Ship's Tracks and Own Symbols [OWN TRACK]

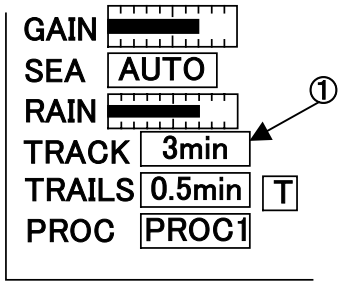
In the case that Any Navigation Equipment is Connected to This System

When navigation equipment is connected, the own ship's track data of up to 1024 points that is sent from the equipment can be stored and displayed. The data storage interval can be set over 4 levels, 3 minutes (distance that the own ship moves within 3 minutes), 10 minutes, 15 minutes, and 30 minutes.

3

Procedures

The setting can be changed by left-clicking the button on the lower left of the screen (right figure①).



○ When setting from the mune:

1 Click the MENU button on the screen.

The Main Menu will appear.

2 Click SUB1 MENU .

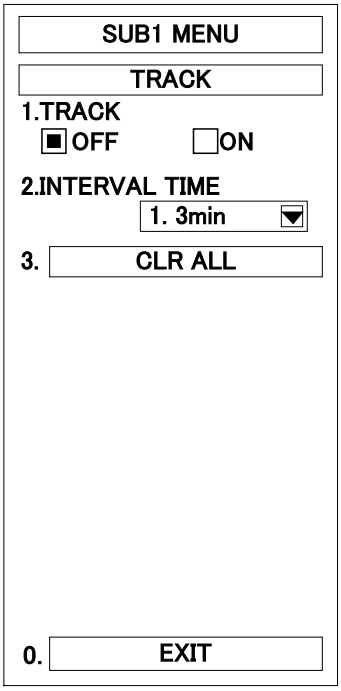
The Sub1 Menu will appear.

3 Click TRACK .

The TRACK Menu will appear.

4 Select "ON" radio button of "1.IR".

"ON"in"1.TRACK"will be set and own ship's past track originated its current position will appear. The current storage time interval will appear at lower left on the radar display.



Cancellation

1 Select "OFF" radio button of "1.IR".

"OFF"in"1.TRACK"will be set and own ship's track and the storage time interval will disappear.

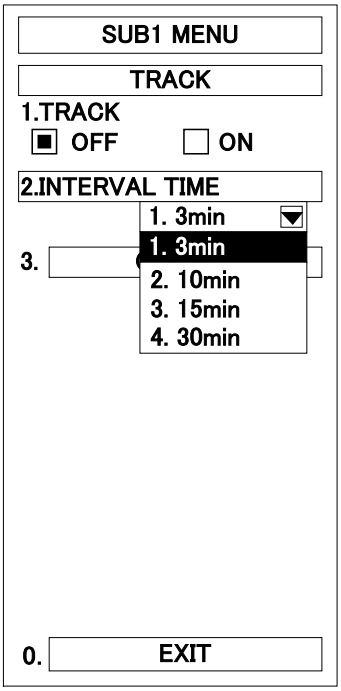
In Case of Changing Storage Time Interval

Procedures

1 **Repeat the above procedure up to Step 3.**

2 **Click INTERVAL .**
2.INTERVAL TIME will be selected and the pull-down menu will appear.

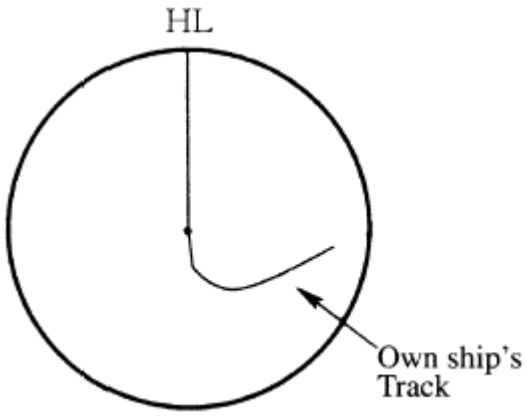
3 **Select the interval time in the pull-down menu, select 1 through 4 with the trackball, then left-click.**



Exit

1 **Click EXIT .**
The Sub1 Menu will reappear.

2 **Click EXIT .**
The Sub1 Menu will be closed.



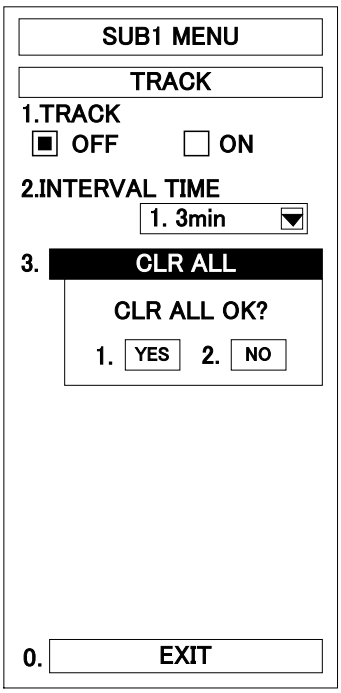
Clear Own Ship's Track Storage

Procedures

1 Repeat the procedures of changing storage time interval of own ship up to step 1.

2 Click CLR ALL .

CLR ALL will be selected. When clearing all the past track, click 1.YES to the question "CLR ALL OK?". If 2.NO is clicked, all the track will be cleared.



Exit

1 Click EXIT .

The Sub1 Menu will reappear.

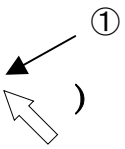
2 Click EXIT .

The Sub1 Menu will be closed.

Marking [MARK]

A maximum of 20 marks can be displayed at arbitrary positions on the radar video.
A mark created on the display holds the latitude and longitude.

[I] Plotting Marks. **CURSOR( )**



Procedures

1 Place the cursor over the upper right section of the screen (right figure), then right-click. Next, select "MARK".

MARK will appear in the CURSOR ( ) at the upper left of the radar display.

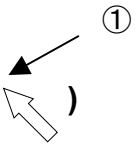
2 Put the cross cursor mark [+] on the position where the [□] mark is inserted.

3 Press trackball section left button.

The cross cursor mark [+] will be changed into the [□] mark and fixed on the radar display. When entering more [□] marks, repeat the procedures from step 2. Up to 20 marks can be entered.

Note: If more than 20 marks are created, the oldest mark is cleared and the newly created mark is displayed.

[II] Clearing Marks **CURSOR( )**



Procedures

1 Place the cursor over the upper right section of the screen (right figure), then right-click. Next, select "MARK".

MARK is displayed on CURSOR ( ) at the upper right of the radar display.

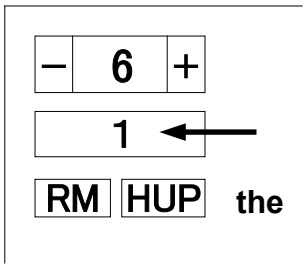
2 Put the cross cursor mark [+] on the position where the [□] mark is inserted.

3 Press trackball section right button.

The [□] mark will disappear. When clearing another [□] mark, repeat the procedure from step 2.

Display Range Rings [RANGE RINGS]

The range rings will appear.



Procedures **1 Press the switch section (section indicated by the arrow in the right figure) of the fixed distance scale on upper left of the screen.**

The range rings will appear and the interval of the range rings will be digitally indicated at the upper left of the radar display.

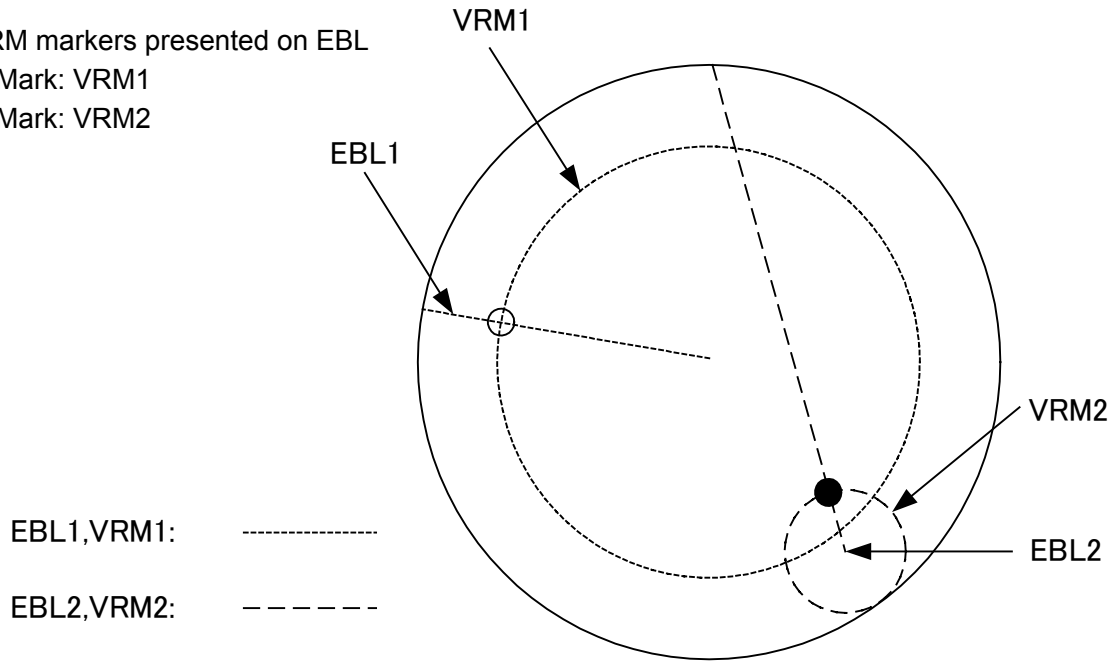
Cancellation **1 When the fixed distance scale is displayed, press the switch on the right figure.**

The range rings will disappear.

Display Variable Range Markers [VRM1/VRM2]

This function is to display and set up variable range marks (VRMs). Two VRMs are available. VRM1 is represented as a broken line and VRM2 as a dotted line. When EBL1 is displayed, VRM1 marker appears on the EBL1. When EBL2 is displayed, VRM2 marker appears on the EBL2. If the starting point of an EBL is offset, the center of a VRM marker is positioned at the starting point of the EBL.

VRM markers presented on EBL
●Mark: VRM1
○Mark: VRM2

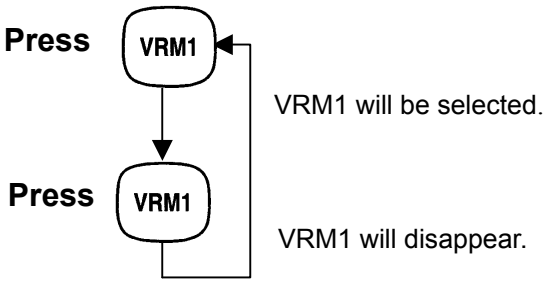


VRM1 Operation

If VRM2 is selected, press VRM1 to select VRM1 before operation.

(The currently selected VRM is displayed in reverse video at the lower right of the radar display.)

Procedures 1 Press VRM1

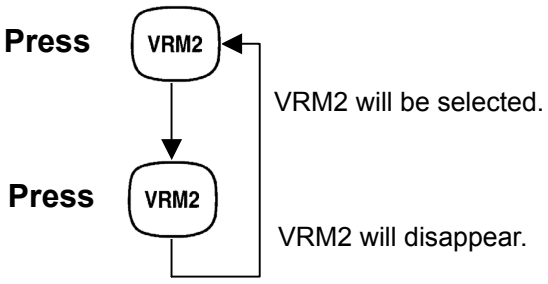


VRM2 Operation

If VRM1 is selected, press VRM2 to select VRM2 before operation.

(The currently selected VRM is displayed in reverse video at the lower right of the radar display.)

Procedures 1 Press VRM2



VRM Range Display

The values of the VRM1 and VRM2 that are currently displayed on the PPI will be indicated on the lower left of the radar display.
The VRM1 or VRM2 that is currently operable will be selected close to its range value.

VRM Operation

The variable range markers are displayed centering on the own ship. When rotating the [VRM] control clockwise, the VRM will be larger. When rotating the [VRM] control counterclockwise, the VRM will be smaller.

Set Guard Zones [GUARD ZONE]

A fan-shape guard zone can be set up to keep a watch over the intrusion of other ships or targets, or to automatically acquire other ships that have intruded into the zone.

By left-clicking the "GZ1, 2" section on the screen, it is possible to set on or off.
In this case, the zone that was set the previous time will be turned on.

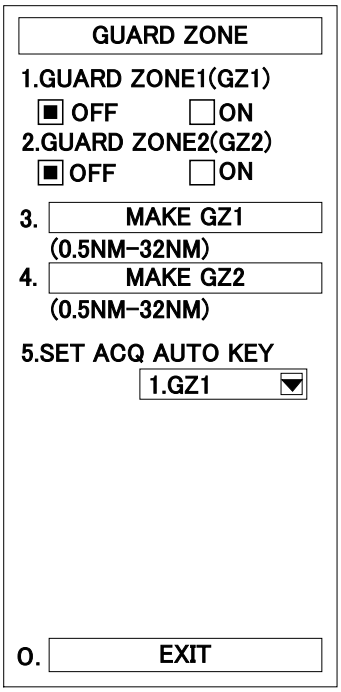
3

[I] Creation of Fan-shaped Guard zone

Procedures

1 Click GZ .

The GUARD ZONE Menu will appear.



2 Select "ON" of "GUARD ZONE1" to create a guard zone 1 and "GUARD ZONE2" to create a guard zone 2.

When Guard Zone 1 and 2 are set, "ON" will set.

3 Click MAKE GZ1 to create GUARD ZONE1.

4 Click MAKE GZ2 to create GUARD ZONE2.

The cursor will move to the echo display section.

Note: Guard Zones 1 or 2 can be set in any area within a range of 0.5 to 32 NM.

5 Use the [VRM] and [EBL] knobs to place VRM and EBL over the starting point of the guard zone, then left click the cursor.

The starting point of the guard zone will be set.

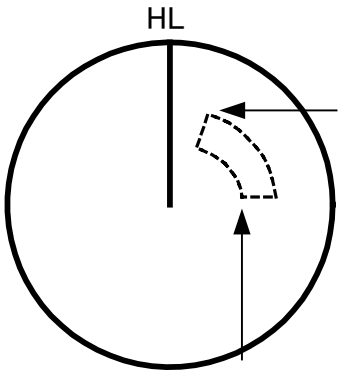
6 Move the EBL to make fan-shaped zone enclosed by the current cross cursor position.

Left-click when a desired guard zone is made.

The shape of the guard zone will be set up.
(The width of a guard zone is fixed to 0.5NM).

Exit **1 Click EXIT or GZ .**

The Guard Zone Menu will be closed.



Operation of Guard Zones

When a target appears within a fan-shaped guard zone, an alarm will sound and a mark ▽ will appear on the target. The track mode becomes effective after about 1 min.
In creating a guard zone, a circular guard ring may be created if the start and end points of the guard zone are set to the same point by omitting step 5 above.
The guard zone is displayed only during radar transmission, but also not appear during the standby operation.

[II] Clearing Guard Zones from Radar Display

Procedures **Left-click the switch "GZ1, 2" on the screen and the guard zone.**

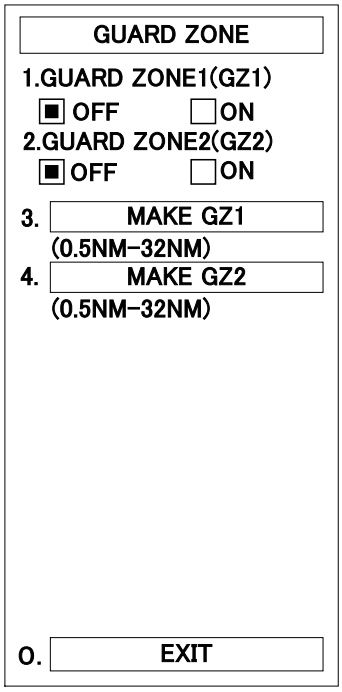
○To turn this off from the menu,

1 Execute the procedures for [Ⅰ] Creation of Fan-shaped Guard Zone up to step 2.

The GUARD ZONE Menu will appear.

2 Press 1 to clear Guard Zone 1 from radar display, and press 2 to clear Guard Zone 2.

"OFF"will be set for Guard Zone 1 or 2, which will be cleared from radar display.



Exit **1 Execute the Exit step in the same procedures for [Ⅰ] Creation of Fan-shaped Guard Zone.**

Reset Alarm Buzzer [ALARM ACK]

ALARM ACK is the function of acknowledging the alarm item when an alarm sounds and stopping an alarm sound as well as canceling flickering display. (If there are two or more alarms, it is necessary to operate the switch for each alarm indication.) The alarm sound can be stopped, but the alarm indication is not cancelled.

Stopping Alarm Sound

3

Procedures

1 Press ALARM ACK **.**

Or left-click the alarm display area on the screen.

The alarm sound will be stopped.

Set Alarm Sound Level

This function sets the sound and volume level of the alarm (alarm sound) to be delivered from the keyboard.

Setting Alarm Sound level

Procedures

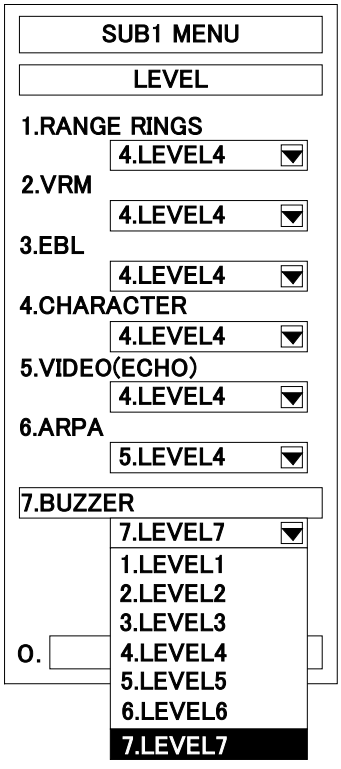
1 Click the MENU on the screen.
The Main Menu will appear.

2 Click SUB1 MENU .
The Sub1 Menu will appear.

3 Click LEVEL .
The LEVEL Menu will be selected.

4 Click BUZZER .
5.BUZZER will be selected and the pull-down menu will appear.

5 Select any level from 1 to 7 for BUZZER volume level in the pull-down and click it.



Exit

1 Click EXIT .

The Sub1 Menu will reappear.

2 Click EXIT .

The Sub1 Menu will be closed.

Note: Changing the "LEVEL" of the buzzer will cause the levels of all the alarms to be changed as well as the key touch sound.
The level of any alarm cannot be set to 0 as well as the key touch sound.

FUNCTION

FUNCTION is a function of setting the process suited for each condition during navigation to enhance the target detection performance.

Setting items: The following nodes can be switched over.

FUNC1: Effective in observing the echoes on short ranges.
FUNC2: Effective in observing the echoes on long ranges.
FUNC3: Effective in observing the echoes in rough weather.
FUNC4: Set by service personnel. The initial setting is the same as FUNC1.
FUNC5: Set by service personnel. The initial setting is the same as FUNC1.

Procedures

1 Click the MENU on the screen.

The Main Menu will appear.

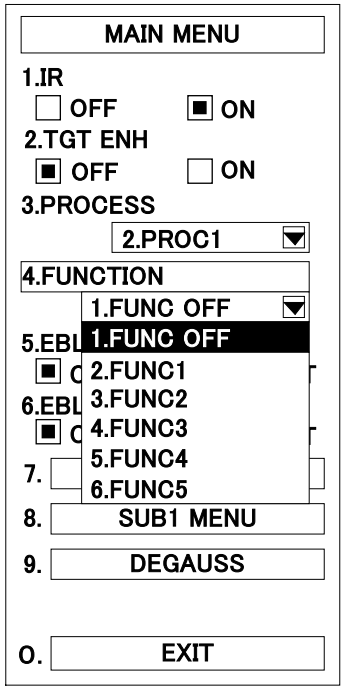
2 Click FUNCTION.

4.FUNCTION will be selected and the pull-down menu will appear.

3 Select a desired process setting item from the click.

The process setting item will be changed and the current setting state will appear at the lower right of the radar display.

4 For changing the setting item, open the pull-down menu in step 2 above again and select a desired process setting item.



Exit

1 Click EXIT .

The Main Menu will be closed.

Cancellation

1 Execute the procedures to function up to step 2.

4.FUNCTION will be selected and the pull-down menu will appear.

2 Click EXIT .

1.FUNC OFF will be set and “FUNC OFF” will appear the lower right of the radar display.

The process setting items of FUNC4 and FUNC5 can be changed by service personnel.

- Setting gain of input target signal (sensitivity preset)
- Setting standard value of input target signal (noise level)
- Setting radar interference rejection (IR):IR1 to IR4 (Effective when IR is ON)
- Setting target enhancement (TGT ENH):EXP1 to EXP4 (Effective when TGT ENH is ON)
- Setting target processing (PROCESS):MODE1 to MODE8 (Effective when PROCESS is ON)
- Setting sensitivity range (Maximum and minimum values)
- Setting sea clutter suppression range (Maximum and minimum values)
- Setting rain/snow clutter suppression range (Maximum and minimum values)

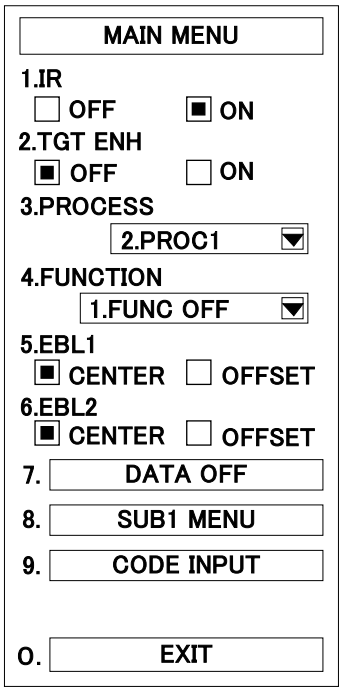
Note: Do not use FUNC2 and FUNC3 on short ranges. Otherwise, detection of ship targets moving high speeds may become poor.
For FUNC1 to FUNC3, the recommended parameters have been preset by the manufacturer, but the preset parameters could no be changed after delivery. In using FUNC1 to FUNC3, IR, TGT ENH and PROCESS shall be set to ON (PROC1 to PROC3).

Expand Targets

Targets displayed on the radar display can be expanded, regardless of the pulse length selected.

Procedures

The "ENH" section at the button left of the screen can be clicked to change the ON/OFF setting.



1 Click MENU.

The Main Menu will appear.

2 Select "ON" radio button of TGT ENH.

"ON"in"2TGT ENH"will be set and"ENH ON "will appear at the lower left of the radar display.
Then, the targets on the radar display will be expanded for higher definition.

Cancellation

1 Click MENU.

2 Select "ON" radio button of TGT ENH.

"OFF" in "2.TGT ENH" will be set and "ENH OFF" will appear at the lower left of the radar display.
The expanded targets on the radar display will be reset to their original sizes.

Exit

1 Click EXIT .

The Main Menu will be closed.

Display Processed Videos

Unnecessary noise will be reduced to highlight targets.

Attention

- In watching a radar beacon mark, SART signal or a fast moving target on the radar display, set the system to : PROCESS OFF (Processed Video OFF).
- It is most suitable to use this function in the TM mode.
  In using this function in the RM mode, use it in the NORTH UP or COURSE UP mode. In using the function in the HEAD UP mode, the video may be blurred.

Procedures **Clicking "PROC" on the screen will change the setting.**

○ When setting from the menu:

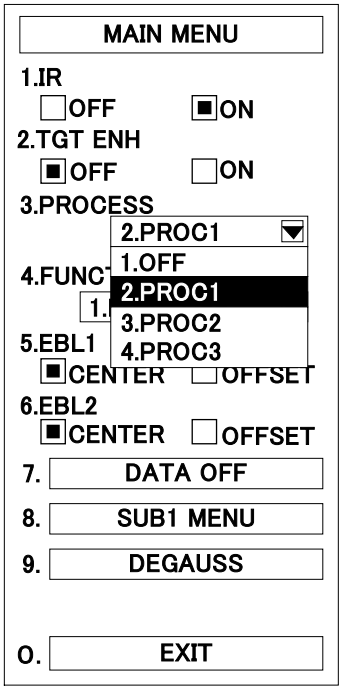
1 Click MENU .

The Main Menu will appear.

2 Click the setting section of "3.PROCESS".

3.PROCESS will be selected and the pull-down menu will appear.

3 Click a setting from 1 to 4.



3-1 When "2.PROC1" is selected.

2.PROC1 will be set and the targets moving at high speeds will be selected.

The targets moving at low speeds will be darkened.

This function is recommendable on the radar ranges of 1.5 NM or less.

3-2 When "3.PROC2" is selected.

3.PROC2 will be set.

This processing speed is in a range between PROC1 and PROC3.

3-3 When"4.PROC3" is selected.

4.PROC3 will be set and the targets moving at low speeds will be selected.

The targets moving at high speeds will be darkened.

This function is recommendable on the radar ranges of 3 NM or more.

Cancellation

1 Execute the procedures to display processed videos up to step 2.

2 Click OFF .

1.OFF will be set.

Exit

1 Click EXIT .

The Main Menu will be closed.

Reduce Radar Interference

Attention

- In watching a radar mark or SART signal on the radar display, set the system to: IR OFF (Radar Interference Rejection OFF)

This function is used when the interference from other ship's radar is strong.

**By left-clicking the 

button on the lower right of the screen, it is possible to set on or off.**

Procedures

1 Click MENU.

The Main Menu will appear.

2 Click "ON" radio button of IR .

“ON” in “1.IR” will be set and the radar interference rejection will be set to ON to reduce radar interference.

Cancellation

1 Click MENU.

2 Click "OFF" radio button of IR .

“OFF” in “1.IR” will be set and the radar interference rejection will be set to OFF.

Exit

1 Click EXIT .

The Main Menu will be closed.

Personal Information

The operating status of the radar equipment is recorded. If there are two or more operators to operate the radar, each operator can register and recall the operating status that is suitable for the operator. The operating status for up to 5 operators and each status can be named (using a maximum of 10 alphanumeric characters).

* Personal Data to be Stored:
  - Bearing mode
  - DAY/NIGHT mode setting
  - Brilliance
  - Alarm level
  - Vector length/mode
  - Various video processing methods (IR, ENH, PROC, and FUNC)

Recalling Operating Status

Procedures

Click the "PIN [ ]" on the lower right of the screen.

Open the LOAD menu. Execute the procedure from step 5.

1 Click [MENU].

The Main Menu will appear.

2 Click [SUB1 MENU].

The Sub1 Menu will appear.

3 Click [PIN].

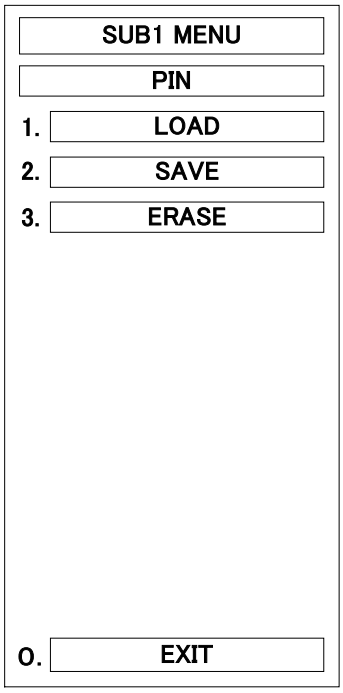
The PIN Menu will appear.

4 Click [LOAD].

The PIN Menu will appear.

5 Select any number on the LOAD Menu and click any of 1 to 5.

The registered operating status will be recalled.



6 Click [1.YES] to the question "FILE ERASE OK?" to recall the registered operating status.

Click [2.NO] to stop the recall.

Exit

1 Click EXIT .

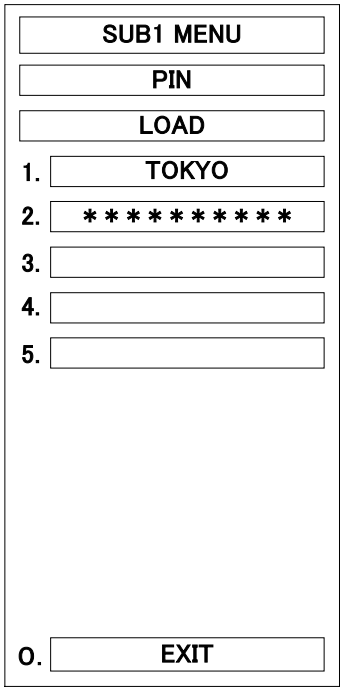
The PIN Menu will reappear.

2 Click EXIT .

The Sub1 Menu will reappear.

2 Click EXIT .

The Sub1 Menu will be closed.



Registering Operating Status

Procedures

1 Execute the procedures to recalling operating status up to step 3.

2 Click SAVE .

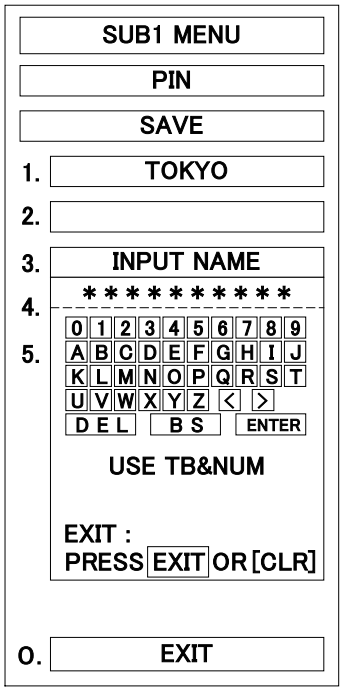
The SAVE Menu will appear.

3 Click any of 1 to 5 to save the operating status item assigned by any number 1 to 5.

The INPUT NME Menu will appear and the selected number to save will be set up.

4 Use the trackball to select an alphabet character from A to Z that is displayed in the menu, press the left trackball button, and input one character or one number of the name used for saving.

A maximum of 10 characters can be entered.



5 Repeat step 4 until the name to save is made up, and select "ENTER" in INPUT NAME Menu by using the trackball and click the trackball section left button.

The operating status will be saved.

Exit

1 Click EXIT .

The PIN will reappear.

2 Click EXIT .

The Sub1 Menu will reappear.

2 Click EXIT .

The Sub1 Menu will be closed.

3

Canceling Registered Operating Status

Procedures

1 Execute the procedures to recalling operating status up to step 3.

2 Click ERASE .

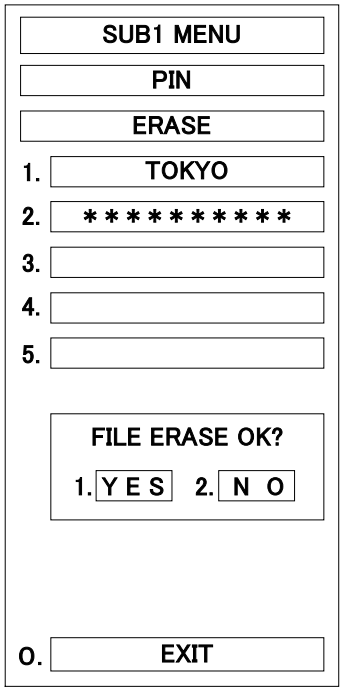
The ERASE Menu will appear.

3 Click any of 1 to 5.

The register number of the operating status to erased will be selected.

4 Click YES to the question "FILE ERASE OK?" to erase the registered number.

Click NO to stop the erasing.



Exit

1 Click EXIT .

The PIN Menu will reappear.

2 Click EXIT .

The Sub1 Menu will reappear.

3 Click EXIT .

The Sub1 Menu will be closed.

Display of Navigational Information

Navigational information such as waypoint marks, and a maximum of 256 point of NAV lines, coastlines, depth contours and NAV marks can be created, displayed, read out, saved, edited and cancelled. (This function is effective only when navigation equipment is connected to this system.)

[I] Displaying Waypoint Marks

If waypoint information is sent from navigation equipment, a waypoint mark will appear on the radar display. If the waypoint appears within the radar display, it is displayed as "○WP".

Procedures

1 Click the MENU on the screen.

The Main Menu will appear.

2 Click SUB1 MENU .

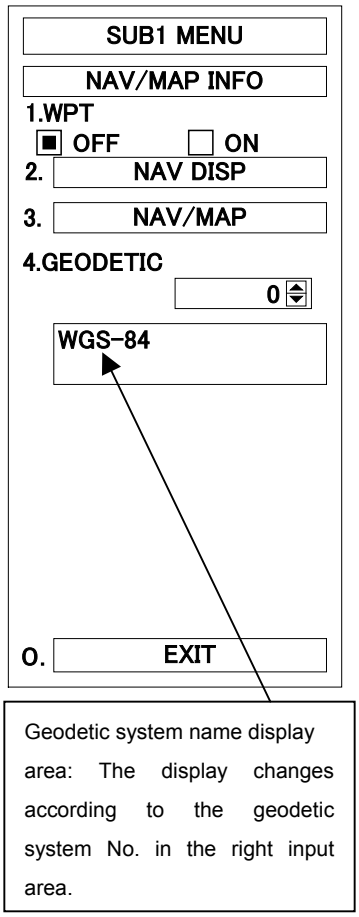
The Sub1 Menu will appear.

3 Click NAV/MAP INFO .

The NAV/MAP INFO Menu will appear.

4 Click "ON" radio button of WPT .

"ON" in 1.WPT will be set and the selected waypoint mark will appear.



Geodetic system name display area: The display changes according to the geodetic system No. in the right input area.

Exit

1 Click EXIT .

The Sub1 Menu will reappear.

2 Click EXIT .

The Sub1 Menu will be closed.

[II] Setting NAV INFO to ON/OFF

The following navigational information can be displayed or cancelled by pressing the corresponding switch.

- Own ship mark [OS MARK]
- NAV lines [NAV LINE]
- Coast lines [COAST]
- Depth contour [CONTOUR]
- Mark 1 [MARK1]
- Mark 2 [MARK2]
- Mark 3 [MARK3]
- Mark 4 [MARK4]

Procedures

1 Click MENU .

The Main Menu will appear.

2 Click SUB1 MENU .

The Sub1 Menu will appear.

3 Click NAV/MAP INFO .

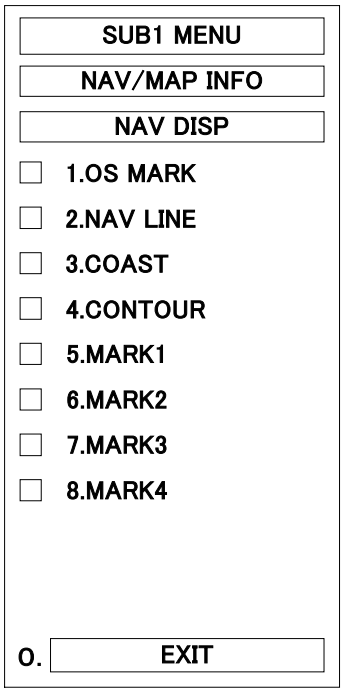
The NAV/MAP INFO Menu will appear.

4 Click NAV DISP .

The NAV DISP Menu will appear.

5 Click the check box next to the numbers 1 though 8 that are to be turned ON or OFF.

The menu item set to ON will be marked with a check mark in the "□".



Exit

1 Click EXIT .

The NAV/MAP INFO Menu will reappear.

1 Click EXIT .

The Sub1 Menu will reappear.

1 Click EXIT .

The Sub1 Menu will be closed.

[III] Making and Editing Navigation Information

Procedures

1 Click MENU .
The Main Menu will appear.

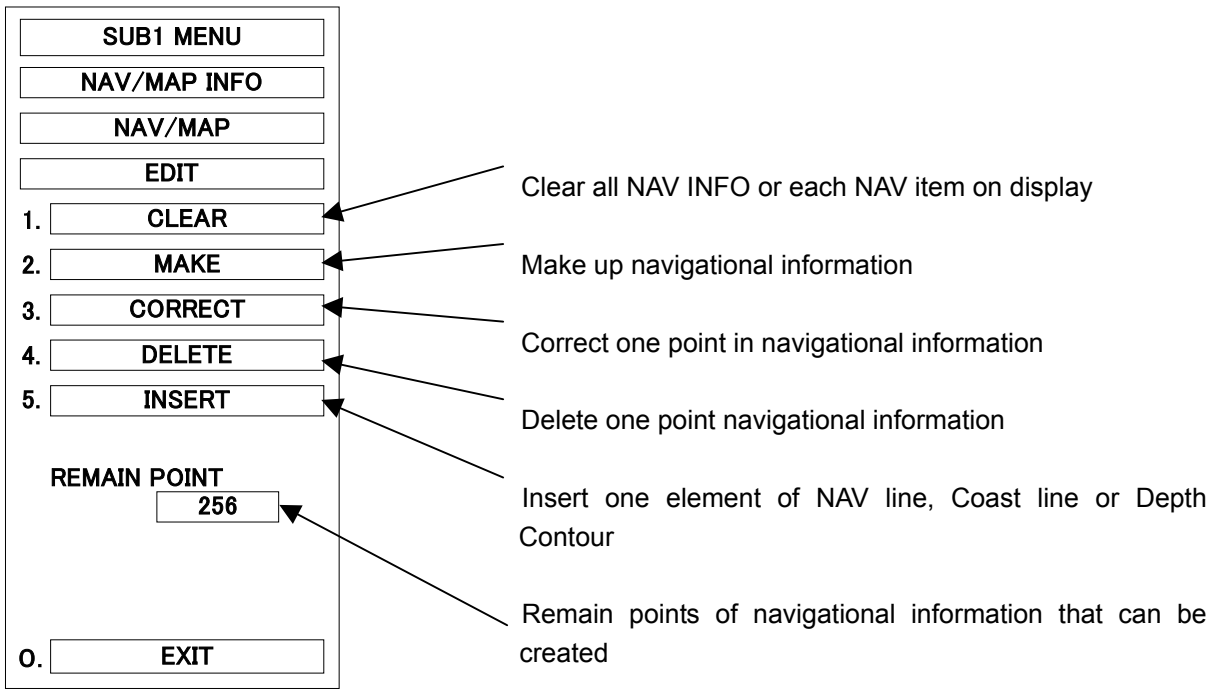
2 Click SUB1 MENU .
The Sub1 Menu will appear.

3 Click NAV/MAP INFO .
The NAV/MAP INFO Menu will appear.

4 Click NAV/MAP .
The NAV/MAP Menu will appear.

5 Click EDIT .
The EDIT Menu will appear.

Note: Latitude and longitude data from the GPS and bearing data from the GYRO are required.



1 CLEAR (Clear all NAV INFO or each NAV item on display)

Procedures

1 Click CLEAR .

The CLEAR Menu will appear.

2 Press any of 1 to 8 to clear any item navigation information.

1 : Clear all navigational information on display.

2 : Clear NAV LINE.

3 : Clear COAST Line.

4 : Clear CONTOUR.

5 : Clear MARK1.

6 : Clear MARK2.

7 : Clear MARK3.

8 : Clear MARK4.

The NAV INFO to be cleared will be selected.

2 MAKE (Make up navigational information)

Procedures

1 Click MAKE .

The MAKE Menu will appear.

2 Press any of 1 to 8 to clear any item navigation information.

1 : Make NAV LINE.

2 : Make COAST Line.

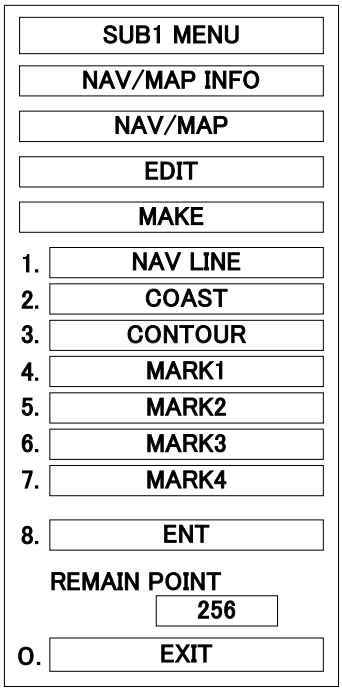
3 : Make CONTOUR.

4 : Make MARK1.

5 : Make MARK2.

6 : Make MARK3.

7 : Make MARK4.



When one of 1 to 7 is selected, NAV MAKE will appear in the CURSOR ( ) at the upper right of the radar display.

3 Move the cross cursor mark to the starting point of a line or any element of a mark using the trackball, and click the trackball section left button.

The starting point of a line or the element of a mark to mark will be set up.

4 Repeat step 3 above. If a line or mark is completed, click the ENT .

Then, a line or a mark will be made.

5 Repeat the steps 2 to 4 to make another line or mark.

6 Click EXIT when all NAV INFO item is made.

The EDIT Menu will reappear.

Note: Navigation information can have a maximum of 256 points plotted. Note that the value of REMAIN POINTS (the number of points that can be still plotted) is decreased whenever lines and marks are plotted.

3 CORRECT (Correct one position of navigational information)

Procedures

1 Click CORRECT.

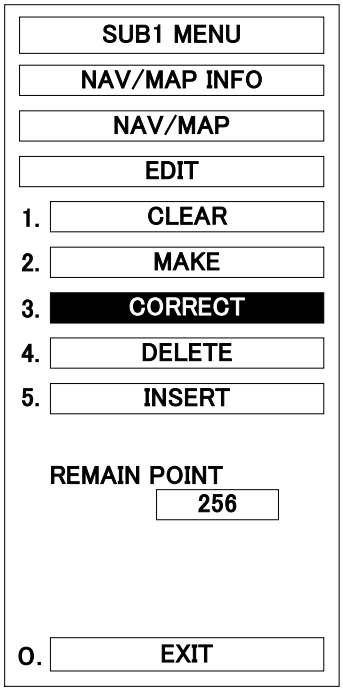
CORRECT will be selected. CORRECT will appear in the CURSOR( ) at the upper right of the radar display.

2 Move the cross cursor mark to any line element or mark to correct using the trackball, and click the trackball section left button.

A dotted-line starting from the line or mark will be drawn as the cross cursor moves.

3 Move the cross cursor to the point to correct using the trackball, and click the trackball section left button.

One element of the line or the mark will be moved.



4 DELETE (Delete one point in navigational information)

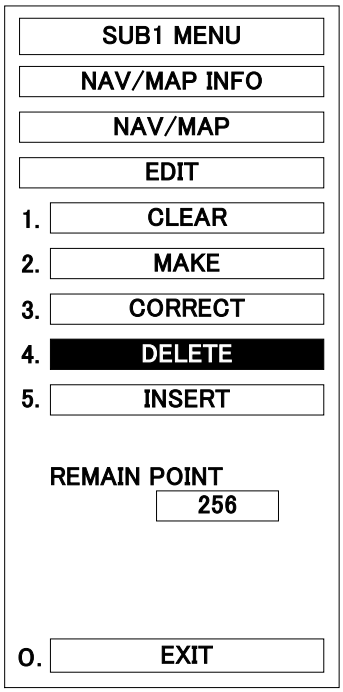
Procedures

1 Click DELETE.

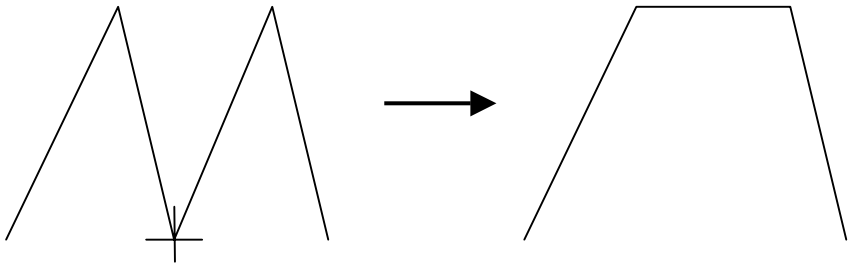
DELETE will be selected. NAV DEL will appear in the CURSOR( ) at the upper right of the radar display.

2 Move the cross cursor mark to any line element or mark to delete using the trackball, and click the trackball section left button.

One element of the line or the mark will be deleted.



(Example)



5 INSERT (Insert one element of NAV line, Coast line or Depth Contour)

Procedures

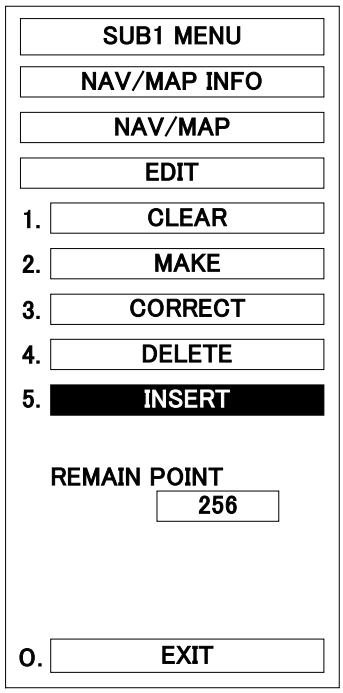
1 Click INSERT .

INSERT will be selected. NAV INS will appear in the CURSOR ( ) at the upper right of the radar display.

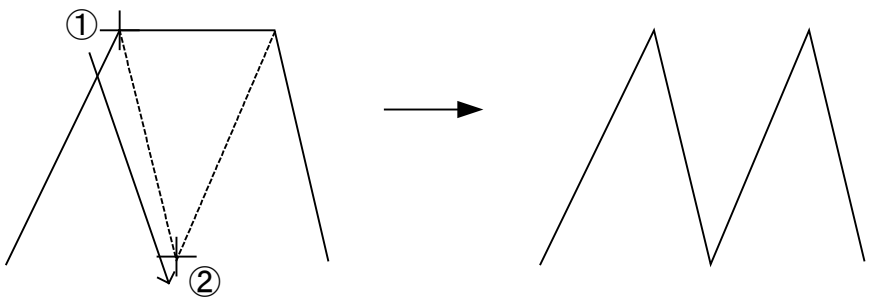
2 Move the cross cursor mark to any line element to which another element is to add, using the trackball, and click the trackball section left button.

3 Move the cross cursor to the point at which another line element is to be inserted, using the trackball, and click the trackball section left button.

One line element will be inserted.



(Example)



6 EXIT (End making and editing navigational information)

Exit

1 Click EXIT .
The NAV/MAP Menu will reappear.

2 Click EXIT .
The NAV/MAP INFO Menu will reappear.

3 Click EXIT .
The Sub1 Menu will reappear.

4 Click EXIT .
The Sub1 Menu will be closed.

[Ⅳ] Setting Navigational Information

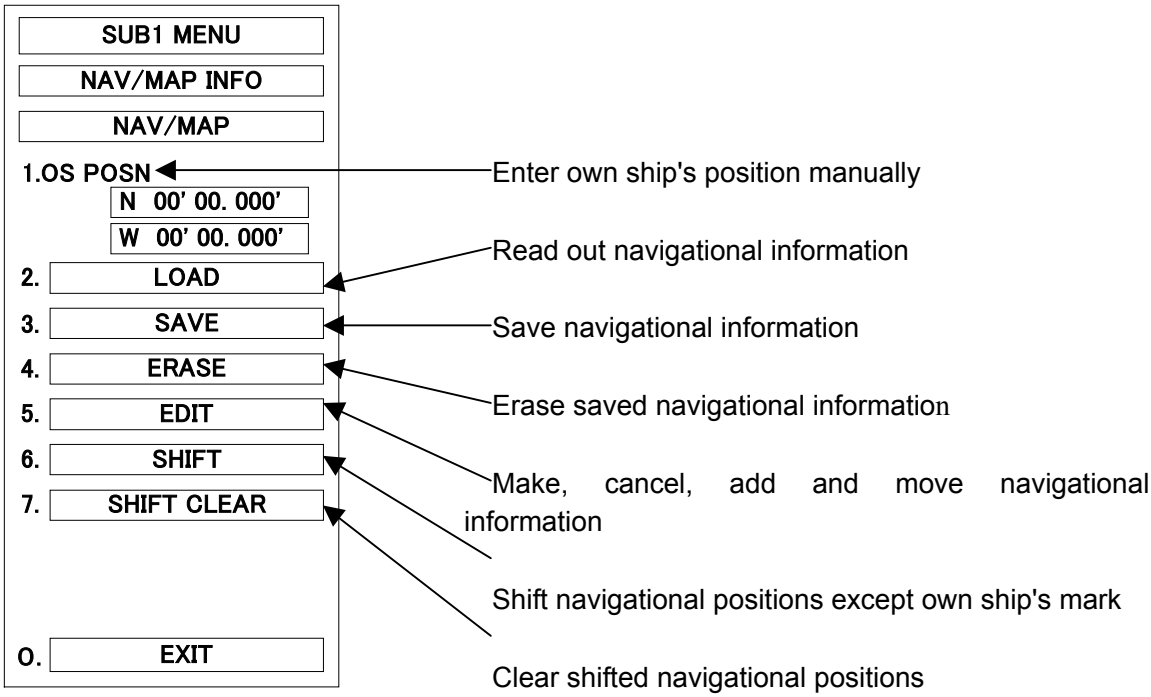
Procedures

1 Click MENU .
The Main Menu will appear.

2 Click SUB1 MENU .
The Sub1 Menu will appear.

3 Click NAV/MAP INFO .
The NAV/MAP INFO Menu will appear.

4 Click NAV/MAP .
The NAV/MAP Menu will appear.



1 OS POSN (Enter own ship's position manually)

Set this function to use the navigational information at any other position than own ship's position.

Procedures

1 Click the latitude and longitude numeric section under "OS POSN".

1.OS POSN will be selected.
The numeric input dialogue box will be displayed.

2 Press ═ or ✛ .

N (north latitude) or S (south latitude) will be selected.

3 Enter a latitude value (XX°XXX.XX') using any of 0 to 9.

4 Press SET .

The latitude value entered manually will be set up.

5 Press ═ or ✛ .

E (east longitude) or W (west longitude) will be selected.

6 Enter a longitude value (XX°XXX.XX’) using any of 0 to 9.

7 Press SET .

The longitude value entered manually will be set up.

Note: The own ship's position entered manually is effective only in the NAV/MAP INFO Menu.

3

2 Select Equipment to Load the Read-out Navigational Information

In the case that any electronic positioning equipment such as GPS is connected to the system, or that own ship's position is entered manually, the data can be read out.

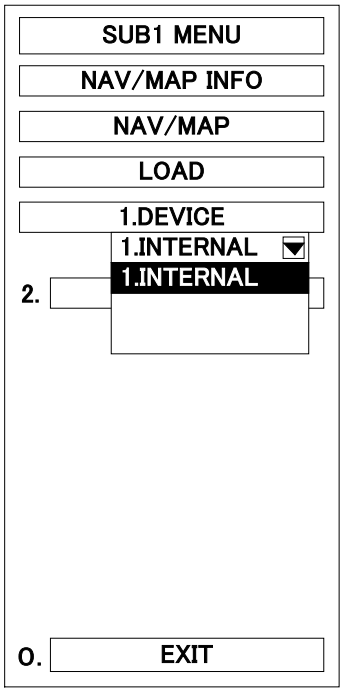
Procedures

1 Click LOAD .

The LOAD Menu will appear.

2 Click DEVICE .

1.DEVICE will be selected and the pull-down menu will appear.



3 Readout Navigational Information Display (Radar Internal Data)

Only when navigational equipment is connected to the system or when own ship's position is entered manually, the readout files can be selected. The selecting method is different depending upon the type of device to load the readout data.

When Setting DEVICE to INTERNAL

Procedures

1 Click LOAD .

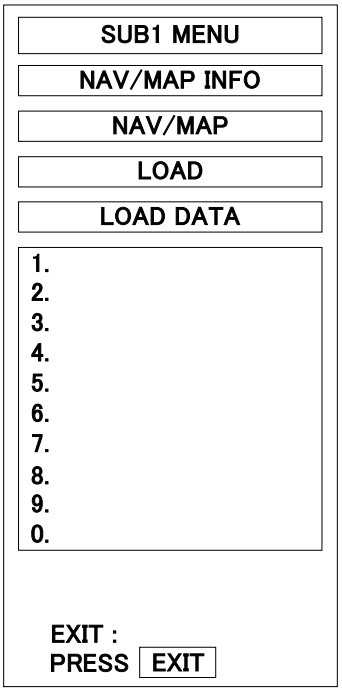
The LOAD Menu will appear.

2 Place the cursor over the navigation information file name (0 through 9) to be read, then double click.

3 Click YES to the question "FILE LOAD OK?" if the file name is right.

The selected number of navigational information will be read out.

To cancel file loading, click NO .



4 The selected file name will appear at the lower right of the radar display.

4 SAVE (Save navigational information)

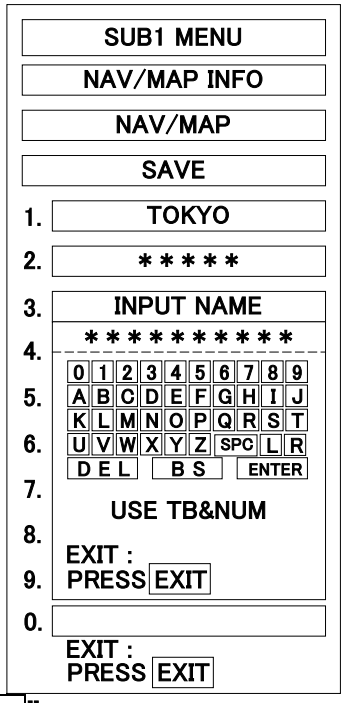
In the case that any electronic navigation equipment is connected to the system, or that own ship's position is entered manually, the data can be saved.

3

Procedures

1 Click SAVE .

The SAVE Menu will appear.



2 Place the cursor over one of the numbers 1 through 0 (ten in all), then click.

The INPUT NAME Menu will appear and the selected number to save will be set up.

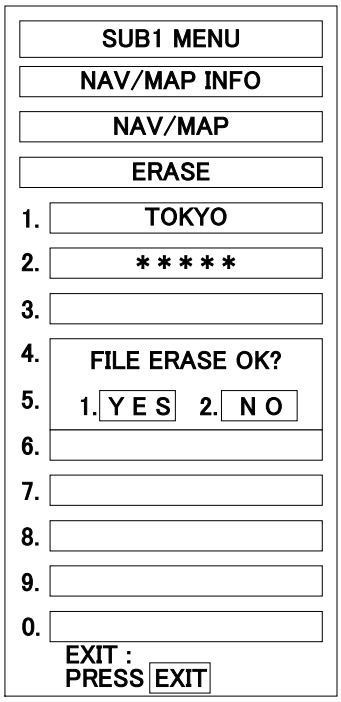
3 Use the trackball to select an alphabet character from A to Z that is displayed in the menu, press the left trackball button, and input one character or one number of the name used for saving.

A maximum of 10 characters can be entered.

4 Repeat step 3 until the name to save is made up, and select " ENTER" in INPUT NAME Menu by using the trackball and click the trackball section left button.

The currently displayed navigational information will be saved.

5 ERASE (Erase saved navigational information)



Procedures

1 Click ERASE .

The ERASE Menu will appear.

2 Place the cursor over one of the numbers 1 through 0 (ten in all), then click.

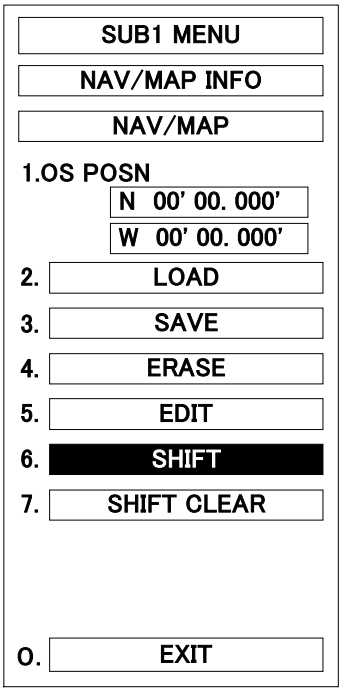
3 Click YES to the question "FILE ERASE OK?" to erase the information.

The elected number of navigational information will be erased.

Click NO to stop erasing the information.

6 SHIFT (Shift navigational positions except own ship's mark)

The position of any navigational information such as NAV lines, coast lines, depth contours, and other marks except own ship's mark can be corrected manually.



Procedures

1 Click SHIFT .

SHIFT will be selected. NAV SHIFT will appear in the CURSOR ( ) at the upper right of the radar display.

2 Move the cross cursor mark to an element of a line such as NAV line, coast line, depth contour line, or a mark using the trackball.

3 Click the trackball section left button.

A line or mark to correct will be set up.

4 Move the cross cursor mark to any point to which a line or mark will be shifted, using the trackball.

5 Click the trackball section left button.

The point to which a line or mark is to be shifted will be set up, and all lines and marks will be shifted.

7 SHIFT CLEAR (Clear the corrected positions of navigation information)

Procedures

1 Click SHIFT CLEAR .

SHIFT CLEAR will be selected.

The latest correction to navigation information (only one correction) will be cleared.

Note: Only the latest correction is cleared and the previous navigation information is restored.
The information cannot be further restored.

8 EXIT (Exit from setting of navigational information)

Exit

1 Click EXIT .

The NAV/MAP INFO Menu will reappear.

2 Click EXIT .

The Sub1 Menu will reappear.

3 Click EXIT .

The Sub1 Menu will be closed.

[V] Setup and Display of Geodetic System

In making up any navigational information, it is necessary to set up the geodetic system used by the connected navigation equipment. When any saved navigational information is loaded, the geodetic system used when the navigational information was saved will also be displayed. Then, check that the geodetic system on display is the same as that for the connected navigation equipment. If both geodetic systems are different, the positions of the navigational information on radar display may be deviated. Therefore, it is important to set the same geodetic system as the navigation equipment.

Procedures

1 Click MENU .

The Main Menu will appear.

2 Click SUB1 MENU .

The Sub1 Menu will appear.

3 Click NAV/MAP INFO .

The NAV/MAP INFO Menu will appear.

4 Click GEODETIC .

4.GEODETIC will be selected.

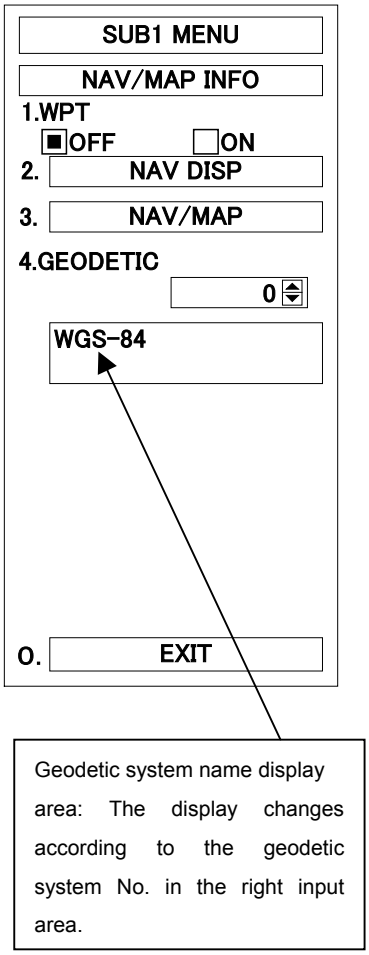
5 Select by pressing ▲▼ in the menu.

This is set by ▲▼ or the numeric input dialogue box.

Select the number of geodetic system.

(See Table of Geodetic Systems)

When the number of geodetic system is entered, its name is changed.



Exit

1 Click EXIT .

The Sub1 Menu will reappear.

2 Click EXIT .

The Sub1 Menu will be closed.

TABLE OF GEODETIC SYSTEM

NO.	NAME	REPRESENTATION
0	WGS-84	WGS-84
1	WGS-72	WGS-72
2	Japan	Japan
3	North American 1927 (U.S)	1927 North America
4	North American 1927 (Canada & Alaska)	1927 Canada, Araska
5	European 1950 (Europe)	European 1950
6	Australian geodetic 1966 (Australia)	Austrarian geodetic 1966
7	Ordnance Survey of Great Britain (England)	UK
8	NAD-83	NAD-83
9		no use
10		no use
11	ADINDAN (Ethiopia & Sudan)	ADINDAN
12	ARC (Botswana)	ARC 1950
13	AUSTRALIAN GEODETIC 1984 (Australia)	AUSTRALIAN GEODETIC 1984
14	BERMUDA 1957 (the Bermudas)	BERMUDA 1957
15	BOGOTA OBSERVATORY (Columbia)	BOGOTA OBSERVATORY
16	CAMPO INCHAUSPE (Argentine)	CAMPO INCHAUSPE
17	CHATHAM 1971 (Chatham Island)	CHATHAM 1971
18	CHUA ASTRO (paraguay)	CHUA ASTRO
19	CORREGO ALEGRE (Brazil)	CORREGO ALEGRE
20	DJAKARTA (VATAVIA)(Sumatra)	DJAKARTA
21	EUROPEAN 1979 (Europe)	EUROPEAN 1979
22	GEODETIC DATUM 1949 (New Zealand)	GEODETIC DATUM 1949
23	GUAM 1963 (Guam)	GUAM 1963
24	HAYFORD 1910 (Finland)	HAYFORD 1910
25	HJORSEY 1955 (Iceland)	HJORSEY 1955
26	INDIAN (India & Nepal)	INDIAN
27	IRELAND 1965 (Ireland)	IRELAND 1965
28	KERTAU 1948 (West Malaysia)	KERTAU 1948
29	L.C.5 ASTRO (Cayman Black Island)	L.C.5 ASTRO
30	LIBERIA 1964 (Liberia)	LIBERIA 1964
31	LUZON (Philippines)	LUZON
32	MERCHICH (Morocco)	MERCHICH
33	MINNA (Cameroon)	MINNA
34	NAHRWAN (Oman)	NAHRWAN
35	NAPARIMA, BWI (Trinidad and Tobago)	NAPARIMA, BWI
36	OLD EGYPTIAN (Egypt)	OLD EGYPTIAN
37	OLD HAWAIIAN (the Hawaii Islands)	OLD HAWAIIAN
38	PICO DE LAS NIEVES (the Canary Islands)	PICO DE LAS NIEVES
39	PROVISIONAL SOUTH AMERICAN 1956 (South America)	PROVISIONAL S-AMERICAN 1956
40	PROVISIONAL SOUTH CHILEAN 1963 (South Chile)	PROVISIONAL S-CHILEAN 1963
41	PUERTO RICO (Puerto Rico and Virgin Islands)	PUERTO RICO
42	QORNOQ (South Greenland)	QORNOQ
43	RT90 (Sweden)	RT90
44	SANTA BRAZ (Sao Maguel, santa Maria Islands)	SANTA BRAZ
45	SOUTH AMERICAN 1969 (South America)	SOUTH AMERICAN 1969
46	SOUTHWEST BASE (Faial, Graciosa, Pico.Sao Jorge and terceira Islands)	SOUTHWEST BASE
47	TIMBALAI 1948 (Brunei and East Malaysia)	TIMBALAI 1948

Function of USER Switch / OPTION Switch.....

USER Switch

In the initial setting, the vector length maximum ON/OFF is registered.
These funcions can be changed only by service personnel.

Functions Registerable in USER Switch:

①Vector Length Maximum: ON/OFF

ON: Vector length	60 min (max)
OFF: Vector length	Time set on VECTOR TIME Menu.

②NAV/MAP INFO Menu: ON/OFF

ON: The NAV/MAP INFO Menu will appear.
OFF: The NAV/MAP INFO Menu will be closed.

③Parallel Index Line Display: ON/OFF

ON: The parallel index lines set on the PI Menu will appear on the radar display.
OFF: The displayed parallel index lines will be cleared.

OPTON Switch

①OPTON1 Switch

The registered function is called. Also, if an option is connected, then this is used to operate that option.

The call of a **MENU** is assigned at the time of factory shipments.

②OPTON2 Switch

The registered function is called. Also, if an option is connected, then this is used to operate that option.

The call of a **TEST** is assigned at the time of factory shipments.

Operation of Performance monitor

This function con be used only when the radar equipment is equipped with the NJU-63/64 Performance Monitor.

1 Method of Operation

In the case that the equipment is provided with radar interswitch, the interswitch shall be set to the Master Radar mode.

3

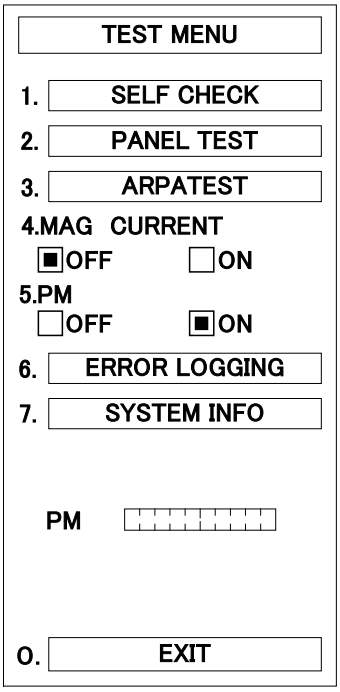
Procedures

1 Click TEST.

The MAIN Menu will appear.

2 Click "ON" radio button of "5.PM".

"ON" in "5.PM" will be set and the radar will automatically be set to RM, OFF CENTER OFF, IR OFF, PROCESS OFF, TGT ENH OFF, FUNCTION OFF and 24 NM range. The PM pattern for checking the receiving system will appear and the [PM] indicator bar-graph will also be in the TEST Menu to be used for checking the transmitted power.

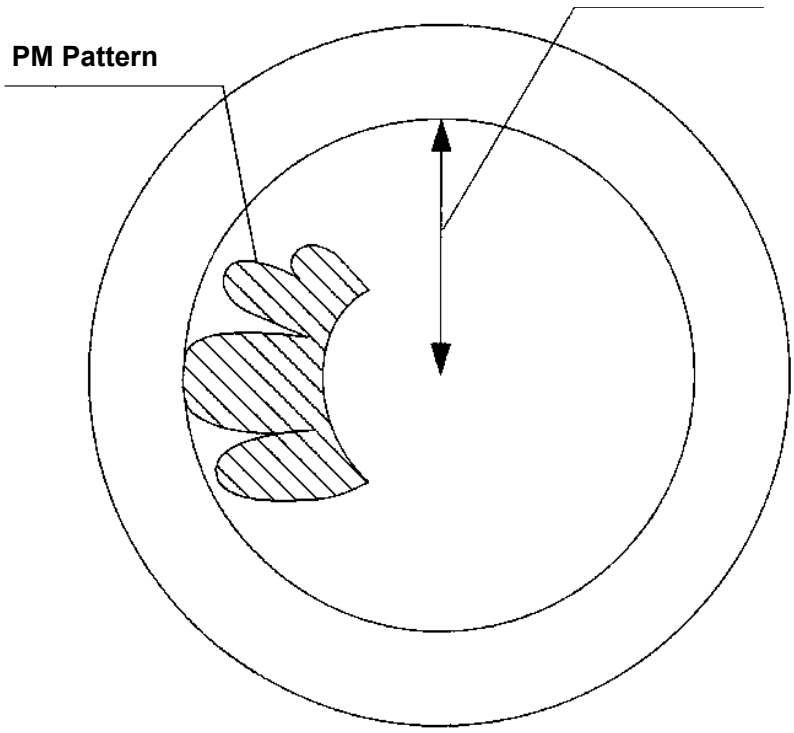


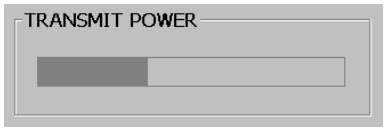
Exit

1 Click EXIT .

The TEST Menu will be closed.

Note: All target acquisitions by ARPA functions will be cancelled.
The target acquisition cancelled when PM is ON will not be recovered.
The radar image is suppressed to make the PM image easy to see.
So, the test menu should be always closed after the PM has been checked.





2 Checking Transmitter System

The value of the TRANSMIT POWER indicator bar graph in the test menu indicates the value corresponding to the transmission output power. If the indicated value becomes extremely short against the bar length checked at the initial time, it is necessary to request for checking of the transmitter system by a service engineer.

Checking procedure

① Read a current value A on the bar indicator.

② Referring to the Calibration Curve I, obtain a relative attenuation d(B) for the initial bar indicator length B that is specified in the INFORMATION LABEL.

③ Then, obtain a relative attenuation d(A) for the value A referring to the Calibration Curve I. The value given by d(A) - d(B) represents the attenuation of the current transmission output power compared with the value at the initial time.

④ If the attenuation value given by d(A) - d(B) is 10 dB or more (due to the life of the magnetron), it is necessary to request for checking of the transmitter system by a service engineer.

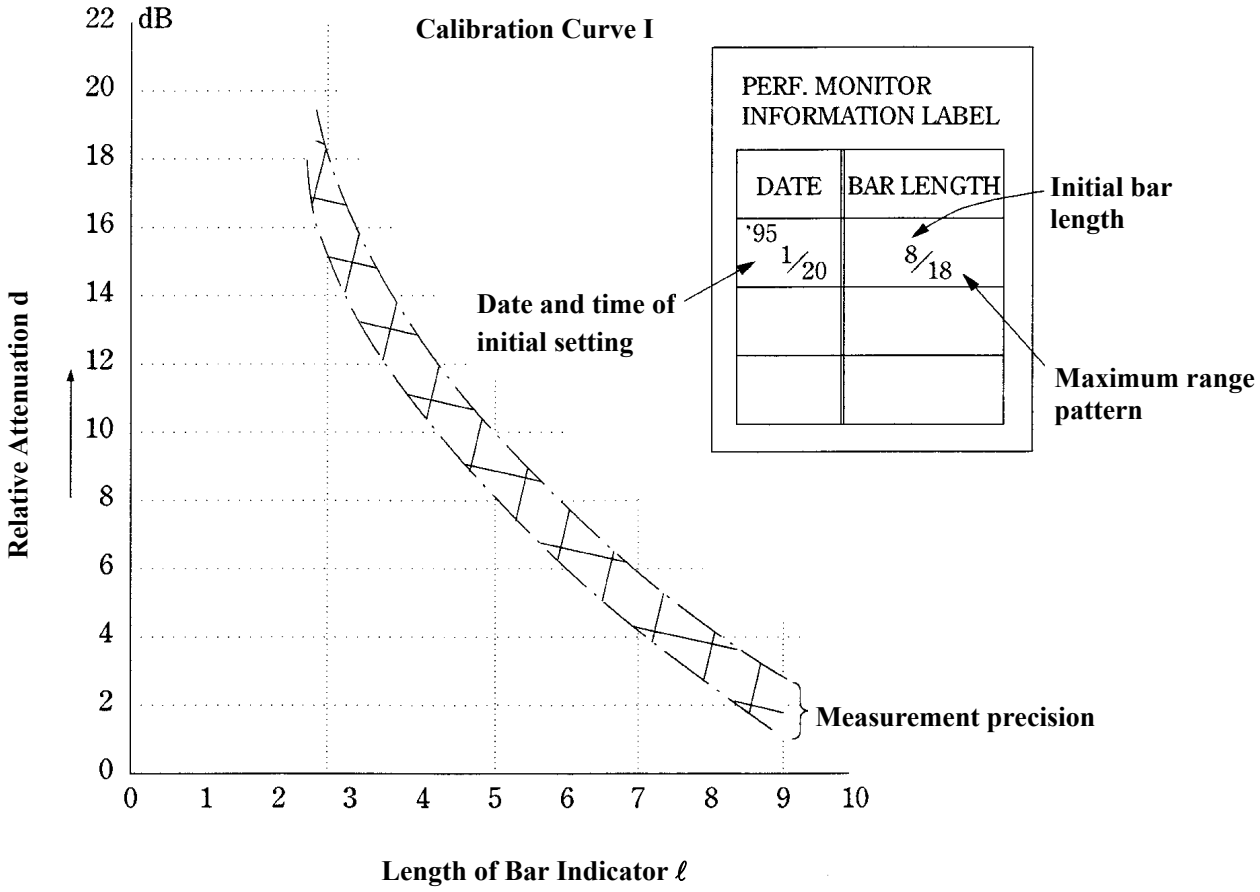
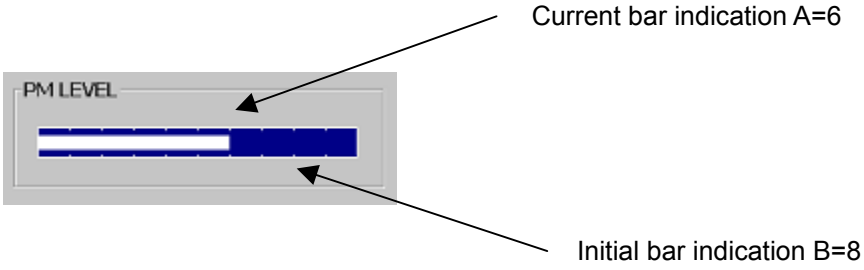


Figure 1

(Example)
Assuming that the initial bar indication is B = 8 and the current bar indication A = 6, the relative attenuation is d(B) = 3.5 dB, d(A) = 7 dB. Thus, d(A) - d(B) = 3.5dB.
This clearly indicates that the current transmission output power is attenuated by approximately 3.5 dB.

