

8.4.4 Replacement of LCD Monitor



Replacement of LCD monitor must be made by specialized service personnel.

For details, refer to Service Manual.

8.4.4.1 Display Unit NCD-4990



CAUTION

Do not touch the LCD screen directly with your fingers.



CAUTION

Do not touch the AR filter directly with your fingers.

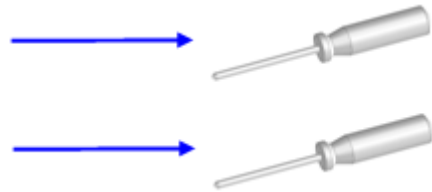


CAUTION

Perform the replacement work on a soft cloth to avoid damage to the LCD screen and other parts.

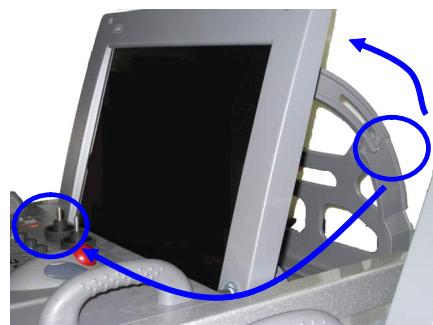
[Required tools]

- A Phillips screwdriver for 4 mm screws
- A Phillips screwdriver for 6 mm screws

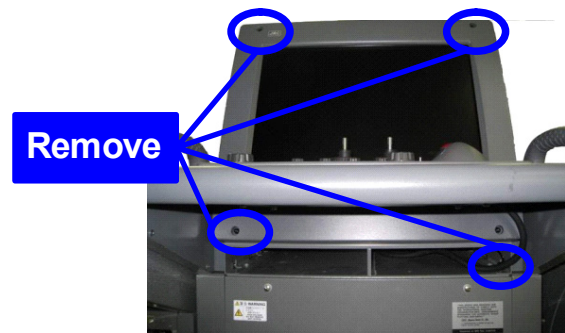


[Disassembly]

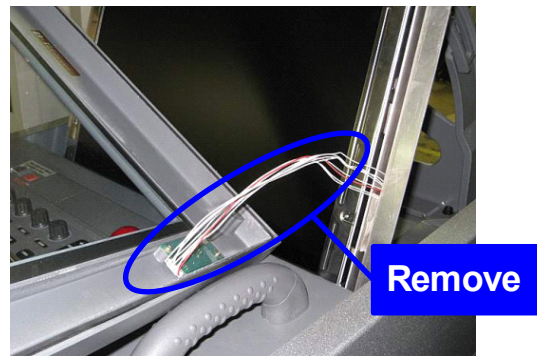
- 1) *Remove the tilt fixing handle (standalone type only).*
- 2) *Tilt up the screen as much as you can (standalone type only).*



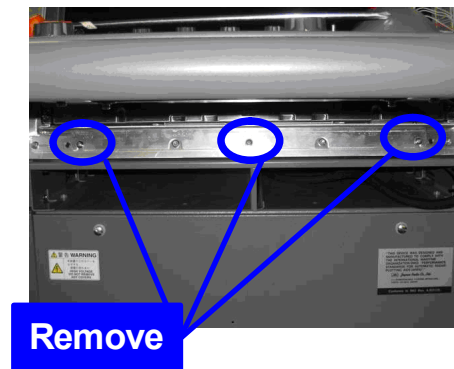
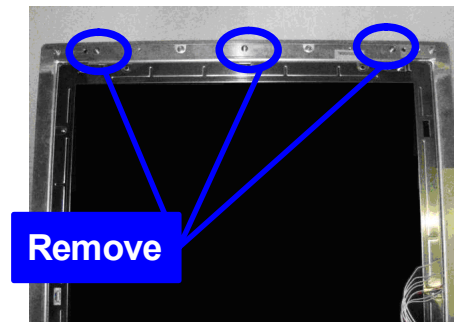
- 3) *Remove the screws (M6) from the four corners and displace the face cover.*



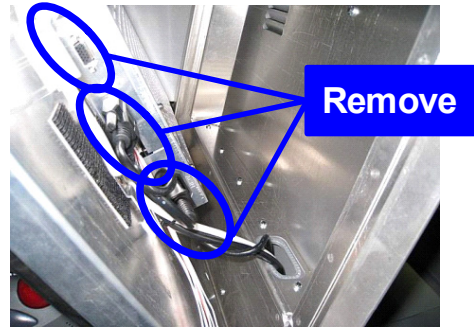
- 4) *Remove the LCD operation circuit cables and remove the face cover.*



- 5) *Remove six M4 screws.*

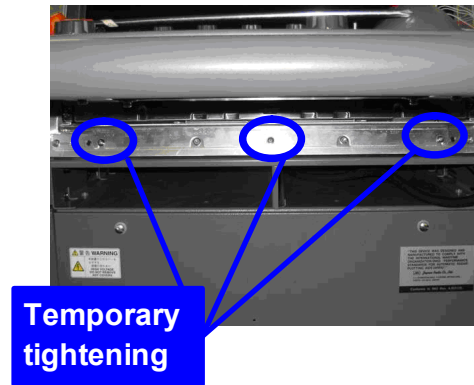


- 6) *Displace the module and remove the three cables.*
- 7) *Remove the LCD module.*

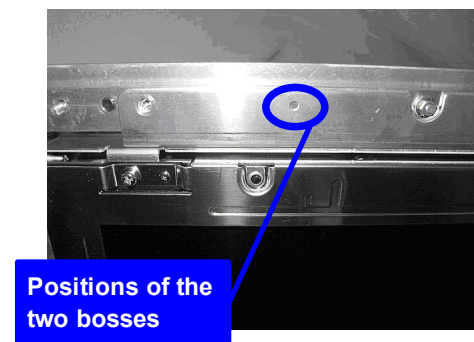


[Assembly]

- 1) *Tighten the lower three M4 screws halfway.*
- 2) *Connect the cables to the LCD module.*
- 3) *Align the module to the lower three screws and insert it downward.*
- 4) *Check the positions of the two bosses and ensure that appropriate space is maintained under the LCD module. Tighten the six screws evenly.*



- 5) *Connect the LCD operation circuit cables and attach the face cover.*
- 6) *Tighten the screws at the four corners.*
- 7) *Attach the tilt fixing handle.*



[Operation Check]

- 1) *After completing the replacement procedures, start the system to make sure that images are displayed properly.*
- 2) *Turn the brightness knob to make sure the brightness can be changed between the minimum and the maximum levels.*

8.4.5 Replacement of Backup Battery



Replacement of backup battery must be made by specialized service personnel.

For details, refer to Service Manual.

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

8.4.5.1 About the Battery Alarm

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

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

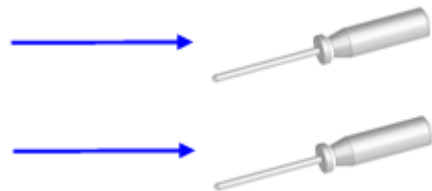


About disposal of used battery, refer to Section 10.2.

8.4.5.2 How to Replacement of Backup Battery

[Required tools]

- A flat tip screwdriver for 6 mm screws
- A Phillips screwdriver for 4 mm screws
- A flat tip nonconductive screwdriver for 3 mm screws



[Disassembly]

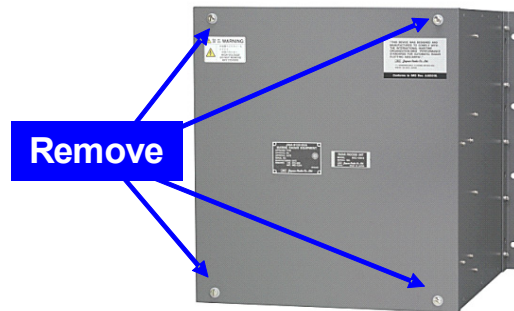
- 1) Remove the four fixing screws to remove the cover from the display unit (NCD-4990).

(A flat tip screwdriver for 6 mm screws)

For standalone type NCD-4990



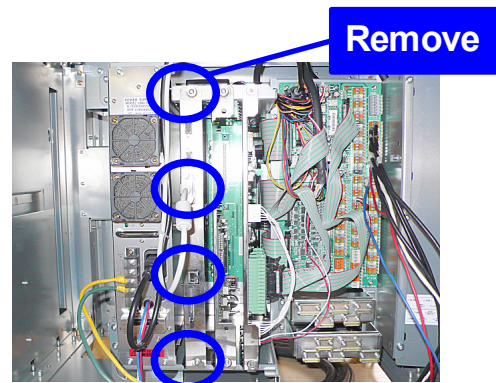
For tabletop type: NDC-1399-9



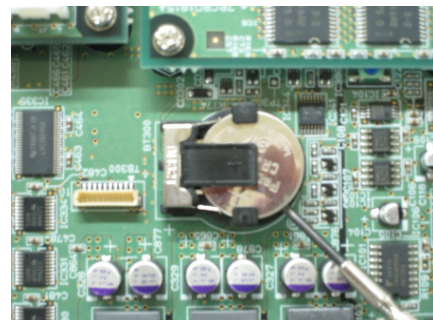
- 2) Remove the cable connected to the radar processing circuit board.

The radar processing circuit is the first board from the left.

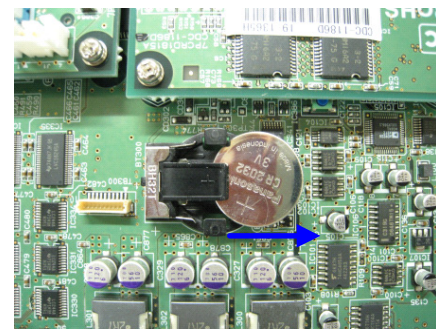
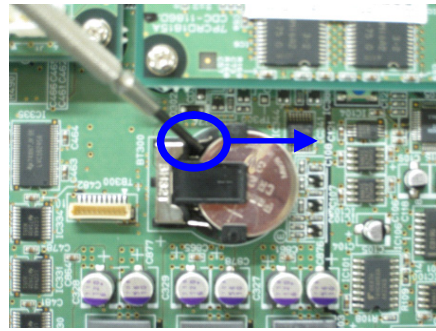
- 3) Remove the two fixing screws (M4).
- 4) Pull out the board to the front.



- 5) Insert the flat tip **nonconductive** screwdriver for adjustment or some stick between the battery and the battery holder and lift the battery up.

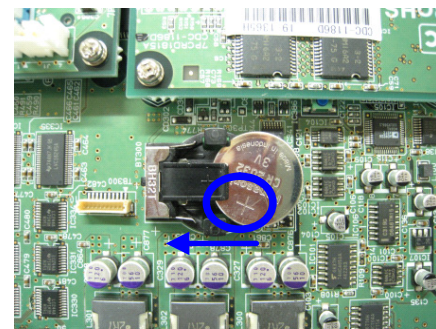


- 6) *Insert the flat tip **nonconductive** screwdriver for adjustment or some stick to the location shown in the figure below and slide the battery sideways to remove the battery.*



[Assembly]

- 1) *Check the polarity of the battery. Make sure that the battery's positive (+) side is facing up.*
- 2) *Slide the battery sideways into the battery holder.*
- 3) *Make sure that the battery is inserted fully.*



[Check Item]

- 1) *Check that no error message comes up.*
- 2) *Check that the system starts up normally.*

[Notes]



CAUTION

If you installed the battery with the wrong polarity, remove the battery immediately and do not use the same battery again.



CAUTION

During the procedures, do not put the battery on any circuit board or conductive item.



CAUTION

To dispose of a used battery, follow the instructions provided in Section 10.2 "DISPOSAL OF USED BATTERIES".



CAUTION

To disassemble of a used battery, have to use non-conductive tool.



SECTION 9

TROUBLE SHOOTING AND AFTER-SALES SERVICE

TROUBLE SHOOTING AND AFTER-SALES SERVICE

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9.1 FAULT FINDING

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

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

9.1.1 List of Alarms and other Indications

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

Error message and alarm are displayed in the lower right of the display. For more details refer to page2-31 Alarm.



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

Table9-1 : List of System Error Message

Message	Description
TXRX (SSW Off)	Scanner: Safety switch OFF.
TXRX (AZI)	Scanner: BP error.
TXRX (HL)	Scanner: HL error.
TXRX (MHV)	Scanner: Modulator's high voltage alarm.
TXRX (Data)	Scanner: No communication, communication mismatched, checksum error, or collision.
TXRX (Heater)	Scanner: Magnetron heater voltage error.
TXRX (Reverse)	Scanner: Reverse rotation.

Table9-1 : List of System Error Message

Message	Description
TXRX (Video)	Scanner: VIDEO error.
TXRX (Trigger)	Scanner: TRIGGER error..
TXRX (Fan 1)	Scanner: FAN 1 error.
TXRX (Fan 2)	Scanner: FAN 2 error.
TXRX (Motor)	Scanner: Motor current error.
Keyboard (Data)	Operation unit: Communication error or checksum error.
Keyboard2 (Data)	Second operation unit: Communication error or checksum error.
GYRO I/F (Data)	GYRO I/F: No communication or checksum error.
GYRO I/F (GYRO)	GYRO I/F: GYRO error (error bit detected).
GYRO I/F (Log)	GYRO I/F: Log error (error bit detected).
GPS (Status)	GPS status error.
Position (Data)	Latitude / longitude data: No communication or data error.
Date (Data)	Date data: No communication or data error.
Speed (Log)	1-axis log: No communication or data error.
Speed (2AXW)	2-axis log (speed over water): No communication or data error.
Speed (2AXG)	2-axis log (speed over ground): No communication or data error.
Speed (GPS)	GPS speed: No communication or data error.
PROC (Interrupt)	Process unit: Interrupt error.
PROC (AZI)	Process unit: AZI error.
PROC (HL)	Process unit: HL error.Error during interrupt from ASIC1 to RADAR DSP.
ASIC1 to RADAR	VIDEO error.
PROC (Video)	Trigger error.
PROC (Trigger)	Heading data: No communication or data error.
Heading (Data)	Water depth: No communication or data error.
Depth (Data)	Water temperature: No communication or data error.
TEMP. (Data)	Wind direction/velocity: No communication or data error.
Wind (Data)	Tidal current: No communication or data error.
Current (Data)	Rate of Turn: No communication or data error.
ROT (Data)	Rudder Sensor Angle: No communication or data error.
RSA (Data)	APB: No communication or data error.
Autopilot (Data)	LCD monitor: Fan error.
Fan (LCD)	RADAR Process Unit Interconnection: Fan error.
Fan (Power)	Power Supply: Fan error.
Fan (PROC)	Scanner: Safety switch OFF.

Table9-2 : List of Notification

Message	Description
CCRP Changed	CCRP is automatic changed.
Weather INFO	Weather information is received.
Copying	Display is capturing to file.

Table9-2 : List of Notification

Set GYRO	Requires setting of true bearing.
TM Reset	Use care of resetting TM.
POSN Reset	Change the latitude and longitude sentence.

Table9-3 : List of Target Tracking Alarms and AIS Function Alarms

メッセージ	内 容
CPA/TCPA	There is a dangerous target.
Trial	There is a dangerous target, when trial maneuver is active.
New Target	Acquisition or activation of a target in the automatic acquisition / activation zone.
Lost	Failure in tracking the target that has been under tracking. Failure in receiving AIS target data for a specified time.
REF Target	Decrease in the reference target accuracy.
MAX Target	The maximum number of targets is under acquisition.
95% Capacity	Over 95% of the maximum number of targets to be tracked.
AIS Max Target	Maximum number of AIS targets.
AIS 95% Capacity	Over 95% of the maximum number of AIS targets.
AIS ACT MAX	Maximum number of AIS targets to be activated.
AIS ACT 95% Capacity	Over 95% of the maximum number of AIS targets to be activated.
TT (Boot)	Target tracking unit start failure.
TT (Data)	The target tracking unit is malfunctioning.
AIS (Data)	AIS: No communication or communication error.
AIS PROC (Data)	AIS processing circuit: No communication or communication error.
AIS Alarm ***ⁱ	AIS alarm (Up to 10 alarm messages can be displayed.).

i. *** is a 3-digit number which is Local Alarm No in the ALR sentence.

Table9-4 : List of Route Messages and Warnings

Message	Description
Arrival	Arrive at way point.
Break Off(WPT)	Out of the way point.
Approach	Approach the route.
Cross Track Error	Go off the route.

Table9-5 : List of Operational Error Messages and Warnings

Message	Description
No Position Data	Mark or line input when the latitude and longitude is invalid.
No Heading Data	Target tracking operation or TM selection when bearing data is invalid.
Out of Range	Out of target acquisition range.

Table9-5 : List of Operational Error Messages and Warnings

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

Table9-6 : List of Conditions Messages

Message	Description
GPS (HDOP)	The HDOP level is increased (Decrease in the GPS accuracy.).
MON Test	Performance monitor is active.
Scanner Rotating	The scanner is rotating (When transmitter is standby state.).
Battery Low	battery is weakening.
Battery Dead	The battery is dead.

Table9-7 : List of Interswitch Alarms and Messages

Message	Description
Master Range CHG	The range of the own display unit has changed due to change in the range of the master display unit.
ISW Complete	The switchover of the Interswitch ended normally.
ISW Busy	Access to the ISW menu was made during interswitching.
TXXR Standby	The scanner unit is in the standby mode.
ISW Straight	Failed in straight connection when the Interswitch system stops operating.
ISW Standby	The Interswitch recovered normally.
ISW Time Out	Failed in switching.
ISW Error	The interswitch is disabled.

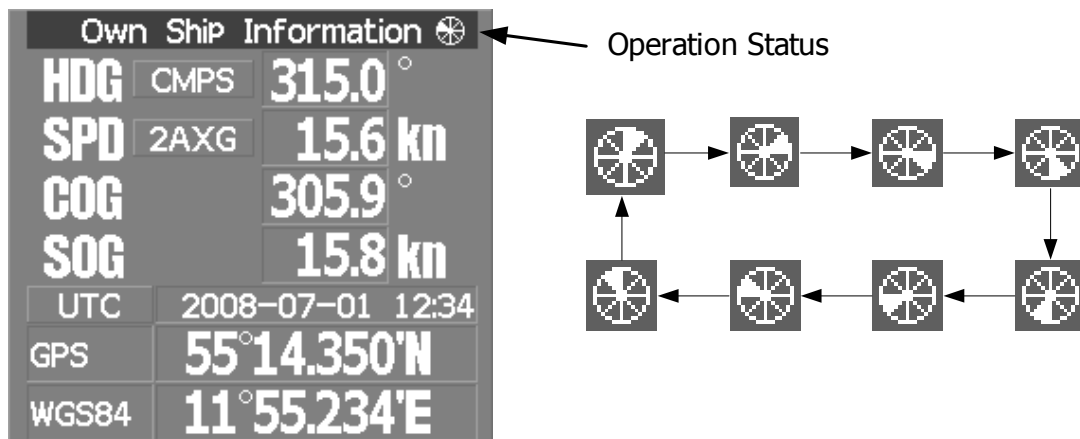
Table9-7 : List of Interswitch Alarms and Messages

Pattern CHG Failed	Connection change failed.
Connection Masked	Inhibition of control / connection is set.
Master Standby	The master display unit does not transmit any signals.
ISW (Data)	No communication, data mismatched, or checksum error.
Update ISW Software	Tried to enter new TXRX function, when interswitch software used old version.

9.1.2 Operation Checking

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

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



9.1.3 Fuse Checking

Melted fuses are caused by any clear cause. When a fuse is replaced, it is necessary to check the related circuits even if there is no trouble. In checking, note that there is some dispersion in the fusing characteristics. Table 9-8 shows a list of fuses used in the equipment.

Table9-8 : Fuse List

Location	Parts#	Current Rating	Protection Circuit	Type
AC/DC Converter	F501	10A	Motor	ST6-10AN1
GYRO Interface circuit	F1 ~ F4	0.5A	GYRO Interface circuit	MF60NR250V0.5

9.2 TROUBLE SHOOTING

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

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

1 Poor Contact in Terminal Board of Inter-Unit Cables

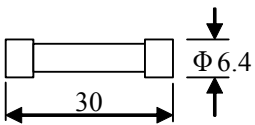
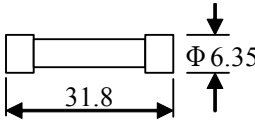
- a. Poor contact in terminal board
- b. The cable end is not fully connected, that it, contacted with earthed another terminal.
- c. Disconnected cable wire

2 Poor Contact of Connector within Unit



This radar equipment is provided with Table 9-9 standard spares.

Table9-9 : 7ZXRD0025

Name	Type/Code	Shape (mm)	In use	Spare	Parts #	Location
Fuse	MF60NR250V0.5 (5ZFGD00006)		4	12	F1 ~ F4	GYRO I/F CMJ-462E
Fuse	ST6-10AN1 (5ZFCA00053)		1	3	F501	AC/DC Converter NBA-5135

9.2.1 Special Parts

NKE-2103

Table9-10 : NKE-2103 (JMA-9110-6XA/6XAH, JMA-7110-6XA/6XAH)

Parts No.	Name	Type	Manufacture	Location	Code
V101	Magnetron	MAF1565N	NJRC	Scanner Unit	5VMAA00102
A101/A102	Circulator	FCX68	Toshiba	Scanner Unit	6AJRD00001
A301	Diode Limiter	NJS6930	NJRC	Scanner Unit	5ATBT00006

NKE-1125/2254

Table9-11 : NKE-1125/2254 (JMA-9122-6XAH/9XA/6XAH, JMA-7122-6XA/9XA/6XAH)

Parts No.	Name	Type	Manufacture	Location	Code
V101	Magnetron	M1568BS	NJRC	Scanner Unit	5VMAA00106
A101/A102	Circulator	NJC3901M	NJRC	Scanner Unit	5AJBV00007
A301	Diode Limiter	NJS6930	NJRC	Scanner Unit	5ATBT00006

NTG-3225

Table9-12 : NTG-3225 (JMA-9123-7XA/9XA, JMA-7123-7XA/9XA)

Parts No.	Name	Type	Manufacture	Location	Code
V101	Magnetron	M1568BS	NJRC	Transmitter Receiver Unit	5VMAA00106
A101/A102	Circulator	NJC3901M	NJRC	Transmitter Receiver Unit	5AJBV00007
A301	Diode Limiter	NJS6930	NJRC	Transmitter Receiver Unit	5ATBT00006

NKE-1130

Table9-13 : NKE-1130 (JMA-9132-SA, JMA-7132-SA)

Parts No.	Name	Type	Manufacture	Location	Code
V101	Magnetron	M1555	NJRC	Scanner Unit	5VMAA00106
A101/A102	Circulator	NJC3316	NJRC	Scanner Unit	5AJBV00007
A301	Diode Limiter	NJS6318	NJRC	Scanner Unit	5ATBT00006

NTG-3230

Table9-14 : NTG-3230 (JMA-9133-SA, JMA-7133-SA)

Parts No.	Name	Type	Manufacture	Location	Code
V101	Magnetron	M1555	NJRC	Transmitter Receiver Unit	5VMAA00104
A101	Circulator	NJC3317	NJRC	Transmitter Receiver Unit	5AJBV00009
A301	TR Limiter	TL378A	NJRC	Transmitter Receiver Unit	5VLAA00037

9.2.2 Circuit Block to be Repaired

Table9-15 : Circuit Block to be Repaired (JMA-9110-6XA/6XAH)

Location	Circuit Block	Type	Remarks
SCANNER UNIT	GEARED MOTOR	7BDRD0048	DC brushless motor (common with HS)
SCANNER UNIT	MODULATOR CIRCUIT	CME-363	Excluding Magnetron
SCANNER UNIT	RECEIVER UNIT	NRG-610	Including CAE-529-1
SCANNER UNIT	POWER SUPPLY CIRCUIT	CBD-1783	
SCANNER UNIT	ENCODER	CHT-71A	
SCANNER UNIT	MOTOR CONTROL POWER SUPPLY	CBD-1779	
SCANNER UNIT	FAN	7BFRD0002	
RADAR PROCESS UNIT	RADAR PROCESS CIRCUIT	MDLW11900	With mounting bracket
RADAR PROCESS UNIT	AIS PROCESS CIRCUIT	CDC-1325	
RADAR PROCESS UNIT	ARPA PROCESS CIRCUIT	CDC-1186D	
RADAR PROCESS UNIT	GYRO I/F CIRCUIT	CMJ-462E	
RADAR PROCESS UNIT	TERMINALBOARD CIRCUIT	CQD-2097	
RADAR PROCESS UNIT	MOTHERBOARD CIRCUIT	CQC-1192	
RADAR PROCESS UNIT	FAN (RPU)	109R0612S4D13	
RADAR PROCESS UNIT	POWER SUPPLY	CBD-1661	
RADAR PROCESS UNIT	FAN (PSU)	7BFRD0006	
OPERATION UNIT	OPERATION CIRCUIT A	CCK-973	
OPERATION UNIT	OPERATION CIRCUIT B	CCK-974	
OPERATION UNIT	OPERATION CIRCUIT D	CCK-976	
OPERATION UNIT	TRACKBALL	5EZLY00003	
OPERATION UNIT	LCD PANEL	7WSRD0002A	23.1-inch LCD
OPERATION UNIT	LCD OPERATION CIRCUIT	CCK-972	

Table9-16 : Circuit Block to be Repaired (JMA-9122-6XA/9XA)

Location	Circuit Block	Type	Remarks
SCANNER UNIT	GEARED MOTOR	MDBW10822	For 100/220VAC
SCANNER UNIT	ENCODER	CHT-71A	
SCANNER UNIT	AC220V MOTOR DRIVER	7EPRD0034	For 220VAC
SCANNER UNIT	AC100V MOTOR DRIVER	7EPRD0035	For 100VAC
SCANNER UNIT	PERFORMANCE MONITOR	NJU-85	
SCANNER UNIT	HEATER CONTROL PART	CHG-216	Option (AC100V)
SCANNER UNIT	BREAK CIRCUIT	CFA-253	
SCANNER UNIT	BREAK CONTROL CIRCUIT	CCB-655	
SCANNER UNIT	BREAK CIRCUIT A	CFA-259	
SCANNER UNIT	BREAK CIRCUIT B	CFA-260	
SCANNER UNIT	T/R CONTROL CIRCUIT	CMC-1205R	
SCANNER UNIT	MODULATOR UNIT	NMA-550	Including CPA-264 Including CMB-404 Including CFR-229 Excluding Magnetron
SCANNER UNIT	MODULATOR CIRCUIT	CPA-264	
SCANNER UNIT	RECEIVER UNIT	NRG-162A	Including CMA-866A
SCANNER UNIT	POWER SUPPLY CIRCUIT	CBD-1682A	
SCANNER UNIT	RELAY FILTER CIRCUIT	CSC-656	
SCANNER UNIT	FAN	7BFRD0002	
RADAR PROCESS UNIT	RADAR PROCESS CIRCUIT	MDLW11900	With mounting bracket
RADAR PROCESS UNIT	AIS PROCESS CIRCUIT	CDC-1325	
RADAR PROCESS UNIT	ARPA PROCESS CIRCUIT	CDC-1186D	
RADAR PROCESS UNIT	GYRO I/F CIRCUIT	CMJ-462E	
RADAR PROCESS UNIT	TERMINALBOARD CIRCUIT	CQD-2097	
RADAR PROCESS UNIT	MOTHERBOARD CIRCUIT	CQC-1192	
RADAR PROCESS UNIT	FAN (RPU)	109R0612S4D13	
RADAR PROCESS UNIT	POWER SUPPLY	CBD-1661	
RADAR PROCESS UNIT	FAN (PSU)	7BFRD0006	
OPERATION UNIT	OPERATION CIRCUIT A	CCK-973	
OPERATION UNIT	OPERATION CIRCUIT B	CCK-974	
OPERATION UNIT	OPERATION CIRCUIT D	CCK-976	
OPERATION UNIT	TRACKBALL	5EZLY00003	
MONITOR UNIT	LCD PANEL	7WSRD0002A	23.1-inch LCD
MONITOR UNIT	LCD OPERATION CIRCUIT	CCK-972	

Table9-17 : Circuit Block to be Repaired (JMA-9122-6XAH)

Location	Circuit Block	Type	Remarks
SCANNER UNIT	GEARED MOTOR	7BDRD0045A	For 100/220VAC
SCANNER UNIT	ENCODER	CHT-71A	
SCANNER UNIT	MOTOR CONTROL POWER CIRCUIT	CBD-1779	
SCANNER UNIT	BREAK CIRCUIT	CFA-257	
SCANNER UNIT	PERFORMANCE MONITOR	NJU-85	
SCANNER UNIT	HEATER CONTROL PART	CHG-216	Option (AC100V)
SCANNER UNIT	POWER SUPPLY CIRCUIT	CBD-1682A	
SCANNER UNIT	T/R CONTROL CIRCUIT	CMC-1205R	
SCANNER UNIT	MODULATOR UNIT	NMA-550	Including CPA-264 Including CMB-404 Including CFR-229 Excluding Magnetron
SCANNER UNIT	MODULATOR CIRCUIT	CPA-264	
SCANNER UNIT	RECEIVER UNIT	NRG-162A	Including CMA-866A
SCANNER UNIT	FAN	7BFRD0002	
RADAR PROCESS UNIT	RADAR PROCESS CIRCUIT	MDLW11900	With mounting bracket
RADAR PROCESS UNIT	AIS PROCESS CIRCUIT	CDC-1325	
RADAR PROCESS UNIT	ARPA PROCESS CIRCUIT	CDC-1186D	
RADAR PROCESS UNIT	GYRO I/F CIRCUIT	CMJ-462E	
RADAR PROCESS UNIT	TERMINALBOARD CIRCUIT	CQD-2097	
RADAR PROCESS UNIT	MOTHERBOARD CIRCUIT	CQC-1192	
RADAR PROCESS UNIT	FAN (RPU)	109R0612S4D13	
RADAR PROCESS UNIT	POWER SUPPLY	CBD-1661	
RADAR PROCESS UNIT	FAN (PSU)	7BFRD0006	
OPERATION UNIT	OPERATION CIRCUIT A	CCK-973	
OPERATION UNIT	OPERATION CIRCUIT B	CCK-974	
OPERATION UNIT	OPERATION CIRCUIT D	CCK-976	
OPERATION UNIT	TRACKBALL	5EZLY00003	
MONITOR UNIT	LCD PANEL	7WSRD0002A	23.1-inch LCD
MONITOR UNIT	LCD OPERATION CIRCUIT	CCK-972	

Table9-18 : Circuit Block to be Repaired (JMA-9123-7XA/9XA)

Location	Circuit Block	Type	Remarks
SCANNER UNIT	GEARED MOTOR	MDBW10822	For 100/220VAC
SCANNER UNIT	ENCODER	CHT-71A	
SCANNER UNIT	AC220V MOTOR DRIVER	7EPRD0034	For 220VAC
SCANNER UNIT	AC100V MOTOR DRIVER	7EPRD0035	For 100VAC
SCANNER UNIT	PERFORMANCE MONITOR	NJU-85	
SCANNER UNIT	HEATER CONTROL PART	CHG-216	Option (AC100V)
SCANNER UNIT	BREAK CIRCUIT	CFA-253	
SCANNER UNIT	BREAK CONTROL CIRCUIT	CCB-655	
SCANNER UNIT	BREAK CIRCUIT A	CFA-259	
SCANNER UNIT	BREAK CIRCUIT B	CFA-260	
TRANSMITTER RECEIVER UNIT	T/R CONTROL CIRCUIT	CMC-1205R	
TRANSMITTER RECEIVER UNIT	MODULATOR UNIT	NMA-552	Including CPA-264 Including CMB-405 Including CFR-229 Excluding Magnetron
TRANSMITTER RECEIVER UNIT	MODULATOR CIRCUIT	CPA-264	
TRANSMITTER RECEIVER UNIT	RECEIVER UNIT	NRG-162A	Including CMA-866A
TRANSMITTER RECEIVER UNIT	POWER SUPPLY CIRCUIT	CBD-1682A	
TRANSMITTER RECEIVER UNIT	RELAY FILTER CIRCUIT	CSC-656	
RADAR PROCESS UNIT	RADAR PROCESS CIRCUIT	MDLW11900	With mounting bracket
RADAR PROCESS UNIT	AIS PROCESS CIRCUIT	CDC-1325	
RADAR PROCESS UNIT	ARPA PROCESS CIRCUIT	CDC-1186D	
RADAR PROCESS UNIT	GYRO I/F CIRCUIT	CMJ-462E	
RADAR PROCESS UNIT	TERMINALBOARD CIRCUIT	CQD-2097	
RADAR PROCESS UNIT	MOTHERBOARD CIRCUIT	CQC-1192	
RADAR PROCESS UNIT	FAN (RPU)	109R0612S4D13	
RADAR PROCESS UNIT	POWER SUPPLY	CBD-1661	
RADAR PROCESS UNIT	FAN (PSU)	7BFRD0006	
OPERATION UNIT	OPERATION CIRCUIT A	CCK-973	
OPERATION UNIT	OPERATION CIRCUIT B	CCK-974	
OPERATION UNIT	OPERATION CIRCUIT D	CCK-976	
OPERATION UNIT	TRACKBALL	5EZLY00003	
MONITOR UNIT	LCD PANEL	7WSRD0002A	23.1-inch LCD
MONITOR UNIT	LCD OPERATION CIRCUIT	CCK-972	

Table9-19 : Circuit Block to be Repaired (JMA-9132-SA)