Example of Checking Transmitter System



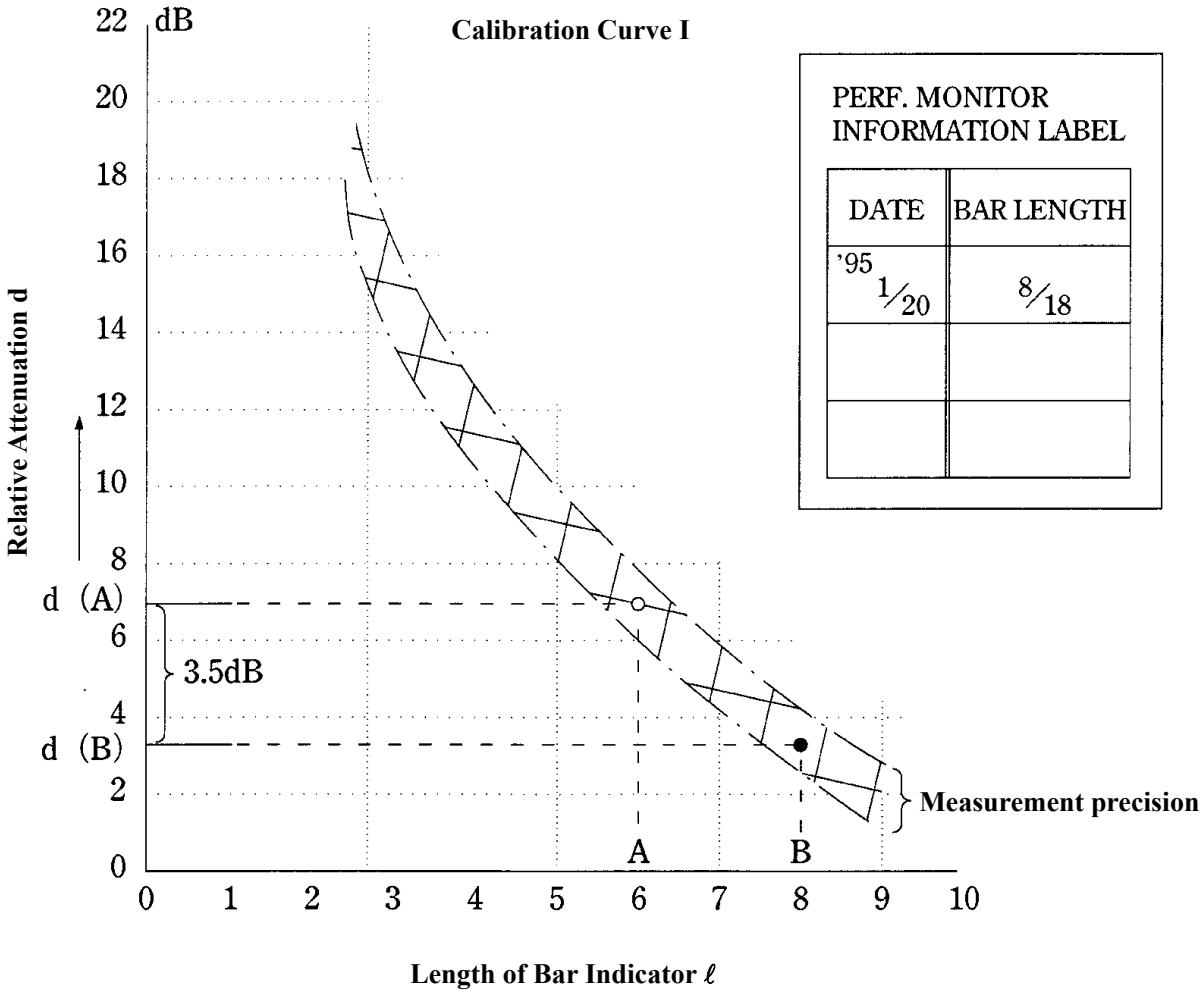


Figure 2

3 Checking Receiver System

The maximum range of the PM pattern on display indicates a deterioration of the sensitivity of the receiver system.

Checking Procedure

⑤ Measure the PM pattern displayed on the display using the VRM of the maximum range 'max' from the PPI sensor.

⑥ Obtain the degree of sensitivity deterioration R (rmax) corresponding to 'rmax' using the calibration curve II and indicate the degree of sensitivity deterioration of the current receiver system.

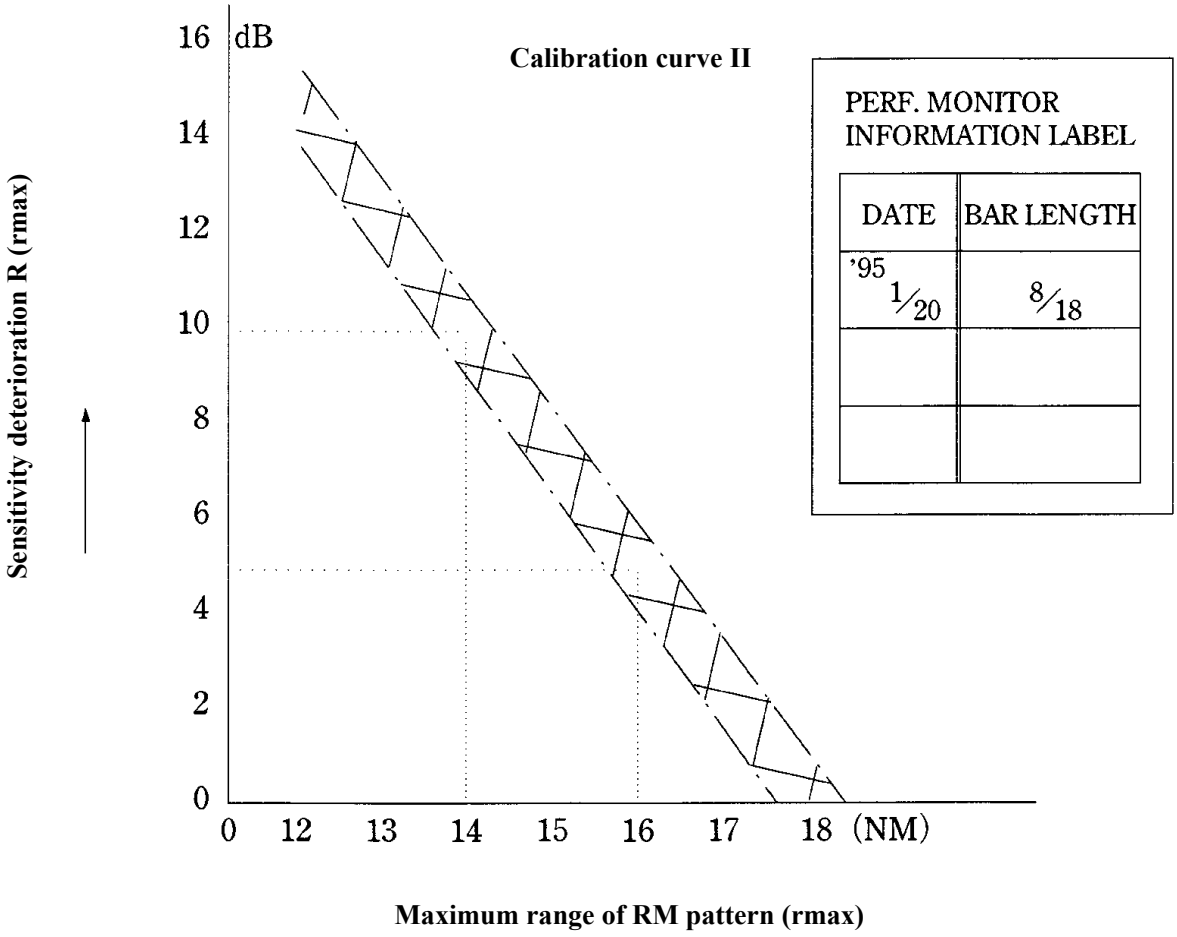
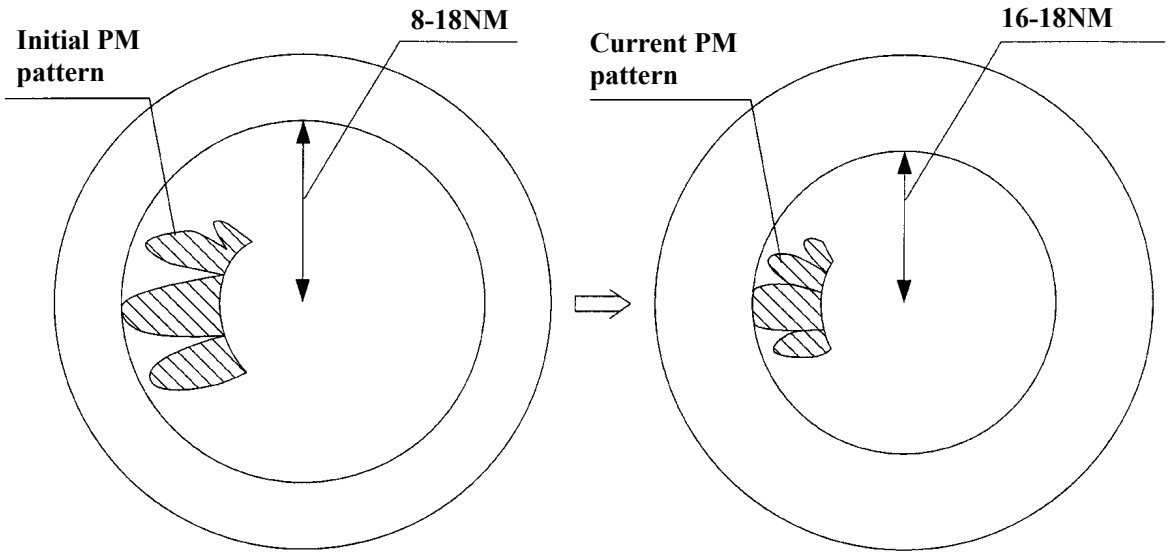


Figure 3

(Example)
Assuming that the maximum range of the initial PM pattern is rBmax = 18 NM according to the INFORMATION LABEL, and if that of the current PM pattern is rAmax = 16 NM, the deterioration value is ΔR (rmax) = 5dB, referring to Calibration Curve II.
This means that the receiver system has sensitivity deterioration of approximately 5dB.

Example of Checking Receiver System



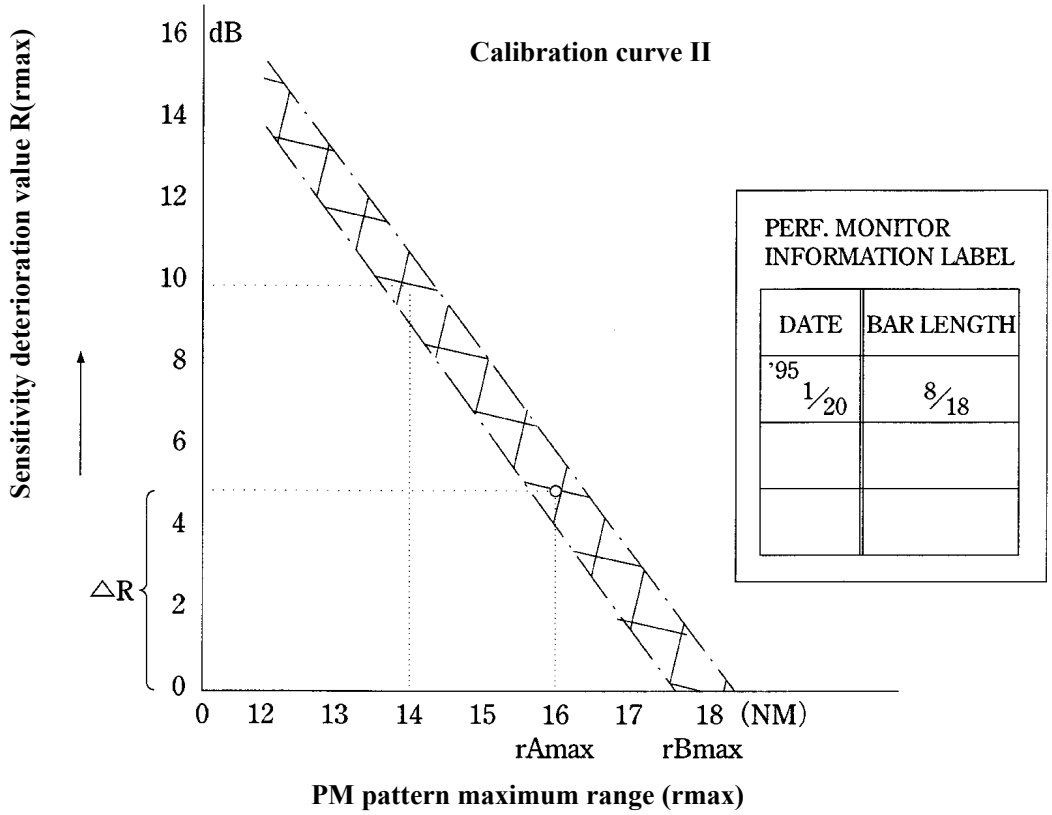
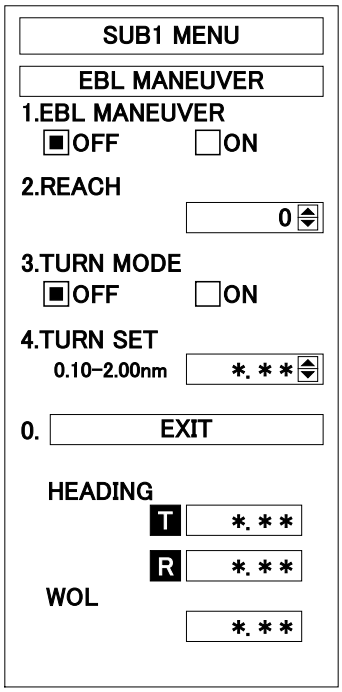


Figure 4

EBL Maneuvering

Menu Composition



[I] Initial Setting

Procedures

1 Click MENU , then SUB1 MENU and SUB1 MENU .

The EBL MANEUBER Menu will appear.

2 Click the numeric section of REACH.

REACH will be selected.

The numeric input dialogue box is opened.

3 Set the numeric value in the dialogue box.

4 Press END .

5 Click TURN MODE.

TURN MODE will be selected.

Select any turn mode.

RADIUS: Constant turn diameter (NM)

RATE: Constant turn speed (deg/min)

6 Click the numeric setting section of TURN SET .

TURN SET will be selected.

The numeric input dialogue box is opened.

7 Set the numeric value in the dialogue box.

8 Press END .

Note: If the initial setting is not correct, the maneuver curve will be affected.

[Ⅱ] Creating Maneuver Curve

Procedures

1 Click MENU , then SUB1 MENU and SUB1 MENU .

The EBL MANEUBER Menu will appear.

2 Click "ON" radio button of EBL MANEUVER.

“ON” in “1.EBL MANEUBER” will be set and a supplemental line, a maneuver curve and WOL will appear on the radar display.

3

3 Set the starting point of the supplemental line using the trackball and click to fix it.

The position of WOL (steering point) will change depending upon the starting point of the supplemental line. If the WOL is behind own ship's position, the line color of the WOL sill change.

4 Set the bearing of the supplemental line using the [EBL] control.

The bearing of the supplemental line will be the bearing in which own ship will finally move. The position of WOL will change depending upon the bearing of the supplemental line. If WOL is behind own ship's position, the line color of the WOL will change.

5 Select by left-clicking the trackball.

The setting will be established. However, if the WOL is behind own ship's position, the entry of Click will be rejected and the setting will not be established.

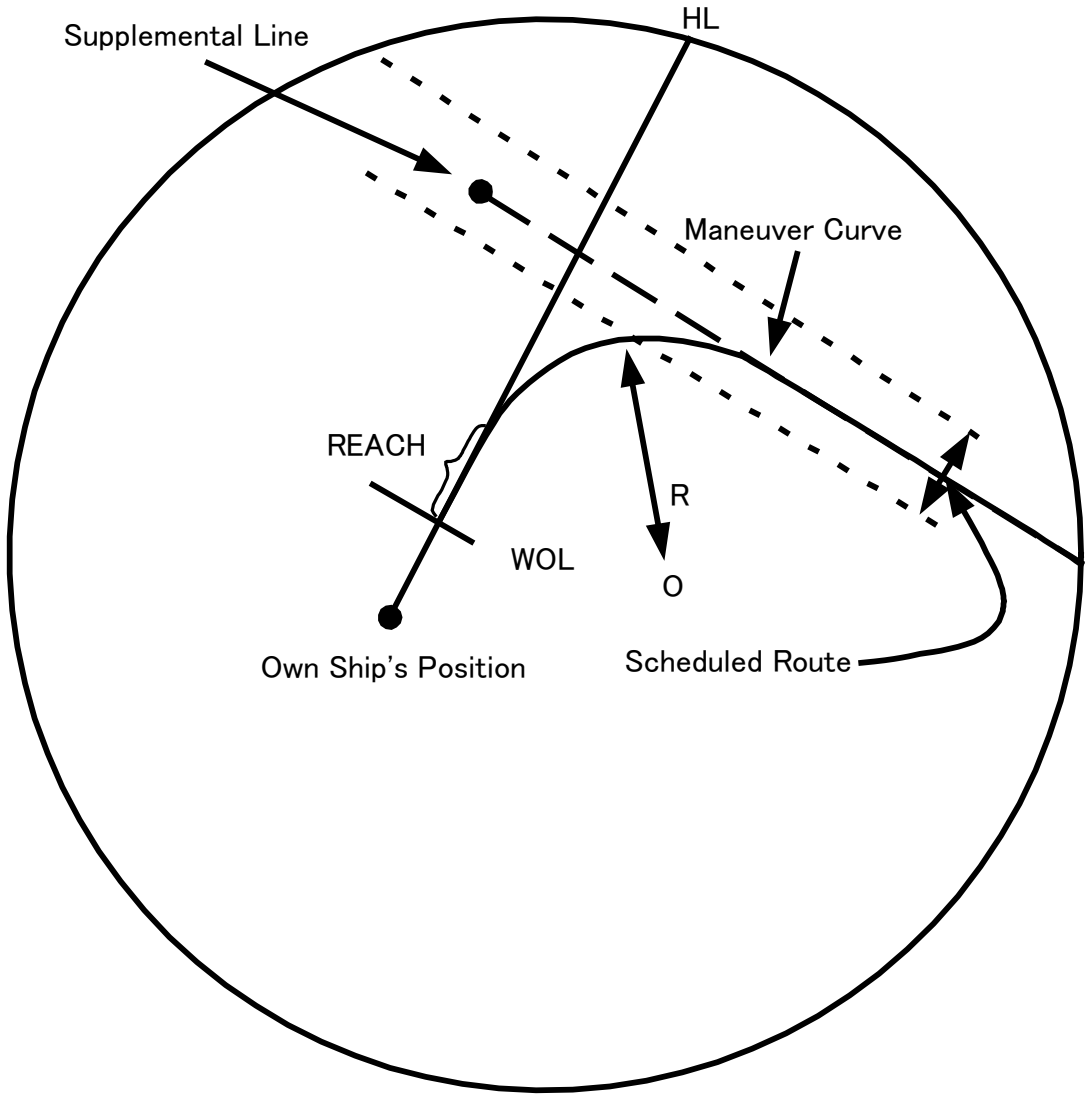
Note: If the [EBL] is pressed during the EBL MANEUVER operation, the Menu will be closed and the maneuver curve creating operation will be stopped.

Procedures **1 Click "OFF" radio button of EBL MNEUVER.**

"OFF"in "1.EBL MANEUVER"will be set and the EBL MANEUVER function will set to OFF.

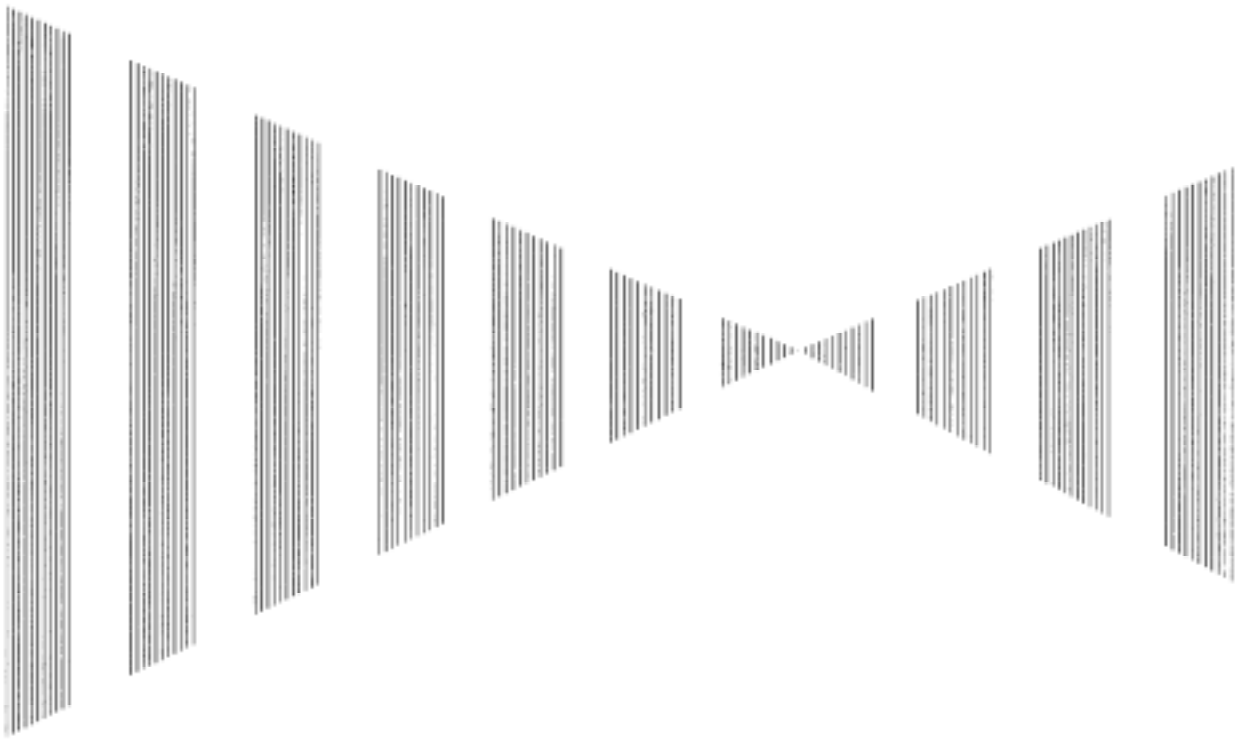
Exit **1 Click EXIT .**

The Sub1 Menu will be closed.



WOL : Steering point
REACH : Distance between when the wheel is steered and when the ship begins to turn
R : Turning radius

SECTION 4
MEASUREMENT OF RANGE AND BEARING



Measurement by Trackball

Procedures

1. **Check the target echoes on the radar display.**

2. **Move the cross cursor mark to a target by the trackball.**

   The [CURSOR] on the radar display indicates the bearing and range of the target.
   The range is a distance from own ship's position.

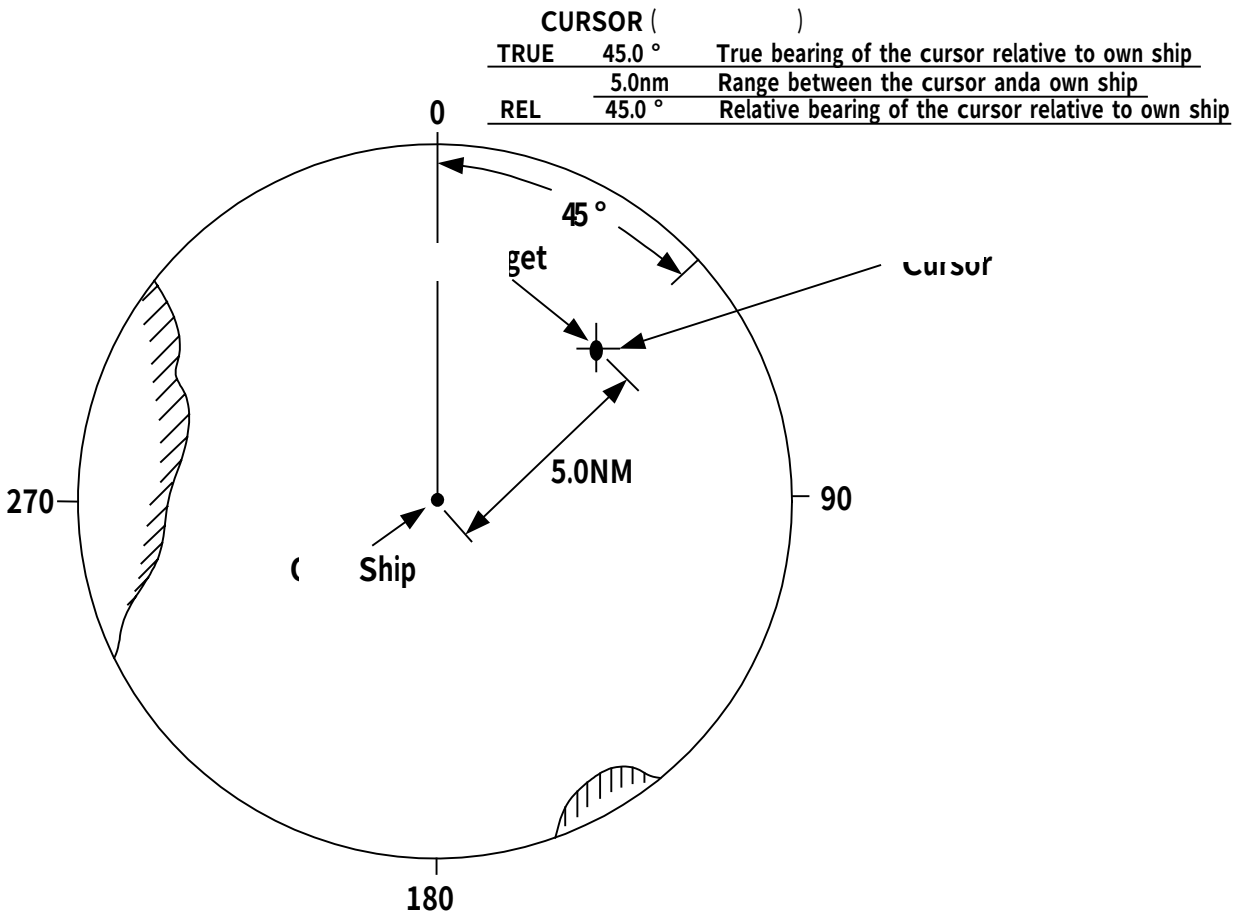
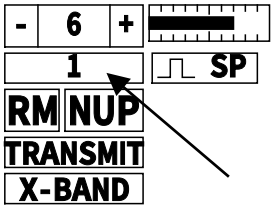


Fig. 4.1

Measurement by Range Rings

Procedures

1. 

Press

The Range Rings will appear on the radar display.
The range between the target and own ships can be determined by visually measuring the target's position that lies between two range rings.
(The range ring interval is fixed and indicates at the upper left of the radar display.)

Measurement by EBLs and VRMs

Procedures

1. Press EBL1 to select EBL1 display and operation.

The "EBL1" indication at the lower right of the radar display will be selected and the EBL1 will appear as a broken-line on the PPI display.

2. Turn the [EBL] control to put EBL1 on a target.

The bearing of the EBL1 will appear at the lower right of the radar display. The EBL1 bearing represents the target's bearing.

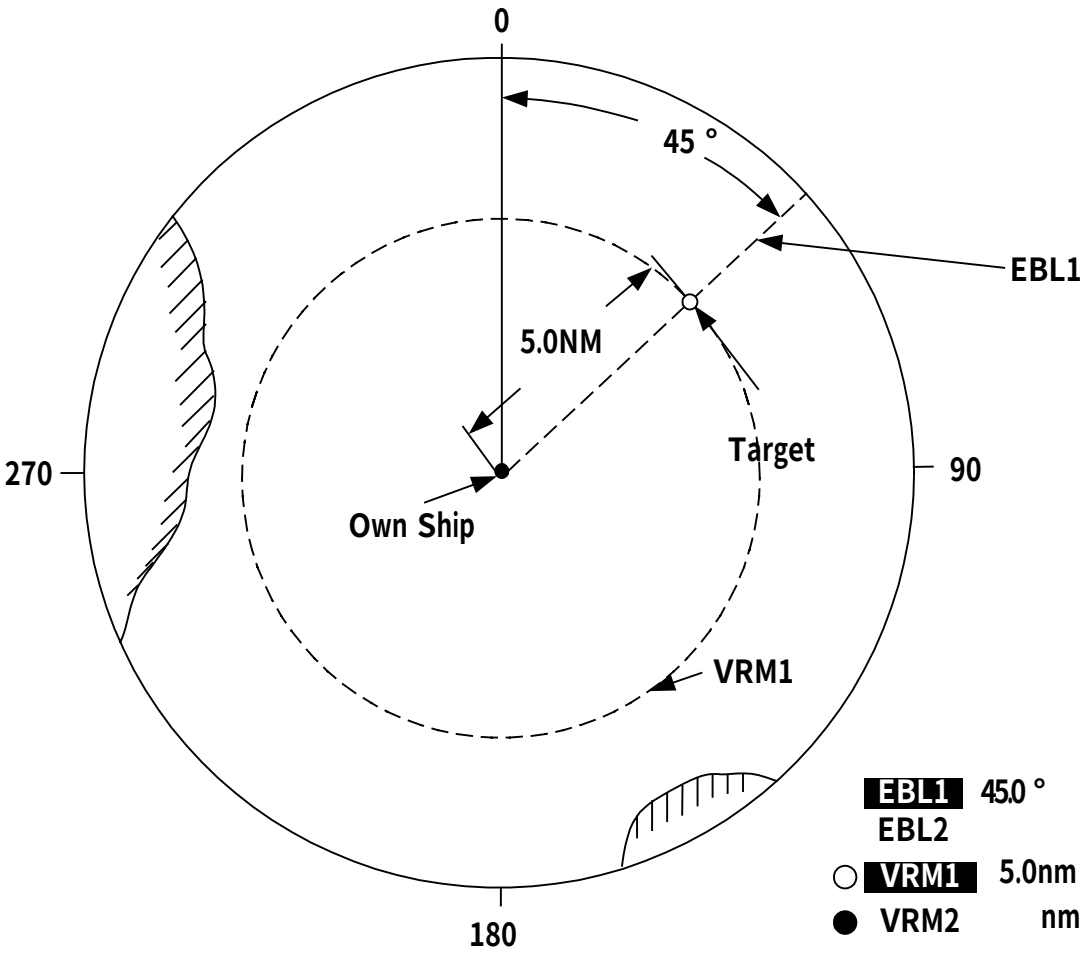
3. Press VRM1 to select VRM1 display and operation.

The "VRM1" indication at the lower right of the radar display will be selected and the VRM1 will appear as a broken-line circle on the PPI display.

4. Move the broken-line VRM1 to the target by using the trackball.

The range of the VRM1 from own ship will appear at the lower right of the radar display. The range of VRM1 signifies a distance between the target and own ship.

Refer to Fig. 4.2 in the next page.
In this figure, the range and bearing are;
Range: 5.0 nm
Bearing: 45.0°


0
45 °
EBL1
5.0NM
Target
270
90
Own Ship
VRM1
180
EBL1 45.0 °
EBL2
VRM1 5.0nm
VRM2 nm

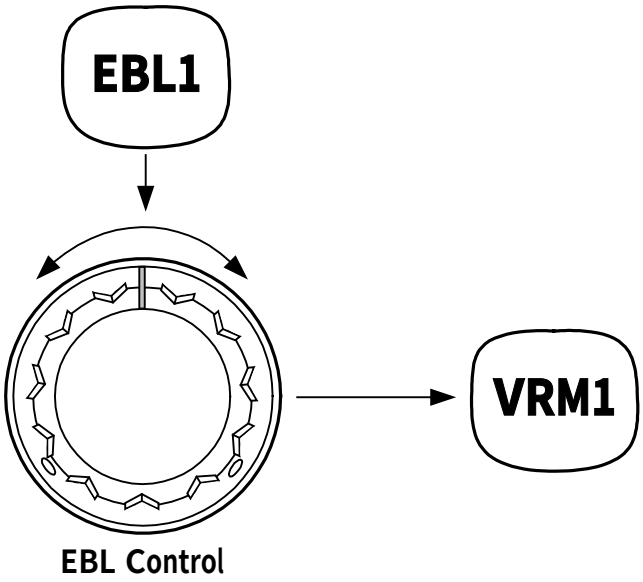

EBL1
VRM1
EBL Control

Fig. 4.2

Measurement between Two Optional Points

Procedures

1. Press EBL2 to select EBL2 display and operation.

The “EBL2” indication at the lower right of the radar display will be selected and the EBL2 will appear as a dotted-line on the PPI display.

2. Left-click the C switch at the lower right of the EBL2.

EBL1	T 263.5	°	C
EBL2	T 238.7	°	C

3. Using the trackball, move the starting point of EBL2 to one (A) of the two points.

(See Fig. 4.3.)

4. Turn the [EBL] control to move EBL2 to the other point (B).

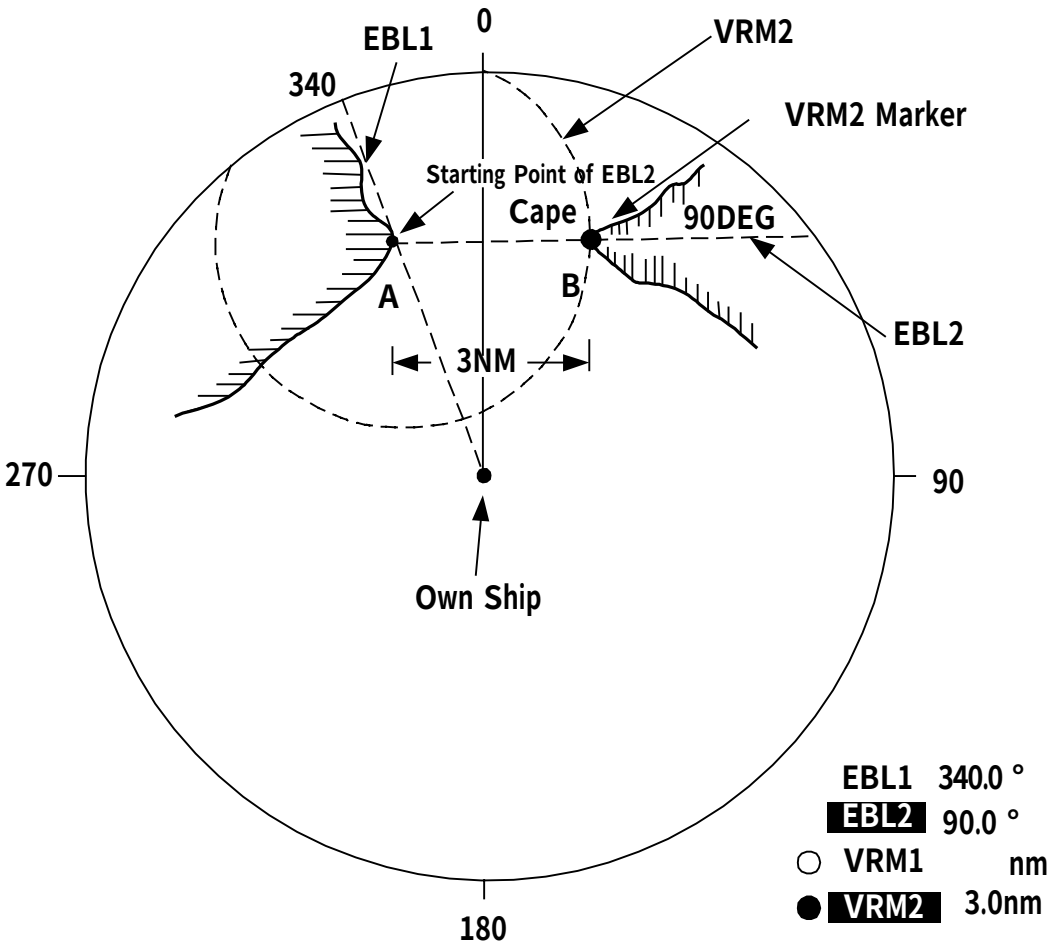
(See Fig. 4.3.)

5. Press VRM2 to select VRM2 display and operation.

(● VRM marker) will appear on a dotted-line of the EBL2.

6. Using the trackball, move the VRM2 marker on a dotted-line of EBL2 to the point B.

The VRM2 marker ● moves away from the center of the display by turning the trackball clockwise, and closer to the center.
The bearing and range between the two points will appear in the “VRM2” and “EBL2” area on the lower right of the radar display.



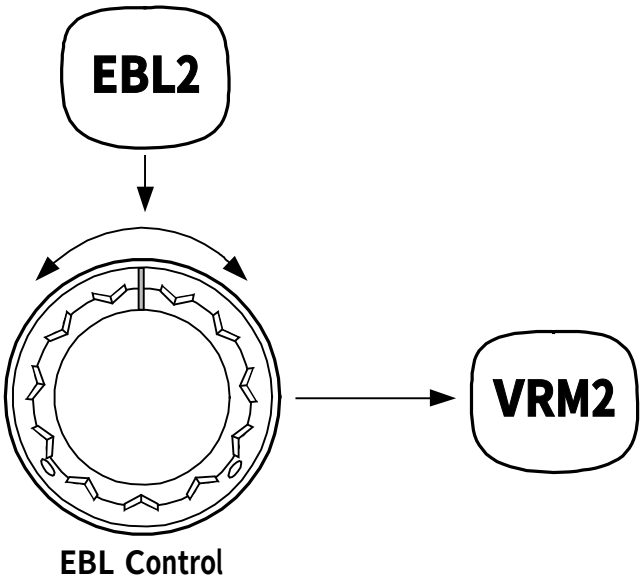
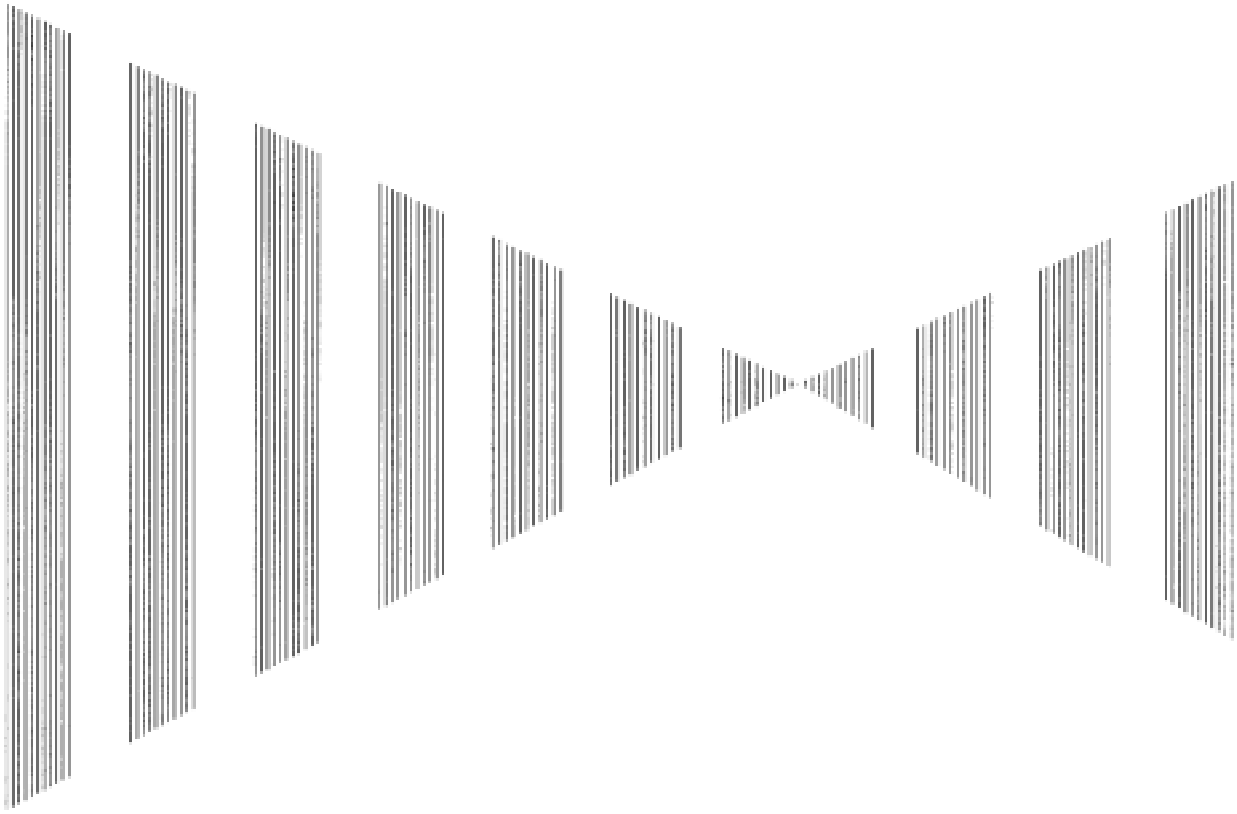


Fig. 4.3

It is also possible to use EBL1 instead of EBL2 in measuring the bearing and range between two optional points. In the procedures above, change EBL2 into EBL1 and VRM2 into VRM1, and left-click C of the EBL2 in step 2.

SECTION 5
OPERATION OF ARPA



Using ARPA

Attention

There are the following limitations on use of the target acquisition and tracking functions of ARPA:

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

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

[II] Intensity of echoes and the tracking function

The intensity of echoes and the tracking function are correlated, and thus the target will be lost if no echoes are detected for six consecutive scans. Therefore, if there is a lost target, radar gain must be increased to improve target detection. If, however, radar gain is increased too much, sea clutter or other noise may be mistakenly detected and tracked as a target, and a false alarm may result. In such cases, do not apply strong impact to the touch panel, trackball or gain, because doing so may cause a malfunction.

[III] Adverse effects of error sources on automatic tracking

To execute accurate tracking, it is necessary to accurately adjust the [GAIN], [SEA] and [RAIN] controls of the radar so that the target to be acquired and tracked is clearly displayed. Inappropriate settings for these controls will reduce the reliability and accuracy of automatic tracking.

5.1 INITIAL SETTING

The initial settings for using the ARPA functions are described in this section.

Setting Collision Decision Criteria: SAFE LIMIT

See sections 3.4 “Basic Operations” and 4 “Measurement of Range and Bearing” for descriptions of operation.

Attention

- Set the optimum values of collision decision conditions, depENTing on the vessel type, water area, weather and oceanographic conditions. (For the relations between those conditions and alarms, refer to section 5.7 “ALARM DISPLAY.”)

Before starting, check the collision decision criteria settings.

Procedures

1 Press MENU or OPTION2 key on the screen.

The Main Menu will appear.

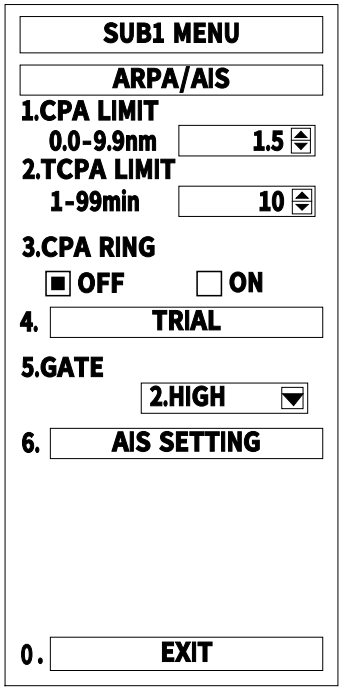
2 Click SUB1 MENU , then ARPA/AIS.

The ARPA Menu will appear.

3 Set CPA LIMIT (Closest Point of Approach).

(1) Left-click the“CPA LIMIT”edit box.

The numeric input dialogue box will be opened.

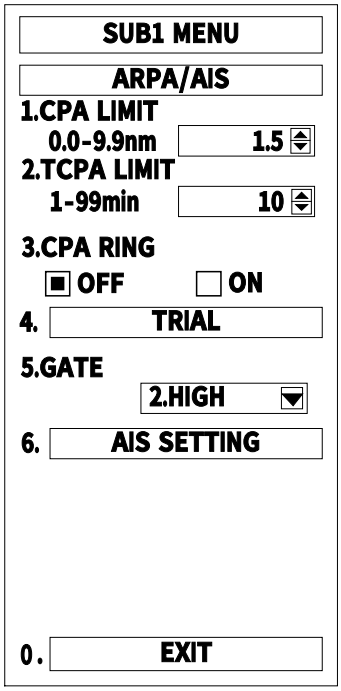


(2) Set the number by pressing the“+”or“－”keys in dialogue box.

(3) Press ENT to set up the value entry.

The input number will be fixed.

4 Display the CPA LIMIT ring.



(1) Click the "ON" of "3.CPA RING".

"ON"in"3.CPA RING"will be set and"CPA RING"will appear on the radar display.

(2) Should the CPA ring not appear, click the "OFF" of "3.CPA RING".

"OFF" in "3.CPA RING" will be set.

Attention: The CPA RING is not appear in the TRUE Vector mode.

5

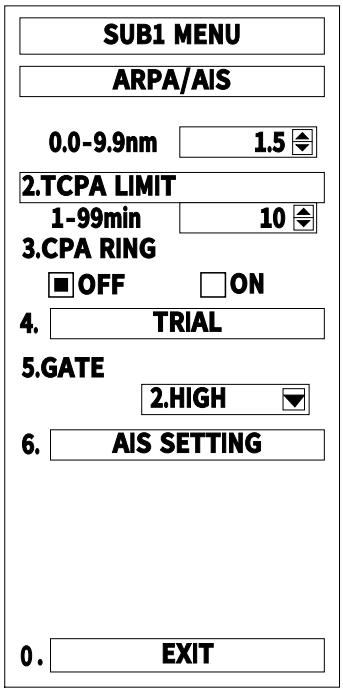
5 Set TCPA LIMIT (Time to CPA)

(1) Click the numeric section of "2.TCPA LIMIT".

The numeric input dialogue box will be opened.

(2) Set the number by pressing the"+"or"－"keys in the dialogue box.

(3) Press ENT to set up the value entry.



Exit

1 Click EXIT .

The Sub1 Menu will reappear.

2 Click EXIT .

The Sub1 Menu will be closed.

Attention: The set values of CPA LIMIT/TCPA LIMIT will appear on the radar display.

Automatic Setting Mode (System Start)

See sections 3.4 “Basic Operations” and 4 “Measurement of Range and Bearing” for descriptions of operation.

Fig. 5-1 Mode Setting at System Start

Mode	Initial setting	Refer to Section
DISPLAY MODE	RM (relative motion)	3.4
ACQUIRE	AUTO OFF	5.3
TRIAL	OFF	5.7
GUARD ZONE	OFF	3.4, 5.6

Setting Range Scale: (RANGE SCALE)

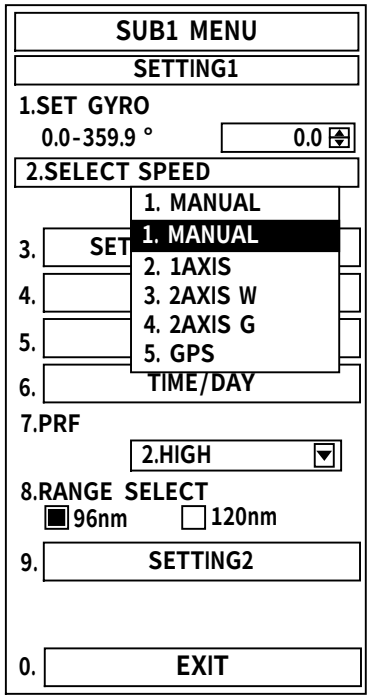
The ARPA functions can operate on all range scales. Usually, set the range between 1.5 to 24 NM depENTing on the area of operation.

Attention: The ARPA acquisition range is 0.1 to 32 NM.

Setting Own Ship's Speed

[I] When the LOG is not in operation (Manual Setting)

If the LOG is not in operation, set the estimated ship's speed manually.



Procedures

1 Press the MENU or OPTION2 key on the screen.

The Main Menu will appear.

2 Click SUB1 MENU , then SETTING1 .

The SETTING1 Menu will appear.

3 Left-click the "2.SELECT SPEED" edit box.

The "2.SELECT SPEED" edit box will be selected.

4 Click MANUAL .

1.MNUAL will be set.

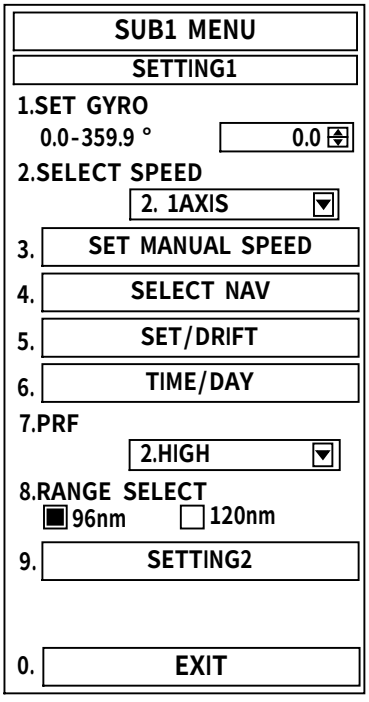
5 Click SET MANUAL SPEED .

"3.SET MANUAL SPEED"will be set.
The numeric input dialogue box will be opened.

6 Set the number by pressing the "+" or "—" keys in the dialogue box.

7 Press ENT to set up the value entry.

Own ship's speed will be set.



Exit

1 Click EXIT .

The Sub1 Menu will reappear.

2 Click EXIT .

The Sub1 Menu will be closed.

[Ⅱ] When the LOG is operating

When the system is set to the LOG mode, the speed signal will be entered automatically and the ship's speed will appear on the radar display.

The speed devices which are displayed on the screen are as follows:

LOG.....1-axis log
2AXW .....2-axis log Speed against water
2AXG.....2-axis log Speed against ground
GPS.....Speed from GPS

5.2 DISPLAY MODE SETTING

Setting Motion Display Mode [TM/RM]

Press RM(R) / TM button on the upper left of the screen, then select the true motion (TM) display mode or the relative motion (RM) display mode.
In the initial state, the mode is set to RM.

Note

For further details on the TM/RM modes, refer to section 3.4 “Select True/Relative Motion Display Mode.”

Setting Bearing Display Mode [AZI MODE]

Set the bearing display mode by pressing N UP/H UP/C UP on the upper left of the screen.

Note

For further details on the TM/RM modes, refer to section 3.4 “Select True/Relative Motion Display Mode.”

5.3 TARGET ID No. DISPLAY

The target ID number is a number displayed next to the symbol when a target ship is acquired. This number is allocated to target ships from 1 to 50 in the order that they are acquired. This number is used to identify each target ship until the target ship is lot or released.

Attention: Whether the Target ID No. display is turned ON or OFF can be checked only with a target acquired. For a description of acquisition, refer to 5.4 "Target Acquisition."

Depress 

to turn Target ID No. Display ON or OFF.

With this display ON, the target ID NO. is displayed next to the capture symbol.
With this display OFF, all the target ID Nos. are non-displayed.
However, the numbers remain displayed for captured targets of which numeric data display is specified.

Note

For a description on how to specify the numeric data display, refer to 5.6 "Data Display."

5.4 TARGET ACQUISITION

Attention

- It is important to adjust the controls [SEA] and [GAIN] properly in the automatic target acquisition mode to minimize the effect of sea clutter.

Target acquisition can be performed in two modes, AUTO and MANUAL, and both modes can be used at the same time.

Automatic Acquisition [AUTO]

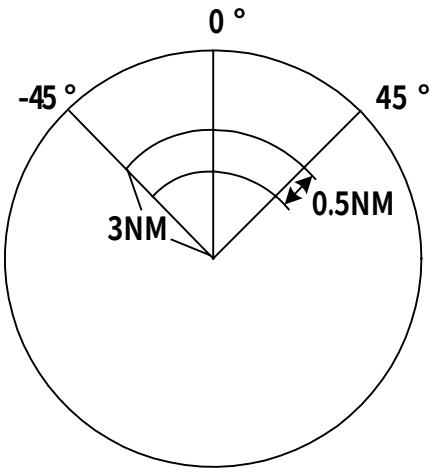
Attention

- If untracked targets enter the guard zone when the maximum number of targets (50 targets) is already being tracked, targets with lower levels of danger will be cancelled and replaced.

Procedures **1 Click GZ1 or GZ2 on the screen.**

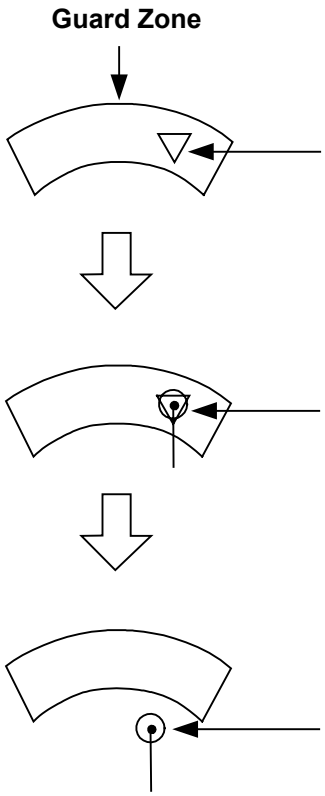
Automatic target acquisition will start. The target acquired will be marked with "▽" and its target ID No., which will move with the target. Its vector will appear within one minute.

Attention: When the Target ID No. display is set to OFF, any acquired target ship will not be given a target ID No.



In the ACQ AUTO mode, the targets within a guard zone will be acquired automatically. The guard zone can be set arbitrarily. If a guard zone is not set, a guard zone of 3 NM and ±45 degrees in the direction of the own ship will be set. (Guard Zone 1: Heading direction, Guard Zone 2: Sternward direction)
For the setting method, refer to section 3.4 “Set Guard Zones.”

Guard zone 1 will come on when GZ1 is clicked. When GZ1 is pressed again, automatic tracking will turn off and the guard zone will be erased from the radar screen, but other ships that were being tracked shall continue to be tracked.



Target that has entered the guard zone.
The guard zone intruder symbol is displayed.

Target that has continued to intrude in the guard zone for one minute.
The guard zone intruded symbol, acquired symbol and vector are displayed.

Target that has moved outside the guard zone.
The capture symbol and vector are displayed.
The guard zone intruder symbol is cleared.

Manual Acquisition [ACQ MANUAL]

Attention

- If the maximum number of targets (50) is already acquired, then new targets cannot be acquired. To do so, cancel any current targets that are not required.

Procedures

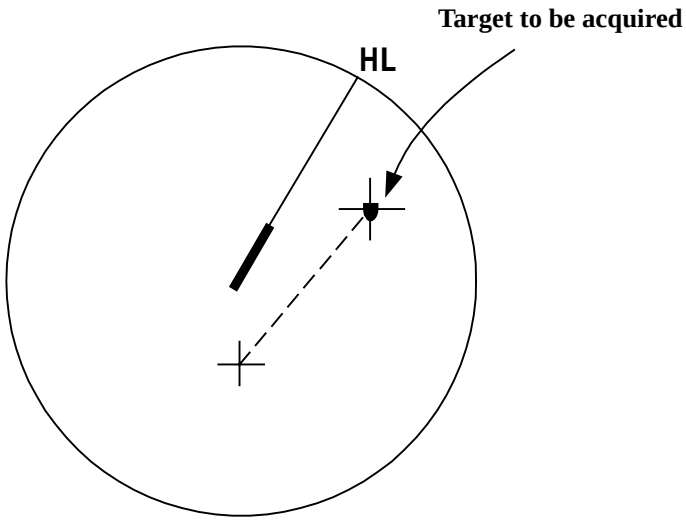
1 Press ACQ MANUAL **.**

2 Move the cross cursor on to the target to be acquired, then press the left trackball button .

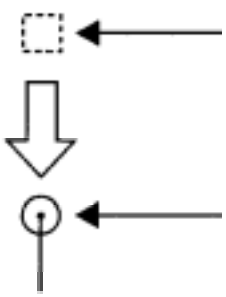
The acquired target will be marked with " ⬚ " and it's target ID No. Its vector will appear within one minute.

Attention: When the Target ID No. display is set to OFF, any captured target ship will not be given a target ID No.

Number of Targets and Acquisition Area



To use the manual acquisition mode only without the automatic mode on concurrently, press [ACQ AUTO] to turn Automatic Acquisition OFF.



Manually acquired target.
The initial acquisition symbol is displayed.

Target that has intruded into the zone for one minute.
The acquisition symbol and vector are displayed.

Use of Automatic and Manual Acquisition Modes [GZ1、GZ2] [ACQ MANUAL]

Method of Operation

Execute manual target acquisition in the automatic acquisition mode, that is, in the state in which the Automatic Acquisition mode [GZ1, GZ2] is ON.

Use of Combined Auto/Manual Mode

When both automatic and manual acquisition modes are used concurrently, important targets should be acquired manually, and the rest should be acquired automatically. If new targets enter the zone and they exceed the maximum number of targets that can be acquired, manual targets will continue to be displayed until they leave the guard zone, but automatically acquired targets will be cancelled according to their degree of importance.

5.5 ARPA DATA DISPLAY

(Refer to the Display Example on page 2-1.)

Display of Vectors

Attention

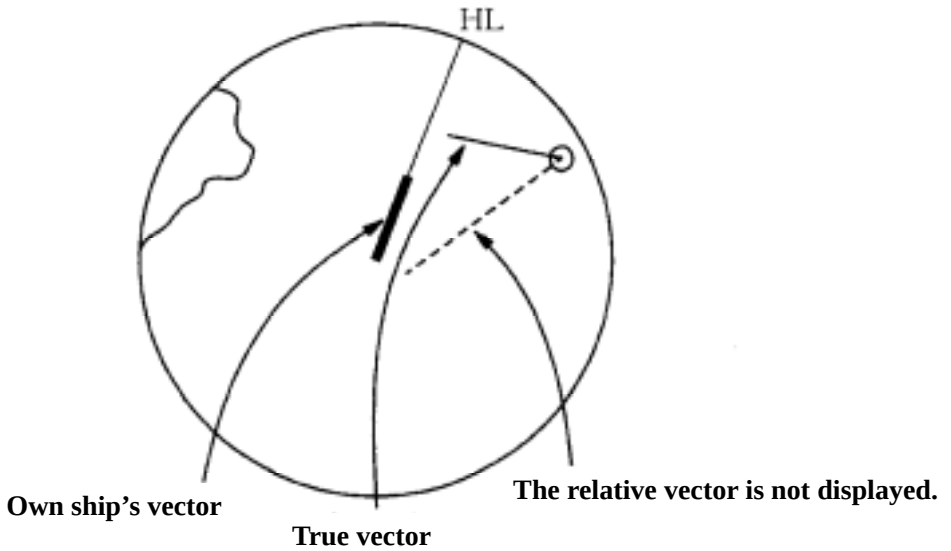
- When a targeting or the own ship changes course or when a target is acquired, the vector may not reach a given level of accuracy until three minutes or more has passed after such a course change or target acquisition.
  Even if three minutes or more have passed, the vector may include an error depENTing upon the tracking conditions.

A vector representing a target's predicted position can be presented in the TRUE vector or RELATIVE vector mode. In each mode, a vector length can be freely changed for a time interval of 1 to 60 minutes.

[l] Vector Mode Selection

True Vector Mode

In the true vector mode, the direction of a target vector indicates the true course of the target and its vector length is proportional to its speed.
In this mode, the own ship's vector is displayed as shown below.
In this mode, the movements of other ships around own ship can be accurately and easily monitored. However, no CPA RING can be displayed in this mode.

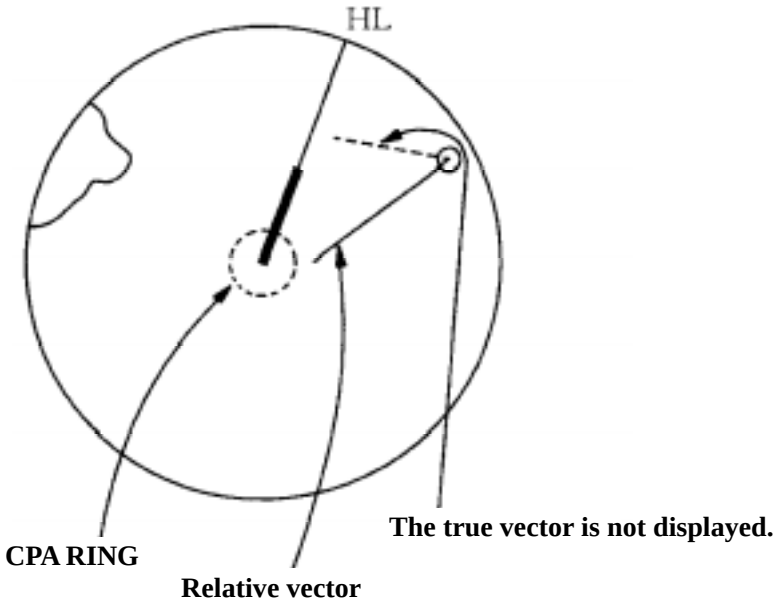


Relative Vector Mode

In order to display the relative vector of a target, press the T/R VECT switch to select the Relative Vector mode.

The relative vector does not represent the true motion of a target, but its relative relation with the own ship. This means that a target with its relative vector directed at the own ship (passing through the CPA LIMIT ring) is a dangerous target.

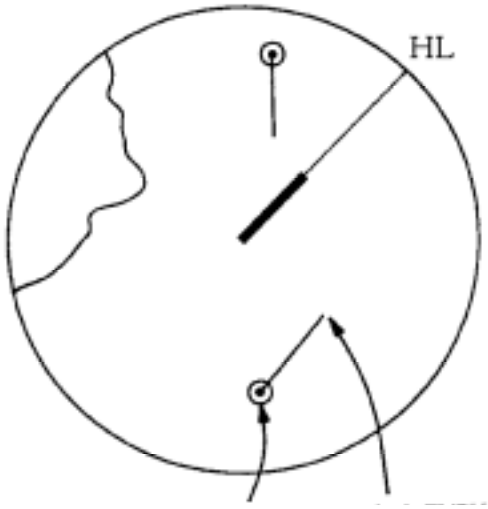
In the Relative Vector mode, the CPA LIMIT of targets can be seen at a glance.



Therefore, the TRUE/REL modes can be used in the following way: The TRUE vector can be used to know the true aspect of a target, and the REL vector can be used to know the closest point of approach (CPA) of a target.

[II] Vector Length: VECTOR TIME

The vector length of a target is proportional to its speed, and the vector time can be changed from 1 to 60 minutes.
The figure below illustrates a vector length of a target of six minutes. The tip of the vector represents the target's expected position in six minutes.



Current position **Future predicted position (Six minutes later in this example)**

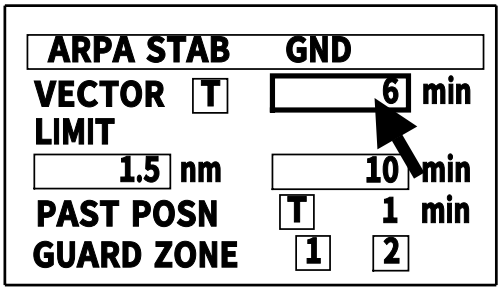
Setting Vector Time

In order to display the relative vector, press the [TRUE/REL] key to select it.

Procedures

1 Click the numeric section of "VECTOR".

The numeric input dialogue box is opened.



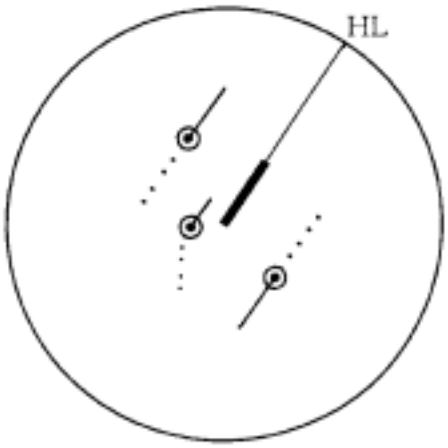
2 When changing vector constants, left-click the numbers 0 to 9 or the "+" or "—" keys to change the vectors.

3 Click ENT .

The number input will be applied as the vector time.

Display of Past Positions [PAST POSN]

Press the [PAST POSN] switch to display the past position of targets.
A maximum of six past positions for each target can appear. Every time the [PAST POSN] switch is pressed, the time interval is changed between 0.5, 1, 2 and 4 minutes. When the interval is 4 and the switch is pressed again, the past positions on display will be turned OFF.
The interval is displayed under PAST POSN in the ARPA information screen. When OFF is displayed, the past position display is turned off.
The trail mode is interlocked with the vector mode to allow the past positions of a target to appear in the True or Relative Vector mode. In the Relative Vector mode, the target's relative past positions are displayed. In the True Vector mode, the target's true past positions are displayed after calculating them from its relative bearing and range, and the course and speed of the own ship.
Fig. 5-2 shows an example of a screENTisplay, and Table 5-1 shows the meanings of the symbols on the radar screen.



5

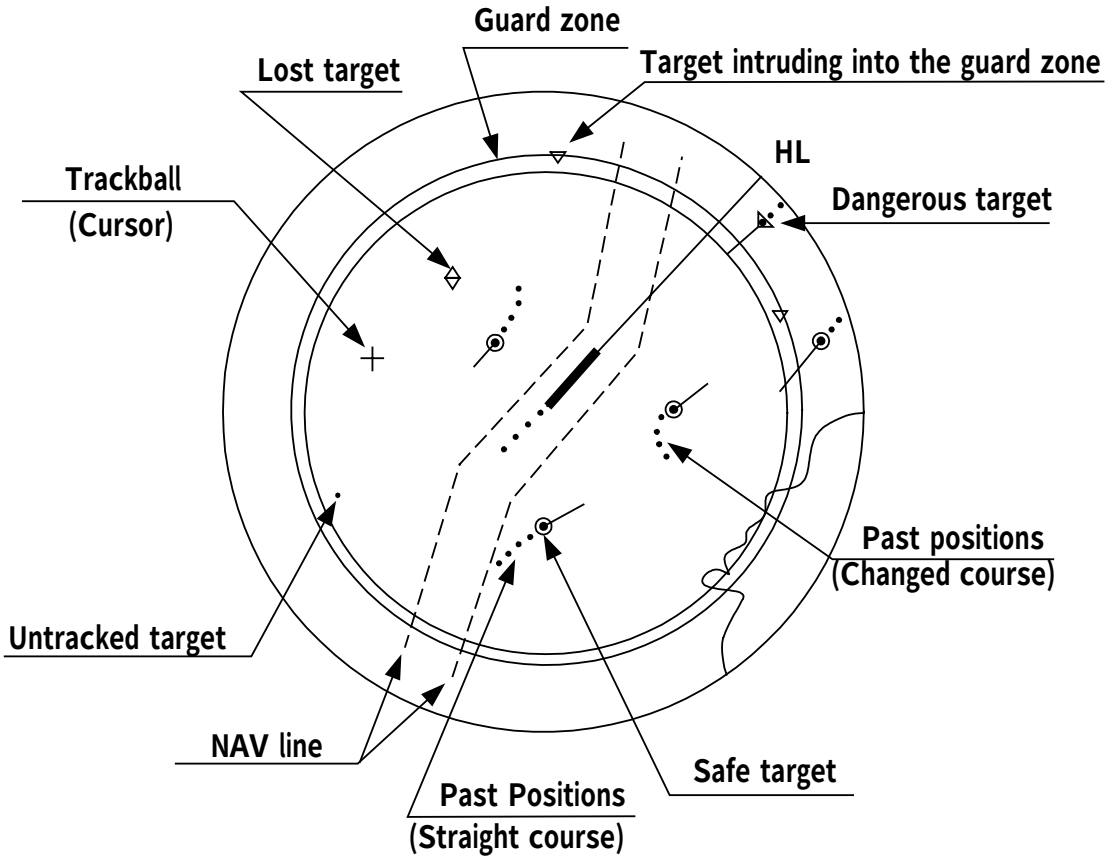
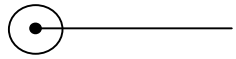
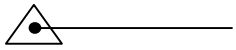
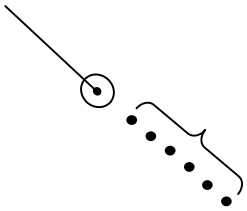


Fig. 5.2 Example of Display (In North Up and True Vector Mode)

In addition to the marks and symbols shown above, fixed/variable range markers, electronic bearing lines and other symbols are shown in an actual image.

Table 5.1 Definitions of Symbols

Vector/Symbol	Definition	Remarks
	**Tracked target**	
	**Dangerous target (CPA/TCPA)**	**Alarm characters (CPA/TCPA) appear and an alarm sounds. The vector and symbol blink.**
	**Initial acquisition mark**	**Displayed after a target is acquired and until its vector is displayed.**
	**Target with its data indicated**	**WhENTesignating a target's data indication with the trackball, the target's symbol is changed into ☐ and the target's ID is indicated. However, in case of a lost target or a dangerous target, its corresponding symbol is displayed instead of ☐.**
	**Lost target (This symbol appears when a target cannot be tracked for any reason.)**	**Alarm characters (LOST) appear and an alarm sounds. No vector is displayed, but the symbol blinks.**
	**Target that has entered the guard zone**	**Alarm characters (GZ) appear and an alarm sounds. The symbol blinks.**
	**Trackball cross cursor**	**This cursor is used to select a target when acquiring manually, canceling targets and for setting numerical data.**
	**Post positions of targets**	**The symbols and vectors are only displayed when [PAST POSN] is ON. The position interval can be set to 0.5, 1, 2 or 4 minutes.**

5.6 DATA DISPLAY

Attention

- When a target or the own ship changes course or when a target is acquired, the vector may not reach a given level of accuracy until three minutes or more has passed after such a course change or target acquisition.
  Even if three minutes or more have passed, the vector may include an error depENTing upon the tracking conditions.

Types of Data Display

Target Data

Target identification (ID)	ID number of the target
True bearing: T BRG	0.1 degree units
Range: RNG	0.01 NM units
True course: T CSE	0.1 degree units
True speed: T SPD	0.1 knot units
Closest point of approach (CPA)	0.1 NM units
Time to CPA (TCPA)	0.1 minute units
Bow crossing range (BCR)	0.1 NM units
Bow crossing time (BCT)	0.1 minute units

Targets that have their numeric data displayed are indicated with the symbol "□" to distinguish them from other targets.