Location	Circuit Block	Type	Remarks
SCANNER UNIT	GEARED MOTOR	MDBW10823	For 100/220VAC
SCANNER UNIT	ENCODER	CHT-71A1	
SCANNER UNIT	AC220V MOTOR DRIVER	7EPRD0034	For 220VAC
SCANNER UNIT	AC100V MOTOR DRIVER	7EPRD0035	For 100VAC
SCANNER UNIT	PERFORMANCE MONITOR	NJU-84	
SCANNER UNIT	HEATER CONTROL PART	CHG-215	Option (AC100V)
SCANNER UNIT	BREAK CIRCUIT	CFA-255	
SCANNER UNIT	BREAK CONTROL CIRCUIT	CCB-655	
SCANNER UNIT	BREAK CIRCUIT A	CFA-261	
SCANNER UNIT	BREAK CIRCUIT B	CFA-262	
SCANNER UNIT	T/R CONTROL CIRCUIT	CMC-1205R	
SCANNER UNIT	MODULATOR UNIT	NMA-551	Including CPA-264 Including CMB-406 Including CFR-229 Excluding Magnetron
SCANNER UNIT	MODULATOR CIRCUIT	CPA-264	
SCANNER UNIT	RECEIVER UNIT	NRG-229	
SCANNER UNIT	POWER SUPPLY CIRCUIT	CBD-1682A	
SCANNER UNIT	RELAY FILTER CIRCUIT	CSC-656	
SCANNER UNIT	FAN	7BFRD0002	
RADAR PROCESS UNIT	RADAR PROCESS CIRCUIT	MDLW11900	With mounting bracket
RADAR PROCESS UNIT	AIS PROCESS CIRCUIT	CDC-1325	
RADAR PROCESS UNIT	ARPA PROCESS CIRCUIT	CDC-1186D	
RADAR PROCESS UNIT	GYRO I/F CIRCUIT	CMJ-462E	
RADAR PROCESS UNIT	TERMINALBOARD CIRCUIT	CQD-2097	
RADAR PROCESS UNIT	MOTHERBOARD CIRCUIT	CQC-1192	
RADAR PROCESS UNIT	FAN (RPU)	109R0612S4D13	
RADAR PROCESS UNIT	POWER SUPPLY	CBD-1661	
RADAR PROCESS UNIT	FAN (PSU)	7BFRD0006	
OPERATION UNIT	OPERATION CIRCUIT A	CCK-973	
OPERATION UNIT	OPERATION CIRCUIT B	CCK-974	
OPERATION UNIT	OPERATION CIRCUIT D	CCK-976	
OPERATION UNIT	TRACKBALL	5EZLY00003	
MONITOR UNIT	LCD PANEL	7WSRD0002A	23.1-inch LCD
MONITOR UNIT	LCD OPERATION CIRCUIT	CCK-972	

Table9-20 : Circuit Block to be Repaired (JMA-9133-SA)

Location	Circuit Block	Type	Remarks
SCANNER UNIT	GEARED MOTOR	MDBW10823	For 100/220VAC
SCANNER UNIT	ENCODER	CHT-71A1	
SCANNER UNIT	AC220V MOTOR DRIVER	7EPRD0034	For 220VAC
SCANNER UNIT	AC100V MOTOR DRIVER	7EPRD0035	For 100VAC
SCANNER UNIT	PERFORMANCE MONITOR	NJU-84	
SCANNER UNIT	HEATER CONTROL PART	CHG-215	Option (AC100V)
SCANNER UNIT	BREAK CIRCUIT	CFA-255	
SCANNER UNIT	BREAK CONTROL CIRCUIT	CCB-655	
SCANNER UNIT	BREAK CIRCUIT A	CFA-261	
SCANNER UNIT	BREAK CIRCUIT B	CFA-262	
TRANSMITTER RECEIVER UNIT	T/R CONTROL CIRCUIT	CMC-1205R	
TRANSMITTER RECEIVER UNIT	MODULATOR UNIT	NMA-553	Including CPA-264 Including CMB-407 Including CFR-229 Excluding Magnetron
TRANSMITTER RECEIVER UNIT	MODULATOR CIRCUIT	CPA-264	
TRANSMITTER RECEIVER UNIT	RECEIVER UNIT	NRG-229	
TRANSMITTER RECEIVER UNIT	POWER SUPPLY CIRCUIT	CBD-1682A	
TRANSMITTER RECEIVER UNIT	RELAY FILTER CIRCUIT	CSC-656	
RADAR PROCESS UNIT	RADAR PROCESS CIRCUIT	MDLW11900	With mounting bracket
RADAR PROCESS UNIT	AIS PROCESS CIRCUIT	CDC-1325	
RADAR PROCESS UNIT	ARPA PROCESS CIRCUIT	CDC-1186D	
RADAR PROCESS UNIT	GYRO I/F CIRCUIT	CMJ-462E	
RADAR PROCESS UNIT	TERMINALBOARD CIRCUIT	CQD-2097	
RADAR PROCESS UNIT	MOTHERBOARD CIRCUIT	CQC-1192	
RADAR PROCESS UNIT	FAN (RPU)	109R0612S4D13	
RADAR PROCESS UNIT	POWER SUPPLY	CBD-1661	
RADAR PROCESS UNIT	FAN (PSU)	7BFRD0006	
OPERATION UNIT	OPERATION CIRCUIT A	CCK-973	
OPERATION UNIT	OPERATION CIRCUIT B	CCK-974	
OPERATION UNIT	OPERATION CIRCUIT D	CCK-976	
OPERATION UNIT	TRACKBALL	5EZLY00003	
MONITOR UNIT	LCD PANEL	7WSRD0002A	23.1-inch LCD
MONITOR UNIT	LCD OPERATION CIRCUIT	CCK-972	

9.3 AFTER-SALES SERVICE

9.3.1 Keeping period of maintenance parts

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

9.3.2 When you Request for Repair

If you suppose the product may be out of order, read the description in Section 9 carefully and check the suspected point again.

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

Repair within the Warranty Period

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

Repair after the Warranty Period

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

Necessary Information for Repair

- Product name, model, manufacturing date and serial number
- Trouble conditions (as detailed as possible. Refer to "Radar Failure Check List" on page 9-15
- Name of company/organization, address and telephone number

9.3.3 Recommended Maintenance

The performance of the product may deteriorate due to the secular change of the parts used in it, though such deterioration depends upon the conditions of operation. So checkup and maintenance is recommendable for the product in addition to your daily care.

For maintenance, consult with the near-by dealer or our sales department. Such maintenance will be made with charges.

For further details of after-sale service, contact the JRC Offices.

Radar Failure Check List



When placing an order for repair of the product, it is requested that you could confirm the check items and fill the results and sent the sheet to our contact. If there is any unclear items, contact the ship on which the product is installed, and give the correct information on the product.

Ship name: _____ Phone: _____ Fax: _____

ⁱ Radar general model name :JMA- _____ ⁱSerial No. : _____

i. Write the full model name correctly

Check the following items in the order of the number, and check 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.

No.	Check Item	Result	
(1)	Power can be turned on. (The lamp on the Operation unit is lit)	YES	NO
(2) ⁱ	A few minutes after powering-on, it will become standby status.	YES	NO
(3) ⁱ	When powering-on (or TX ON), LCD monitor something is lit.	YES	NO
(4) ^{i,ii}	The antenna rotates at the transmission (TX) ON.	YES	NO
(5) ^{i,ii}	Current is supplied to the magnetron. (Refer to the instruction manual)	YES	NO
(6) ⁱⁱ	Turning is enabled. (Check with the range of 6 NM or more)	YES	NO
(7) ⁱⁱ	Fixed marker is displayed.	YES	NO
(8) ⁱⁱ	VRM is displayed.	YES	NO
(9) ⁱⁱ	While noise is displayed while set at SEA and RAIN minimum, GAIN maximum, IR-OFF and range 48 NM.	YES	NO
(10) ⁱⁱ	Target reflection echo is displayed.	YES	NO
(11) ⁱⁱ	Sensitivity of reflection echo is normal.	YES	NO
(12) ⁱⁱ	EBL is displayed.	YES	NO
(13) ⁱⁱ	Cursor mark moves.	YES	NO
(14) ^{ii,iii}	GYRO course can be set and normally displayed.	YES	NO
(15) ^{ii,iii}	LOG speed can be normally displayed.	YES	NO
(16) ⁱⁱ	Target tracking function works normally.	YES	NO
(17) ^{ii,iii}	If equipped with an interswitch, when switching from the straight mode (II) to (X), the failures (items marked NO) in the above (1) to (16), are switched over to the other unit.	YES	NO
(18)	Others (Error message, etc.)		

i. If result is NO, then check the fuse. (Refer to Section 9.1.2 "Operation Checking" and Section 9.2 "TROUBLE SHOOTING")

ii. Check these items while transmission is ON.

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

SECTION 10 DISPOSAL



DISPOSAL

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10.4	DISPOSAL OF TR-TUBE	10-2
10.5	ABOUT THE CHINA ROHS	10-3

10.1 DISPOSAL OF THE UNIT

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

10.2 DISPOSAL OF USED BATTERIES



WARNING



When disposing of used lithium batteries, be sure to insulate the batteries by taping the $\oplus\ominus$ terminals.

Otherwise, heat generation, explosion or a fire may occur.

In this unit, Lithium batteries are used for the following parts:

Radar Processing circuit (CDC-1324): BT1 (Maxell: CR2032)

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

10.3 DISPOSAL OF USED MAGNETRON

Magnetron is used in the Scanner (NKE – 2103/2254/1125/1130) and Transmitter Receiver Unit (NTG-3225/3230).

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

For detail, consult with our dealer or business office.

10.4 DISPOSAL OF TR-TUBE

In the case that either mark shown in Fig 10-1 is on the expired TR-tube, Radioisotopes are in the TR-tube.

- Disposal of TR-tube with these marks must be done in accordance with the laws and regulations of the pertaining country. For detail, consult with our dealer or business office.
- Radiation from TR-tube has no effect on the human body.
- Don't take apart TR-tube.

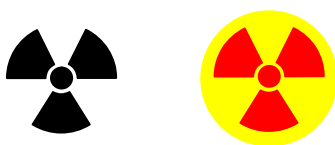


Fig 10-1: Radioisotopes Marks

10.5 ABOUT THE CHINA ROHS

有毒有害物质或元素的名称及含量

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

形式名(Type): JMA-9100 Series, JMA-7100Series

名称(Name): RADAR

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

SECTION 11 SPECIFICATION

SPECIFICATION

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11.1

JMA-9133-SA TYPE RADAR

GENERAL SPECIFICATION

Class of emission	P0N
Display	Color Raster Scan
Screen	23.1inch LCD (Effective diameter of Radar: more than 320mm)
Range Scale	0.125、0.25、0.5、0.75、1.5、3、6、12、24、48、96NM
Range Resolution	less than 30m
Minimum Detection Range	less than 40m
Bearing Accuracy	less than 1°
Bearing Indication	Relative motion mode : N-UP, C-UP and H-UP True motion mode : N-UP and C-UP
Ambient Condition	Temperature SCANNER UNIT -25 to +55°C (Storage -25 to +70°C) Other Unit -15 to +55°C Relative humidity 93% at +40°C
Vibration	2 to 13.2Hz Amplitude +/-1mm +/-10% 13.2 to 100Hz Acceleration 7m/s ²
Power Supply Input	AC100 to 115V, 50/60Hz, 1φ or AC220 to 240V, 50/60Hz, 1φ
Power Consumption	Approx.400VA typical Approx. 2000VA at Maximum wind speed
PS Voltage Fluctuation	+/-10% (at the maximum cable length)
Pre Heating Time	Within 4 minute
From STBY to TX	Within 5 sec.
SCANNER UNIT (NKE-1139)	
	See 11.8
TRANSMITTER RECEIVER UNIT (NTG-3230)	
	See 11.15
DISPLAY UNIT (NCD-4990)	
	See 11.17
PERFORMANCE MONITOR (NJU-84)	
	See 11.20
OPTION	
Scanner with Deicing Heater	NKE-1139-D (Only heater collar)
Radar Inter switch	NQE-3141-2A (Maximum 2 Radars) NQE-3141-4A (Maximum 4 Radars)
DISPLAY UNIT (Desktop type)	NCD-4990T
Maximum Cable Length	
SCANNER UNIT to TRANSMITTER RECEIVER UNIT	30m
DISPLAY UNIT to TRANSMITTER RECEIVER UNIT	35m
SAFE DISTANCE FOR STANDARD COMPASS	
SCANNER UNIT	1.4m
TRANSMITTER RECEIVER UNIT	3.9m
DISPLAY UNIT	4.0m

11.2 JMA-9132-SA TYPE RADAR

GENERAL SPECIFICATION	
Class of emission	P0N
Display	Color Raster Scan
Screen	23.1inch LCD (Effective diameter of Radar: more than 320mm)
Range Scale	0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96NM
Range Resolution	less than 30m
Minimum Detection Range	less than 40m
Bearing Accuracy	less than 1°
Bearing Indication	Relative motion mode : N-UP, C-UP and H-UP True motion mode : N-UP and C-UP
Ambient Condition	Temperature SCANNER UNIT -25 to +55°C (Storage -25 to +70°C) Other Unit -15 to +55°C Relative humidity 93% at +40°C
Vibration	2 to 13.2Hz Amplitude +/-1mm +/-10% 13.2 to 100Hz Acceleration 7m/s ²
Power Supply Input	AC100 to 115V, 50/60Hz, 1φ or AC220 to 240V, 50/60Hz, 1φ
Power Consumption	Approx.400VA typical Approx. 2000VA at Maximum wind speed
PS Voltage Fluctuation	+/-10% (at the maximum cable length)
Pre Heating Time	Within 4 minute
From STBY to TX	Within 5 sec.
SCANNER UNIT (NKE-1130)	
	See 11.9
DISPLAY UNIT (NCD-4990)	
	See 11.17
PERFORMANCE MONITOR (NJU-84)	
	See 11.20
OPTION	
Scanner with Deicing Heater	NKE-1139-D (Only heater collar)
Radar Inter switch	NQE-3141-2A (Maximum 2 Radars) NQE-3141-4A (Maximum 4 Radars)
DISPLAY UNIT (Desktop type)	NCD-4990T
Maximum Cable Length	
SCANNER UNIT to TRANSMITTER RECEIVER UNIT	65m
SAFE DISTANCE FOR STANDARD COMPASS	
SCANNER UNIT	5.1m
DISPLAY UNIT	4.0m

11.3 JMA-9123-7XA/9XA TYPE RADAR

GENERAL SPECIFICATION

Class of emission	P0N
Display	Color Raster Scan
Screen	23.1inch LCD (Effective diameter of Radar: more than 320mm)
Range Scale	0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96NM
Range Resolution	less than 30m
Minimum Detection Range	less than 40m
Bearing Accuracy	less than 1°
Bearing Indication	Relative motion mode : N-UP, C-UP and H-UP True motion mode : N-UP and C-UP
Ambient Condition	Temperature SCANNER UNIT -25 to +55°C (Storage -25 to +70°C) Other Unit -15 to +55°C Relative humidity 93% at +40°C
Vibration	2 to 13.2Hz Amplitude +/-1mm +/-10% 13.2 to 100Hz Acceleration 7m/s ²
Power Supply Input	AC100 to 115V, 50/60Hz, 1φ or AC220 to 240V, 50/60Hz, 1φ
Power Consumption	Approx.350VA typical Approx. 1700VA at Maximum wind speed
PS Voltage Fluctuation	+/-10% (at the maximum cable length)
Pre Heating Time	Within 4 minute
From STBY to TX	Within 5 sec.

SCANNER UNIT (NKE-1129-7/9)

See 11.10

TRANSMITTER RECEIVER UNIT (NTG-3225)

See 11.16

DISPLAY UNIT (NCD-4990)

See 11.17

PERFORMANCE MONITOR (NJU-85)

See 11.21

OPTION

Scanner with Deicing Heater	NKE-1139-D (Only heater collar)
Radar Inter switch	NQE-3141-2A (Maximum 2 Radars) NQE-3141-4A (Maximum 4 Radars)

DISPLAY UNIT (Desktop type) NCD-4990T

Maximum Cable Length

SCANNER UNIT to TRANSMITTER RECEIVER UNIT	30m
DISPLAY UNIT to TRANSMITTER RECEIVER UNIT	35m

SAFE DISTANCE FOR STANDARD COMPASS

SCANNER UNIT	1.05m
TRANSMITTER RECEIVER UNIT	2.8m
DISPLAY UNIT	4.0m

11.4 JMA-9122-6XA/9XA TYPE RADAR

GENERAL SPECIFICATION	
Class of emission	P0N
Display	Color Raster Scan
Screen	23.1inch LCD (Effective diameter of Radar: more than 320mm)
Range Scale	0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96NM
Range Resolution	less than 30m
Minimum Detection Range	less than 40m
Bearing Accuracy	less than 1°
Bearing Indication	Relative motion mode : N-UP, C-UP and H-UP True motion mode : N-UP and C-UP
Ambient Condition	Temperature SCANNER UNIT -25 to +55°C (Storage -25 to +70°C) Other Unit -15 to +55°C Relative humidity 93% at +40°C
Vibration	2 to 13.2Hz Amplitude +/-1mm +/-10% 13.2 to 100Hz Acceleration 7m/s ²
Power Supply Input	AC100 to 115V, 50/60Hz, 1φ or AC220 to 240V, 50/60Hz, 1φ
Power Consumption	Approx.350VA typical Approx. 1700VA at Maximum wind speed
PS Voltage Fluctuation	+/-10% (at the maximum cable length)
Pre Heating Time	Within 4 minute
From STBY to TX	Within 5 sec.
SCANNER UNIT (NKE-1125-6/9)	
	See 11.11
DISPLAY UNIT (NCD-4990)	
	See 11.17
PERFORMANCE MONITOR (NJU-85)	
	See 11.21
OPTION	
Scanner with Deicing Heater	NKE-1139-D (Only heater collar)
Radar Inter switch	NQE-3141-2A (Maximum 2 Radars) NQE-3141-4A (Maximum 4 Radars)
DISPLAY UNIT (Desktop type)	NCD-4990T
Maximum Cable Length	
SCANNER UNIT to TRANSMITTER RECEIVER UNIT	65m
SAFE DISTANCE FOR STANDARD COMPASS	
SCANNER UNIT	2.4m
DISPLAY UNIT	4.0m

11.5 JMA-9122-6XAH TYPE RADAR

GENERAL SPECIFICATION	
Class of emission	P0N
Display	Color Raster Scan
Screen	23.1inch LCD (Effective diameter of Radar: more than 320mm)
Range Scale	0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96NM
Range Resolution	less than 30m
Minimum Detection Range	less than 40m
Bearing Accuracy	less than 1°
Bearing Indication	Relative motion mode : N-UP, C-UP and H-UP True motion mode : N-UP and C-UP
Ambient Condition	Temperature SCANNER UNIT -25 to +55°C (Storage -25 to +70°C) Other Unit -15 to +55°C Relative humidity 93% at +40°C
Vibration	2 to 13.2Hz Amplitude +/-1mm +/-10% 13.2 to 100Hz Acceleration 7m/s ²
Power Supply Input	AC100 to 115V, 50/60Hz, 1φ or AC220 to 240V, 50/60Hz, 1φ
Power Consumption	Approx.350VA typical Approx. 1000VA at Maximum wind speed
PS Voltage Fluctuation	+/-10% (at the maximum cable length)
Pre Heating Time	Within 4 minute
From STBY to TX	Within 5 sec.
SCANNER UNIT (NKE-2254-6HS)	
	See 11.11
DISPLAY UNIT (NCD-4990)	
	See 11.17
PERFORMANCE MONITOR (NJU-85)	
	See 11.21
AC-DC CONVERTER (NBA-5135)	
	See 11.22
OPTION	
Scanner with Deicing Heater	None
Radar Inter switch	NQE-3141-2A (Maximum 2 Radars) NQE-3141-4A (Maximum 4 Radars)
DISPLAY UNIT (Desktop type)	NCD-4990T
Maximum Cable Length	
SCANNER UNIT to TRANSMITTER RECEIVER UNIT	65m
SAFE DISTANCE FOR STANDARD COMPASS	
SCANNER UNIT	2.4m
DISPLAY UNIT	4.0m

11.6 JMA-9110-6XA TYPE RADAR

GENERAL SPECIFICATION	
Class of emission	P0N
Display	Color Raster Scan
Screen	23.1inch LCD (Effective diameter of Radar: more than 320mm)
Range Scale	0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96NM
Range Resolution	less than 30m
Minimum Detection Range	less than 40m
Bearing Accuracy	less than 1°
Bearing Indication	Relative motion mode : N-UP, C-UP and H-UP True motion mode : N-UP and C-UP
Ambient Condition	Temperature SCANNER UNIT -25 to +55°C (Storage -25 to +70°C) Other Unit -15 to +55°C Relative humidity 93% at +40°C
Vibration	2 to 13.2Hz Amplitude +/-1mm +/-10% 13.2 to 100Hz Acceleration 7m/s ²
Power Supply Input	AC100 to 115V, 50/60Hz, 1φ or AC220 to 240V, 50/60Hz, 1φ
Power Consumption	Approx.350VA typical Approx. 1000VA at Maximum wind speed
PS Voltage Fluctuation	+/-10% (at the maximum cable length)
Pre Heating Time	Within 4 minute
From STBY to TX	Within 5 sec.
SCANNER UNIT (NKE-2103-6)	
	See 11.13
DISPLAY UNIT (NCD-4990)	
	See 11.17
PERFORMANCE MONITOR (NJU-85)	
	See 11.21
AC-DC CONVERTER (NBA-5135)	
	See 11.22
OPTION	
Scanner with Deicing Heater	None
Radar Inter switch	NQE-3141-2A (Maximum 2 Radars) NQE-3141-4A (Maximum 4 Radars)
DISPLAY UNIT (Desktop type)	NCD-4990T
Maximum Cable Length	
SCANNER UNIT to TRANSMITTER RECEIVER UNIT	65m
SAFE DISTANCE FOR STANDARD COMPASS	
SCANNER UNIT	2.4m
DISPLAY UNIT	4.0m

11.7 JMA-9110-6XAH TYPE RADAR

GENERAL SPECIFICATION	
Class of emission	P0N
Display	Color Raster Scan
Screen	23.1inch LCD (Effective diameter of Radar: more than 320mm)
Range Scale	0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96NM
Range Resolution	less than 30m
Minimum Detection Range	less than 40m
Bearing Accuracy	less than 1°
Bearing Indication	Relative motion mode : N-UP, C-UP and H-UP True motion mode : N-UP and C-UP
Ambient Condition	Temperature SCANNER UNIT -25 to +55°C (Storage -25 to +70°C) Other Unit -15 to +55°C Relative humidity 93% at +40°C
Vibration	2 to 13.2Hz Amplitude +/-1mm +/-10% 13.2 to 100Hz Acceleration 7m/s ²
Power Supply Input	AC100 to 115V, 50/60Hz, 1φ or AC220 to 240V, 50/60Hz, 1φ
Power Consumption	Approx.350VA typical Approx. 1000VA at Maximum wind speed
PS Voltage Fluctuation	+/-10% (at the maximum cable length)
Pre Heating Time	Within 4 minute
From STBY to TX	Within 5 sec.
SCANNER UNIT (NKE-2103-6HS)	
	See 11.14
DISPLAY UNIT (NCD-4990)	
	See 11.17
PERFORMANCE MONITOR (NJU-85)	
	See 11.21
AC-DC CONVERTER (NBA-5135)	
	See 11.22
OPTION	
Scanner with Deicing Heater	None
Radar Inter switch	NQE-3141-2A (Maximum 2 Radars) NQE-3141-4A (Maximum 4 Radars)
DISPLAY UNIT (Desktop type)	NCD-4990T
Maximum Cable Length	
SCANNER UNIT ~ DISPLAY UNIT	65m
SAFE DISTANCE FOR STANDARD COMPASS	
SCANNER UNIT	2.4m
DISPLAY UNIT	4.0m

11.8 SCANNER UNIT (NKE-1139)

SCANNER UNIT NKE-1139

Dimension	Height 791 x Swing Circle 4000 (mm)
Mass	Approx.150kg
Polarization	Horizontal
Directional Characteristics	Horizontal beam width : 1.9° Vertical beam width : 25° Side lobe Level : below -26dB (within +/-10°) : below -30dB (outside +/-10°)
Revolution	Approx.24rpm
Power Supply for Motor	AC100 - 115V、 50/60Hz、 1φ or AC220 - 240V、 50/60Hz、 1φ
Maximum Wind Velocity	51.5m/s (100knots)

11.9 SCANNER UNIT (NKE-1130)

SCANNER UNIT NKE-1130

Dimension	Height 791 x Swing Circle 4000 (mm)																		
Mass	Approx.180kg																		
Polarization	Horizontal																		
Directional Characteristics	Horizontal beam width : 1.9° Vertical beam width : 25° Side lobe Level : below -26dB (within +/-10°) : below -30dB (outside +/-10°)																		
Revolution	Approx.24rpm																		
Power Supply for Motor	AC100 - 115V、 50/60Hz、 1φ or AC220 - 240V、 50/60Hz、 1φ																		
Maximum Wind Velocity	51.5m/s (100knots)																		
Transmitting Frequency	3050 ± 20MHz																		
Transmitting Power	30kW																		
Transmitting Tube	Magnetron[M1555]																		
TX Pulse width / Repetition Frequency	SP1 : 0.07μs/2250Hz MP1 : 0.2μs/2250Hz MP2 : 0.3μs/1900Hz、 MP3 : 0.4μs/1400Hz LP1 : 0.8μs/750Hz、 LP2 : 1.0μs/650Hz LP3 : 1.2μs/510Hz																		
	<table border="1"> <tr> <td>0.125、 0.25、 0.5NM</td> <td>: SP1</td> </tr> <tr> <td>0.75NM</td> <td>: SP1/MP1</td> </tr> <tr> <td>1.5NM</td> <td>: SP1/MP1/MP2/MP3</td> </tr> <tr> <td>3NM</td> <td>: MP1/MP2/MP3/LP1</td> </tr> <tr> <td>6NM</td> <td>: MP1/MP2/MP3/LP1/LP2</td> </tr> <tr> <td>12NM</td> <td>: MP1/MP2/MP3/LP1/LP2</td> </tr> <tr> <td>24NM</td> <td>: MP3/LP1/LP2</td> </tr> <tr> <td>48NM</td> <td>: LP2</td> </tr> <tr> <td>96NM</td> <td>: LP3</td> </tr> </table>	0.125、 0.25、 0.5NM	: SP1	0.75NM	: SP1/MP1	1.5NM	: SP1/MP1/MP2/MP3	3NM	: MP1/MP2/MP3/LP1	6NM	: MP1/MP2/MP3/LP1/LP2	12NM	: MP1/MP2/MP3/LP1/LP2	24NM	: MP3/LP1/LP2	48NM	: LP2	96NM	: LP3
0.125、 0.25、 0.5NM	: SP1																		
0.75NM	: SP1/MP1																		
1.5NM	: SP1/MP1/MP2/MP3																		
3NM	: MP1/MP2/MP3/LP1																		
6NM	: MP1/MP2/MP3/LP1/LP2																		
12NM	: MP1/MP2/MP3/LP1/LP2																		
24NM	: MP3/LP1/LP2																		
48NM	: LP2																		
96NM	: LP3																		
Modulator	Solid State Modulator Circuit																		
Duplexer	Circulator + Diode Limiter																		
Front End Module	Built-in																		
Intermediate Frequency Amplifier	Intermediate Frequency : 60MHz Band Width : 25/8/3MHz Gain : more than 90dB Amplifying Characteristics : Logarithmic Amplifier																		
Overall Noise Figure	7.5dB (Typical)																		
Tuning	Manual/AUTO																		

11.10 SCANNER UNIT (NKE-1129-7/9)

SCANNER UNIT NKE-1129-7/9

Dimension	7ft Height 536 x Swing Circle 2270 (mm) 9ft Height 536 x Swing Circle 2825 (mm)
Mass	7ft Approx.51kg 9ft Approx.53kg
Polarization	Horizontal
Directional Characteristics	Horizontal beam width : 1.0° (7ft) : 0.8° (9ft) Vertical beam width : 20° Side lobe Level : below -26dB (within +/-10°) : below -30dB (outside +/-10°)
Revolution	Approx.24rpm
Power Supply for Motor	AC100 - 115V、50/60Hz、1φ or AC220 - 240V、50/60Hz、1φ
Maximum Wind Velocity	51.5m/s (100knots)

11.11 SCANNER UNIT (NKE-1125-6/9)

SCANNER UNIT NKE-1125-6/9

Dimension	6ft Height 536 x Swing Circle 1910 (mm) 9ft Height 536 x Swing Circle 2825 (mm)																		
Mass	6ft Approx. 55kg 9ft Approx. 60kg																		
Polarization	Horizontal																		
Directional Characteristics	Horizontal beam width : 1.2° (6ft) : 0.8° (9ft) Vertical beam width : 20° Side lobe Level : below -26dB (within +/-10°) : below -30dB (outside +/-10°)																		
Revolution	Approx.24rpm																		
Power Supply for Motor	AC100 - 115V、 50/60Hz、 1φ or AC220 - 240V、 50/60Hz、 1φ																		
Maximum Wind Velocity	51.5m/s (100knots)																		
Transmitting Frequency	9410 ± 30MHz																		
Transmitting Power	25kW																		
Transmitting Tube	Magnetron[M1568BS]																		
TX Pulse width / Repetition Frequency	SP1 : 0.07μs/2250Hz MP1 : 0.2μs/2250Hz MP2 : 0.3μs/1900Hz、 MP3 : 0.4μs/1400Hz LP1 : 0.8μs/750Hz、 LP2 : 1.0μs/650Hz LP3 : 1.2μs/510Hz																		
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0.125、 0.25、 0.5NM	: SP1																		
0.75NM	: SP1/MP1																		
1.5NM	: SP1/MP1/MP2/MP3																		
3NM	: MP1/MP2/MP3/LP1																		
6NM	: MP1/MP2/MP3/LP1/LP2																		
12NM	: MP1/MP2/MP3/LP1/LP2																		
24NM	: MP3/LP1/LP2																		
48NM	: LP2																		
96NM	: LP3																		
Modulator	Solid State Modulator Circuit																		
Duplexer	Circulator + Diode Limiter																		
Front End Module	Built-in																		
Intermediate Frequency Amplifier	Intermediate Frequency : 60MHz Band Width : 25/8/3MHz Gain : more than 90dB Amplifying Characteristics : Logarithmic Amplifier																		
Overall Noise Figure	7.5dB (Typical)																		
Tuning	Manual/AUTO																		

11.12 SCANNER UNIT (NKE-2254-6HS)

SCANNER UNIT NKE-2254-6HS

Dimension	Height 536 x Swing Circle 1910 (mm)																		
Mass	Approx. 55kg																		
Polarization	Horizontal																		
Directional Characteristics	Horizontal beam width : 1.2° Vertical beam width : 20° Side lobe Level : below -26dB (within +/-10°) : below -30dB (outside +/-10°)																		
Revolution	Approx.24rpm																		
Power Supply for Motor	DC24V																		
Maximum Wind Velocity	51.5m/s (100knots)																		
Transmitting Frequency	9410 ± 30MHz																		
Transmitting Power	25kW																		
Transmitting Tube	Magnetron[M1568BS]																		
TX Pulse width / Repetition Frequency	SP1 : 0.07μs/2250Hz MP1 : 0.2μs/2250Hz MP2 : 0.3μs/1900Hz、MP3 : 0.4μs/1400Hz LP1 : 0.8μs/750Hz、LP2 : 1.0μs/650Hz LP3 : 1.2μs/510Hz																		
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0.125、0.25、0.5NM	: SP1																		
0.75NM	: SP1/MP1																		
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12NM	: MP1/MP2/MP3/LP1/LP2																		
24NM	: MP3/LP1/LP2																		
48NM	: LP2																		
96NM	: LP3																		
Modulator	Solid State Modulator Circuit																		
Duplexer	Circulator + Diode Limiter																		
Front End Module	Built-in																		
Intermediate Frequency Amplifier	Intermediate Frequency : 60MHz Band Width : 25/8/3MHz Gain : more than 90dB Amplifying Characteristics : Logarithmic Amplifier																		
Overall Noise Figure	7.5dB (Typical)																		
Tuning	Manual/AUTO																		

11.13 SCANNER UNIT (NKE-2103-6)

SCANNER UNIT NKE-2103-6HS

Dimension	Height 458 x Swing Circle 1910 (mm)																		
Mass	Approx. 40kg																		
Polarization	Horizontal																		
Directional Characteristics	Horizontal beam width : 1.2° Vertical beam width : 20° Side lobe Level : below -26dB (within +/-10°) : below -30dB (outside +/-10°)																		
Revolution	Approx.24rpm																		
Power Supply for Motor	DC24V																		
Maximum Wind Velocity	51.5m/s (100knots)																		
Transmitting Frequency	9410 ± 30MHz																		
Transmitting Power	10kW																		
Transmitting Tube	Magnetron[MAF1565N]																		
TX Pulse width / Repetition Frequency	SP1 : 0.08μs/2250Hz MP1 : 0.25μs/1700Hz MP2 : 0.5μs/1200Hz LP1 : 0.8μs/750Hz、LP2 : 1.0μs/650Hz																		
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0.125、0.25、0.5NM	: SP1																		
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3NM	: MP1/MP2LP1																		
6NM	: MP1/MP2/LP1/LP2																		
12NM	: MP1/MP2/LP1/LP2																		
24NM	: MP2/LP1/LP2																		
48NM	: LP2																		
96NM	: LP2																		
Modulator	Solid State Modulator Circuit																		
Duplexer	Circulator + Diode Limiter																		
Front End Module	Built-in																		
Intermediate Frequency Amplifier	Intermediate Frequency : 60MHz Band Width : 20/6/3MHz Gain : more than 90dB Amplifying Characteristics : Logarithmic Amplifier																		
Overall Noise Figure	7.5dB (Typical)																		
Tuning	Manual/AUTO																		

11.14 SCANNER UNIT (NKE-2103-6HS)

SCANNER UNIT NKE-2103-6HS

Dimension	Height 458 x Swing Circle 1910 (mm)																		
Mass	Approx. 40kg																		
Polarization	Horizontal																		
Directional Characteristics	Horizontal beam width : 1.2° Vertical beam width : 20° Side lobe Level : below -26dB (within +/-10°) : below -30dB (outside +/-10°)																		
Revolution	Approx.24rpm																		
Power Supply for Motor	DC24V																		
Maximum Wind Velocity	51.5m/s (100knots)																		
Transmitting Frequency	9410 ± 30MHz																		
Transmitting Power	10kW																		
Transmitting Tube	Magnetron[MAF1565N]																		
TX Pulse width / Repetition Frequency	SP1 : 0.08μs/2250Hz MP1 : 0.25μs/1700Hz MP2 : 0.5μs/1200Hz LP1 : 0.8μs/750Hz、LP2 : 1.0μs/650Hz																		
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0.125、0.25、0.5NM	: SP1																		
0.75NM	: SP1/MP1																		
1.5NM	: SP1/MP1/MP2																		
3NM	: MP1/MP2LP1																		
6NM	: MP1/MP2/LP1/LP2																		
12NM	: MP1/MP2/LP1/LP2																		
24NM	: MP2/LP1/LP2																		
48NM	: LP2																		
96NM	: LP2																		
Modulator	Solid State Modulator Circuit																		
Duplexer	Circulator + Diode Limiter																		
Front End Module	Built-in																		
Intermediate Frequency Amplifier	Intermediate Frequency : 60MHz Band Width : 20/6/3MHz Gain : more than 90dB Amplifying Characteristics : Logarithmic Amplifier																		
Overall Noise Figure	7.5dB (Typical)																		
Tuning	Manual/AUTO																		

11.15 TRANSMITTER RECEIVER UNIT (NTG-3230)

SCANNER UNIT NTG-3230

Dimension	:Width 615 x Depth 365 x Height 615 (mm)																		
構造	Wall Mount, Drip Proof																		
Mass	Approx.33kg																		
Transmitting Frequency	3050 ± 20MHz																		
Transmitting Power	30kW																		
Transmitting Tube	Magnetron [M1555]																		
TX Pulse width / Repetition Frequency	SP1 : 0.07µs/2250Hz MP1 : 0.2µs/2250Hz MP2 : 0.3µs/1900Hz、MP3 : 0.4µs/1400Hz LP1 : 0.8µs/750Hz、LP2 : 1.0µs/650Hz LP3 : 1.2µs/510Hz																		
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0.125、0.25、0.5NM	: SP1																		
0.75NM	: SP1/MP1																		
1.5NM	: SP1/MP1/MP2/MP3																		
3NM	: MP1/MP2/MP3/LP1																		
6NM	: MP1/MP2/MP3/LP1/LP2																		
12NM	: MP1/MP2/MP3/LP1/LP2																		
24NM	: MP3/LP1/LP2																		
48NM	: LP2																		
96NM	: LP3																		
Modulator	Solid State Modulator Circuit																		
Duplexer	Circulator + TRHPL																		
Front End Module	Built-in																		
Intermediate Frequency Amplifier	Intermediate Frequency : 60MHz Band Width : 25/8/3MHz Gain : more than 90dB Amplifying Characteristics : Logarithmic Amplifier																		
Overall Noise Figure	7.5dB (Typical)																		
Tuning	Manual/AUTO																		

11.16 TRANSMITTER RECEIVER UNIT (NTG-3225)

SCANNER UNIT NTG-3225

Dimension	:Width 460 x Depth 227 x Height 461 (mm)																		
構造	Wall Mount, Drip Proof																		
Mass	Approx.15kg																		
Transmitting Frequency	9410 ± 30MHz																		
Transmitting Power	25kW																		
Transmitting Tube	Magnetron[M1568BS]																		
TX Pulse width / Repetition Frequency	SP1 : 0.07µs/2250Hz MP1 : 0.2µs/2250Hz MP2 : 0.3µs/1900Hz、MP3 : 0.4µs/1400Hz LP1 : 0.8µs/750Hz、LP2 : 1.0µs/650Hz LP3 : 1.2µs/510Hz																		
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0.125、0.25、0.5NM	: SP1																		
0.75NM	: SP1/MP1																		
1.5NM	: SP1/MP1/MP2/MP3																		
3NM	: MP1/MP2/MP3/LP1																		
6NM	: MP1/MP2/MP3/LP1/LP2																		
12NM	: MP1/MP2/MP3/LP1/LP2																		
24NM	: MP3/LP1/LP2																		
48NM	: LP2																		
96NM	: LP3																		
Modulator	Solid State Modulator Circuit																		
Duplexer	Circulator + Diode Limiter																		
Front End Module	Built-in																		
Intermediate Frequency Amplifier	Intermediate Frequency : 60MHz Band Width : 25/8/3MHz Gain : more than 90dB Amplifying Characteristics : Logarithmic Amplifier																		
Overall Noise Figure	7.5dB (Typical)																		
Tuning	Manual/AUTO																		

11.17 DISPLAY UNIT (NCD-4990)

DISPLAY UNIT NCD-4990

Dimension	Width 700 x Depth 850 x Height 1100 (mm)
Structure	Self-Standing, Drip Proof
Mass	Approx.130kg
Screen	23.1inch Color LCD (Effective Diameter, more than 320mm)
Viewing Distance	1m from the center of Display
Range Scale	0.125, 0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24, 48, 96NM
Range Marker	0.025, 0.05, 0.1, 0.25, 0.5, 1, 2, 4, 8, 16NM
Range Accuracy	Less than 1% of the Range Scale in use, or 30m whichever is larger
Variable Range Marker	2 (VRM1/VRM2)
VRM Scale	0.000 to 100.0nm, Numerical Indication in 4 digits
Bearing Scale	360° in 1° step
Off Center	Within 66% of Radius, except 96nm range
Trackball Cursor	Built-in (Target Range, Relative/True bearing Presentation)
Electronic Bearing Lines	2 (EBL1/EBL2) (on Center/Floating)
EBLBearing Indication	000.0° to 359.9° Numerical Indication in 4 digits
Tuning Indication	Bar graph
Marking Function	Electronic Mark (Maximum 20 points)
Heading Line Indication	Electronic
True Motion Unit	Built in (0.25, 0.5, 0.75, 1.5, 3, 6, 12, 24 and 48nm)
Anti Sea Clutter (SEA)	Manual/AUTO
Anti Rain Clutter (SEA)	Manual/AUTO
Display mode	North-up / Head-up / Course-up
Trails Indication	Off/0.25/0.5/1/3/6/10/15min and Continues
Video Process (PROC)	Built in (Scan correlation / Remain)
Interference Rejection (IR)	Built in (Off / Low / Middle / High)
Auto-acquisition Zone (AZ)	Sector (2)
User Map ⁱ	Built in, Mark and Line (20,000 points)
Self diagnostic function	Built in
Own Ship's Track Indication ⁱ	Built in
Parallel Index Line (PI)	Built in
AIS Indication	Built in
	Display 300
	Activate 100
	Association function:Built in
Interfacing	Slave Display (TRG, VD, BP, BZ) GPS IEC61162-1(NMEA0183) LOG GYRO AIS IEC61162-2 Inter Switch (OPTION) Radar Buoy External Alarm output

Receivable Signal

Receive capability Port:	NAV1/ALM/ARPA/JARPA at terminal board TB4501 COM port (D-Sub 9 PIN)	
Navigation equipment IEC61162-1/2	Longitude/Latitude	GGA>RMC>RMA>GNS>GLL
	Waypoint	RMB>BWC(BWR)
	COG/SOG	RMC > RMA > VTG
	SPEED	VBW
	Day/Time information	ZDA
	Alarm acknowledge	ACK
	Rate of Turn	ROT
	Rudder	RSA
Bearing signal	GYRO-SYNC	360x, 180x, 90x, 36x(GYRO I/F)
	GYRO-STEP	360x, 180x, 90x, 36x(GYRO I/F)
	IEC61162-2 38400bps	THS>HDT over 40Hz (HDG port at terminal board TB4501)
	IEC61162-1 ⁱⁱ	HDT>HDG>HDM>VHW (HDG port at terminal board TB4501)
Speed signal	LOG-SYNC	360x, 180x, 90x, 30x(GYRO I/F)
	LOG-PULSE	800, 400, 200, 100(GYRO I/F)
External event mark	Contact input (EVENT port at terminal board TB4601)	
Radar buoy	Negative input (RBVD port at terminal board TB4401)	
Depth	IEC61162-1/JRC	DPT>DBS>DBT>DBK, JRC format
Water temperature	IEC61162-1/JRC	MTW, JRC format
Tendency	IEC61162-1/JRC	CUR, JRC format
Wind	IEC61162-1	MWV>MWD
AIS	IEC61162-2	VDM,VDO (AIS port at terminal board TB 4601)
Acknowledge	Contact input (SYSACK, ARPAACK, PWRACK port at terminal board TB4601)	
Sendable Signal		
Slave video	Radar video: TIY, VD, BP(2048p), BZ (Terminal board TB4401)	
Send capability Port	NAV1, NAV2, ALM, ARPA, JARPA port at terminal board TB4303. COM port (D-Sub 9 PIN)	
Navigation information IEC61162-1/2	Radar system data	RSD
	Own ship data	OSD
	Tracking target data	TTM,TLL,TTD,TLB,JRC-ARPA
	AIS target data	TTM,TLL,TTD,TLB
	Alarm	ALR
	Auto pilot	APB
	Bearing of destination	BOD
	Latitude/Longitude data	GGA,GLL,RMC
	Waypoint	RMB,BWC
	COG/SOG	VTG
	Cross track error	XTE
	Heading data	HDT,THS
	External alarm	Default setting normally closed contact



Maximum current | 200mA (SYSALM, ALPAALM, PWRALM port at terminal board TB4601)

Acknowledge	Contact output (ACKOUT port at terminal board TB4401)	
Watchman reset	Contact output (WMRST port at terminal board TB4401)	
Remote maintenance	JRC format (MNT port at terminal board TB4601)	
AIS alarm acknowledge	ACK (AIS port at terminal board TB4601)	
External monitor	Multi scan monitor	Analog RGB, HD15pin Connector 2 port

- i. Only with Navigation Equipment is connected.
 The Speed measuring accuracy of speed sensor shall confirm to IMO Resolution MSC.96(72).
 The measuring accuracy of GPS shall confirm to IMO Resolution MSC.112(73).
- ii. Can't be use for target tracking.

11.18 Target Tracking Function

Target Tracking Function					
Available range scale	All range				
Acquisition	Acquisition mode	Manual/AUTO (AUTO mode uses Auto-acquisition Zone)			
	Manual Cancellation	Any one Target or All targets at once			
Tracking	Number of Target	100 Targets (AUTO Tracking)			
	Maximum tracking range	32nm (Available all range scale)			
Presentation	Display mode	TM (True Motion) / RM (Relative Motion)			
	Azimuth mode	North-up / Head-up / Course-up			
	Vector mode	True/Relative Display			
	Vector Length	Variable, 1 to 60 min. (1min. step)			
	Past Position	True/Relative Display Number of Dots...10 points Display Interval Time...0.5 / 1 / 2 / 4 min			
	Time to Display Vector Time to Stabilize Vector	Within 1min Within 3min			
Alarm	Auto-acquisition Zone	2 (sector)			
	Setting Range	AZ1 (0.5 ~ 32NM),AZ2 (0.5 ~ 32NM)			
	Alarm Indication	Symbol on Display, Visible / Audible Alarm			
Safe Limits (CPA / TCPA)	Setting Condition	CPA LIMIT 0.1 to 9.9NM TCPA LIMIT 1 to 99 minute			
	Setting Condition	Safe Target	CPA > CPA LIMIT 0 > TCPA TCPA > TCPA LIMIT		
Danger Target		CPA ≤ CPA LIMIT 0 ≤ TCPA ≤ TCPA LIMIT			
Alarm Indication		Status	Symbol	Alarm	Audible
		Safe Target	○ (wht)	OFF	OFF
Danger Target		○ (red)	CPA/TCPA	ON	
Lost Target		Symbol on Display Visible / Audible Alarm			
Data Indication	Target Data	Simultaneous and Continuous Display for 4 Targets True Bearing, Range, True Course, True Speed, CPA, TCPA, BCR, BCT			
	Own Ship's Data	Course and Speed			
Trial Maneuver	Manual Setting				
	Trial Course	0° to 359.9°			
	Trial Speed	0 to 100 kn			
Accuracy of Display	Complied with IMO Requirement				
System Failure Alarm	Visible / Audible Alarm				
Speed Input	Manual/AUTO (LOG)				

11.19 AIS FUNCTION

AIS 機能		All range	
Activation	Activation mode	Manual/AUTO (AUTO mode uses Auto-activation Zone)	
	Manual Cancellation	Any one Target	
Presentation	Number of Activated Target	100 Targets	
	Number of Target	300 Targets (sleeping target and activated target)	
	Past Position	True/Relative Display	
		Number of Dots...10 points	
		Display Interval Time...0.5 / 1 / 2/ 4 min	
		Display Interval distance...0.1 / 0.2 / 0.5/ 1 NM	
	Message	Broadcast Message, Addressed Message	
	Display mode	TM (True Motion) / RM (Relative Motion)	
	Azimuth mode	North-up / Head-up / Course-up	
	Vector mode	True/Relative Display	
	Vector Length	Variable, 1 to 60 min. (1min. step)	
Alarm	Auto-activation Zone	2 (Sector)	
	Setting Range	AZ1(0.5 to 32nm), AZ2(0.5 to 32nm)	
	Alarm Indication	Symbol on Display, Visible / Audible Alarm	
Safe Limits (CPA / TCPA)	Setting Condition	CPA LIMIT	0.1 to 9.9NM
		TCPA LIMIT	1 to 99min
Alarm Condition	Safe Target	CPA > CPA LIMIT	
		0 > TCPA TCPA > TCPA LIMIT	
	Danger Target	CPA ≤ CPA LIMIT	
		0 ≤ TCPA ≤ TCPA LIMIT	
Alarm Indication	Status	Symbol	Alarm
	Safe Target	△ (wht)	OFF
	Danger Target	△ (red)	CPA/TCPA
Lost Target		Symbol on Display	Audible
		Visible / Audible Alarm	
Data Indication	Target Data	Simultaneous and Continuous Display for 2 Targets	
	simple display	Ship's Name, Call Sign, MMSI, Course, Speed, CPA and TCPA	
	detail display	Ship's Name, Call Sign, MMSI, Course, Speed, CPA, TCPA, Bearing, Range, Ship's Heading Bearing, Rate of Turn, Latitude, Longitude, Destination and Navigation Status	
	Own Ship's Data	The ship's name, call sign, MMSI, course, speed, ship's heading bearing, rate of turn, latitude, longitude, destination and navigation status of own ship	
Trial Maneuver	Manual Setting	Trial Course	0° to 360°
		Trial Speed	0 to 100 kn

Accuracy of Display	Complied with IMO Requirement
System Failure Alarm	Visible / Audible Alarm
Speed Input	Auto (LOG)

11.20 PERFORMANCE MONITOR (NJU-84)

PERFORMANCE MONITOR NJU-84

Dimension	Width 130 x Depth 180 x Height 70 (mm)
Mass	Approx.0.7kg
Operating Frequency	3050 ± 30MHz

11.21 PERFORMANCE MONITOR (NJU-85)

PERFORMANCE MONITOR NJU-85

Dimension	Width 130 x Depth 149 x Height 70 (mm)
Mass	Approx.0.7kg
Operating Frequency	9410 ± 30MHz

11.22 AC-DC CONVERTER (NBA-5135)

AC-DC CONVERTER NBA-5135

Dimension	Width 315 x Depth 385 x Height 99 (mm)
Mass	Approx.5kg
Power supply Input	AC100 to 240V, 50/60Hz, 1φ
Output Voltage	DC24V +/-5%
Output Current	12A max

Appendix A

NQE-3141 Interswitch Unit

NQE-3141 Interswitch Unit

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A.1 OVERVIEW

A.1.1 Overview

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

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

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

Up to 8 units can be changed over.

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

Tune Adjustment	Section 7.1.3 "Tuning (Tune Adjustment)"
Bearing Adjustment	Section 7.1.4 "Bearing Adjustment"
Range Adjustment	Section 7.1.5 "Range Adjustment"
Antenna Height	Section 7.1.8 "Antenna Height Setting (Antenna Height)"
Antenna installation location	Section 7.1.9 "Setting of CCRP (CCRP Setting)"
Sector Blank	Section 7.2.2 "Sector Blank Setting (Sector Blank)"
TNI Blank	Section 7.2.3 "TNI Blank Setting (TNI Blank)"
Performance monitor adjustment	Section 7.3.4 "Adjustment of Performance Monitor"
PRF Fine Tuning	Section 3.8.3 "Set Scanner Unit (TXRX Setting)"

A.1.2 Interswitch Setup

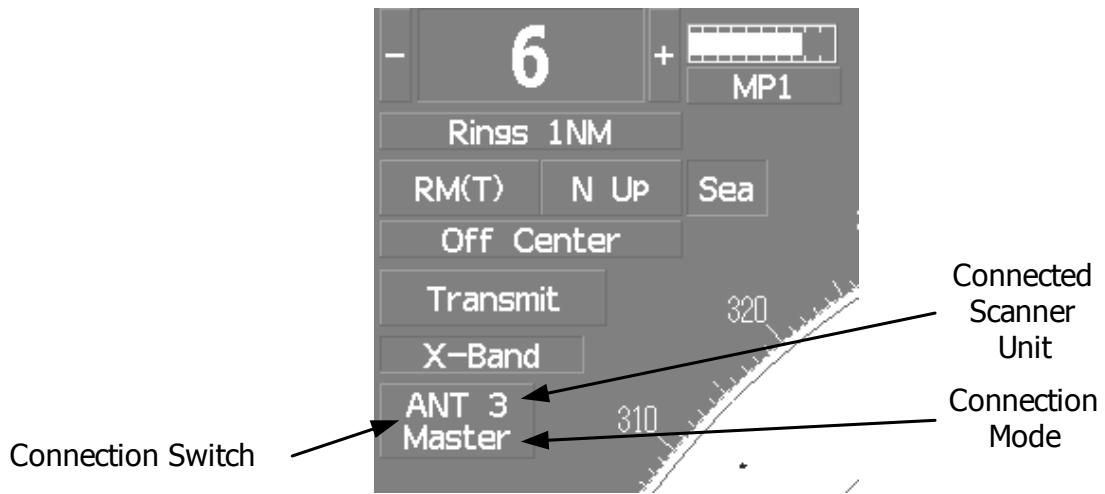
Connection modes can be changed simply by changing the interswitch connection (upper left of the display).



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

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

upper left of the display



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

The lower stand indicates the connection mode.

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

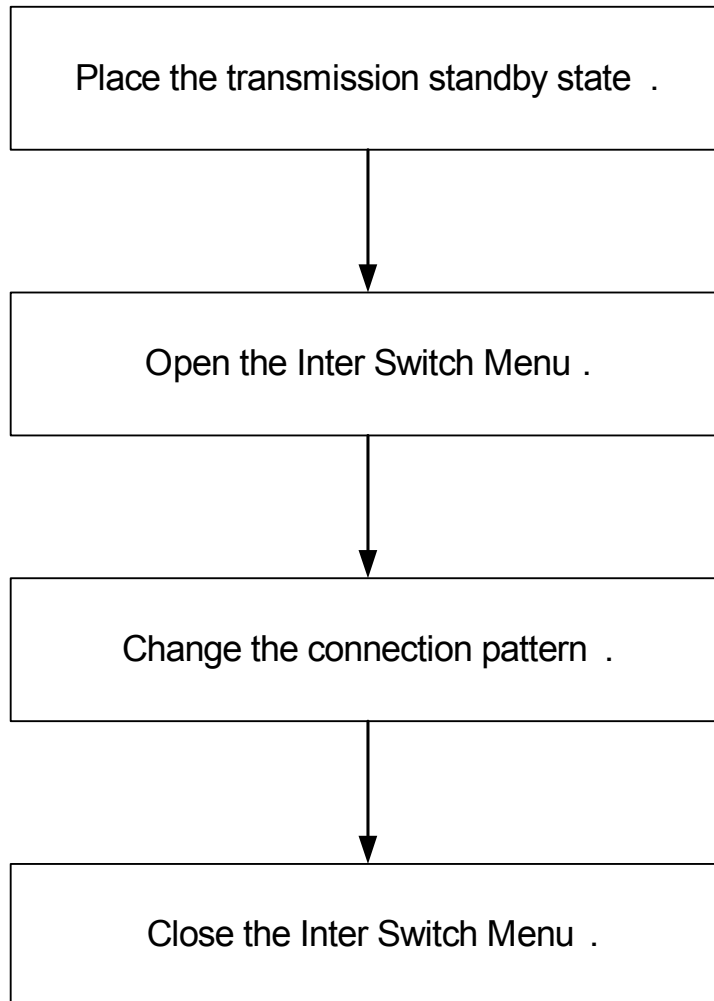
Slave :Mode in which the scanner unit cannot be controlledⁱ

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

A.2 INTERSWITCH OPERATION

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

A.2.1 Operation Flow



A.2.2 Inter Switch Menu

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

Procedures

- 1) **Press the [TX/STBY] key to stop transmitting.**

The transmission standby state will be placed.

- 2) **Move the cursor onto the Interswitch connection change (upper left of the display), and left-click.**

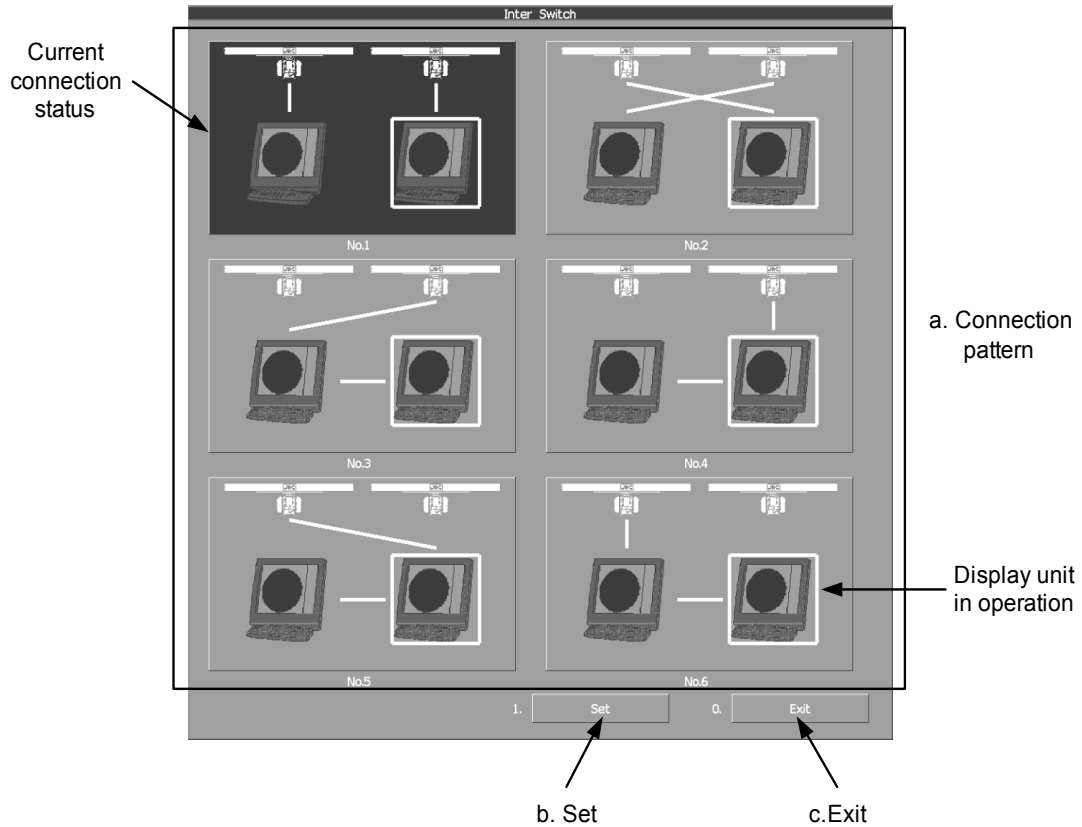
The Inter Switch Menu will appear.

Exit

- 1) **Left-click the `0.Exit` button.**

The Inter Switch Menu will close.

Inter Switch Menu (with 2 Display Units)



a. Connection pattern

If this button is clicked, the connection pattern is selected.

The display unit in operation is enclosed in a square □.


The background of the current connection pattern display is highlighted.

b. Set

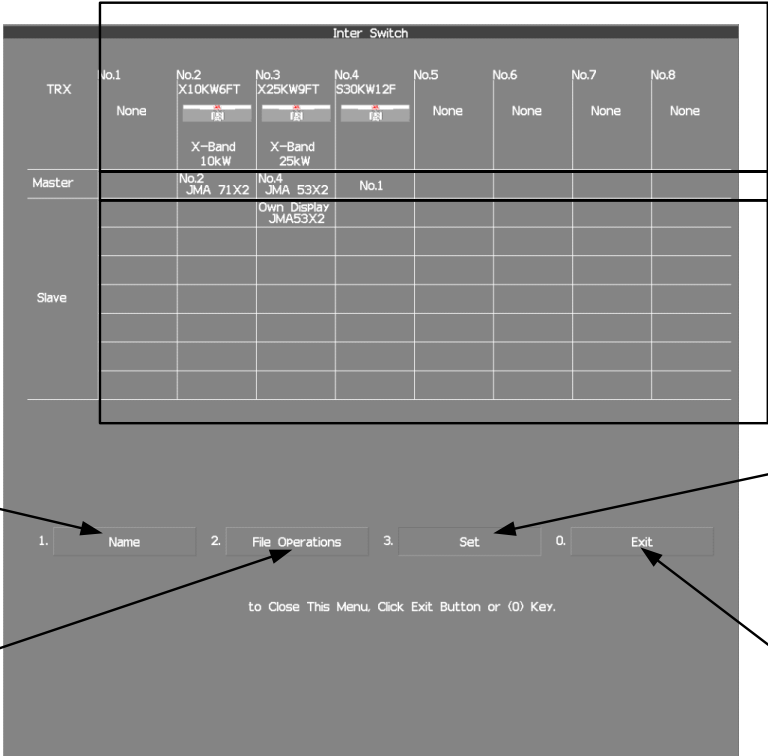
If this button is clicked, the change of connection is determined.

c. Exit

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

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

Inter Switch Menu (with 3 or More Display Units)



	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8
TRX	None	X10KW6FT	X25KW9FT	S30KW12F	None	None	None	None
Master		X-Band 10kW JMA 71X2	X-Band 25kW JMA 53X2	No.1 Own Display JMA53X2				
Slave								

1. Name 2. File Operations 3. Set 0. Exit

to Close This Menu, Click Exit Button or (0) Key.

Annotations: a. Connected scanner unit, b. Display unit connected as master, c. Display unit connected as slave, d. Name, e. File Operations, f. Set, g. Exit

a. Connected scanner unit

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



b. Display unit connected as master

c. Display unit connected as slave

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

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

d. Name

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

e. File Operations

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

f. Set

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

g. Exit

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


A.2.3 Change of Connection Pattern (with 2 Display Units)


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

Procedures

1) **Open the Inter Switch menu (with 2 Display Units).**

2) **Move the cursor onto the Connection pattern** (see Section A.2.2 "Inter Switch Menu" and Section a. "Connection pattern") **to be changed , and left-click.**

The connection pattern will be selected, and  (Section b. "Set") will blink.

3) **Left-click the  button.**

The connection pattern will be changed.

A.2.4 Change of Connection Pattern (with 3 or More Display Units)

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

Procedures

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

- 2) **Move the cursor onto the display unit** (Section b. "Display unit connected as master" or Section c. "Display unit connected as slave") **to be changed , and left-click.**

The selected display unit will be highlighted.

To deselect the display unit, left-click key again.

- 3) **Move the cursor to the change-destination display unit, and left-click.**

The selected display unit in step 2 will be switched to the change-destination display unit, and **3. Set** (Section f. "Set") will blink.

If the change destination is empty, control will move and **3. Set** will blink.

- 4) **Left-click the **3. Set** button.**

The connection pattern will be changed.



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

A.2.5 Operating Connection Pattern Files (File Operations)

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

[1] Loading connection patterns (Load)

Procedures

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

- 2) **Left-click the button.**

The File Operations menu will appear.

- 3) **Left-click the button.**

Currently saved connection patterns in memory will be listed.

- 4) **Left-click the button corresponding to the file to be loaded.**

Confirmation Window will appear.

- 5) **Left-click the to load.**

The connection pattern will be changed.

[2] Saving connection patterns (Save)

Procedures

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

- 2) **Left-click the button.**

The File Operations window will appear.

- 3) **Left-click the button.**

The Save menu will appear.

Currently saved connection patterns in memory will be listed.

- 4) **Left-click the button corresponding to the file to be saved.**

The Input File Name window will appear.

- 5) **Enter the file name to be saved.**

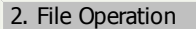
Up to 8 characters can be entered. For the input method on the character input screen, see Section 3.3.4.7 "Entering a character".

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


[3] Erasing a connection pattern (Erase)

Procedures

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

- 2) **Left-click the  button.**

The File Operations window will appear.

- 3) **Left-click the  button.**

The Erase menu will appear.

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

- 4) **Left-click the button corresponding to the file to be erased.**

Confirmation Window will appear.

- 5) **Left-click the  to load.**

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

A.2.6 Names of Display Units and Scanner Units

The display units and antenna units can be named.

Procedures

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

- 2) **Left-click the  button.**

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

- 3) **Move the cursor to the display unit** (Section b. "Display unit connected as master" or Section c. "Display unit connected as slave") **or scanner unit** (Section a. "Connected scanner unit") **to be renamed , and left-click.**

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

- 4) **Input a new unit name.**

Up to 8 characters can be input as a unit name. For the input method on the character input menu, see Section 3.3.4.7 "Entering a character".

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

A.3 REFERENCE

A.3.1 Preheat Time after Change of Connection Pattern

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

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

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

A.3.2 Notes on Changing Connection Pattern

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

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

A.3.3 Notes on Connecting Slave Display Unit

Before a slave display unit can be placed in transmission state, the master display unit must be placed in transmission state. If the master display unit is moved from the transmission state to the transmission standby state, the slave display unit is forcibly placed in transmission standby state. When they are in transmission standby state, TXRX Standby is shown in the alarm indication (lower right of the display), and the alarm sounds.

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

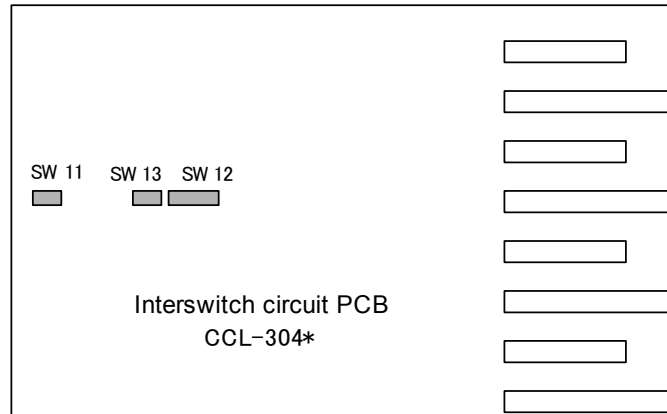
Range change for a slave display unit is limited by the range and pulse length / repetition frequency of the master display unit. As a rule, a greater range than the range of the master display unit cannot be set for a slave display unit. However, if the transmitter pulse length of a slave display unit is identical to the master display unit's and the repetition frequency is within the master display unit's, a greater range than the master display unit's can be selected for the slave display unit. When the master display unit narrows the range or changes the transmitter

pulse length, the range of the slave display unit may be forcibly changed. In this case, Master Range CHG is shown in the alarm indication (lower right of the display), and the alarm sounds.