Note

If a target's data is displayed, but without the symbol "□", such a target exists outside the currently shown radar display.

Method of Displaying Target Data [TGT DATA]

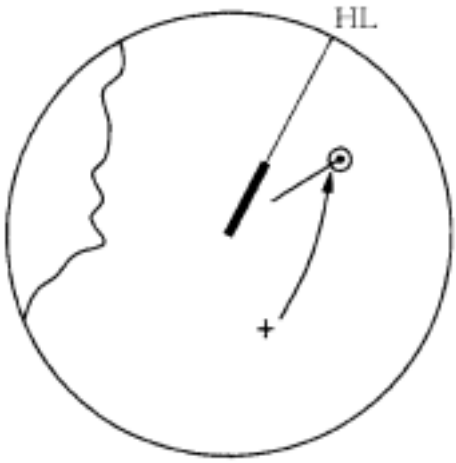
Procedures

1 Press TGT DATA **.**

TGT DATA will appear in the CURSOR ( ) at the upper right of the radar screen.

2 Move the cross cursor to a target (being tracked) to indicate its data using the trackball. Next, press the left trackball button to select it. (Up to two targets can be selected.)

The data of the designated target will be displayed, and the symbol will change to "□". The target data will remain on the radar display until the target is lost and its vector disappears, or until another target is designated.
If a target with the " ⬚ " symbol is designated, only its true bearing (BRG) and range (RNG) will appear until its vector appears.



Cancellation of Displaying Target Data [TGT DATA]

Procedures

1 Press TGT DATA **.**

TGT DATA will appear in the CURSOR ( )at the upper right of the radar screen.

2 Move the cross cursor to a target (being target) to indicate its data using the trackball. Next, press the right trackball button to select it.

The data of the designated target will be deleted, and the symbol will, change to acquisition mark.

5.7 ALARM DISPLAY

The ARPA system provides the following alarms:

Dangerous target alarm:	CPA/TCPA
Guard zone intrusion alarm:	GZ
Lost target alarm:	LOST
System function alarm:	ARPA (DATA)
Gyro set alarm:	SET GYRO

Dangerous Target Alarm: (CPA/TCPA)

CAUTION

If either the CPA LIMIT or TCPA LIMIT is set to zero, then the dangerous target alarm will not operate.
Since these alarms may include some errors depENTing on the target tracking conditions, the navigation officer himself should make the final decision for ship operations such as collision avoidance.

In the ARPA system, targets are categorized into two types: tracked targets and dangerous targets. The degree of danger can easily be recognized on the display at a glance, so that an officer can easily decide to which target he should pay attention.
The types of targets and alarms are shown below.

Dangerous Target Alarm

Status	Symbol on CRT	Alarm characters	Alarm sound	Conditions
Tracking target	○	(OFF)	(OFF)	• CPA>CPA LIMIT • 0>TCPA • TCPA>TCPA LIMIT
Dangerous target	△	CPA/ TCPA	Beeping (pee-poh) Acknowledgeable	• CPA≦CPA LIMIT 0≦TCPA≦TCPA LIMIT

CPA LIMIT and TCPA LIMIT: The setting values

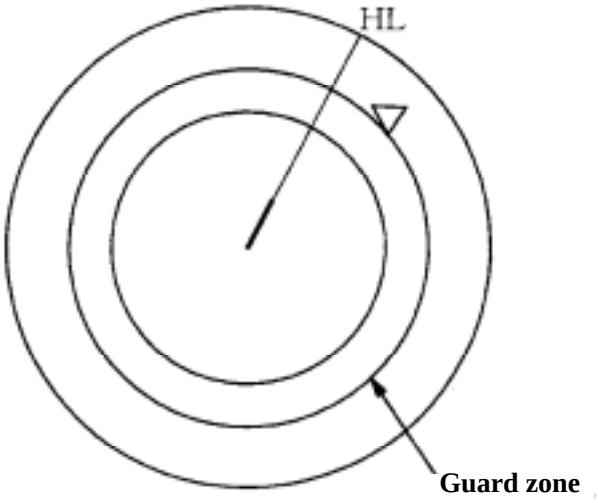
Guard Zone Alarm [GUARD ZONE]

CAUTION

In setting a guard zone, it is necessary to adjust radar tuning, gain, sea clutter suppression and rain/snow clutter suppression to ensure that target echoes are displayed in the optimum conditions. The guard zone alarm is not generated for the targets that are not detected by radar.

5

The guard zone function is used to set a zone at an arbitrary range and to sound an alarm if a target intrudes into this zone.
Refer to section 3.4 “Set Guard Zones” on how to set guard zones.



Guard Zone Alarm

Status	Symbol on CRT	Alarm characters	Alarm sound	Conditions
Target entering the guard zone	▽	GZ	Beeping (pipipi) Acknowledgeable	An alarm sound is generated when a target enters the 0.5 NM range between the outer and inner rings.

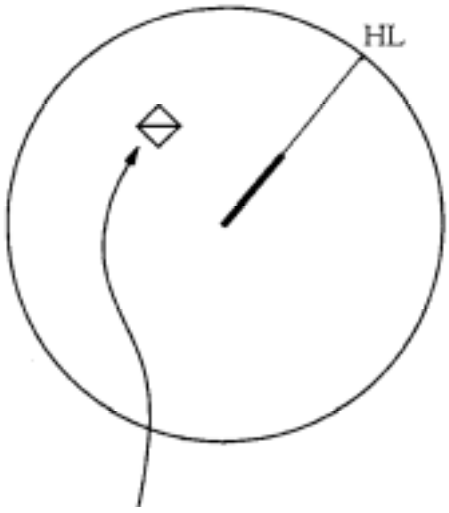
Lost Target Alarm [LOST TARGET]

Attention

- If the radar tuning, gain, sea clutter suppression and rain/snow clutter suppression are not appropriate, the lost target alarm may be generated frequently, so that adjustments should be made carefully.

When it is impossible to continue tracking any acquired and tracked target, the LOST target alarm will be generated. The typical causes for this alarm are shown below, but they are not limited to these:

- The target echo is very weak;
- The target has entered the shadow of land or a large ship and its echo is not being received;
- The target echo is hidden by sea clutter.



Lost target

Lost Target Alarm

Status	Symbol on CRT	Alarm characters	Alarm sound	Conditions
Lost target		LOST	Beep sound (pee) Acknowledgeable	The alarm will sound once when a lost target symbol is displayed.

System Function Alarm [ARPA (DATA)]

When an abnormal state of an input signal or a problem in the processing circuitry occurs, a character string or alarm is generated. When an alarm occurs for any ARPA function, ARPA (DATA) will appear in the WARNING display area, but no indication is made in the ARPA information display. The cause of the alarm may be an operational error in ARPA, so please contact the service depot or manufacturer.

Gyro Set Alarm [SET GYRO]

The North Stabilizing Kit (NSK) in this system receives signals from a gyro. Even if the power is turned off, the system will track gyro motions. However, the system stops tracking the gyro if the power of the master gyro is turned off or if there are any problems with the line. When the power of the master gyro is turned back on, the SET GYRO alarm will be generated.
If this alarm is sounded, set the gyro.

Gyro Set Alarm

Alarm characters	Alarm sound	Conditions
SET GYRO	Beep sound (pipi)	The signals from the gyro are stopped, but the gyro is recovered.

5.8 TRIAL MANEUVERING

Attention

- In trial maneuvering, a simulation is executed with the current course and speed of the target ship. Since the situation is different from actual ship maneuvers, the CPA LIMIT and TCPA LIMIT should be set with ample leeway.

Trial maneuvering is used to simulate the course and speed necessary to avoid a collision when a dangerous target appears. When the ship's course and speed are manually entered against the data of the acquired target, a check is made to determine whether there is any danger.

The ranges of course and speed to be entered manually are as follows:

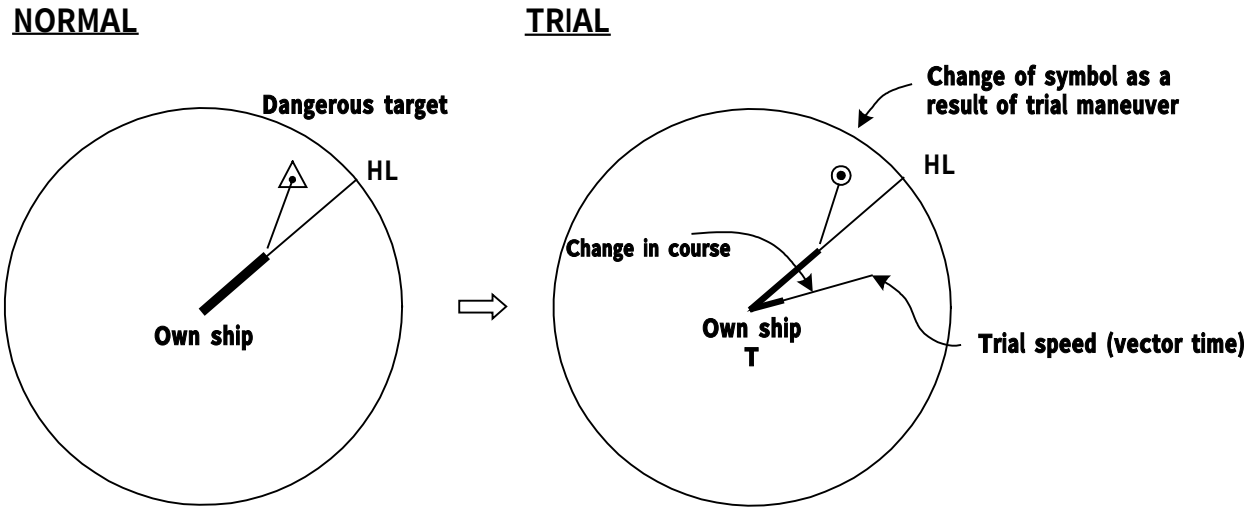
Course: 360 degrees (0.1 degree intervals)..... [EBL] control
Speed: 0 to 100 knots (0.1 knot steps)..... [VRM] control

Trial Maneuvering in the True Vector Mode

In the True Vector mode, calculations are made according to the values set by TRIAL SPEED and TRIAL COURSE, and the result is displayed as a bold-line that represents the change of the own ship's vector as shown in the figure below (an example of the course changed to starboard).

In this figure, the dangerous target that is ahead to the port side becomes safe as a result of the simulation.

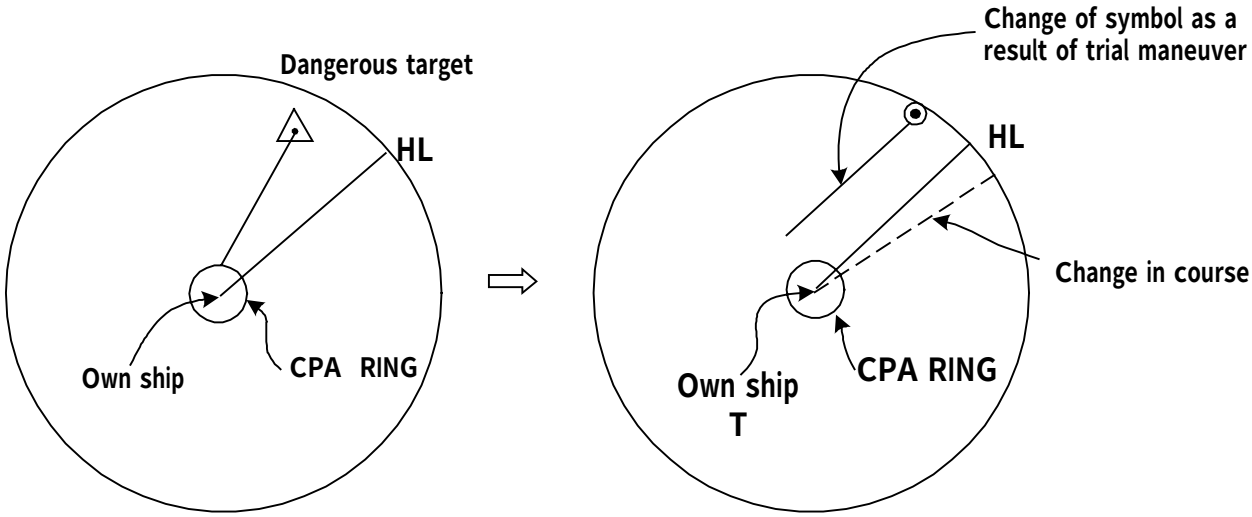
The target data display field indicates the current CPA LIMIT and TCPA LIMIT values regardless of the result of the simulation.



Trial Maneuvering in the Relative Vector Mode

The result of trial maneuvering in the Relative Vector mode is shown by a change in target vector. In the figure below (with the same conditions as in the True Vector mode on the previous page), it is seen that the acquired target is a dangerous one because its vector is crossing the CPA RING.

NORMAL **TRIAL**



The above figure shows that the relative vector of the target has changed as shown in the figure as a result of simulation (course and speed), so that the target's symbol is changed to "◯"; i.e., a safe target. As was the case in the True Vector mode, the data display field indicates the current values of CPA LIMIT and TCPA LIMIT, not those as the result of the simulation.
The course change of own ship is displayed as a dotted line.

Using the TRIAL Function

Procedures

1 Press the MENU or OPTION2 key on the screen.

The ARPA menu will be opened.

2 Click SUB1 MENU , then ARPA/AIS and TRIAL .

The ARPA TRIAL menu will be opened.

3 Left-click “ON” under “1.TRIAL”.

“1.TRIAL” will be turned “ON” and the character “T” will blink below the own ship display in the radar screen, indicating that the system is conducting a trial.

4 Make the settings with the course [EBL] control and speed [VRM] control.

5 The plot data symbols are “△” for dangerous targets and “○” for safe targets.

Cancellation

1 Select OFF under TRIAL in the ARPA TRIAL menu.

“OFF” will be set for “TRIAL” and the system will return to the normal display.

Exit

1 Click EXIT .

The ARPA TRIAL menu will be closed.

2 Click EXIT .

The ARPA menu will be closed.

5.9 DELETING UNWANTED TARGETS

When it is no longer necessary to continue tracking acquired and tracked targets with their symbols and vectors displayed, or when it necessary to reduce the number of vectors to make the screen easier to observe, unnecessary targets can be cancelled one by one.
When all targets are reacquired from the beginning, all the targets on display can be cancelled at once.

Deleting Targets

Deleting one target

Procedures

1 Press ACQ CANCEL **.**

The ARPA menu is opened.

2 Place the cross cursor over the target to be deleted.

3 Press the left trackball button.

The symbol and vector of the target will be deleted, and only the target echo will remain.

Or,

Procedures

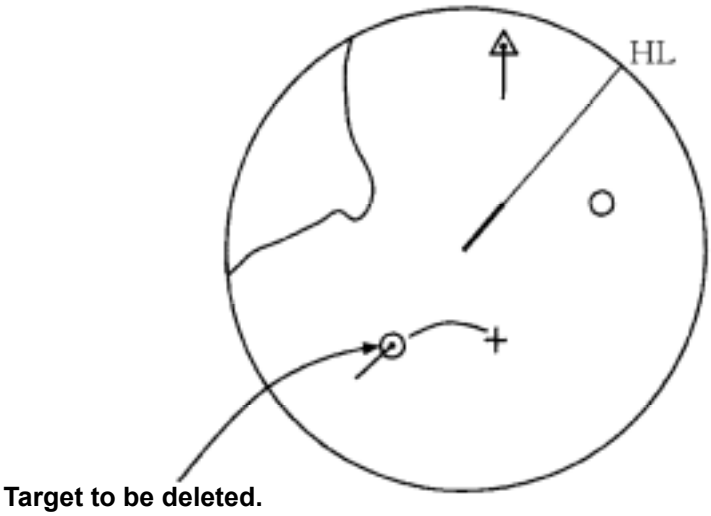
1 Press ACQ MANUAL **.**

The ARPA menu is opened.

2 Place the cross cursor over the target to be deleted.

3 Press the left trackball button.

The symbol and vector of the target will be deleted, and only the target echo will remain.



Attention

- When all targets are deleted, the system stops tracking all the targets and they must be acquired again, either automatically or manually. Therefore, do not use this method except when it is necessary to delete all targets.

Deleting all targets

Procedures **1 Press ACQ CANCEL continuously for 2 seconds or more.**

All the symbols and vectors of all targets will be deleted.

5.10 ARPA SETTING

CAUTION

This simulation is a function to check whether the ARPA system is operating normally. Do not use this function except to check ARPA operation.
Especially, avoid using this mode during actual navigation because it will display pseudo targets on the radar screen which may be confused with actual targets. Using this function during actual navigation can lead to accidents.

The following constants used for ARPA can be referred to and modified:

[I]	SIMULATOR:	Pseudo targets are generated on the radar display to check whether the ARPA functions are operating normally.
[II]	VD LEVEL:	Quantizing level for the video to be input to the target detection circuit.
[III]	VECTOR CONSTANT:	Constant to calculate the ARPA vectors.
[IV]	GATE:	Gate size to acquire and track targets.
[V]	TEST VIDEO:	Test video for use in checking the operation of the target detection circuit.

Simulation

CAUTION

Do not change the VD LEVEL and VECTOR CONSTANT, because they are already set to the optimum values. Making any changes to these may cause deterioration in the ARPA performance.

Pseudo targets are generated in certain known positions to check whether the ARPA processing circuits are operating normally. Since the pseudo targets move according to known parameters, the values for these pseudo targets can be compared with the known values by acquiring, tracking and displaying them, and thereby checking whether the ARPA system is operating normally.
This function should be used only in the standby mode.

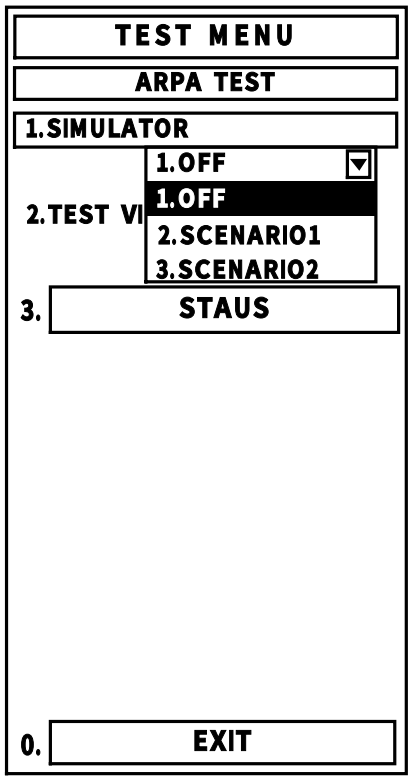
Procedures

1 Press TX STBY to set the standby mode.

2 Click TEST on the screen.
Or press OPTION1 key.
The TEST Menu will appear.

3 Click ARPA TEST .
The ARPA TEST menu will appear.

4 Click the "1.SIMULATOR" edit box.
SIMULATOR is selected, and the pull down menu is displayed.



5 When moving the pseudo target:

[Ⅰ] SCENARIO1

Click SCENARIO1 , then TX STBY to set the transmission mode.

2.SCENARIO1 will be set to generate a pseudo target at the true bearing of 18°and the relative range of 3.2NM. The target will then approach true bearing of 90°and the relative range of 1NM at a relative speed of 20kts .Characters“XX”appear blinking at the lower of the radar display, showing that the system is executing the simulation mode.

[Ⅱ] SCENARIO2

Click SCENARIO2 , then TX STBY to set the transmission mode.

3.SCENARIO2 will be set to generate a pseudo target at the true bearing of 0°and the relative range of 6NM. The target will then approach own ship at a relative speed of 10 kts in a relative course of 180°. Characters“XX”appear blinking at the lower of the radar display, showing that the system is executing the simulation mode.

Note: When the range between own ship and the pseudo target is 0, the target will disappear.

6 When finishing the simulation, press TX STBY to set the standby mode, then click OFF .

1.OFF will be set.

Exit

1 Click EXIT or TEST .

The TEST Menu will be closed.

Pseudo Target Parameters

SCENARIO NUMBER	Start point		End point		Target speed
	Distance	Direction	Distance	Direction	
1	3.2NM	18 °	1NM	90 °	20kts
2	6NM	0 °	0NM	0 °	10kts
3	6NM	18 °	1NM	18 °	10kts
4	6NM	45 °	1NM	45 °	105kts
5	6NM	45 °	6NM	150 °	20kts
6	6NM	45 °	6NM	150 °	20kts

Gate Size

CAUTION

Do not change the preset gate size carelessly. If the gate value is improper, the ARPA acquisition and tracking functions may deteriorate.
Otherwise, this may cause accidents to occur.

The Gate Size is defined as an“Area Within which targets are watched by the ARPA”processing circuit.
If the gate size is too large, targets are not lost but may be swapped with other close targets.
If the gate size is too small, targets are not easily swapped, but may be lost.
The ARPA processing circuit is designed to detect target sizes and set an accurate gate size depENTing on the ranges and sizes of those targets (NARROW is the standard size). However, change the setting parameters to select the best size in the following conditions:

Set 2.NARROW in normal operation.

・When acquiring and tracking targets that spread widely in the angular direction
(The angular direction of the gate aperture is important)・・・・・・・・・・・・・・・・・・・・・・1.WIDE

・When many targets are densely congested and swapped within 3NM in a port
(The gate size should be reduced)・・・3.SMALL

Procedures

1 Press the MENU or OPTION2 key on the screen.

The Main Menu will appear.

2 Click SUB1 MENU , then ARPA/AIS.

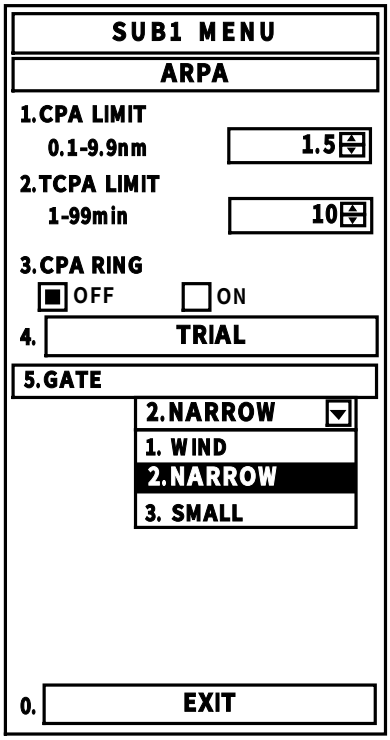
The ARPA Menu will appear.

3 Click the "5.GATE" edit box.

The "2.SELECT SPEED" edit box will be selected.

4 Press any of 1 to 3.

Enter the number of gate type to change.



5

Exit

1 Click EXIT .

The Sub1 Menu will reappear.

2 Click EXIT .

The Sub1 Menu will be closed.

Test Video

Attention

- TEST VIDEO may not appear for targets that are not acquired or tracked, or if the controls [GAIN] and [SEA] are not adjusted appropriately.

Test Video is used to check whether the video signals under target acquisition and tracking are inputted to and processed in the target processing circuit normally.
However, it is sufficient to check that 3.VDH in TEST VIDEO is displayed.
The start of the Test video mode is available only in the Standby mode.

Procedures

1 Press TX STBY to set the standby mode.

2 Click TEST on the screen.
Or press OPTION1 key.
The TEST Menu will appear.

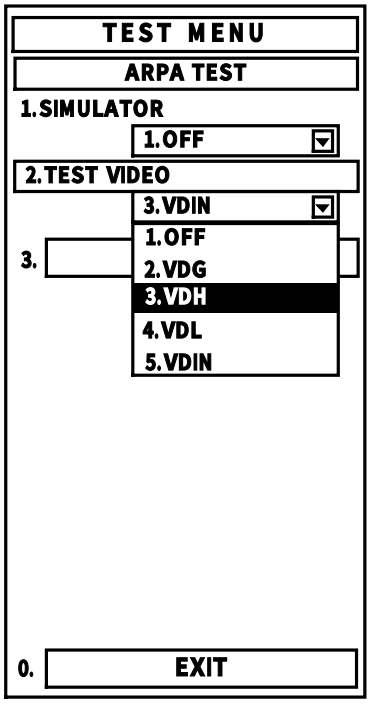
3 Click ARPA TEST .
The ARPA TEST Menu will appear.

4 Click the "2.TEST VIDEO" edit box.
"2.TEST VIDEO" is selected and the pull down menu is displayed.

5 Click "3.VDH" to select it.
3.VDH will be set.
Test video for 3.VDH (video input in quantizing HIGH level) will appear on the radar display.

6 Press TX STBY to set the transmission state.

7 In order to change the test video type, press TX STBY to enter the standby mode, then select the test video type from the pull down menu.



Attention: If OFF is set, test video will not be displayed.

Exit

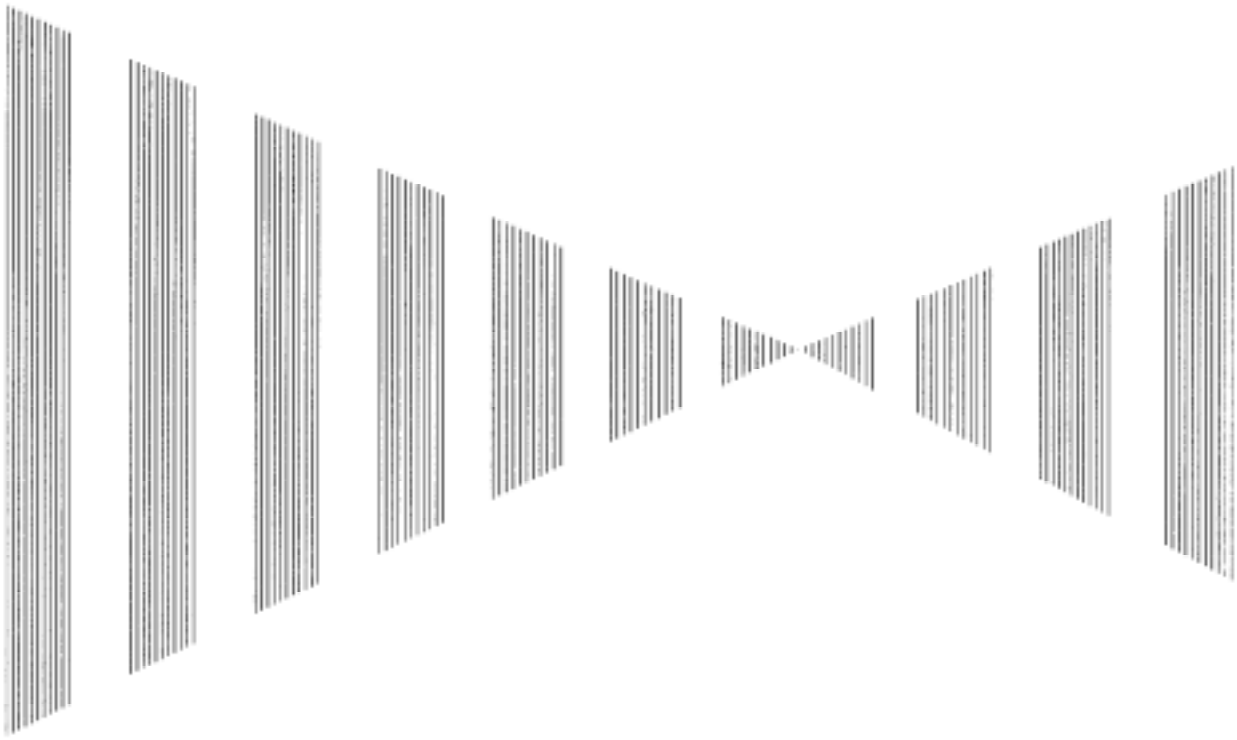
1 Click EXIT or TEST.

The TEST Menu will be closed.

Execute TEST VIDEO in 3.VDH normally.

Attention: If any target displayed clearly in the radar display is not displayed in the Test Video mode, the target detection circuit og te ARPA system may have a trouble.

SECTION 6
TRUE AND FALSE ECHOES ON DISPLAY



The radar operator has a role of interpreting the radar displays to provide his best aid in maneuvering the ship. For this purpose, the operator has to observe the radar displays after fully understanding the advantages and disadvantages that the radar has. For better interpretation of radar displays, it is important to gain more experiences by operating the radar equipment in fair weathers and comparing the target ships watched with the naked eyes and their echoes on the radar display.

The radar is mainly used to monitor the courses of own ship and other ships in open seas, to check buoys and other nautical marks when entering a port, to measure own ship's position in the coastal waters relative to the bearings and ranges of the shore or islands using a chart, and to monitor the position and movement of a heavy rain if it appears on the radar display.

Various types of radar display will be explained below.

Radar Wave with the Horizon

Radar beam radiation has the nature of propagating nearly along the curved surface of the earth. The propagation varies with the property of the air layer through which the radar beam propagates.

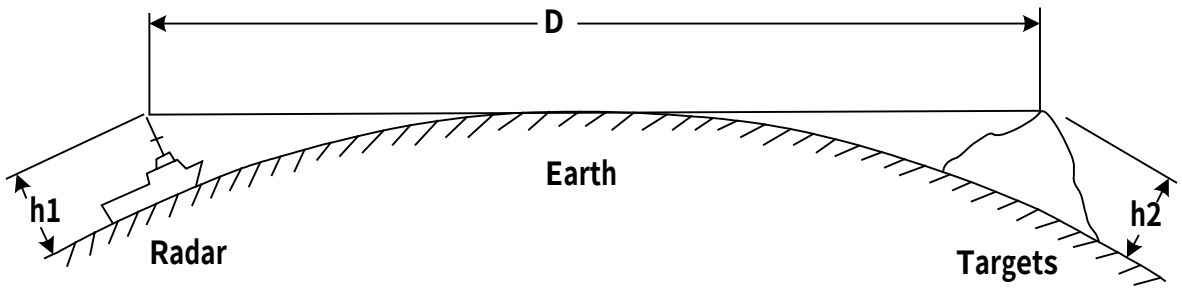
In the normal propagation, the distance (D) of the radar wave to the horizon is approximately 10% longer than the distance to the optical horizon. The distance (D) is given by the following formula:

$$D = 2.23(\sqrt{h1} + \sqrt{h2})(nm)$$

h1: Height (m) of radar scanner above sea level

h2: Height (m) of a target above sea level

Fig. 6.1 is a diagram for determining the maximum detection range of a target that is limited by the curve of the earth surface in the normal propagation.



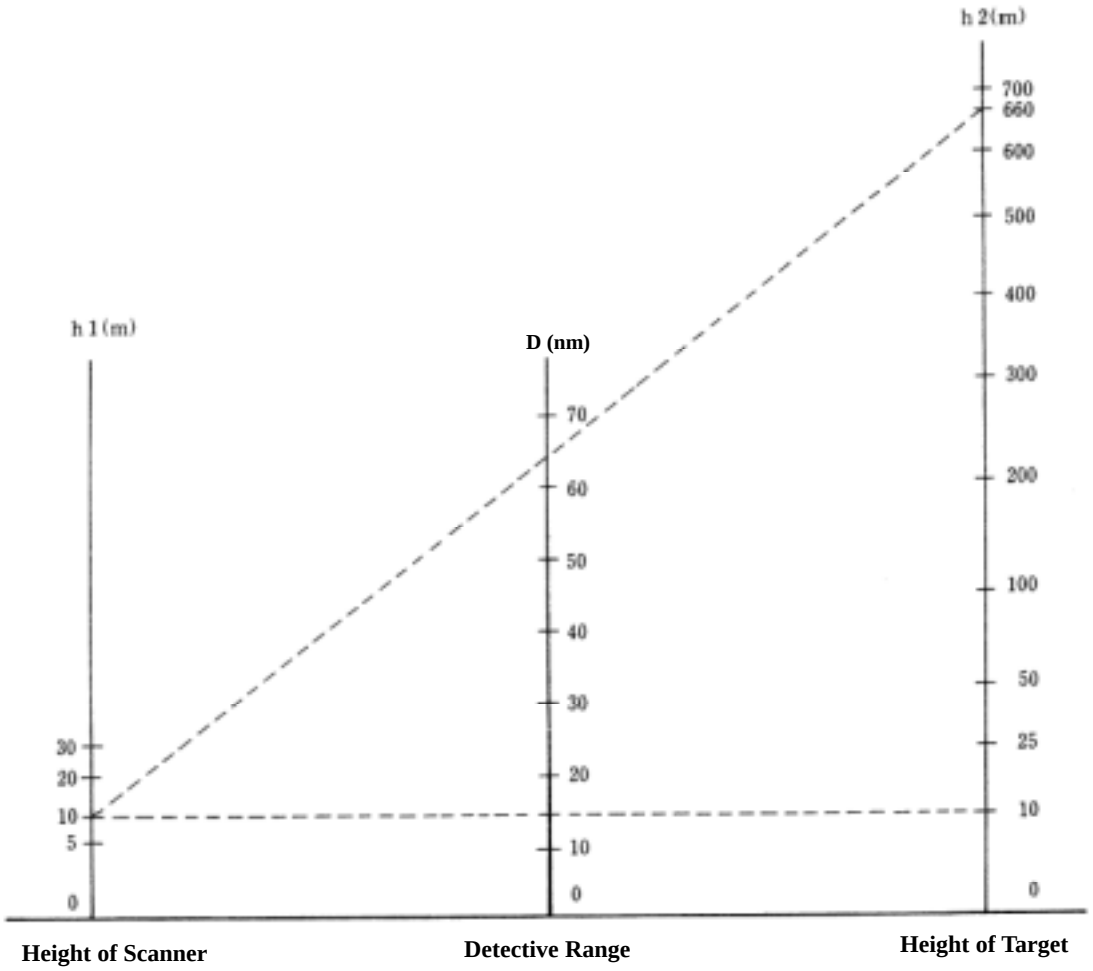


Fig. 6.1

6

When the height of own ship's scanner is 10 m for instance,

(a) A target that can be detected at the radar range of 64 nm on the radar display is required to have a height of 660 m or more.

(b) If the height of a target is 10 m, the radar range has to be approx. 15 nm. However, the maximum radar range at which a target can be detected on the radar display depends upon the size of the target and the weather conditions, that is, the radar range may increase or decrease depending upon those conditions.

Strength of Reflection from the Targets

The signal intensity reflected from a target depends not only on the height and size of the target but also on its material and shape. The echo intensity from a higher and larger target is not always higher in general.
In particular, the echo from a coast line is affected by the geographic conditions of the coast.
If the coast has a very gentle slope, the echo from a mountain on the inland appears on the radar display.
Therefore, the distance to the coast line should be measured carefully.

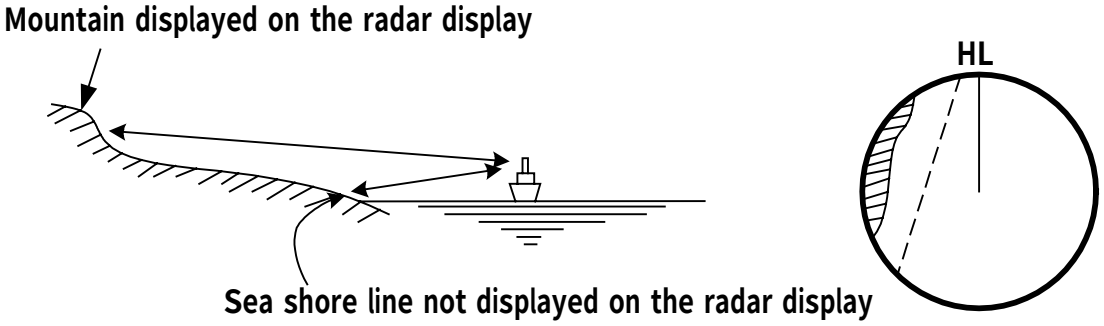


Fig. 6.2

6

Sea Clutters

When the sea surface ruffles, bright echo returns spread around the center of the radar display.
The higher the waves are, the echo returns are larger.
Swirling currents may appears as a smooth line like a coastal line.

False Echoes

The radar observer may be embarrassed with some echoes that do not exist actually. These false echoes appear by the following caused that are well known:

[I] Shadow

When the radar scanner is installed near a funnel or mast, the echo of a target that exists in the direction of the funnel or mast cannot appear on the radar display because the radar beam is reflected on the funnel or mast. Whether there are some false echoes due to shadows can be checked by monitoring the sea clutter returns, in which there may be a part of weak or no returns.
Such shadows appear always in the same directions, which the operator should have in mind in radar operation.

[II] Side Lobe Effect

A broken-line circular arc may appear at the same range as the main lobe of the radar beam on the radar display. This type of false echo can easily be discriminated when a target echo appears independent. (See Fig. 6.3)

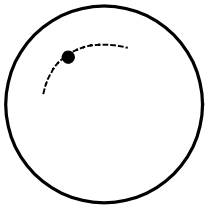


Fig. 6.3

[III] False Echo by Secondary Reflection

When a target exists near own ship, two echoes from the single target may appear on the radar display. One of those echoes is the direct echo return from the target and the other is the secondary reflection return from a mast or funnel that stands in the same direction as shown in Fig. 6.4.

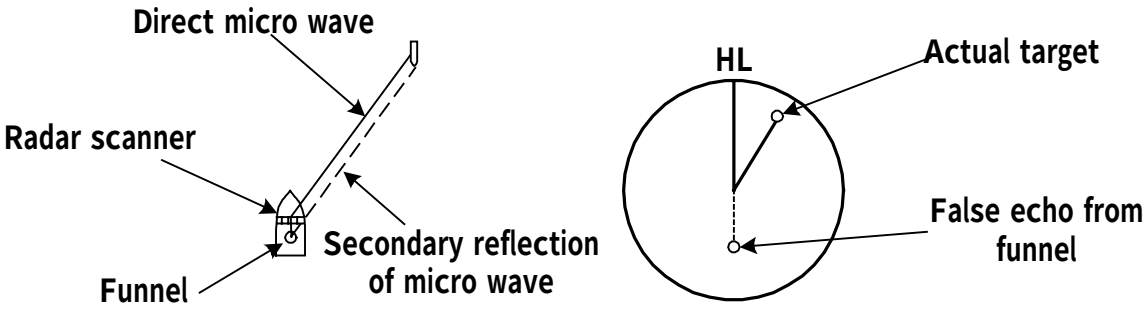


Fig. 6.4

[IV] False Echo by Multiple Reflection

When there is a large structure or ship with a high vertical surface near own ship as shown in Fig. 6.5, multiple reflection returns may appear on the radar display. These echoes appear in the same intervals, of which the nearest echo is the true echo of the target.

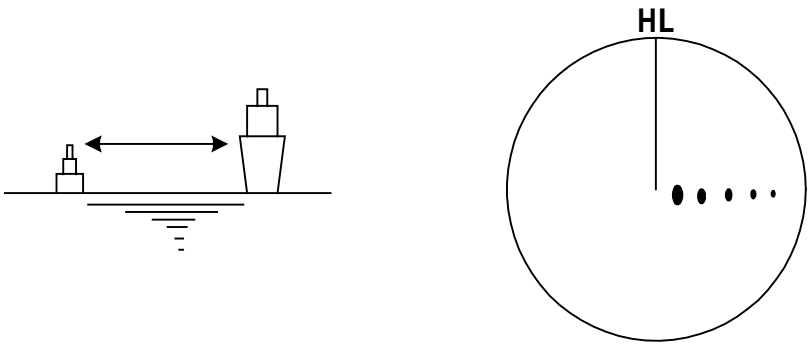


Fig. 6.5

[V] Abnormal Propagation

The maximum radar detection range depends upon the height of the scanner and the height of a target as described in the section of “The Horizon for Radar Beam Radiation”. If a so-called “duct” occurs on the sea surface due to a certain weather condition, however, the radar beam may propagate to an abnormally long distance, at which a target may be detected by the radar.

For instance, assuming that the radar range is 6 NM (on the repetition frequency of 1100 Hz), the first pulse is reflected from a target at about 76 NM or more and received during the next pulse repetition time. In this case, a false echo appears at a position that is about 76 NM shorter than the actual distance. If the false echo appears at 5 NM on the radar display, the true distance of the target is 5 + 76 = 81 NM. On the radar range scale of 1.5 NM (on the repetition frequency of 1900 Hz), a false echo may appear at a position that is about 43 NM shorter than the actual distance.

This type of false echo can be discriminated by changing over the range scale (the repetition frequency), because the distance of the target changes accordingly.

[VI] Radar Interface

When another radar equipment using the same frequency band as that on own ship is near own ship, a radar interference pattern may appear on the radar display. This interference pattern consists of a number of spots which appear in various forms. These spots do not always appear at the same places, so that they can be discriminated from the target echoes. (See Fig. 6.6)

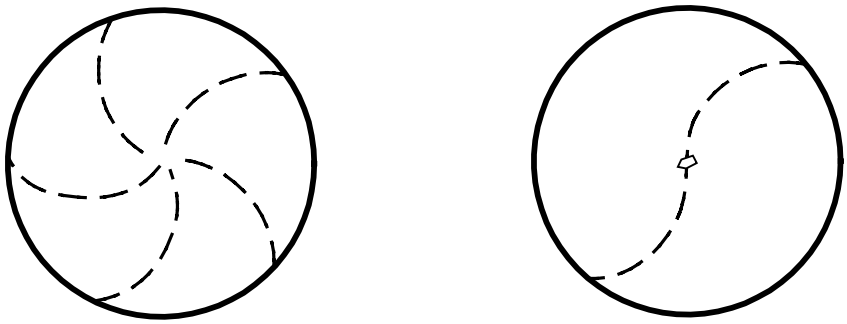


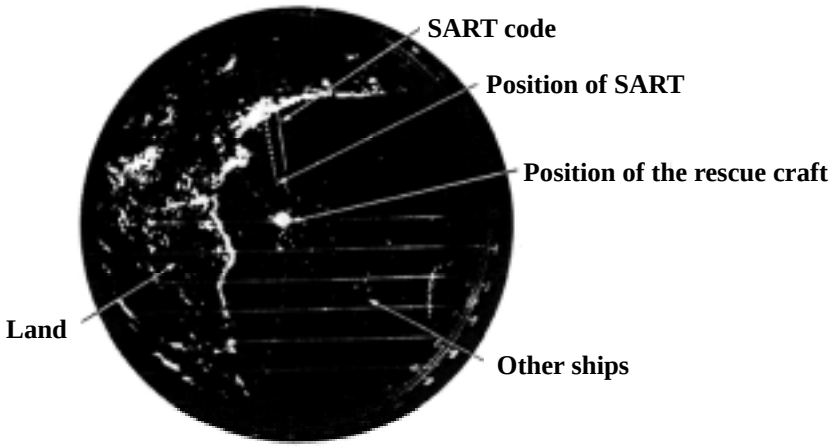
Fig. 6.6

Display of Radar Transponder (SART)

The SART (Search and rescue Radar Transponder) is a survival device authorized by the GMDSS (Global Maritime Distress and Safety System), which is used for locating survivors in case that a distress accident occurs at sea. The SART is designed to operate in the 9 GHz frequency band. When receiving the 9 GHz radar signal (interrogating signal) transmitted from the radar equipment on a rescue ship or search aircraft, the SART transmit a series of response signals to inform the distress position to the rescue and search party.

The SART position can be displayed on the radar video by setting the radar as follows:

- Radar range scale: 6 NM or 12 NM
- Sea clutter control: Minimum (Most counterclockwise)
- AUTO SEA function: OFF
- TUNE control: No tuning (to weaken clutter echoes)
- Interference rejector (IR): OFF
- PROCESS: OFF

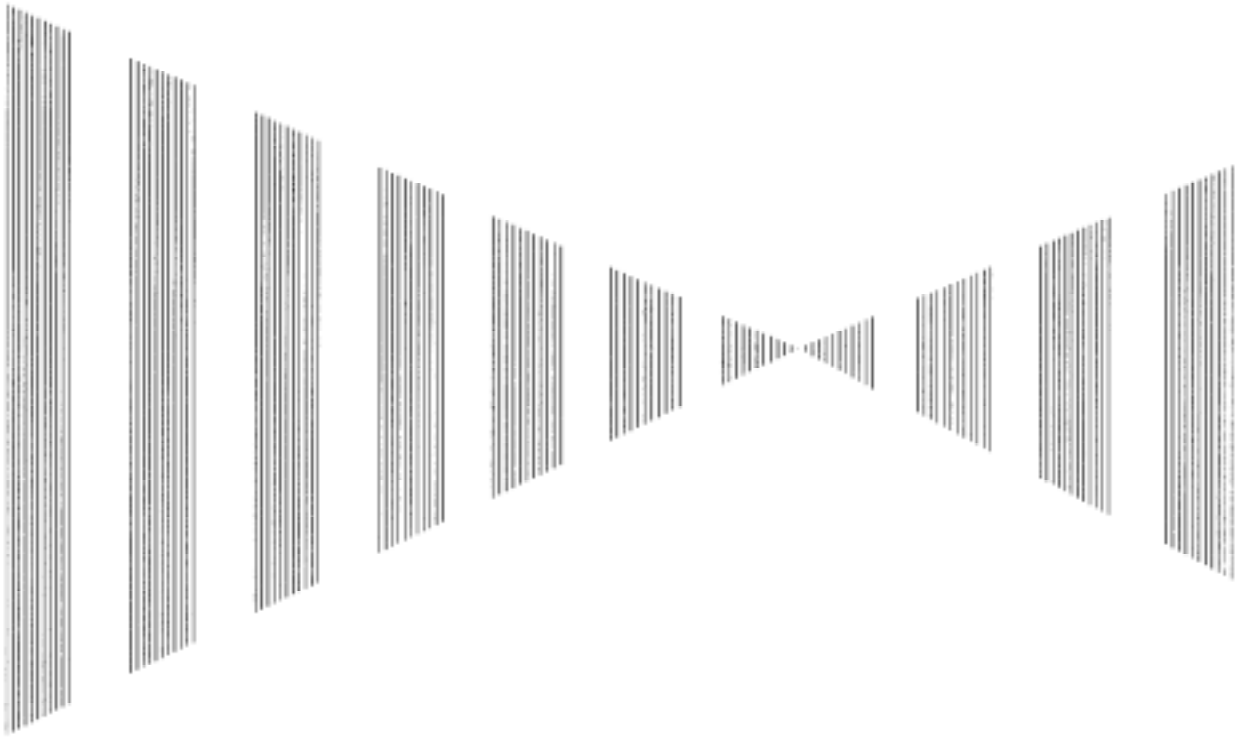


[Example of Display]

Attention

- When the radar is set as in ① to ⑥ above to detect the SART signal, the targets around own ship will disappear from the radar display. So it is necessary to exercise full surveillance over the conditions around own ship by visual watch in order to avoid any collision or stranding.
  If two or more sets of radar equipment are installed on own ship, use one set of 9 GHz band radar for detection of the SART signal and operate others as normal radars for monitoring targets around own ship, checking on own ship's position and avoidance of stranding.
  After end of detecting the SART signal, it is necessary to readjust the radar for normal navigation.

SECTION 7
MAINTENANCE



7.1 ROUTINE MAINTENANCE

WARNING

Never carry out internal inspection or repair work of the equipment by a user.
Inspection or repair work by unauthorized person may cause a fire or an electric shock.
Ask your nearest branch, business office or a dealer for inspection and repair.

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

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 as often as possible.
Common points of maintenance for each unit are as follows:

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.

7.2 MAINTENANCE ON EACH UNIT

Scanner NKE-1079/1075/1089/1087

WARNING

Turn off the main power source before starting maintenance.
Otherwise, an electric shock or injury may result.

Set the Safety Switch for Stopping the Scanner to cents [OFF].
Otherwise, an accidental contact with the rotating scanner may result in injury.
Otherwise, an electric shock may result.

After finishing the maintenance work, set the safety switch for stopping the scanner to "ON".

Precautions on Mounting the Cover

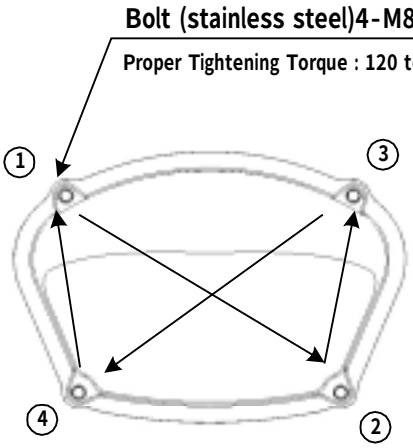
When the cover is removed for regular checkup and replacement of parts and refitted after such work, the procedures of fastening bolts shall be taken with the following precautions:

(a) The proper fastening torque of the fitting bolts (M8) is 1176 to 1470 N•cm (120 to 150 kgf•cm) (which makes the inside water-tight and protects the packings against permanent compressive strain).
The packings start producing from the cover at the torque of approximately 1470 N•cm (150 kgf•cm) or more.
Do not fasten the bolts with a torque exceeding the specified value. Otherwise, the screws may be broken.

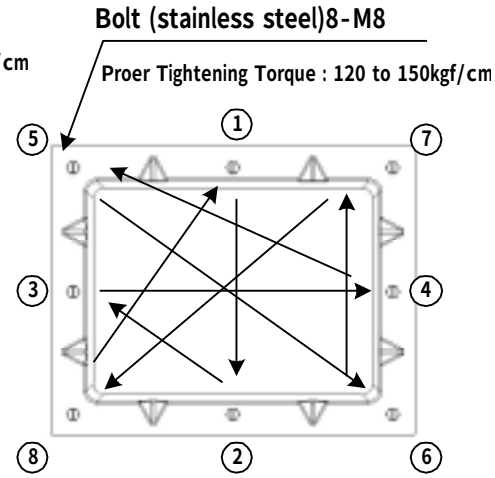
(b) Use an offset wrench of 11 mm × 13 mm or a double-ended wrench of 13 mm × 17 mm (not longer than 200 mm).

(c) 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.



Cover of NKE-1089
Bolt Tightening Procedure



Cover of NKE-1079
Bolt Tightening Procedure

(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, trichlorethylene and ketone for cleaning. Otherwise, the radiation plane may deteriorate.

Check up and clean the radiator.

(2) Scanner Mechanism

(a) Supply Oil Seal

When there is not a grease nipple, the replenishment of grease oil is unnecessary.

Remove the cap of the grease nipple on the front of the S band radiator support and supply it with a grease gun. Make the oiling every six months. The oil quantity shall be approximately 100 g that is as much as the grease comes out of the oil seal. Use the grease of Mobilux 2 or EP2 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. Greasing in short intervals is more effective to prevent the gears from wear and tear and extend their service life, but grease those at least every six months. Use Mobilux2 or EP2 of Mobile Oil.

(c) Mounting legs

Check the mounting legs and mounting bolts of the scanner unit case on corrosion sometimes and keep them in order not to cause any danger. Apply paint to them once a half year because painting is the best measure against corrosion.

Transmitter-receiver Unit NTG-3037/3028

Wipe dust on the transmitter and receiver sections with a piece of dry cloth or feather.

Display Unit NCD-4263

WARNING

Do not wipe the radar display surface strongly with a piece of dry cloth or do not use gasoline or thinner for cleaning. Otherwise, the display surface may be damaged.

Dust accumulated on the radar display 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.

Coaxial Cable (JMA-9933-SA)

(1) The coaxial pipe gland of the coaxial cable will be provided with perfect water-tight treatment at the time of installation. Check it and ensure that not water leak occurs from the connection parts. In particular it is recommended to apply paint to the coaxial pipe gland every six months.

WARNING

Do not give strong impact to the coaxial cable by hitting it with any tool or hammer.
Otherwise, it may be broken.

Do not put any heavy article on the coaxial cable. Otherwise, it may be broken.

Do not twist or pull the coaxial cable. Otherwise, it may be broken.

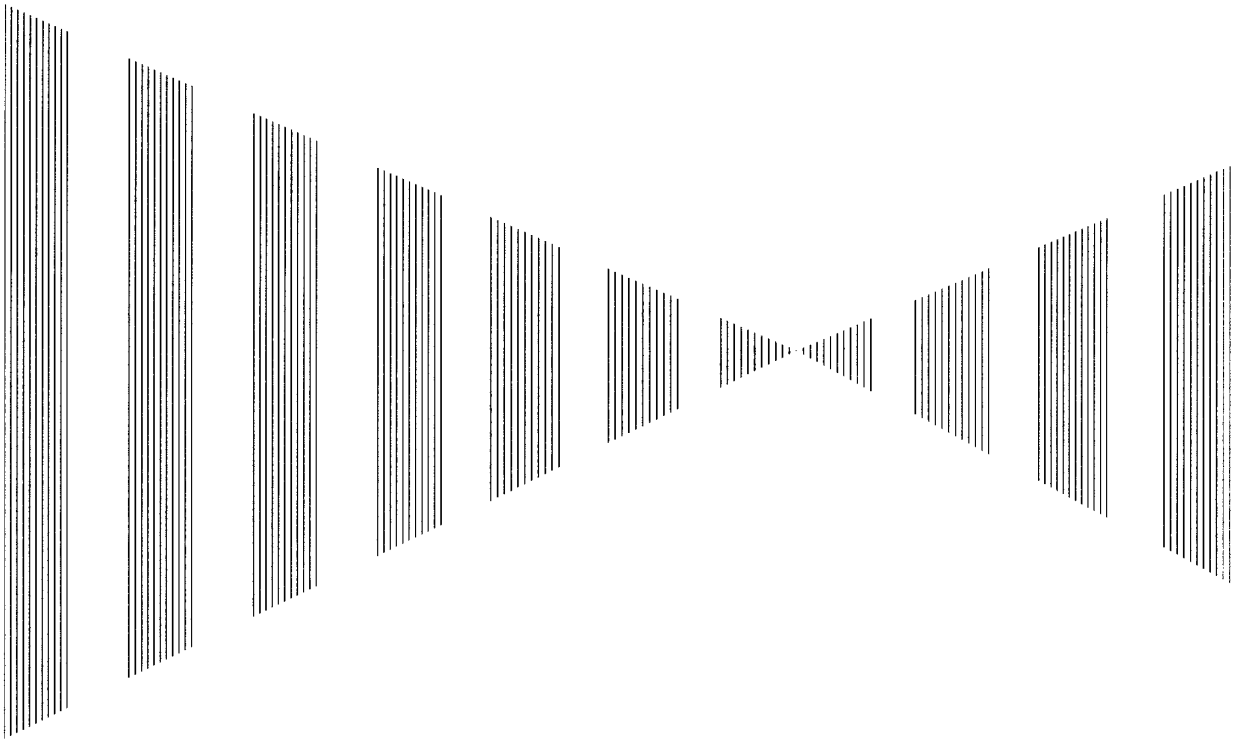
(2) For further details, refer to the Coaxial Cable Connection Procedures for the S band Radar.

Wave Guide (JMA-9923-7XA/9XA)

Attention

- Connect the wave guide properly with no gaps. Otherwise, such gaps may cause water leaks or corrosion later.

SECTION 8
COUNTERMEASURES FOR TROUBLE AND ADJUSTMENT



8.1 FUNCTION 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 Function Check List

Equipment	Check Item	Criteria	Remarks
Transmitter-receiver Unit	Tuning LED of Receiver	The LED is lighting during operation	48 NM range
Display Unit	Video and echoes on the screen Sensitivity CRT brilliance can be controlled correctly Various markers Various numerical indications Lighting	Can be correctly controlled	
	Safety switch and various currents and voltages	(1) Refer to Check of Safety Switch, Various Currents and Voltages, and Signals.	
	Communication lines	(2) Refer to Check of Peripheral Units.	
	Panel	(3) Refer to Check of Panel.	
	ARPA	(4) Refer to Check of ARPA.	
	Magnetron current	(5) Refer to Check of Magnetron Current.	
	Performance Monitor	(6) Refer to Check of Performance Monitor.	
	Error Logging Display	(7) Refer to Check of Error Logging Display.	
	System Information Display	(8) Refer to System Information Display.	

Function Check on Test Menu

The function status of this radar equipment can be checked on the TEST Menu.

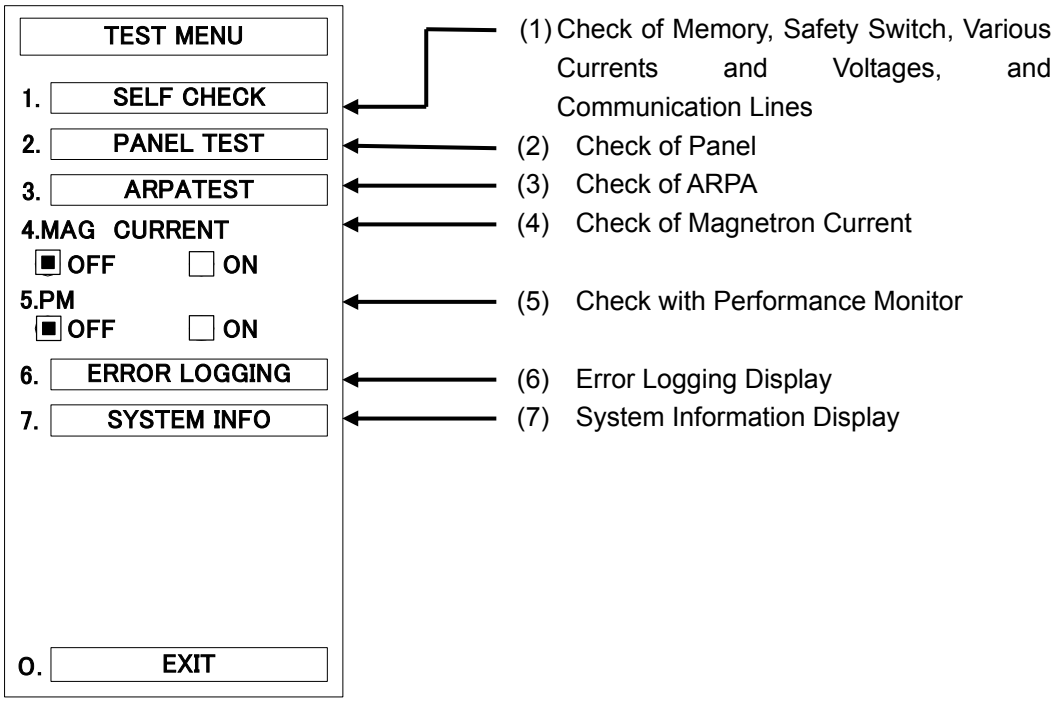
Procedures

1 Click TEST on the screen. Or click OPTION1 key.

The TEST Menu will appear.

2 Left-click at any test item.

A click of the left mouse button at any test item displays detailed information on the selected test item.



EXIT **1 Click EXIT .**

The TEST Menu will be closed.

1 SELF CHECK
1-1 SENSOR

Procedures

1 Click TEST on the screen. Or click OPTION1 key.

The TEST Menu will appear.

2 Click SELF CHECK.

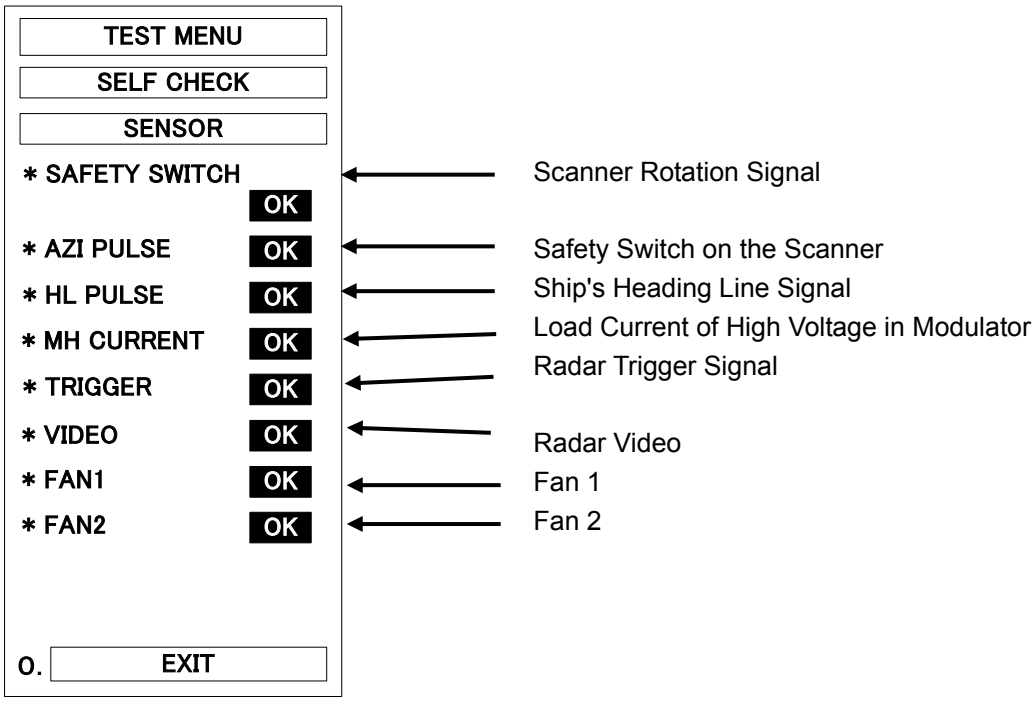
The SELF CHECK Menu will appear.

3 Click SENSOR.

The SENSOR Menu will appear.

4 Check OK on each item.

If any item is no good, NG will be selected.
In the standby mode, ** will be selected for VIDEO.
If the safety switch on the scanner is OFF, OFF will be selected.



EXIT

1 Click EXIT .

The SELF CHECK Menu will reappear.

2 Click EXIT .

The TEST Menu will reappear.

2 Click EXIT .

The TEST Menu will be closed.

1-2 LINE CHECK

Procedures

1 Click TEST on the screen. Or click OPTION1 key.

The TEST Menu will appear.

2 Click SELF CHECK.

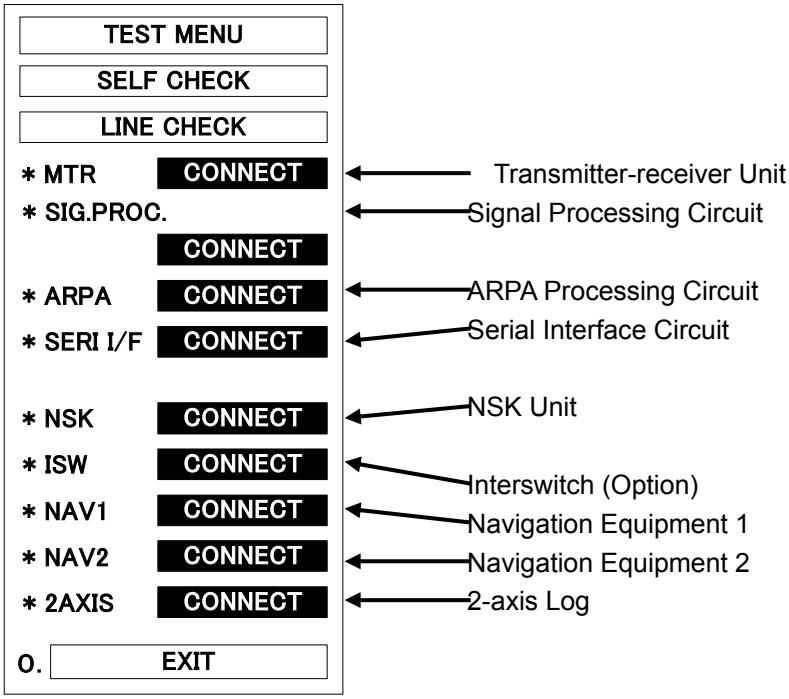
The SELF CHECK Menu will appear.

3 Click LINE CHECK.

The LINE CHECK Menu will appear.

4 Check whether each communication line is connected.

- When the device is connected: CONNECT
- When the device is not connected: DISCONNECT
- When the not recognition: ＊＊＊＊＊



EXIT

1 Click EXIT.

The SELF CHECK Menu will reappear.

2 Click EXIT.

The TEST Menu will reappear.

3 Click EXIT.

The TEST Menu will be closed.

1-3 MONITOR CHECK

Keep off condition.
This function is useful for monitor adjustment with service man.

NOTE: Keep off condition.
If the test pattern of the monitor is displayed, it can be returned to the previous screen with "OPTION2" or by left-clicking the mouse.

2 PANEL TEST

2-1 KEY

Refer to (2) Checking panel in Section 8.1.1 Function Check on Test Menu.

Procedures

1 Click the TEST on the screen.

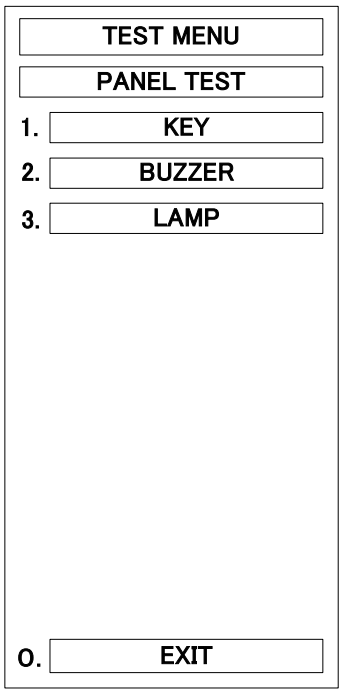
The TEST menu will appear.

2 Click PANEL TEST .

The PANEL TEST Menu will appear.

3 Click KEY .

"1.KEY" is set and the control panel diagram will appear on the display. When a key on the control panel of the actual equipment is pressed, the portion corresponding to the pressed key in the panel diagram will turn the color.



Exit

1 Click EXIT .

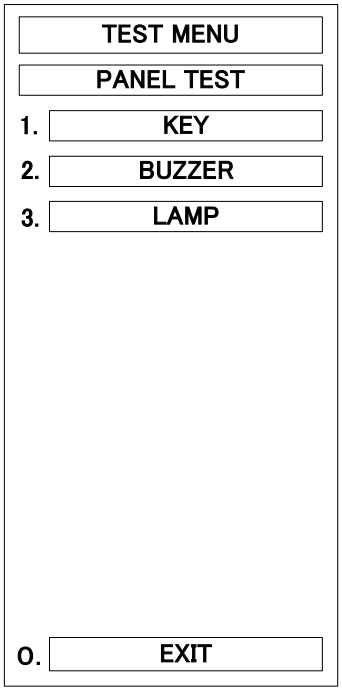
The TEST Menu will be finished.

2 Click EXIT .

The TEST Menu will be closed.

2-2 BUZZER

Refer to (2) Checking Panel in Section 8.1.1 Function Check on Test Menu.



Procedures

1 Click the TEST on the screen.

The TEST menu will appear.

2 Click PANEL TEST .

The PANEL TEST Menu will appear.

3 Click BUZZER .

The BUZZER Menu will appear. A beep of the buzzer indicates that the operation is normal..

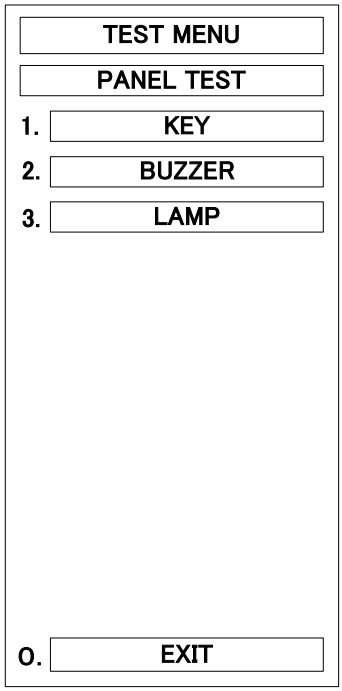
Exit

1 Click EXIT .

The TEST Menu will be closed.

2-3 LAMP

Refer to (2) Checking Panel in Section 8.1.1 Function Check on Test Menu.



Procedures

1 Click the TEST on the screen.

The TEST menu will appear.

2 Click PANEL TEST .

The PANEL TEST Menu will appear.

3 Click LAMP .

The LAMP Menu will appear. The key backlight is turned on, the operation is normal.

Exit

1 Click TEST .

The TEST Menu will be closed.

Note: When performing a LAMP test, the operation cannot be checked if the

brilliance level of the key backlight is at maximum. (The brilliance will not change)

3 ARPA TEST

3-1 SIMULATOR

Refer to (3) Checking ARPA in Section 8.1.1 Function Check on Test Menu.

Procedures

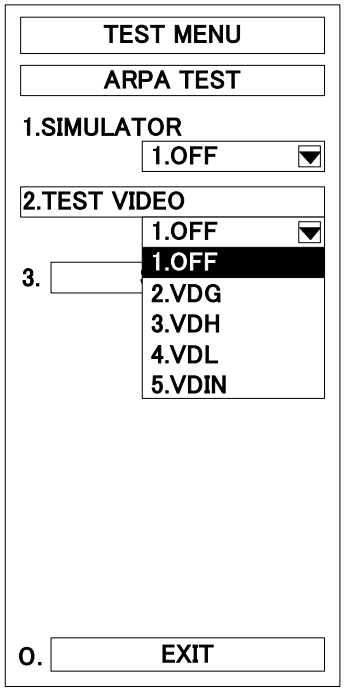
1 Press TX/STBY to set the standby mode.

2 Click the TEST on the screen.
The TEST menu will appear.

3 Click RPA TEST.
The ARPA TEST Menu will appear.

4 Click SIMULATOR .
"1.SIMULATOR"will be selected and the pull-down menu will appear.

5 Select any setting item of ARPA Simulator in the pull-down menu and press any of 1 to 7.



6 Press TX/STBY to set the transmission mode.

Exit

1 Click TESE .

The TEST Menu will be closed.

Note: In normal operation, it is necessary to turn off the "SIMULATOR".

3-2 TEST VIDEO

Refer to (3) Checking ARPA in Section 8.1.1 Function Check on Test Menu.

Procedures

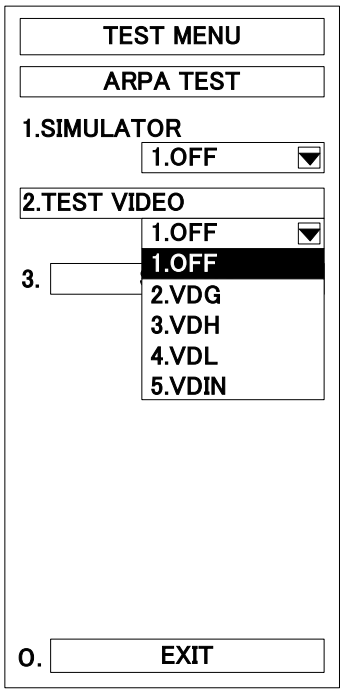
1 Press TX/STBY to set the standby mode .

2 Click the TEST on the screen.
The TEST menu will appear.

3 Click ARPA TEST .
The ARPA TEST Menu will appear.

4 Click TEST VIDEO .
2.TEST VIDEO will be selected and the pull-down menu will appear.

5 Select any setting item in the pull-down menu and press any of 0 to 7 numbers.



6 Press TX/STBY to set the transmission mode.

Exit

1 Click TEST .

The TEST Menu will be closed.

3-3 STATUS

Procedures

1 Click TEST on the screen. Or click OPTION1 key.

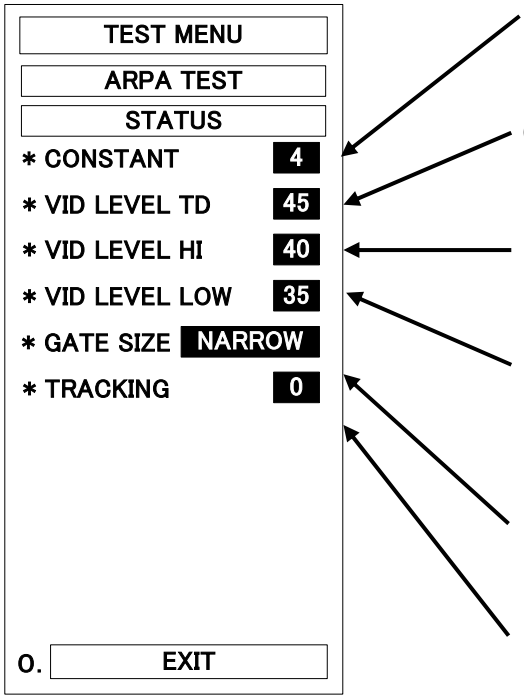
The TEST Menu will appear.

2 Click ARPA TEST.

The ARPA TEST Menu will appear.

3 Click STATUS.

The STATUS Menu will appear to indicate the ARPA setting values and conditions.



Vector Constant
(Refer to Vector Constant in Section 8.5 ADJUSTMENTS)

Quantization Level in Automatic Acquisition
(Refer to Quantization Level in Section 8.5 ADJUSTMENTS)

Quantization Level on medium and Short Ranges (Refer to Quantization Level in Section 8.5 ADJUSTMENTS)

Quantization Level on Long Range
(Refer to Quantization Level in Section 8.5 ADJUSTMENTS)

Gate Size
(Refer to Gate Size in Section 5.10 ARPA SETTING)

Current Numbers of Targets Under Tracking

8

EXIT

1 Click EXIT.

The ARPA TEST Menu will reappear.

2 Click EXIT.

The TEST Menu will be reappear.

3 Click EXIT.

The TEST Menu will be closed.

4 MAG CURRENT

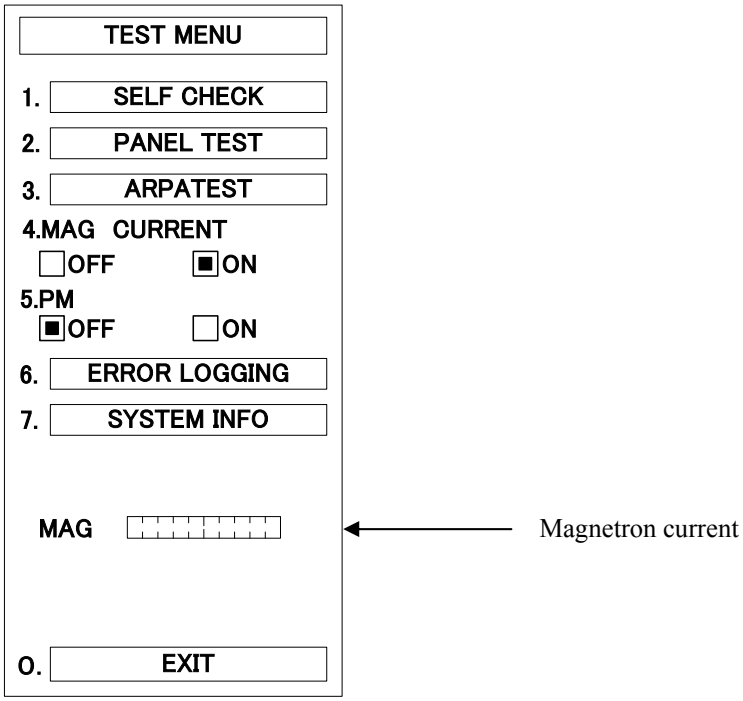
Procedures

1 Click TEST on the screen. Or click OPTION1 key.

The TEST Menu will appear.

2 Select "ON" radio button of MAG CURRENT .

"ON" in "4.MAG CURRENT" will be set. The magnetron current is displayed at the bar-graph on the TEST Menu.



Check "5－9.5" in the 24 NM range.

EXIT

1 Click EXIT.

The TEST Menu will be closed.

5 PM (Performance Monitor)

Refer to (5) Checking Performance Monitor in Section 8.1.1 Function Check on Test Menu.

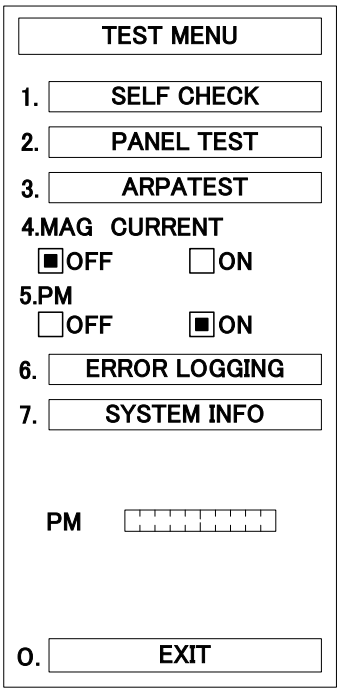
Procedures

1 Click the TEST on the screen.

The TEST menu will appear.

2 Select "ON" radio button of PM .

If the Performance Monitor is installed, “ON” in “5.PM” will be set and the status performance monitor will appear by the [PM] bar-graph in the TEST Menu.
Press 5 again. “5.PM” will be set to “ON” and the [PM] indicator in the menu will disappear.



of

Exit

1 Click EXIT or TEST .

The TEST Menu will be closed. If “5.PM” is set to “ON”, the status will be set to “OFF” automatically.

8

6 ERROR LOGGING

If any system error occurs, the communication line in which the error is caused will be indicated by the selected characters. The errors that are released will also be indicated in time sequence.

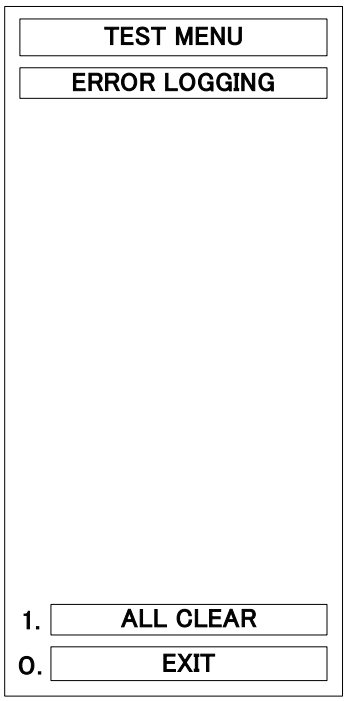
Procedures

1 Click TEST on the screen. Or click OPTION1 key.

The TEST Menu will appear.

2 Click ERROR LOGGING.

The ERROR LOGGING Menu will appear and the location in which an error has occurred will appear by selected characters..



EXIT

1 Click EXIT.

The ERROR LOGGING Menu will be closed.

2 Press EXIT.

The TEST Menu will be closed.

7 SYSTEN INFO

The current system information will be indicated.

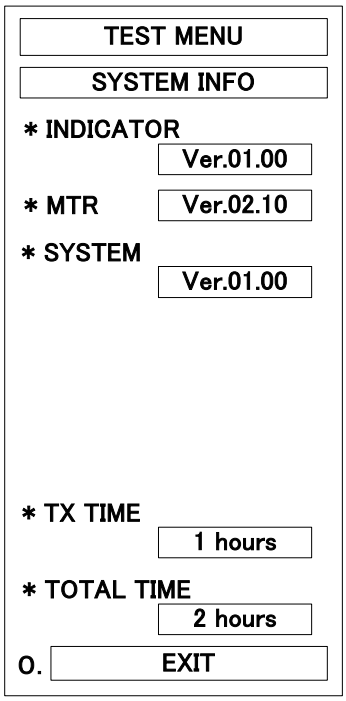
Procedures

1 Click TEST on the screen. Or click OPTION1 key.

The TEST Menu will appear.

2 Click SYSTEM INFO.

The SYSTEM INFORMATION Menu will appear to display the current system information.



EXIT

1 Click EXIT.

The TEST Menu will reappear.

2 Click EXIT.

The TEST Menu will be closed.

List of Alarms and other Indications

Table 8.2 List of Gyro Alarms

Message	Description
SET GYRO	Requires initialization of NSK or setting of initial values for gyro.
TM RESET	Own ship's position has reached at approx. 60% of the radar PPI radius in the TM mode.
POSN RST	Change the latitude and longitude sentence.

Table 8.3 List of ARPA Alarms

Message	Description
CPA/TCPA	CPA/TCPA of a target (ARPA)
GZ	A target approaching own ship exists in a guard zone.
LOST	A target under acquisition can not be tracked.

Table 8.4 List of Operational Error Messages and Warnings

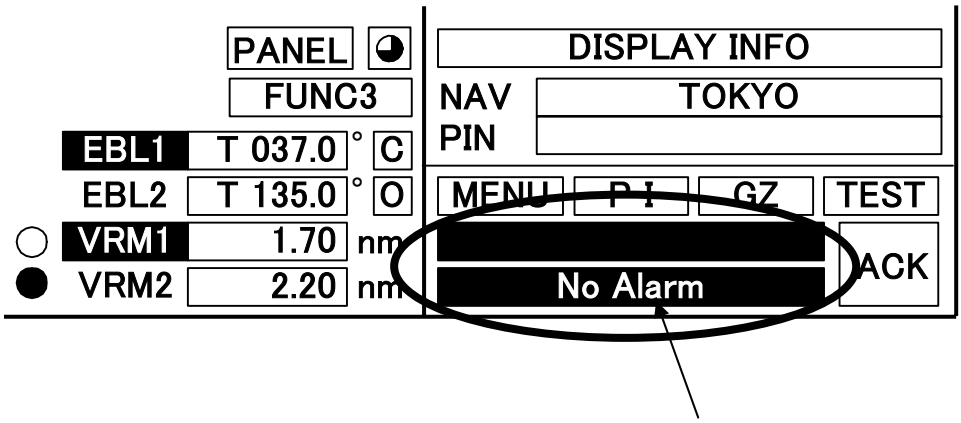
Error Message	Description
OUT OF RANGE	Tried to create a guard zone outside the specified range.
CHANGE RANGE	The range is set outside the specified in creating a guard zone.
MAX POINT	Tried to enter navigation information beyond the specified.
CAN'T TRANSMIT	Tried to transmit within 1 second after standby or when the transmitter-receiver has any trouble.
MAX MARK	Tried to enter more than 20 plot marks.
CAN'T CHANGE	Key in with the [+] or [-] at any place where only a numerical value can be entered.
NO GYRO DATA	Any operation requiring Gyro data was made without it.
INVALID DATA	Tried to enter any data beyond its range.
NO POSITION DATA	Any operation requiring position data was made without it.
CHG REL VECTOR	Tried to display a CPA ring in TRUE mode.
MAX TARGET	The maximum number of targets (50 targets) is under acquisition.
SELECT STRAIGHT	The operator set PM to ON without selecting straight.
NOT ALLOWED	Improper operation

Table 8.5 List of Interswitch Alarms and Messages

Error Message	Description
MASTER RANGE CHG	Tried to change the master range.
ALREADY SELECTED	Selected the already selected pattern.
ISW END!	The switchover of the Interswitch ended normally.
ISW BUSY!	Access to the ISW menu was made during interswitching.
MTR ST-BY!	The master MTR is in the standby mode.
ISW STRAIGHT	Failed in straight connection when the Interswitch system stops operating.
ISW STAND-BY!	The Interswitch recovered normally.
ISW TIME OUT	Communication error occurred between interswitch and display.
ISW ERROR!	The interswitch is disabled.

Note:

An error message and a warning are displayed at lower right (shown below) in radar display mode.



8

Table 8.6 List of System Alarms

Message	Description
MTR(AZI)	Bearing signal error
MTR(HL)	Ship's heading line signal error
MTR(MHV)	Modulator's high voltage error
MTR(DATA)	Communications error with the transmitter-receiver unit
MTR(HEATER)	Magnetron heater voltage is abnormal
MTR(REVERSE)	Antennal rotation is reversed
MTR STATUS	Transceiver status error
SSW OFF	The safety switch is OFF during switchover of the scanners
NSK(GYRO)	Gyro signal OFF
ISW(DATA)	Communications error with the interswitch
LOG	Log signal OFF
NAV(DATA)	Date from navigation equipment OFF
DLOG	2-axis log signal OFF
ARPA(DATA)	Communications error with the ARPA unit
NSK(DATA)	Communications error with NSK unit
VIDEO	Radar video OFF
TRIGGER	Trigger signal OFF
FAN1	Fan alarm 1
FAN2	Fan alarm 2
PROC(DATA)	Signal processing circuit error
SERI(DATA)	Serial interface circuit error
LAN(DATA)	LAN I/F circuit error
232C(DATA)	RS-232C communications error
MTR(VID)	Abnormal scanner vibrations
MTR(TMP)	Abnormal scanner temperature
MAG(HDG)	Data from Mag compass have been cut off
PROC(AZI)	Bearing pulse is abnormal

8.2 TROUBLESHOOTING

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

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

Melted fuses are caused by any clear cause. When a fuse is replaced, it is necessary to check the related circuits even if there is no trouble. In this case, note that there is some dispersion in the fusing characteristics. Table 8.7 shows a list of fuses used in the equipment.

Table 8.7 Fuse List

Location	Parts No.	Nominal Current	Protection Circuit	Type
Transmitter-receiver Unit	F1	1A	Rectifier circuit PC1001	MF51NN-1A
Display Unit (NSK)	F1 to F4	0.5A	LOG.NSK circuit PC4201	MF60NR-0.5A

8.3 COUNTERMEASURES TO TROUBLE

As this radar equipment includes complicated circuits, it is necessary to request a specialist engineer for repair or instructions for countermeasure 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 treated, so that it is earthed or contacts with another terminal.
c) Disconnected cable wire

2 Poor Contact of Connector within Unit

Reference:

This radar equipment is provided with the standard spares as shown in Table 8.8.

Table 8.8 Spares (6ZXRD00198)

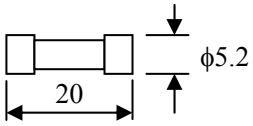
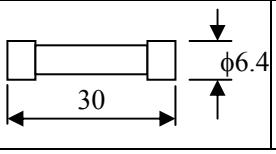
Name	Type/Code	Shape (mm)	In use	Spare	Parts No.	Location
Fuse	MF51NN-1A (5ZFAD00042)		1	3	F1	Transmitter-receiver PC1001
Fuse	MF60NR-0.5A (5ZFAD00013)		4	12	F1 to F4	Display NSK Circuit

Table 8.9 Special Parts

[Ⅰ] JMA-9933-SA

Parts No.	Name	Type	Manufacturer	Location	Code
V201	Magnetron	M1302	NJRC	Transmitter-receiver	5VMAA00032
A201	Circulator	NJC3310	NJRC	Transmitter-receiver	5AJBV00002
A202	TRHPL	TL378A	NJRC	Transmitter-receiver	5VLAA00032

[Ⅱ] JMA-9932-SA

Parts No.	Name	Type	Manufacturer	Location	Code
V101	Magnetron	M1302	NJRC	Scanner	5VMAA00032
A101	Circulator	NJC3320	NJRC	Scanner	5AJBV00004
A303	TRHPL	TL378A	NJRC	Scanner	5VLAA00032

[Ⅲ] JMA-9923-7XA/9XA

Parts No.	Name	Type	Manufacturer	Location	Code
V1	Magnetron	M1568B(J)	NJRC	Transmitter-receiver	5VMAA00082
A201/A202	Circulator	FCX68	TOSHIBA CORPORATION	Transmitter-receiver	6AJRD00001
A203	Diode Limiter	NJS6930	NJRC	Transmitter-receiver	5EZAA00024
A302	Pin Attenuator	NJS6926	NJRC	Transmitter-receiver	5ENAC00019

[Ⅳ] JMA-9922-6XA/9XA

Parts No.	Name	Type	Manufacturer	Location	Code
V1	Magnetron	M1568B(J)	NJRC	Scanner	5VMAA00082
A101	Circulator	FCX68	TOSHIBA CORPORATION	Scanner	6AJRD00001
A303	Diode Limiter	NJS6930	NJRC	Scanner	5EZAA00019

Table 8.10 Repair Circuit Block (JMA-9933-SA)

Location	Circuit Block	Type	Remarks
Scanner	Motor with gear	MPEM30030	AC220/230V3ϕ
Scanner	Motor with gear	MPEM30110	AC220/230V1ϕ
Scanner	Motor with gear	MPEM30092	AC100/110V1ϕ
Transmitter-receiver	Modulator	NMA-1253-1	Including PC210 (CPA-209) Excluding Magnetron
Transmitter-receiver	Receiver	NRG-88	PC301(CEA-334-1) PC302(CEA-424) PC303(CEA-205) Including PC304 (CBD-1274)
Transmitter-receiver	Power supply circuit	CBA-1682	
Transmitter-receiver	T/R control circuit	CMC-1205	
Display	Power supply circuit	CBD-1661	
Display	Terminal board circuit	CQD-1949	
Display	NSK/LOG I/F circuit	CMJ-462A	
Display	Mother board	CMC-1094	
Display	Panel circuit-1	CCK-900	
Display	Panel circuit-2	CCK-901	
Display	Panel circuit-3	CCK-902	
Display	Display control circuit	CMC-1218	
Display	Signal processing circuit	CDC-1209	
Display	Interswitch circuit	NQE-3141	(Option)

Table 8.11 Repair Circuit Block (JMA-9932-SA)

Location	Circuit Block	Type	Remarks
Scanner	Motor with gear	MPEM30030	AC220/230V3ϕ
Scanner	Motor with gear	MPEM30110	AC220/230V1ϕ
Scanner	Motor with gear	MPEM30092	AC100/110V1ϕ
Transmitter-receiver	Modulator	NMA-534-1	Including PC210 (CPA-209) Excluding Magnetron
Transmitter-receiver	Receiver	NRG-222	PC301(CEA-334-4) PC302(CEA-424) PC303(CEA-205) Including PC304 (CBD-1274)
Transmitter-receiver	Power supply circuit	CBA-1682	
Transmitter-receiver	T/R control circuit	CMC-1205	
Display	Power supply circuit	CBD-1661	
Display	Terminal board circuit	CQD-1949	
Display	NSK/LOG I/F circuit	CMJ-462A	
Display	Mother board	CMC-1094	
Display	Panel circuit-1	CCK-900	
Display	Panel circuit-2	CCK-901	
Display	Panel circuit-3	CCK-902	
Display	Display control circuit	CMC-1218	
Display	Signal processing circuit	CDC-1209	
Display	Interswitch circuit	NQE-3141	(Option)

Table 8.12 Repair Circuit Block (JMA-9923-7XA/9XA)

Location	Circuit Block	Type	Remarks
Scanner	Motor with gear	MDBW10645	AC220/230V3ϕ
Scanner	Motor with gear	MPEM30177	AC220/230V1ϕ
Scanner	Motor with gear	MPEM30176	AC100/110V1ϕ
Transmitter-receiver	Modulator	NMA-1252-1	Including PC210 (CPA-209) Excluding Magnetron
Transmitter-receiver	Receiver	NRG-98	
Transmitter-receiver	Power supply circuit	CBA-1682	
Transmitter-receiver	T/R control circuit	CMC-1205	
Display	Power supply circuit	CBD-1661	
Display	Terminal board circuit	CQD-1949	
Display	NSK/LOG I/F circuit	CMJ-462A	
Display	Mother board	CMC-1094	
Display	Panel circuit-1	CCK-900	
Display	Panel circuit-2	CCK-901	
Display	Panel circuit-3	CCK-902	
Display	Display control circuit	CMC-1218	
Display	Signal processing circuit	CDC-1209	
Display	Interswitch circuit	NQE-3141	(Option)

Table 8.13 Repair Circuit Block (JMA-9922-6XA/9XA)

Location	Circuit Block	Type	Remarks
Scanner	Motor with gear	MDBW10645	AC220/230V3ϕ
Scanner	Motor with gear	MPEM30177	AC220/230V1ϕ
Scanner	Motor with gear	MPEM30176	AC100/110V1ϕ
Transmitter-receiver	Modulator	NMA-499-1	Including PC210 (CPA-209) Excluding Magnetron
Transmitter-receiver	Receiver	NRG-154	
Transmitter-receiver	Power supply circuit	CBA-1682	
Transmitter-receiver	T/R control circuit	CMC-1205	
Display	Power supply circuit	CBD-1661	
Display	Terminal board circuit	CQD-1949	
Display	NSK/LOG I/F circuit	CMJ-462A	
Display	Mother board	CMC-1094	
Display	Panel circuit-1	CCK-900	
Display	Panel circuit-2	CCK-901	
Display	Panel circuit-3	CCK-902	
Display	Display control circuit	CMC-1218	
Display	Signal processing circuit	CDC-1209	
Display	Interswitch circuit	NQE-3141	(Option)

8.4 REPLACEMENT OF MAJOR PARTS

⚠ DENGER
In this INTER-SWITCH system, even if it turns OFF a Indicator power supply, the power supply may be supplied to the scanner. **Turn off the main power source of the radar before open the scanner unit.**

CAUTION

Turn off the main power source before replacing parts. Otherwise, an electric shock or injury may result.

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 result.

Take off your wrist watch when bringing your hands close to the magnetron. Since the magnetron is a strong magnet, your wrist watch may be damaged if not taken off.

Replacement of the LCD unit requires two persons.
If one person attempts replacing the LCD unit, he/she may drop it and get injured.

High voltage will temporarily remain inside, even after the main power has been turned off. Do not touch the inverter circuit of the LCD unit with wet hands.
Failure to observe this precaution may result in electrical shock.

Replacement of PARTS Periodically

The parts shown below, it is need to exchang periodically.

Parts	Exchange Standard
1. Magnetron	4,000 hours
2. Motor	10,000 hours
3. LCD	50,000 hours
4. Fan Motor	20,000 hours
5. Lithium battery	3 years

Replacement of Magnetron (V1/V101/V201)

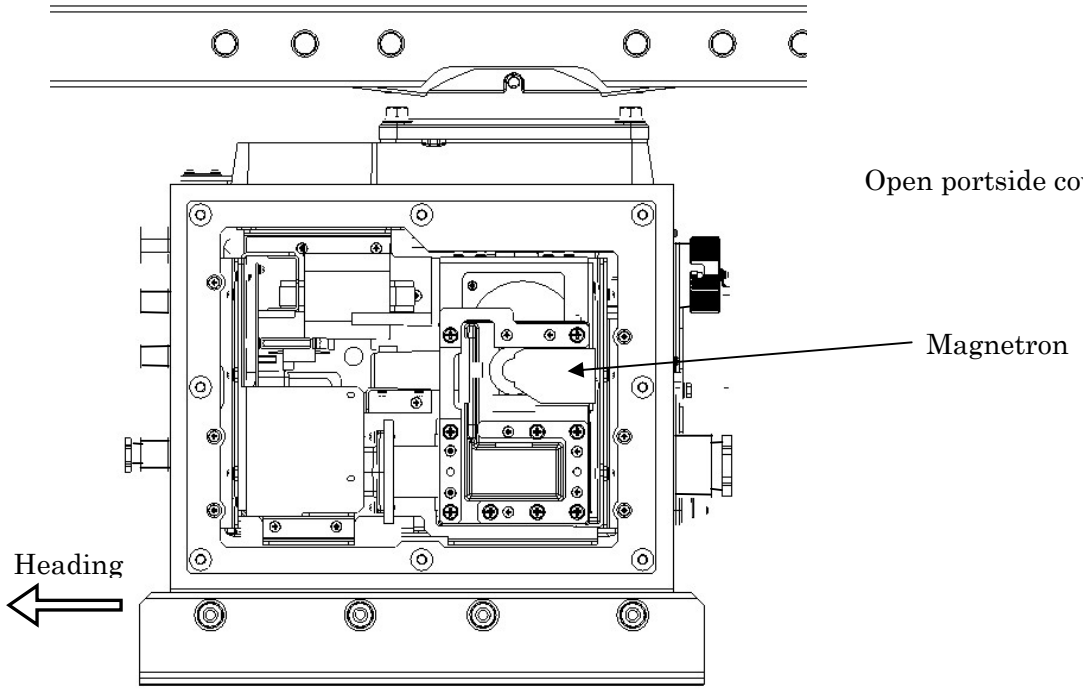
Remove the shield cover of the modulator and check that no charge remains in the high-voltage modulator circuit. Then, remove the socket of the magnetron. The magnetron can be demounted by removing the screws fixing it. When mounting a new magnetron, do not touch the magnet with a screwdriver or put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

Handling of Magnetron under Long-Time Storage

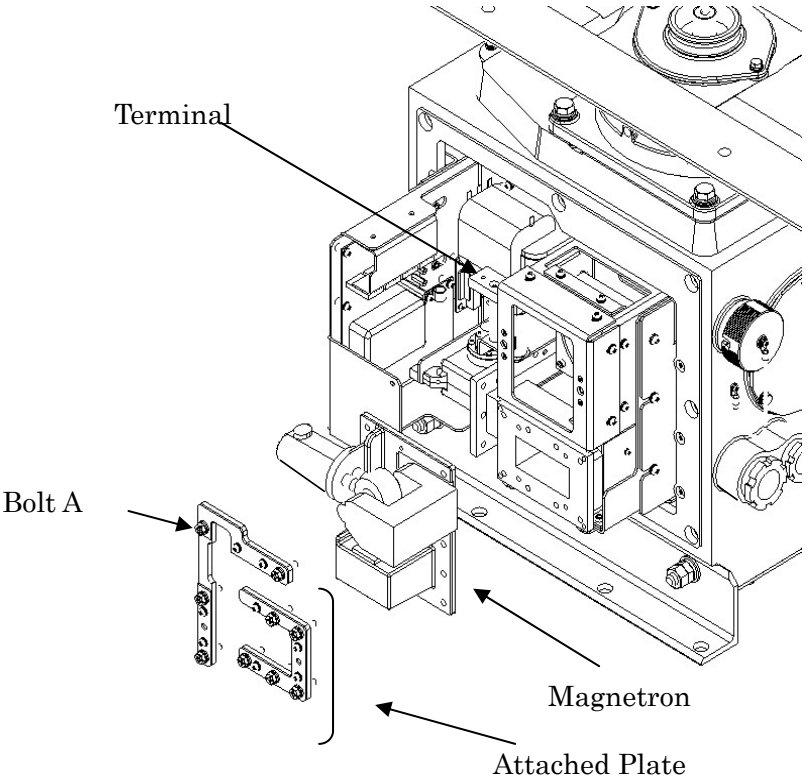
The magnetron that has been kept in storage for a long time may cause sparks and operate unstably when its operation is started. Perform the aging in the following procedures:

(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 is 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.
(3) After transmission is made for about 15 minutes, conduct the tuning adjustment.
(4) Adjust RV1 within the receiver so that the bar graph of the tuning indicator on the display reaches the reading 10 without saturation.

< Scanner: NKE-1075A　Magnetron Exchange Procedure



Open portside cover.



・Remove the reads of magnetron on terminal.
・Loosen 9 bolts A.
　And remove 2 attached plates.

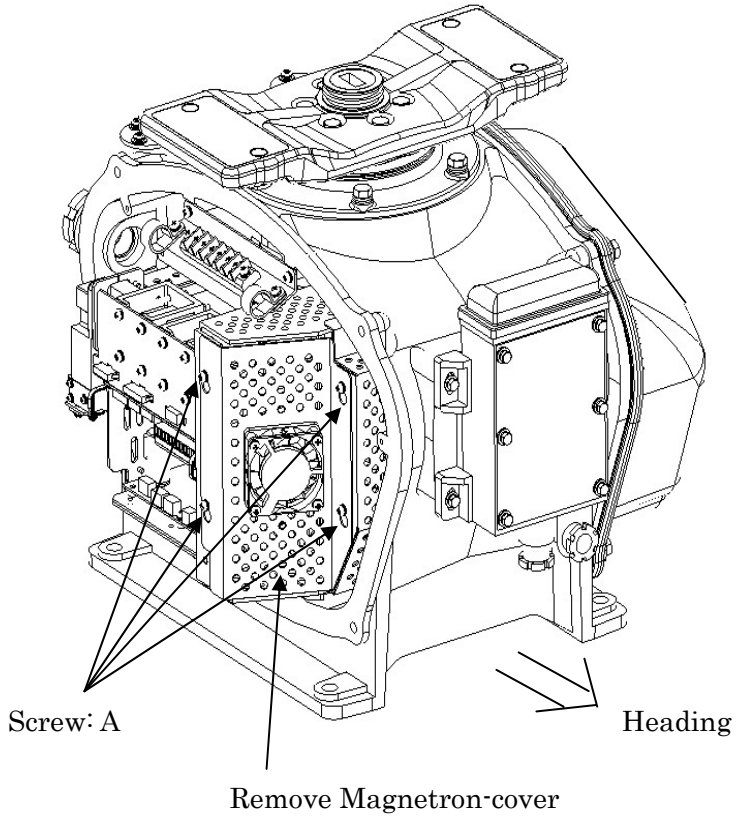
Caution）⚠

Be careful of the handling of a magnetron.

・Exchange Magnetron.
　Attach Magnetron, plates, reads.
　Setting up scanner unit.

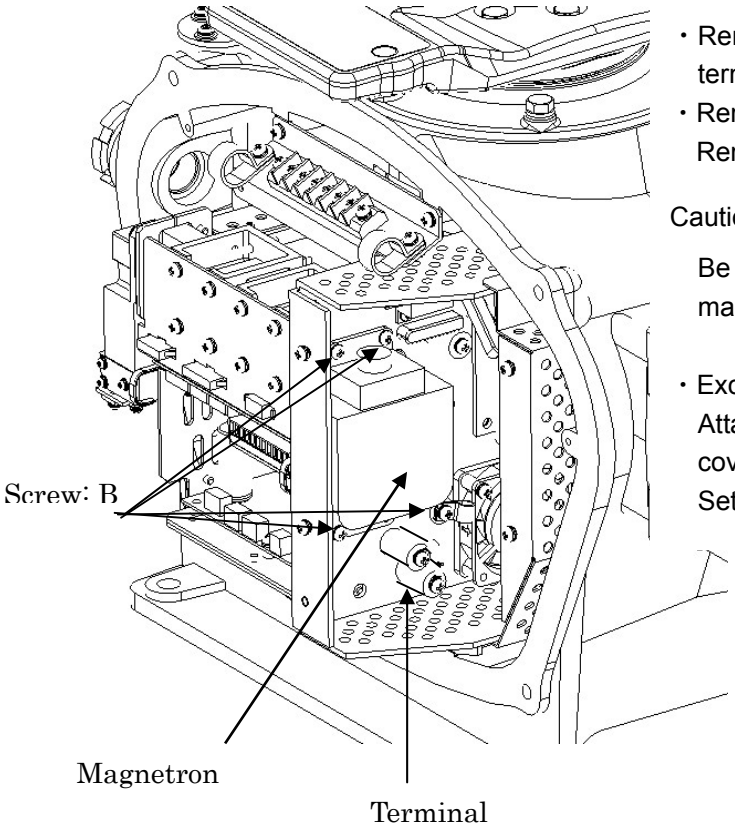
8

< Scanner: NKE-1087 Magnetron Exchange Procedure



Open starboard cover of scanner.

Loosen 4 screws A.
And remove magnetron-cover.



・Remove Magnetron-leads at the terminal.
・Remove 4 screws B.
Remove The Magnetron.

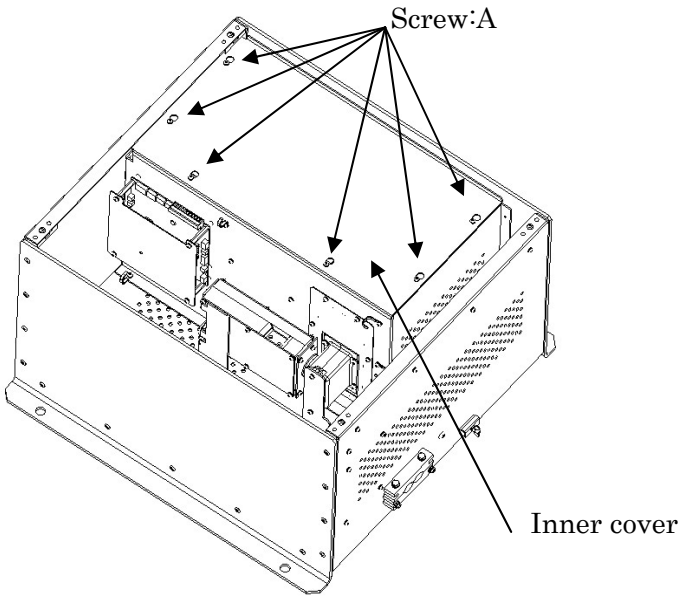
Caution) ⚠

Be careful of the handling of a magnetron and screws.

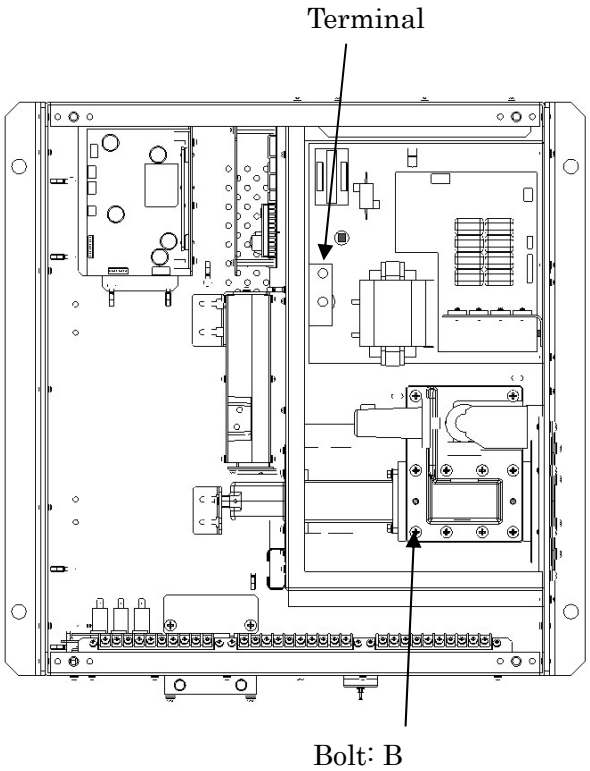
・Exchange Magnetron.
Attach Magnetron, leads and cover.
Setting up scanner unit.

8

< Transmitter Receiver: NTG-3037A　Magnetron Exchange Procedure

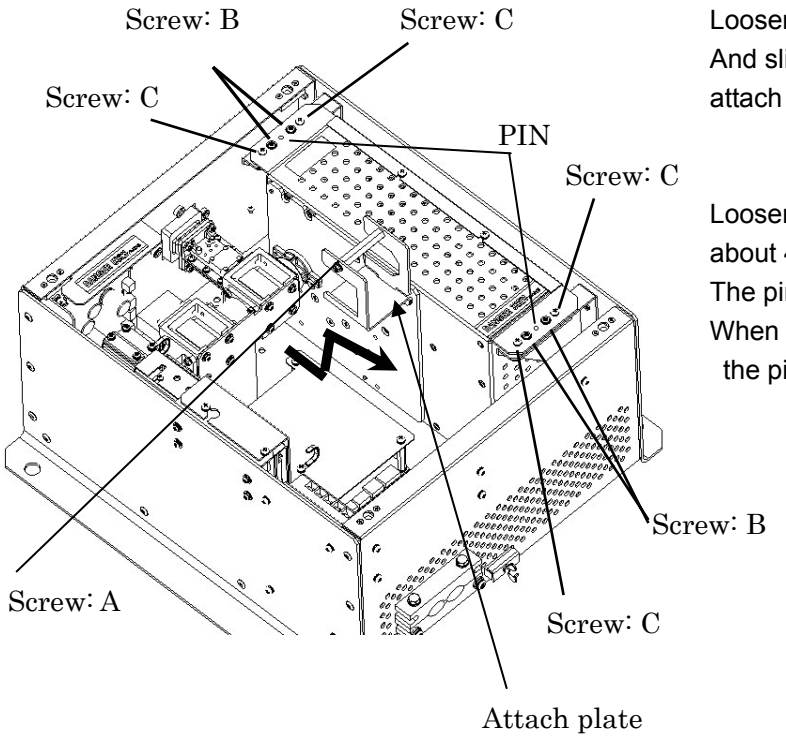


・Remove outer-cover.
・Loosen 6 screws A.
・Remove inner cover.



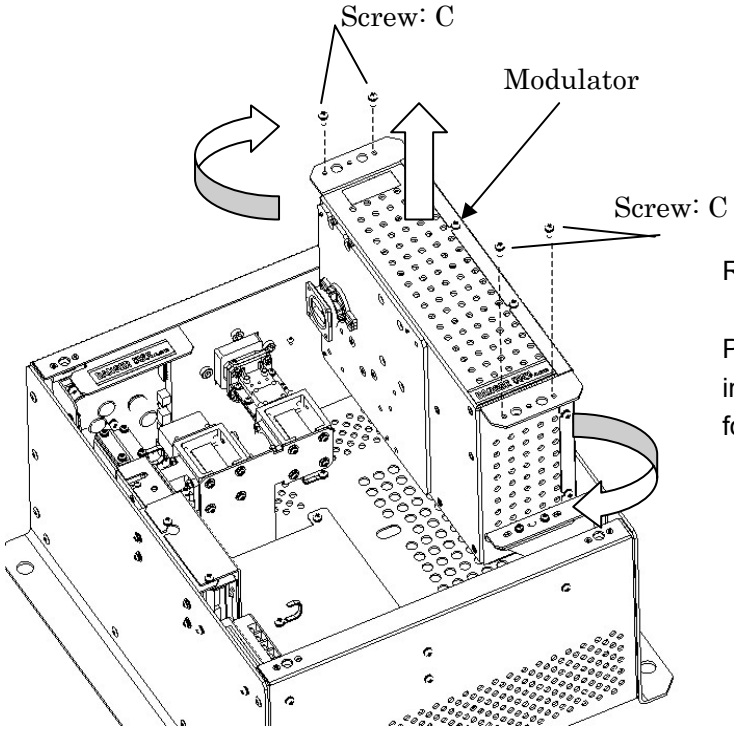
・Remove Magnetron leads from terminal.
・Remove 9 bolts B. Remove Magnetron.
・Exchange Magnetron. Attach Magnetron, leads and cover. Setting up TR control unit.

8



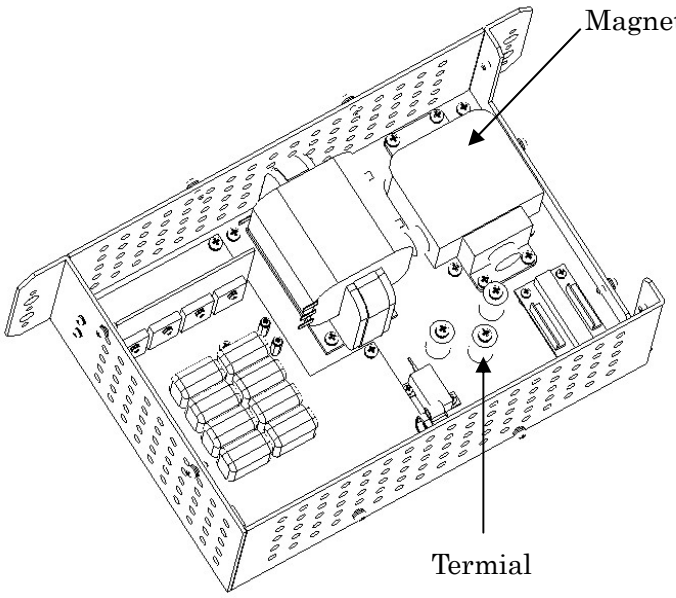
Remove outer cover.
Loosen screw A.
And slide and remove attach plate.

Loosen 4 screws B about 4-5 turns.
The pin falls.
When pin is not fall, push the pin by Philips.

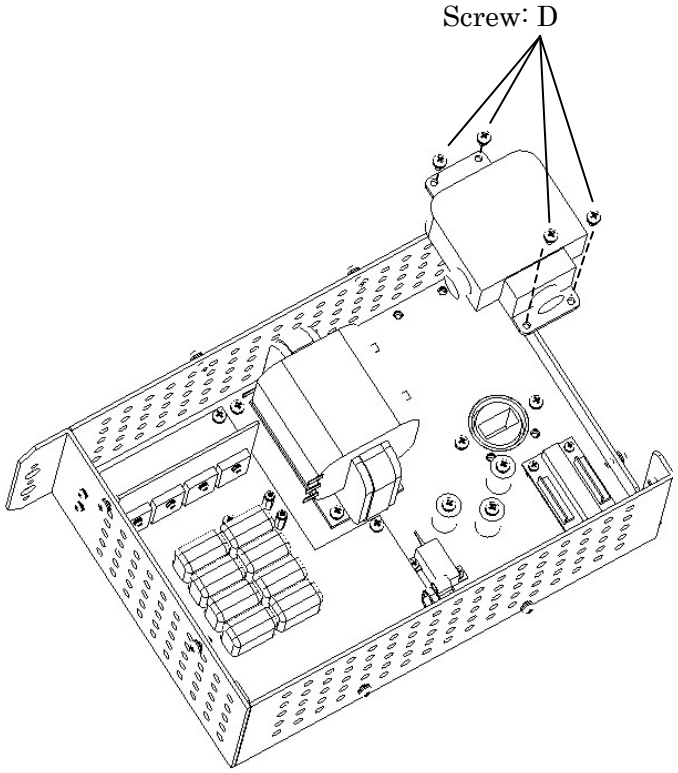


Remove 4 screws C.

Pulls out rotating Modulator in the direction of an arrow for a while.



Remove Magnetron cover.
Remove Magnetron leads on the terminal.



Loosen 4 screws D.
Remove the Magnetron.

Exchange the Magnetron.
Attach the leads and cover.

Setting up TR control unit.

8

Replacement of the Liquid-Crystal Monitor

Attention

- The liquid-crystal monitor is easily damaged, even by a slight shock. When handling this monitor for replacement, be extra careful so as not to hit a hard object against the monitor. In addition, do not place the monitor on a hard object.

1 JMA-9933-SA, JMA-9923-7XA/9XA (Display unit: NCD-4263)

(1) Four screws of the front of a processing part are loosened.
(2) The cable connected from the liquid crystal (LCD) part is removed. (Three)
The band which is fixing the cable is removed.
A cable is drawn out upwards.
(3) Four bolts which have stopped the liquid crystal display part to the case are removed..
(4) A display part is removed.
(5) Four screws of a liquid crystal top and six screws (rotation part) stopped from the lower side are removed. (It becomes only the display part of liquid crystal.)
(6) A reverse procedure performs attachment of a new liquid crystal display monitor.

8.5 ADJUSTMENTS

This section describes the electrical adjustments of the equipment as the adjustment procedures to be carried out by service persons at the time of installation.

⚠ CAUTION

Do not carry out the adjustments of the equipment except authorized service persons. Otherwise, an accident or trouble may result.

Do not carry out the adjustments during navigation. Otherwise, the radar performance may be affected, resulting in an accident or trouble.

Tuning adjustments, bearing adjustments, and range adjustments can be performed from the keyboard.
The following procedure must be used to enter the equipment into adjustment mode:

Procedures

1 Click MENU on the screen. Or press OPTION2 key.

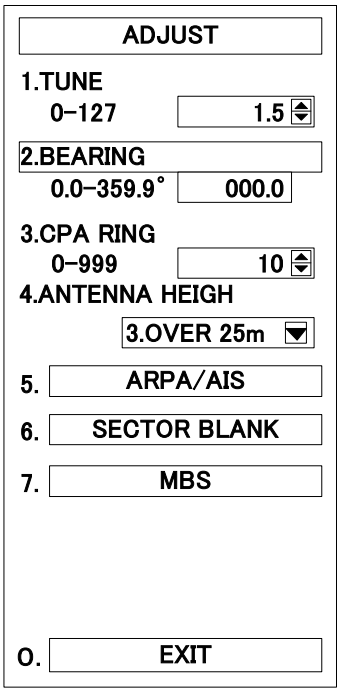
The MAIN Menu will appear.

2 Click CODE INPUT.

The CODE INPUT Menu will appear.

3 Click 0 , then END .

The ADJUST Menu will appear.



EXIT

1 Click EXIT.

The ADJUST Menu will be closed.

2 Click EXIT.

The CODE INPUT Menu will be closed.

3 Click EXIT.

The TEST Menu will be closed.

Tuning Adjustment

Procedures

1 If the AUTO TUNE mode is ON, change the mode to the Manual mode.

2 Set the range scale to 24 NM and adjust the [TUNE] control to the center.

3 Click MENU on the screen. Or press OPTION2 key.

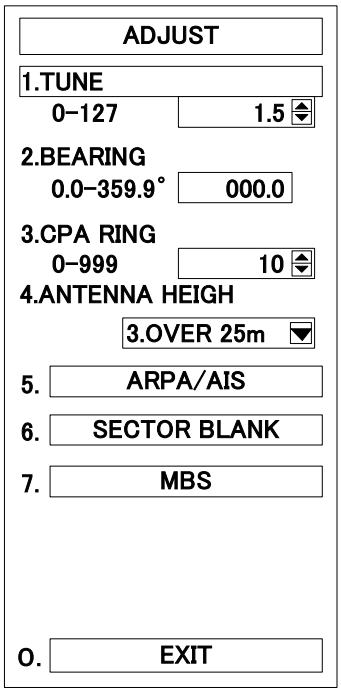
The MAIN Menu will appear.

4 Click CODE INPUT .

The CODE INPUT Menu will appear.

5 Click 0 , then END .

The ADJUST Menu will appear.



6 Click the "1.TUNE" edit box.

The numeric input dialogue box is opened.

7 Using △ and ▽ , adjust the bar-graph of the tuning indicator on the upper left of the display so that it becomes the longest, and press END to set it.

EXIT

1 Click EXIT.

The ADJUST Menu will be closed.

2 Click EXIT.

The CODE INPUT Menu will be closed.

3 Click EXIT.

The MAIN Menu will be closed.

8

Bearing Adjustment

Adjust the bearing so that bearing of the target measured with the ship's compass corresponds to that of the target echo on the radar display.

Procedures

1 Press the "N UP/H UP/C UP" button on the upper left of the screen, then change the bearing display to relative display (H UP) .

2 Measure the bearing of an adequate target (for example, a ship at anchor, a breakwater or a buoy) relative to own ship's heading. (For instance, assume that the bearing of the target is 25°.)

3 Click MENU on the screen. Or press OPTION2 key.

The MAIN Menu will appear.

4 Click CODE INPUT .

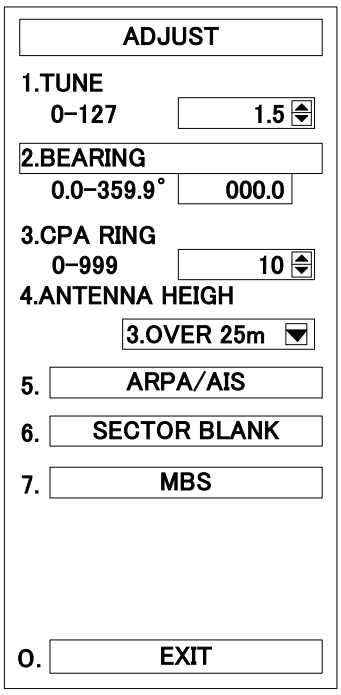
The CODE INPUT Menu will appear.

5 Click 0 , then END .

The ADJUST Menu will appear.

6 Click the "2.BEARING" edit box.

2.BEARING will be selected.



7 The EBL for bearing adjustment will appear.
Rotate the [EBL] control and adjust EBL to the target selected in Step 2 above.
Press [EBL] control to set it.

8 Rotate the [EBL] control and adjust the EBL for bearing adjustment to the bearing of the target selected in Step 2 above.
Press [EBL] control to set it.
(Adjust the EBL bearing to 25° as the instance in Step 2 above)

9 Repeat the procedures from step 5 above if the bearing is not completely coincident with the target's actual bearing.

EXIT **1 Click [EXIT].**

The ADJUST Menu will be closed.

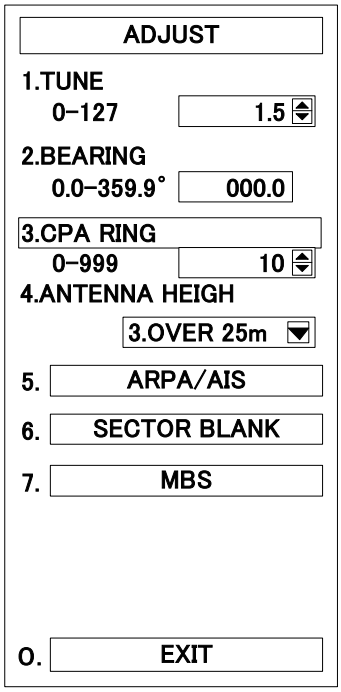
Range Adjustment

Adjust the range that the range of the target on the radar video is indicated correctly.

Procedures

1 Click [MENU] on the screen. Or press [OPTION2] key.

The MAIN Menu will appear.



2 Click [CODE INPUT].

The CODE INPUT Menu will appear.

3 Click [0], then [END].

The ADJUST Menu will appear.

4 Click the "3.RANGE" edit box.

[3.RANGE] will be selected.

5 Find a target on the radar display the range of which is already known.

(For example, assume that the actual range of the target is 0.33NM)

6 Using [+] and [-], adjust the target echo's position to the position of the target selected in step 4 above. Press [END] to set it.

Move the target echo upward by [+] and downward by [-].

EXIT **1 Click [EXIT].**

The ADJUST Menu will be closed.

2 Click [EXIT].

The CODE INPUT Menu will be closed.

3 Click [EXIT].

The MAIN Menu will be closed.

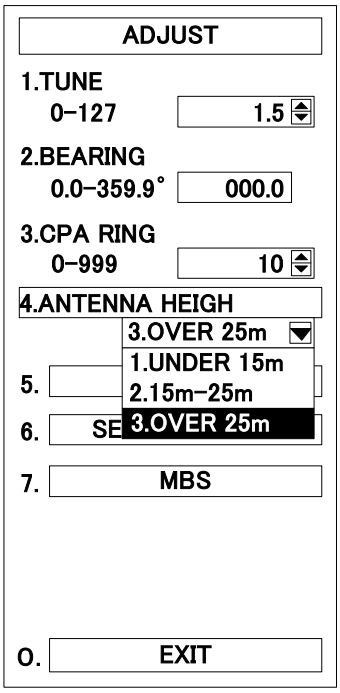
Antenna Height Adjustment

Set the height of the antenna above the sea level.
Do not change this setting inadvertently.

Procedures

1 Click MENU on the screen. Or press OPTION2 key.

The MAIN Menu will appear.



2 Click CODE INPUT.

The CODE INPUT Menu will appear.

3 Click 0 , then END .

The ADJUST Menu will appear.

4 Click the "4.ANTENNA HEIGHT" edit box.

4.ANTENNA HEIGHT will be selected.

5 Measure the height from the sea surface to the top of the antenna, then select the corresponding antenna height from the pull-down menu.

The selected antenna height value will be set.

EXIT

1 Click EXIT .

The ADJUST Menu will be closed.

2 Click EXIT .

The CODE INPUT Menu will be closed.

3 Click EXIT .

The MAIN Menu will be closed.

8

Vector Constant

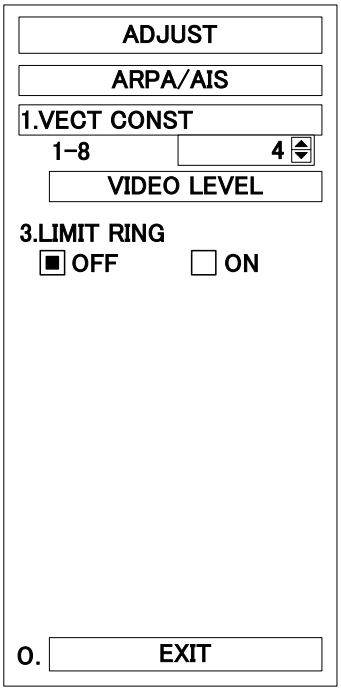
Attention

- Do not change the set value carelessly.
  The vector constant shall be set to 4 normally. If the vector constant value is higher, a target's vector will be better followed up when the target and own ship change their course or speed, but the vector accuracy will be lower on the

Procedures

1 Click MENU on the screen. Or press OPTION2 key.

The MAIN Menu will appear.



2 Click CODE INPUT.

The CODE INPUT Menu will appear.

3 Click 0 , then END .

The ADJUST Menu will appear.

4 Click ARPA/AIS .

The ARPA/AIS Menu will appear.

5 Click the "1. VECT CONST" edit box.

1.VECT CONST will be selected.

6 Input the new value by pressing the 0 to 8 number buttons or by using the + or - buttons, then press END to input.

EXIT

1 Click EXIT .

The ADJUST Menu will be closed.

2 Click EXIT .

The CODE INPUT Menu will be closed.

3 Click EXIT .

The MAIN Menu will be closed.

Quantization Level

CAUTION

Do not change the set quantization level carelessly. If the level deviates from the proper value, the ARPA acquisition and tracking functions will deteriorate.
Otherwise, this may cause accidents to occur.

The quantization level determines the minimum signal level of the input video to the ARPA target detection circuit. In this test, the value of the quantization level can be set in a range of 1 to 63.
If the value is set to a lower level, weak target echoes will be inputted to the ARPA target detection circuit, but much radar noise will also be inputted to the circuit together, and target acquisition and tracking may be disabled. Therefore, it is important to set a value that is 4 or 5 higher than the detected noise level.

Procedures

1 Click MENU on the screen. Or press OPTION2 key.

The MAIN Menu will appear.

2 Click CODE INPUT .

The CODE INPUT Menu will appear.

3 Click 0 , then END .

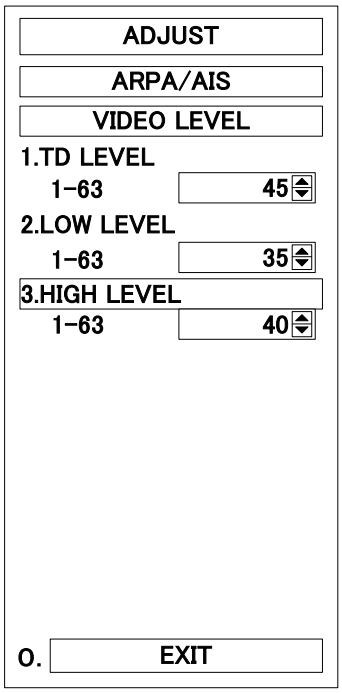
The ADJUST Menu will appear.

4 Click ARPA/AIS .

The ARPA/AIS Menu will appear.

5 Click VIDEO LEVEL .

The VIDEO LEVEL Menu will appear.



6 Click the "3.HIGH LEVEL" edit box.

3.HIGH LEVEL will be selected.

7 To change the quantization level, enter a new value using any of 0 to 9 or [+] and [-] , and press [END] to set it.

EXIT **1 Click [EXIT].**

The ADJUST Menu will be closed.

2 Click [EXIT].

The CODE INPUT Menu will be closed.

3 Click [EXIT].

Control will be returned to the MAIN Menu.

Do not change the quantization level LOW LEVEL.

Adjustment of NSK Unit to Gyro Compass and Log

The NSK Unit of the radar equipment is of solid-state type and designed to be compatible with almost all types of gyro compass by switch operation (For the step motor type, 35 V DC to 100 V DC, and for the synchro-motor type, the primary excitation voltage is 50 V AC to 115 V AC). Before power-on operation, the switches S1, S2, S6 and S7 on the NSK Unit (CMJ-462) shall be set to the type of gyro compass in use in accordance with the procedures as described below. The gyro select switch on the NSK Unit is set to the gyration ratio of 360X and to be compatible with the synchro type before delivery from factory. Check the type of the gyro compass used in own ship and make settings in the procedures below. For further details, refer to Fig. 127 Setting Table of Gyro Compass and Gyro Select Switches of Display Unit, Type NCD-4263.

① Set the switches and jumper of the NSK Unit (CMJ-462) before tuning on the radar equipment.

- S5: Set it to [OFF].
- S6, 7: Set this switch assembly according to the particular type of gyro.
  S6, S7 ····· 「UP」····· Step signal
  「DOWN」····· Synchro signal

- S1-1 to 4: Set this switch assembly according to the particular type of gyro.
  S1-1 ····· Set this switch assembly according to the particular type of gyro.
  「UP」····· Step signal
  「DOWN」····· Synchro signal
  S1-2, 3 ····· Gyration ratio

Gyration ratio	S1-2	S1-3
36×	ON	ON

90 ×	OFF	ON
180 ×	ON	OFF
360 ×	OFF	OFF

S1-4 ····· Gyration direction
「ON」····· Reverse (counterclockwise)
「OFF」····· Normal (clockwise)

- S1-5-8: Set this switch assembly according to the particular type of log.

S1-5 ····· Log type-1
「ON」····· Synchro signal
「OFF」····· Pulse signal

S1-6 ····· Log type-2
「ON」····· 1-axis
「OFF」····· 2-axis

S1-7,8 ····· Log ratio

Log ratio	S1-7	S1-8
100P/30 ×	ON	ON
200P/90 ×	OFF	ON
400P/180 ×	ON	OFF
800P/360 ×	OFF	OFF

② Connect the gyro signal and the log signal cables to the Terminal Board Circuit.
③ Set S7 to [ON].

After power-on operation, the switch S1-4 shall be set to [ON] if the radar video and the indicated value of COPURSE (own ship's true bearing) is reversed.

Table 8.14 Gyro and Log Select Switches (S1 Dip Switch)

S1 Setting Table

S 1			1	2	3	4	5	6	7	8
GYRO SIG. / GYRO SIGNAL SET	STEP TYPE		ON							
	SYNC TYPE		OFF							
	RATIO	36 ×		ON	ON					
		90 ×		OFF	ON					
		180 ×		ON	OFF					
		360 ×		ON	OFF					
	DIRECTION	REV (Reverse)				ON				
		NORM (Normal)				OFF				
LOG SIG. / LOG SIGNAL SET	TYPE1	SYNC					ON			
		PULSE					OFF			
	TYPE2	1 AXIS						ON		
		2 AXIS						OFF		
	PULSE	100P/30 ×							ON	ON

	/NM	200P/90 ×	OFF	ON
		400P/180 ×	ON	OFF
		800P/360 ×	OFF	OFF

S2 Setting Table

S2	1	2	3	4
	LOG ALM	GYRO SIMULATOR	LOG SIMULATOR	N/A
	5	6	7	8
	GYRO ALM ON=5S,OFF=0.5S	N/A	N/A	N/A

Main Bang Suppression Adjustment

The adjustment is intended for suppressing the main bang that is an echo signal from the microwave circuit such as waveguide appearing as a circular echo at the radar video center. It is the optimum level in which the main bang suppression is adjusted so that the main bang remains weak on the video.

Attention

- Do not change the adjusted level carelessly. If the adjustment is improper, the target signals on the short ranges may be cleared.

Procedures

1 Set the radar range scale to the minimum 0.125 NM, set PROCESS, TGT ENH and FUNCTION to OFF, and set the system to the Transmit mode.

2 Adjust the operation controls as follows:
[GAIN] control: Maximum
[SEA] control: Center (MANUAL)
[RAIN] control: Minimum (MANUAL)

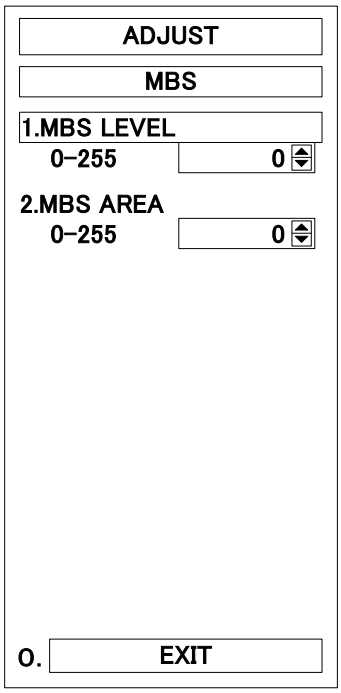
3 Click MENU on the screen.

Or press OPTION2 key.

The MAIN Menu will appear.

4 Click CODE INPUT.

The CODE INPUT Menu will appear.



5 3 Click [0] , then [END] .

The ADJUST Menu will appear.

6 Click [MBS] .

The MBS Menu will appear.

7 Click the "1.MBS LEVEL" edit box.

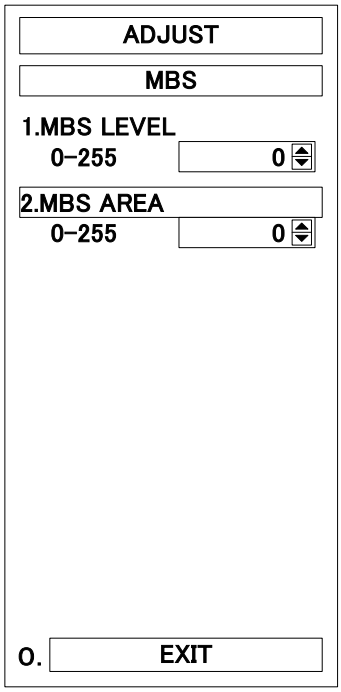
[1.MBS LEVEL] will be selected.

8 Enter any value to adjust the suppression range using 0 to 9 or [+] and [-] , and press [END] to set it up.

9 Click "2.MBS AREA" edit box in the state of step 5.

[2.MBS AREA] will be selected.

10 Enter any value to adjust the suppression level using 0 to 9 or [+] and [-], and press [END] to set it up.



EXIT

1 Click [EXIT].

The ADJUST Menu will reappear.

2 Click [EXIT].

The ADJUST Menu will be closed.

3 Click [EXIT].

The CODE INPUT Menu will be closed.

4 Click [EXIT].

The MAIN Menu will be closed.

8

8.6 SETTING

True Bearing Setting

Adjust the bearing that the bearing angle of the radar is the same as that of the gyro.

Procedures

1 Click MENU on the screen.

Or press OPTION2 key.

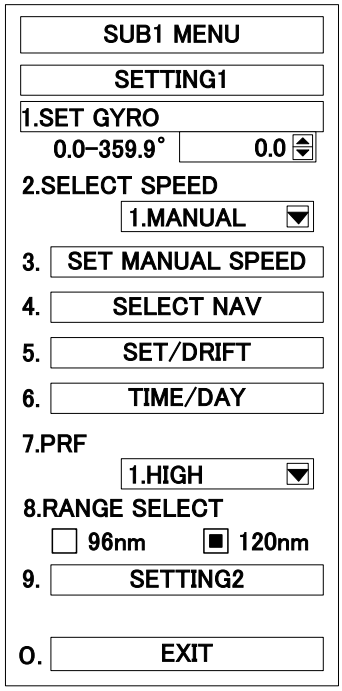
The MAIN Menu will appear.

2 Click SUB1 MENU , then SETTING1 .

The SETTING1 Menu will appear.

3 Click in the "GYRO SETTING" edit box.

The GYRO SETTING edit box will be selected.



4 Enter any value using 0 to 9 or + and - to adjust the radar bearing to the gyro bearing, and press END to set it up.

EXIT

1 Click EXIT.

The SUB1 Menu will reappear.

2 Click EXIT.

The SUB1 Menu will be closed.

3 Click EXIT.

The MAIN Menu will be closed.

8

Ship Speed Setting

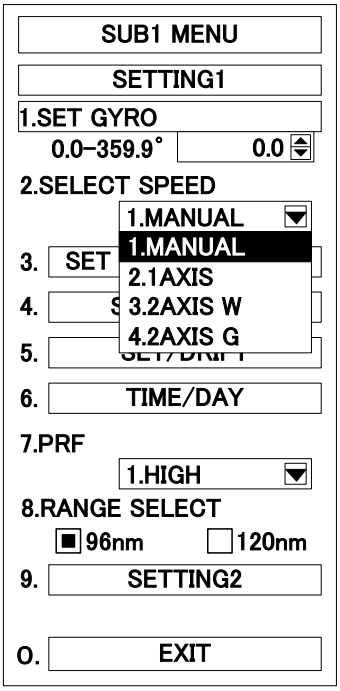
The ship's speed and various other related values, and manual speed can be set.

Procedures

1 Click MENU on the screen.

Or press OPTION2 key.

The MAIN Menu will appear.



2 Click SUB1 MENU , then SETTING1 .

The SETTING1 Menu will appear.

3 Click the "2.SELECT SPEED" edit box.

The SPEED edit box will be selected.

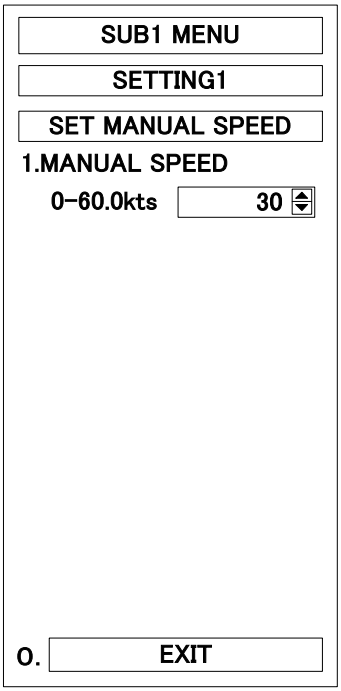
4-1 Manual Speed Setting

(1) Click MANUAL .

1.MANUAL will be set.

(2) Click SET MANUAL SPEED after step 2 above is completed.

The SET MANUAL SPEED Menu will appear.



(3) Click the "1.MANUAL SPEED" edit box.

The numeric input dialogue box is opened.

(4) Press any of 0 to 9 or + and - and press END.

The speed (max. 100.0 kts) will be set.

Note: The manually entered speed is effective only when MANUAL is set in SELECT SPEED.

4-2 LOG Setting

(1) Click 1AXIS for 1-axis log.

2.1AXIS will be set.

4-3 Selection of Data against Water for 2-axis Log (NMEA Signal)

(1) Click 2AXIS W .

3.2AXIS W will be set.

4-3 Selection of Data against Ground for 2-axis Log (NMEA Signal)

(1) Click 2AXIS G .

4.2AXIS G will be set.

Attention

- The speed data cannot be selected when the sentence VBW of NMEA0183 is not entered.

EXIT

1 Click EXIT.

The SUB1 Menu will reappear.

2 Click EXIT.

The SUB1 Menu will be closed.

3 Click EXIT.

The MAIN Menu will be closed.

Navigation Equipment Setting

The data from the navigation equipment such as GPS will be selected.

Procedures

1 Click MENU on the screen.

Or press OPTION2 key.

The MAIN Menu will appear.

2 Click SUB1 MENU , then SETTING1 .

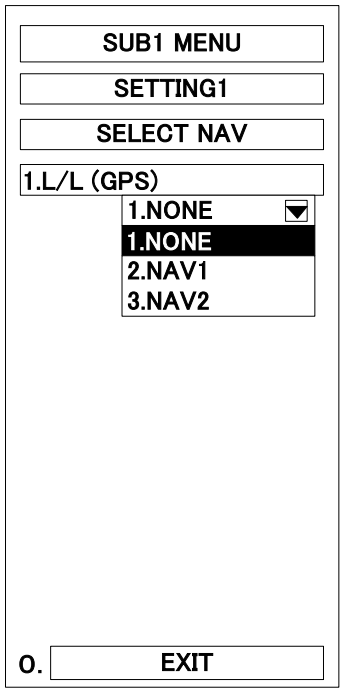
The SETTING1 Menu will appear.

3 Click SELECT NAV.

The SELECT NAV Menu will appear.

4 Click the "1.L/L (GPS)"edit box.

The "1.L/L (GPS)" edit box will be selected.



- When using no navigation equipment -

5-1 Select and set "NONE" by clicking .

- When using navigation equipment 1 -

5-2 Select and set "NAV1" by clicking .

- When using navigation equipment 1 -

5-3 Select and set "NAV2" by clicking .

EXIT

1 Click EXIT.

The PORT Menu will be closed.

2 Click EXIT.

The SETTING Menu will be closed.

3 Click EXIT.

The MAIN Menu will be closed.

Current Correction (SET/DRIFT) Setting

The current set and drift will be set.

Attention

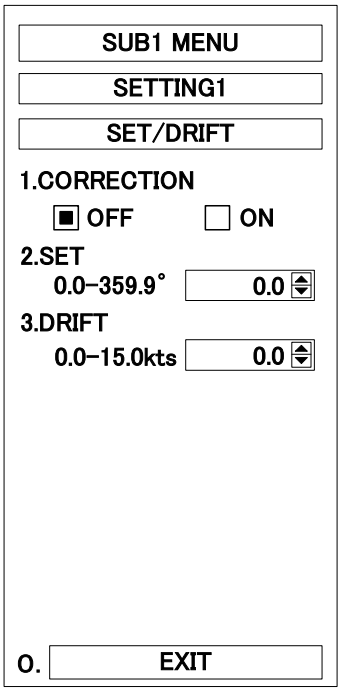
- Setting with this function is valid only when MANUAL or 1AXIS is selected for ship's speed setting (SPEED).

Procedures

1 Click MENU on the screen.

Or press OPTION2 key.

The MAIN Menu will appear.



2 Click SUB1 MENU, then STTING1 .

The STTING1 Menu will appear.

3 Click SET/DRIFT .

The SET/DRIFT Menu will appear.

4 Click "1.CORRECTION" to "ON" .

"ON" in "1.CORRECTION" will be set to operate the current correction mode.
If the current correction mode is not operated, press "1.CORRECTION"to set it to "OFF".

5 Set "1.CORRECTION" to "ON" and click the "2.SET" edit box.

The numeric input dialogue box will be opened.

6 Enter any angle of the current set using 0 to 9 or + and - , and press END to set it up.

The current set will be set.

7 Set "1.CORRECTION" to "ON" and click the "3.DRIFT" edit box.

The numeric input dialogue box will be opened

8 Enter any angle of the current set using 0 to 9 or [+] or [-] , and press [END] to set it up.

The current drift will be set.

EXIT

1 Click [EXIT].

The PORT Menu will be closed.

2 Click [EXIT].

The SETTING Menu will be closed.

3 Click [EXIT].

The MAIN Menu will be closed.

Time/Day Display Setting

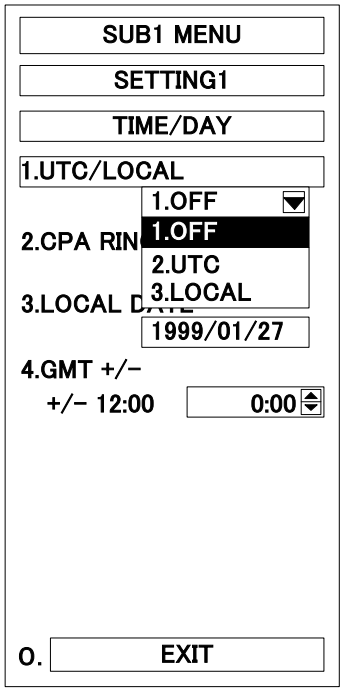
In displaying the time, it is necessary to set the LOCAL TIME, LOCAL DATA and GMT +/-.

Procedures

1 Click MENU on the screen.

Or press OPTION2 key.

The MAIN Menu will appear.



2 Click SUB1 MENU, then STTING1 .

The STTING1 Menu will appear.

3 Click TIME/DAY .

The TIME/DAY Menu will appear.

4 Click "1.UTL/LOCAL" edit box.

The UTL/LOCAL pull-down menu will appear.

- If the time of day is not to be displayed -

5-1 Left-click on "OFF" to select no time display.

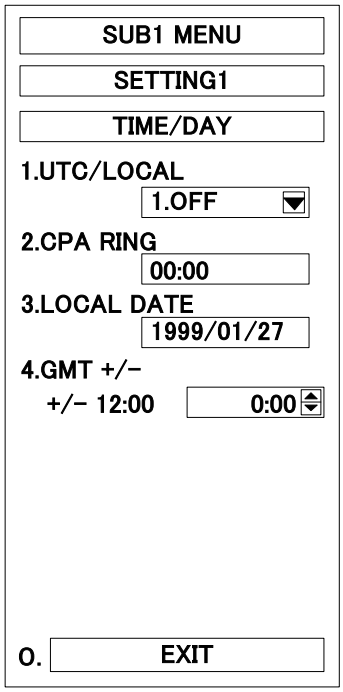
- If UTC (Universal Coordinated Time) is to be displayed -

5-2 Left-click on "UTC" to select UTC display.