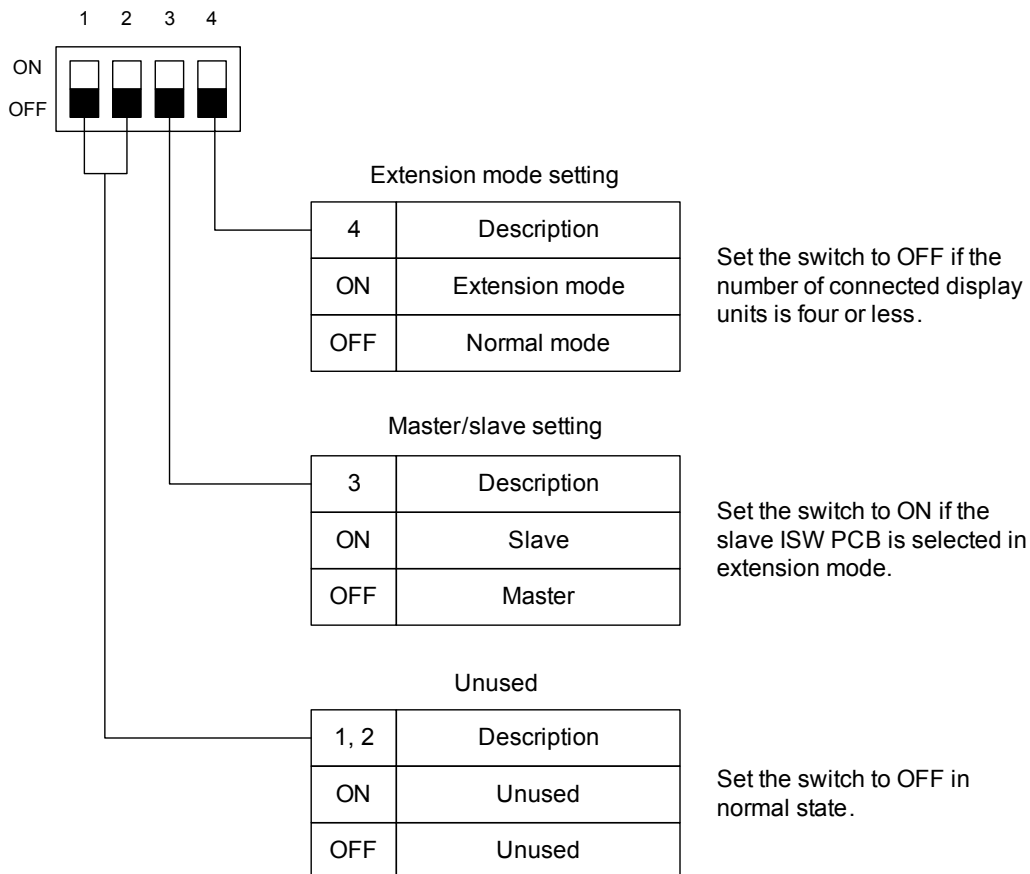
A.3.4 Setting at Installation

Setting of the interswitch circuit (CCL-304*)

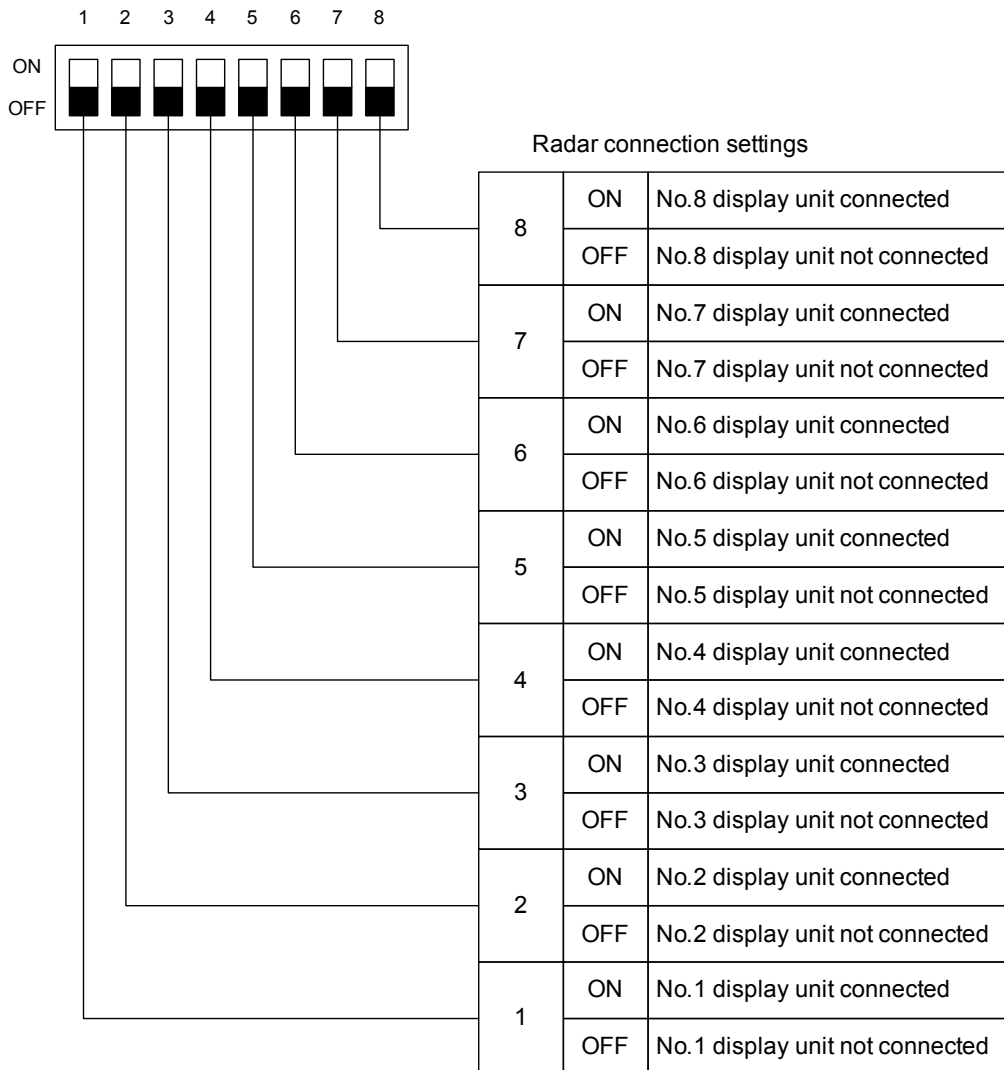
The settings of the DIP switches SW11 to SW13 are shown below.



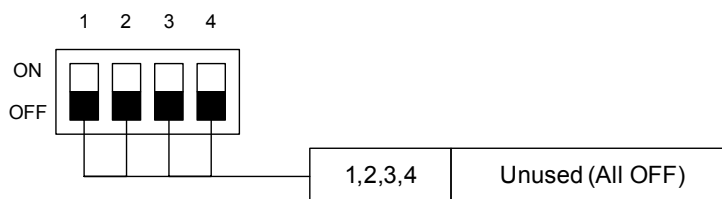
1) SW11 setting (extension mode and master/slave settings)



2) SW12 setting (radar connection settings)



3) SW13 (unused)



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

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DRAWINGS

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B.1

Interconnection Diagram of Display Unit

B.1.2 NCD-4990 w/NBA-5135

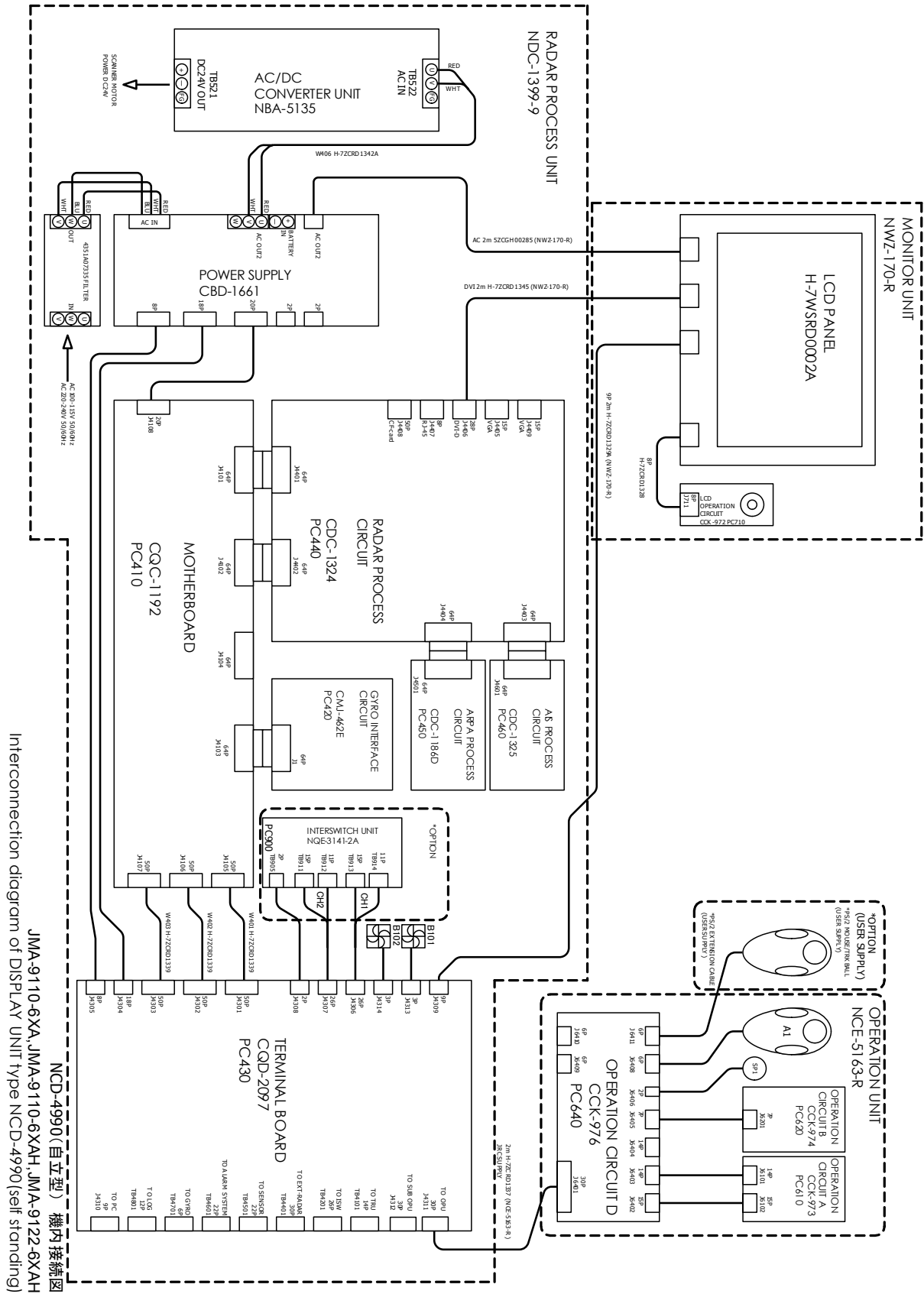
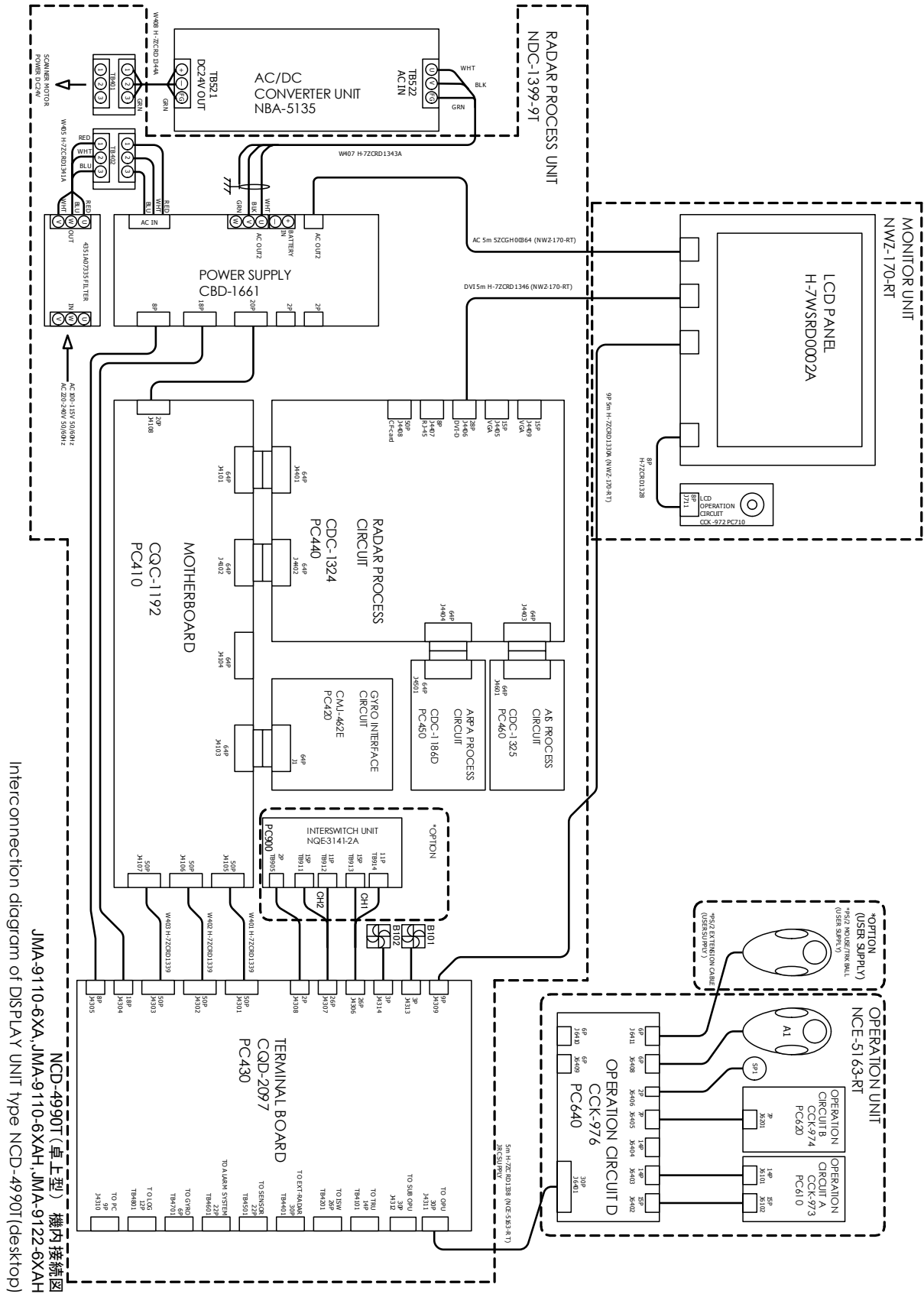


Fig B-2: Interconnection Diagram of NCD-4990 w/NBA-5135



B.1.4 NCD-4990T w/NBA-5135

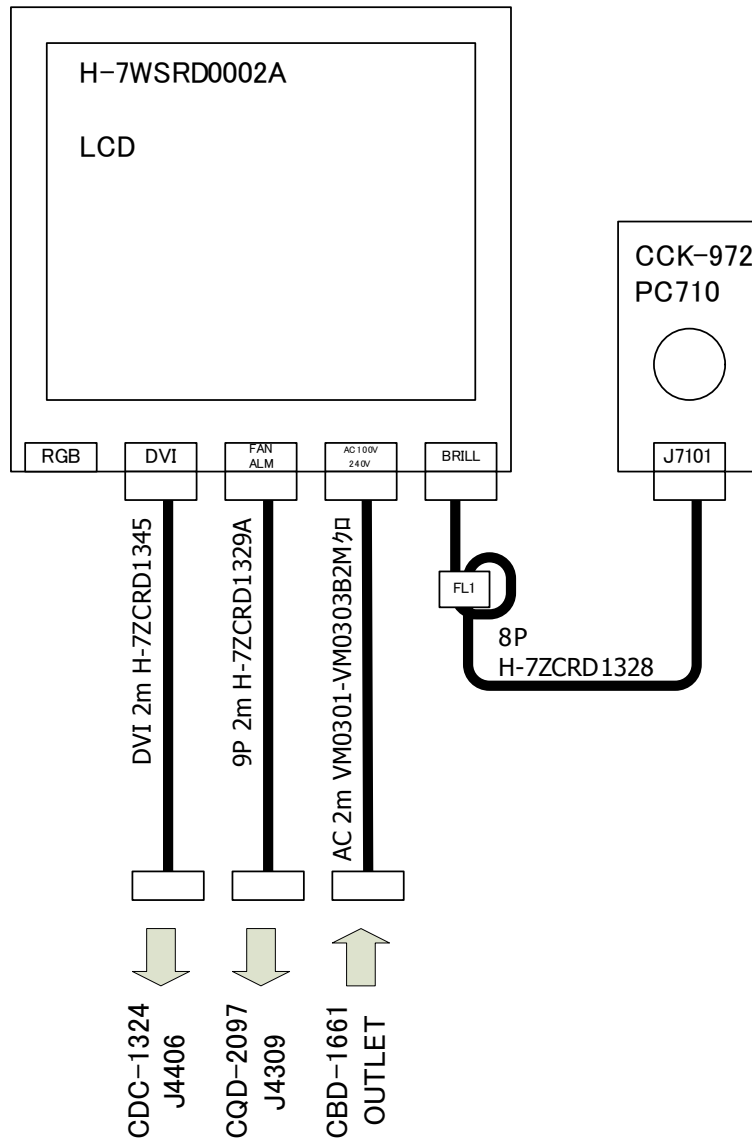


Interconnection diagram of DISPLAY UNIT type NCD-4990T (desktop)

JMA-9110-6XA, JMA-9110-6XAH, JMA-9122-6XAH
 NCD-4990T (桌上型) 機内接続図

Fig B-4: Interconnection Diagram of NCD-4990T w/NBA-5135

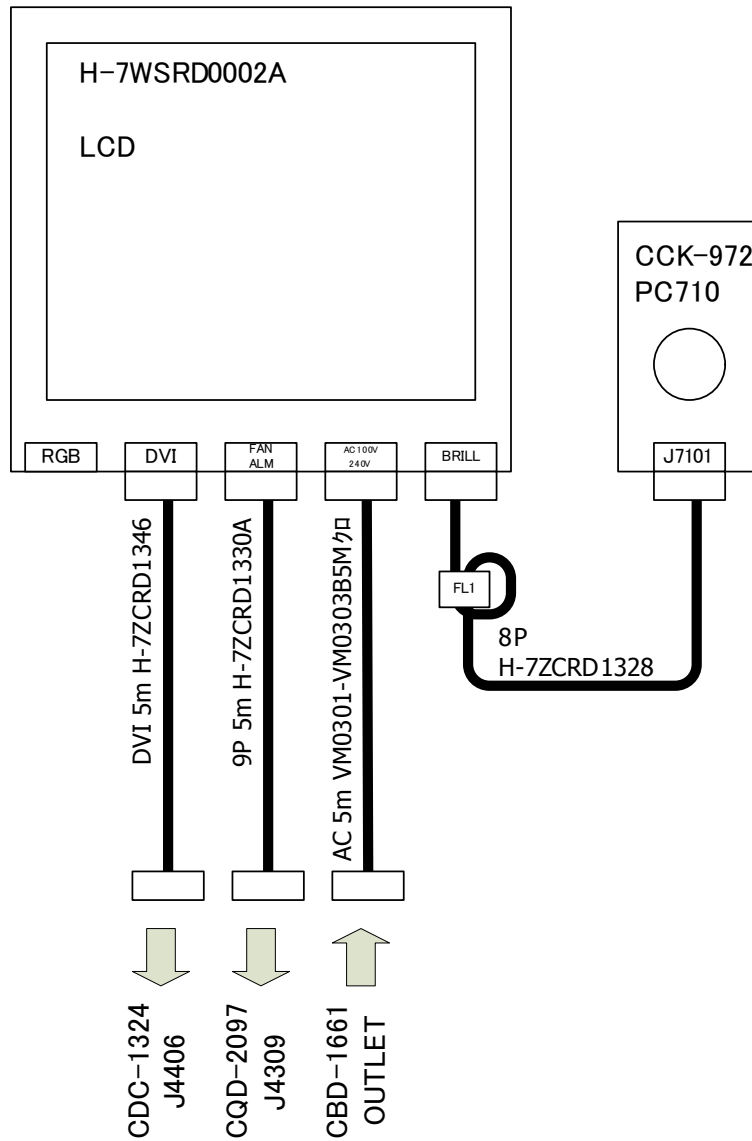
B.1.5 NWZ-170-R



CML-764-R (NWZ-170-R)
Monitor Unit Interconnection

Fig B-5: Interconnection Diagram of NWZ-170-R

B.1.6 NWZ-170-RT

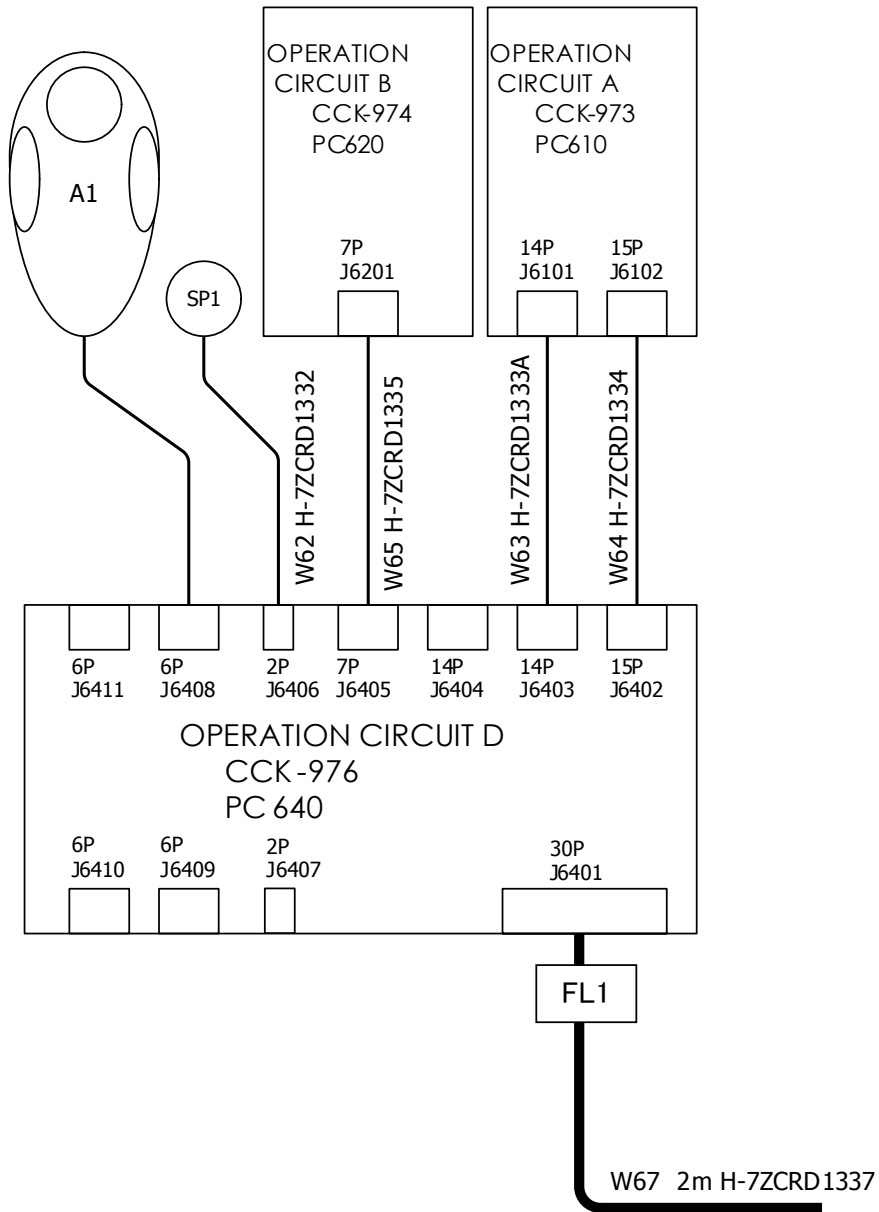


CML-764-RT (NWZ-170-RT)
Monitor Unit Interconnection

Fig B-6: Interconnection Diagram of NWZ-170-RT

B.1.7 NCE-5163-R

OPERATION UNIT
NCE-5163-R



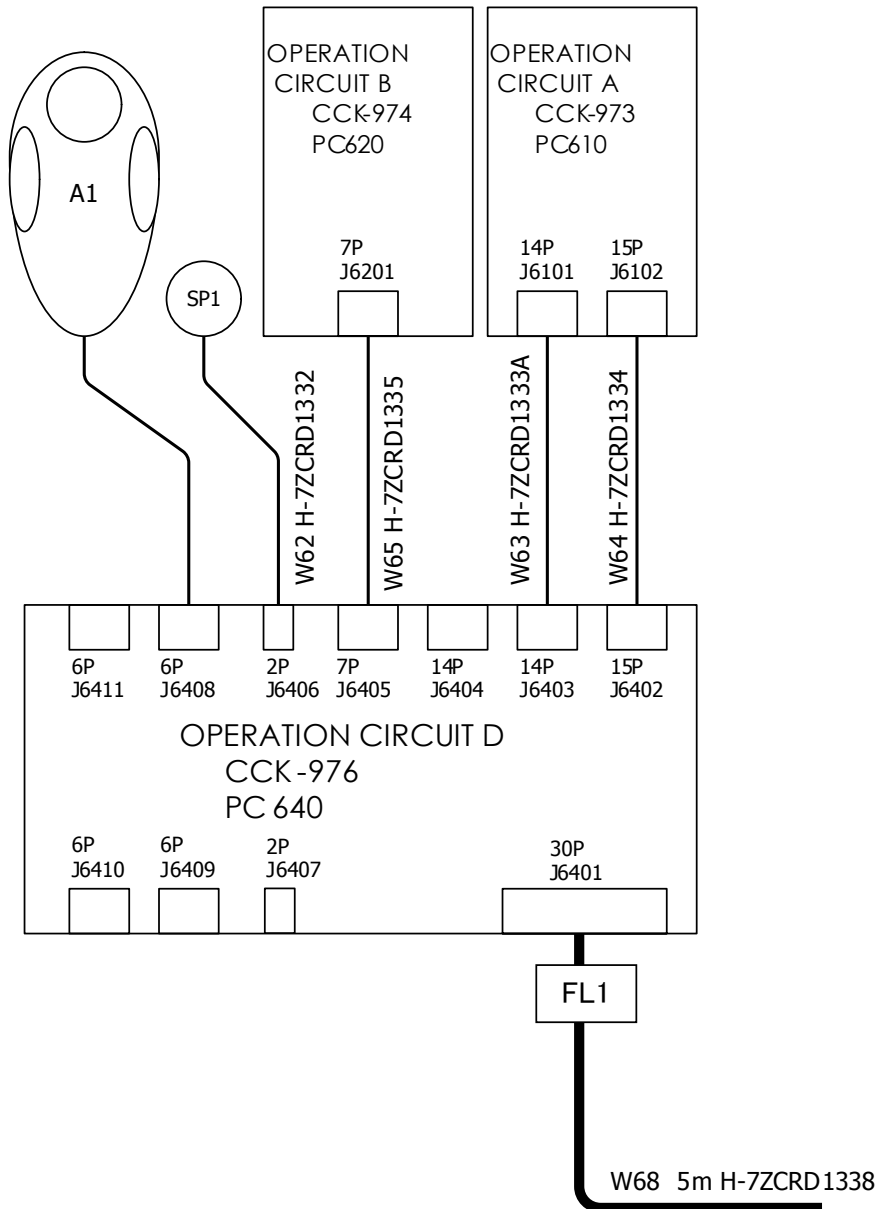
CMD-996-R (NCE-5163-R)

Operation Unit Interconnection

Fig B-7: Interconnection Diagram of NCE-5163-R

B.1.8 NCE-5163-RT

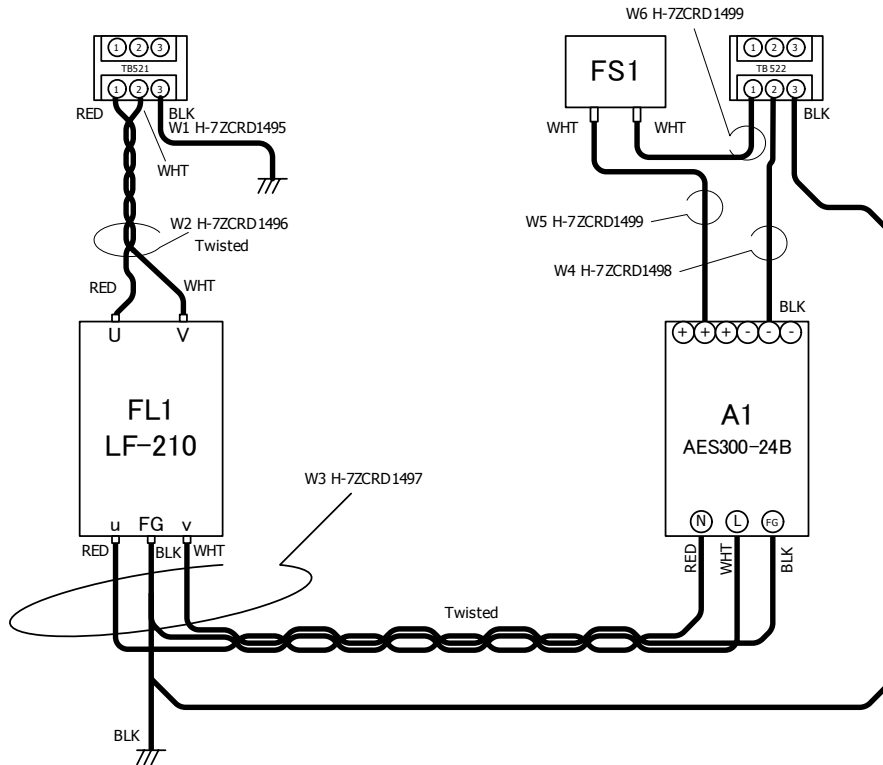
OPERATION UNIT
NCE-5163-RT



CMD-996-RT (NCE-5163-RT)
Operation Unit Interconnection

Fig B-8: Interconnection Diagram of NCE-5163-RT

B.1.9 NBA-5135



CBD-1684A (NBA-5135)