- If LOCAL (Location Time) is to be displayed -

5-3 Left-click on "UTC" to select local time display.

1) **Left-click in the "2.LOCAL TIME" edit box.**
   The numeric input dialogue box will be opened.
2) **Enter any local time using 0 to 9 and press END to set it up.**
   The LOCAL TIME will be set.
3) **Left-click in the "3.LOCAL DATE" edit box.**
   The numeric input dialogue box will be opened.
4) **Enter any local date sing 0 to 9 and press END to set it up.**
   The LOCAL DATE will be set.
5) **Left-click in the "4.GMT + / -" edit box.**
   The numeric input dialogue box will be opened.



8

6) **Enter the time difference between the local time and the UTC using [+] and [-] , and press [END] to set it up.**
The "GMT + / -" will be set.

EXIT

1 Click [EXIT].

The TIME/DATE Menu will be closed.

2 Click [EXIT].

The SETTING Menu will be closed.

3 Click [EXIT].

The MAIN Menu will be closed.

Attention

- Time correction is not available when the "ZDA" sentence of NMEA0183 is not received.

Adjustment of Performance Monitor (NJU-63/64)

Procedures

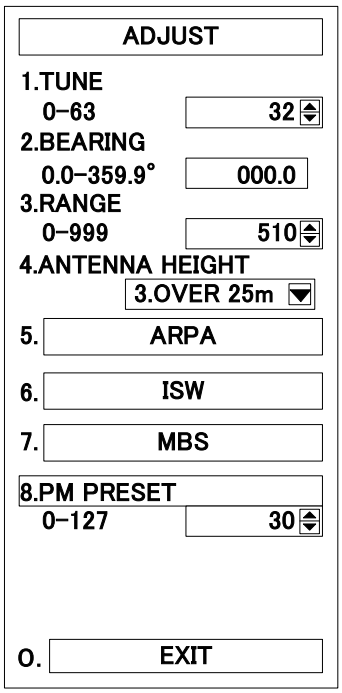
1 Set the radar to Master Radar when the Interswitch is installed.

2 Press VRM1 to display VRM1 and set the range of VRM1 to 10-18* NM.

* Set the range to 12 to 18 NM when a waveguide is installed between the scanner unit and the transmitter-receiver unit. (X band radar)

* Set the range to 12 to 18 NM when the transceiver unit is incorporated in the scanner unit or in case of operating the S band radar.

3 Open the ADJUST Menu as directed in Section 8.5, Adjustments.



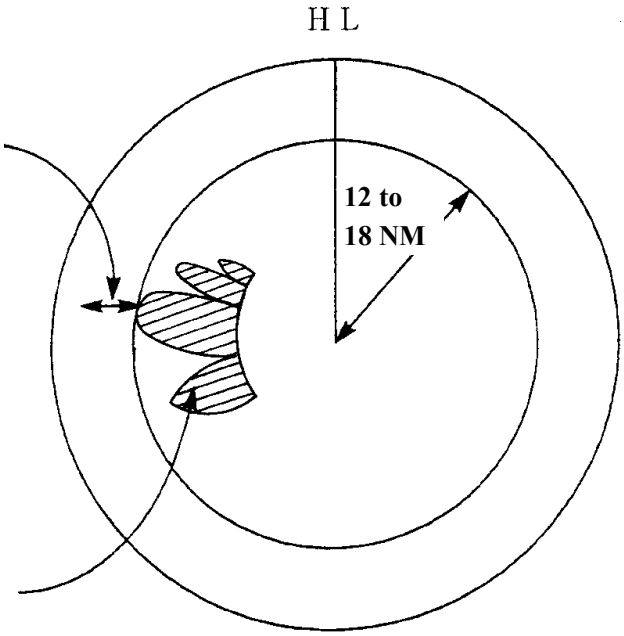
4 Left-click on PM PRESET.

The PM PRESET Menu will appear. The radar will automatically be set to RM, OFF CNTER OFF, IR OFF, PROCESS OFF, TGT ENH OFF, FUNCTION OFF and 24 NM range.

5 Affix the INFORMATION LABEL as supplied with the Performance Monitor to a suitable position of the board side of the Display Unit.

6 Write down the value of the "PM" indicator in the TEST Menu and the date of checking in the INFORMATION LABEL.

Adjust the PM pattern using the ten-key or [+] and [-] so that its outer edge is within 12 to 18 NM. (See step 2)



PM Pattern

EXIT **1 Click EXIT.**

The PM PRESET Menu will be closed and the display will return to the status existing before the tests were conducted.

Note:
- **All target acquisitions by ARPA functions will be cancelled.**
  The target acquisition cancelled when PM is ON will not be recovered.
- **The radar image is suppressed to make the PM image easier to see.**
  Therefore, the ADJUST MENU should be always opened after PM check is completed.

Adjustment of Inter switch

[Checking after Installation]

Turn off the ship's mains (switch board) for the radar equipment.

(1) Check that the Interswitch is installed properly after completion of the installation.
In particular, check if the cable is connected correctly and if the shield meshwork of the cable is grounded properly.

(2) Check that the internal settings in each Display Unit are made adequately.

[Checking the Interswitch Operation]

Turn on the ship's mains (switch board) for the radar equipment.

(1) Checking Interswitch Patterns.
6 interswitch patterns are available for 2-ynits of radar system, and 12 interswitch patterns are available for 3-units of radar system.
For the checking procedures, refer to the Instruction Manual for Interswitch Kit as attached hereto.

(2) Checking and adjusting Radar Video
The radar system with the built-in interswitch kit shall be adjusted in the following three parameters:
- Range adjustment (0 NM adjustment)
- Bearing adjustment
- Rough tuning adjustment

These types of adjustment shall be made for each interswitch pattern as follows:
2-units system ・・・・・・・ No.1 and No.2
3-units system ・・・・・・・ No.1 , No.2 , No.3 and No.12 .
For the method of adjustment, refer to the respective adjustment procedures.

Note: Each adjustment should be performed swiftly after the interswitch is equipped. These adjustments should be performed on the patterns specified according to the radar quantity of the system.
If the patterns are switched without adjustments and the radar is used, accurate information cannot be obtained from the radar.

2-units System

a. Pattern No.1
① Adjustment between the Display Unit (right) and the MTR (right). (Adjust by operating the panel of the Display Unit (right))
② Adjustment between the Display Unit (left) and the MTR (left). (Adjust by operating the panel of the Display Unit (left))

b. Pattern No.2
① Adjustment between the Display Unit (right) and the MTR (left). (Adjust by operating the panel of the Display Unit (right))
② Adjustment between the Display Unit (left) and the MTR (right). (Adjust by operating the panel of the Display Unit (left))

3-units System

a. Pattern No.1

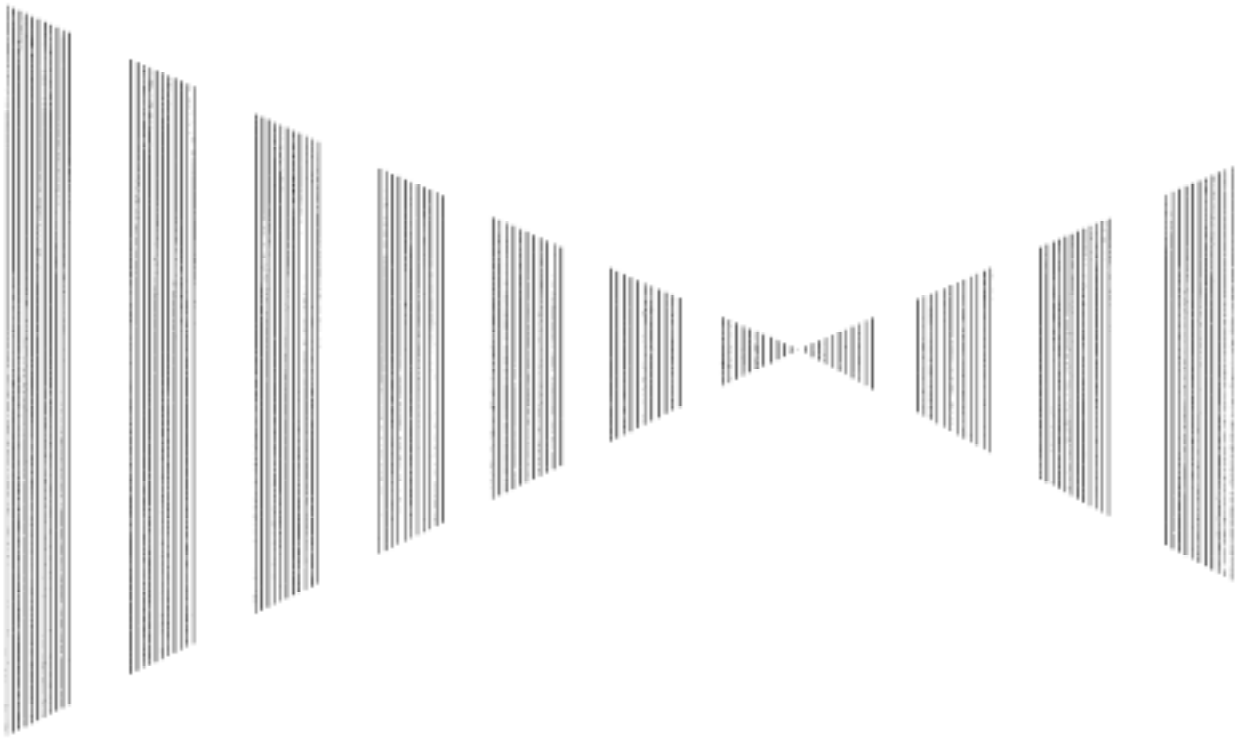
① Adjustment between the Display Unit (center) and the MTR (center). (Adjust by operating the panel of the Display Unit (center))
② Adjustment between the Display Unit (left) and the MTR (left). (Adjust by operating the panel of the Display Unit (left))
③ Adjustment between the Display Unit (right) and the MTR (right). (Adjust by operating the panel of the Display Unit (right))

b. Pattern No.2
① Adjustment between the Display Unit (center) and the MTR (left). (Adjust by operating the panel of the Display Unit (center))
② Adjustment between the Display Unit (left) and the MTR (center). (Adjust by operating the panel of the Display Unit (left))
③ Adjustment between the Display Unit (right) and the MTR (right). (Unnecessory adjustment)

c. Pattern No.3
① Adjustment between the Display Unit (center) and the MTR (right). (Adjust by operating the panel of the Display Unit (center))
② Adjustment between the Display Unit (left) and the MTR (left). (Unnecessory adjustment)
③ Adjustment between the Display Unit (right) and the MTR (center). (Adjust by operating the panel of the Display Unit (right))

d. Pattern No.12
① Adjustment between the Display Unit (center) and the MTR (center). (Unnecessory adjustment)
② Adjustment between the Display Unit (left) and the MTR (right). (Adjust by operating the panel of the display Unit (left))
③ Adjustment between the Display Unit (right) and the MTR (left). (Adjust by operating the panel of the Display Unit (right))

SECTION 9
AFTER-SALES SERVICE



When you Request for Repair

If you suppose the product may be out of order, read the description in Section8 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 change. In case that any failure is caused due to misuse, faulty operation, negligence or force major such as natural disaster and fine, the product will be repaired with charges.

- Repair after the Warranty Period

  It 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 9-2
  - ☆ Name of company/organization address and telephone number

Recommended Maintenance

The performance of the product may deteriorate due to the secular change of the parts used in it, though such deterioration depends upon the conditions of operation.
So checkup and maintenance is recommendable for the product in addition to your daily care.
For maintenance, consult with the near-by dealer or our sales department.
Such maintenance will be made with changes.

9

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

Radar Failure Check List

When placing an order for repair of the product, it is requested that you could confirm the check items and fill the results and sent the sheet to our contact.
If there is any unclear items, contact the ship on which the product is installed, and give the correct information on the product.

Ship name: _____ Phone: _____ Fax: _____
Radar general model name: JMA-_____ Serial No. : _____
(Write the full model name correctly)

(1) Check the following items in the order of the number, and circle the applicable answer between YES or NO. If the item cannot be determined as YES or NO, explain in detail in the item (18), others.
(2) If any of the items (1) to (5) if marked as NO, check the fuse of the product (refer to Section 8.2 and 8.3).
(3) Check the items (4) to (17) while the transmission (TX) in ON.

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

No.	Check Item	Result	
(1)	Power can be turn on. (The lamp on the operation panel 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), the LCD displays something (LCD is lit).	YES	NO
(4)	The scanner rotates at the transmission (TX) ON. (Check the following items while transmission is ON)	YES	NO
(5)	Current is supplied to the magnetron. (Refer to the instruction manual)	YES	NO
(6)	Tuning 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 STC and FTC 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)	ARPA works normally.	YES	NO
* (17)	If wquipped with an interswitch, when switching from the straight mode (| |) to (×), the failures (items marked NO) in the ablve (1) to (16), are switched over to the other unit.	YES	NO

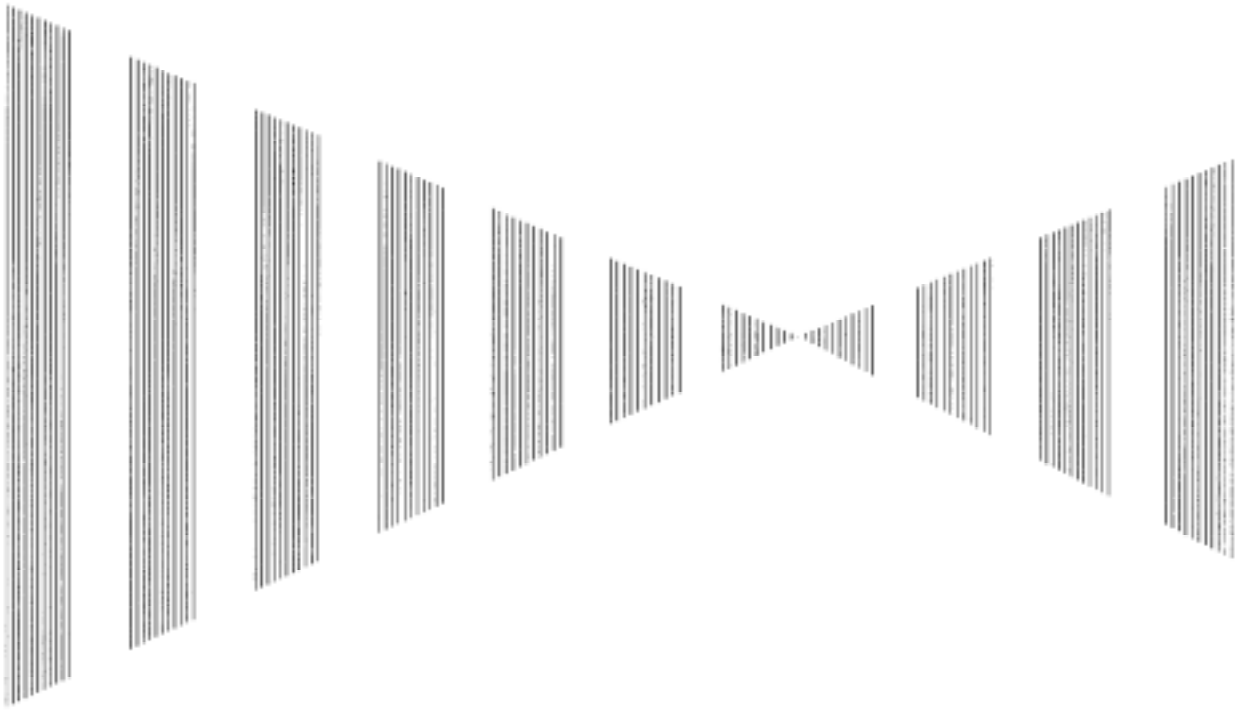
(18) Others (Error message, etc.) _____

_____

_____

9

SECTION 10
DISPOSAL



10.1 DISPOSAL OF THE UNIT

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

10.2 DISPOSAL OF USE BUTTERIES

⚠ WARNING

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

In this unit, lithium batteries are used for the following parts:
Indication control board（CMC-1218）: BT1(Maxell:CR2032）

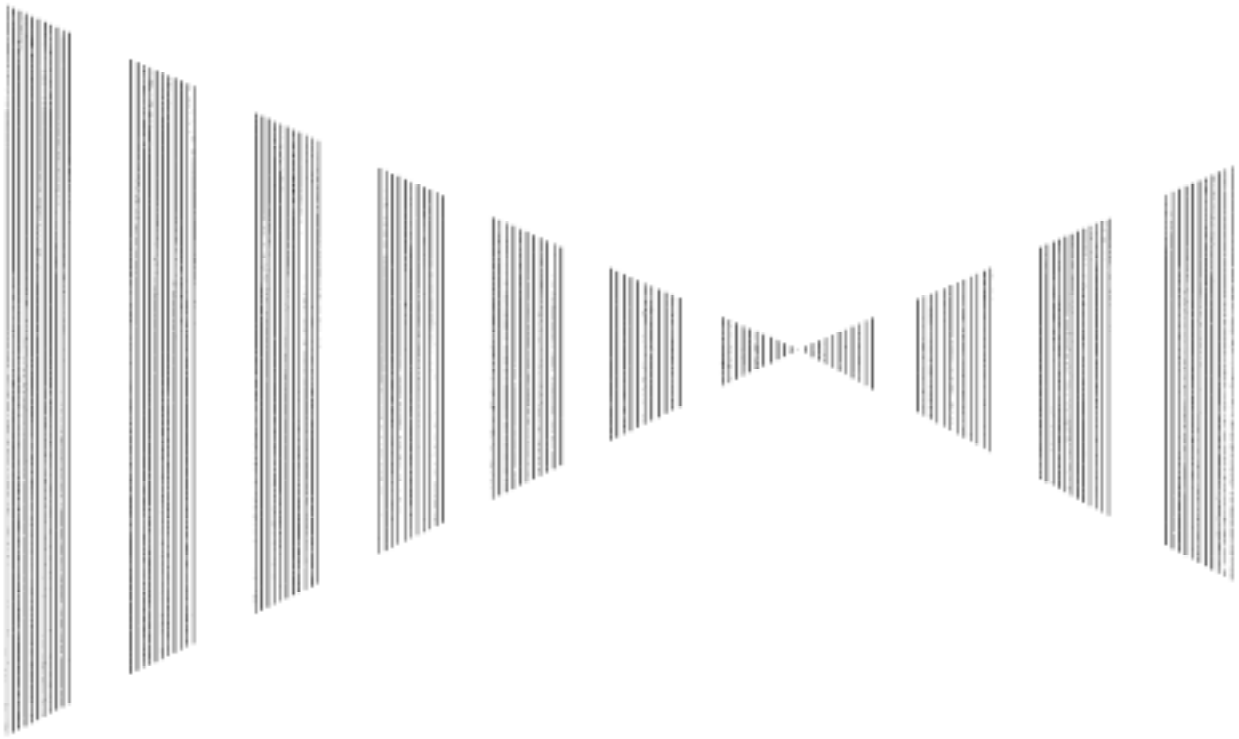
- Do not store used lithium batteries but dispose of them as non-combustible waste.
- When disposing of used lithium batteries, be sure to insulate the batteries by taping the + and - terminals.
  For disposal of batteries, be sure to follow the local laws and regulation.
  For detail, consult with the dealer you purchased the product our business office, or local government.

10.3 DISPOSAL OF USED MAGNETRON

Magnetron is used in the Scanner (NKE-1079/1089) and the Transmitter-receiver unit (NGT-3037/3037A/3028) of the unit.

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

SECTION 11
SPECIFICATIONS



SPECIFICATIONS

11.1 JMA-9933-SA TYPE RADAR

■ General Specification

(1)	Type of Emission	: P0N
(2)	Display	: Color Raster Scan
(3)	Screen	: 23.1-inch Color LCD (Effective Diameter, more than 340mm)
(4)	Range scale	: 0.125,0.25,0.5,0.75,1.5,3,6,12,24,48 and 96 (or 120) NM
(5)	Range Resolution	: Less than 30m
(6)	Minimum Detective Range	: Less than 40m
(7)	Bearing Accuracy	: Less than 1°
(8)	Bearing Indication	: North-up / Head-up / Course-up
(9)	Ambient Condition	: Temperature Scanner −25℃ to +55℃ (Storage Temperature−25℃ to +70℃) Other Units expect Scanner−25℃ to +55℃ Relative Humidity 93% at +40℃
(10)	Vibration	: 2 to 13.2Hz amplitude ±1mm±10% 13.2 to 100Hz,max.accelaration 7m/s^2 constant
(11)	Power Supply Input	: Scanner AC220V,60Hz,3φ AC110/220V, 60Hz,1φ
(12)	Power Consumption	: Approx.800VA
(13)	Power Supply Input Voltage Fluctuation	: Input Voltage ±10% (at the maximum cable length)
(14)	Pre-heating Time	: Within 4 min
(15)	From Standby up to Operation	: Within 15 sec

■ Scanner (NKE-1079) See 11.5

■ Transmitter-receiver (NTG-3037) See 11.9

■ Display (NCD-4263) See 11.11

■ Performance Monitor (NJU-63) See 11.13

■ Option

(1)	Scanner with Deicing Heater	: NKE-1079-D (only heater collar)
(2)	Radar Interswitch	: NQE-3141-2/4
(3)	Display Unit (Desktop Type)	: NCD-4263T

■ Distance between Units Maximum Distance

(1) Scanner to Transmitter-receiver : 30m
(2) Display to Transmitter-receiver : 35m

■ Compass Safety Distance Standard
(1) Scanner : 1.4m
(2) Transmitter-receiver : 2.8m
(3) Display : 3.2m

11.2 JMA-9932-SA TYPE RADAR

■ General Specification

(1) Type of Emission : P0N
(2) Display : Color Raster Scan
(3) Screen : 23.1-inch Color LCD
(Effective Diameter, more than 340mm)
(4) Range scale : 0.125,0.25,0.5,0.75,1.5,3,6,12,24,48
and 96 (or 120) NM
(5) Range Resolution : Less than 30m
(6) Minimum Detective Range : Less than 40m
(7) Bearing Accuracy : Less than 1°
(8) Bearing Indication : North-up / Head-up / Course-up
(9) Ambient Condition : Temperature
Scanner −25℃ to +55℃
(Storage Temperature −25℃ to +70℃)
Other Units expect Scanner−15℃ to +55℃
Relative Humidity 93% at +40℃
(10) Vibration : 2 to 13.2Hz amplitude ±1mm±10%
13.2 to 100Hz,max.accelaration 7m/s^2
constant
(11) Power Supply Input : Scanner AC220/230V,60Hz,3φ
AC100/110/220/230V,60Hz,1φ
(12) Power Consumption : Approx.800VA
(13) Power Supply Input
Voltage Fluctuation : Input Voltage ±10%
(at the maximum cable length)
(14) Pre-heating Time : Within 4 min
(15) From Standby
up to Operation : Within 15 sec

■ Scanner (NKE-1075A) See 11.6

■ Display (NCD-4263) See 11.11

■ Performance Monitor (NJU-63) See 11.13

■ Option
(1) Scanner with Deicing Heater : NKE-1075A-D (only heater collar)

(2) Radar Interswitch : NQE-3141-2/4
(3) Display Unit (Desktop Type) : NCD-4263T

■ Distance between Units Maximum Distance
(1) Scanner - Display : 65m

■ Compass Safety Distance Standard
(1) Scanner : 1.4m
(2) Display : 3.2m

11.3 JMA-9923-7XA/9XA TYPE RADAR

■ General Specification
(1) Type of Emission : P0N
(2) Display : Color Raster Scan
(3) Screen : 23.1-inch Color LCD
(Effective Diameter, more than 340mm)
(4) Range Scale : 0.125,0.25,0.5,0.75,1.5,3,6,12,24,48
and 96 (or 120) NM
(5) Range Resolution : Less than 30m
(6) Minimum
Detective Range : Less than 40m
(7) Bearing Accuracy : Less than 1°
(8) Bearing Indication : North-up / Head-up / Course-up
(9) Ambient Condition : Temperature
Scanner −25℃ to +55℃
(Storage Temperature −25℃ to +70℃)
Other Units expect Scanner −15℃ to +55℃
Relative Humidity 93% at +40℃
(10) Vibration : 2 to 13.2Hz amplitude ±1mm±10%
13.2 to 100Hz,max.accelaration 7m/s^2
constant
(11) Power Supply Input : Scanner AC220/230V,60Hz,3φ
AC100/110/220/230V,60Hz,1φ
(12) Power Consumption : Approx.600VA

(13) Power Supply Input
Voltage Fluctuation : Input Voltage±10%
(at the maximum cable length)
(14) Pre-heating Time : Within 4 min
(15) From Standby
up to Operation : Within 15 sec

■ Scanner (NKE-1089-7/9) See 11.6

■ Transmitter-receiver (NTG-3028) See 11.10

■ Display (NCD-4263) See 11.11

■ Performance Monitor (NJU-64) See 11.13

■ Option

(1) Scanner with Deicing Heater : NKE-1089-7D/9D (only heater coller)
(2) Radar Interswitch : NQE-3141-2 / 4
(3) Display Unit (Desktop Type) : NCD-4263T

■ Distance between Units Maximum Distance

(1) Scanner to Transmitter-receiver : 30m
(2) Display to Transmitter-receiver : 35m

■ Compass Safety Distance Standard

(1) Scanner : 1.4m
(2) Transmitter-receiver : 2.8m
(3) Display : 3.2m

11.4 JMA-9922-6XA/9XA TYPE RADAR

■ General Specification

(1) Type of Emission : P0N
(2) Display : Color Raster Scan
(3) Screen : 23.1-inch Color LCD
(Effective Diameter, more than 340mm)
(4) Range Scale : 0.125,0.25,0.5,0.75,1.5,3,6,12,24,48
and 96 (or 120) NM
(5) Range Resolution : Less than 30m
(6) Minimum
Detective Range : Less than 40m
(7) Bearing Accuracy : Less than 1°
(8) Bearing Indication : North-up / Head-up / Course-up
(9) Ambient Condition : Temperature
Scanner −25℃ to +55℃
(Storage Temperature −25℃ to +70℃)
Other Units expect Scanner −15℃ to +55℃
Relative Humidity 93% at +40℃
(10) Vibration : 2 to 13.2Hz amplitude ±1mm±10%
13.2 to 100Hz,max.accelaration 7m/s^2
constant
(11) Power Supply Input : Scanner AC220/230V,60Hz,3φ
AC100/110/220/230V, 60Hz, 1φ
(12) Power Consumption : Approx.600VA
(13) Power Supply Input
Voltage Fluctuation : Input Voltage±10%
(at the maximum cable length)
(14) Pre-heating Time : Within 4 min
(15) From Standby

up to Operation : Within 15 sec

■ Scanner (NKE-1087-6/9) See 11.6

■ Display (NCD-4263) See 11.11

■ Performance Monitor (NJU-64) See 11.13

■ Option

(1) Scanner with Deicing Heater : NKE-1087-6D/9D (only heater coller)
(2) Radar Interswitch : NQE-3141-2 / 4
(3) Display Unit (Desktop Type) : NCD-4263T

■ Distance between Units Maximum Distance

(1) Scanner Display : 65m

■ Compass Safety Distance Standard

(1) Scanner : 2.4m
(2) Display : 3.2m

11.5 SCANNER (NKE-1079)

(1) Dimensions : Height 837×Swing Circle 4000 (mm)
(2) Mass : Approx. 142kg
(3) Polarization : Horizontal Polarization
(4) Directional Characteristic : Horizontal Beam Width 1.9°(-3dB width)
Vertical Beam Width 30°(-3dB width)
Sidelobe Level Below -26dB (Within ±10°)
Below -30dB (Outside ±10°)
(5) Revolution : Approx. 26rpm (60Hz)
(6) Drive Motor : 220V AC, 60Hz, 3φ
AC110/220V , 60Hz, 1φ
(7) Wind Velocity : Relative Wind Velocity 51.5m/s (100 knots)

11.6 SCANNER (NKE-1075A)

(1) Dimensions : Height 581 × Swing Circle 4000 (mm)
(2) Mass : Approx. 163kg
(3) Polarization : Horizontal Polarization
(4) Directional Characteristic : Horizontal Beam Width 1.9°(-3dB width)
Vertical Beam Width 30°(-3dB width)
Sidelobe Level Below -26dB (Within ±10°)
Below -30dB (Outside ±10°)
(5) Revolution : Approx. 26 rpm (60Hz)
(6) Drive Motor : AC220/230V, 60Hz,3φ

AC100/110/220/230V , 60Hz, 1φ

(7) Wind Velocity : Relative Wind Velocity 51.5m/s (100knots)

(8) Transmitting Frequency : 3050±10MHz

(9) Peak Power : 30kW

(10) Transmitting Tube : Magnetron [M1302]

(11) Pulse Width / Repeatition Frequency :

0.07μs/1900Hz		(0.125,0.25,0.5NM)
0.07μs/1900Hz	(0.75NM)	By change over
0.15μs/1900Hz		SP switch
0.1 μs/1900Hz		
0.2 μs/1900Hz	(1.5NM)	By change over
0.3 μs/1900Hz		SP switch
0.2 μs/1900Hz		
0.3 μs/1900Hz	(3NM)	By change over
0.6 μs/1100Hz		SP switch
0.6 μs/1100Hz	(6,12NM)	By change over
1.2 μs/570Hz		SP switch
1.2 μs/570Hz	(24,48,96,120NM)	

(12) Modulation : Solid States Modulator Circuit

(13) Duplexer : Circulator + TRHPL

(14) Front End Module : Built-in

(15) Intermediate Frequency Amplifier : Intermediate Frequency : 60MHz
Band Width : 20/6/3MHz
Gain : More than 90dB
Amplifying Characteristics : Logarithmic Amplifier

(16) Overall Noise Figure : 7.5dB (Average)

(17) Tuning : Manual/Auto

11.7 SCANNER (NKE-1089-7/9)

(1) Dimensions : 7ft Height 536×Swing Circle 2270 (mm)
9ft Height 536×Swing Circle 2825 (mm)

(2) Mass : 7ft Approx. 43kg
9ft Approx. 46kg

(3) Polarization : Horizontal Polarization

(4) Directional Characteristic : Horizontal Beam Width 7ft 1°(-3dB width)
9ft 0.8°(-3dB width)
Vertical Beam Width 20°(-3dB width)
Sidelobe Level Below -26dB (within ±10°)
Below -30dB (Outside±10°)

(5) Revolution : Approx. 26rpm (60Hz)

(6) Drive Motor : 7ft AC 220/230V, 60Hz, 3φ
AC100/110V / 220/230V ,60Hz, 1φ
9ft AC220/230V ,60Hz, 3φ
AC100/110V / 220/230V ,60Hz, 1φ

(7) Wind Velocity : Velocity 51.5m/s (100knots)

11.8 SCANNER（NKE-1087-6/9）

(1) Dimensions : 6ft Height 536 × Swing Circle 1910(mm)
9ft Height 536 × Swing Circle 2825(mm)

(2) Mass : 6ft Approx. 48kg
9ft Approx. 52kg

(3) Polarization : Horizontal Polarization

(4) Directional Characteristic : Horizontal Beam Width 6ft 1.2°(-3dB width)
9ft 0.8°(-3dB width)
Vertical Beam Width 20°(-3dB width)
Sidelobe Level Below -26dB (within ±10°)
Below -30dB (Outside±10°)

(5) Revolution : Approx. 26rpm (60Hz)

(6) Drive Motor : 6ft AC220/230V ,60Hz, 3φ
AC100/110V / 220/230V,60Hz, 1φ
9ft AC220/230V,60Hz, 3φ
AC100/110V / 220/230V, 60Hz, 1φ

(7) Wind Velocity : Velocity 51.5m/s (100knots)

(8) Transmitting Frequency : 9410±30MHz

(9) Peak Power : 25kW

(10) Transmitting Tube : Magnetron [M1568B(J)]

(11) Pulse Width / Repeatition Frequency :

0.07μs/1900Hz	(0.125,0.25,0.5NM)	
0.07μs/1900Hz	(0.75NM)	By change over SP switch
0.15μs/1900Hz		
0.1 μs/1900Hz		
0.2 μs/1900Hz	(1.5NM)	By change over SP switch
0.3 μs/1900Hz		
0.2 μs/1900Hz		
0.3 μs/1900Hz	(3NM)	By change over SP switch
0.6 μs/1100Hz		
0.6 μs/1100Hz	(6,12NM)	By change over SP switch
1.2 μs/570Hz		
1.2 μs/570Hz	(24,48,96,120NM)	

(12) Modulation : Solid States Modulator Circuit

(13) Duplexer : Circulator + Diode Limiter

(14) Front End Module : Built-in

(15) Intermediate Frequency Amplifier : Intermediate Frequency：60MHz
Band Width：20/6/3MHz
Gain：More than 90dB
Amplifying Characteristics：Logarithmic Amplifier

(16) Overall Noise Figure : 7.5dB (Average)
(17) Tuning : Manual/Auto

11.9 TRANSMITTER-RECEIVER UNIT（NTG-3037）

(1) Dimensions : Height 615 × Width 615 × Depth 365 (mm)
(2) Structure : Wall Mount Drip Proof
(3) Mass : Approx. 35kg
(4) Transmitting Frequency : 3050±10MHz
(5) Peak Power : 30kW
(6) Transmitting Tube : Magnetron［M1302］
(7) Pulse Width / Repeatition Frequency :

0.07μs/1900Hz		(0.125,0.25,0.5NM)
0.07μs/1900Hz	(0.75NM)	By change over
0.15μs/1900Hz		⎍SP switch
0.1 μs/1900Hz		
0.2 μs/1900Hz	(1.5NM)	By change over
0.3 μs/1900Hz		⎍SP switch
0.2 μs/1900Hz		
0.3 μs/1900Hz	(3NM)	By change over
0.6 μs/1100Hz		⎍SP switch
0.6 μs/1100Hz	(6,12NM)	By change over
1.2 μs/570Hz		⎍SP switch
1.2 μs/570Hz		(24,48,96,120NM)

(8) Modulation : Solid States Modulator Circuit
(9) Duplexer : Circulator + TRHPL
(10) Front End Module : Built-in
(11) Intermediate Frequency Amplifier : Intermediate Frequency：60MHz
Band Width：20/6/3MHz
Gain：More than 90dB
Amplifying Characteristics：Logarithmic Amplifier
(12) Overall Noise Figure : 7.5dB (Average)
(13) Tuning : Manual/Auto

11.10 TRANSMITTER-RECEIVER UNIT（NTG-3028）

(1)	Dimensions	：Height 461 × Width 460 × Depth 227 (mm)
(2)	Structure	：Wall Mount Drip Proof
(3)	Mass	：Approx. 19kg
(4)	Transmitting Frequency	：9410±30MHz
(5)	Peak Power	：25kW
(6)	Transmitting Tube	：Magnetron［M1568B(J)］
(7)	Pulse Width / Repeatition Frequency	：0.07μs/1900Hz （0.125,0.25,0.5NM）

0.07μs/1900Hz
0.15μs/1900Hz
（0.75NM） By change over SP switch

0.1 μs/1900Hz
0.2 μs/1900Hz
0.3 μs/1900Hz
(1.5NM) By change over SP switch

0.2 μs/1900Hz
0.3 μs/1900Hz
0.6 μs/1100Hz
(3NM) By change over SP switch

0.6 μs/1100Hz
1.2 μs/570Hz
(6,12NM) By change over SP switch

1.2 μs/570Hz (24,48,96,120NM)

(8)	Modulation	：Solid States Modulation circuit
(9)	Duplexer	：Circulator + TRHPL
(10)	Front End Module	：Built-in
(11)	Intermediate Frequency Amplifier	：Intermediate Frequency：60MHz Band Width：20/6/3MHz Gain：More than 90dB Amplifying Characteristics：Logarithmic Amplifier
(12)	Overall Noise Figure	：7.5dB (Average)
(13)	Tuning	：Manual/Auto

11.11 DISPLAY UNIT（NCD-4263）

(1)	Dimension	: Height 1100 × Width 703 × Depth 1052 (mm)
(2)	Structure	: Self-Standing Drip Proof
(3)	Mass	: Approx. 150kg
(4)	Display	: 23.1-inch Color LCD (Effective Diameter, more than 340mm)
(5)	Range Scale	: 0.125,0.25,0.5,0.75,1.5,3,6,12,24,48, and 96 (or 120) NM
(6)	Range Marker	: 0.025,0.05,0.1,0.25,0.5,1,2,4,8,and 16(or 20) NM
(7)	Range Accuracy	: Less than 1% of the maximum distance of the range scale in use or 30m whichever is larger
(8)	Variable Rage Markers	: 2(VRM1 / VRM2)
(9)	VRM Scale	: 0.00 - 96.0(or 120.0) NM, Numerical indication in 4 digits
(10)	Bearing Marker	: 360°in 1°steps
(11)	Off Center	: Within 60% of the radius of any range except 96 NM and 120NM
(12)	Trackball Cursor	: Built-in (Target range, Relative / True bearing presentation)
(13)	Electronic Bearing Lines	: 2 (EBL1 / EBL2) (Center / Independent)
(14)	EBL Bearing Indication	: 0.0°- 359.9°, Numerical indication in 4 digits
(15)	Tuning Indication	: Bar-graph
(16)	Marking Function	: Electronic mark(Max. 20 points
(17)	Heading Line Indication	: Electronic
(18)	True Motion Unit	: Built-in (0.25,0.5,0.75,1.5,3,6,12,24 and 48 NM)
(19)	STC(SEA)	: Manual / Auto
(20)	FTC(RAIN)	: Manual / Auto
(21)	Display Mode	: North-up / head-up / Course-up
(22)	Trails Indication	: 0.5 min / 1 min / 3 min / 6 min / OFF
(23)	Video Process	: Built-in
(24)	Interference Rejection	: Built-in (ON/OFF)
(25)	Guard Zone	: Ring
(26)	Navigation Lines	: Built-in (256 points × 10 types) (only with navigation equipment is connected)
(27)	Self-diagnostic-Function	: Built-in
(28)	Own Ship's Track Indicate	: Built-in (only with navigation equipment is connected)
(29)	Parallel Line Cursor	: Built-in

(30) Interface : Sub display

Loran-C, GPS } IEC61162-1(NMEA0183)

Radar buoy
LOG
GYRO
Radar Interswitch (option)
External Alarm output

(Reference) NMEA0183 Interface

□ Receivable sentence

- BWC
- GGA
- GLL
- RMA
- RMB
- RMC
- VBW
- ZDA
- VTG

□ Priority

(1) Latitude/Longitude : GGA > RMC > RMA > GLL

(2) Waypoint : RMB > BWC

Note : The speed measuring accuracy of speed sensor shall conform to IMO Resolution A.824(19).

11.12 ARPA

(1) Acquisition

- Acquisition Mode : Auto/Manual Acquisition(Targets are acquired within guard zone in the automatic acquisition mode)
- Manual Cancellation of Unwanted Target : Each One Target or All Target at once

(2) Tracking

- Number of Targets : 50 Targets (Auto Tracking)
- Acquisition and Tracking Range : 32 NM

(3) Presentation

- Display Modes : TM (True Motion) / RM (Relative Motion)
- Bearing Modes : North-up / Head-up / Course-up
- Vector Modes : True/Relative Display
  Vector Length : Adjustable from 1 to 60 min
- Past Position Display : True / Relative Display
  Number of Dots : 6 points
  Display Time 30sec, 1 min, 2 min, 4 min
- Time to Display Vector : Within 1 min
- Time to Stabilize Vector : Within 3 min

(4) Alarm

- Guard Zone : 2
- Setting Ranges : Guard Zone 1 (0.5 - 32 NM),
  Guard Zone 2 (0.5 - 32 NM)
- Alarm Indication : □ mark on LCD with Visible / Audible alarm

(5) Safe Limits (CPA/TCPA)

- Setting Condition : CPA LIMIT (0.1 - 9.9 NM)
  TCPA LIMIT (1 - 99 min)
- Alarm Condition :

Safe Target	• CPA>CPA LIMIT • 0>TCPA • TCPA>TCPA LIMIT
Danger Target	• CPA□CPA LIMIT, 0□TCPA□TCPA LIMIT

- Alarm Display :

Status	LCD Symbol	Alarm	Buzzer
Safe Ship	○	OFF	OFF
Danger Ship	□	CPA／TCPA	ON

- Lost Target : ◈ mark on LCD
  Visible / Audible Alarms

(6)	Data Indication	
	• Target Data	: Simultaneous and Continuous Display for 2 targets True Bearing, Range, True Course, True Speed, CPA, TCPA, BCR and BCT
	• Own Ship's Data	: Course and Speed
(7)	Trial Maneuver	Manual Setting
	• Trial Course	: 0°- 360°
	• Trial Speed	: 0 - 100 knots
(8)	Accuracy of Display	: Complied with IMO Technical Requirements
(9)	System Failure Alarm	: Visible / Audible Alarms
(10)	Speed Input	: Manual/Auto(log)

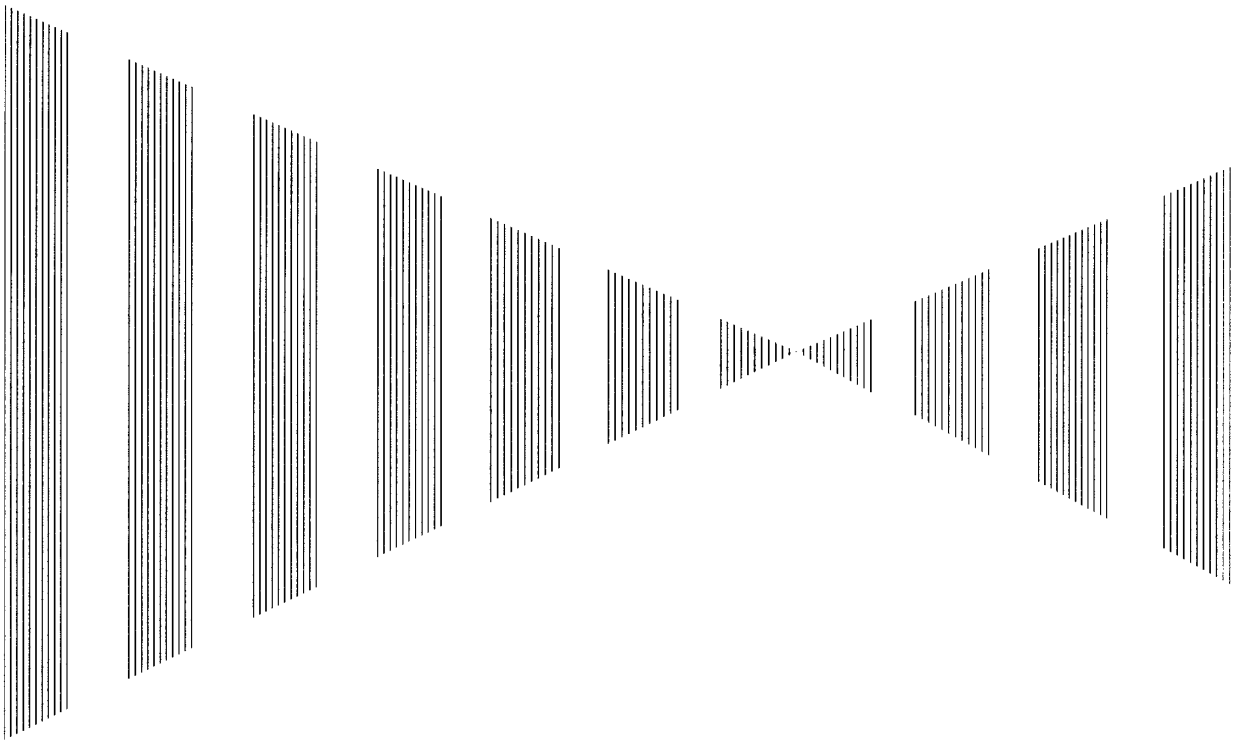
11.13 PERFORMANCE MONITOR（NJU-63）

Dimensions	: Height 56 × Width 150 × Depth 249 (mm)
Mass	: Approx. 1.5kg
Operation Frequency	: 3050±30MHz

11.14 PERFORMANCE MONITOR（NJU-64）

Dimensions	: Height 56 × Width 150 × Depth 215 (mm)
Mass	: Approx. 1.5kg
Operation Frequency	: 9410±30MHz

APPENDIX



APPENDIX

Radar System Composition.....

Table A-1 S band System Composition

Equipment	JMA-9933-SA	JMA-9932-SA
Type of Scanner	NKE-1079(*1)	NKE-1075A(*1)
Type of Performance Monitor	NJU-63	NJU-63
Type of Transmitter-receiver Unit	NTG-3037	------
Type of Modulator Unit	NMA-446	NMA-487
Type of Receiver Unit	NRG-88	NRG-222
Type of Display Unit	NCD-4263(*2)	

*1 NKE-1079-1 (110V AC 60 Hz 1φ)
NKE-1079-2F (220V AC 60 Hz 3φ)
NKE-1079-D (110V AC 60 Hz 1φ)
NKE-1079-2DF (220V AC 60 Hz 3φ) (Option with deicing heater collar)
NKE-1075A-1 (100/110/220/230V AC 60 Hz 1φ)
NKE-1075A-2F (220/230V AC 60 Hz 3φ)
NKE-1075A-D (110/110/220/230V AC 60 Hz 1φ)
NKE-1075A-2DF (220/230V AC 60 Hz 3φ) (Option with deicing heater collar)

*2 NCD-4263 : Self-standing type
NCD-4263T : Desktop type (NWZ-158T: Monitor Unit, NDC-1279T: Control Unit, NCE-7721: Keyboard Unit) (Option)

Note: The ARPA unit have the approbation by the Ministry of Transport Automatic equipment for Prevention of collision JAS-9900.

Table A-2 X band System Composition

Equipment	JMA-9923-7XA	JMA-9923-9XA	JMA-9922-6XA	JMA-9922-9XA
Type of Scanner	NKE-1089-7(*1)	NKE-1089-9(*2)	NKE-1087-6(*3)	NKE-1087-9(*4)
Type of Performance Monitor	NJU-64			
Type of Modulator Unit	NMA-449			
Type of Receiver Unit	NRG-98/154			
Type of Display Unit	NCD-4263(*5)			

*1 NKE-1089-71/72 (7ft 100/110/220/230V AC 60Hz 1φ)
NKE-1089-72F (7ft 220/230V AC 60Hz 3φ)
NKE-1089-71D/72D (7ft 100/110/220/230V AC 60Hz 1φ)
(Option with deicing heater collar)
NKE-1089-72DF (7ft 220/230V AC 60Hz 3φ) (Option with deicing heater collar)

*2 NKE-1089-91/92 (9ft 100/110/220/230V AC 60Hz 1φ)
NKE-1089-92F (9ft 220/230V AC 60Hz 3φ)
NKE-1089-91D/92D (9ft 100/110/220/230V AC 60 Hz 1φ)
(Option with deicing heater collar)
NKE-1089-91DF (9ft 220/230V AC 60Hz 3φ) (Option with deicing heater collar)

*3 NKE-1087-61/62 (6ft 100/110/220/230V AC 60Hz 1φ)
NKE-1087-62F (6ft 220/230V AC 60Hz 3φ)
NKE-1087-61D/62D (6ft 100/110/220/230V AC 60 Hz 1φ)
(Option with deicing heater collar)
NKE-1087-62DF (6ft 220/230V AC 60Hz 3φ) (Option with deicing heater collar)

*4 NKE-1087-91/92 (9ft 100/110/220/230V AC 60Hz 1φ)
NKE-1087-92F (9ft 220/230V AC 60Hz 3φ)
NKE-1087-91D/92D (9ft 100/110/220/230V AC 60Hz 1φ)
(Option with deicing heater collar)
NKE-1087-92DF (9ft 220/230V AC 60Hz 3φ) (Option with deicing heater collar)

*5 NCD-4263 : Self-standing type
NCD-4263T : Desktop type (NWZ-158T: Monitor Unit, NDC-1279T: Control Unit, NCE-7721: Keyboard Unit)(Option)

Note: The ARPA unit have the approbation by the Ministry of Transport Automatic equipment for Prevention of collision JAS-9800.

Radar System Circuit Block.....

Table A-3 3-unit Type Scanner (S band)

Type of Scanner	NKE-1079-1 (100V AC,1φ)	NKE-1079-2F (220V AC,3φ)	NKE-1079-1D (100V AC,1φ)	NKE-1079-2DF (220V AC,3φ)
Inner Antenna Driving Part	CQC-764 CBP-129	CQC-764 CBP-128	CQC-764 CBP-129	CQC-764 CBP-128
Heater Cont.	---	---	CCK-751	CCK-751

("D" is attached with a heater control part option to a form name Heater Cont：CCK-751）

Table A-4 2-unit Type Scanner (S band)

Type of Scanner	NKE-1075-1 (100V AC,1φ)	NKE-1075-2 (230V AC,1φ)	NKE-1075-2F (230V AC,3φ)
Inner Antenna Driving Part	CQC-1004 CBP-129	CQC-1004 CBP-146	CQC-1004 CBP-128
IF AMP circuit Inner Receiver Unit	CAE-344-4 CMA-554	CAE-344-4 CMA-554	CAE-344-4 CMA-554
Receiver Unit	RNG-222		
RF AMP circuit LO OSC circuit Bias circuit Limiter circuit	CAF-424 CCH-205 CBD-1274 CNL-23	CAF-424 CCH-205 CBD-1274 CNL-23	CAF-424 CCH-205 CBD-1274 CNL-23
Modulator Unit	NMA-534		
Modulator circuit Inner Modulator circuit Filter circuit	CPA-209 CNM-239 CFR-161	CPA-209 CNM-239 CFR-161	CPA-209 CNM-239 CFR-161
T/R control circuit Power circuit Relay circuit	CMC-1205 CBD-1682 CSC-632	CMC-1205 CBD-1682 CSC-632	CMC-1205 CBD-1682 CSC-632

("D" is attached with a heater control part option to a form name Heater Cont：CCK-751）

Table A-5 3-unit Type Scanner (X band)

Type of Scanner	NKE-1089-71/91 (100/110VAC,1φ)	NKE-1089-72/92 (220/230VAC,1φ)	NKE-1089-72F/92F (220/230VAC,3φ)
Inner Antenna Driving Part	CQC-1108 CBP-170	CQC-1108 CBP-171	CQC-1108 CBP-172

("D" is attached with a heater control part option to a form name Heater Cont：CCK-751**)**

Table A-6 2-unit Type Scanner (X band)

Type of Scanner	NKE-1087-6 (100/110VAC,1φ)	NKE-1087-6 (220/230VAC,1φ)	NKE-1087-6 (220/230VAC,3φ)
Inner Antenna Driving Part	CQC-683 CBP-122	CQC-683 CBP-123	CQC-683 CBP-132
Receiver Unit	RNG-222		
IF AMP circuit Inner Receiver Unit	CAE-344 CMA-588	CAE-344 CMA-588	CAE-344 CMA-588
Modulator Unit	NMA-534		
Modulator circuit Inner Modulator Unit Filter circuit	CPA-209-1 CNM-234 CFR-161	CPA-209-1 CNM-234 CFR-161	CPA-209-1 CNM-234 CFR-161
T/R control circuit Power circuit Relay circuit	CMC-1025 CBD-1645 CSC-632	CMC-1025 CBD-1645 CSC-632	CMC-1025 CBD-1645 CSC-632

("D" is attached with a heater control part option to a form name Heater Cont：CCK-751**)**

Table A-7 3-unit Type Transmitter-receiver Unit Composition (S band)

Type of Transmitter-receiver Unit	NTG-3037
Modulator Unit	NMA-1253
・Modulator circuit ・Filter circuit ・Inner Modulator Unit	CPA-209 CFR-161 CNM-236
Receiver Unit	NRG-88
・IF AMP circuit ・RF AMP circuit ・LO OSC circuit ・Bias circuit ・Limiter circuit ・Inner receiver unit	CAE-344-1 CAF-424 CGH-205 CBD-1274 CNL-23 CMA-554
・Power circuit ・T/R control circuit ・Relay circuit	CBD-1682 CMC-1205 CSC-632
・Inner transmitter-receiver unit	CQC-1093

Table A-8 3-unit Type Transmitter-receiver Unit Composition (X band)

Type of Transmitter-receiver Unit	NTG-3028
Modulator Unit	NMA-1252
・Modulator ・Filter circuit ・Inner modulator unit	CPA-209-1 CFR-161 CNM-235
Receiver Unit	NRG-98
・IF AMP ・Inner receiver unit	CAE-344 CMA-588
・Power circuit ・T/R control circuit ・Relay circuit	CBD-1682 CMC-1205 CSC-632
・Inner transmitter-receiver unit	CQC-1092

Table A-9 NCD-4263 Type Display Unit Circuit Compositions

	Display Unit NCD-4263	JRC Code	Remarks
1	Inner display unit	CWB-1256	
2	NSK/LOG I/F unit NSK/LOG I/F circuit	CMJ-462A	
3	Rack unit Terminal board circuit Display control circuit Radar process circuit Mother board	 CQD-1949 CMC-1218 CDC-1209 CQC-1094	
4	Inner keyboard unit Panel circuit 1 Panel circuit 2 Panel circuit 3 Connection cable	CWB-1211-PSO/RST CCK-900 CCK-901 CCK-902 CFQ-6908-RSO/RST	
5	Monitor unit Case part Operation unit	 CWB-1255 CCK-906	
6	Inner power supply unit Power supply circuit	 CBD-1661	
7	Interswitch circuit	CCL-291 (NQE-3141)	 (Option)

Table A-10 NDC-1279 Type Control Unit Circuit Compositions

	Control Unit NDC-1279	JRC Code	Remarks
1	Inner display unit	CWB-1256	
2	NSK/LOG I/F unit NSK/LOG I/F circuit	CMJ-462A	
3	Rack unit Terminal board circuit Display control circuit Radar process circuit Mother board	 CQD-1949 CMC-1218 CDC-1209 CQC-1094	
4	Inner power supply circuit Power supply circuit	 CBD-1661	
5	Interswitch circuit	CCL-291 (NQE-3141)	 (Option)

Table A-11 NCE-7721 Type Keyboard Unit Circuit Compositions

	Keyboard Unit NCE-7721	JRC Code	Remarks
1	Inner keyboard unit	CWB-1211-RSO/RST	
	Panel circuit 1	CCK-900	
	Panel circuit 2	CCK-901	
	Panel circuit 3	CCK-902	
	Connection cable	CFQ-6908-RSO/RST	(Option)

Table A-12 NWZ-158 Type Monitor Unit Circuit Compositions

	Monitor Unit NWZ-158	JRC Code	Remarks
1	Monitor unit Case part Operation unit	 CWB-1255T CCK-906	

INTERSWITCH
(NQE-3141)
OPERATION MANUAL

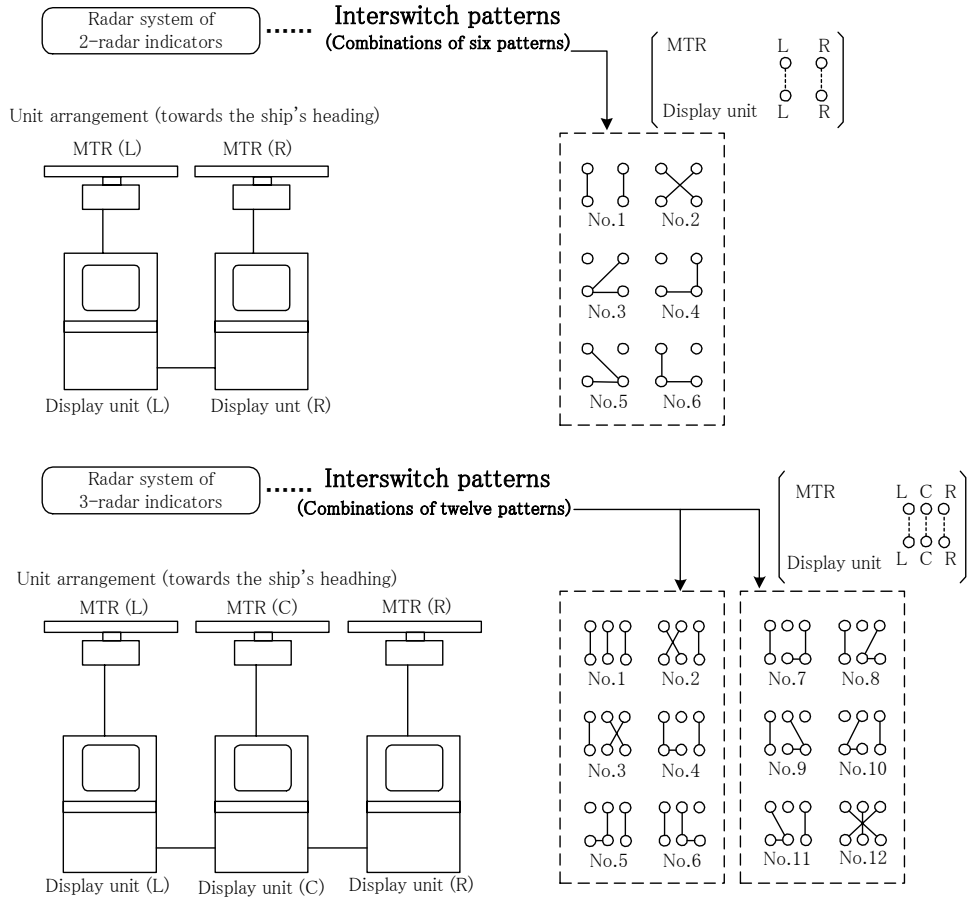
1. GENERAL

1.1 Outline

The NQE-3141 interswitch allows interconnections to be changed freely between bridge-installed multiple radar display units and multiple scanner units different in characteristics. The NQE-3141 can change the interconnections between multiple radar display units and multiple transmitter-receiver/scanner units (in the remainder of this manual, referred to as MTRs) in the JMA-9900 Series radar system.
It is possible to change the interconnections between up to eight combinations of units: (two units in the case of a built-in type) x (four units in the case of a separate type).

1.2 Interswitch Construction

The Interswitch Kit is incorporated in the display unit. (Option)
The number of combined display units and MTRs according to the interswitch kit is different between the 2-units system and the 3-units system.
The distinction between the 2-units system and the 3-units system is determined by the internal settings.
The pattern switchover operations can be exercised simply and quickly according to the menus displayed on the display unit. The interseitch patterns as shown below are displayed at the upper left of the radar display. (The position filled on the mark indicates the position of the display unit currently operated.)



APPENDIX

2. OPERATIONS

When switching over the interswitch patterns, first set the system to the STBY mode and proceed the switch operations on the operation panel of the Display Unit as shown in the operation flow below.

2.1 Operation Flow

The following flowchart shows the operation flow from menu opening to menu closing.

〔Open of software button〕

① Click the

on the upper left of the screen.
(This software button is differing in selecting pattern. This picture is 2UNIT, No.4.)

〔Open of the Sub1 Menu〕

① Click MENU , then SUB1 MENU

〔The ISW Menu will appear〕

① Click ISW .

〔Changing interswitch patterns〕

① Click the pattern selection menu number.
Click SET .
② Click EXIT .

The radar will be placed in the standby mode. The changed pattern diagram in the center of the display as well as the change menu at the right of the display will be displayed.

〔Closing the interswitch menu〕

① Click EXIT .

〔The Sub1 Menu will be closed〕

① Click MENU .

2.2 Software button /Sub1 Menu

Refer to: (A) [Sub1 Menu display･･･Selection of an ISW Menu]

Open of software button

Click the  on the upper left of the screen.

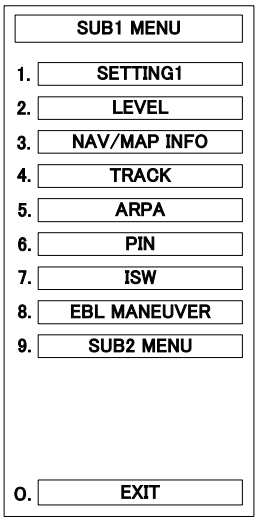
Open the ISW Menu.
This software button is differing in selecting pattern. This picture is 2UNIT, No.4.

Open of the Sub1 Menu

① Click Menu .

② Click SUB1 MENU .
The Sub1 Menu will appear.

Sub1 Menu



The Sub1 Menu will be closed

③ Click Menu . Or click EXIT .

APPENDIX

2.3 ISW (Interswitch) Menu

Refer to: (B) [ISW MENU 1･･･2-units (No.1 to No.6)]
(C) [ISW MENU 2･･･3-units (No.1 to No.6)]
(D) [ISW MENU 3･･･3-units (No.7 to No.12)]

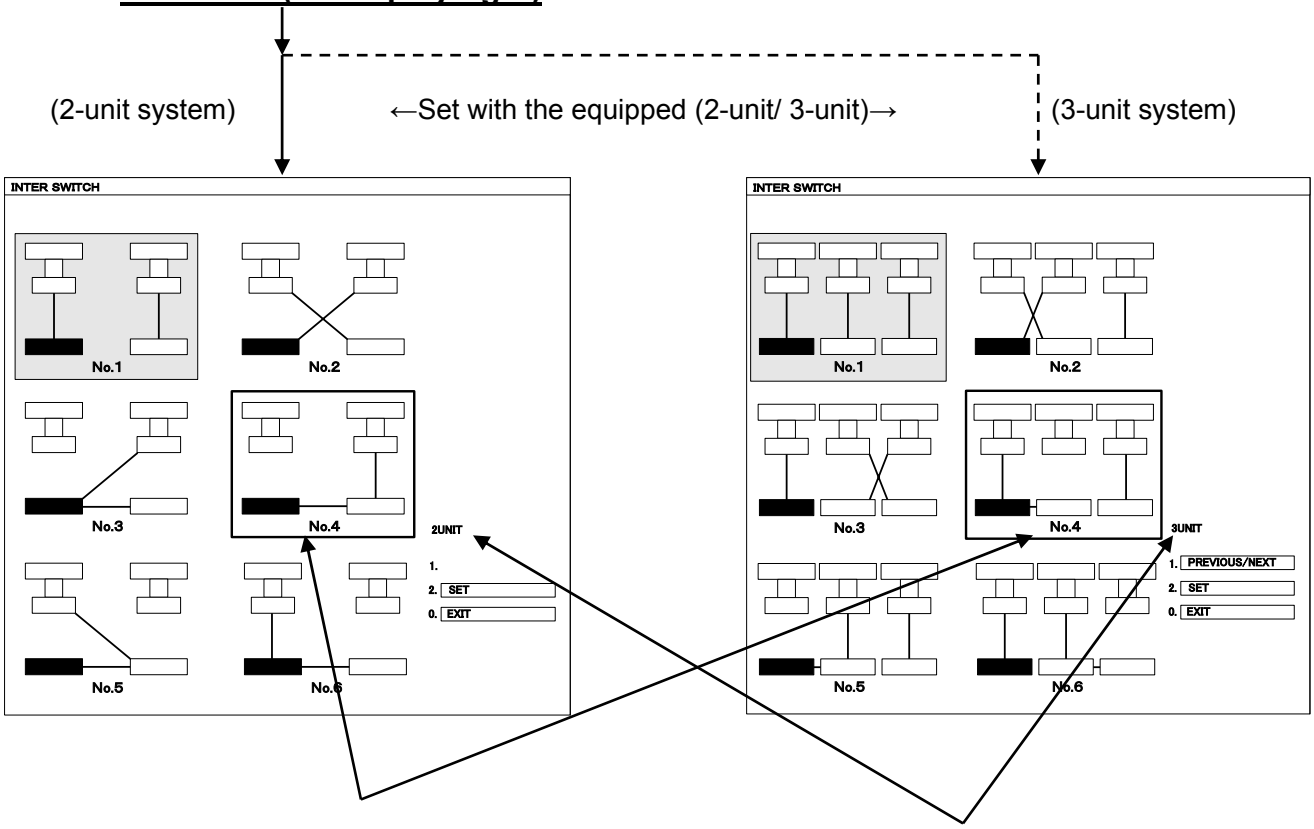
The Interswitch Menu can be selected only when the radar system is set to on the standby mode. Although the Interswitch Menu can be opened during transmission, the radar system will stop transmission and enter the standby state automatically.

The Sub1 Menu will appear

The ISW Menu will appear

③ Click ISW .

ISW Menu (on display right)



Pattern No.
The number surrounded by a frame is the number to be selected.

Unit No. of radar system

APPENDIX

ISW Menu (Pattern Diagram)(on display center)

The pattern diagrams for the 2-units sysem is different from the pattern diagrams for the 3-units system.

・6 pattern diagrams are displayed gor 2-units system.
・12 pattern diagrams (on two pages with 6 patterns per page) are displayed for 3-units system.

In the pattern diagram.

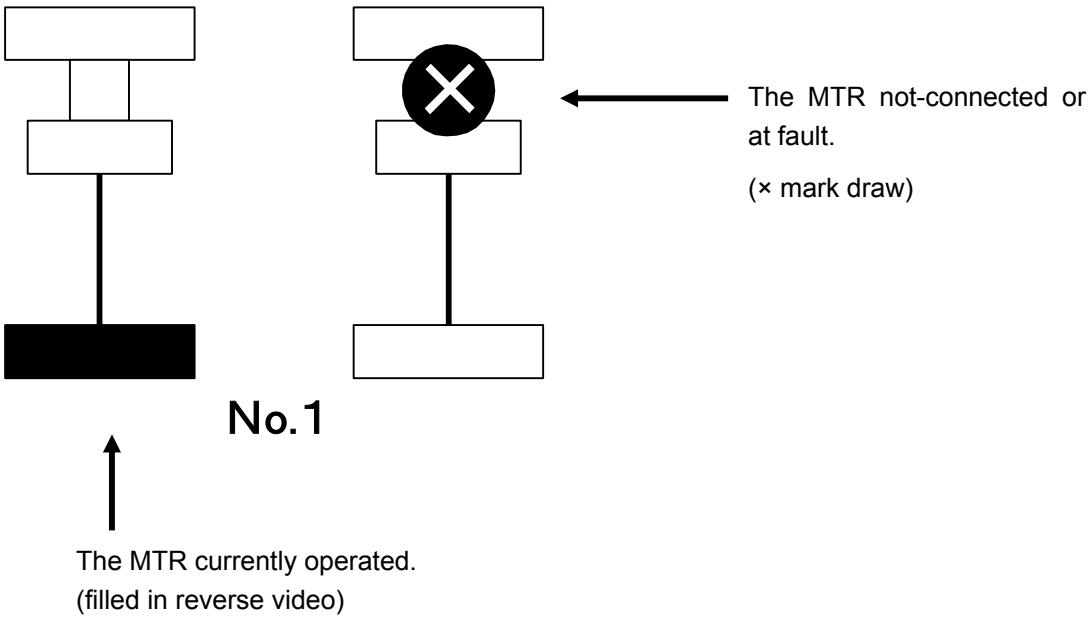
・The pattern diagram dark filled represents the current pattern.
・The display unit currently in operation is highlighted in the reverse black/white view.
・A display unit or MTR marked with“×”is not connected or has a failure.
・The pattern diagram with the mark“×”cannot be selected as described above.

The ISW Menu will be closed

② Click EXIT .

The Sub1 Menu will be closed

③ Click EXIT .



The MTR not-connected or at fault.

(× mark draw)

The MTR currently operated.
(filled in reverse video)

2.3 Changing Interswitch Patterns

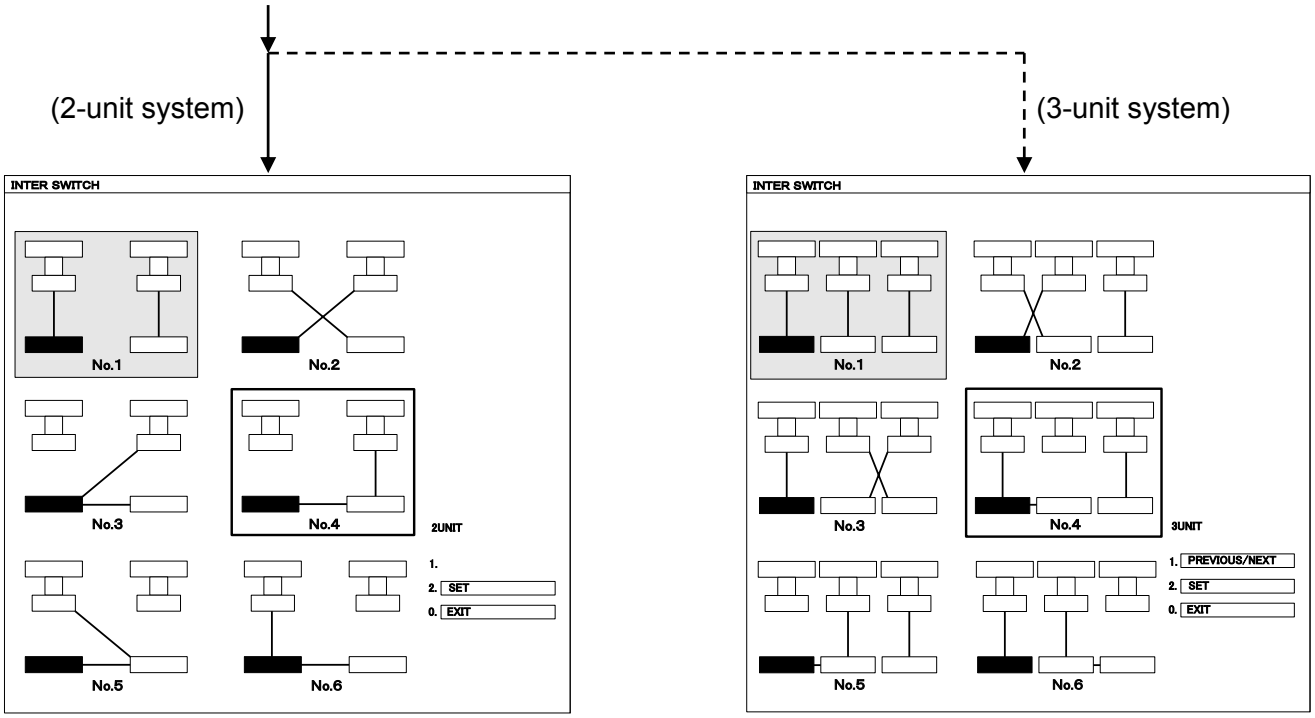
The Sub1 Menu will appear

The ISW Menu will appear

Select an ISW pattern

① Click [+] or [-] to select Pattern No.

ISW Menu (on display right)



ISW Menu (Pattern Diagram)(on display center)

Click [+] or [-] , and the pattern diagram will be enclosed by a square line, which signifies“selecting”.

3-unit system is click [PEVIOUS/NEXT],selectid No.7 to No.12

② Click [SET] .

([SET] is indicated to selecting pattern.)

APPENDIX

Message Area (on display lower right)

"ISW END"is blinking and an alarm buzzer sounds.

ISW Menu (Pattern Diagram)(on display center)

The selected pattern deagram is blinking for about 5 seconds, and if it is established, the pattern is selected.

Note that if the seitchover fails, the selected pattern will not appear. The blinking is stopped after about 5 second and the previous pattern diagram will reappear. In this case."ISW TIME OUT"will appear on the message area on the lower right of the display and an alarm sound is given.