AC/DC Converter Interconnection

Fig B-9: Interconnection Diagram of NBA-5135

B.2 Power System Daigram of Display Unit

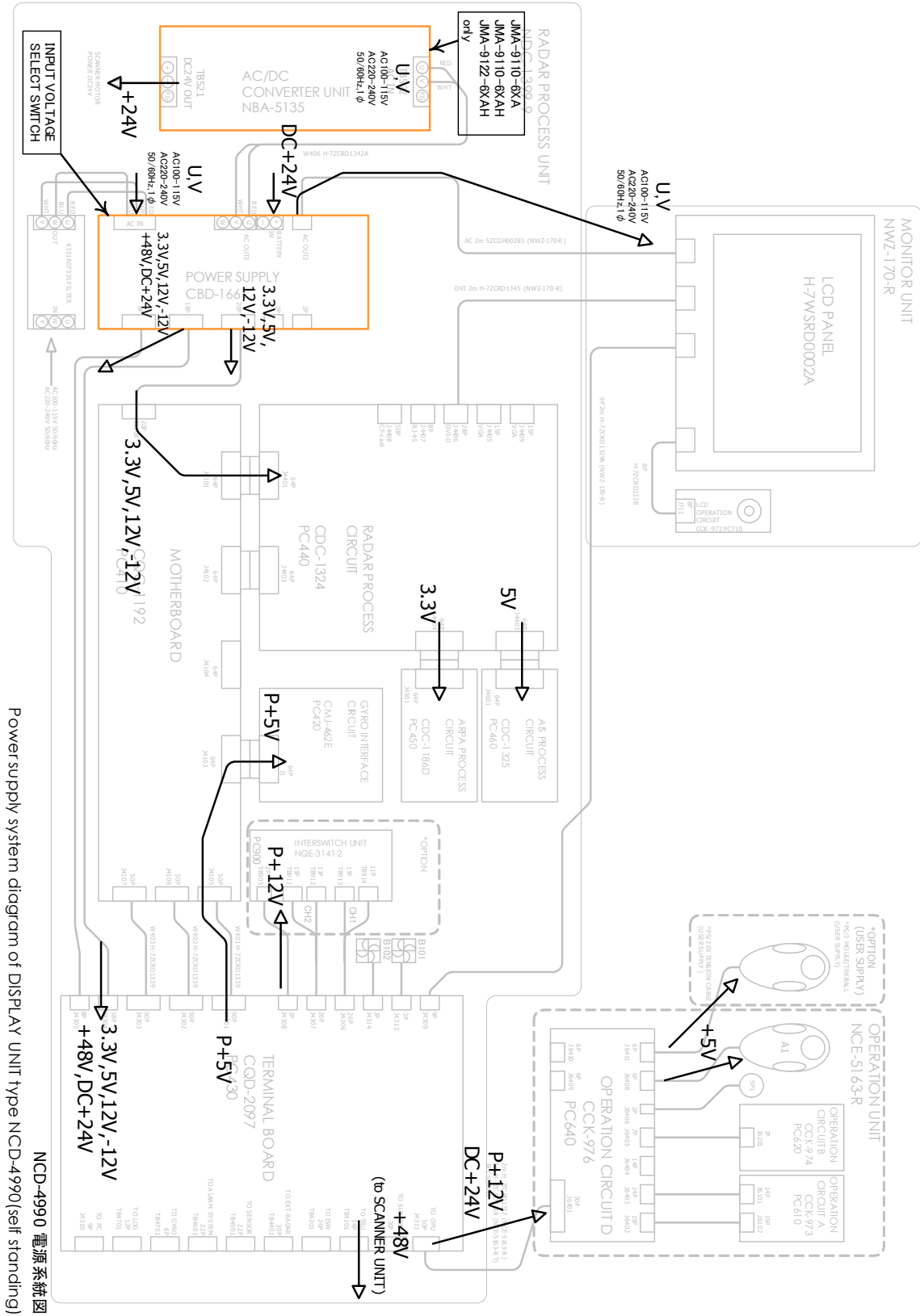


Fig B-10: Power System Diagram of NCD-4990/T

B.3

Signal Flow Diagram of Display Unit

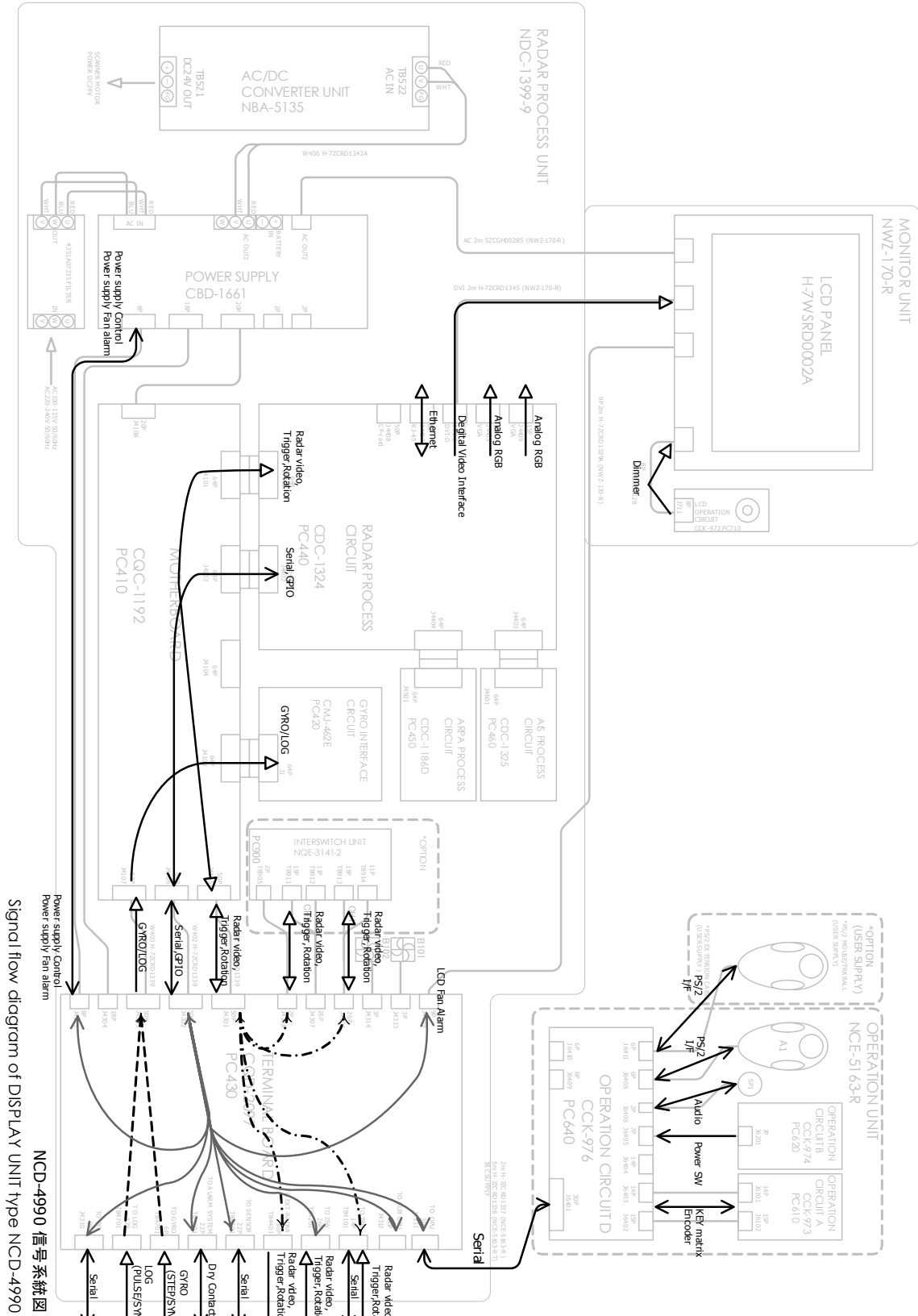


Fig B-11: Signal Flow Diagram of NCD-4990/T

B.4

Primary Power System Diagram

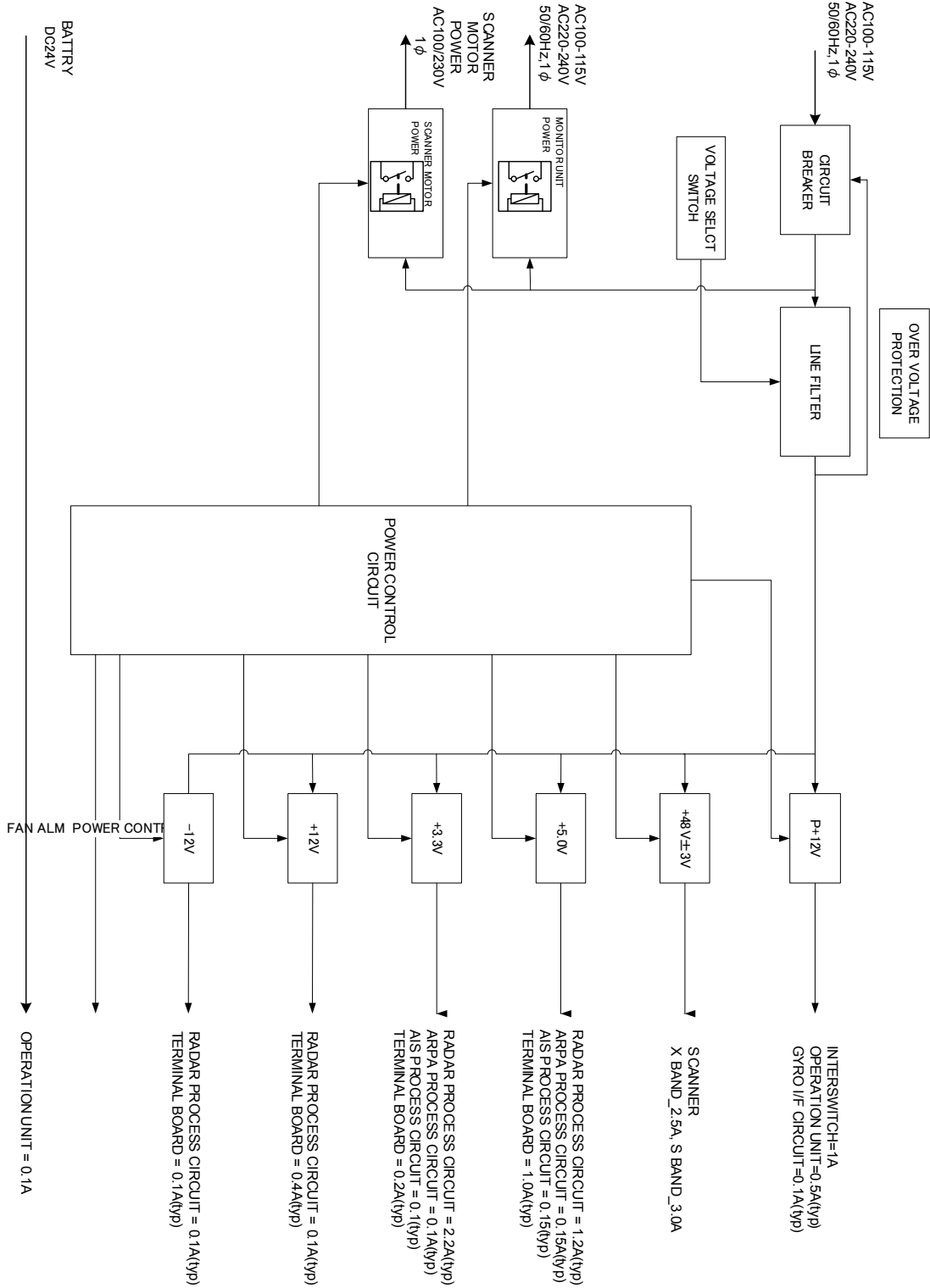


Fig B-12: Primary Power System Diagram

B.5

Block Diagram of Scanner Unit

B.5.1 NKE-2103

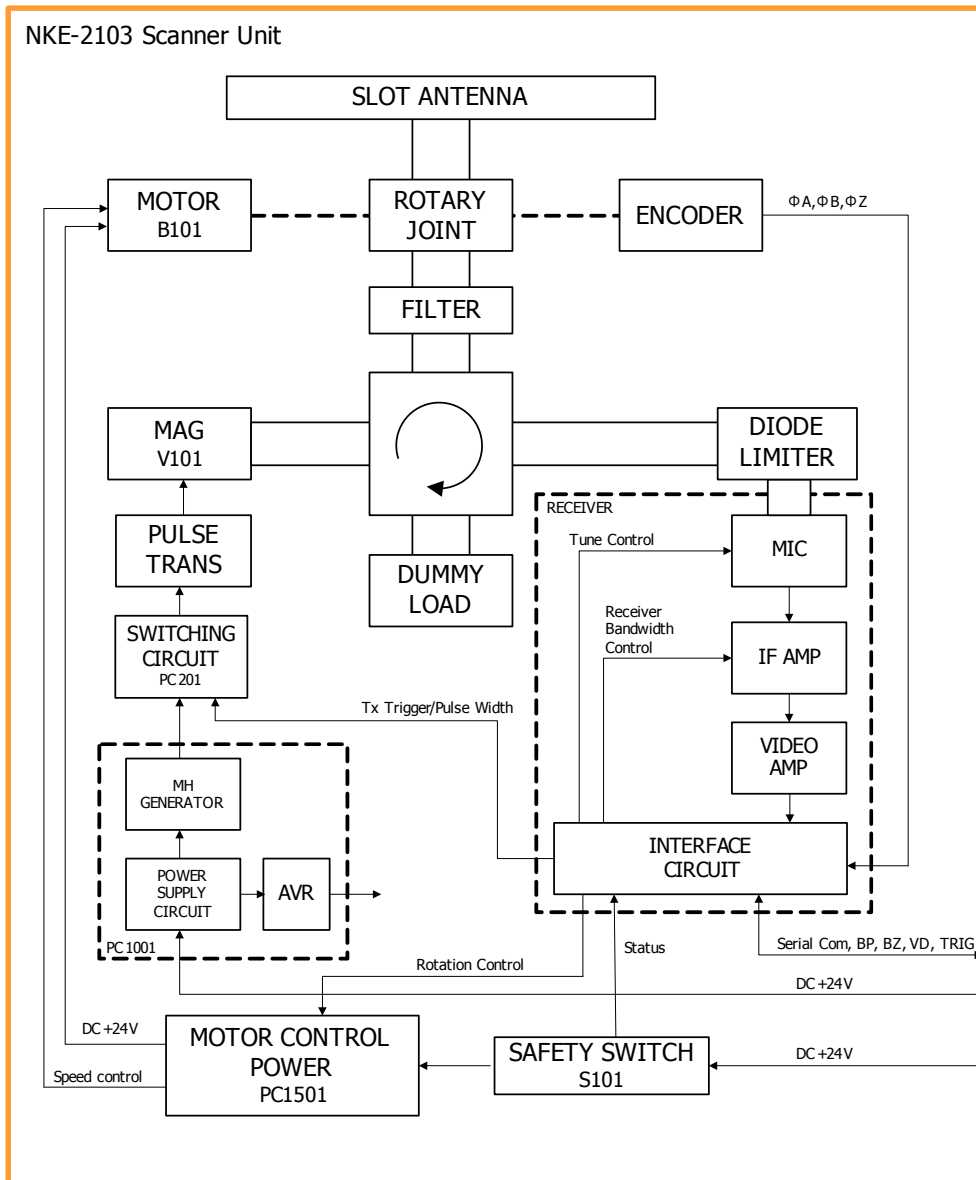


Fig B-13: Block Diagram of NKE-2103

B.5.2 NKE-2254

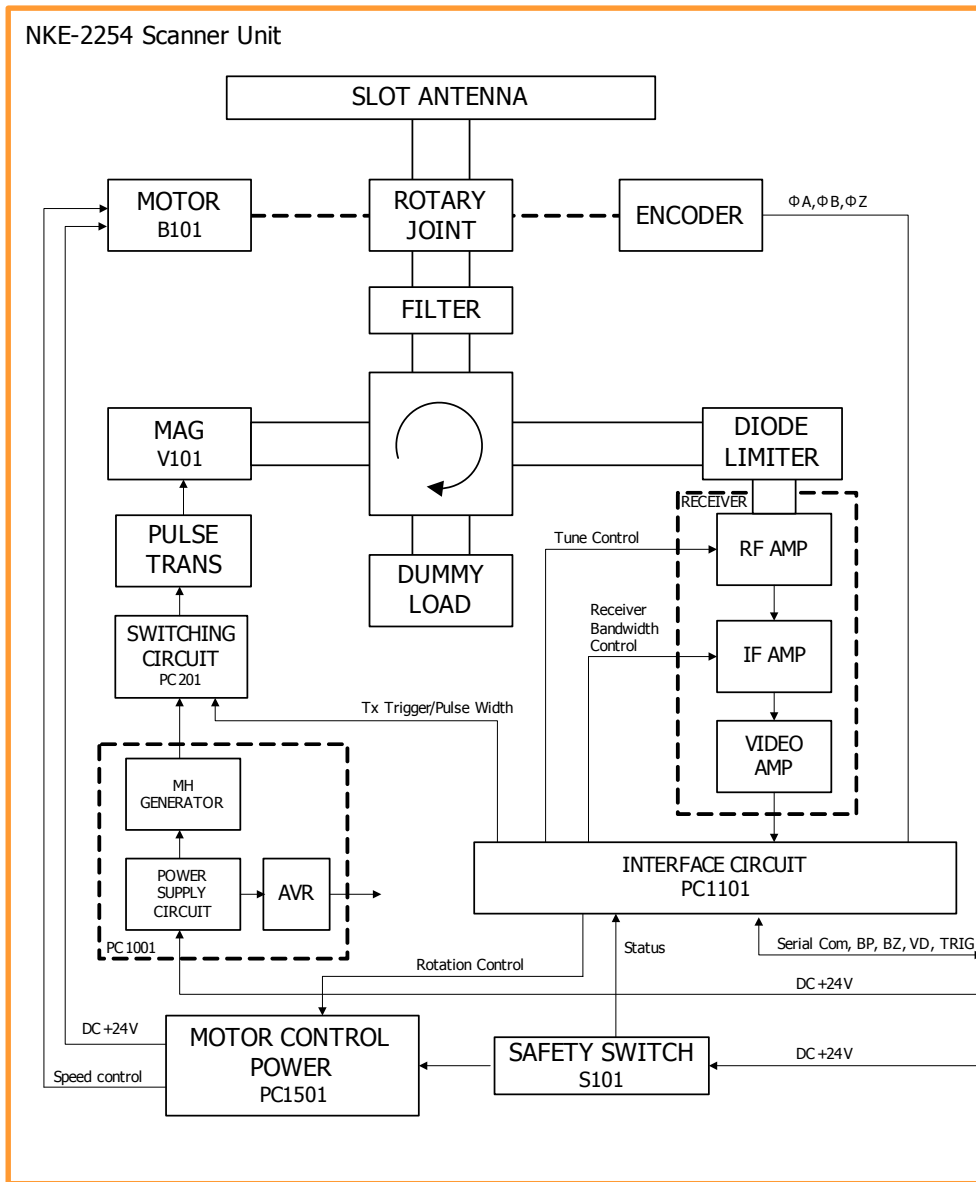


Fig B-14: Block Diagram of NKE-2254

B.5.3 NKE-1125/NKE-1130

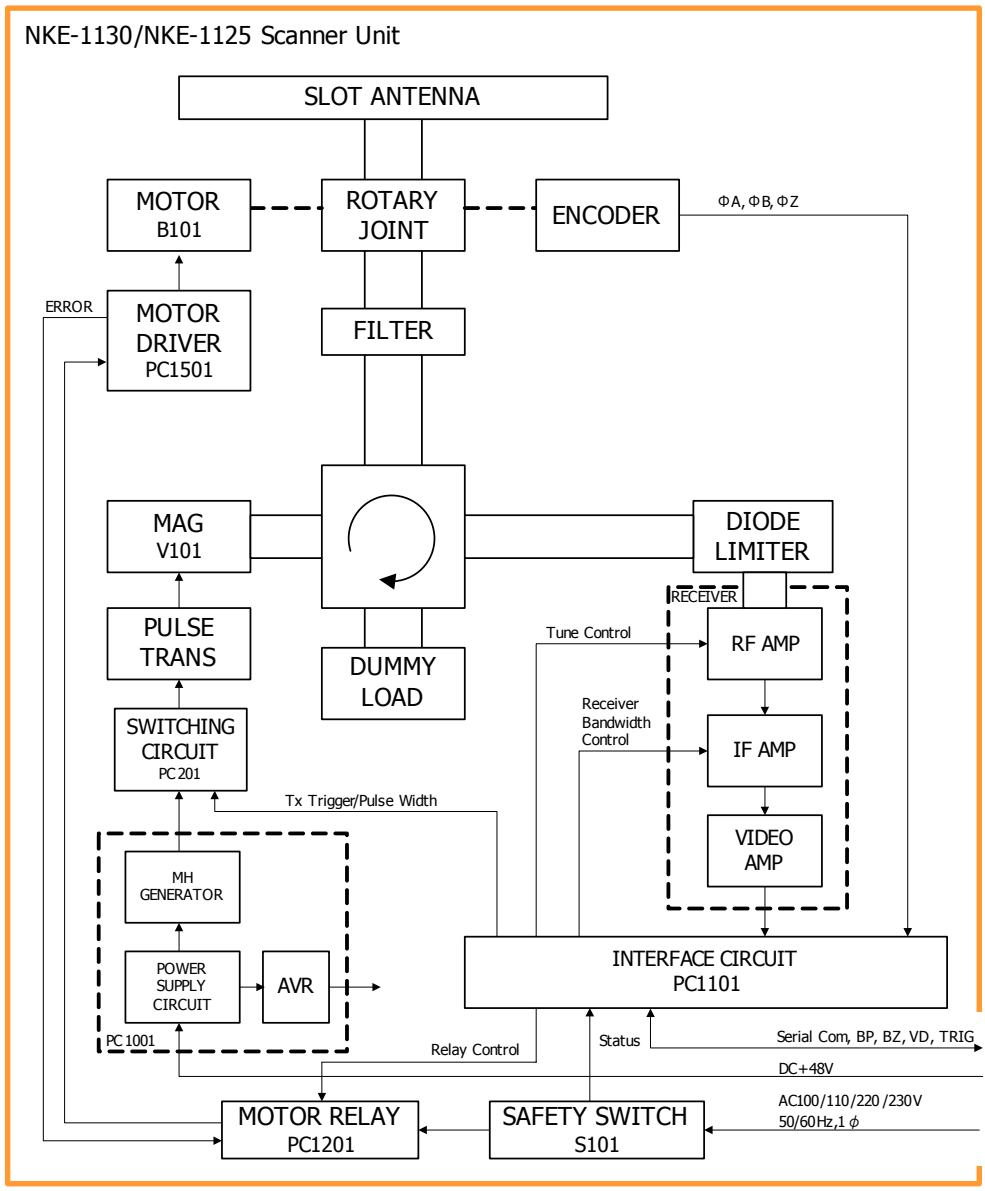


Fig B-15: Block Diagram of NKE-1125/NKE-1130

B.5.4 NKE-1129, NTG-3225 / NKE-1139, NTG-3230

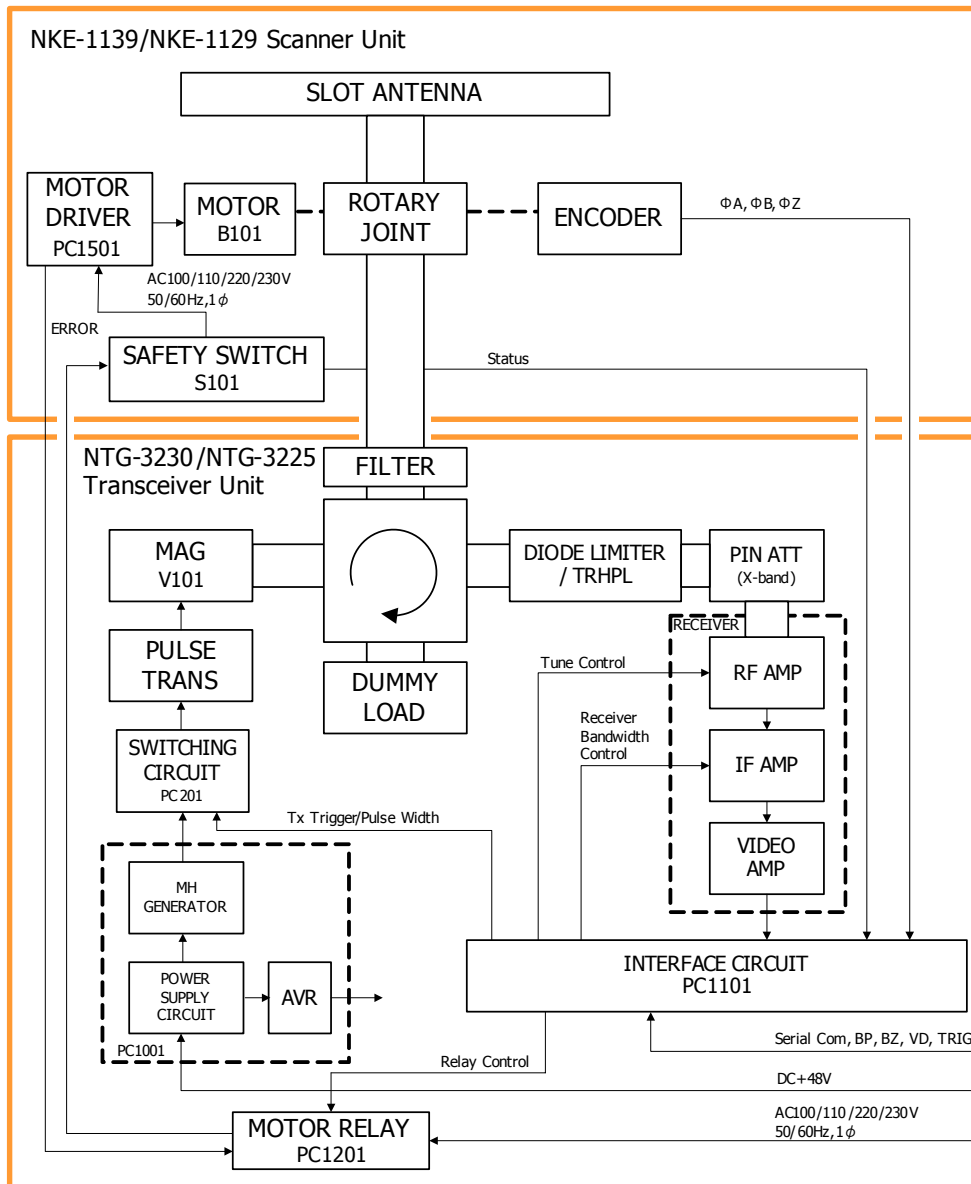


Fig B-16: Block Diagram of NKE-1129, NTG-3225 / NKE-1139, NTG-3230

B.6 Interconnection Diagram of Scanner Unit

B.6.1 NKE-2103

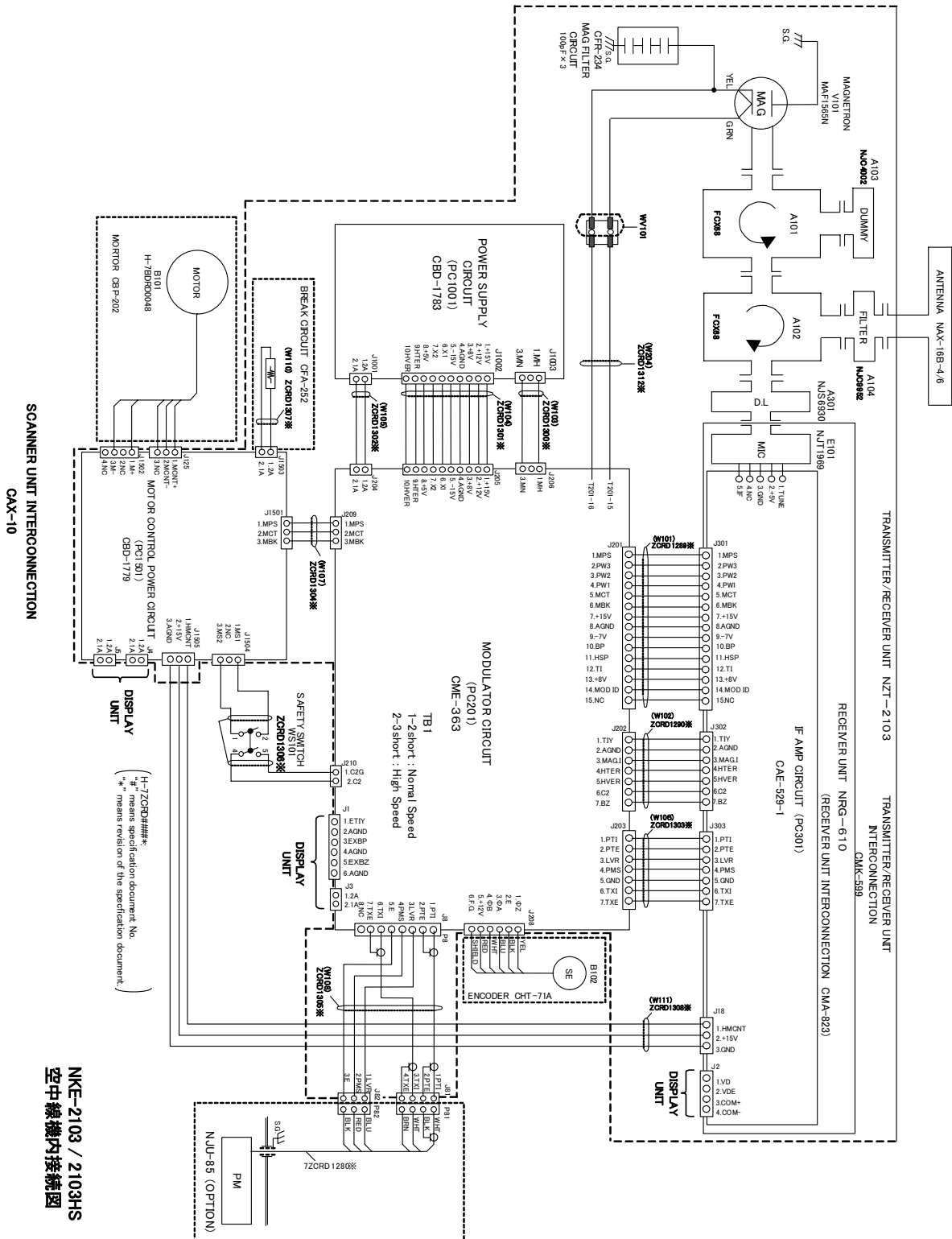


Fig B-17: Interconnection Diagram of NKE-2103

B.6.2 NKE-2254

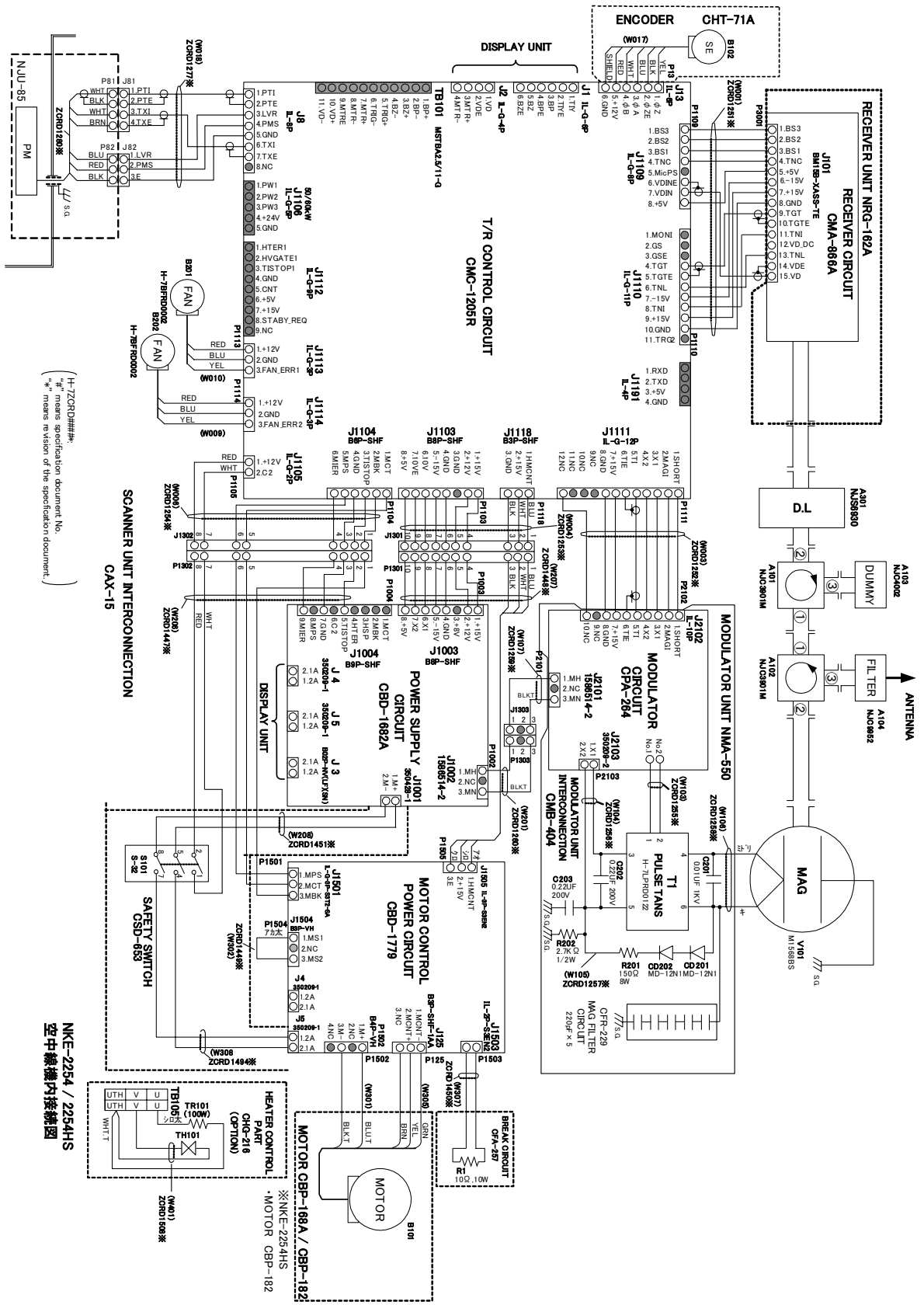


Fig B-18: Interconnection Diagram of NKE-2254

B.6.3 NKE-1125 (AC110V)

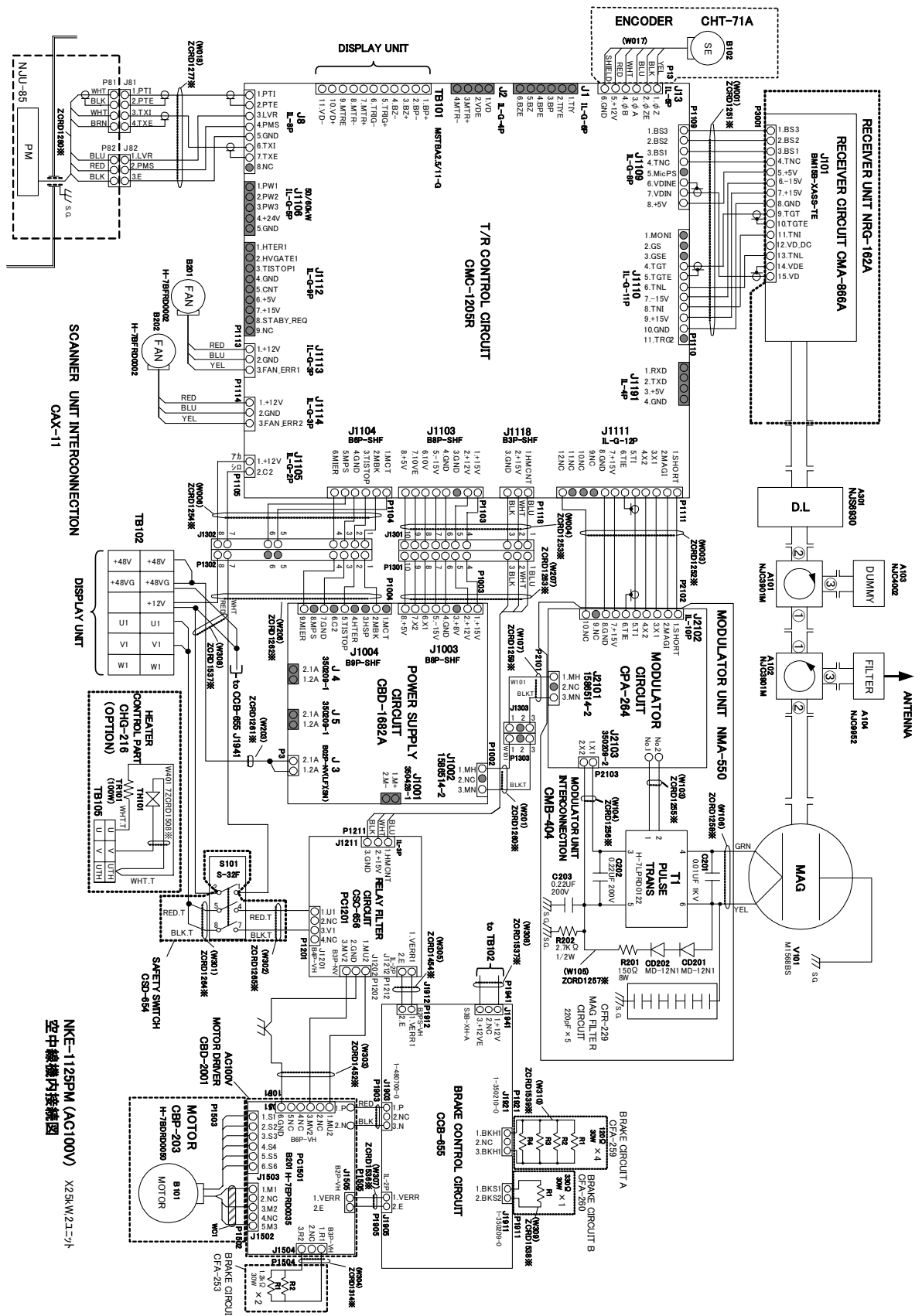


Fig B-19: Interconnection Diagram of NKE-1125 (AC110V)

B.6.4 NKE-1125 (AC220V)

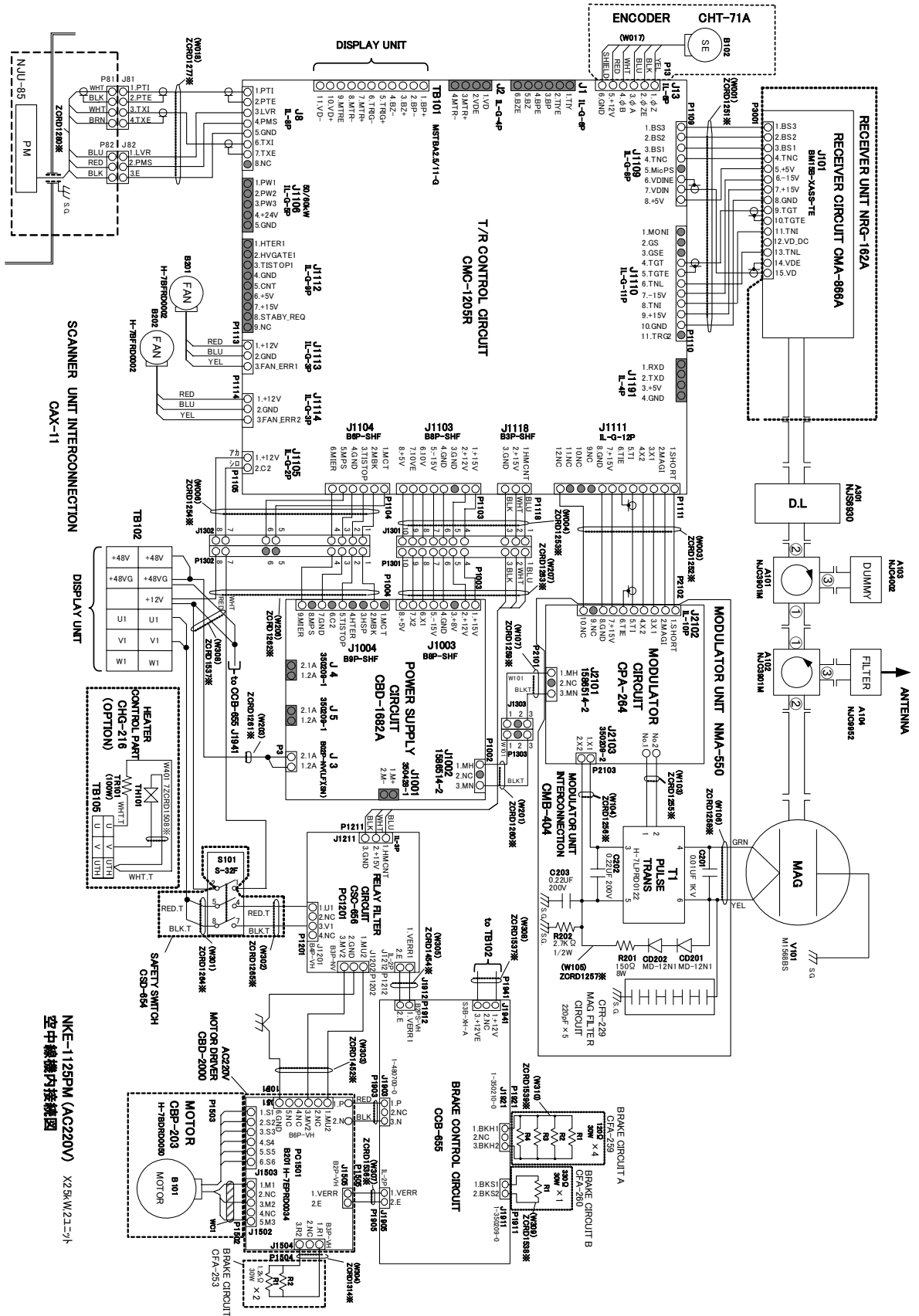
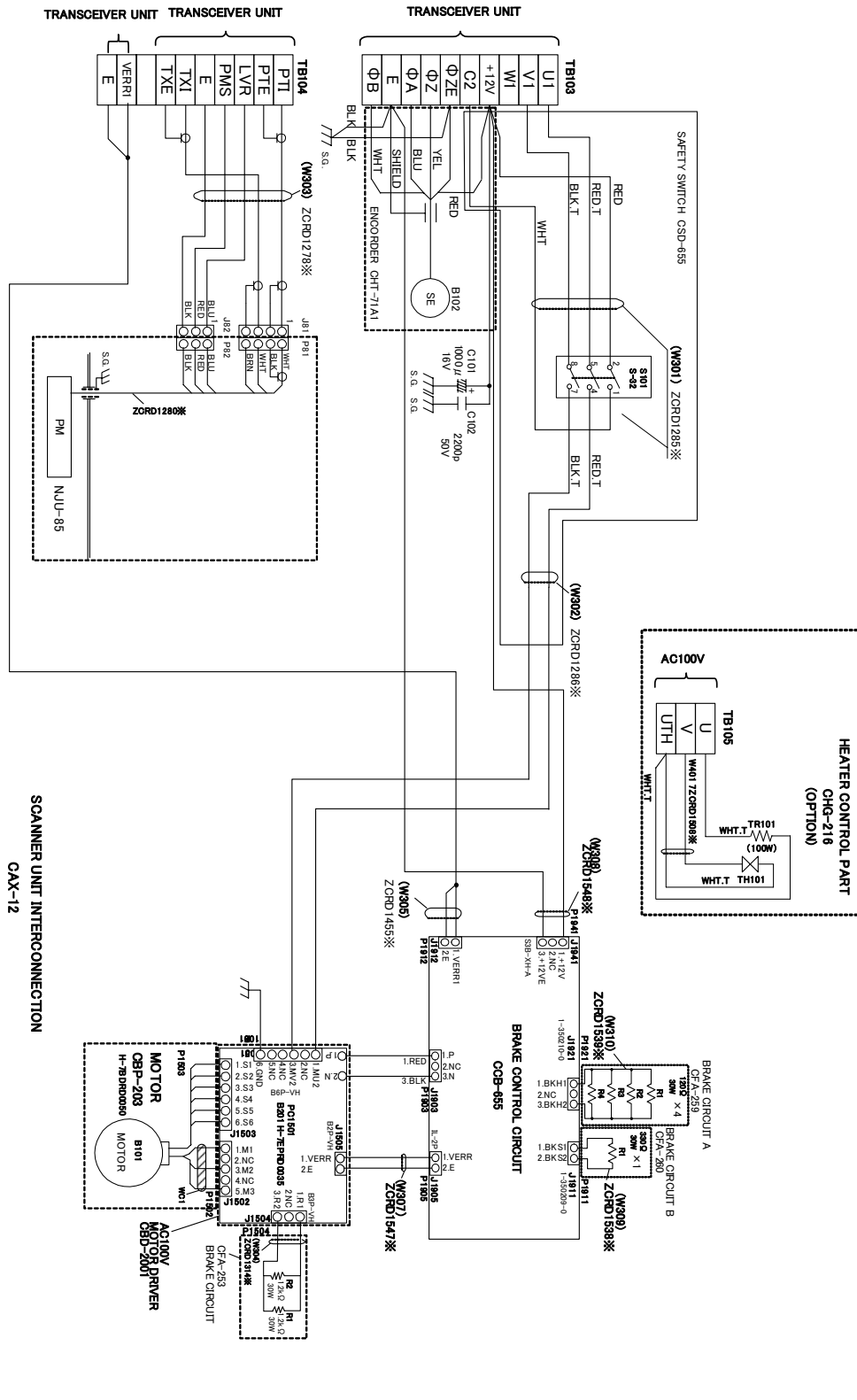


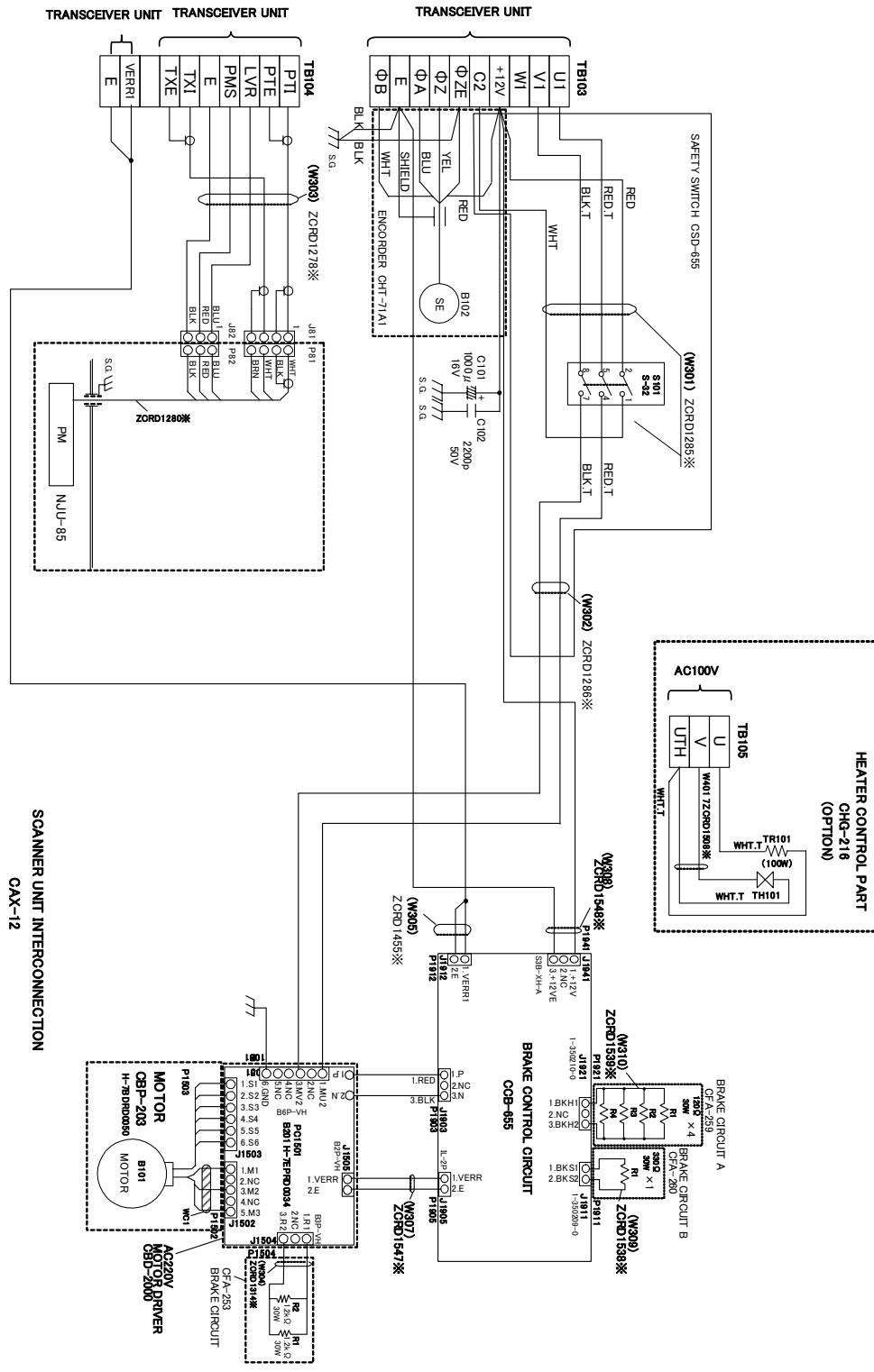
Fig B-20: Interconnection Diagram of NKE-1125 (AC220V)



B.6.5 NKE-1129 (AC110V)



B.6.6 NKE-1129 (AC220V)



NKE-1129PM (AC220V) 空中線機内接続図
CAX-12

Fig B-22: Interconnection Diagram of NKE-1129 (AC220V)



B.6.7 NTG-3225

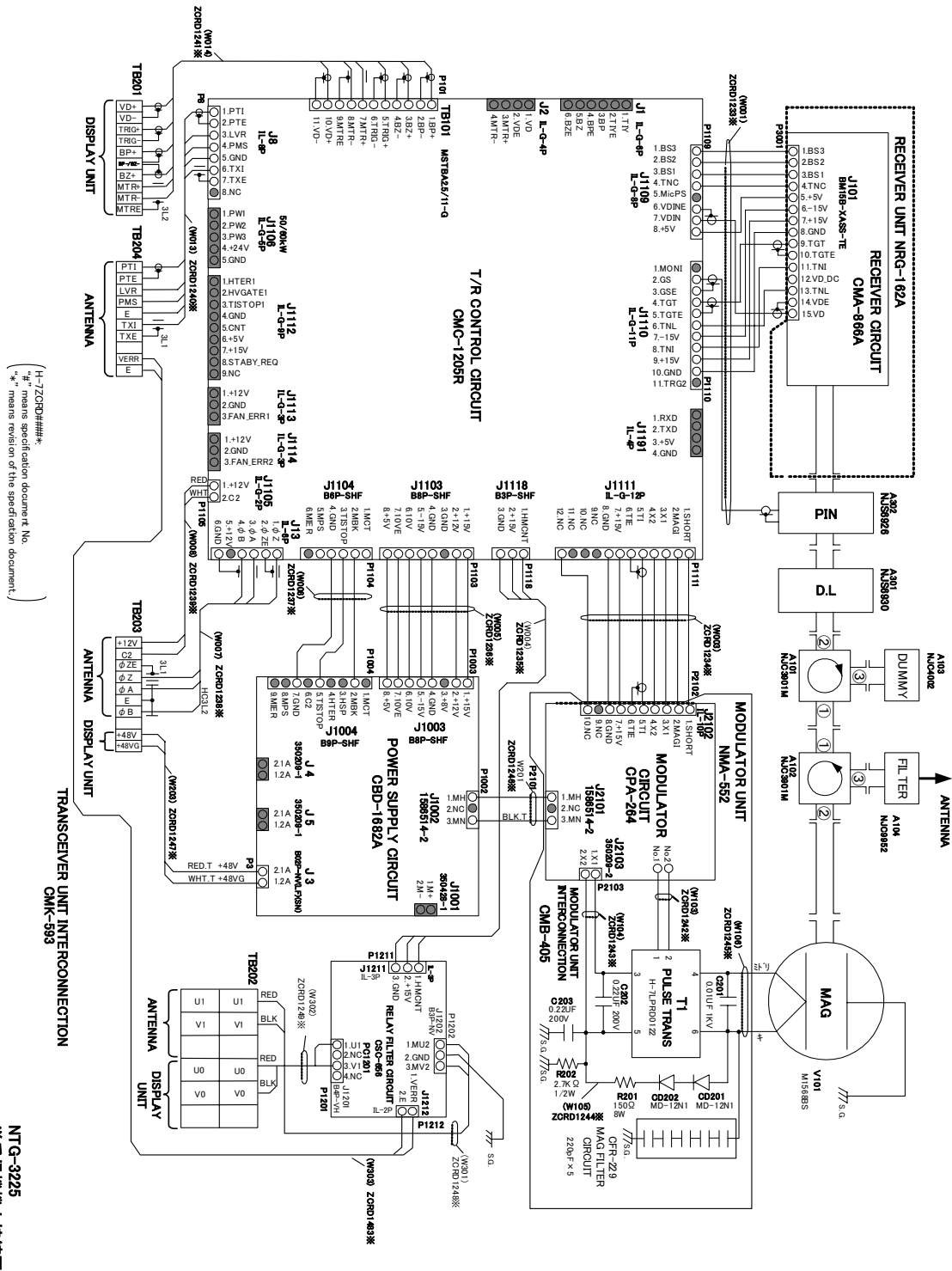


Fig B-23: Interconnection Diagram of NTG-3225

B.6.8 NKE-1130 (AC110V)

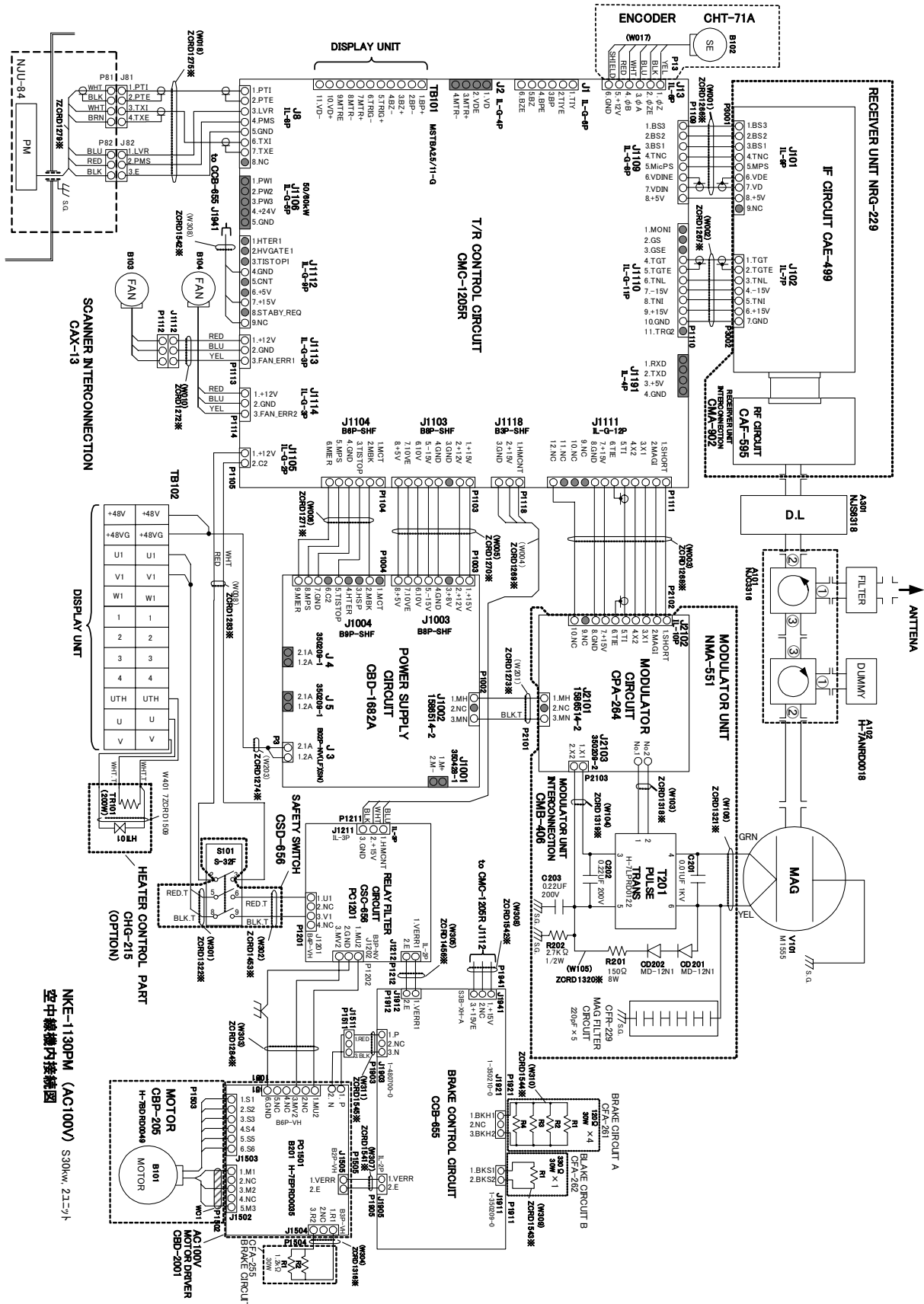


Fig B-24: Interconnection Diagram of NKE-1130 (AC110V)

B.6.9 NKE-1130 (AC220V)

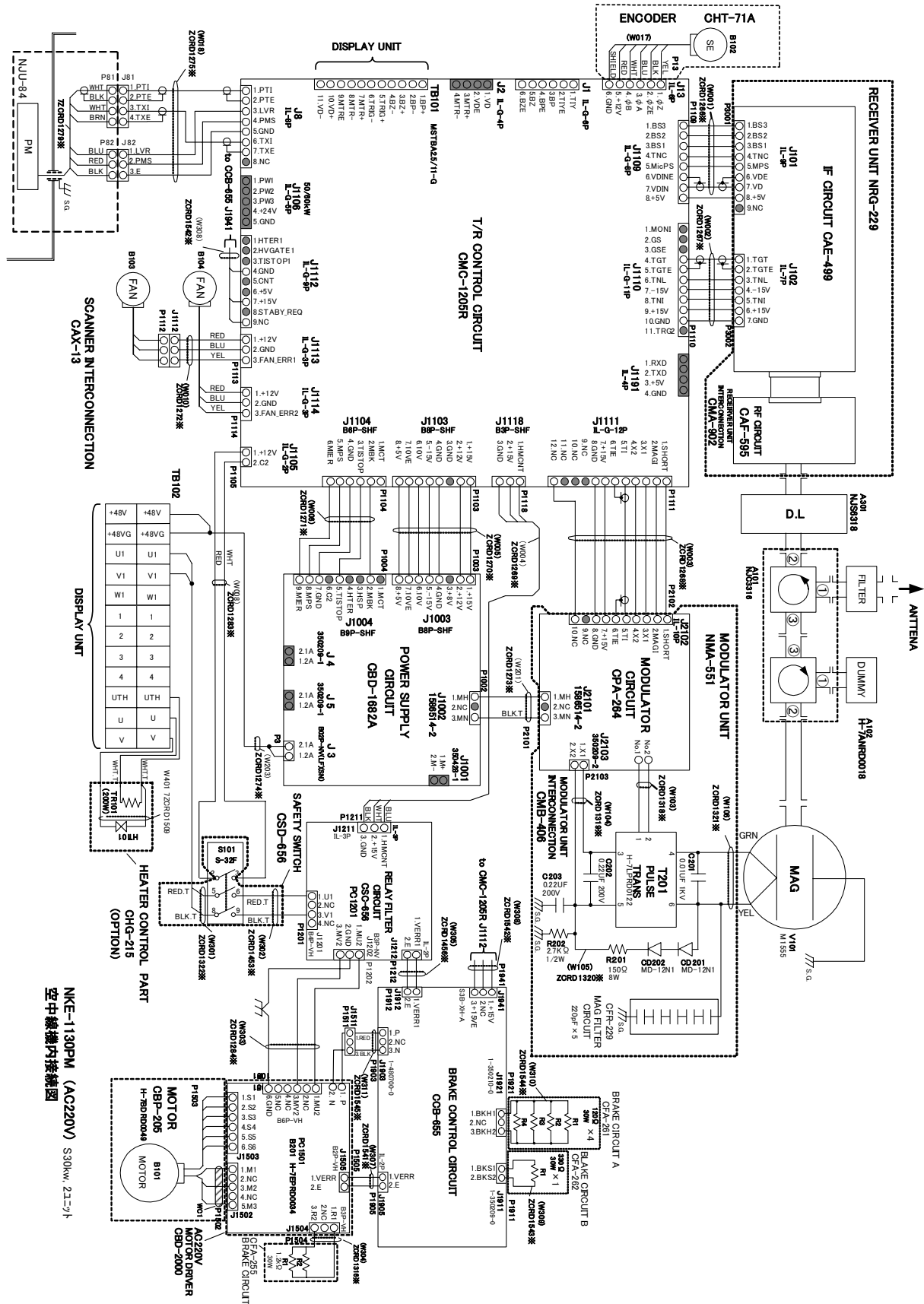


Fig B-25: Interconnection Diagram of NKE-1130 (AC220V)

B.6.10 NKE-1139 (AC110V)

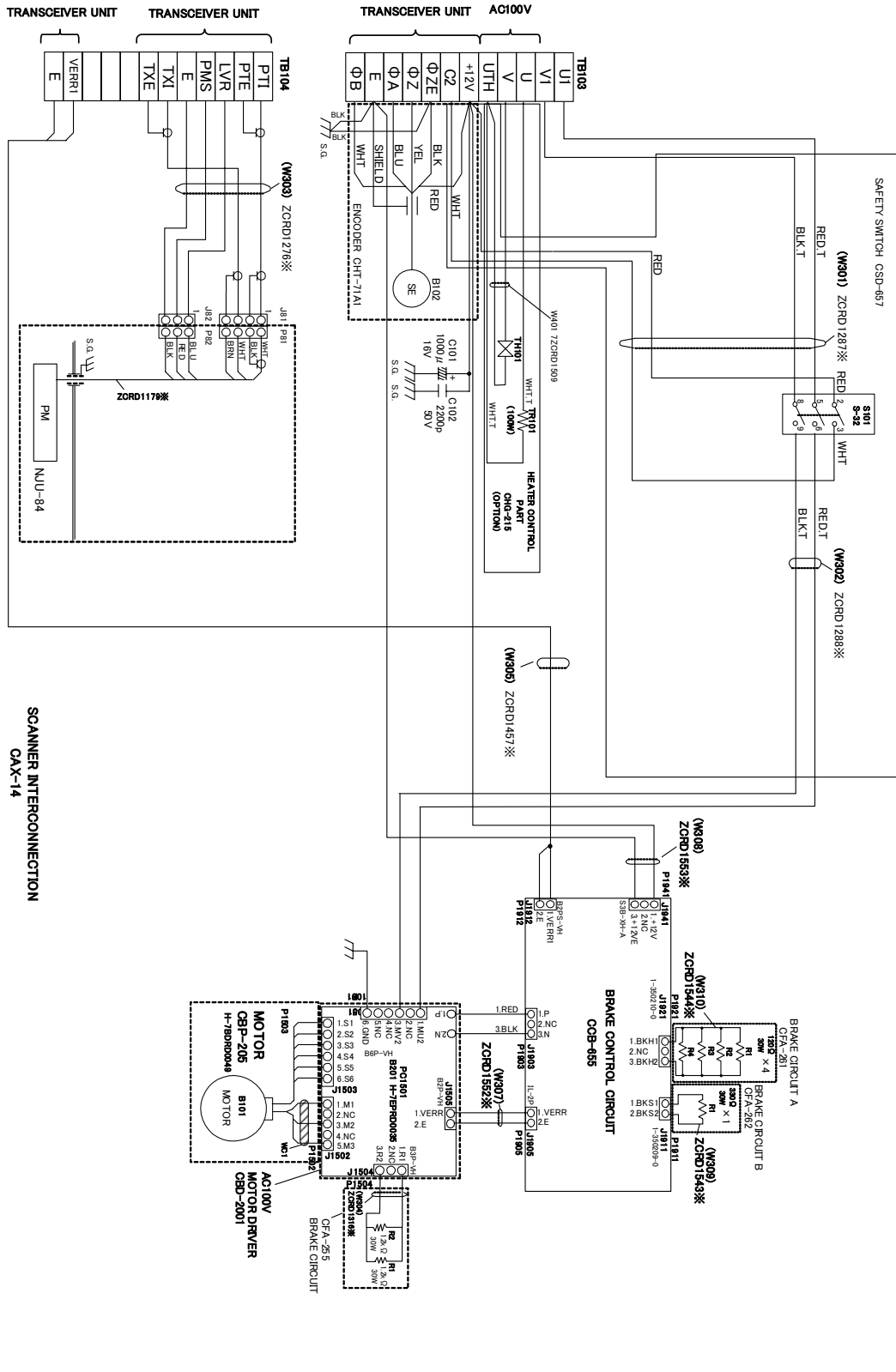


Fig B-26: Interconnection Diagram of NKE-1139 (AC110V)

NKE-1139PM (AC100V) 空中線機内接続図
S/N: 2017.3.12.9F

B.6.11 NKE-1139 (AC220V)

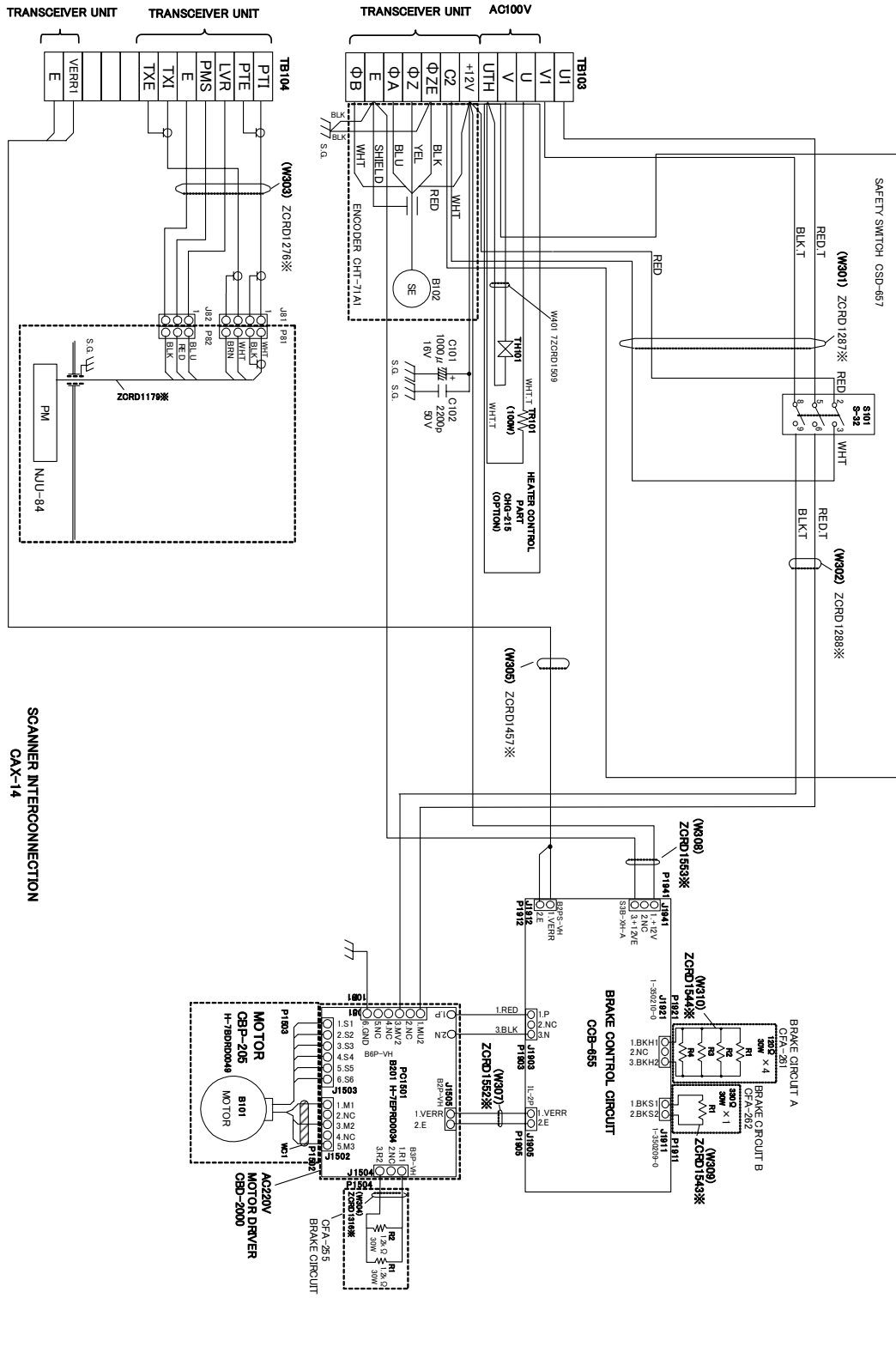
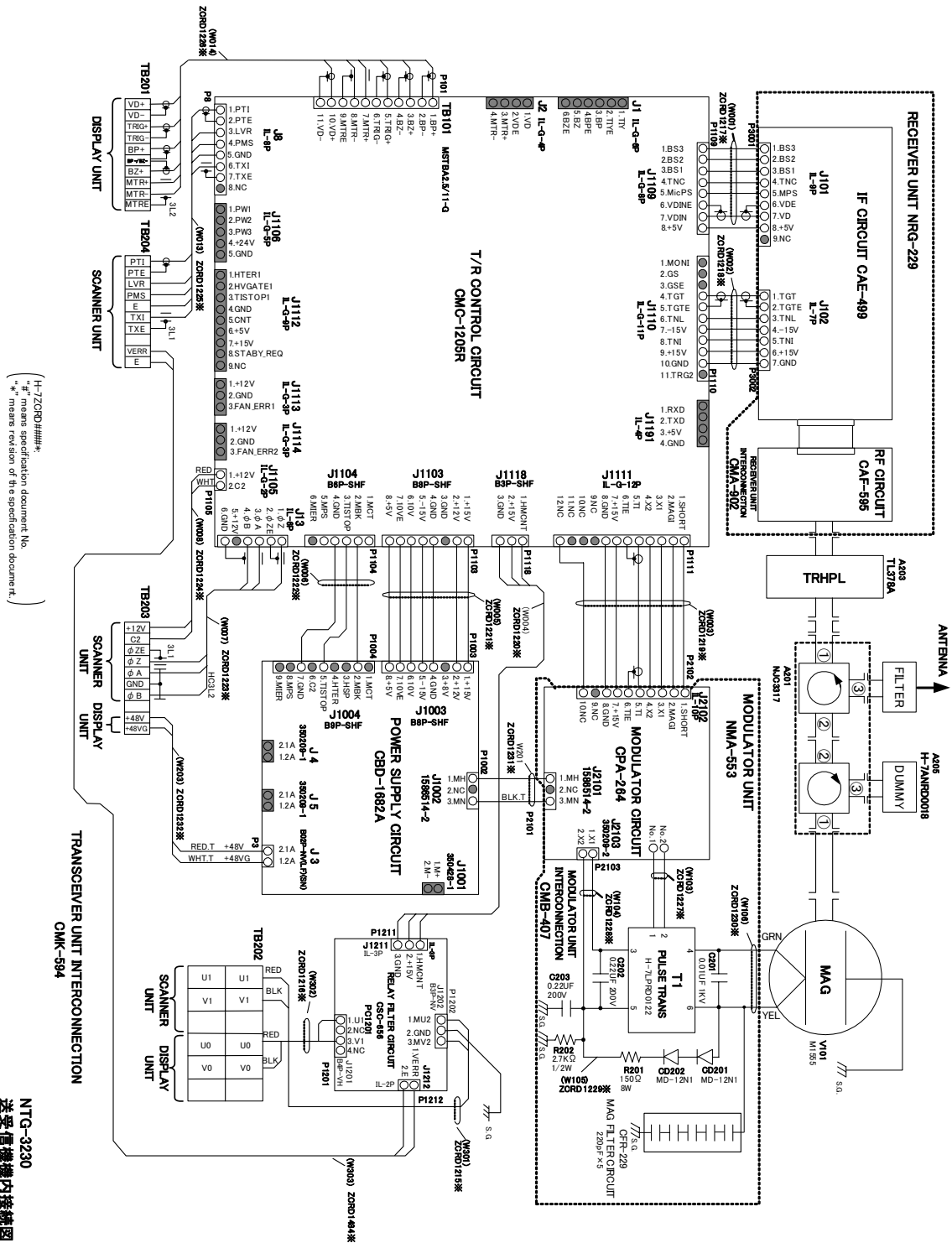


Fig B-27: Interconnection Diagram of NKE-1139 (AC220V)

B.6.12 NTG-3230



(H-7ZORD####*
 "Z" means specification document No.
 "*" means revision of the specification document.)