In this state, re-select the pattern diagram and seitch over the units. If the re-selection fails, contact JRC service depot.

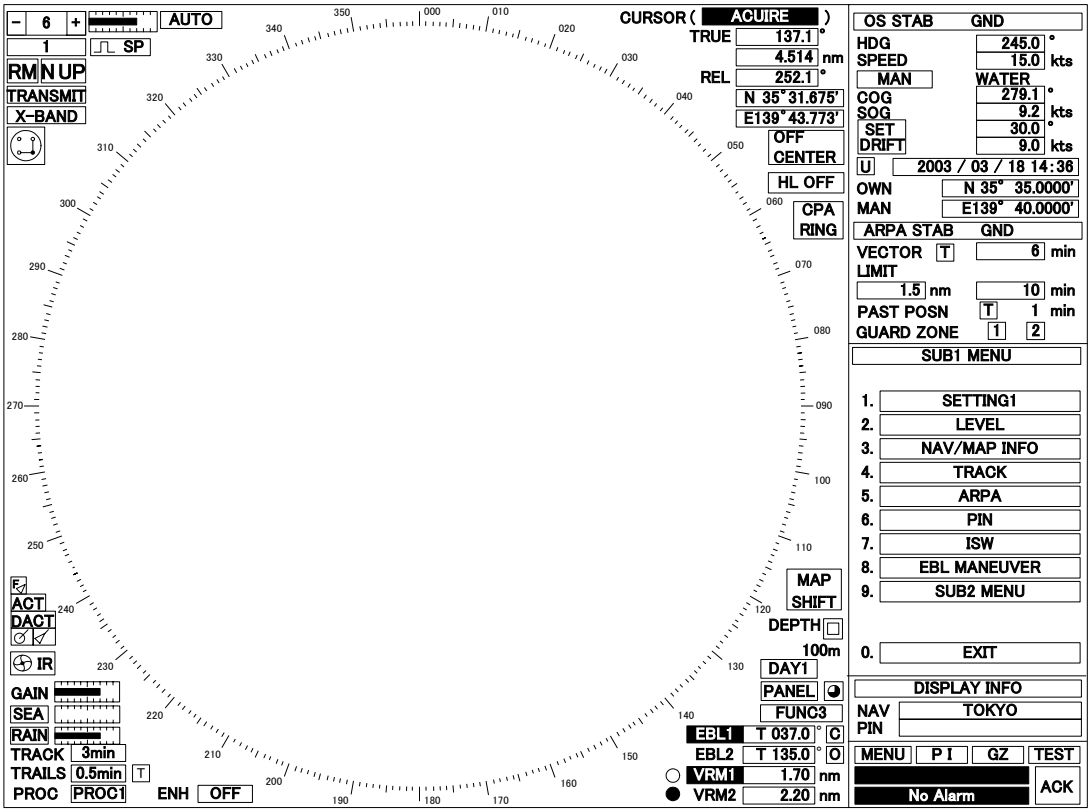
Pre-heat Time Countdown (on display center or the upper part)

When the seitchover operation is completed, the timer at the display center or the upper part will start the countdown. At this time, the radar operation state at the upper right of the display indicates "PREHEAT".

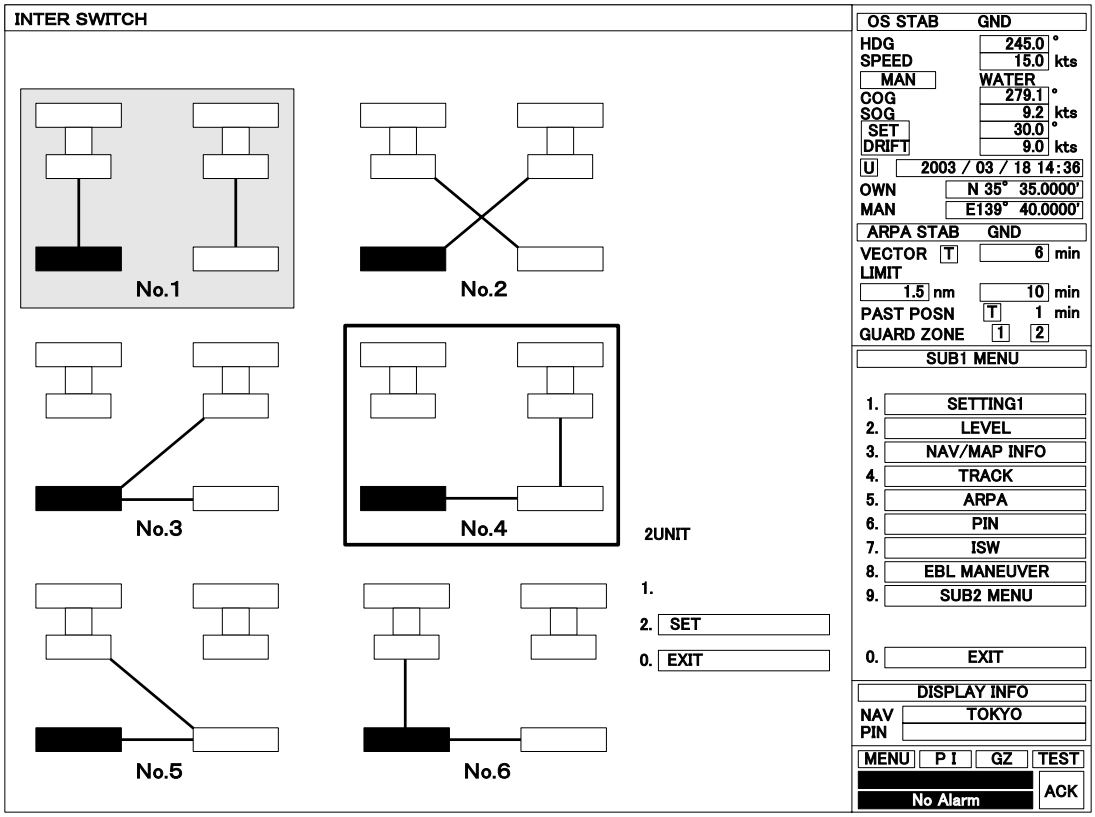
If the count "0:00" is indicated, the indication at the upper right on the radar display is changed from "PREHEAT" to "STANDBY".

The ISW Menu will be closed

The Sub1 Menu will be closed

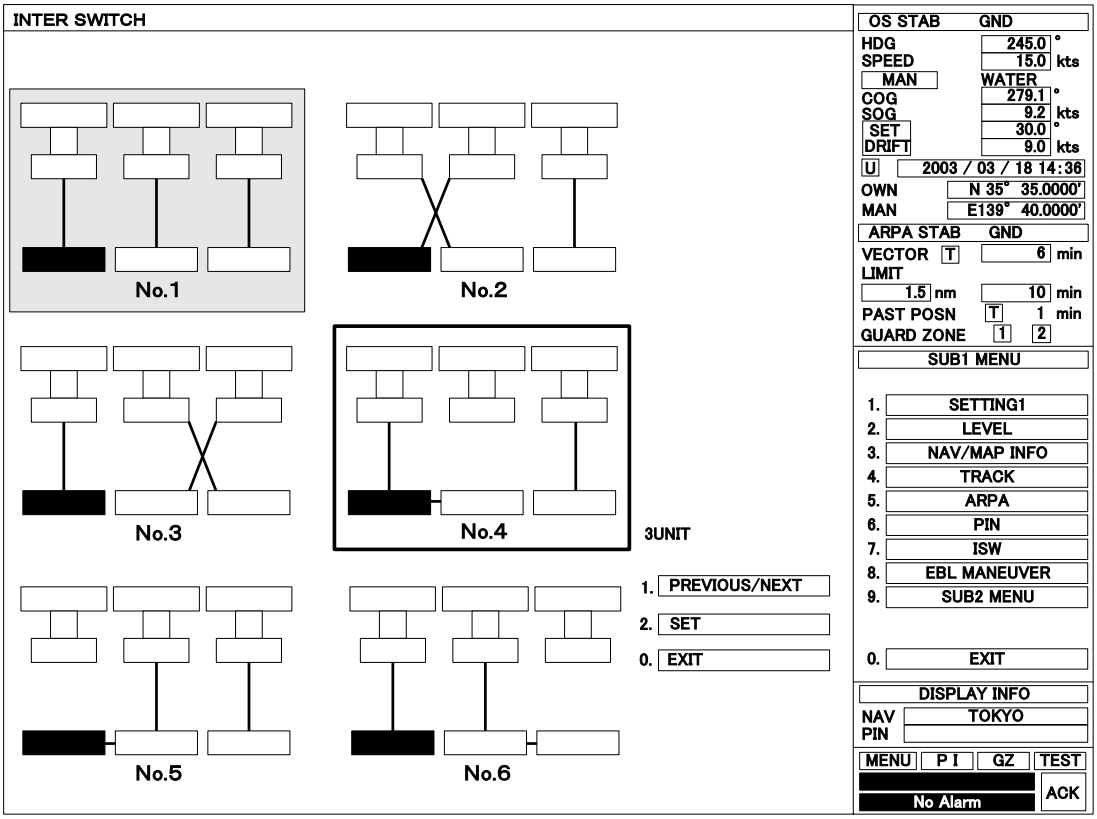


(A) [Sub1 Menu display･･･Selection of an ISW Menu]



(B) [ISW MENU 1･･･2-units (No.1 to No.6)]
The current connection pattern: No.1
The current connection pattern to be selected: No.4

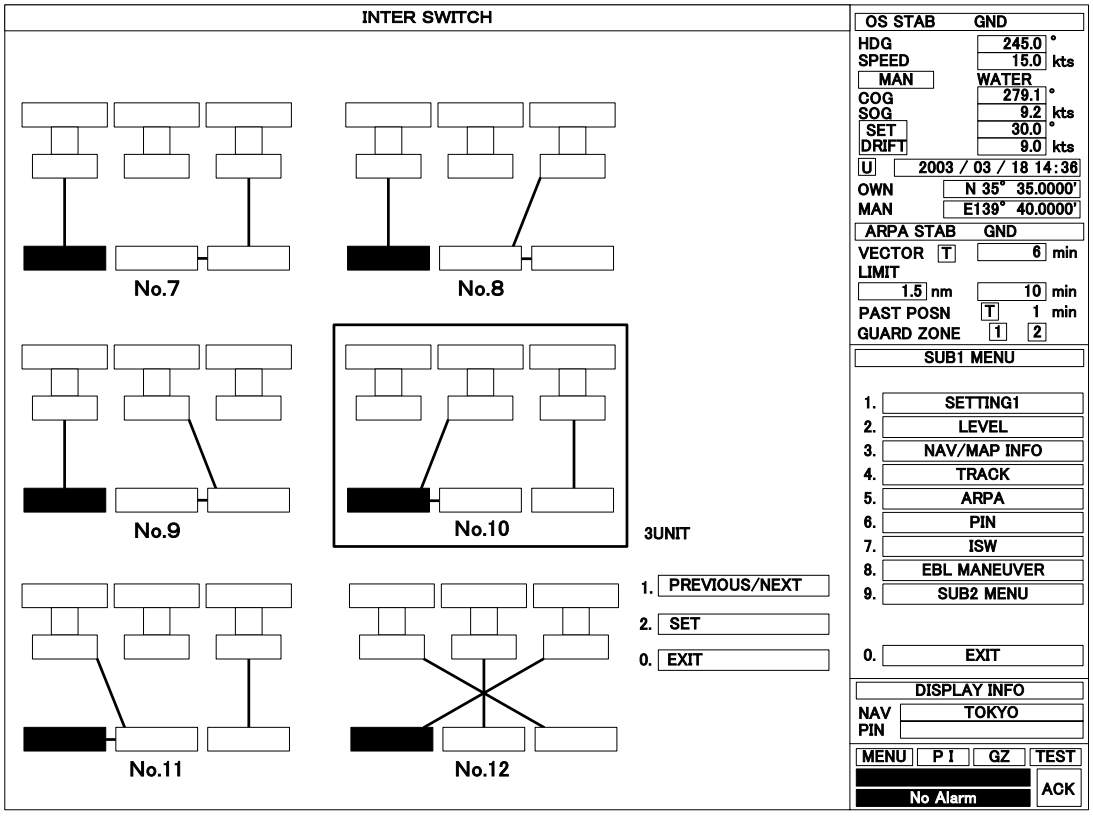
APPENDIX



(C) [ISW MENU 2･･･3-units (No.1 to No.6)]

The current connection pattern: No.1

The current connection pattern to be selected: No.4



(D) [ISW MENU 3･･･3-units (No.7 to No.12)]

The current connection pattern to be selected: No.10

3. REFERENCES

Preheating Time after Pattern Selection

After switching over the interswitch patterns, it is necessary to wait for the time as mentioned below because the pre-heat time is different from the previous interconnection between the MTR and the display unit. This measure is taken for protecting the electronic tube emitting radar pulses.

(a) Not changed to the new interconnection condition:.....No preheat time
(b) Changed to the new interconnection condition.
However, the MTR was used before change:.....30 seconds
(c) Changed to the new interconnection condition.
However, the MTR was used before change:.....3 minutes

Notes on Pattern Selection

Immediately after switching over the patterns, the try to select another pattern may fail. This means that even If the pattern switchover is completed, it takes some time to prepare for the next interswitch operation. In this case, "ISW BUSY" will be indicated in the message area on the display lower right, and the interswitch operation is not available.

Alarm Sound Control

The interseitch alarm continues to sound for about 5 seconds. In setting the alarm sound level, open the Sub1 Menu, press [2] switch to select the "5.BUZZER" in LEVEL Menu.
When stopping the alarm sound immediately after it sounds, press [ALARM ACK] switch. Even when the alarm sound stops, a certain message will remain in the message area.

Notes on Master/Slave Connection

The Master/Slave connection is a configuration in which the Display Unit connected to the Scanner Unit is the Master Unit, while the Display Unit connected to the Master Unit is a Slave Unit. Of the interswitch patterns, the following pattern numbers includes the Master/Slave connection:
a) 2-unit System: No.3, No.4, No.5 and No.6
b) 3-unit System: No.4, No.5, No.6, No.7, No.8, No.9, No.10 and No.11

If the Master Display Unit is not in the transmission state, it is impossible to set the Slave Display Unit to the transmission state, If the Master Display Unit is changed from the transmission to the standby mode, the Slave Display Unit will also be set to the standby mode forcibly. In this status, "MTR ST-BY" will be indicated in the message area and the alarm will beep.

The Slave Display Unit will not change the radar video even if the tuning control is adjusted because the tuning is controlled by the Master Display Unit. The tuning indicator at the upper left of the display will show "SLAVE".

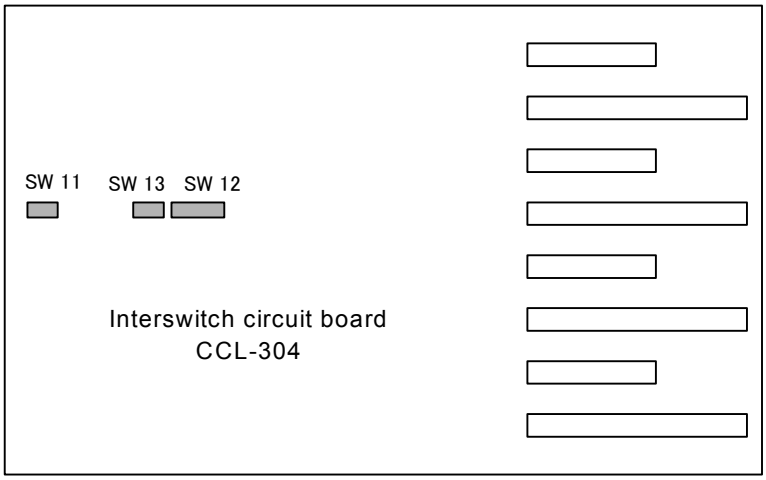
The change of the range scale on the Slave Display Unit depends upon the range scale on the Master Display Unit. In general, the Slave Display Unit can not change the range scale into a higher one than that on the Master Display Unit. However, a higher range scale may be selected by the Slave Display Unit if the pulse length/repetition frequency is the same as on the Master Display.

Scanner Safety Switch

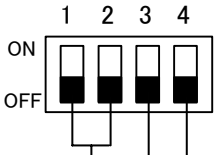
If the Scanner Units are changed over in the condition that the safety switch of one Scanner Unit is set to "OFF" while the other is set to "ON", "SSW OFF" will be indicated on both the display.

◎ Setting the DIP switches of the interswitch circuit (CCL-304)

Set DIP switches SW11, SW12, and SW13 as follows:



(1) Setting SW11 (Expansion mode setting and master/slave setting)



Expansion mode setting

4	Description
ON	Expansion mode
OFF	Normal mode

Select OFF to connect up to four units.

Master/slave setting

3	Description
ON	Slave
OFF	Master

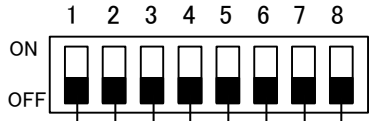
In expansion mode, select ON for the ISW circuit board at the slave side.

Not used

1, 2	Description
ON	Not used
OFF	Not used

Select OFF.

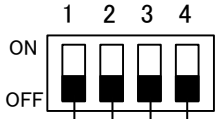
(2) Setting SW12 (Radar connection setting)



Radar connection setting

1	ON	No. 1 display unit connection
	OFF	No. 1 display unit non-connection
2	ON	No. 1 scanner unit connection
	OFF	No. 1 scanner unit non-connection
3	ON	No. 2 display unit connection
	OFF	No. 2 display unit non-connection
4	ON	No. 2 scanner unit connection
	OFF	No. 2 scanner unit non-connection
5	ON	No. 3 display unit connection
	OFF	No. 3 display unit non-connection
6	ON	No. 3 scanner unit connection
	OFF	No. 3 scanner unit non-connection
7	ON	No. 4 display unit connection
	OFF	No. 4 display unit non-connection
8	ON	No. 4 scanner unit connection
	OFF	No. 4 scanner unit non-connection

(3) SW13 (Not used)



1, 2, 3, 4	Not used

Note: Set the DIP switches of the ISW circuit in accordance with the INSTALLATION MANUAL, and ensure safety when and before setting the DIP switches.

JMA-9900 series Radar

INSTALLATION OF AIS

Introduction

Thank you for purchasing the optional AIS information display kit for JRC marine radar. This product provides the AIS information display function, which is optionally available on the JMA-9900 Radar series.

●Read this operation manual carefully before use.

●This manual describes operations of the optional AIS display function only.
Please refer to JAM-9900 series operation manual for operation of other radar functions.
Please keep this operation manual for reference.

●There are two types of AIS interfaces for JMA-9900 Series Radar as follows.

JMA-9900 TYPE	AIS I/F Type
Self-standing type	NQA-4172*, 7ZCRD0967
Desktop type	NQA-4172*, NQA-4172-6

* NQA-4172 : Base Kit (Common unit for both types of JMA-9900 radar.)

Note

This optional AIS kit was checked the operation only by the connection with JRC AIS（JHS-180）.

The capacity and limitations of the system and operational limitations

1. Vectors of ARPA target are displayed by dashed lines instead of solid lines to keep consistency with those of AIS targets.

2. Maximum 50 AIS targets are displayed in this system. Three kinds of AIS target filter are provide to prioritize on displaying AIS targets effectively. See 1-10 in this manual.

3. Note that following operational restrictions in this system before using.

1) An AIS function cannot turn ON

・When "MANUAL" was selected as a speed input source.

・When SET and DRIFT was set in “LOG” speed mode

2) "LOG" speed mode cannot be chosen as a speed source.

・When an AIS function was ON and SET and DRIFT were set.

3) "MANUAL" speed mode cannot be selected..

・When an AIS function was ON.

4) SET／DRIFT (Current correction) function cannot turn ON.

・When an AIS function was ON and speed was set as "LOG".

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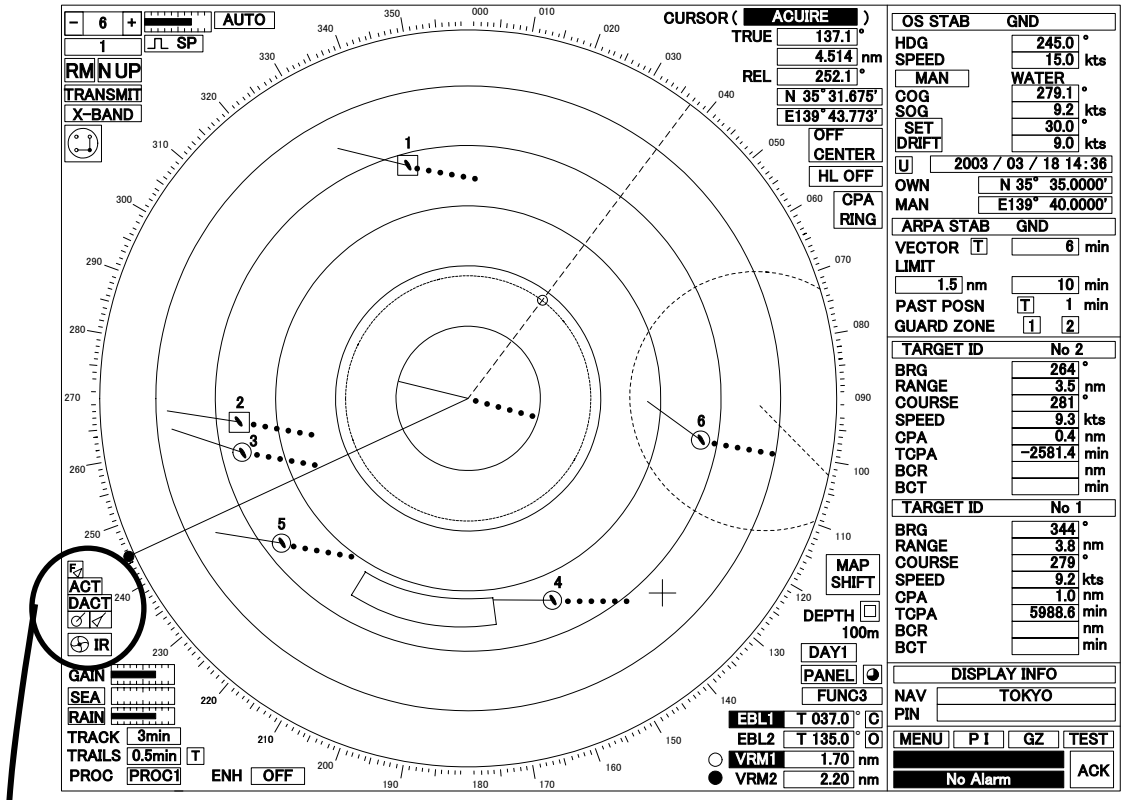
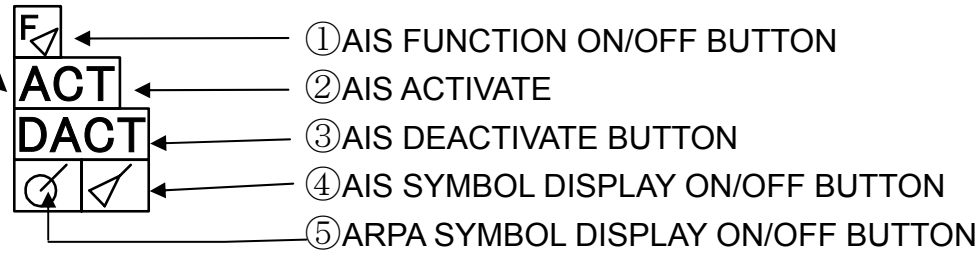
1. AIS Information Display Function

1-1 AIS Software Buttons

When AIS I/F is connected, the AIS software button as shown below is displayed on a radar screen. By operating these buttons, ON/OFF of an AIS function, activation or deactivation of a AIS symbol, and the display ON/OFF of ARPA-AIS symbol can be performed.



Example of Display with Optional AIS I/F



AIS Software buttons

APPENDIX

1-2 Initial Setting

■GPS Antenna installation position Setting

The distance of the GSP antenna from the position of the radar scanner should be set.

Operation procedure

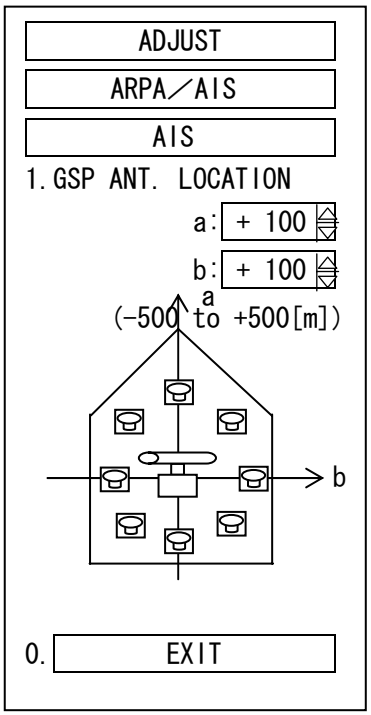
1. Left-click MENU on the screen.
   MAIN menu opens.

2. Left-click CODE INPUT.
   CODE INPUT menu opens.

3. Left-click 0 → END.
   ADJUST menu opens.

4. Left-click ARPA／AIS .
   ARPA/AIS menu opens.

5. Left-click AIS .
   AIS menu opens.



6. The GPS antenna rough direction from the radar scanner is chosen with the GPS button " . ".

7. Left-click the button in the **a:** box of "1.GPS ANT. LOCATION".
   The distance of the GPS antenna from the radar scanner in bow-stern direction should be entered. (The direction of the bow side is plus and the direction of the stern side is minus.)

8. Left-click the button in the **b:** box of "1.GPS ANT. LOCATION".
   The distance of the GPS antenna from the radar scanner in port-starboard direction should be entered. (The direction of starboard side is plus and the direction of the port side is minus.

Note 1

Unless it performs this setup correctly, the position of an AIS symbol may not coincide with the radar echo position of the target.

Note 2

When this setup is performed, offset is added to the data received from GPS, and the compensated latitude and longitude are displayed as own ship position. It would be the radar scanner installation position.

APPENDIX

■Collision Decision Criteria Setting (CPA/TCPA)

The collision decision criteria CPA/TCPA of ARPA target are used for AIS target as well.

Operation procedure

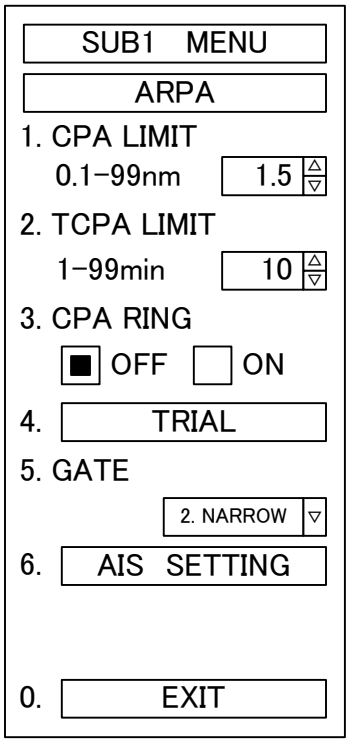
1. Left-click MENU on the screen.
   MAIN menu opens.

2. Left-click SUB1 MENU → ARPA／AIS.
   ARPA menu opens.

3. Set CPA LIMIT (Closest Point of Approach)

   (1) Left-click the "1.CPA LIMIT" edit box.

   CPA LIMIT will be selected.
   The numeric input dialogue box is opened.



   (2) Input the new value by pressing the 0 to 9 number keys or by using the + or - keys, then press END to input.

4. Set TCPA LIMIT (Time to CPA)

   (1) Left-click the "2.TCPA LIMIT" edit box.

   TCPA LIMIT will be selected.
   The numeric input dialogue box is opened.

   (2) Input the new value by pressing the 0 to 9 number keys or by using the + or - keys, then press "END" to input.

For further details, please refer to Chapter 5 of a JMA-9900 series Instruction Manual.

1-3. AIS Function ON/OFF

■ON/OFF of AIS function is set up. There are two methods to switch ON/OFF of AIS function.

Operation procedure

(Method-1 : With the AIS software button on screen.)

Put the arrow cursor on the F button at the lower left a screen and click the left button of the track ball. Every time the left section button is pressed, AIS function on/off changes alternatively as follows.

a. When the symbol is displayed in the bright color -----AIS function is ON.

b. When the symbol is displayed in the dark color -------AIS function is OFF.

(Method-2 : With the menu operation.)

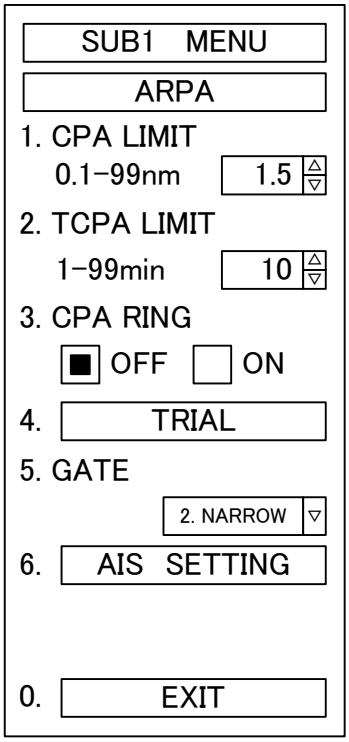
1. Left-click MENU on the screen.
   Main menu opens.

2. Left-click SUB1 MENU .
   SUB1 menu opens.

3. Left-click ARPA/AIS .
   ARPA/AIS menu opens.

4. Left-click AIS SETTING.
   AIS SETTING menu opens.

5. Left-click "ON" or "OFF" of "1.AIS FUNCTION".
   "1.AIS FUNCTION" is changed to on or off.



Note:

When AIS function is OFF, no AIS symbol is displayed and all AIS functions are completely turned off. Even if there is a dangerous target, AIS function would not be turned on automatically.

APPENDIX

1-4 AIS Target※1 Activation

■Manual Target Activation

An AIS target is activated by either of the mehod-1 or the method–2 as follows, and then the vector and the heading of the target are displayed.

Operation procedure

(Method-1 : With the software button on the screen)

1. Put the arrow cursor on the [ACT] button at the lower left of the screen and click the left button of the track ball.
   Cursor mode ”AIS ACT" is displayed at the upper right side on the screen.
2. Put the cross cursor “+” on the target to be activated and press the track ball section left button .
   The selected AIS target is activated.

(Method-2 : With the menu operation)

1. Left-click [MENU] on the screen.
   Main menu opens.

2. Left-click [SUB1 MENU].
   SUB1 menu opens.

3. Left-click [AIS/ARPA].
   ARPA/AIS menu opens.

4. Left-click [AIS SETTING].
   AIS SETTING menu opens.

5. Left-click "ON" of "2.AIS ACTIVATE".
   Cursor mode ”AIS ACT" is displayed at the upper right side on the screen.

6. Put the cross cursor “+” on the target to be activated and press the track ball section left button .
   The selected AIS target is activated.

APPENDIX

※1 Refer to "1.9 Definitions of AIS Target Symbols” about the activated target.

■Automatic Target Activation

The AIS target in a guard zone is activated automatically and the vector and the heading of the target are displayed. The guard zone for AIS target activation is the same zone used in ARPA. For further details of guard zone setting, please see “Set Guard Zones” at Chapter 3.4 of the instruction manual of JMA-9900 series radar. Dangerous AIS targets are also activated automatically.

Note:

・When the manual ‘ACTIVATION’ operation is performed at the position where no AIS sleeping symbol is displayed, an AIS target is searched at the near area pointed by the cursor “+”. The following “search mark” is displayed.

Search Mark

A activated target symbol is displayed when an AIS target is found near the “search mark”. Then the “search mark” is removed. On the other hand, no AIS target found in approx. 4 minutes, the “search mark” disappears.

・When no vector of the activated target is displayed, please refer to "1-13 Conditions of AIS Symbol Display."

・No activated symbol may be displayed if the priority of the search target is lower than existing activated AIS targets displayed on the screen. Refer to “1-13 Conditions of AIS Symbol Display”.

1-5 AIS Target Deactivation

When an AIS target is deactivated, the vector and the heading are deleted as a sleeping[※2] target.

Operation procedure

(Method-1 : With the software button on the screen)

1. Put the arrow cursor on the DACT button and click the track ball section left button.
   Cursor mode ”AIS DEACT" is displayed at the upper right side on the screen.
2. Put the cross cursor “+” on the target to be deactivated and press the track ball section left button .
   The selected AIS target is deactivated.

(Method-2 : With the menu operation)

1. Left-click MENU on the screen.
   Main menu opens.
2. Left-click SUB1 MENU .
   SUB1 menu opens.
3. Left-click ARPA/AIS .
   ARPA/AIS menu opens.
4. Left-click AIS SETTING.
   AIS SETTING menu opens.
5. Left-click "ON" of "3.AIS DEACTIVATE".
   Cursor mode ”AIS DEACT" is displayed at the upper right side on the screen.
6. Put the cross cursor “+” on the target to be deactivated and press the track ball section left button . The selected AIS target is deactivated.

Note

This operation is only available for an activated target.

※2 Refer to "1.9 Definitions of AIS Target Symbols” about the sleeping target.

1.6 AIS SYMBOL DISPLAY ON/OFF

AIS symbol display is changed to on or off by the procedure method-1 or method-2 as follows.

Operation procedure

(Method-1 : With the software button on the screen)

Put the arrow cursor on the button and click the track ball section left button. Each time the left button is pushed, AIS symbol display is changed to on or off.

When the button is displayed in the bright colour ----- AIS Symbol display is on.

When the button is displayed in the dark colour ----- AIS Symbol display is off.

(Method-2 : With the menu operation)

1. Left-click MENU on the screen.
   Main menu opens.

2. Left-click SUB1 MENU .
   SUB1 menu opens.

3. Left-click ARPA /AIS .
   ARPA/AIS menu opens.

4. Left-click AIS SETTING.
   AIS SETTING menu opens.

5. Left-click "ON" or "OFF" of "4.AIS SYMBOL DISPLAY".
   AIS symbol display is changed to on or off.

Note

The ARPA symbol display can only turned OFF when the AIS function id ON.

Turning the AIS function OFF will automatically return ARPA symbols display back ON.

1-7. ARPA Symbol Display ON/OFF

ARPA symbol display is changed to on or off by the procedure either of the method-1 or method-2 as follows.

Operation procedure

(Method-1 : With the software button on the screen)

Put the arrow cursor on the button and click the track ball section left button. Every time the left button is pushed, ARPA symbol display is changed to on or off.

When the button is displayed in the bright color ----- ARPA Symbol display is on.

When the button is displayed in the dark color ----- ARPA Symbol display is off.

(Method-2 : With the menu operation)

1. Left-click MENU on the screen.
   Main menu opens.

2. Left-click SUB1 MENU .
   SUB1 menu opens.

3. Left-click ARPA/AIS .
   ARPA/AIS menu opens.

4. Left-click AIS SETTING.
   AIS SETTING menu opens.

5. Left-click "ON" or "OFF" of "4.AIS SYMBOL DISPLAY".
   ARPA symbol display is changed to on or off.

■ Types of Data Display

The detailed or simple numerical data of an AIS target are available. The display items in each detailed and simple mode are shown as follows.

Display Items	Detailed Mode	Simple Mode
NAME (Ship's Name)	Max 20 characters	Max 20 characters
CALL SIGN	Max 7 characters	Max 7 characters
MMSI	Max 9 characters	Max 9 characters
COG	Unit 0.1 degrees	Unit 0.1 degrees
SOG	Unit 0.1 knots	Unit 0.1 knots
CPA	Unit 0.1 nm	Unit 0.1 nm
TCPA	Unit 0.1 min	Unit 0.1 min
BRG	Unit 0.1 degrees	No display
RANGE	Unit 0.01 nm	
HDG	Unit 0.1 degrees	
ROT	Unit 0.1°／min	
L／L (Lat/Lon)	Unit 0.001 seconds	

One target data in the detailed mode or two target data in the simple mode are displayed at the numerical data area on the screen.

■ Target Data Display

Operation procedure

1. Press TGT DATA

Cursor mode changes and "TGT DATA" is displayed on the upper right of the screen.

2. Put the cross cursor "+" on the target to be data displayed and press the track ball section left button .

The numerical information of the selected AIS target is displayed at the right side of the screen, and ⌜ ⌝ ⌞ ⌟ is displayed on the AIS target symbol.

Note:

When the numerical data is displayed without ⌜ ⌝ mark on the radar screen, the target might exist out of the radar display range.

■ Target Data Display Cancel

Operation procedure

1. Press TGT DATA

Cursor mode changes and "TGT DATA" is displayed on the upper right of the screen.

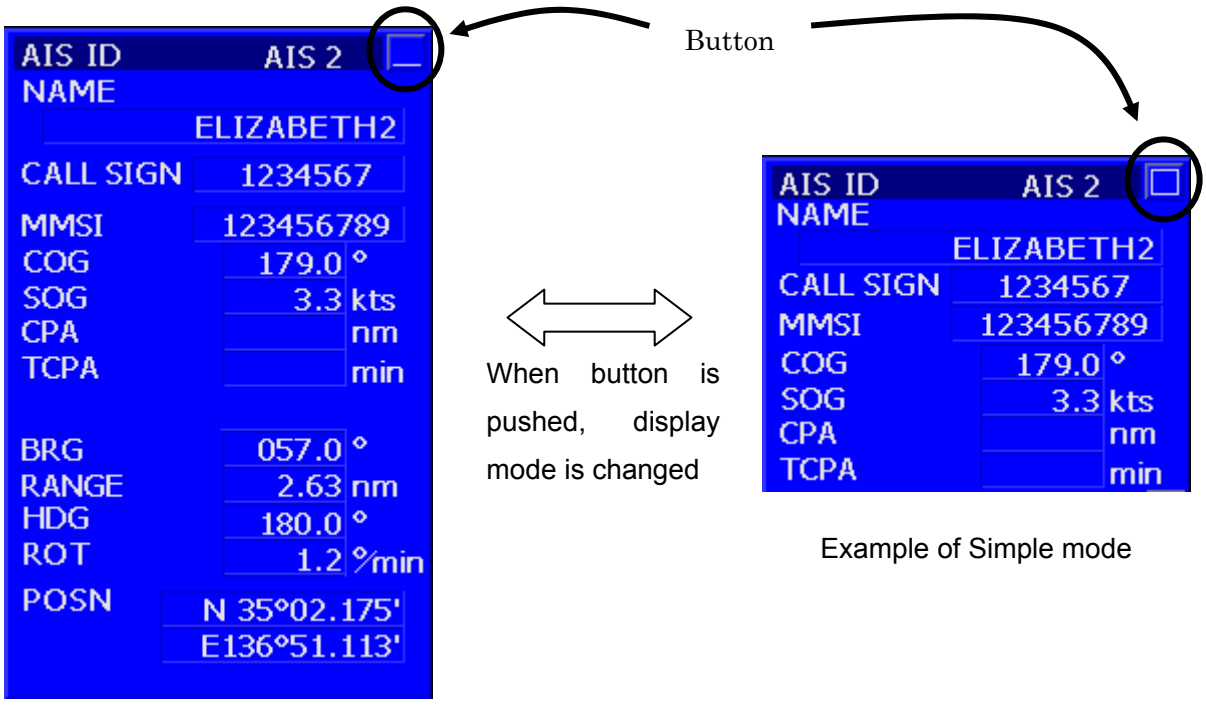
2. Put the cross cursor "+" on the target to be turn off the numerical data display and press the track ball section left button .

The numerical information of the selected AIS target data is removed from the numerical data area at the right-hand side of the screen and the symbol ⌜ ⌝ disappears.

■ Target Data Display in simple/detail mode

Operation procedure

1. Put the cursor on the buttons ▢ or ▁ at the upper right of AIS target numerical data area, and press the trackball section left button.
2. Every time the button is pushed, the mode of numerical data changes to simple or detail as follows..



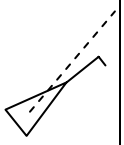
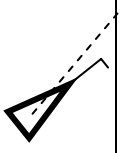
Example of Detail mode

Example of Simple mode

APPENDIX

1-9. Definitions of AIS Target Symbols

The AIS symbol is as follows.

Symbol	AIS Target	Definitions & Meaning
	Sleeping Target	A target symbol indicating the presence and orientation of a vessel equipped with AIS in a certain location. No additional information is presented until activated thus avoiding information overload. The most acute apex of the triangle is aligned with the heading of the target, or with its COG.
	Activated Target	A symbol representing the automatic or manual activation of a sleeping target for the display of additional graphically presented information including: - a vector (speed and course over ground or water); - the heading; and - ROT or direction of turn indication (if available) to display actually initiated course changes. The COG/SOG vector is displayed as dashed line. The heading is displayed as solid line of fixed length. A flag on the heading indicates a turned its direction in order to detect a target maneuver. When no data is coming, the vector , heading and flag are not displayed.
	Selected Target	A symbol representing the manual or automatic selection of any AIS target for the display of detailed information in a separate data display area. In this area, received target data as well as the calculated CPA and TCPA values will be shown. Squares indicated by its corners are drawn around the target symbol. This mark is displayed on the around of a numerical display target.
	Dangerous Target	A symbol representing an AIS target (activated or not) which data contravene pre-set CPA and TCPA limits. CPA/TCPA alarm sound occurs and a symbol is flashed until acknowledged.
	Lost Target	A symbol representing the last valid predicted position of an AIS

		target before the reception of its data was lost. It will become a lost target when fixed time reception of the data of a dangerous target cannot be carried out. When it becomes a lost target, a symbol will be displayed on the position predicted by data received at the end, such as a course and speed.

1-10. AIS Filter Setting

■ Meaning of AIS Filter

When an AIS filter is set up, AIS targets in the filtering area can be displayed preferentially. A default filter is set up within a circle with a radius of 20nm from own ship and other type of filter is selectable by the procedure in this section. When 50 or more AIS targets exist within the limits of the filter, AIS symbols are displayed according to the display priority indicated in 1-13 “Max target number and Display priority”.

■AIS Filter Type Selection

There are three kinds of AIS filters as follows. One of them can be selected.

1) RANGE・・・ A filter is set up in the shape of a circle which makes a radius set-up distance.
2) SECTOR・・・A filter is set up in the shape of a sector including the own ship heading direction.
3) ZONE ・・・A zone area surrounded by two directions and two ranges from own ship.

Operation procedure

1. Left-click MENU on the screen.
   Main menu opens.

2. Left-click SUB1 MENU .
   SUB1 menu opens.

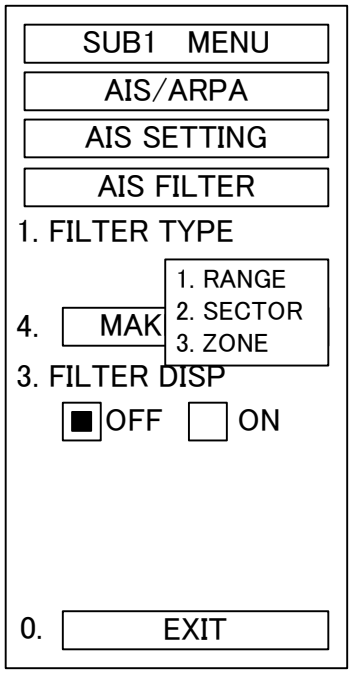
3. Left-click ARPA/AIS .
   ARPA/AIS menu opens.

4. Left-click AIS SETTING.
   AIS SETTING menu opens.

5. Left-click AIS FILTER.
   AIS FILTER menu opens.

6. Left-click the selection section (combo box) of "1.FILTER TYPE".

FILTER TYPE is chosen and the following pull down menu is displayed.



7. Select the FILTER TYPE from the pull-down menu, select 1 through 3 with the trackball, then left-click.

Note:

If a ARPA guard zone is set, the filter area for AIS target will be modified automatically to cover the guard zone.

■ AIS Filter Setting

Note:

An AIS filter setting procedure changes according to the filter type chosen.

Select a filter type should be set before setting up a filter area.

Operation procedure

1. Set up the type of a filter, according to the preceding clause.
   After selecting a filter type, then perform the following procedure to set a filter area..

2. Left-click MAKE FILTER .
   It goes into filter setting mode.

【When a filter type is "RANGE"】

3. Adjust a setting marker to filter setting distance with a VRM knob and left-click.

【When a filter type is “SECTOR”】

3. Adjust a setting marker to a filter start angle with an EBL knob and left-click.

4. Adjust a setting marker to a filter end angle with an EBL knob and left-click.

【When a filter type is “ZONE”】

3. Rotate EBL and VRM control knobs to adjust the cross point of EBL and VRM to the starting point of a filter zone. Then left click.

4. Rotate EBL and VRM control knobs to adjust the cross point of EBL and VRM to the end point of a filter zone. Then left click.

■ AIS Filter Area Display

Operation procedure

1. Left-click MENU on the screen.
   Main menu opens.

2. Left-click SUB1 MENU .
   SUB1 menu opens.

3. Left-click ARPA/AIS .
   ARPA/AIS menu opens.

4. Left-click AIS SETTING.
   AIS SETTING menu opens.

5. Left-click AIS FILTER.
   AIS FILTER menu opens.

6. Left-click "ON" or "OFF" of "3.FILTER DISP".
   The filter area display changes to on or off.
   When it is set to ON, filter setting area is displayed as a green dashed line on the radar screen.

1-11. AIS and ARPA Target Association Condition

■ When the distance between an AIS target and an ARPA target is less than the “identical distance” of a preset value, these targets might be the same. In this case, only AIS symbol is displayed and ARPA symbol may be suppressed. The method of setting the “identical distance” to activate this association is as follows.

Operation procedure

1. Left-click [MENU] on the screen.
   Main menu opens.

2. Left-click [SUB1 MENU] .
   SUB1 menu opens.

3. Left-click [ARPA/AIS] .
   ARPA/AIS menu opens.

4. Left-click [AIS SETTING].
   AIS SETTING menu opens.

5. Left-click the "7.IDENTICAL DISTANCE" edit box.

   [TCPA LIMIT] will be selected.
   The numeric input dialogue box is opened.

6. Input the new value by pressing the 0 to 9 number keys or by using the [+] or [-] keys, then press [END] to input.

Note:

1. ARPA symbol which was suppressed by this association can be re-displayed by switching OFF the AIS display. See “1-6 AIS Symbol Display”.
2. Both AIS and ARPA symbol are displayed when the “IDENTICAL DISTANCE” is set to zero. (Association OFF mode.) When turning power on the radar display, the “IDENTICAL DISTANCE” is set to zero.

1-12. AIS Lost Target

When a dangerous AIS target is lost, the lost target alarm will be activated and the dangerous target symbol will change to a lost symbol. And the present target position is predicted by the final received data from the target and the lost symbol position will be updated for approx. 1 minute. The lost symbol would be deleted when “ALARM ACK” key is pressed or no data has been received for approx. 1 minute after activating a lost target alarm.

LOST TARGET interval depends on the Class A or Class B and the category of ship. Please see the following the lost target interval for Class A and Class B ship.

【SOLAS ships】（Class A）

Category of Ship	Lost target Interval
Ship at anchor or moored and moving at less than 3 knots	18 min
Ship at anchor or moored and moving at more than 3 knots	60 sec
Ship 0 to 14 knots	60 sec
Ship 0 - 14 knots and changing course	60 sec
Ship 14 - 23 knots	36 sec
Ship 14 – 23 knots and changing course	36 sec
Ship > 23 knots	12 sec
Ship > 23 knots and changing course	12 sec

【Non SOLAS ships】（Class B）

Category of Ship	Lost target Interval
Ship < 2 knots	18 min
Ship 2 – 14 knots	180 sec
Ship 14 – 23 knots	90 sec
Ship > 23 knots	30 sec

NOTE:

When non dangerous target is lost, the target symbol will be fixed at the last reported position and deleted automatically after waiting for the data input from the target for above lost target interval.

1-13. Conditions of AIS Symbol Display

■ Maximum Target Number and Display Priority

Up to 50 AIS target symbols can be displayed in JMA-9900 series radar. When more than 50 AIS targets exist, 50 targets to be displayed are selected by the following priority order.

1. Dangerous target. (Both CPA and TCPA of a target are less than the preset CPA and TCPA safe limit.)
2. Selected Target for numerical data display.
3. The target specified in target search mode. (See 1-4 Note for search mode)
4. The target in an AIS filter. (The closer target from own ship in the filter has higher priority than further ones.)
5. Targets outside of a filter and they do not conform with the above 1 to 4 conditions. A nearer target from own ship has higher priority than further ones.

Note:

When the 50 AIS targets symbol are displayed and 51st target enters, "AIS MAX TARGET" message appears at the lower right part of the screen and alarm sounds with “Pi! Pi! “.

■ AIS Target Vector Display

- The vector of an AIS symbol is displayed in either ground-stabilized or sea-stabilized by a setup of the own speed equipment.

The vector used now is displayed on "OS STAB" at the upper right of a screen.

When displayed as "OS STAB GND"--- AIS Vector presentation is Ground-stabilized
When displayed as "OS STAB SEA" --- AIS Vector presentation is Sea-stabilized

- When the vector of an AIS symbol is displayed by sea-stabilized, the sea-stabilized vector of AIS target is calculated from the COG/SOG of AIS target and the own ship COG/SOG & CSE/STW information.
-

Note:

The vector of AIS target is not displayed in following cases.

Case 1: COG / SOG data is not transmitted from GPS/DGPS.

Case 2: The selected speed equipment is not working normally.

■ There are the following alarms in AIS system.

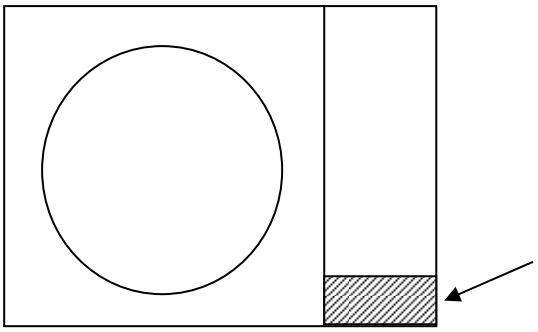
Alarm Message	Meaning
CPA / TCPA	Dangerous Target is occurred
LOST	Lost Target is occurred
AIS MAX TARGET	The number of displayed AIS symbols was exceeded the maximum target number 50. (The 51st data was received.)
AIS (DATA)	AIS is not connected correctly. Or AIS is turned off.
AIS I/ F (DATA)	The AIS interface is not connected to radar correctly. Otherwise the interface is faulty.
AIS ALARM ***	It is the alarm information received from AIS, Local Alarm Number of an ALR sentence is displayed by 3 figure number "***".. See the AIS Alarm list below.

AIS Alarm List on RADAR display

AIS Alarm NO.	**Meaning of AIS Alarm**
001	Tx malfunction
002	Antenna VSWR exceeds limit
003	Rx channel 1 malfunction
004	Rx channel 2 malfunction
005	Rx channel 70 malfunction
006	General failure
008	MKD connection lost
025	external EPFS lost
026	no sensor position in use
029	no valid SOG information
030	no valid COG information
032	Heading lost / invalid
035	no valid ROT information

Note:

An alarm message is displayed at lower right part of the radar screen.



1-15. Operational restrictions

AIS function is not available when the manual speed input or SET/DRIFT data is used and following operational restrictions exist

1) An AIS function cannot turn ON

・When "MANUAL" was selected as a speed input source.

・When SET and DRIFT was set in “LOG” speed mode

2) "LOG" speed mode cannot be chosen as a speed source.

・When an AIS function was ON and SET and DRIFT were set.

3) "MANUAL" speed mode cannot be selected..

・When an AIS function was ON.

4) DRIFT／SET (Current correction) function cannot turn ON.

・When an AIS function was ON and speed was set as "LOG".

2. Basic Operation with Track Ball

The operation method of the trackball of each menu in this manual. is described in “3.4 Basic Operations” of the JMA-9900 Instruction Manual.

3．Installation of AIS Information Display Kit

Note:

Following connection and setup are not required if the AIS interface was built in the factory before shipping.

3-1. Composition of AIS Information Display Kit

The AIS kit for JMA-9900 consists of .

-AIS I/F TYPE □ : AIS I/F PCB, Base attachment

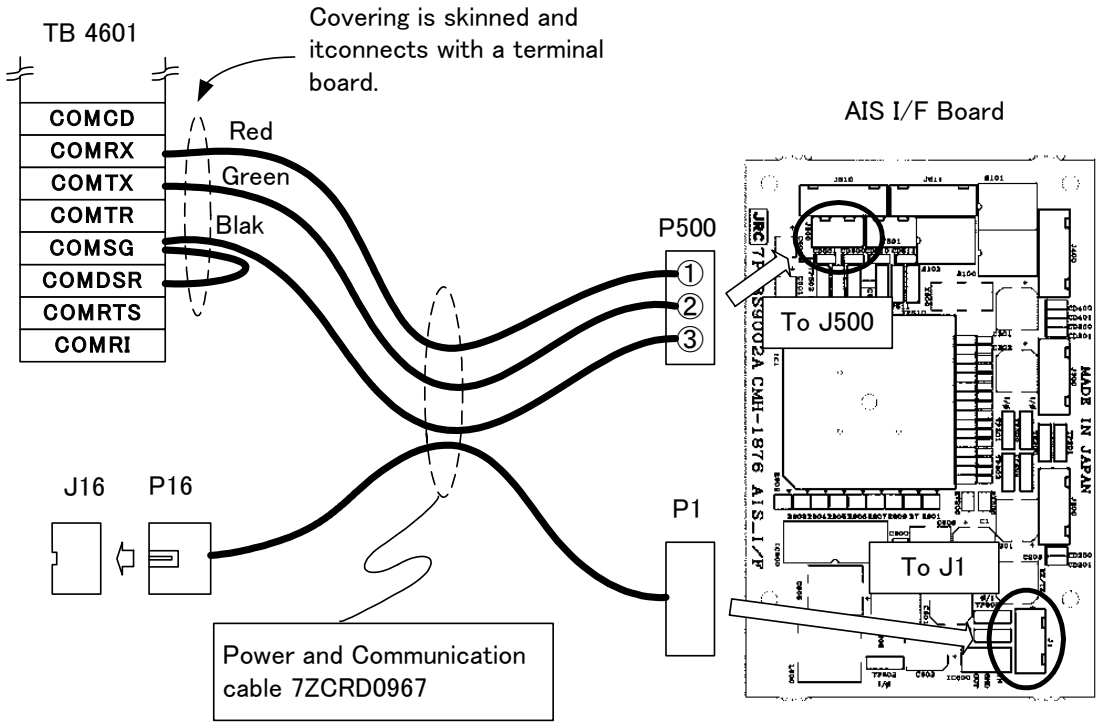
-7ZCRD0967 : Power and Communication cable

3-2. AIS I/F Connection

(1) Attach the AIS I/F in the indicator. Refer to AIS UNIT INSTALLATION MANUAL.

(2) Connect the communication cable as shown in the following figure.

JMA-9900 Terminal Board



(3) Power cable connection

Connect P16 of attached cable to J16 of the terminal board.

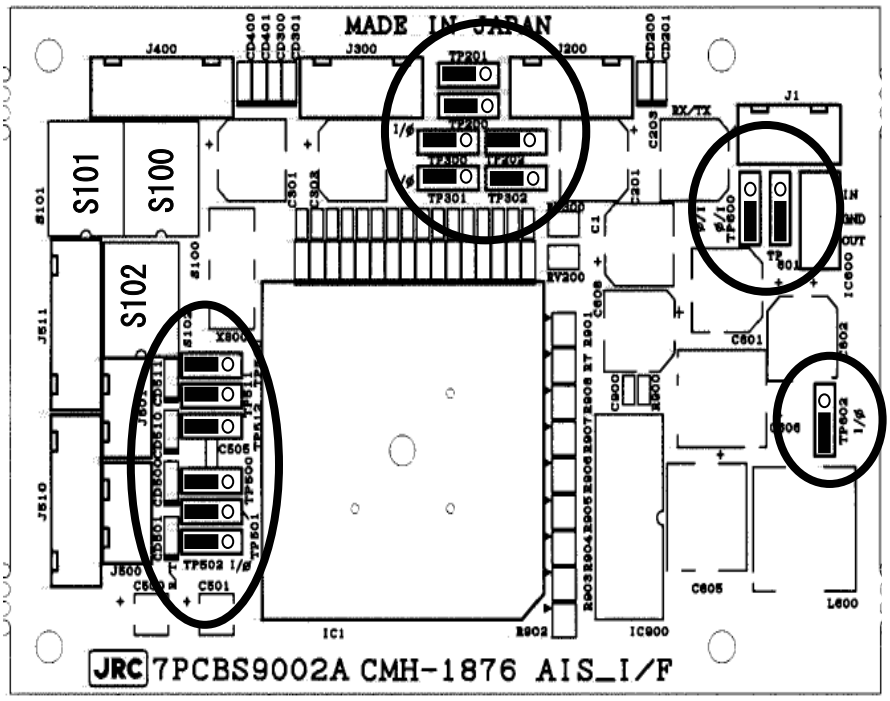
Connect P1 of attached cable to J1 of AIS I/F board.

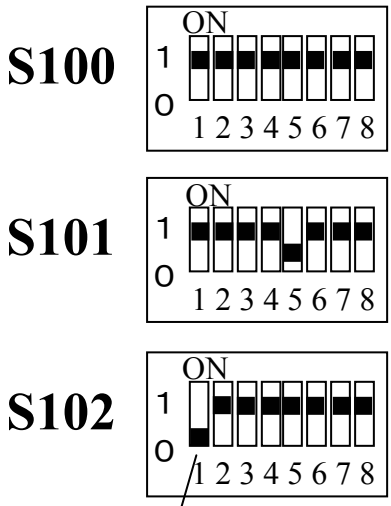
When ISW is equipped, exchange the existing power cable with the 7ZCRD0967 power cable in this kit.

APPENDIX

3-3. Set up after Installation

Set up a link pin, as shown in the following figure.





Note.
It differs from "JMA-9800."

3-4. Turn on & Check

Turn on ship's main power. And turn on radar power.

AIS I/F is operating normally if the button for AIS (refer to 1-1.AIS button) is displayed on the screen lower left.

, The connection or the setup may not be performed correctly if the AIS button is not displayed. Please turn off the radar and check connection and a setup.

Note:

Refer to the installation manual in the case of connection.

APPENDIX

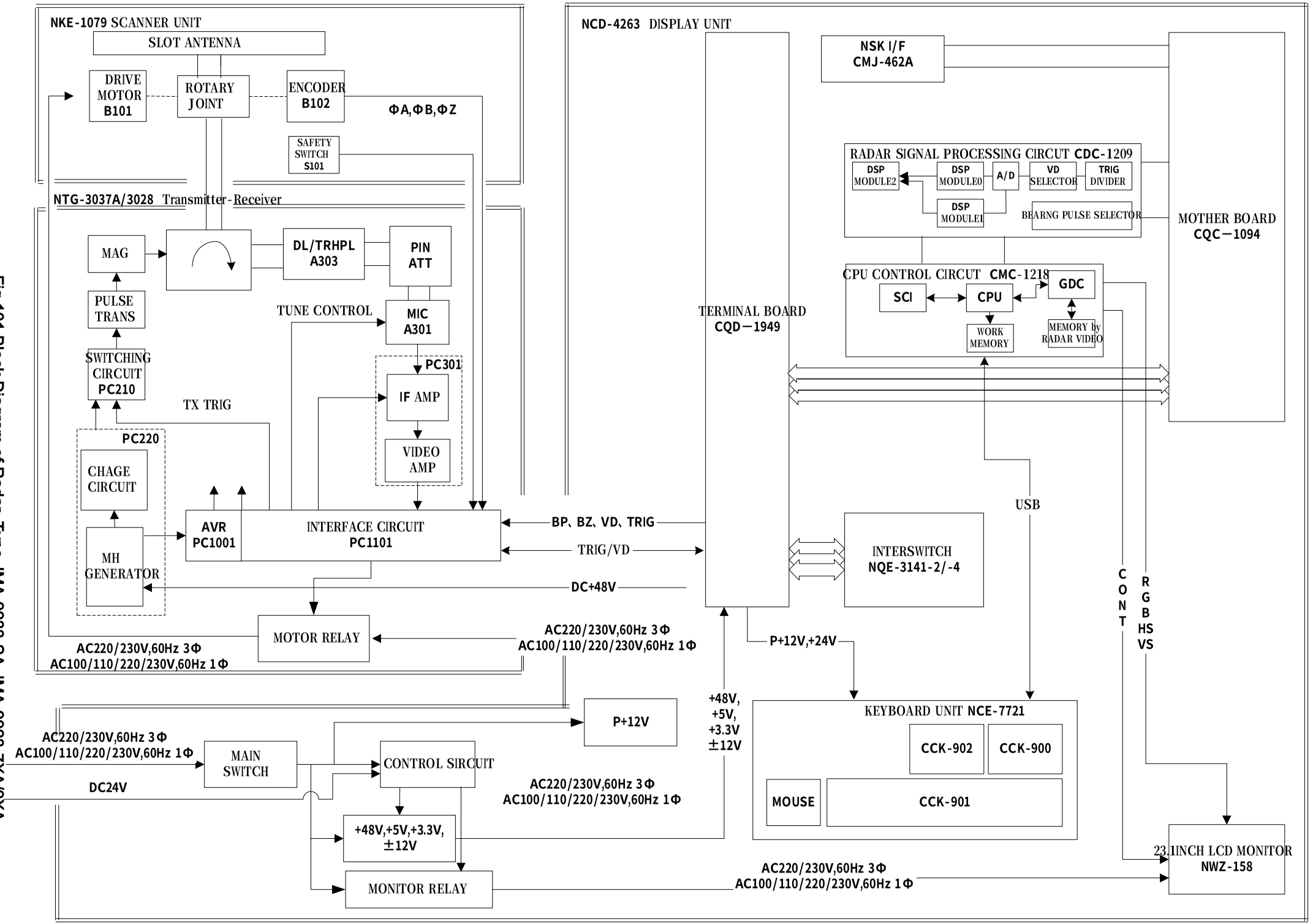


Fig.101 Block Diagram of Radar, Type JMA-9933-SA,JMA-9923-7XA/9XA

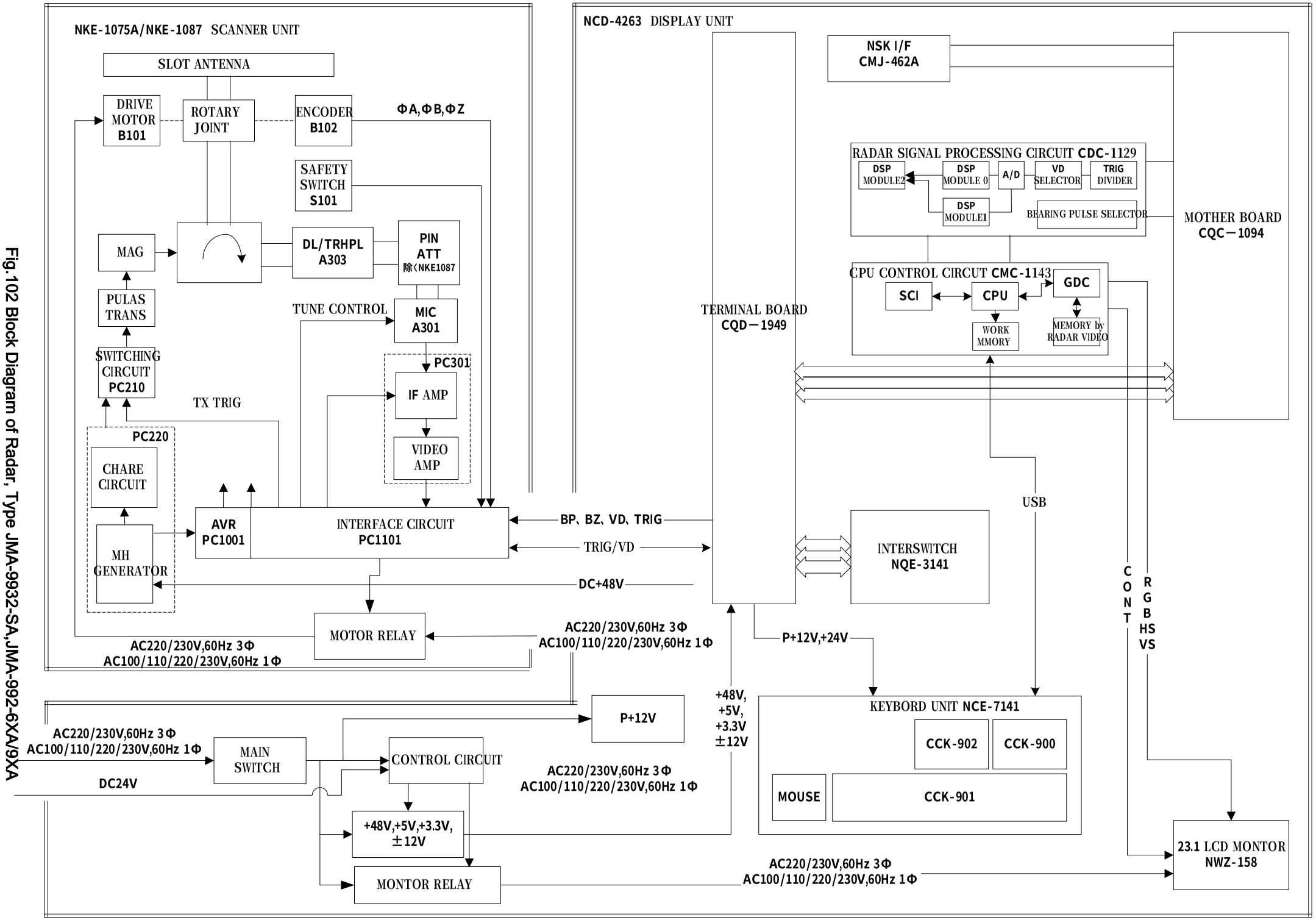
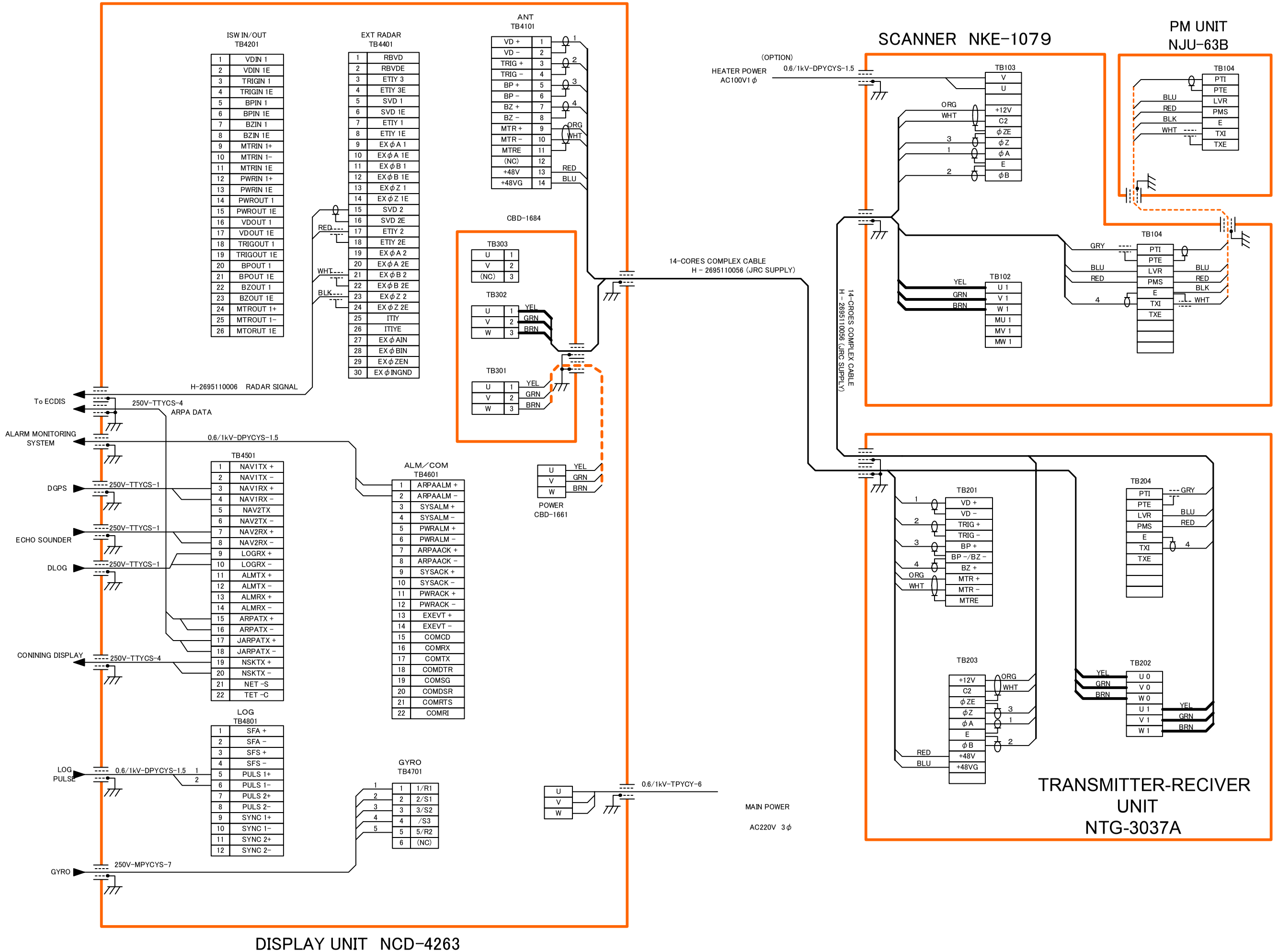


Fig.102 Block Diagram of Radar, Type JMA-9932-SA,JMA-992-6XA/9XA

Fig.103(1) Terminal Board Connection Diagram of Radar, Type JMA-9933-SA (self standing type AC 220V 3f)



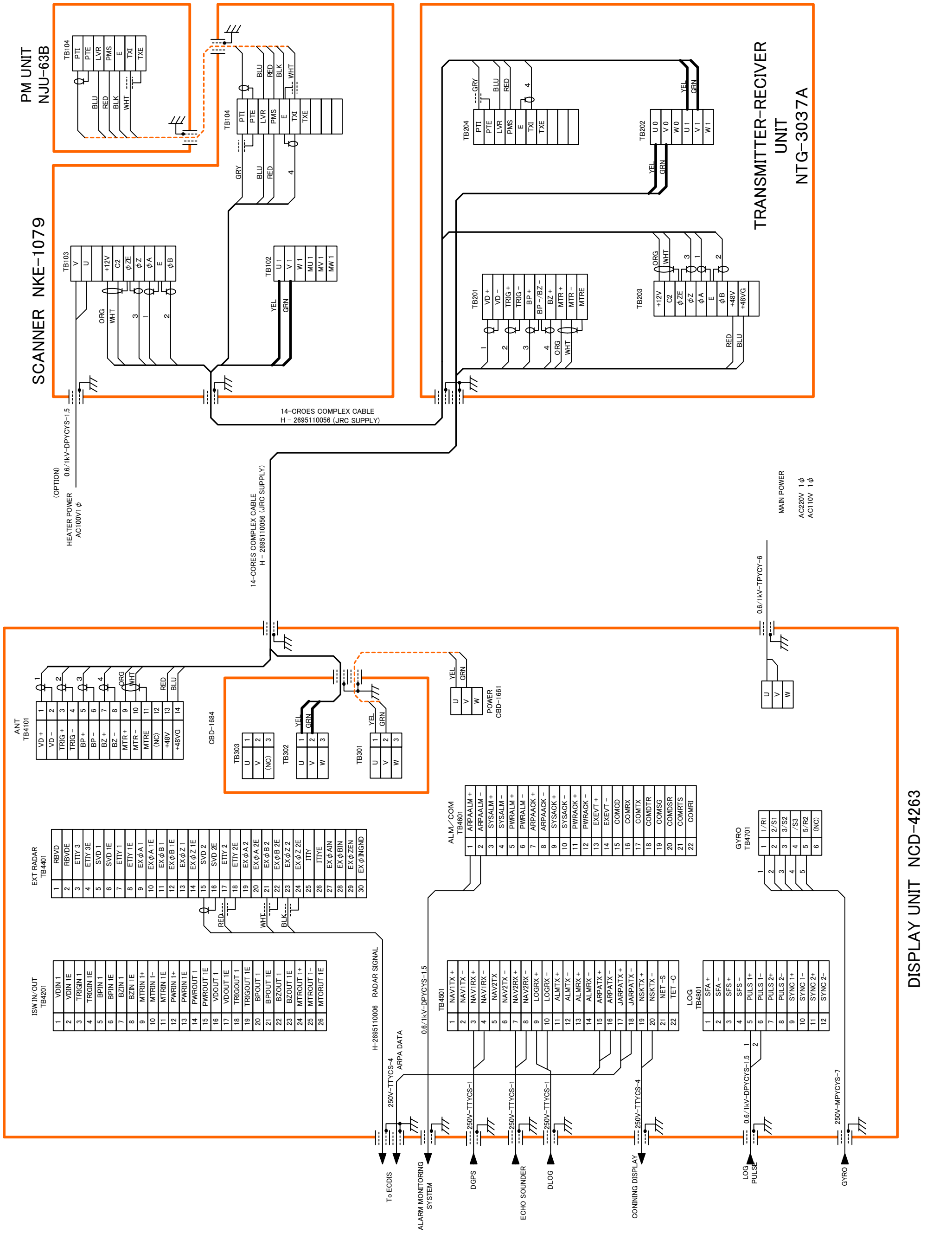


Fig.103(2) Terminal Board Connection Diagram of Radar, Type JMA-9933-SA (self standing type AC220V AC100V 1f)

Fig.104(1) Terminal Board Connection Diagram of Radar, Type JMA-9933-SA (desk top type AC 220V 3f)

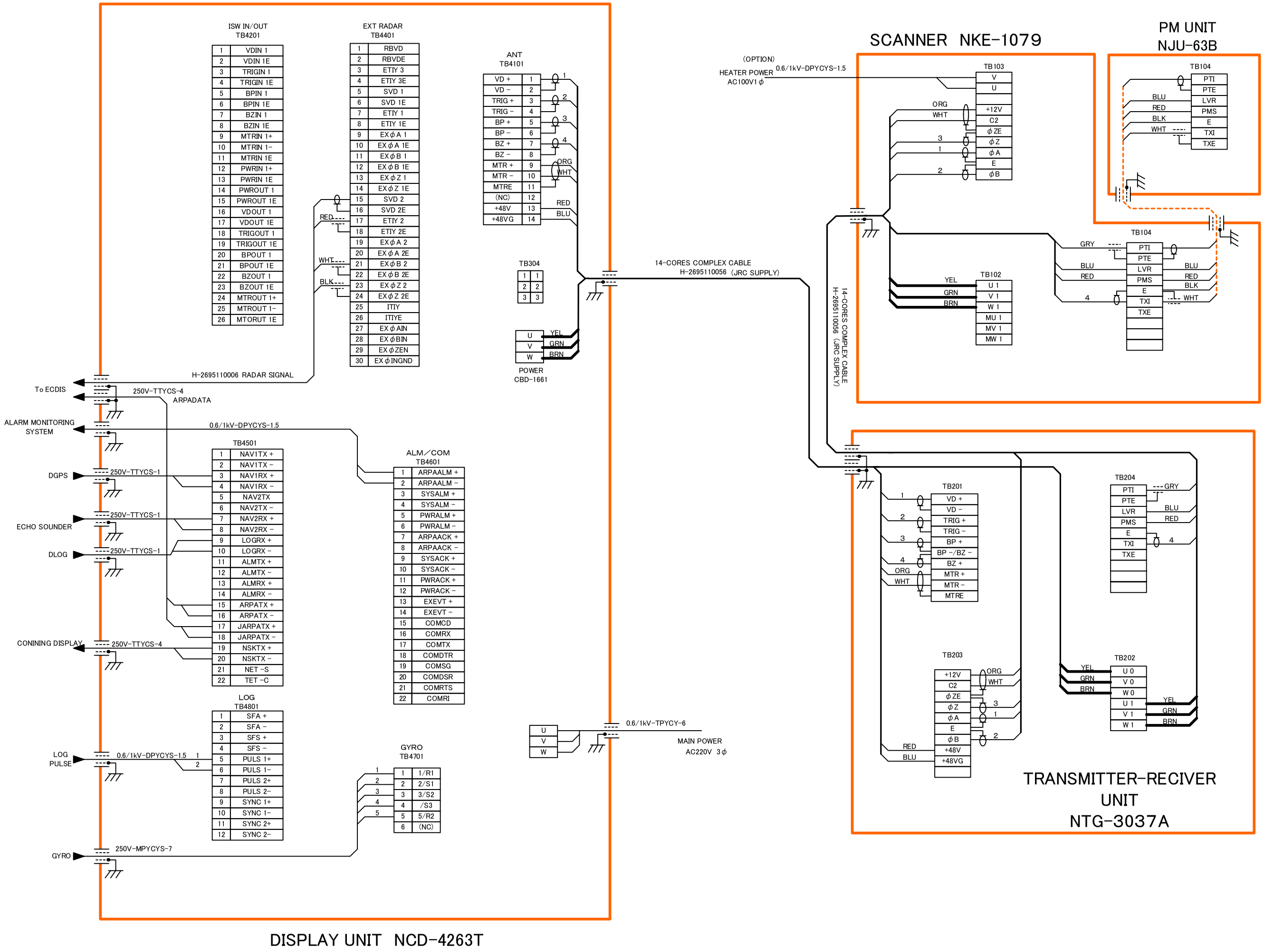


Fig.104(2) Terminal Board Connection Diagram of Radar, Type JMA-9933-SA (desk top type AC220V AC100V 1f)

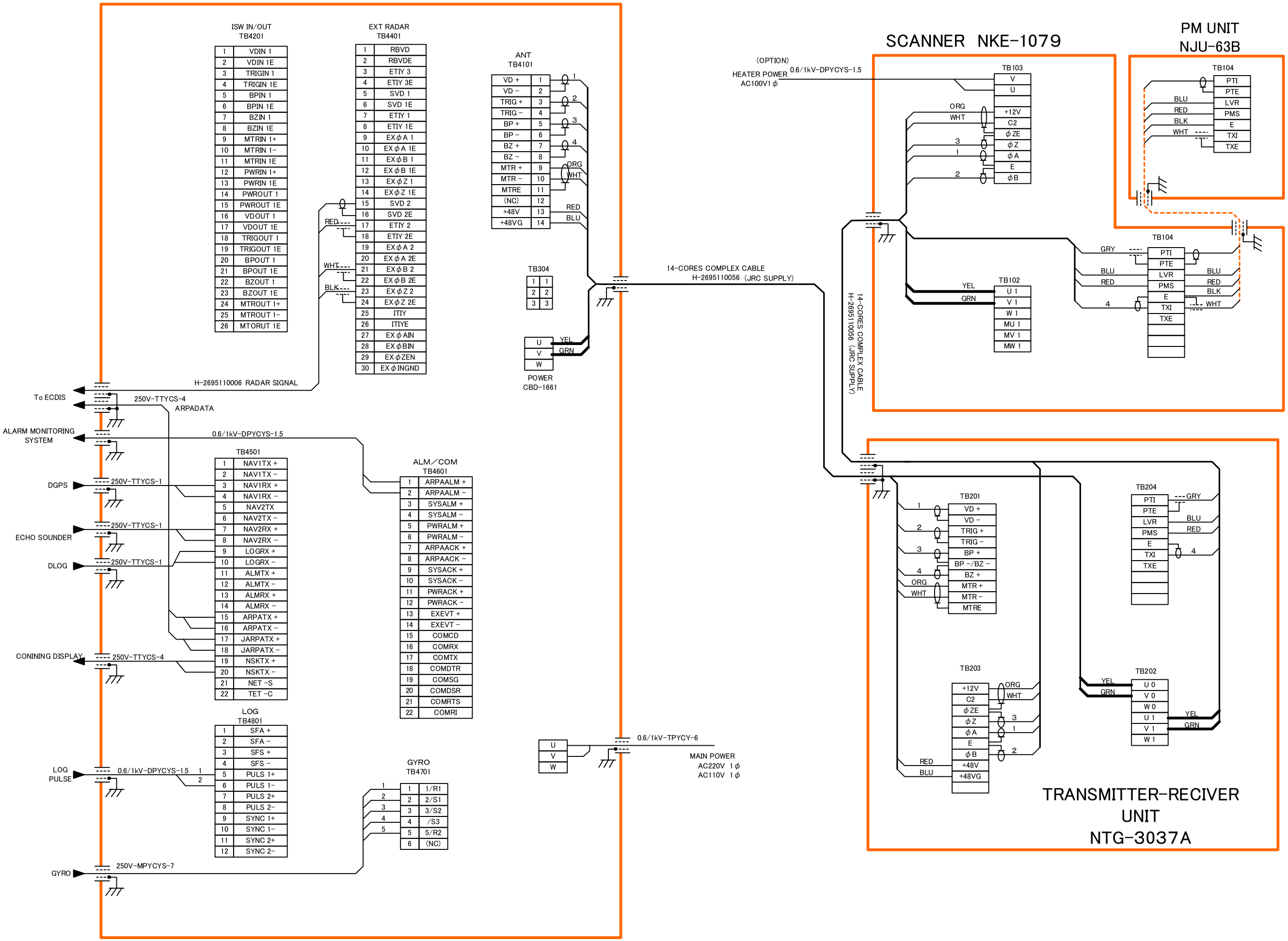


Fig.105(1) Terminal Board Connection Diagram of Radar, Type JMA-9932-SA (self standing type AC 220V 3f)

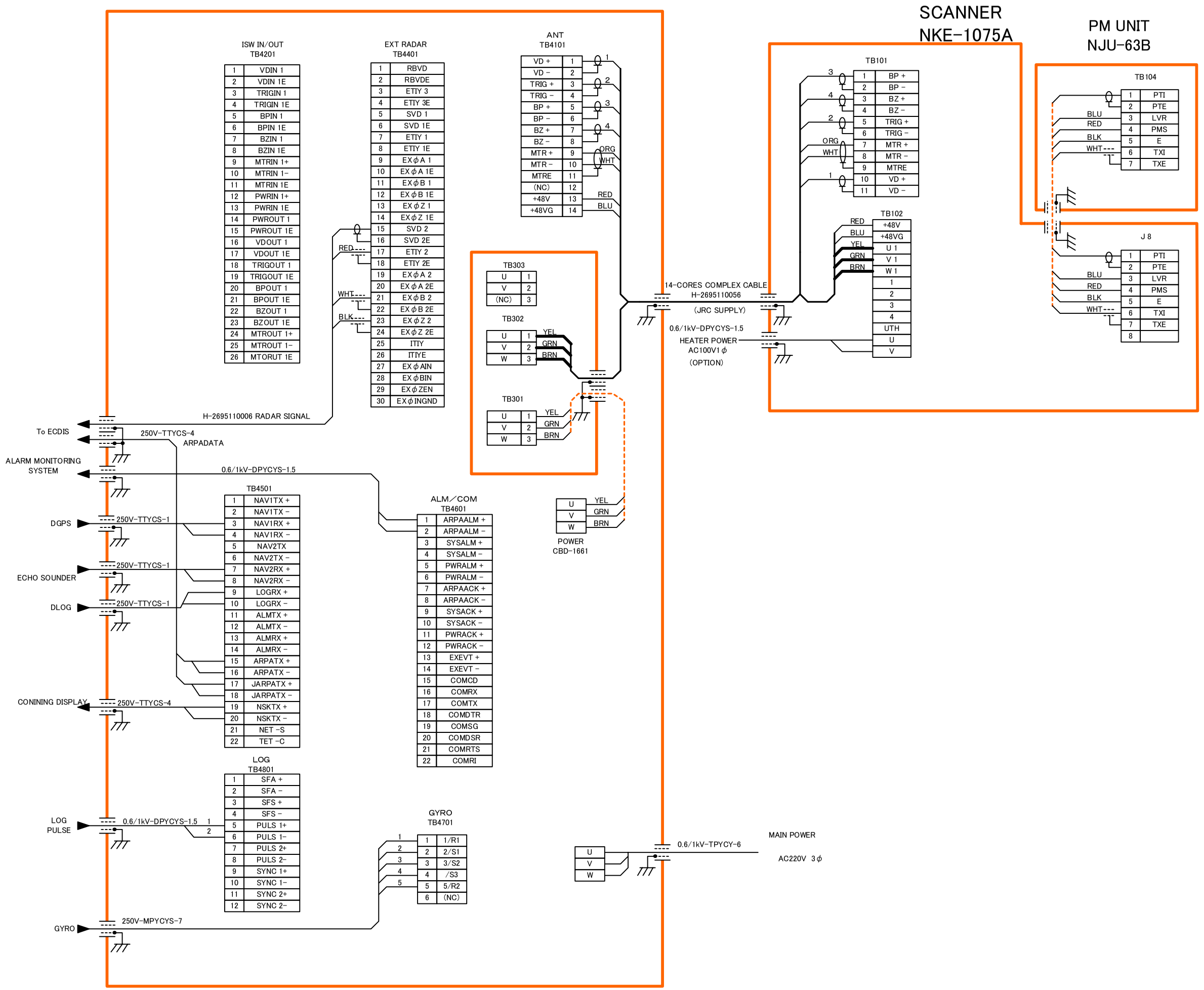
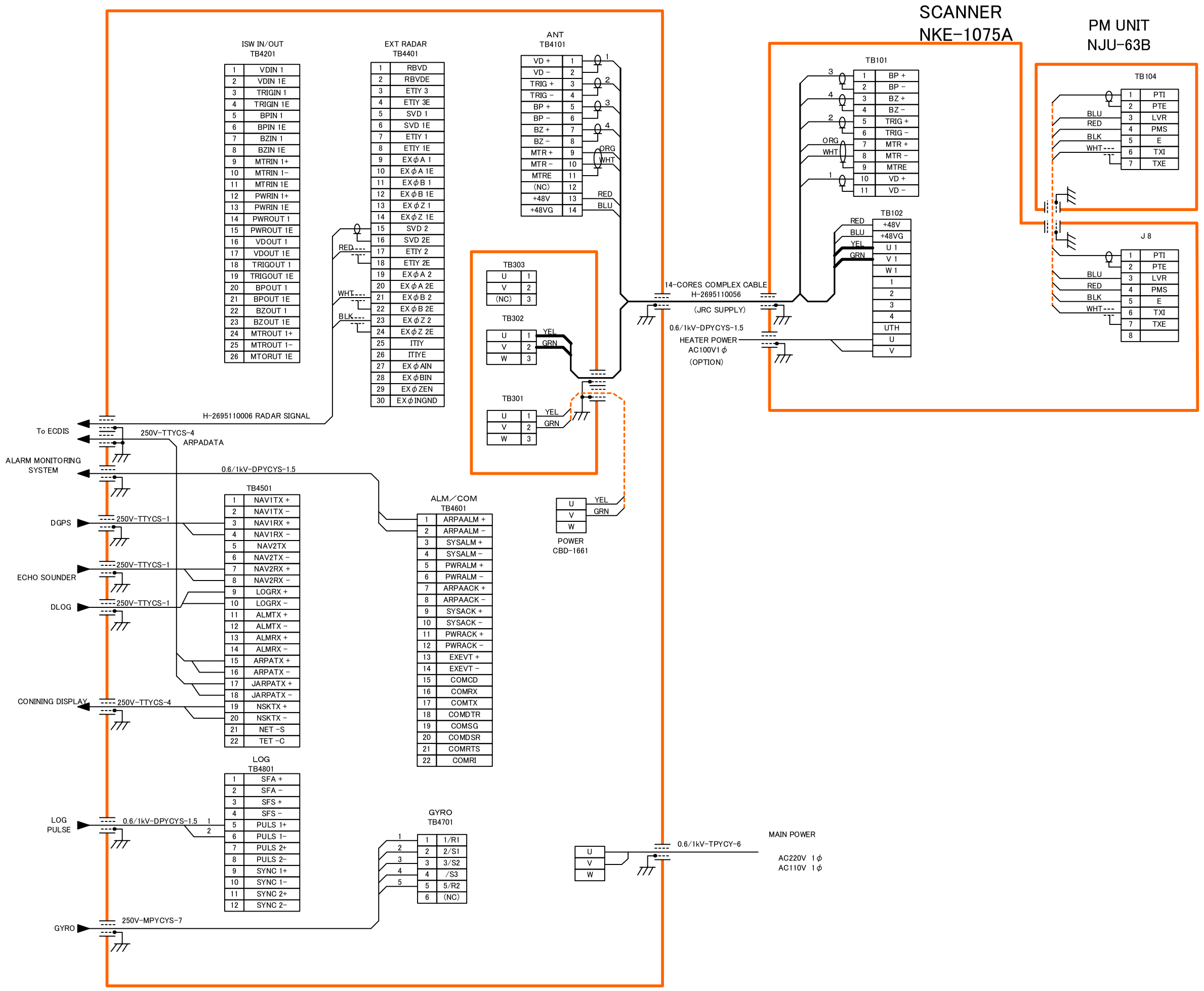


Fig.105(2) Terminal Board Connection Diagram of Radar, Type JMA-9932-SA (self standing type AC220V AC100V 1f)



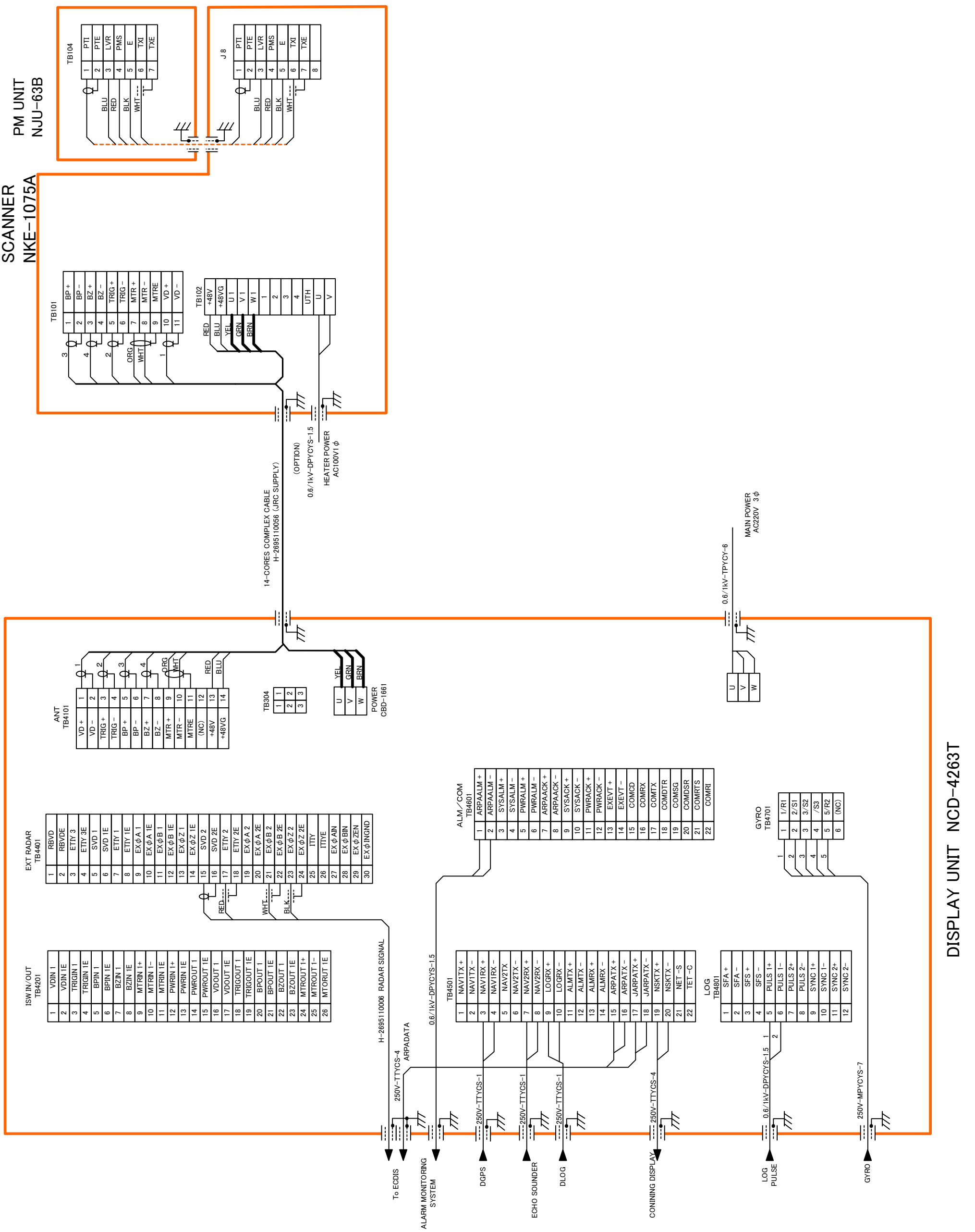


Fig.106(1) Terminal Board Connection Diagram of Radar, Type JMA-9932-SA (desk top type AC 220V 3f)

Fig.106(2) Terminal Board Connection Diagram of Radar, Type JMA-9932-SA (desk top type AC220V AC100 1f)

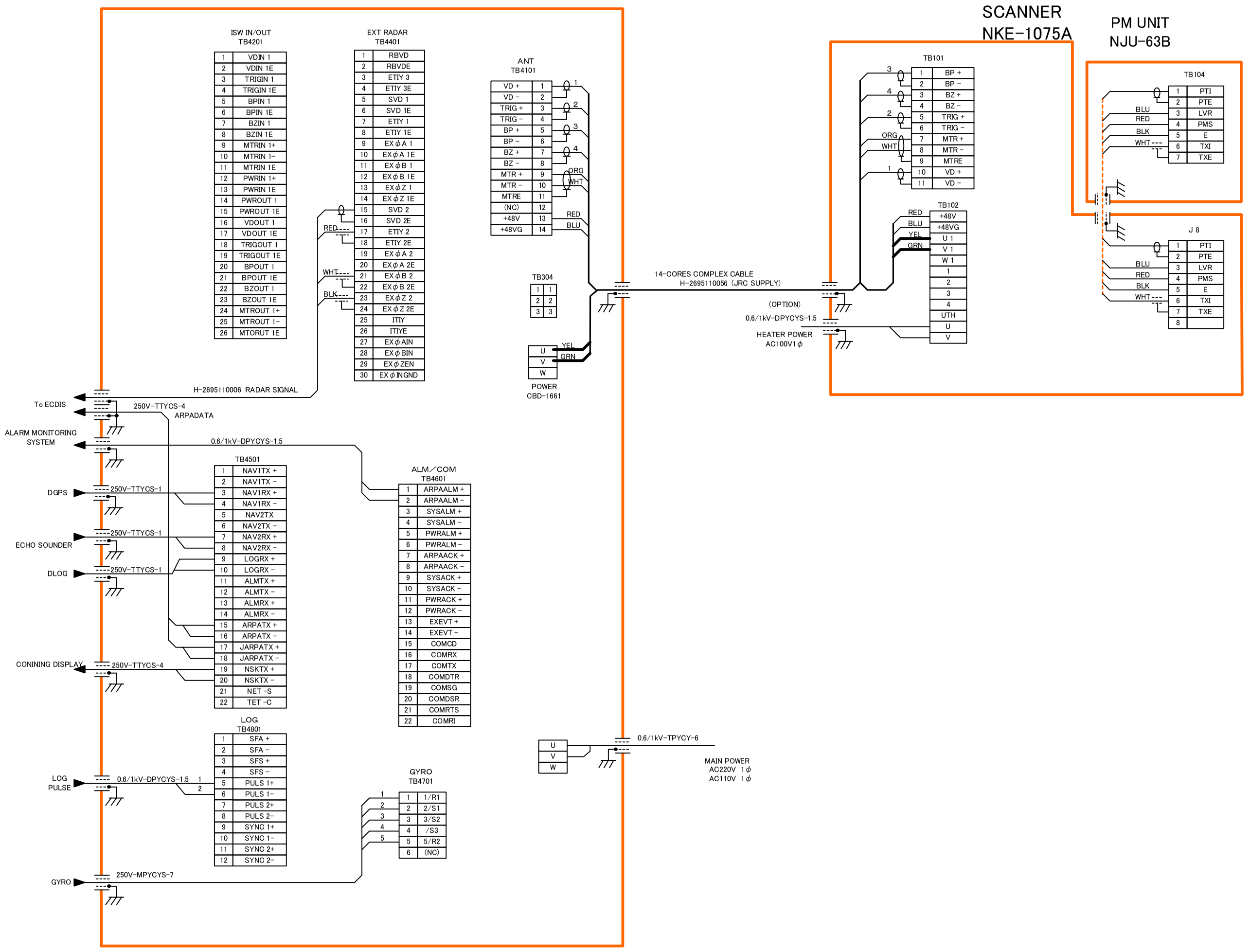


Fig.107 Terminal Board Connection Diagram of Radar, Type JMA-9923-7/9XA (self standing type AC 220V/230V 3f)

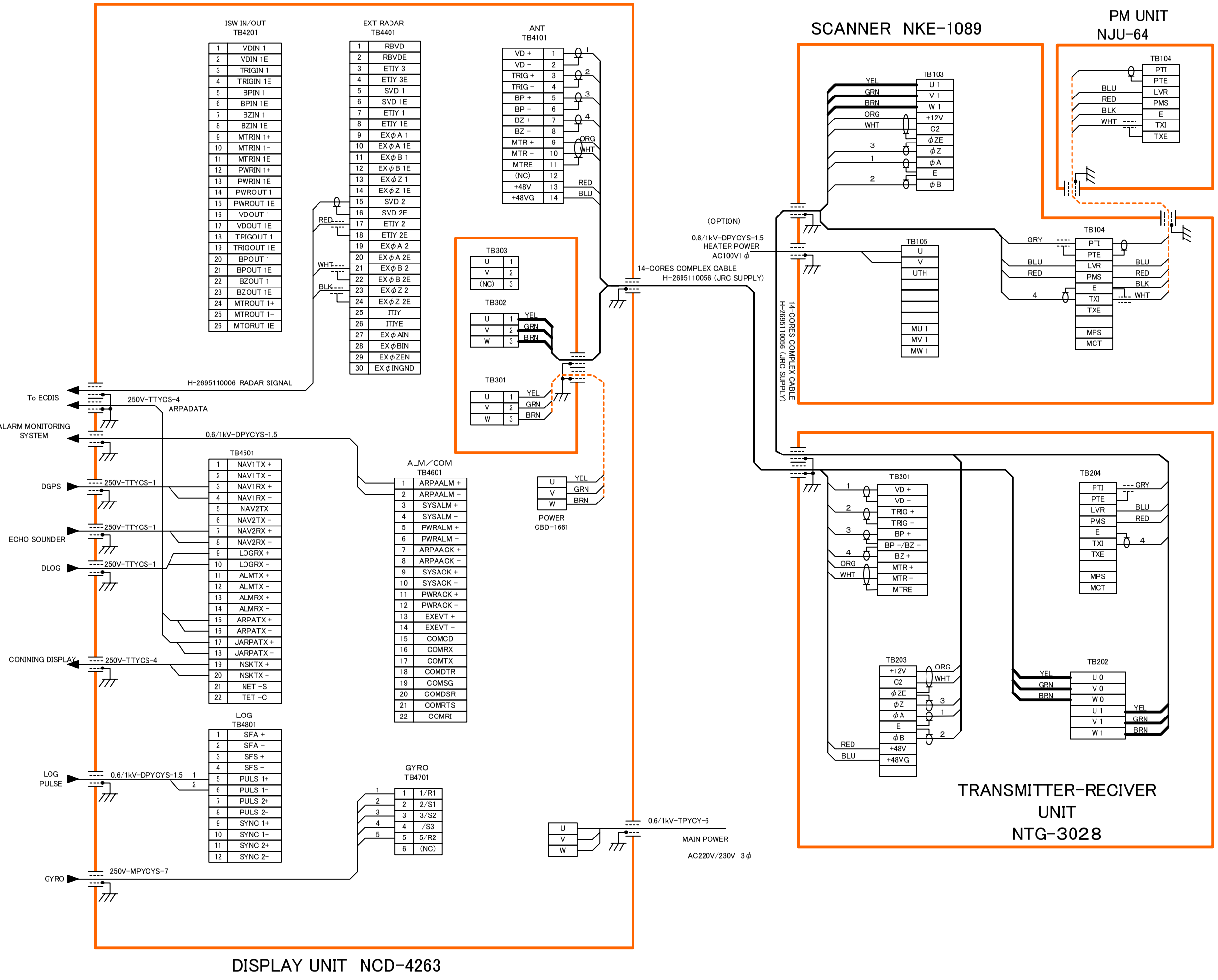
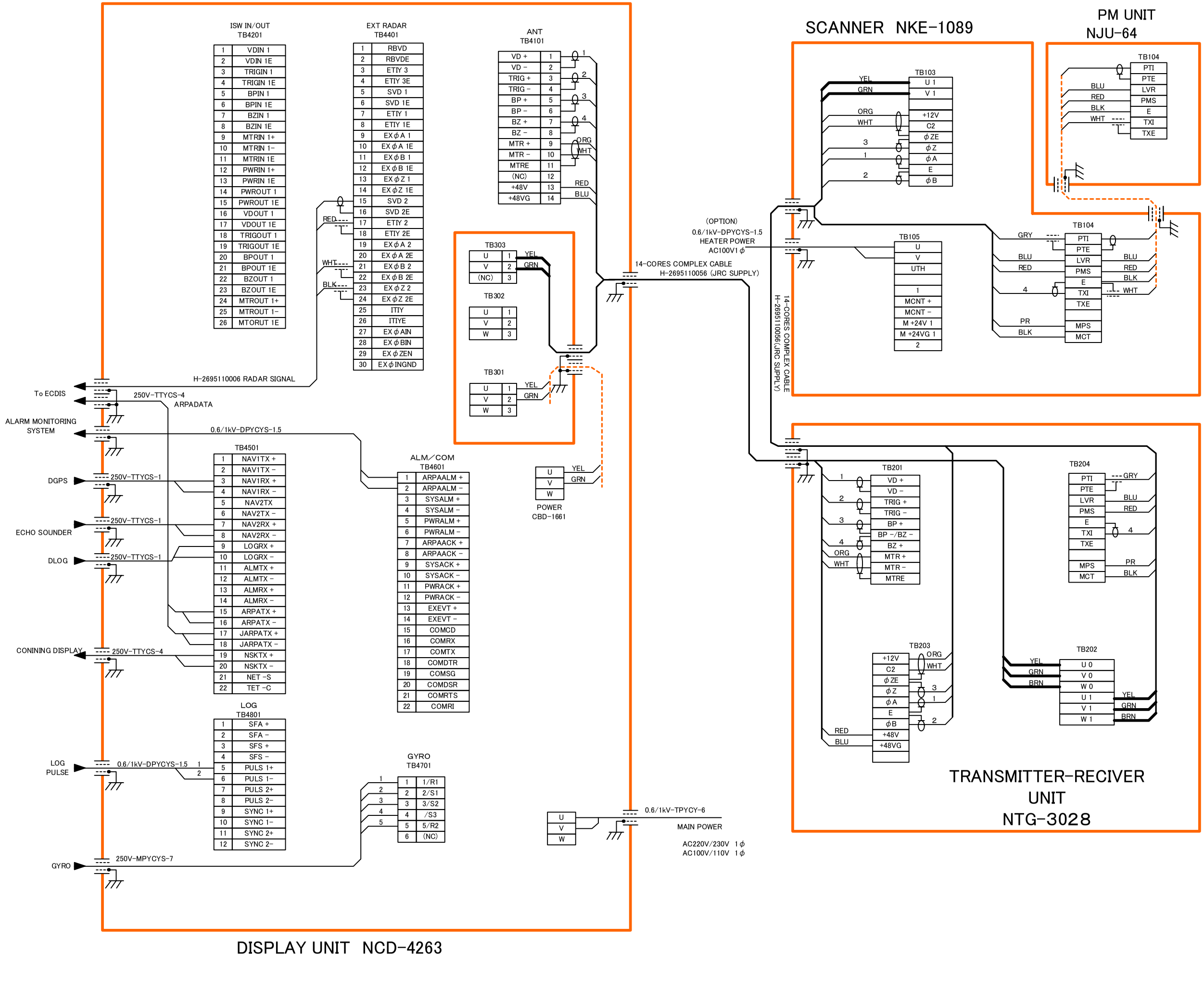


Fig.108 Terminal Board Connection Diagram of Radar, Type JMA-9923-7/9XA (self standing type AC220V/230V 1f AC100V/110V 1f)



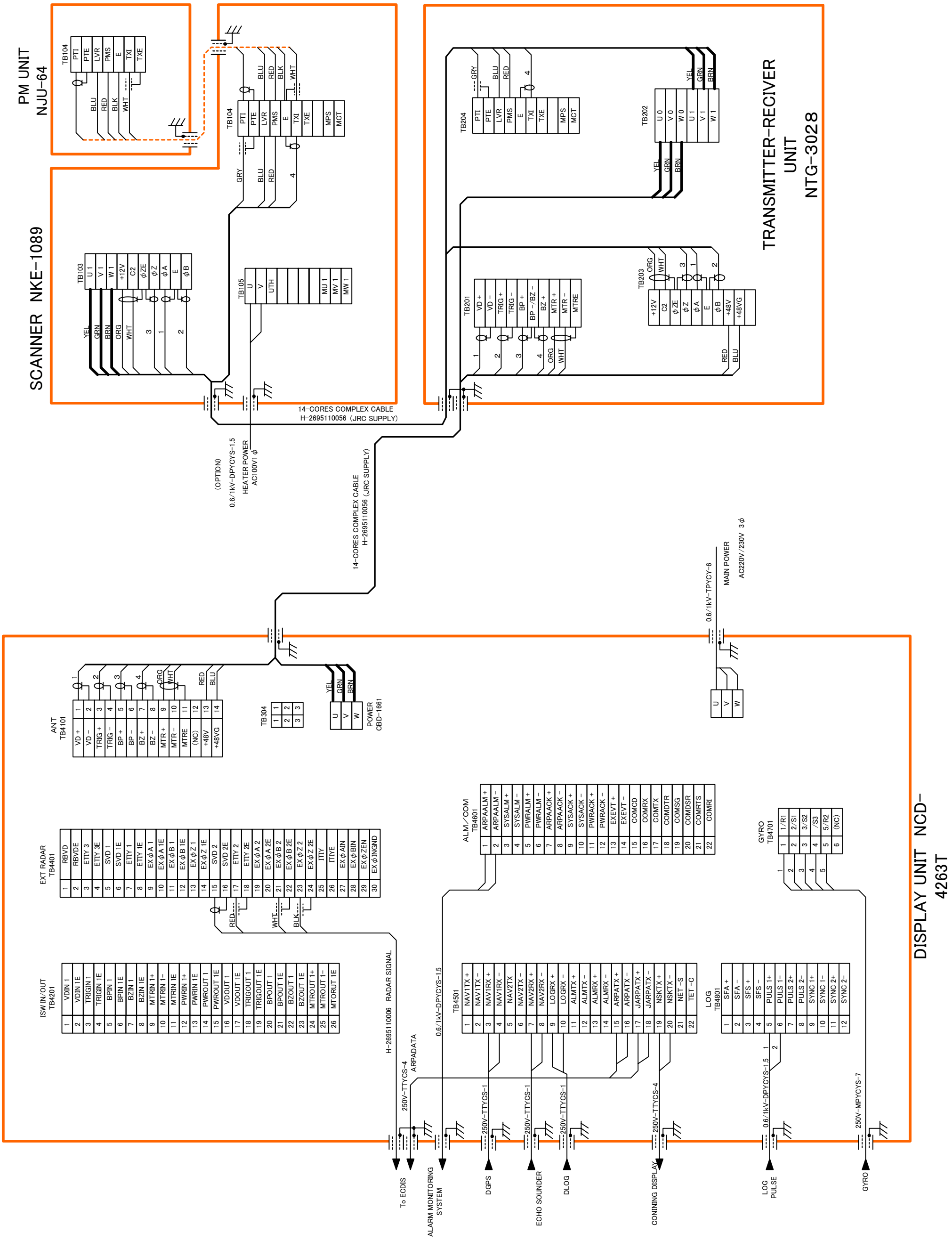


Fig.109 Terminal Board Connection Diagram of Radar, Type JMA-9923-7/9XA (desk top type AC 220V/230V 3f)

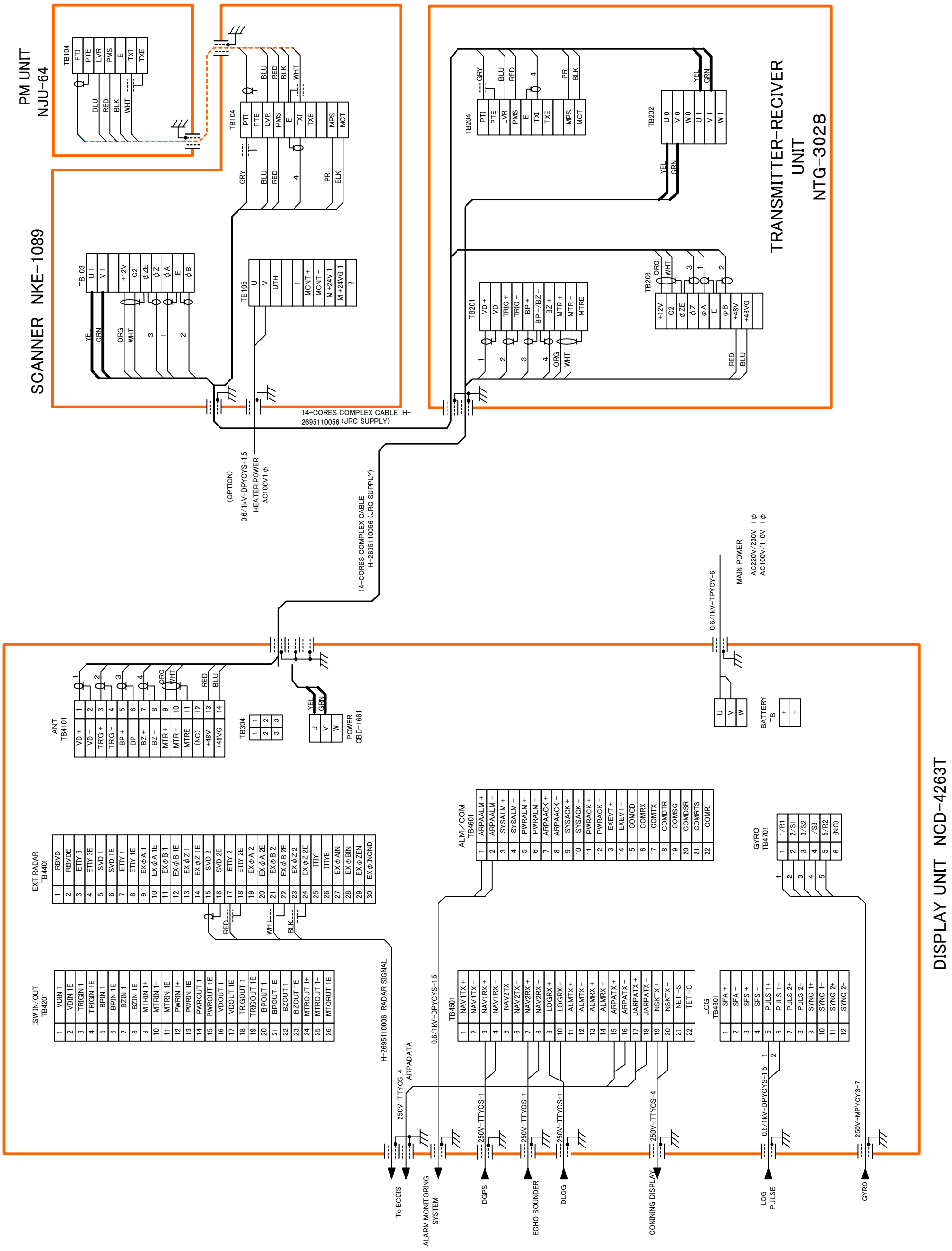


Fig.110 Terminal Board Connection Diagram of Radar, Type JMA-9923-7/9XA (desk top type AC220V/230V 1f AC100V/110V 1f)

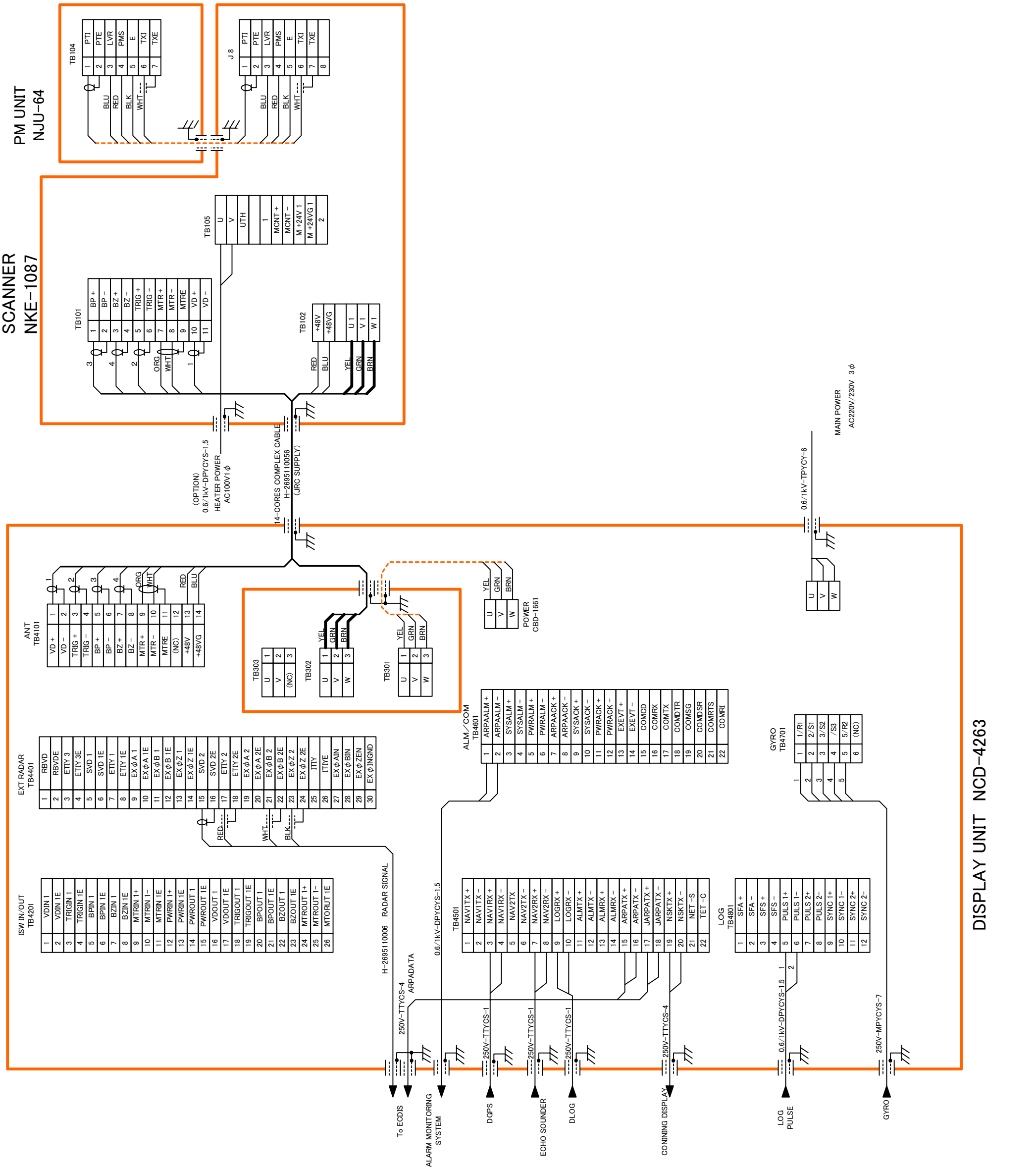


Fig.111 Terminal Board Connection Diagram of Radar, Type JMA-9922-6/9XA (self standing type AC 220V/230V 3f)

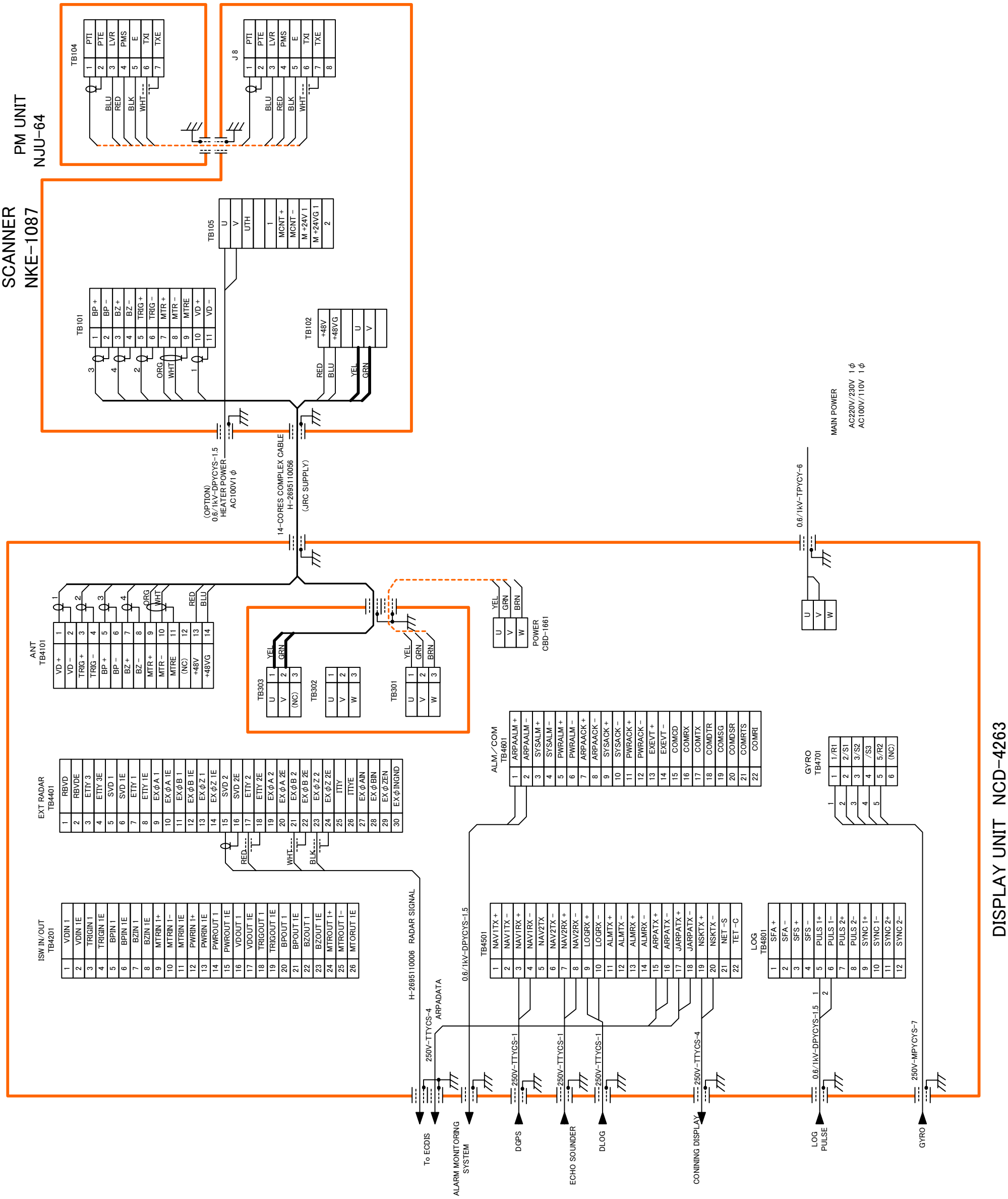
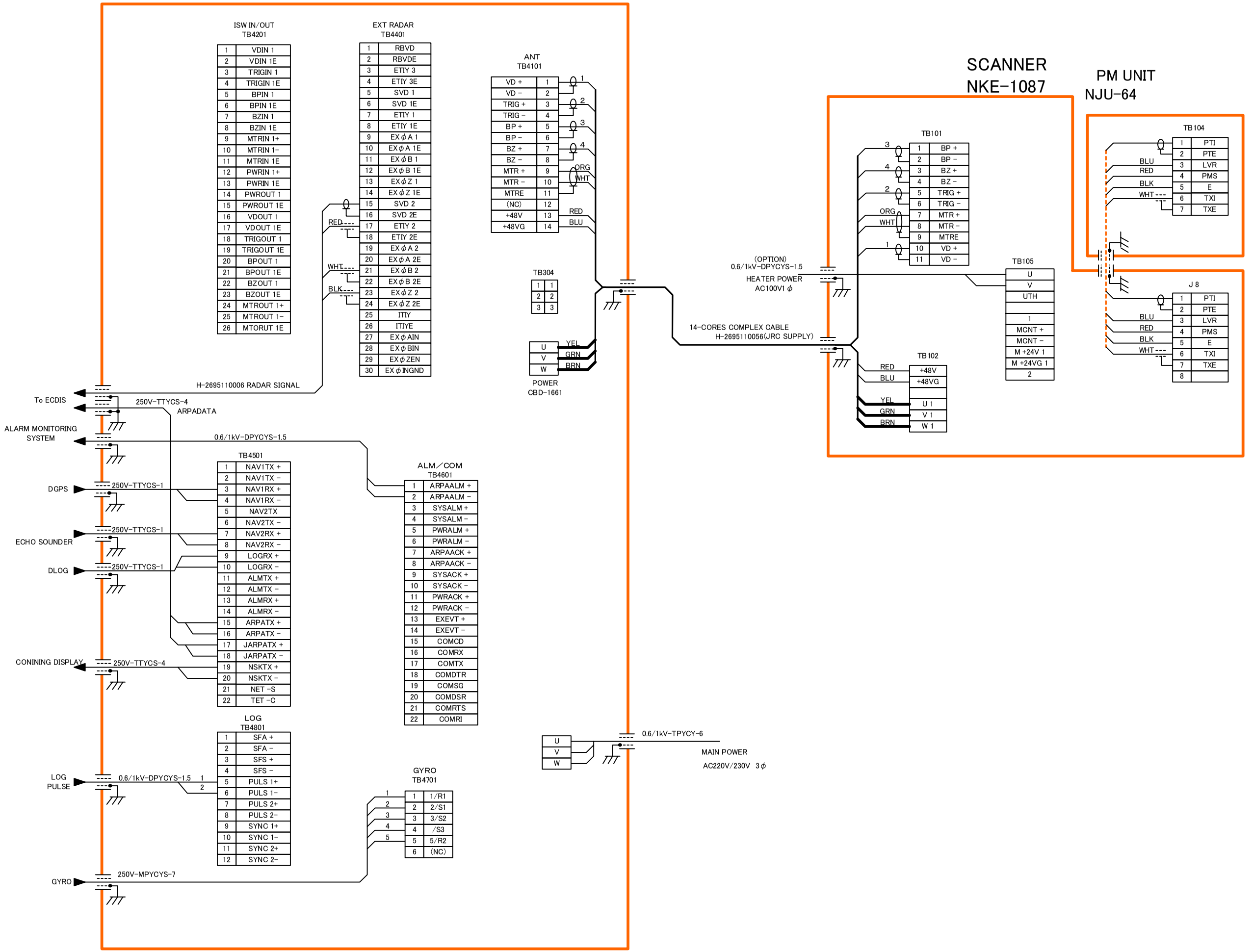


Fig.112 Terminal Board Connection Diagram of Radar, Type JMA-9922-6/9XA (self standing type AC220V/230V 1f AC100V/110V 1f)

Fig.113 Terminal Board Connection Diagram of Radar, Type JMA-9922-6/9XA (desk top type AC220V/230V 3f)



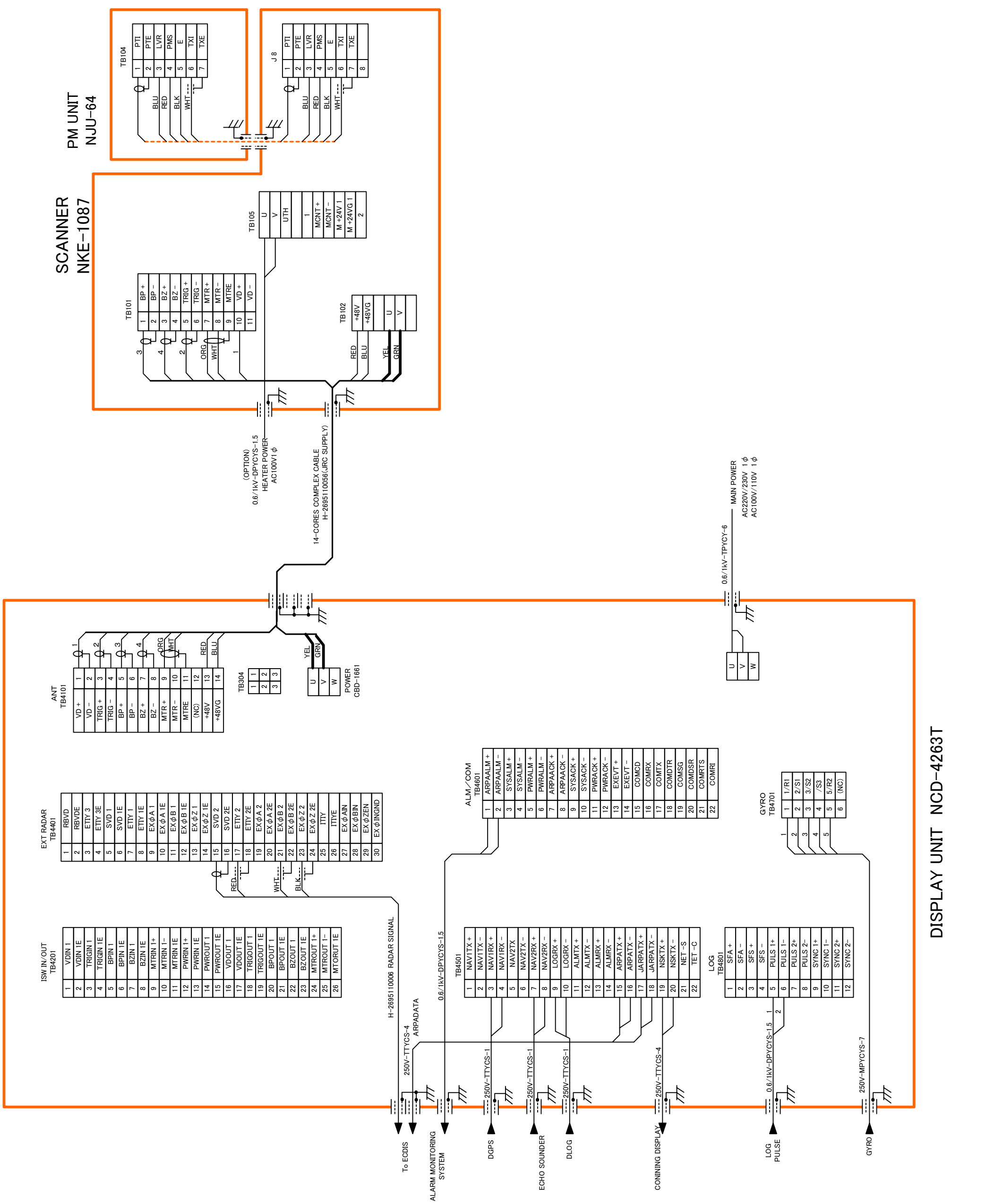


Fig.114 Terminal Board Connection Diagram of Radar, Type JMA-9922-6/9XA (desk top type AC220V/230V 1f AC100V/110V 1f)

JAM-9933-SA:110V_1Φ, 220V_3Φ

DISPLAY UNIT (NCD-4263)

POWER UNIT (CBD-1661)

U
V
W

NFB701
TB701
TB701
TB701

PB7

250V CNT

S701
100
200

INSUPUTVOLTAGE SELECTION

DC250V

DC24V
TB701

PB8
CONTROL CIRCUIT

P+12V
+24V

+3.3V On/Off
+5V On/Off

PB1 P+12V
PB2 +48V
PB3 +5V
PB4 +3.3V
PB5 ±12V

U TB701
V TB701
W TB701
U J701
V J701

U0
V0
W0

PS(POWER On/Off)
TX/STBY
PWRALM
PSMON

J3
J3
J3
J4
J2
J2
J2
J1
J2
J1
J2
J1
J2

SCANNER (NKE-1079)

B101
M
U1/TB102
V1/TB102
W1/TB102
S1
SFA SWITCHI

TRANSMITTER-RECEIVER UNIT (NTG-3037)

U1/TB202
V1/TB202
W1/TB202
U0/TB202
V0/TB202
W0/TB202

RELAY CIRCUIT CSC-632

POWER SUPLAY CBD-1682

±15V
+12V
+5V

+48V
TB203

AC100/110V
AC220/230V
U
V
MONTOR NWZ-158

KEBOARD UNIT NCE-7721
CCK-901
J207

INTERSWITCH CIRCUIT
NQE-3141
(OPTION)

CPU CONTROL CIRCUIT CMC-1218

RADAR SIGNAL PROCESSIN CIRCUIT CDC-1029

+5V
+3.3V
±12V
CN1

MOTHER BOARD CQC-1094

NSK/LOG IF CIRCUIT
CMJ-462A
J3101
+5V
+3.3V
±12V
J4007

+5V
+3.3V
±12V
+48V
+24V
P+12V
J4016
J4001

PS
TX/STBY
PWRALM
J4001

+48V
TB4101

PS
P+12V
+24V
PWRALM
J4048

J4048
P+12V
J4303

TERMINAL BOARD CQD-1949

Fig.115 Primary Power Supply Block Diagram of Radar, Type JMA-9933-SA

JAM-9932-SA:110V_1Φ, 220V_3Φ

DISPLAY UNIT (NCD-4263)

POWER UNIT (CBD-1661)

U
V
W

NFB70

TB701
TB701
TB701

PB7

250V CNT

S701
100
200

INSUPUTVOLTAGE SELECTION

DC250V

DC24V

TB701

PB8

CONTROL CIRCUIT

P+12V

+24V

PS(POWER On/Off)
TX/STBY

PWRALM

PSMON

+3.3V On/Off

+5V On/Off

PB1 P+12V

PB2 +48V

PB3 +5V

PB4 +3.3V

PB5 ±12V

U TB701
V TB701
W TB701

U J701
V J701

U0
V0
W0

J3
J3
J3
J4
J2
J2
J2
J1
J2
J1
J2
J1
J2

SCANNER (NKE-1075)

B101

M

U0/TB102
V0/TB102
W0/TB102

S1

SFA SWITCHI

RELAY CIRCUIT CSC-632

U0
V0
W0
U1
V1
W1

POWER SUPLAY CBD-1682

+48V
TB102

±15V
+12V
+5V

AC100/110V
AC220/230V

U
V

MONTOR NWZ-158

KEBOARD UNIT NCE-7721

CCK-901

J207

INTERSWITCH CIRCUIT
NQE-3141
(OPTION)

P+12V

J4303

CPU CONTROL CIRCUIT CMC-1218

RADAR SIGNAL PROCESSIN CIRCUIT CDC-1029

+5V
+3.3V
±12V

CN1

MOTHER BOARD CQC-1094

NSK/LOG IF CIRCUIT
CMJ-462A

J3101

+5V
+3.3V
±12V

J4007

+5V
+3.3V
±12V
+48V
+24V
P+12V

J4016

J4001

PS
TX/STBY
PWRALM

J4001

+48V

TB4101

PS
P+12V
+24V
PWRALM

J4048

J4048

TERMINAL BOARD CQD-1949

Fig.116 Primary Power Supply Block Diagram of Radar, Type JMA-9932-SA

JAM-9923-7XA:100V/110V_1φ, 220V/230V_1φ, 220V/230V_3φ
JAM-9923-9XA: 220V/230V_3φ

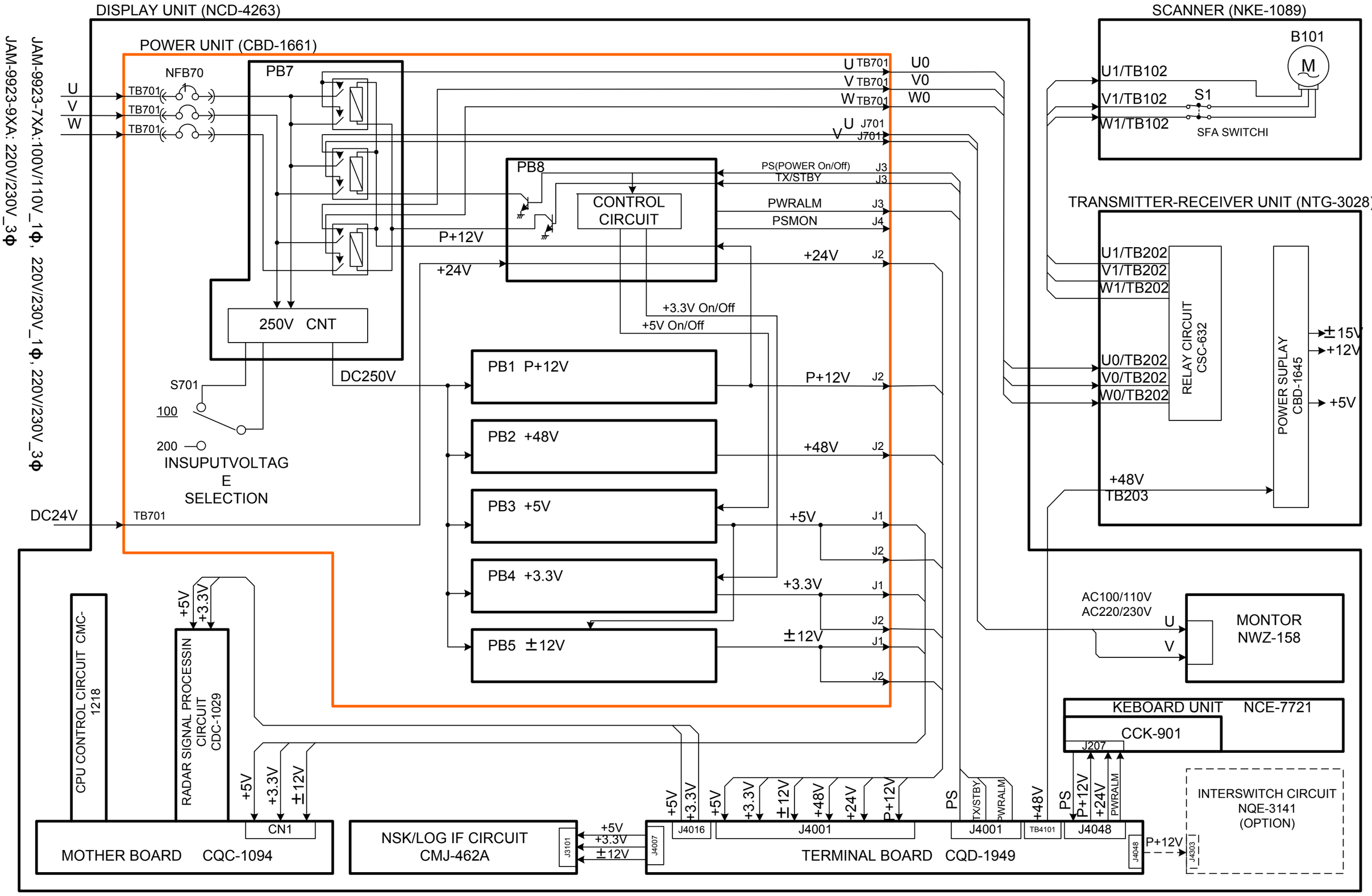


Fig.117 Primary Power Supply Block Diagram of Radar, Type JMA-9923-7XA/9XA

JAM-9922-6XA:100V/110V_1φ, 220V/230V_1φ, 220V/230V_3φ

JAM-9922-9XA: 220V/230V_3φ

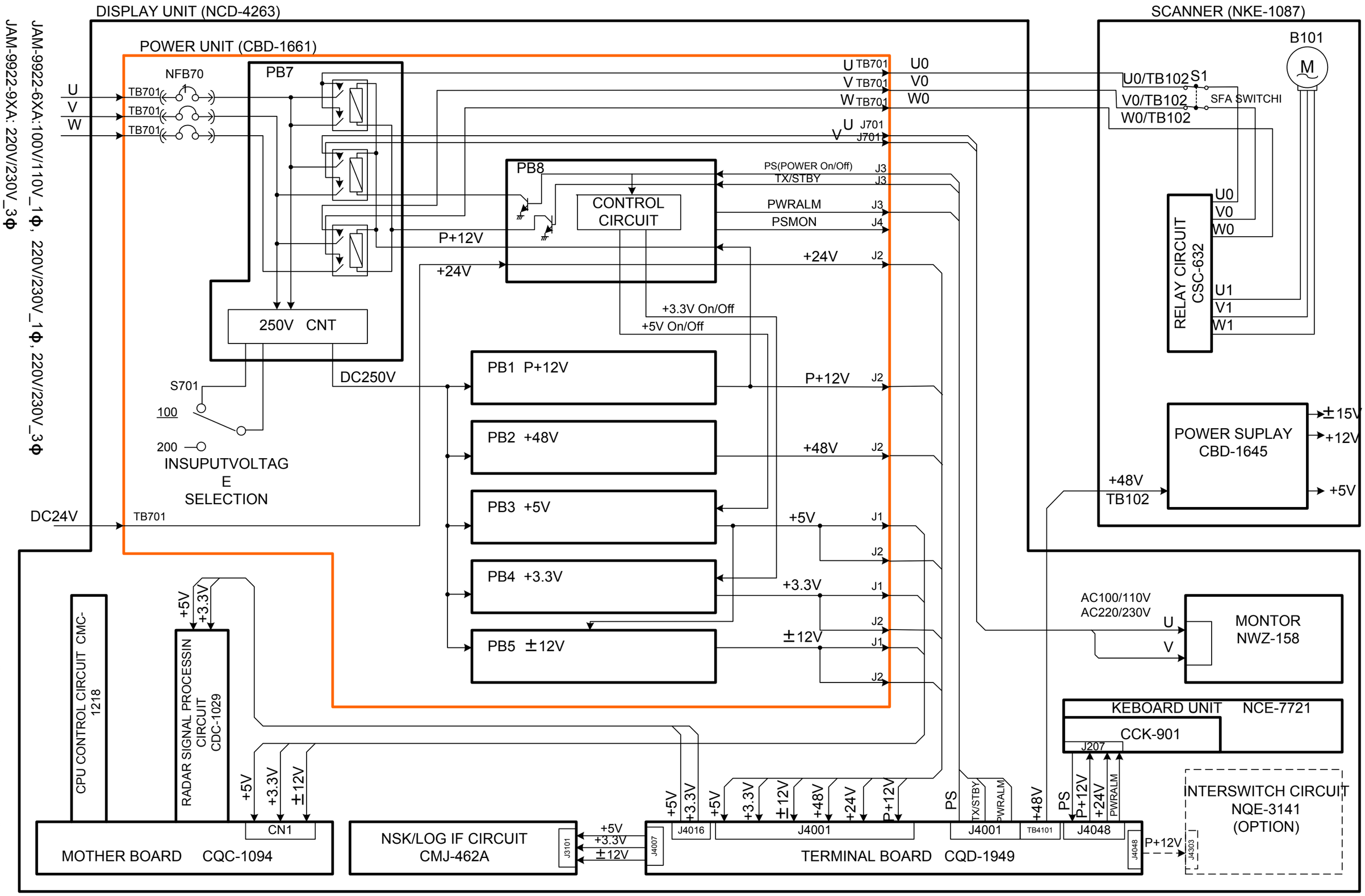


Fig.118 Primary Power Supply Block Diagram of Radar, Type JMA-9922-6XA/9XA

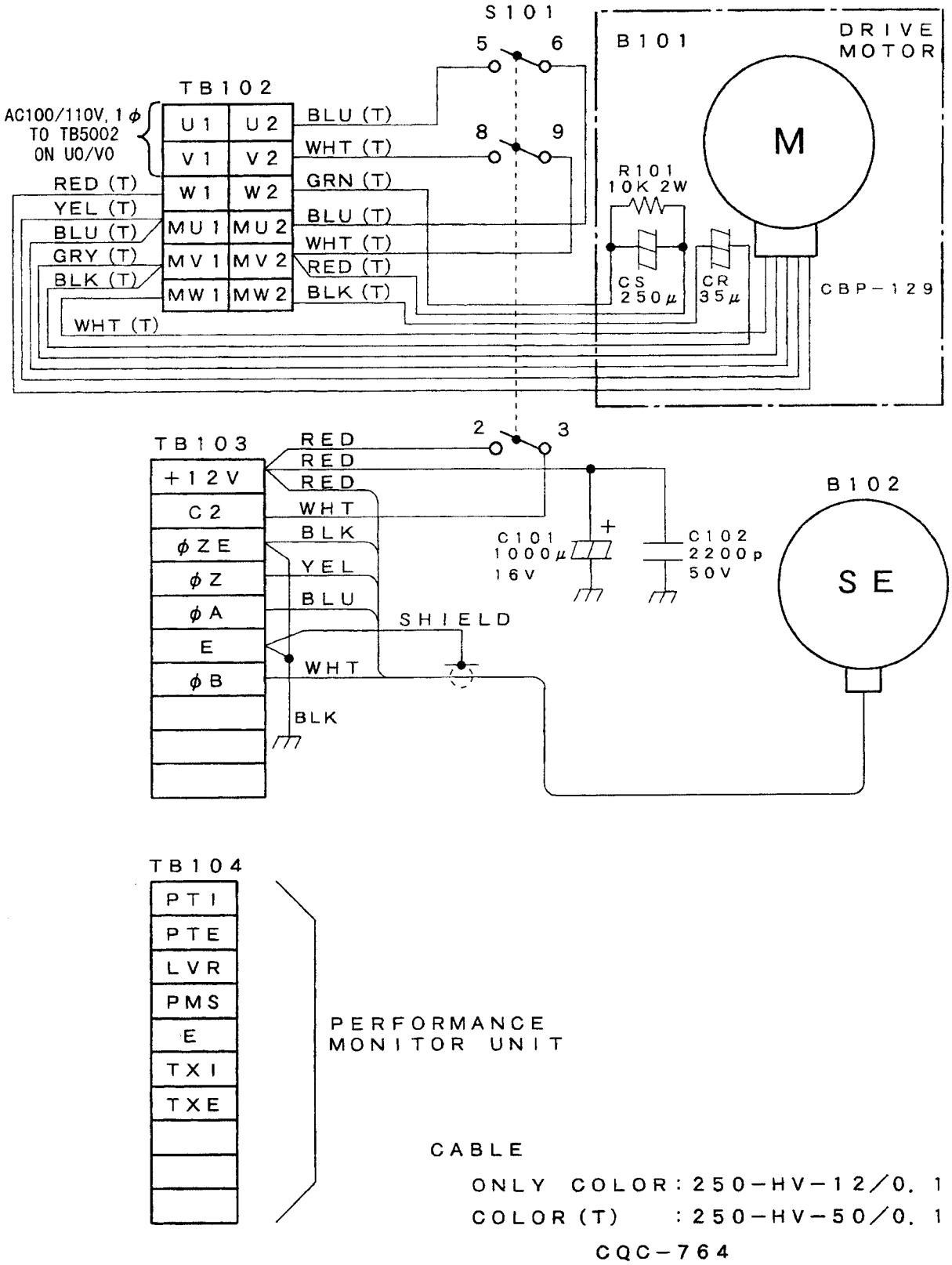


Fig.119 Internal Connection Diagram of Scanner Unit, □ Type NKE-1079

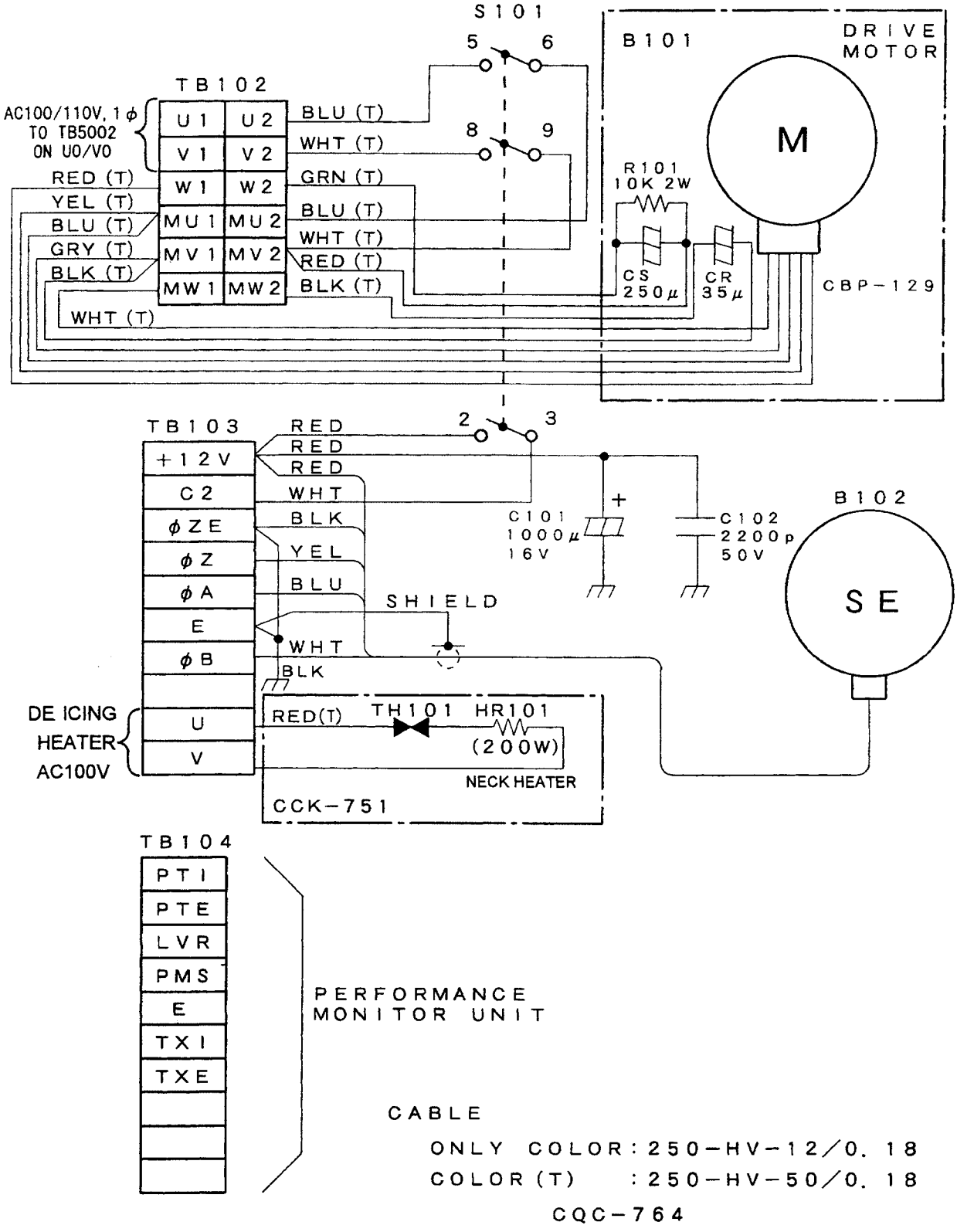


Fig.120 Internal Connection Diagram of Scanner Unit,
Type NKE-1079-D

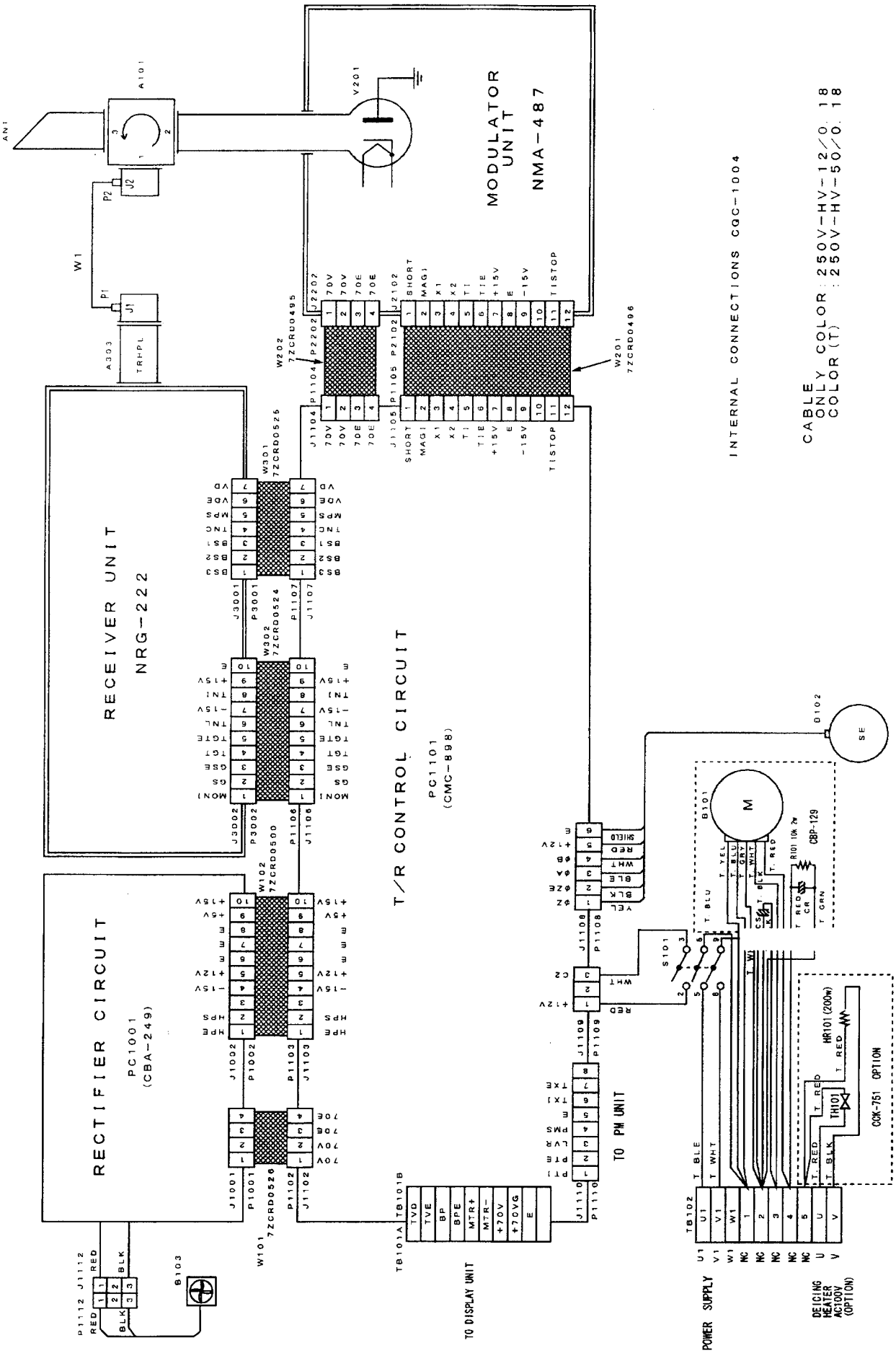


Fig.121 Internal Connection Diagram of Scanner Unit, □ Type NKE-1075/1075A (100V AC,1-phase)□