NTG-3230
 送受信機機内接続図

Fig B-28: Interconnection Diagram of NTG-3230



B.7

Terminal Board Connection Diagram

B.7.1 JMA-9110-6XA/JMA-9110-6XAH

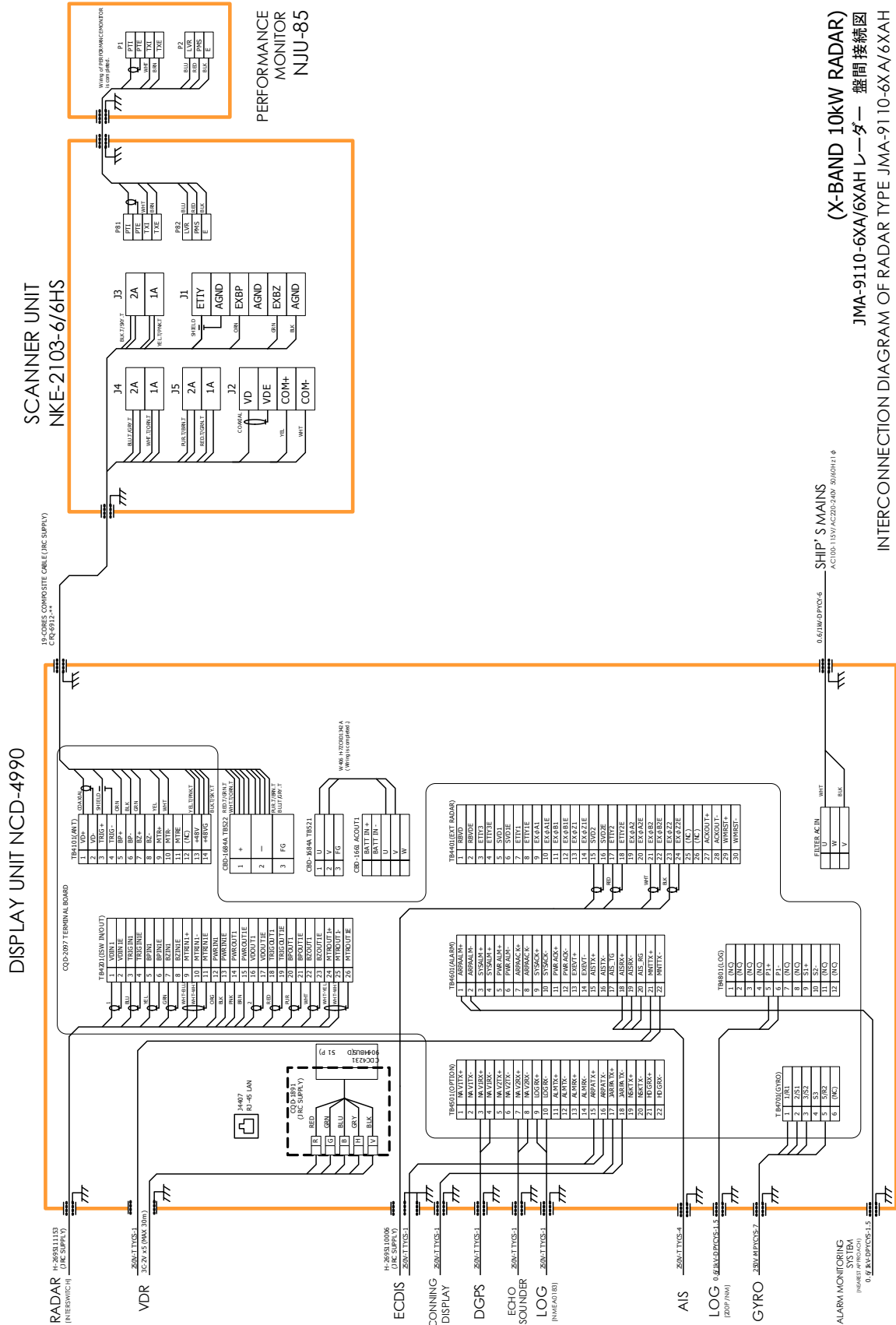


Fig B-29: Terminal Board Connection Diagram of JMA-9110-6XA/JMA-9110-6XAH



B.7.2 JMA-9110-6XA/JMA-9110-6XAH (desktop)

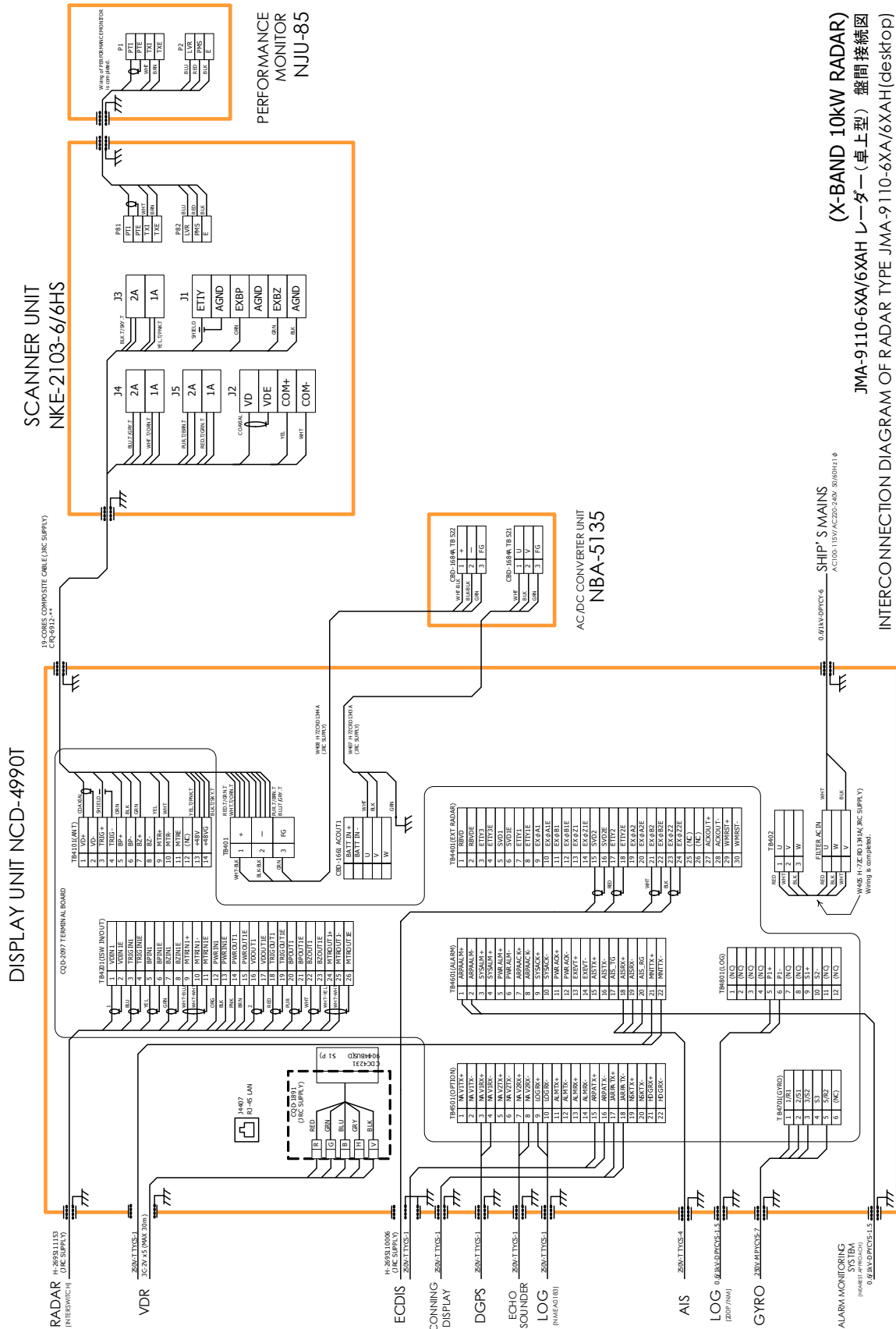


Fig B-30: Terminal Board Connection Diagram of JMA-9110-6XA/JMA-9110-6XAH (desktop)

B.7.4 JMA-9122-6XAH (desktop)

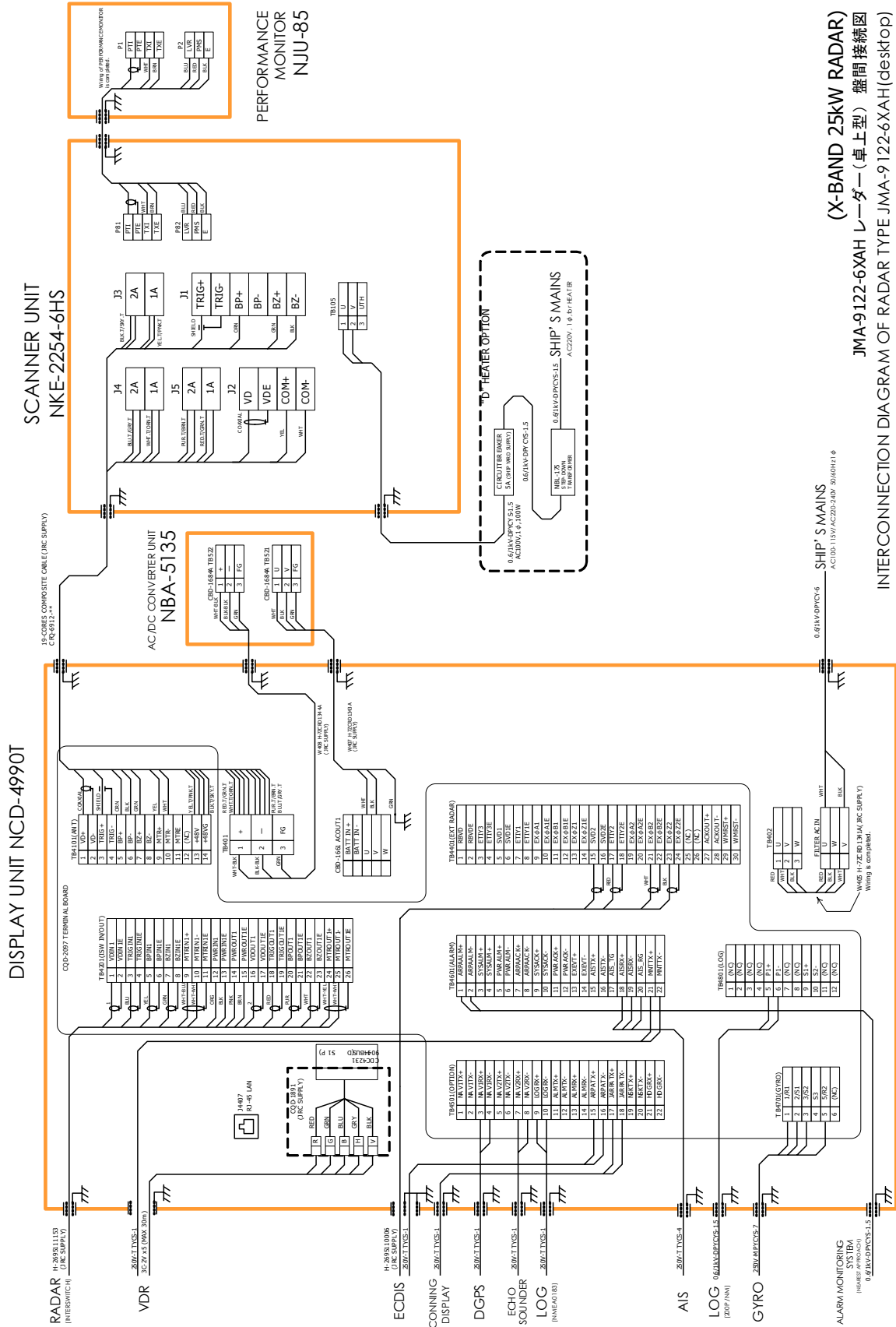


Fig B-32: Terminal Board Connection Diagram of JMA-9122-6XAH (desktop)

B.7.5 JMA-9122-6XA/9XA

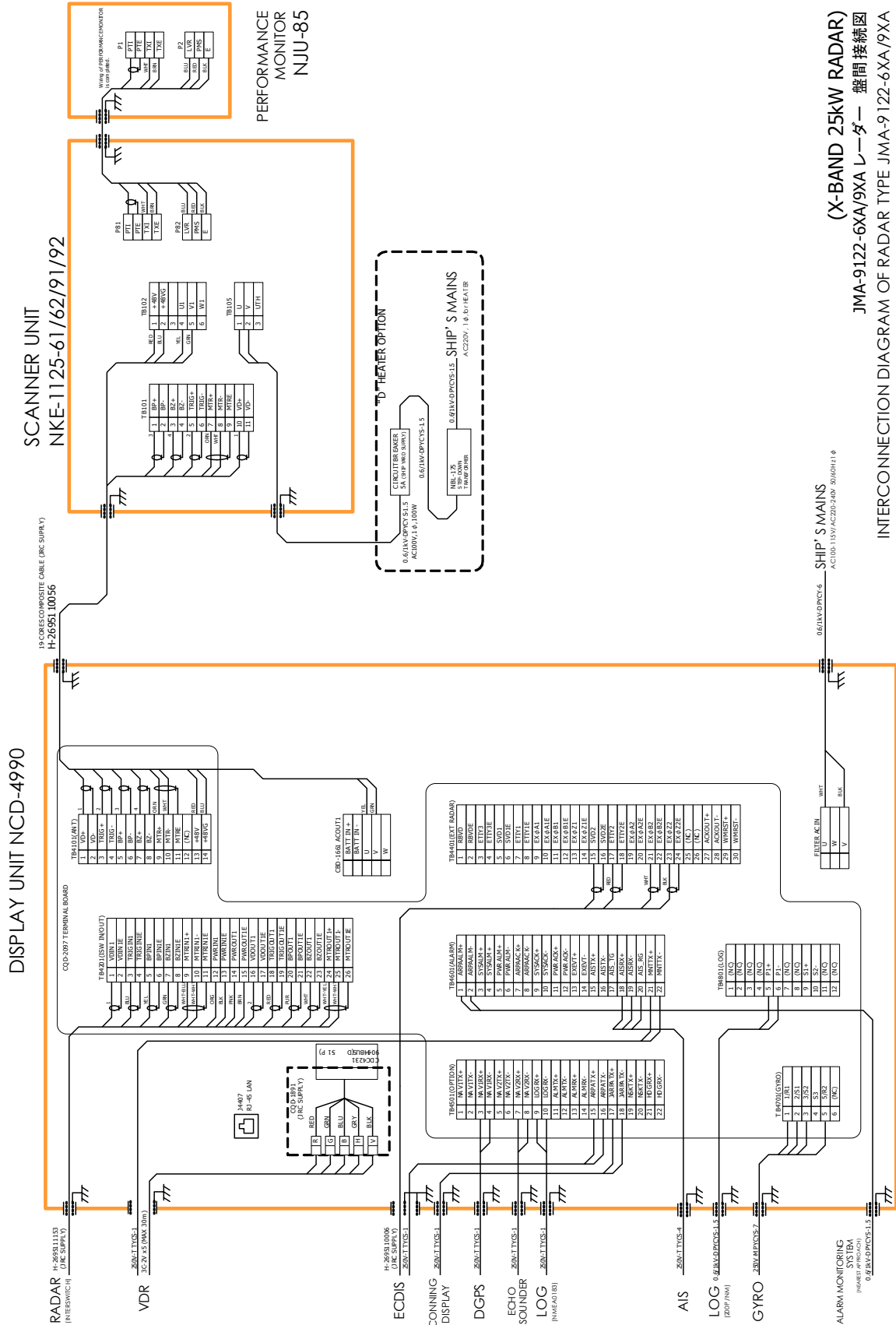


Fig B-33: Terminal Board Connection Diagram of JMA-9122-6XA/9XA



B.7.7 JMA-9132-SA

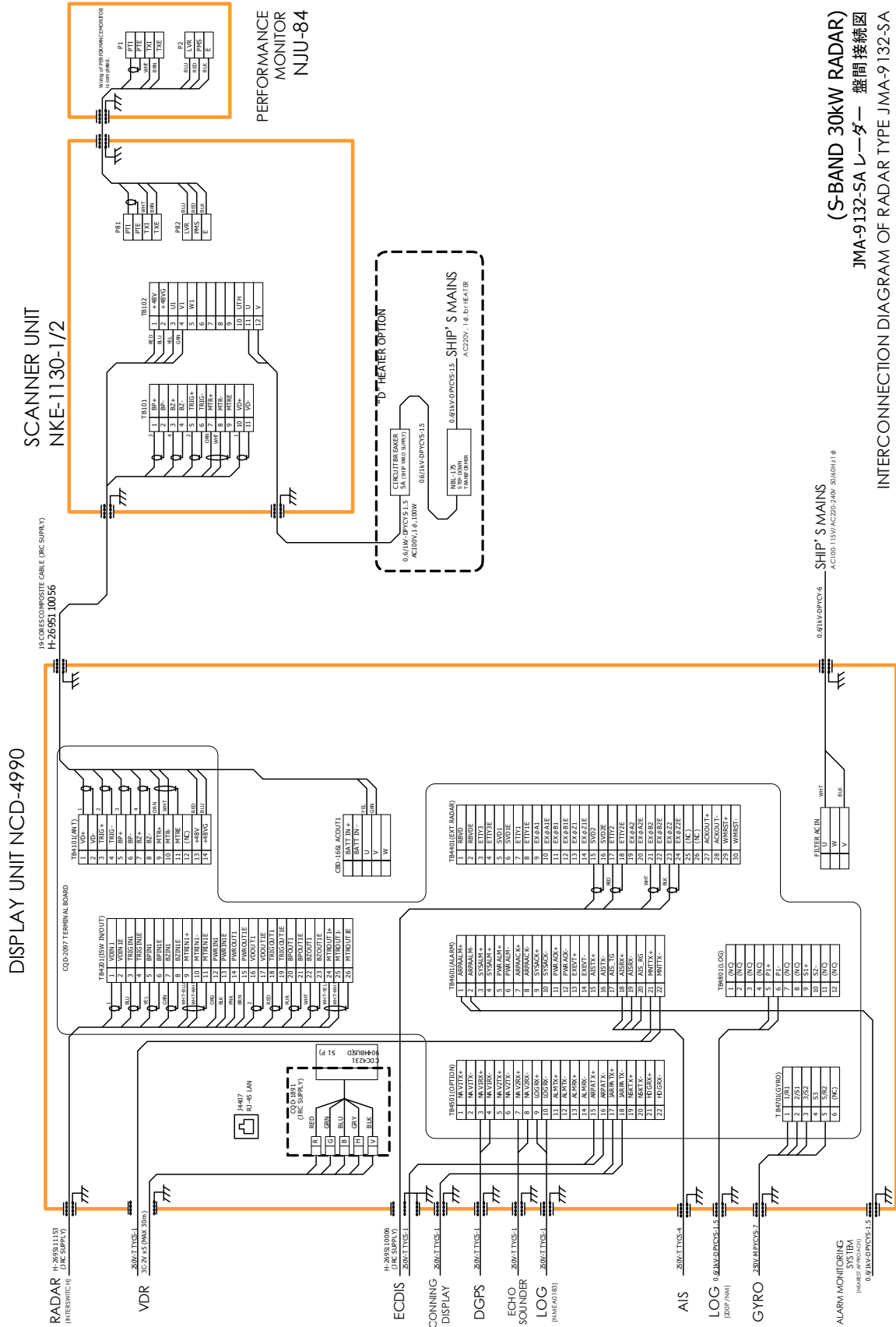


Fig B-35: Terminal Board Connection Diagram of JMA-9132-SA

(S-BAND 30KW RADAR)
JMA-9132-SA レーダー 盤間接続図
INTERCONNECTION DIAGRAM OF RADAR TYPE JMA-9132-SA



B.7.8 JMA-9133-SA

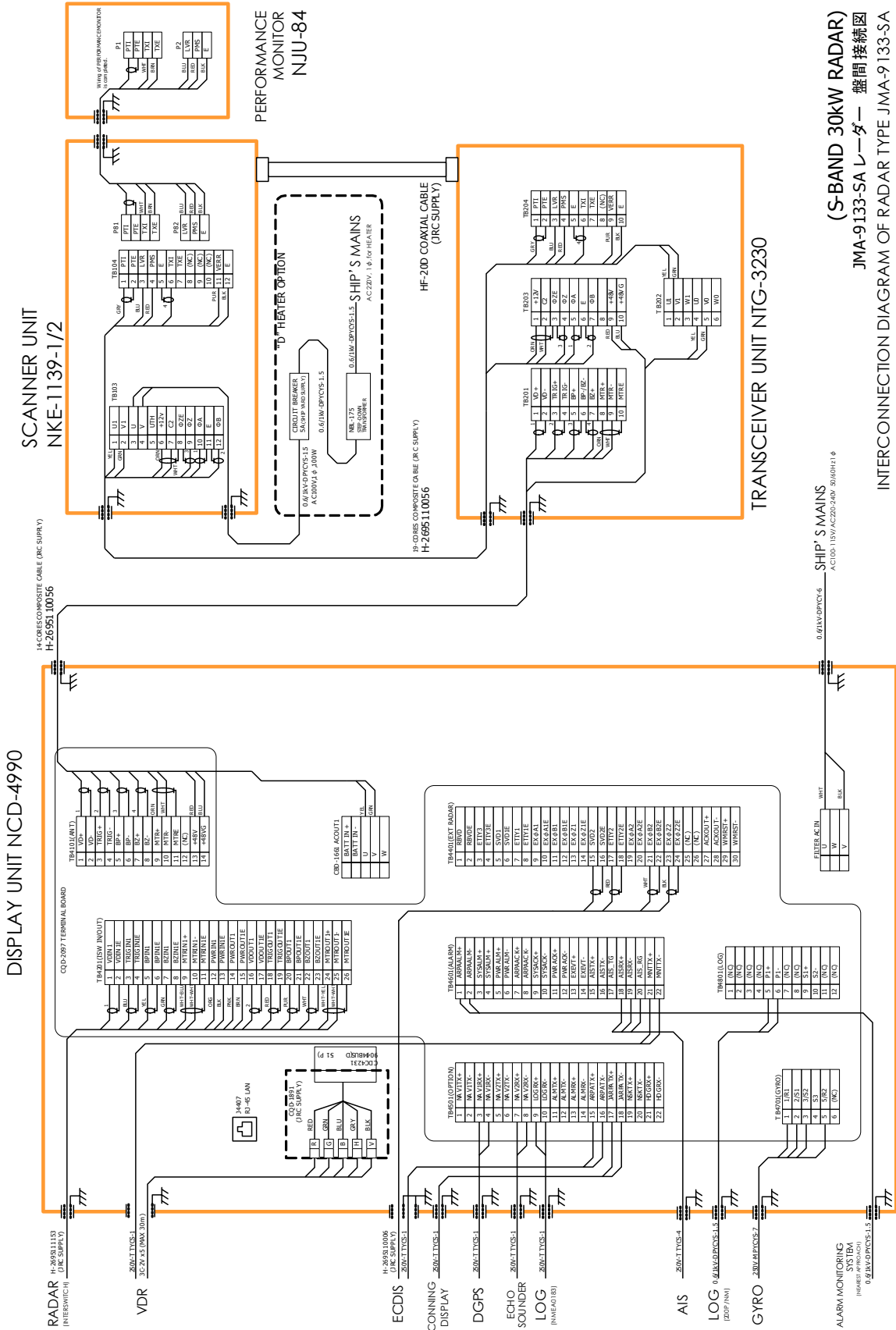
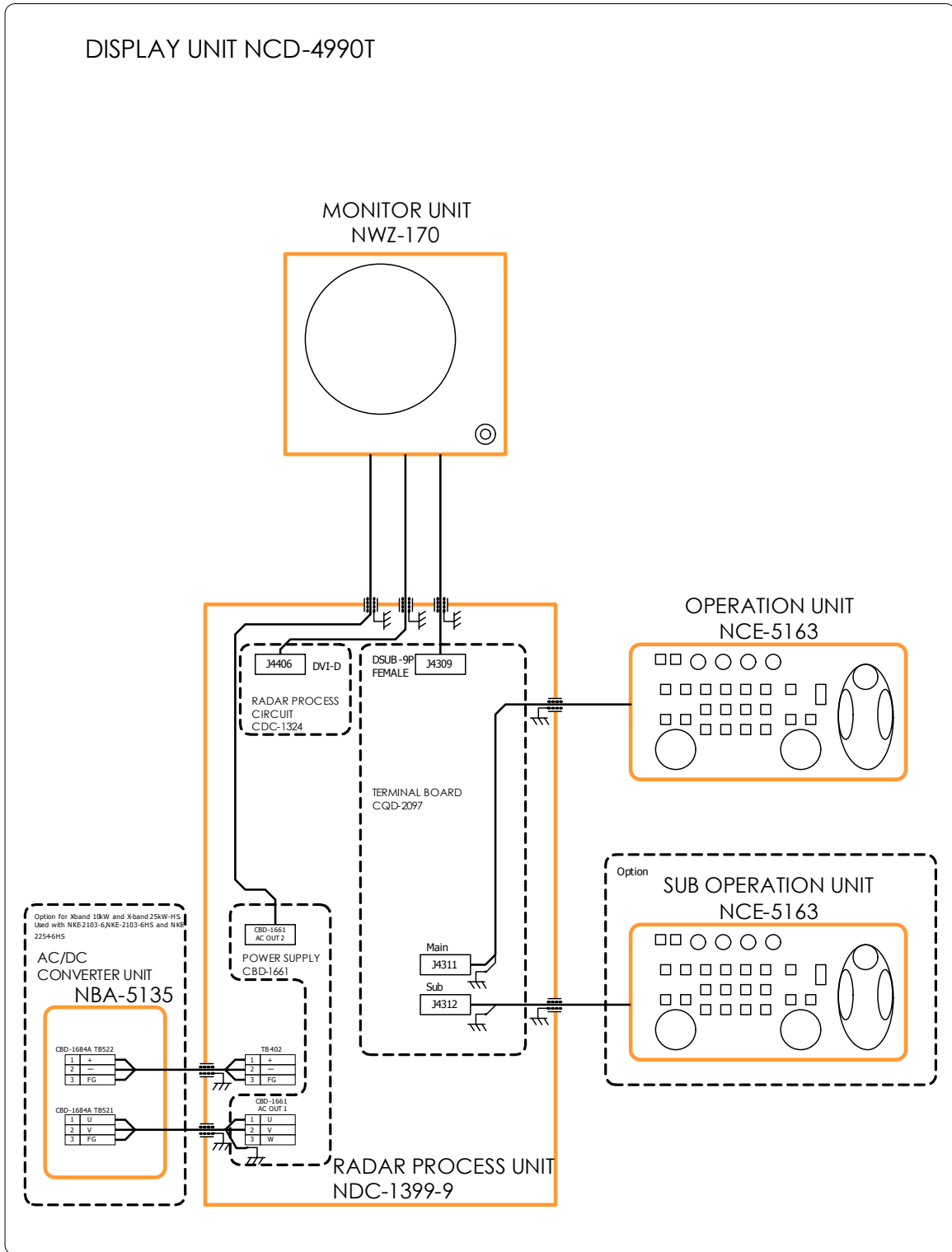


Fig B-36: Terminal Board Connection Diagram of JMA-9133-SA

(S-BAND 30KW RADAR)
 JMA-9133-SA レーダー 盤間接続図
 INTERCONNECTION DIAGRAM OF RADAR TYPE JMA-9133-SA

B.7.9 NCD-4990T



JMA-9100 Series RADAR
 NCD-4990T 卓上型レーダー指示機 ユニット間接続図
 INTERCONNECTION DIAGRAM OF DISPLAY UNIT TYPE NCD4990T(desktop)

Fig B-37: Inter-Unit Connection Diagram of NCD-4990T

B.8 GYRO I/F

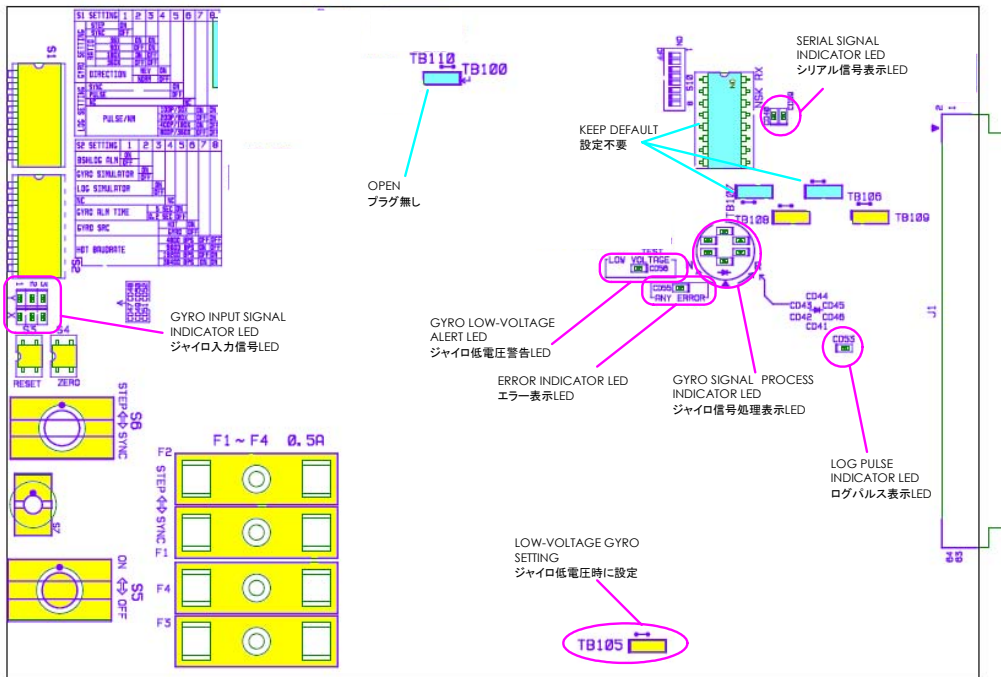


Fig B-38: Parts Location of CMJ-462E

TableB-1 : Setting Table of CMJ-462E S1/S2

S1 SETTING		1	2	3	4	5	6	7	8	
ジャイロ信号号 GYRO SETTING	STEP	ON								
	SYNC	OFF								
	RATIO	36X	ON	ON						
		90X	OFF	ON						
		180X	ON	OFF						
360X		OFF	OFF							
回転方向 DIRECTION	逆/REV			ON						
	正/NOR			OFF						
シンクロ/SYNC					ON					
パルス/PULSE					OFF					
未接続/NC					OFF					
ログ信号号 LOG SETTING	パルス PULSE/NM	100P/30X			ON	ON				
		200P/90X			OFF	ON				
		400P/180X			ON	OFF				
		800P/360X			OFF	OFF				