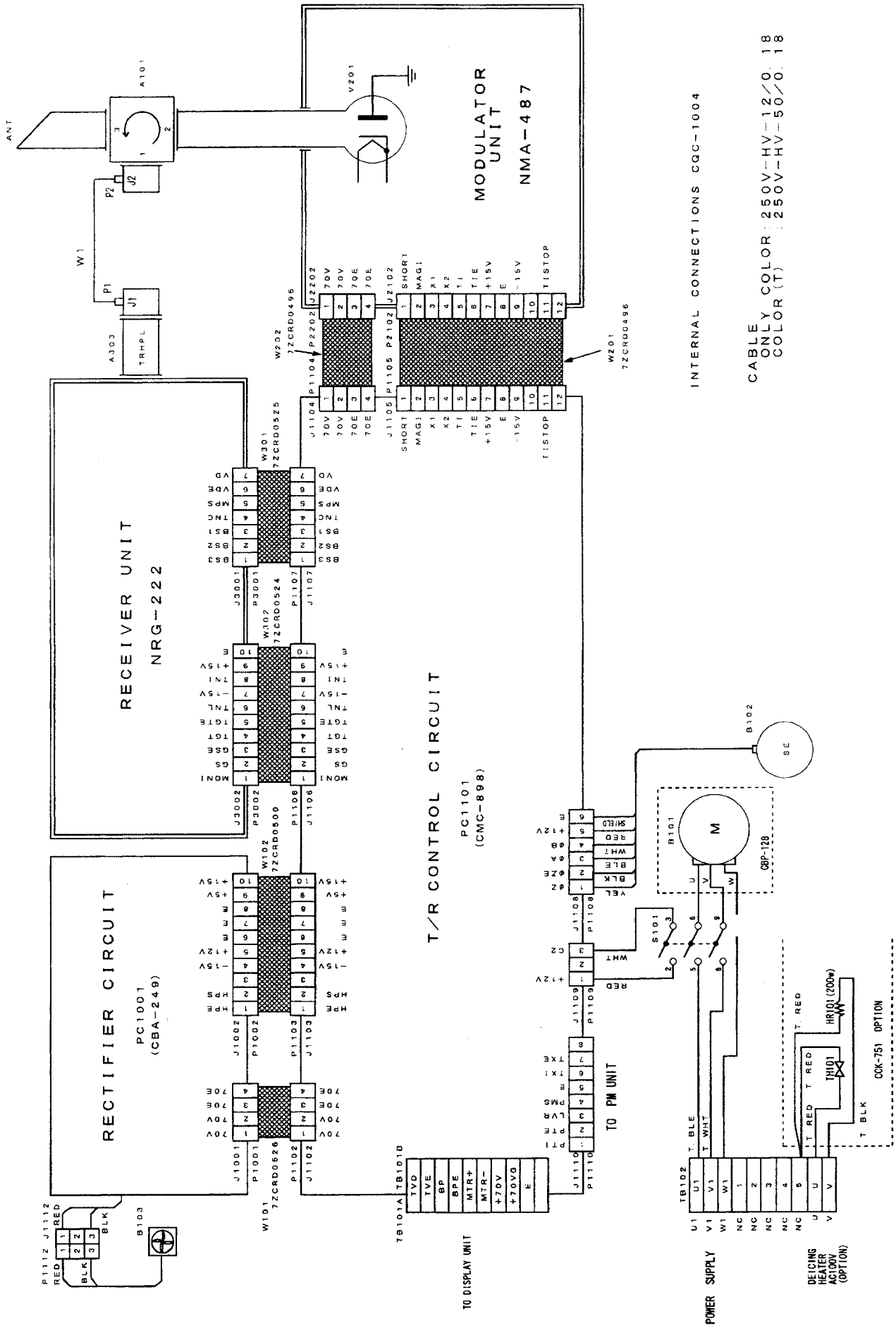


Fig.122 Internal Connection Diagram of Scanner Unit, Type □
NKE-1075/1075A (230V AC,3-phase)□

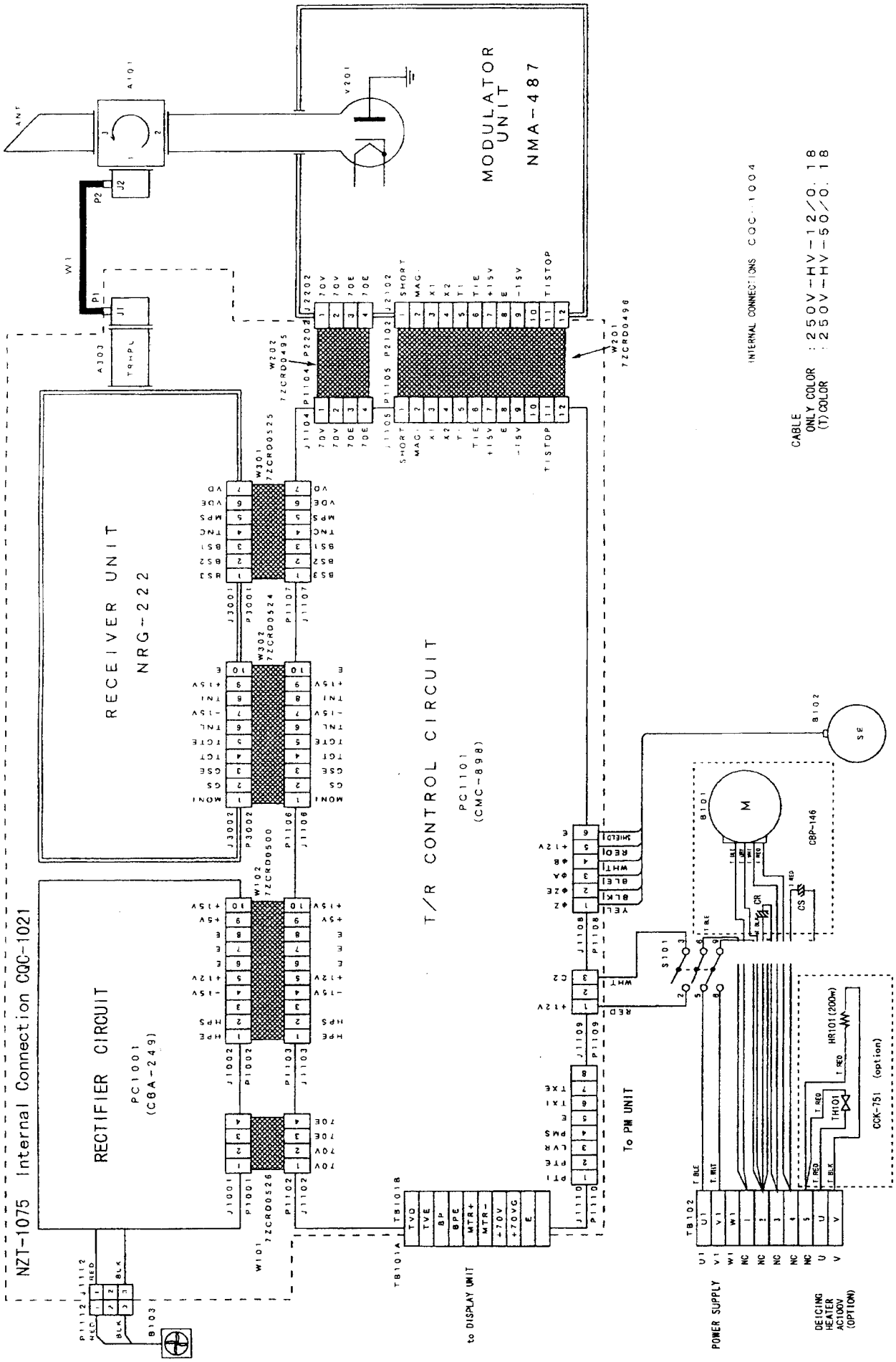
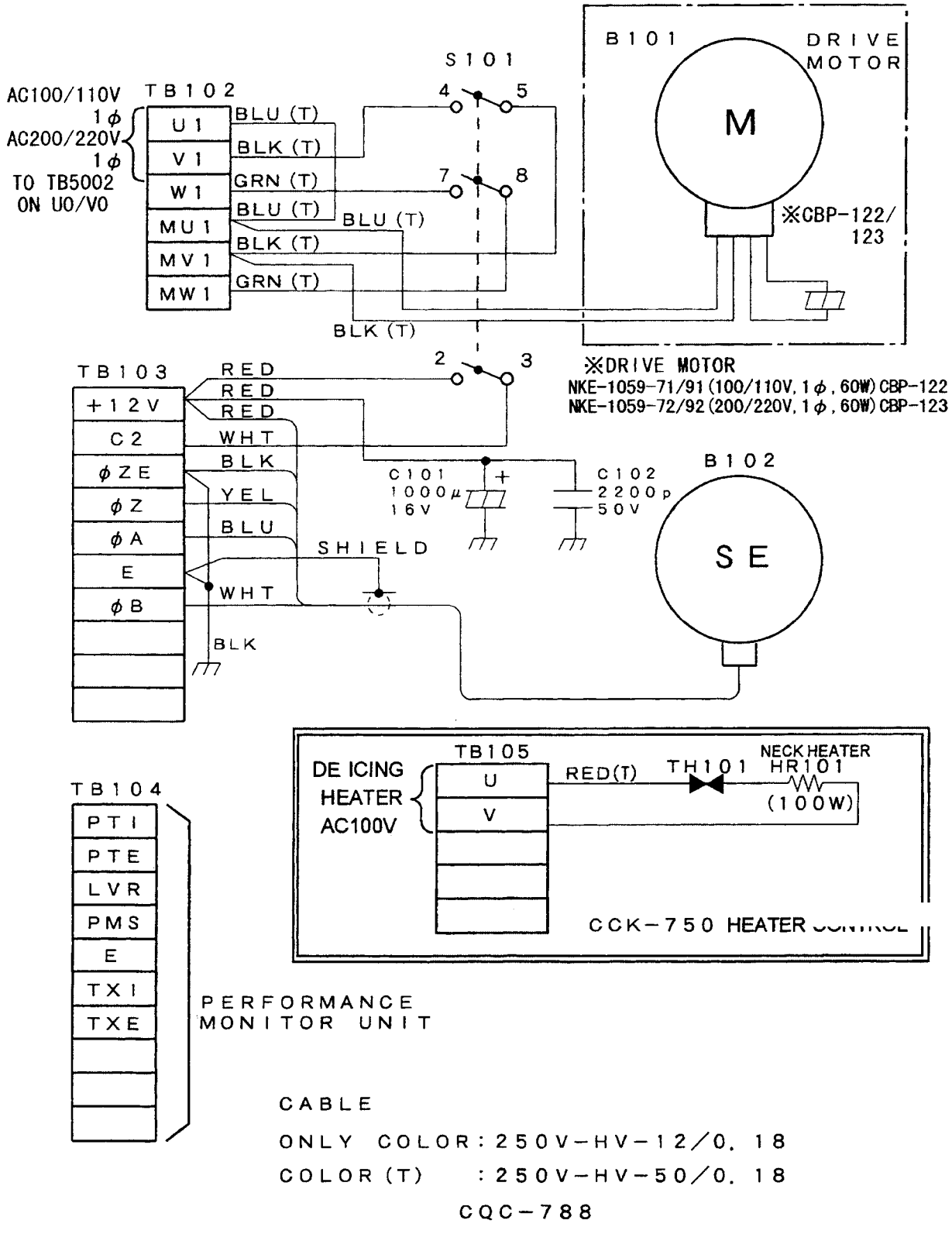


Fig.123 Internal Connection Diagram of Scanner Unit, Type □
NKE-1075/1075A (230V AC,1-phase)□



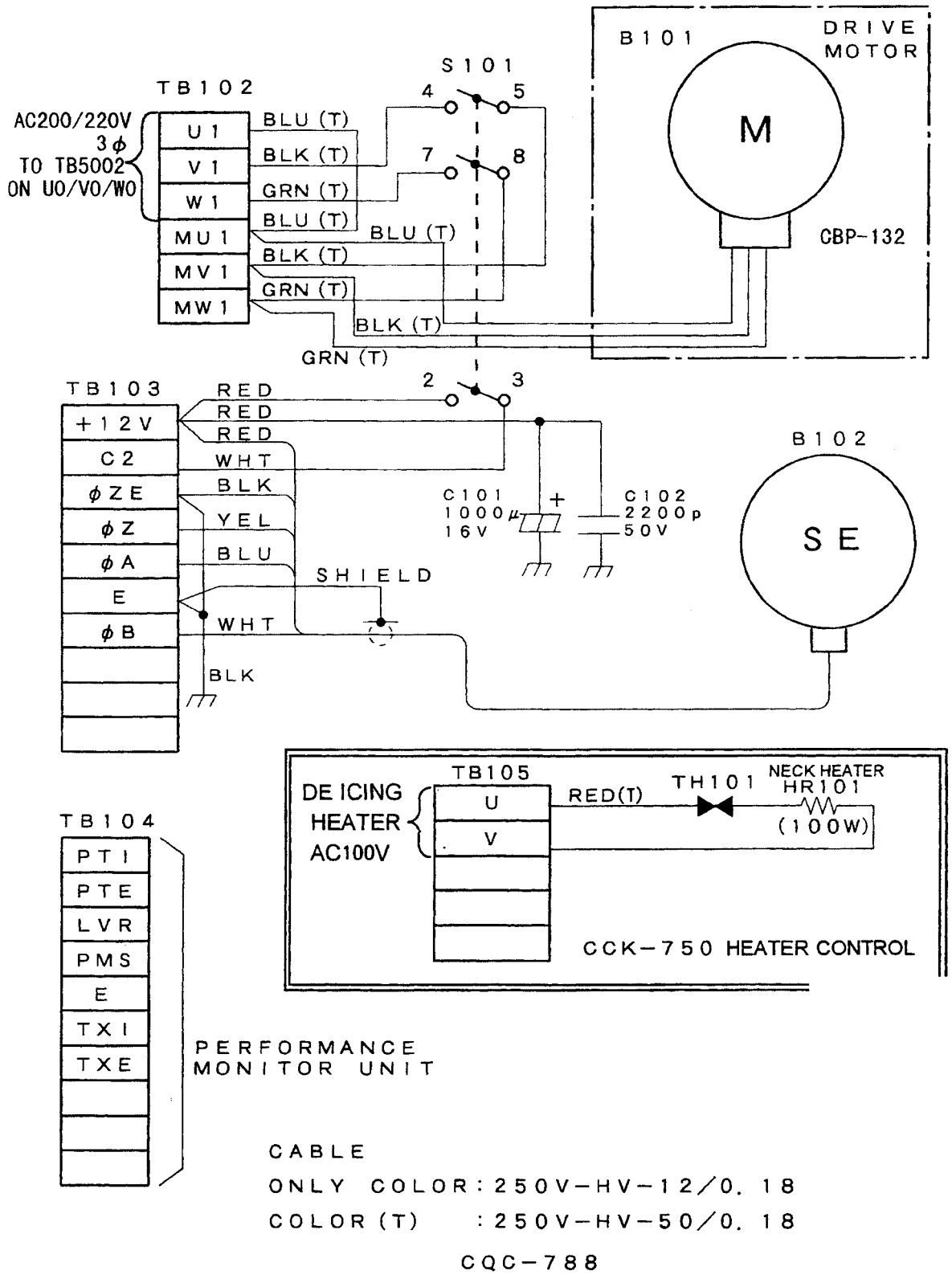
CABLE

ONLY COLOR : 250V-HV-12/0.18

COLOR (T) : 250V-HV-50/0.18

CQC-788

Fig.124 Internal Connection Diagram of Scanner Unit, □
Type NKE-1089-7/9 (1-phase)



CABLE

ONLY COLOR : 250V-HV-12/0.18

COLOR (T) : 250V-HV-50/0.18

CQC-788

Fig.125 Internal Connection Diagram of Scanner Unit, □
Type NKE-1089-7/9 (3-phase)

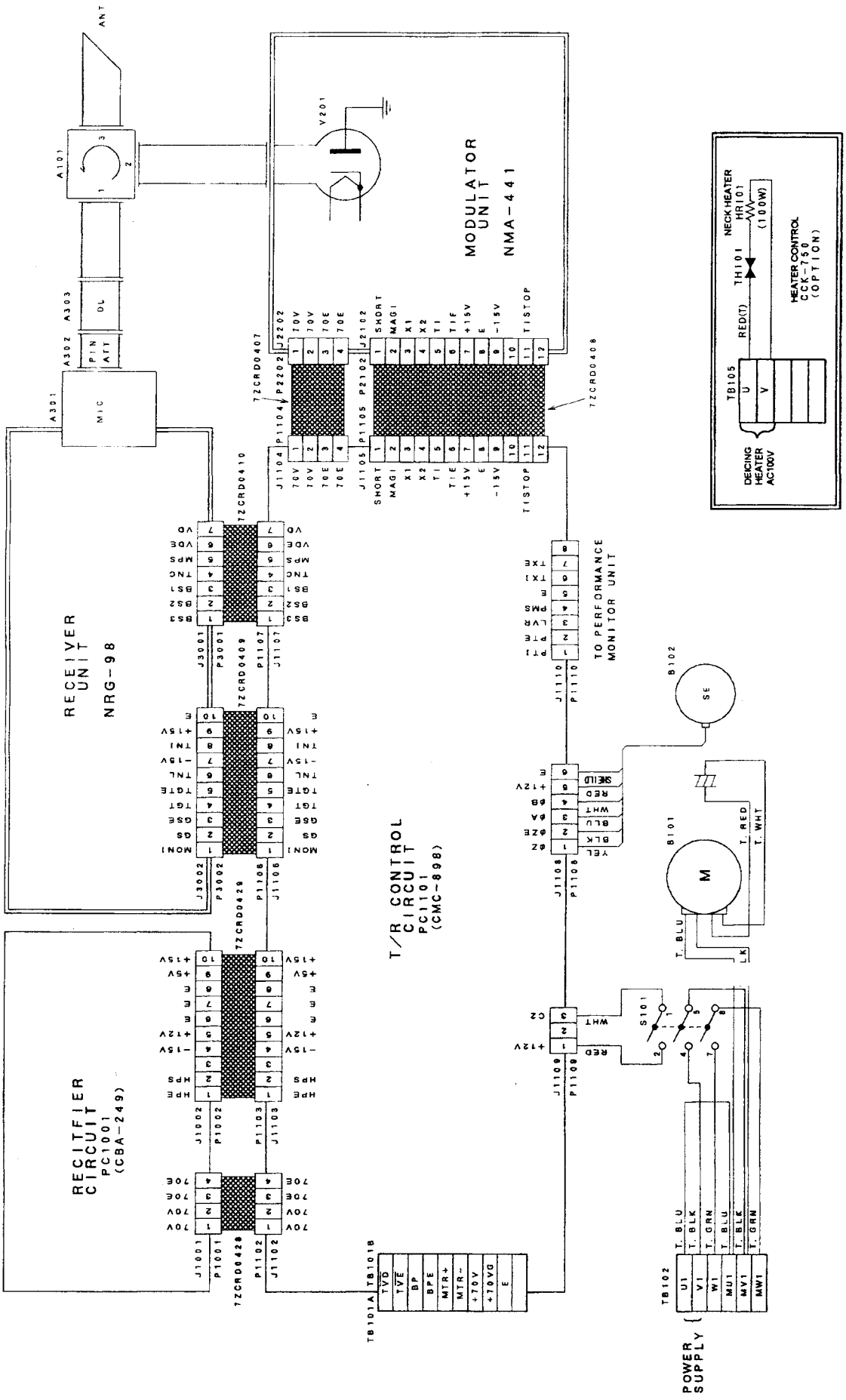


Fig.126 Internal Connection Diagram of Scanner Unit, □
Type NKE-1087-6/9 (1-phase)

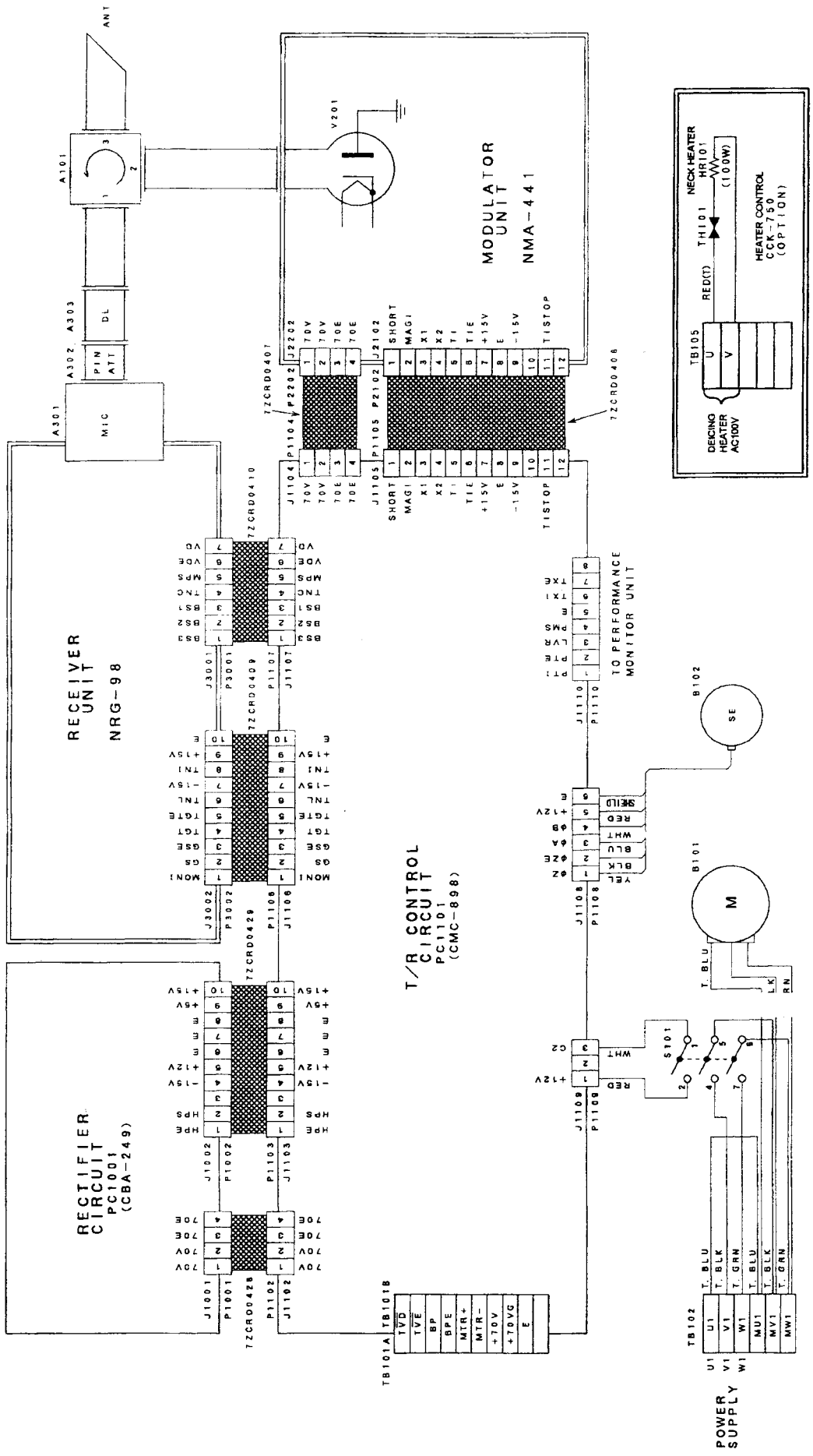


Fig.127 Internal Connection Diagram of Scanner Unit, □
Type NKE-1087-6/9 (3-phase)

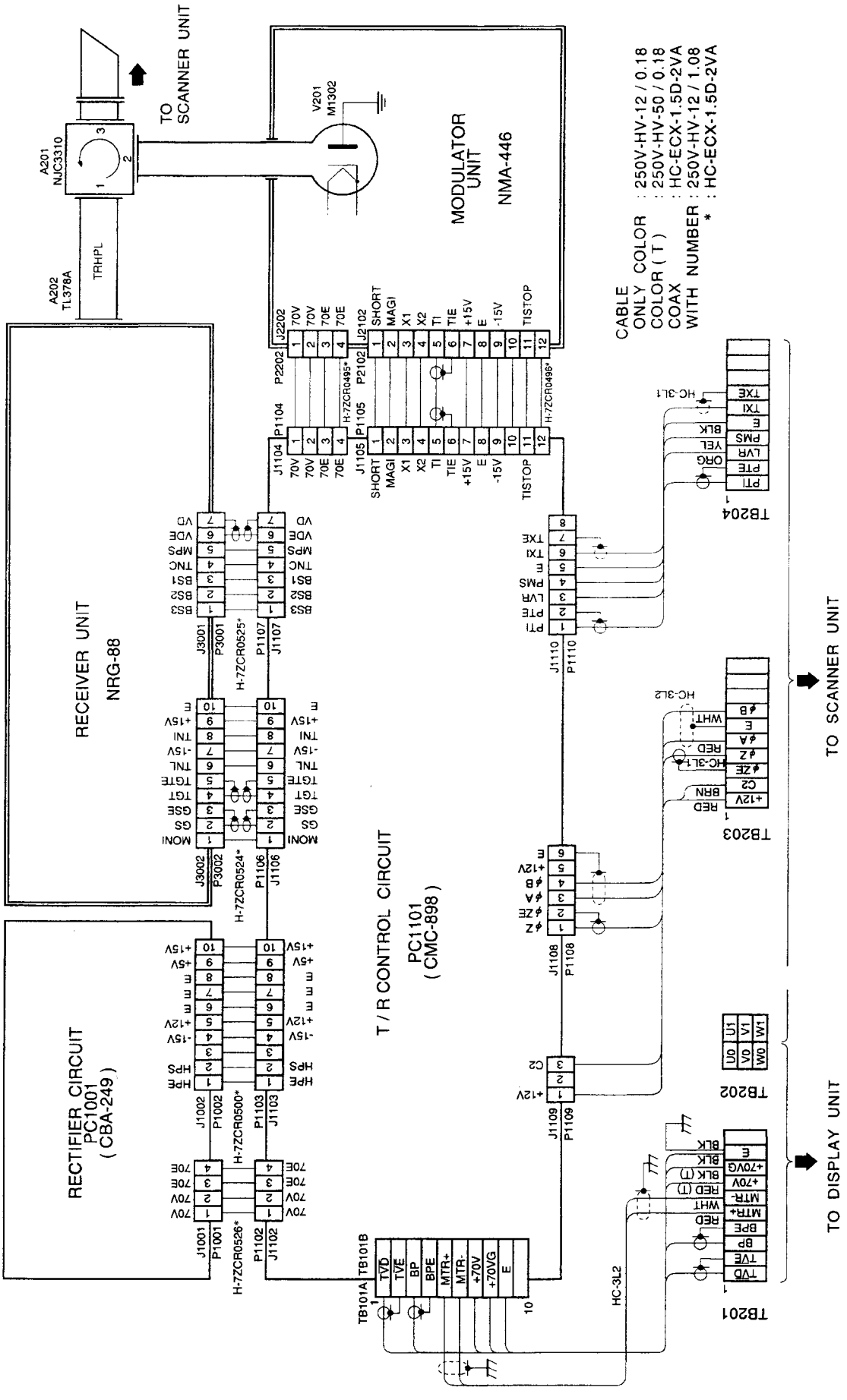


Fig.128 Internal Connection Diagram of □
Transmitter-receiver Unit, Type NTG-3037/3037A

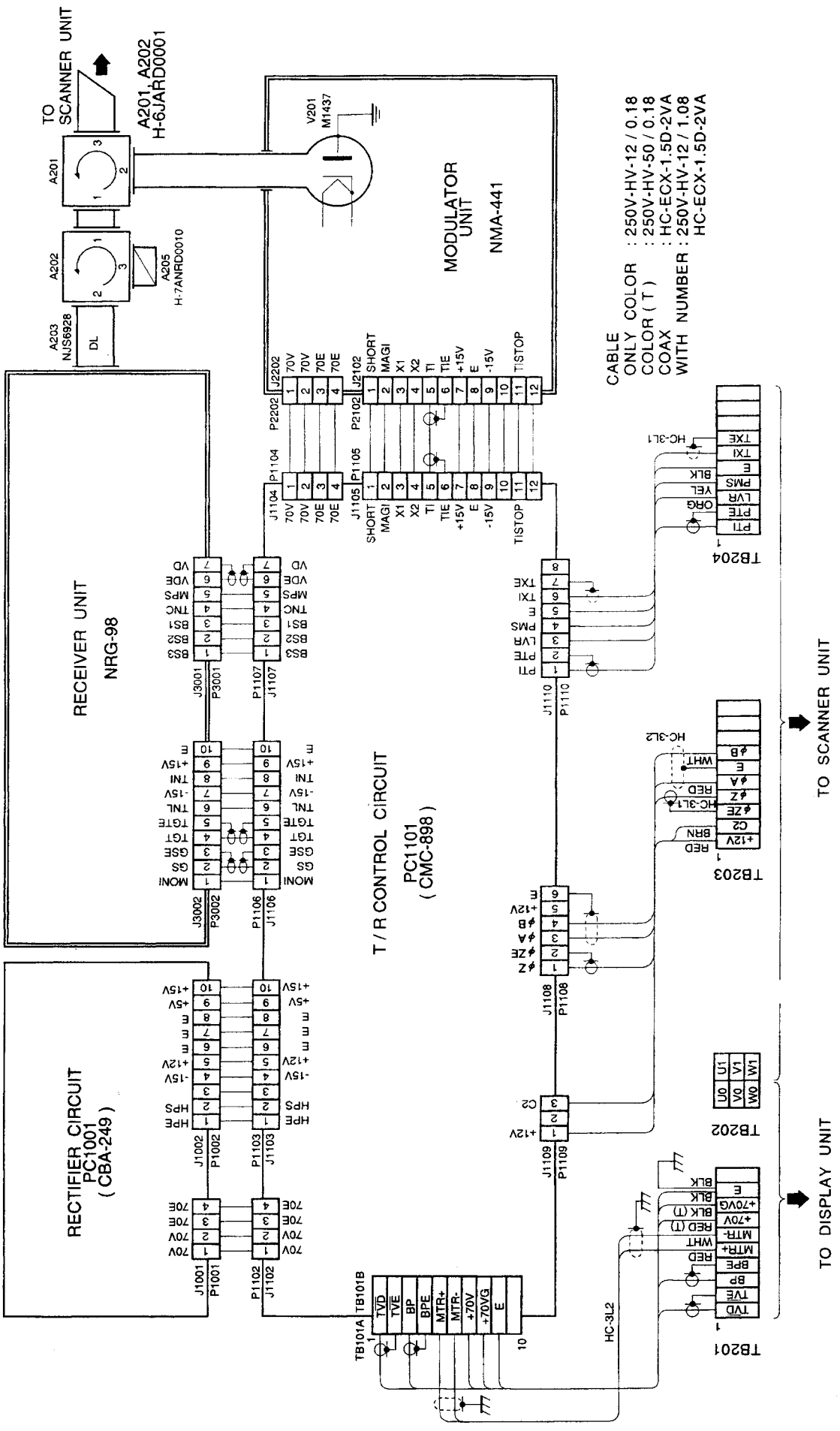


Fig.129 Internal Connection Diagram of □
Transmitter-receiver Unit, Type NTG-3028

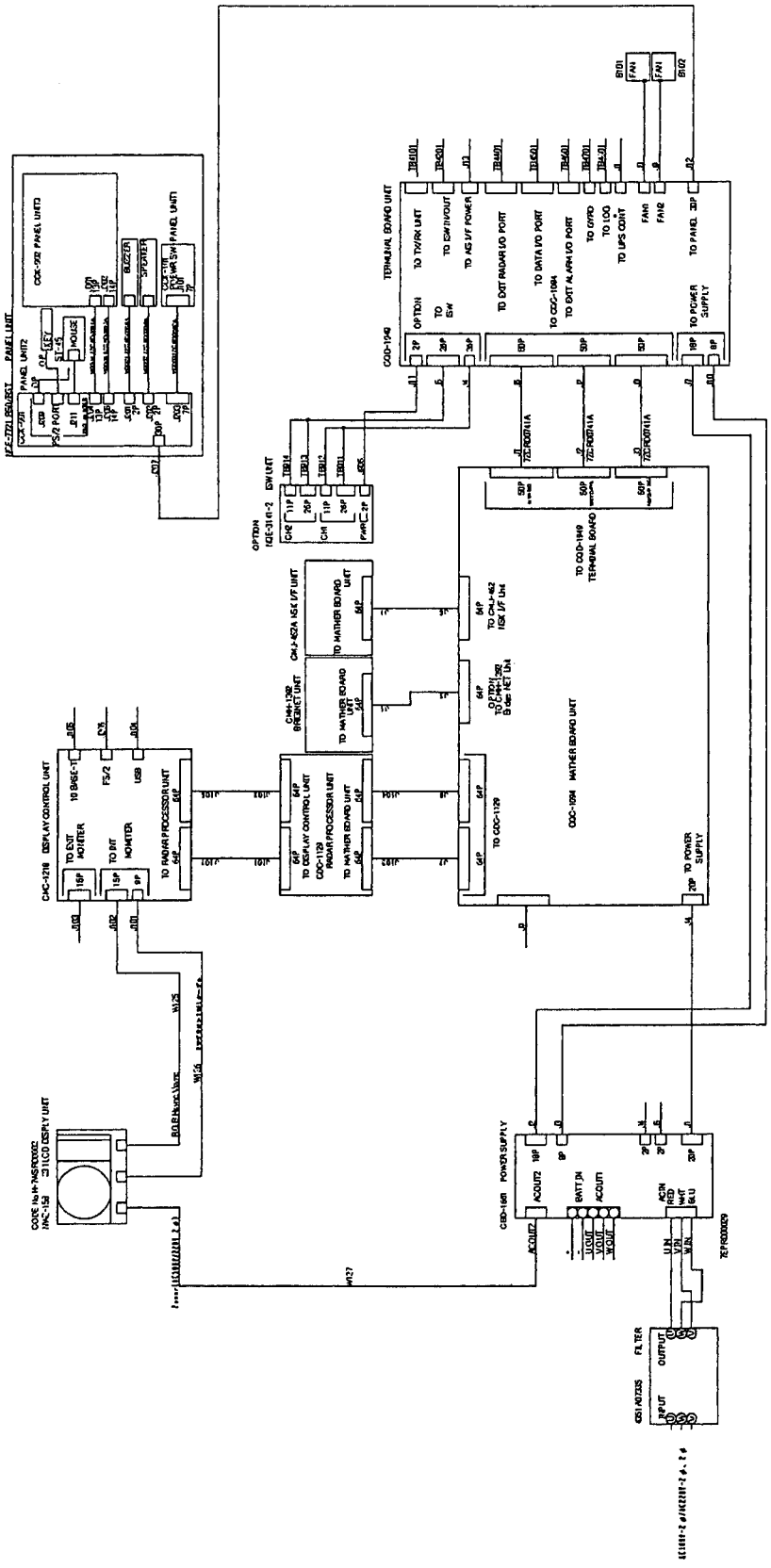


Fig.130 Internal Connection Diagram of Display Unit, [
Type NCD-4263

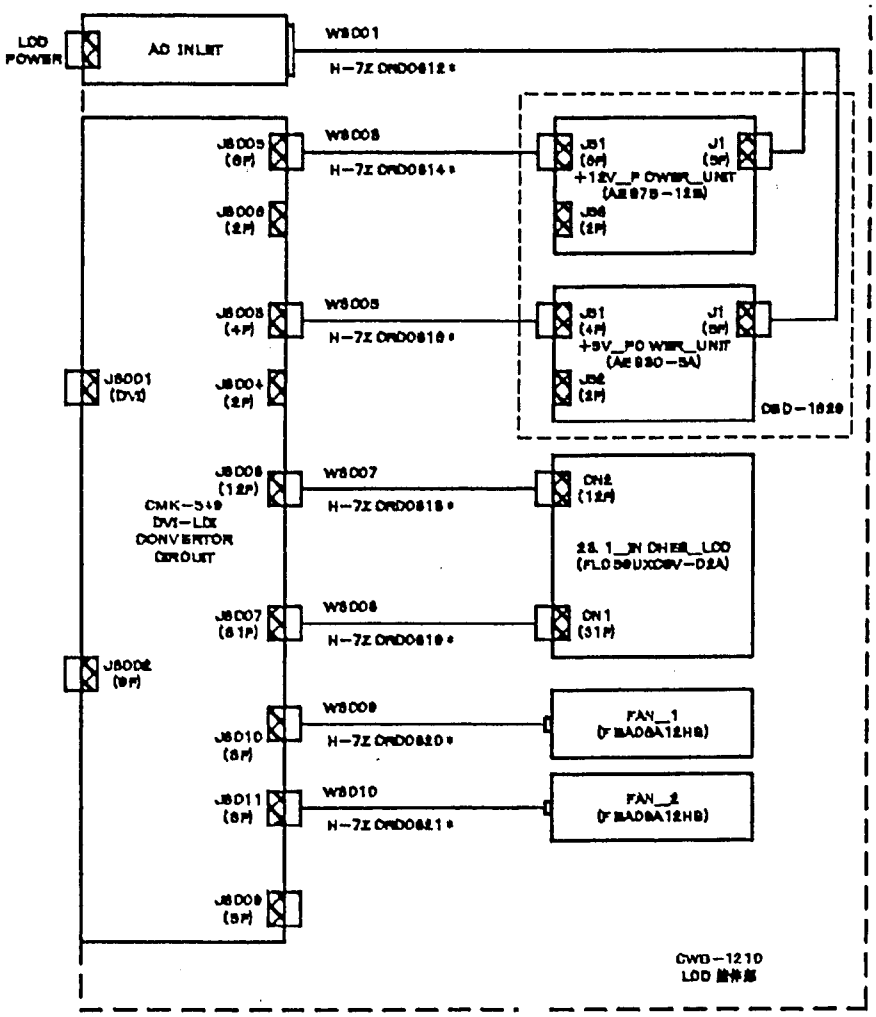


Fig.131 Internal Connection Diagram of CRT Monitor of Display Unit, □
Type NCD-4263

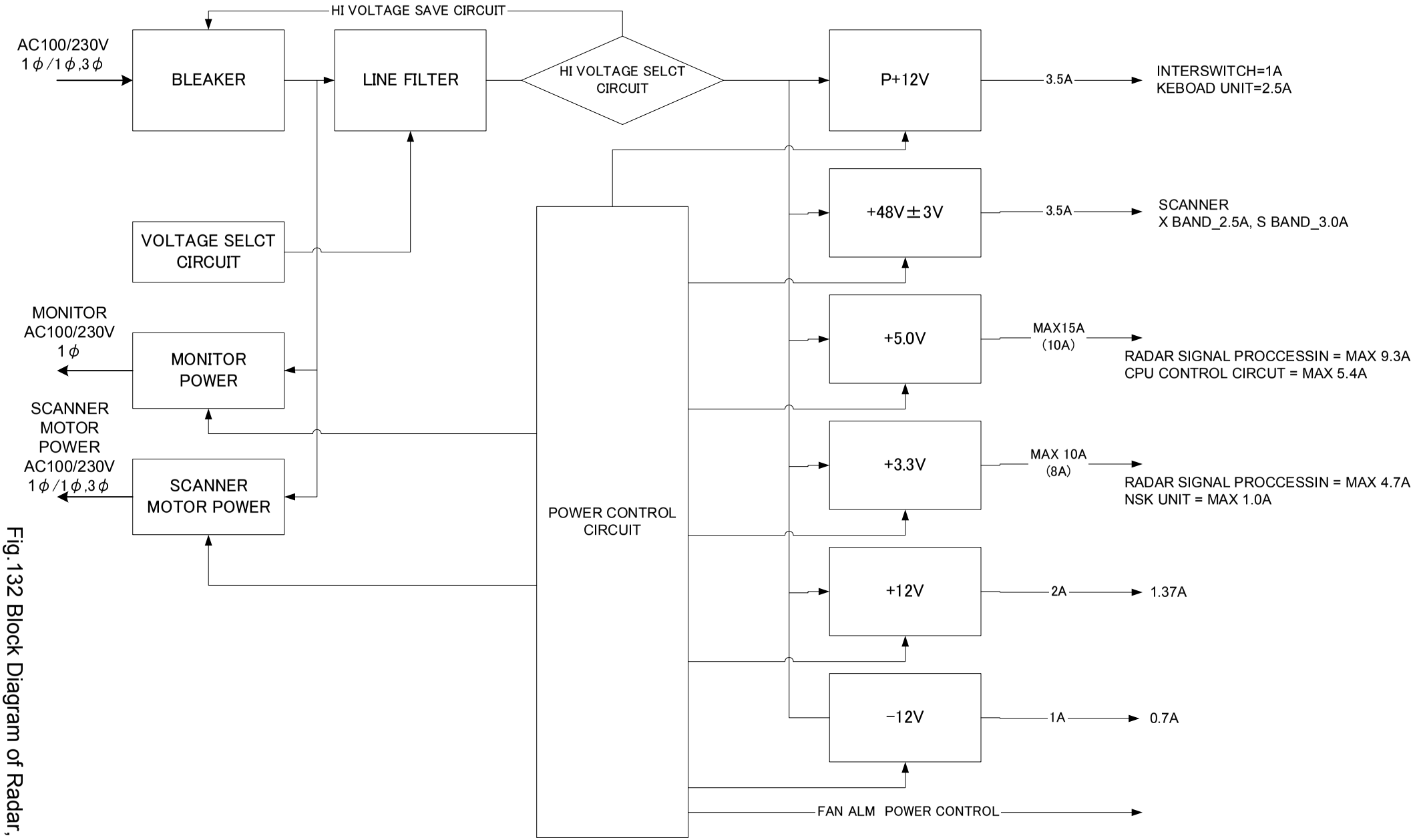


Fig.132 Block Diagram of Radar,
Type JMA-9933-SA and JMA-9923-7XA/9XA

S1 設定表／S1 SETTING TABLE

S1			1	2	3	4	5	6	7	8
ジャイロ信号／GYRO SIGNAL SET	STEP TYPE		ON							
	SYNC TYPE		OFF							
	RATIO	36X		ON	ON					
		90X		OFF	ON					
		180X		ON	OFF					
		360X		OFF	OFF					
	DIRECTION	REV（逆転）				ON				
		NORM（正転）				OFF				
ログ信号／LOG SIGNAL SET	TYPE 1	SYNC					ON			
		PULSE					OFF			
	TYPE 2	1 AXIS						ON		
		2 AXIS						OFF		
	PULSE／NM	100P/30X							ON	ON
		200P/90X							OFF	ON
		400P/180X							ON	OFF
		800P/360X							OFF	OFF

S2設定表／S 2 SETTING TABLE

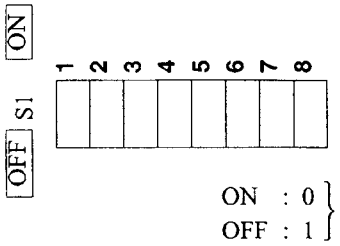
S 2	1	2	3	4
	LOG ALM	GYRO SIMULATOR	LOG SIMULATOR	N／A
	5	6	7	8
	GYRO ALM ON＝5S, OFF＝0.5S	N／A	N／A	N／A

Fig.133 List of NSK and LOG Select Switches of Display Unit, Type NCD-4263

Setting the speed log switches

1. This radar uses the six types of standard speed log signals listed below.
   Pulse type: 800 pulse/NM, 400 pulses/NM, 200 pulses/NM, or 100 pulses/NM
   Synchro type: 360X/NM, 180X/NM, 90X/NM, or 30X/NM
   Set Gyro/Log Selection Switch S1 using the S1 setting table.
2. Connect the speed log signal line to, for the pulse type, the [PULSE] side, or for the synchro type, the [SYNCRO] side, of terminal block TB4801 (Terminal Board Circuit).

3. S1 : Gyro/Log Selection Switch
   Set the switch assembly in accordance with the S1 setting table.



S102 SETTING TABLE

		1	2	3	4	5	6	7	8
GYRO SIGNAL	STEP	0							
	SYNC	1							
	36X		0	0					
	90X		1	0					
	180X		0	1					
	360X		1	1					
	DIRECTION		Reverse(REV)		0				
			Normal(NOR)		1				
LOG SIGNAL	TYPE		SYNCHRO			0			
			PULSE			1			
			1AXIS				0		
			2AXIS				1		
	PULSE/NM		100P/30X					0	0
			200P/90X					1	0
			400P/180X					0	1
			800P/360X					1	1

4. Light-emitting diode CD116 (1-axis) and CD117 (2-axis) are provided to check pulse-type log input signals.
   This LED lights if the log signal level is +2V or more (or under a non-connected status of the log signal line), or it dose not light if the log signal level is +2V or less.

Fig.134 Setting Table of Speed LOG Select Switches of □ Display Unit, Type NCD-4263

Item / Manufactuer	Gyro compasses	Repeater motors (For reference only)	PCMJ-431 Excitation voltate	Gyro select switches (S102, J102 ~ J106 located on the CMJ-431) S5 setting 1	2	3	4	5	6	7	8	J102 ~ J106 setting
TOKIMEC (JAPAN) Sperry (U.S.A.)	ES-2/11, GLT-100 ~ 103/105/106K/107/1104, NJZ-501 (R501)	Synchro motor INMS (TS63N7E13) (36X)	115 VAC 60Hz	OFF	ON	ON	OFF	Speed log selection				SYNC
	ES-11A,GM-11/11A/21/110/120, MS-2000/3000 PR-222R/226/237/237-L /1＊8＊ /2022/2023/22＊＊, TG-200	Synchro motor TSAN60E11 (90X)	110 VAC 60Hz	OFF	OFF	ON						SYNC
	GLT-201/202/203, MK-14/14T, MKE-1/14T, MOD-1/2/T, PR-500/2502/2503/2507/2507L /3507/4507/5507, SR-130/140, TG-100/5000	Step motor GA-2001G Drawing # 103590810 600 excitation (180X)	70 VDC	ON	ON	OFF						STEP
	ES-16, SR-120/220	Step motor GA-2001G Drawing # 103590820 150 excitation (180X)	35 VDC	ON	ON	OFF						STEP
	CMZ-700D ES-140/160, PR-26＊＊/6＊6＊/6＊7＊, SR-140/160, TG-6000		24 VDC									
YOKOGAWA (JAPAN)	C-1A/2/3/E, HOKUSHIN PLATH-55/C, PLATH HKRK-C3	Synchro motor YM-14 TS-19 (360X)	60 VDC 60Hz	OFF	OFF	OFF						SYNC
	C1JR, C-1 JUNIOR, CMZ-200A/300, D-1, IPS, IPS -2-H2/2B/2B-H2C/5, KM008, KR-053, PLATH NAVIGAT-1, PT11-H2/21/21-H2	Synchro motor PY76-N2 (360X)	100 VAC 50/60Hz	OFF	OFF	OFF						SYNC
ARMA BROWN (France)	1351, MK-1 ~ 7/10/20, MKL-1, MOD-4, NB-23-88, SERIE, SGB-1000	Step motor BZ-2191 (180X)	50 VDC	ON	ON	OFF						STEP
ANSCHUTZ (Germany)	110-301,139-31, ANSCHUTZ-1 ~ 6/12/14/Z, GM-BH, K8051, NB23-126, Z0658U	Synchro motor NB23-91 (360X)	50 VAC 50Hz	OFF	OFF	OFF						SYNC
C. PLATH (Germany)	NAVIGAT 763-331E, PLATH NAVIGAT-Ⅱ/Ⅲ	Synchro motor YM14A (360X)	50 VAC 60Hz	OFF	OFF	OFF						SYNC

OFF

Note: Must be set to ON if the radar picture and the [COURSE] indication turn Reverse.

＊: Numeric number

Fig.135 Setting Table of Gyro Compass and Gyro Select Switches □ ofDisplay Unit, Type NCD-4263 □

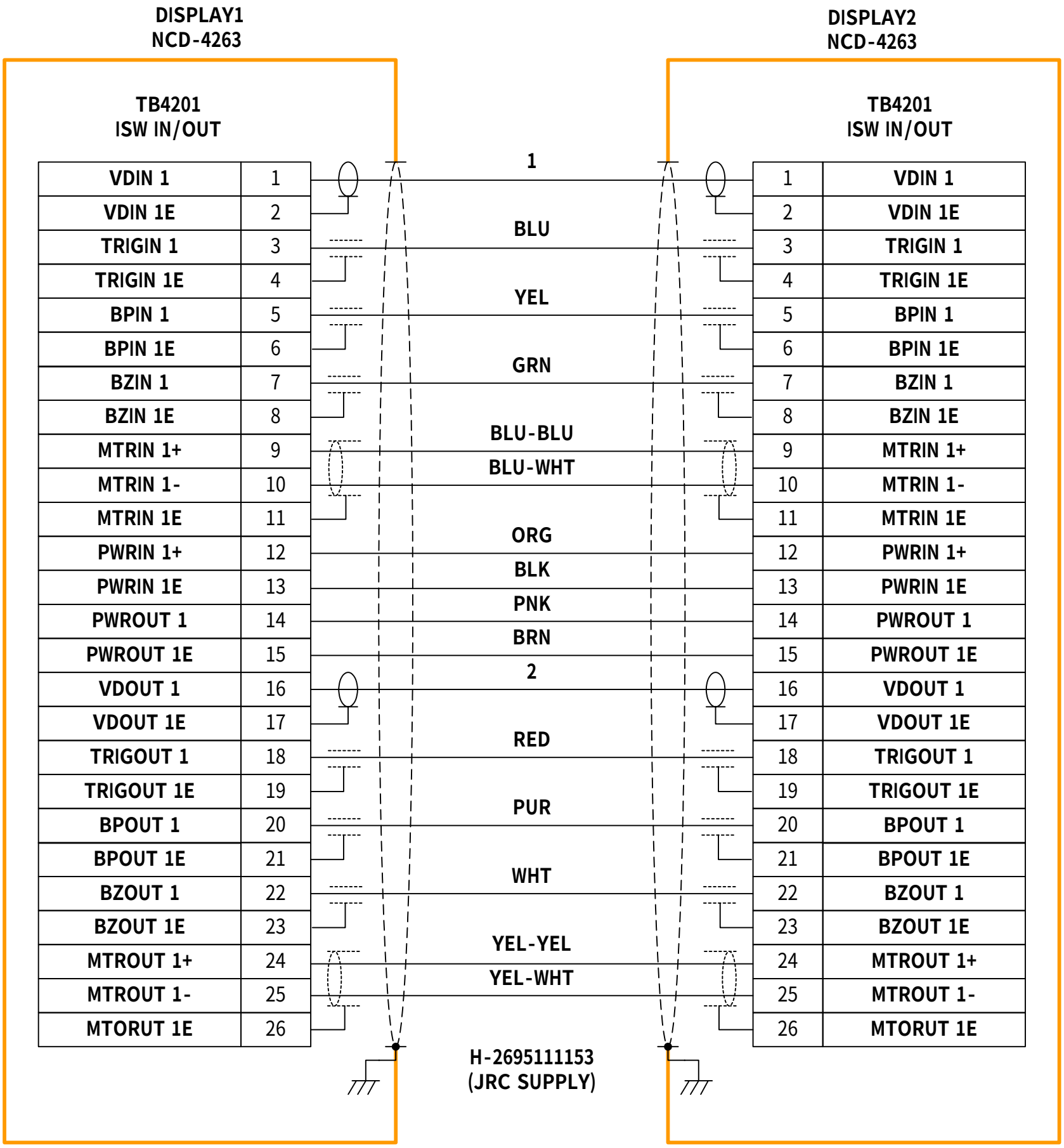


Fig.136 Terminal Board Connection Diagram of 2-unit Interswitchse System, Type•@NQE-3141-2

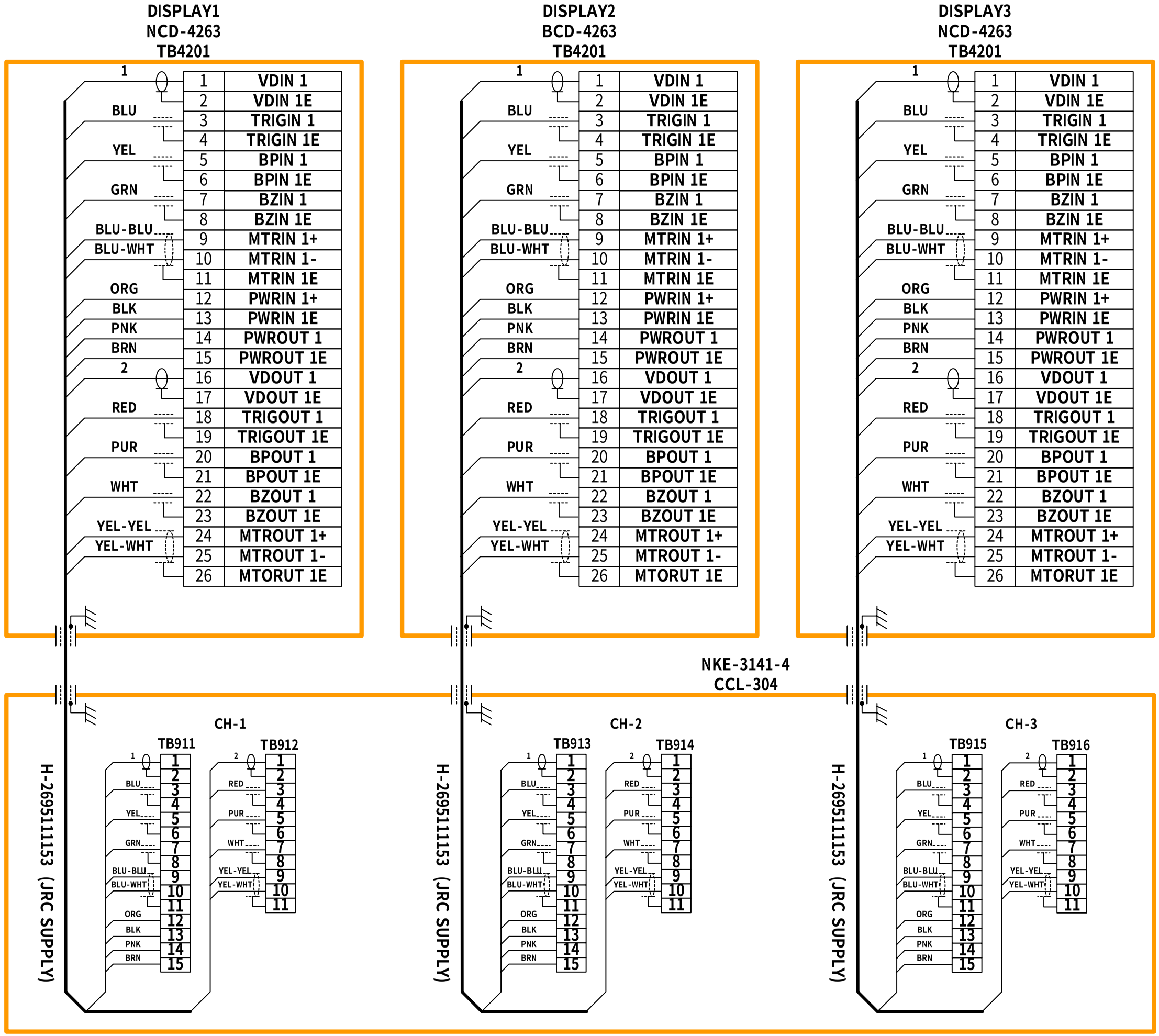


Fig.137 Terminal Board Connection Diagram of 4-unit Interswitches System, Type NQE-3141-4

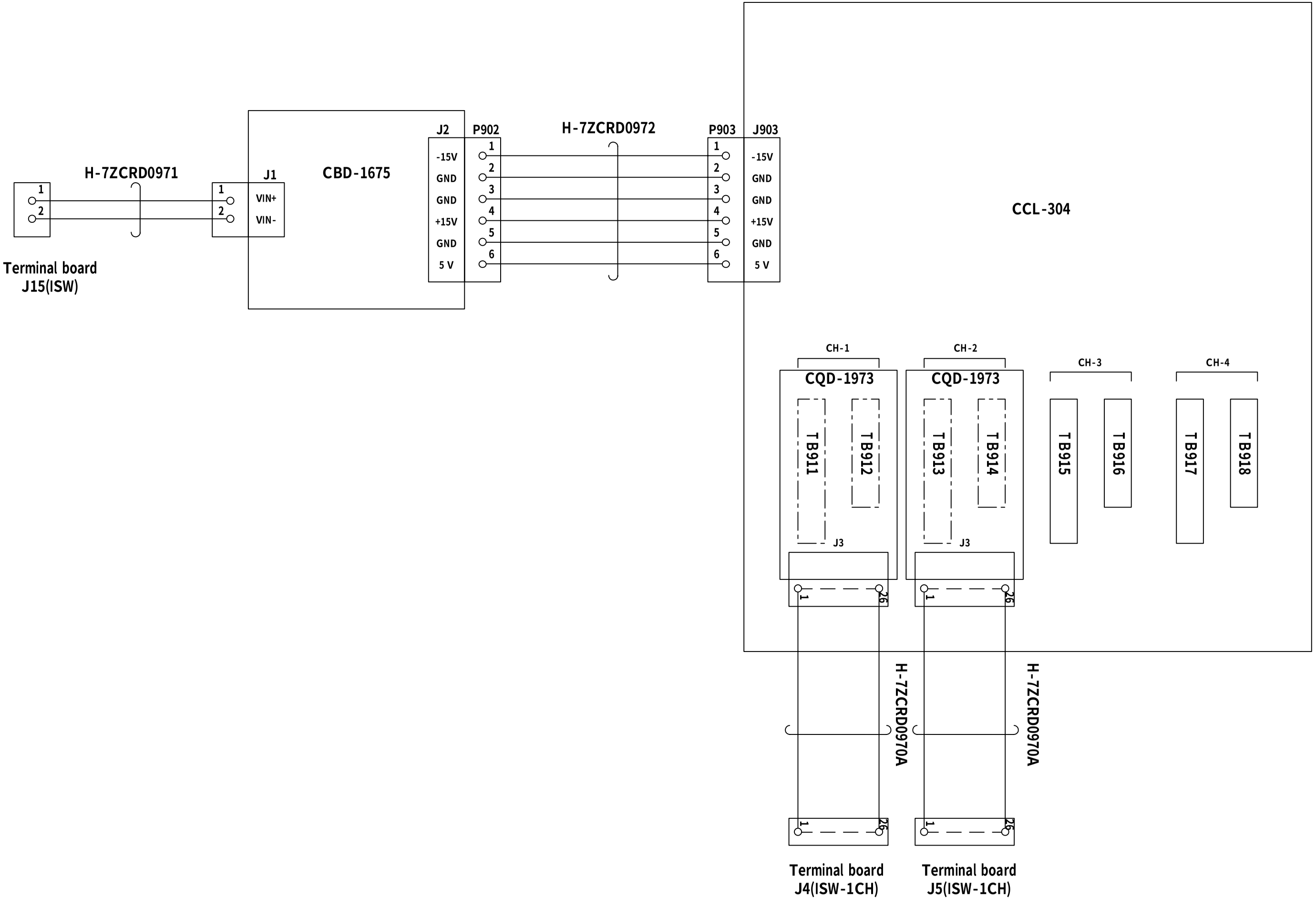


Fig.138(1) Internal Connection Diagram of Interswitch, Type NQE-3141-2

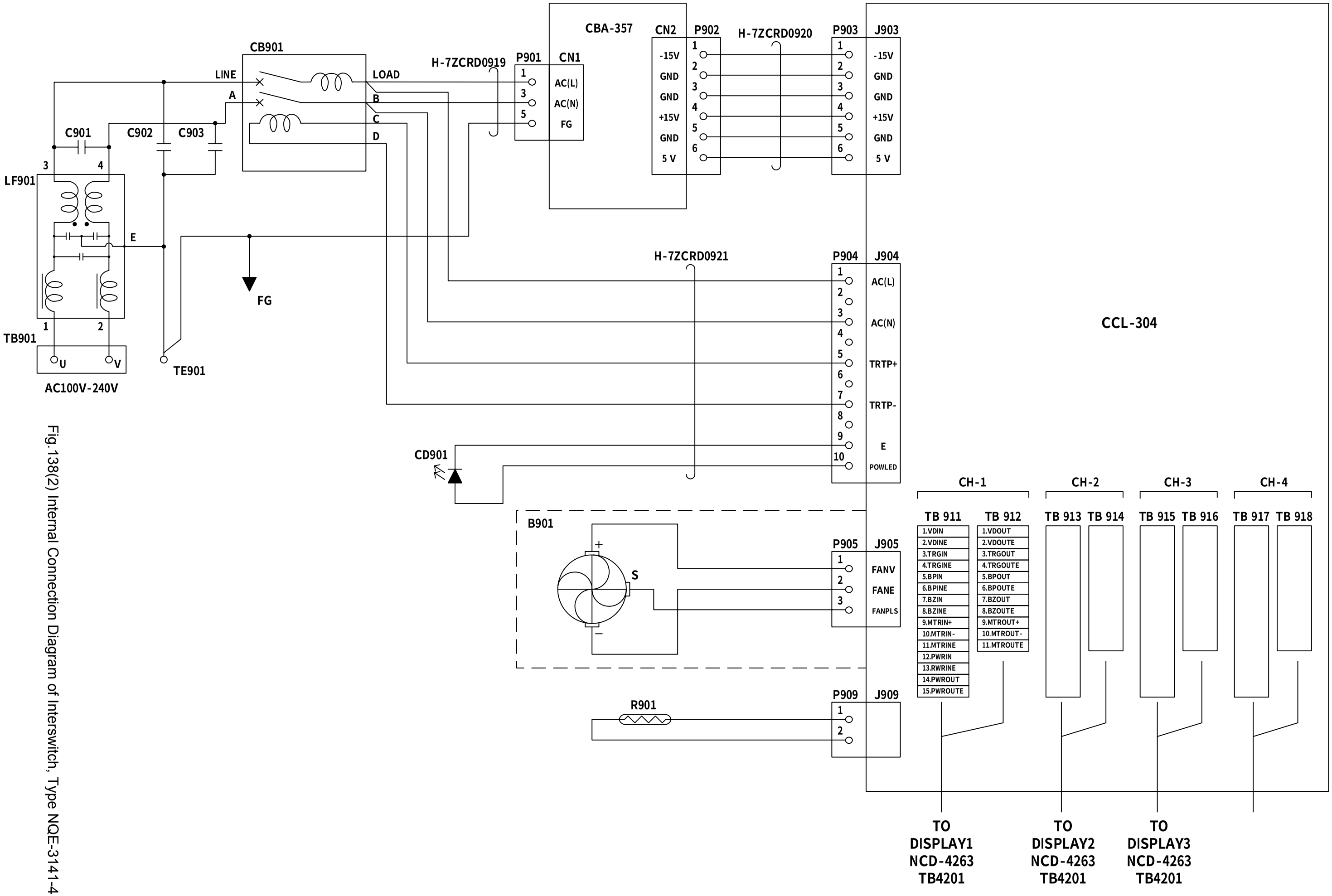


Fig.138(2) Internal Connection Diagram of Interswitch, Type NQE-3141-4

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