S2 SETTING		1	2	3	4	5	6	7	8
BSHLOG ALM	ON								
	OFF								
GYRO SIMULATOR	ON								
	OFF								
LOG SIMULATOR				ON					
				OFF					
N.C. (No Connection)				OFF					
GYRO ALM TIME	5 SEC				ON				
	0.2 SEC				OFF				
GYRO SRC (Heading Sensor Source)	HDT (NMEA (HDT/THS))					ON			
	GYRO					OFF			
NMEA BAUDRATE	4800 BPS						OFF	OFF	
	9600 BPS						ON	ON	
	19200 BPS						OFF	ON	
	38400 BPS						ON	ON	

TableB-2 : Gyro, Log Settings

Manufacturer	Item	Gyro compasses	Repeater motors (For reference only)	CMJ-462 Excitation voltate	Gyro select swiches (S1, S6, S7 located on the CMJ-462)								S6, S7 setting															
					1	2	3	4	5	6	7	8																
トキメック TOKIMEC (JAPAN) スベリー 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	1	OFF	2	ON	3	ON	4	OFF	5	Speed log selection	6	SYNC													
				7	注) レーダー画像及び COURSEの指示値 が逆転する場合は ONIに設定する	8																						
	ES-11A, GM-11/11A/21/110/120, MS-2000/3000 PR-222R/226/237/237-L /1*6*/2022/2023/22**, TG-200	Synchro motor TSAN60E11 (90X)	110 VAC 60Hz	1		OFF	2	OFF	3	ON		4		OFF		5	Speed log selection	6	SYNC									
				7		注) レーダー画像及び COURSEの指示値 が逆転する場合は ONIに設定する	8																					
	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	1			ON	2	ON	3		OFF				4		OFF		5	Speed log selection	6	STEP					
				7			注) レーダー画像及び COURSEの指示値 が逆転する場合は ONIに設定する	8																				
	ES-16 SR-120/220 CMZ-700D ES-140/160 PR-26**/6*6*/6*7*, SR-140/160 TG-6000/8000	Step motor GA-2001G Drawing#103590820 150 excitation (180X)	35 VDC	1				ON	2	ON		3				OFF				4		OFF		5	Speed log selection	6	STEP	
				7				注) レーダー画像及び COURSEの指示値 が逆転する場合は ONIに設定する	8																			
	横河電機 YOKOGAWA (JAPAN)	C1JR C-1JUNIOR, 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 YM-14 TS-19 (360X)	60 VAC 60Hz					1	OFF	2	OFF	3		OFF	4				OFF				5		Speed log selection		6
					7				注) レーダー画像及び COURSEの指示値 が逆転する場合は ONIに設定する	8																		
アーマーブラウン ARMA BROWN (France)	MK-1~7/10/20, MKL-1, NOD-4, NB-23-88, SERIE, SOB-1000	Synchro motor PY76-N2 (360X)	100 VAC 50/60Hz	1	OFF					2	OFF	3	OFF	4	OFF	5	Speed log selection		6					SYNC				
				7	注) レーダー画像及び COURSEの指示値 が逆転する場合は ONIに設定する	8																						
アンシュツ ANSCHUTZ (Germany) プラート社 C. PLATH (Germany)	T10-301, T39-31, ANSCHUTZ-1~6/12/14/Z, GM-BH, K8051, NB23-126, Z0858U NAVIGAT 763-331E, PLATH NAVIGAT-II/III	Step motor BZ-2191 (180X)	50 VDC	1		ON				2	ON	3	OFF	4		OFF		5	Speed log selection		6		STEP					
				7		注) レーダー画像及び COURSEの指示値 が逆転する場合は ONIに設定する	8																					
アンシュツ ANSCHUTZ (Germany) プラート社 C. PLATH (Germany)	NB23-91 (360X) YMI4A (360X)	Synchro motor NB23-91 (360X)	50 VAC 50Hz	1			OFF			2	OFF	3	OFF	4				OFF			5	Speed log selection			6		SYNC	
				7			注) レーダー画像及び COURSEの指示値 が逆転する場合は ONIに設定する	8																				
アンシュツ ANSCHUTZ (Germany) プラート社 C. PLATH (Germany)	YMI4A (360X)	Synchro motor YMI4A (360X)	50 VAC 60Hz	1				OFF		2	OFF	3	OFF	4						OFF	5				Speed log selection	6		SYNC
				7				注) レーダー画像及び COURSEの指示値 が逆転する場合は ONIに設定する	8																			

* : Numeric number

B.9 Inter Switch Unit

B.9.1 Terminal Board Connection Diagram

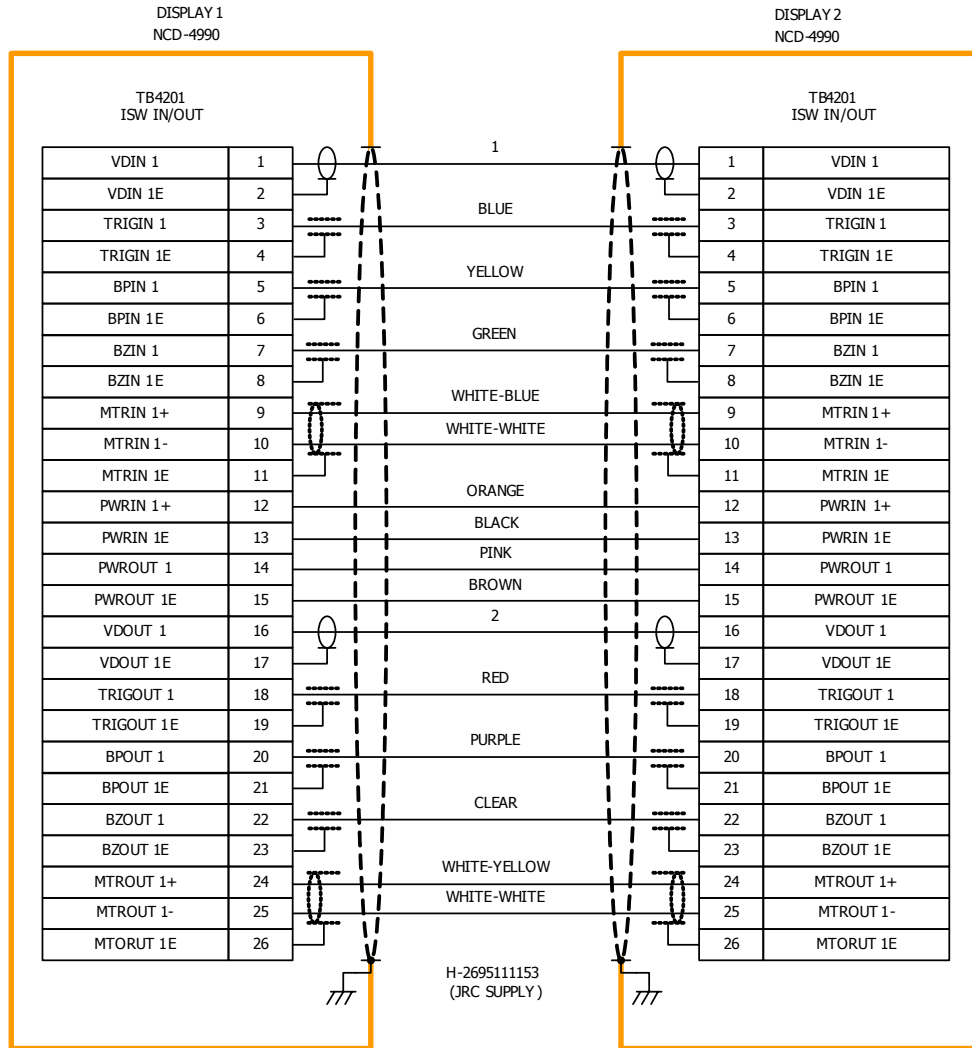


Fig B-39: Terminal Board Connection Diagram of NQE-3141-2A

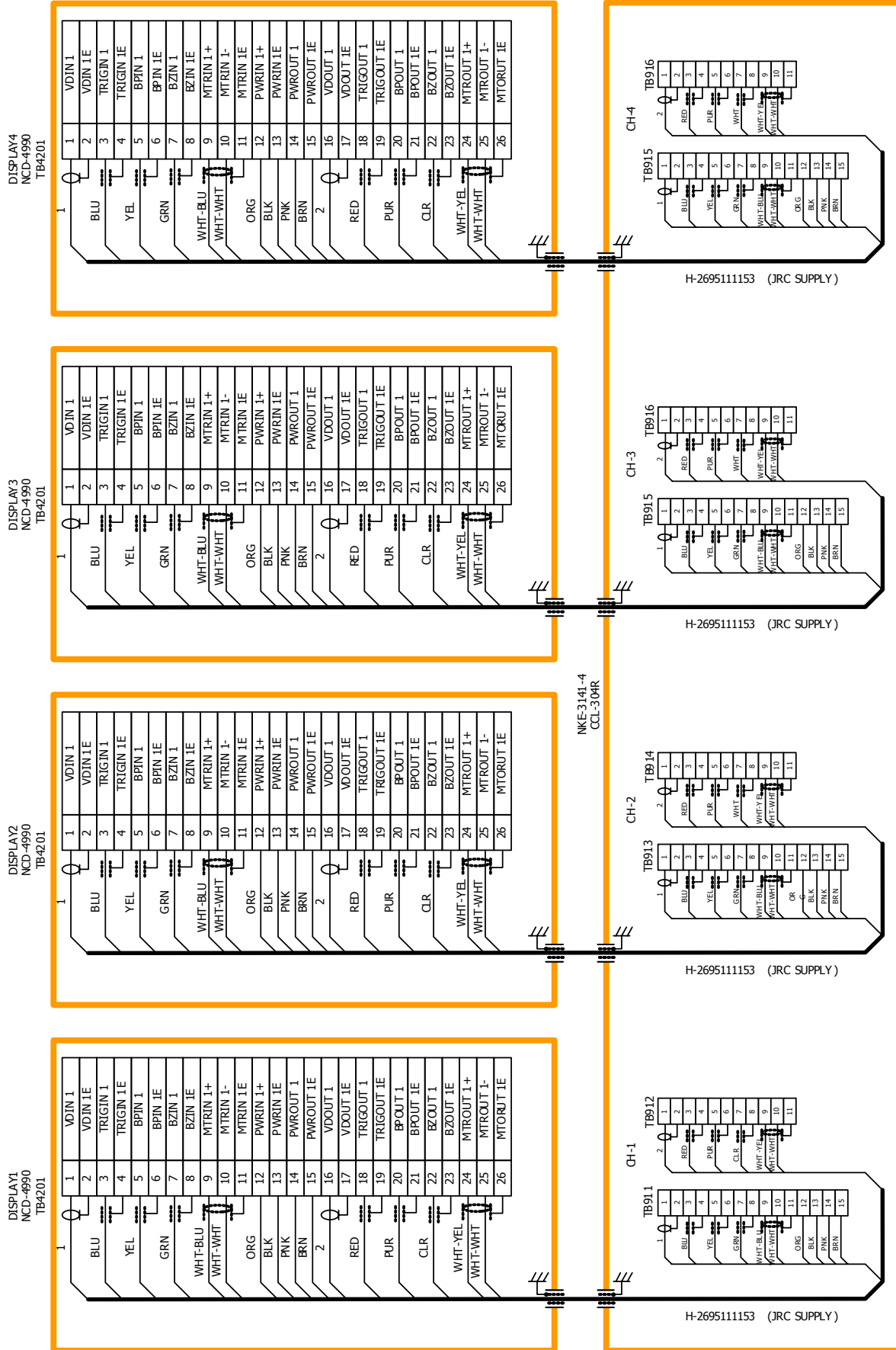


Fig B-40: Terminal Board Connection Diagram of NQE-3141-4A

B.9.2 Interconnection Diagram

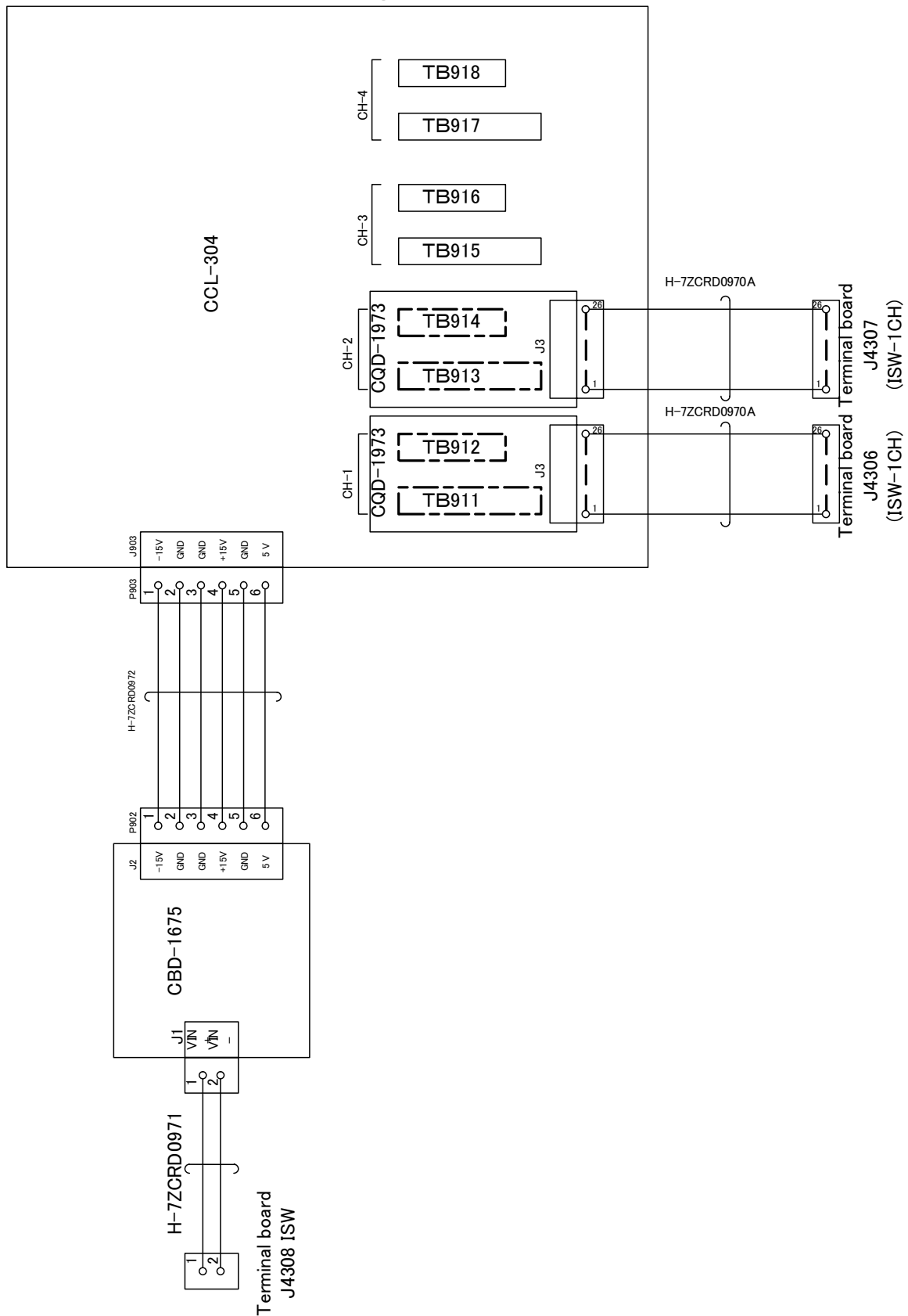


Fig B-41: Interconnection Diagram of NQE-3141-2A

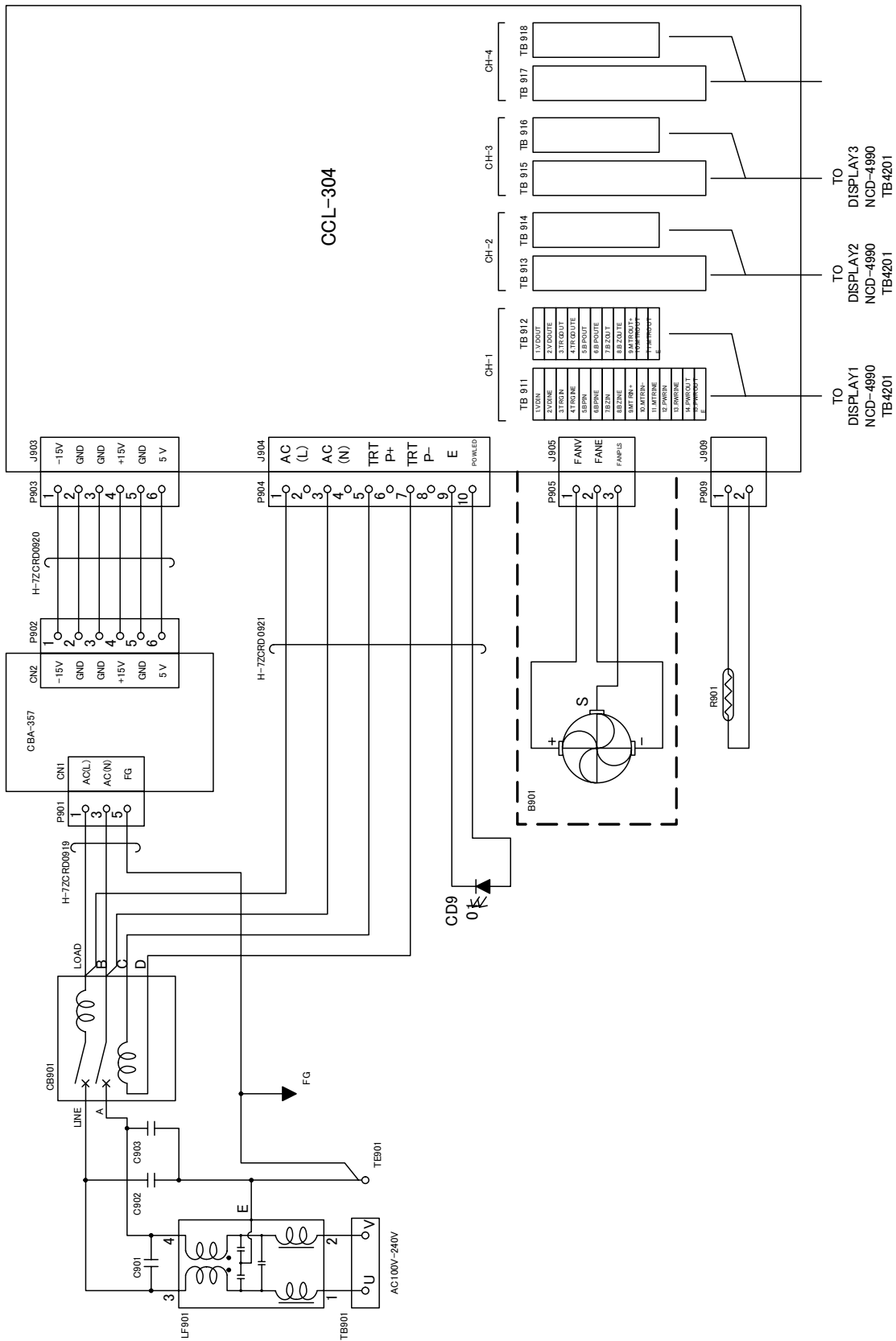


Fig B-42: Interconnection Diagram of NQE-3141-4A

Appendix C

Menu Index

Menu Index

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C.5	AZ	C-9
C.6	Track	C-10
C.7	Route	C-11
C.8	U.Map	C-12
C.9	Serviceman Menu	C-14

C.1

Main

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 - └ 3. Turn Mode
 - └ 4. Turn Set
- └ 2. File Manager - - - - - section 3.11.1 on page 3-120
- ▣ 3. RADAR Menu
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 - └ 1. Video Latitude - - - - - section 3.8.1.1 on page 3-91
 - └ 2. Video Noise Rejection - - - - - section 3.8.1.2 on page 3-92
 - └ 3. AUTO Dynamic Range - - - - - section 3.8.1.3 on page 3-92
 - └ 4. Process Switch - - - - - section 3.8.1.4 on page 3-93
 - └ 5. 2nd Process Mode- - - - - section 3.8.1.5 on page 3-93
 - └ 6. Process Switch Rrange - - - - - section 3.8.1.6 on page 3-93
 - └ 7. Fast Target Detection - - - - - section 3.8.1.7 on page 3-94
 - ▣ 8. User Function Setting - - - - - section 3.9.3 on page 3-113
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 - └ 3. Process
 - └ 4. Target Enhance
 - └ 5. AUTO Sea/Rain
 - └ 6. Save Present State
 - ▣ 9. Next
 - └ 1. Pulse Length 0.75nm - - - - - page 3-115
 - └ 2. Pulse Length 1.5nm
 - └ 3. Pulse Length 3/4nm
 - └ 4. Pulse Length 6/8nm
 - └ 5. Pulse Length 12nm
 - └ 6. Pulse Length 16nm
 - ▣ 9. Next
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 - └ 2. Video Noise Rejection
 - └ 3. AUTO Dynamic Range
 - └ 4. Process Switch
 - └ 5. 2nd Process Mode
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 - └ 7. Fast Target Detection
 - ▣ 9. Next
 - └ 1. Trails Interval - - - - - page 3-115
 - └ 2. Trails Mode
 - └ 3. Trails Reference Level
 - └ 4. Trails Reduction
 - └ 6. Trails Process
 - └ 7. Max Interval
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 - └ 2. PRF
 - └ 3. Small Buoy Detection
 - └ 4. Fishnet Detection
 - └ 5. Antenna Height
 - └ 8. Set Mode Default
 - └ 9. Initialize
 - ▣ 2. Function2 Setting
 - ▣ 3. Function3 Setting
 - ▣ 4. Function4 Setting
 - 9. SART - - - - - section 6.5 on page 6-12
 - ▣ 2. RADAR Trails Setting
 - └ 1. Trails Mode - - - - - section 3.8.2.1 on page 3-95
 - └ 2. Trails Ref Level - - - - - section 3.8.2.2 on page 3-95
 - └ 3. Trails Reduction - - - - - section 3.8.2.3 on page 3-96
 - └ 5. Trails Process - - - - - section 3.8.2.4 on page 3-96



- 6. Max Interval - - - - - *section 3.8.2.5 on page 3-96*
 - 3. TXRX Setting
 - 1. PRF Fine Tuning - - - - - *section 3.8.3.1 on page 3-97*
 - 2. Stagger Trigger - - - - - *section 3.8.3.2 on page 3-97*
 - 4. PRF - - - - - *section 3.8.3.3 on page 3-97*
 - 5. Ice Class Standby Mode - - - - - *section 3.8.3.4 on page 3-98*
 - 4. Multi Window Setting
 - 1. DIR/DIST EXP Display - - - - - *section 3.8.8.1 on page 3-105*
 - 2. Numeric NAV INFO - - - - - *section 3.8.8.2 on page 3-105*
 - 3. Depth Graph Setting - - - - - *section 3.8.8.3 on page 3-106*
 - 1. Depth Graph Display
 - 2. Depth Range
 - 3. Time Range
 - 4. Depth Unit
 - 4. Wind Graph Setting - - - - - *section 3.8.8.4 on page 3-107*
 - 1. Wind Graph Display
 - 2. Wind Speed Unit
 - 5. TEMP Graph Setting - - - - - *section 3.8.8.5 on page 3-108*
 - 1. TEMP Graph Display
 - 2. TEMP Graph Color
 - 3. TEMP Range
 - 1. Temperature setting (MIN)
 - 2. Temperature setting
 - 3. Temperature setting
 - 4. Temperature setting
 - 5. Temperature setting
 - 6. Temperature setting (MAX)
 - 4. Time Range
 - 6. Course Bar Setting - - - - - *section 3.8.8.6 on page 3-109*
 - 1. Course Bar Display
 - 2. Autopilot Course
 - 3. ROT Scale
 - 5. Map Setting
 - 3. JRC/ERC Setting
 - 1. Day/Night
 - 2. Color of Land
 - 3. Bright of Land
 - 4. Color of Sea
 - 5. Bright of Sea
 - 6. Color of Name
 - 7. Bright of Name
 - 8. Bright of Track/Mark/Line
 - 9. Next
 - 1. LAT/LON Line
 - 2. Color of L/L Line
 - 3. Bright of L/L Line
 - 5. Map Display Setting
 - 3. LAT/LON Correction
 - 7. Map Draw AZI Mode
 - 6. NAV Equipment Setting
 - 1. GYRO Setting - - - - - *section 3.4.14 on page 3-36, section 7.1.7 on page 7-9*
 - 2. MAG Compass Setting - - - - - *section 3.4.16 on page 3-37*
 - 1. Heading Correction
 - 2. Correct Value
 - 3. Set/Drift Setting - - - - - *section 3.4.16.1 on page 3-38*
 - 1. Correction
 - 2. Set
 - 3. Drift
 - 7. Sub Menu
 - 1. Display Color Setting - - - - - *section 3.8.5.1 on page 3-99*
 - 1. Day/Night - - - - - *section 3.8.5.2 on page 3-100*
 - 2. Outer PPI
 - 3. Inner PPI
 - 4. Character
 - 5. RADAR Video
 - 6. RADAR Trails(Time)
 - 8. Target Symbol
 - 9. Next
 - 1. Cursor
 - 2. Range Rings

- └ 3. EBL/VRM/PI
 - └ 4. Own Symbol/HL/Vector
 - └ □2. Brilliance Setting- - - - - section 3.8.5.3 on page 3-100
 - └ 1. RADAR Video - - - - - section 3.8.5.4 on page 3-101
 - └ 2. RADAR Trails
 - └ 3. Target Symbol- - - - - section 3.8.5.5 on page 3-102
 - └ 4. Range Rings
 - └ 5. EBL/VRM/PI
 - └ 6. Character
 - └ 7. Own Symbol/HL/Vector
 - └ 8. Keyboard
 - └ □3. User Setting
 - └ 1. Load User Setting - - - - - section 3.10.1 on page 3-118
 - └ 2. Save User Setting - - - - - section 3.10.2 on page 3-119
 - └ 3. Delete User Setting - - - - - section 3.10.3 on page 3-119
 - └ □4. Option Key Setting
 - └ 1. Option1 - - - - - section 3.8.7 on page 3-103
 - └ 2. Option2 - - - - - section 3.8.7 on page 3-103
 - └ □5. Buzzer Volume - - - - - section 3.8.6 on page 3-102
 - └ 1. Key ACK
 - └ 2. OPE Miss
 - └ 3. CPA/TCPA Alarm
 - └ 4. New Target Alarm
 - └ 5. Lost Alarm
 - └ 6. Navigation Alarm
 - └ 7. System Alarm
 - └ 8. Inter Switch
 - └ □6. Date/Time Setting - - - - - section 7.2.7 on page 7-20
 - └ 1. UTC/LMT
 - └ 2. LMT Date
 - └ 3. LMT Time
 - └ 4. Time Zone
 - └ 5. Display Style
 - └ 6. Synchronize with GPS
 - └ □7. Screen Capture Setting
 - └ □1. Select Item
 - └ 1. Graphic
 - └ 2. RADAR Video
 - └ 3. RADAR Trails
 - └ 4. Map
 - └ 2. Select Card Slot
 - └ 3. File Erase
 - └ 4. AUTO Capture Interval
 - └ 5. AUTO File Erase
 - └ □9. EBL/Cursor Setting - - - - - section 4.1.3 on page 4-3
 - └ 1. EBL1 Bearing Fix
 - └ 2. EBL2 Bearing Fix
 - └ □3. Cursor Setting - - - - - section 4.1.3.3 on page 4-5
 - └ 1. EBL/VRM Control CURS
 - └ 2. Cursor Length
 - └ 4. Cursor Pattern
 - └ □8. Plot Setting
 - └ 6. AUTO Backup - - - - - section 3.8.9 on page 3-110
 - └ □9. Test Menu- - - - - section 8.3.1 on page 8-6
 - └ □1. Self Test - - - - - section 8.3.1.1 on page 8-7
 - └ □1. Memory Test
 - └ 1. SDRAM
 - └ 2. SRAM
 - └ 3. FLASH ROM
 - └ 4. GRAPHIC
 - └ 2. TXRX Test
 - └ 3. Line Test
 - └ 4. Supply Voltage
 - └ □2. Monitor Test- - - - - section 8.3.1.2 on page 8-9
 - └ 1. Pattern 1
 - └ 2. Pattern 2
 - └ 3. Pattern 3
 - └ 4. Pattern 4
 - └ 5. Pattern 5
 - └ 6. Pattern 6





- |
- |
- | | | 7. Pattern 7
- | | | 8. Pattern 8
- | | 3. Keyboard Test - - - - - section 8.3.1.3 on page 8-9
 - | | | 1. Key Test
 - | | | 2. Buzzer Test
 - | | | 3. Light Test
- | | 4. MON Display - - - - - section 8.3.1.4 on page 8-10
- | | 5. System Alarm Log - - - - - section 8.3.1.5 on page 8-10
- | | 6. System Information - - - - - section 8.3.1.6 on page 8-11
- | 0. EXIT

C.2 PI

	1. Display for All Lines	- - - - -	section 4.1.4.3 on page 4-9
	□2. Operation Mode	- - - - -	page 4-10
		All	
		Individual	
		Track	
		Equiangular	
	□3. Control ¹	- - - - -	page 4-11
		All:All ²	
		Individual:Sequential	
		Individual:Index Line 1	
		Individual:Index Line 2	
		Individual:Index Line 3	
		Individual:Index Line 4	
		Individual:Index Line 5	
		Individual:Index Line 6	
		Individual:Index Line 7	
		Individual:Index Line 8	
		Track:Group 1	
		Track:Group 2	
		Track:Group 3	
		Track:Group 4	
		Equiangular:Group 1	
		Equiangular:Group 2	
		Equiangular:Group 3	
		Equiangular:Group 4	
	4. Floating	- - - - -	-page 4-11
	5. Heading Link	- - - - -	-page 4-11
	6. Next		
	8. Press EBL Dial to Control PI# ³		
	9. Press VRM Dial to Move End Point# ⁱⁱ		
	1. Range Scale Link	- - - - -	page 4-12
	□2. Reference Bearing ⁱ	- - - - -	page 4-12
		All:True ⁴	
		All:HL	
		Individual:True	
		Individual:HL	
		Individual:Index Line 1	
		Individual:Index Line 2	
		Individual:Index Line 3	
		Individual:Index Line 4	
		Individual:Index Line 5	
		Individual:Index Line 6	
		Individual:Index Line 7	
		Individual:Index Line 8	
		Track:True	
		Track:HL	
		Track:Index Line 1	
		Track:Index Line 2	
		Track:Index Line 3	
		Track:Index Line 4	
		Track:Index Line 5	
		Track:Index Line 6	
		Track:Index Line 7	
		Track:Index Line 8	
	3. Operation Area	- - - - -	page 4-13
	□4. Display for Individual Line	- - - - -	page 4-13

- 1.The setting items are determined by the setting of Operation Mode.
- 2.Operating Mode : Control
- 3.Displayed only when "3. Control" is Individual.
- 4.Operating Mode : Reference Bearing



C.3

TT

- └─□1. Association Setting - - - - - *section 5.4 on page 5-37*
 - └─ 1. Association
 - └─ 2. Priority
 - └─ 3. Bearing
 - └─ 4. Range
 - └─ 5. Course
 - └─ 6. Speed
 - └─ 7. Applicable AIS Target
- └─□2. Target Track Setting - - - - - *section 5.6.2 on page 5-44*
 - └─ 1. Target Track Function - - - - - *section 5.6.2.2 on page 5-44*
 - └─□2. Target Track Color- - - - - *section 5.6.2.1 on page 5-44*
 - └─ 1. All
 - └─ 2. Target Track No.1
 - └─ 3. Target Track No.2
 - └─ 4. Target Track No.3
 - └─ 5. Target Track No.4
 - └─ 6. Target Track No.5
 - └─ 7. Target Track No.6
 - └─ 8. Target Track No.7
 - └─ 9. Next
 - └─ 1. Target Track No.8
 - └─ 2. Target Track No.9
 - └─ 3. Target Track No.10
 - └─ 4. Other
 - └─□3. Target Track Display- - - - - *section 5.6.2.4 on page 5-46*
 - └─ 1. All
 - └─ 2. Target Track No.1
 - └─ 3. Target Track No.2
 - └─ 4. Target Track No.3
 - └─ 5. Target Track No.4
 - └─ 6. Target Track No.5
 - └─ 7. Target Track No.6
 - └─ 8. Target Track No.7
 - └─ 9. Next
 - └─ 1. Target Track No.8
 - └─ 2. Target Track No.9
 - └─ 3. Target Track No.10
 - └─ 4. Other
 - └─ 4. Track Memory Interval- - - - - *section 5.6.2.5 on page 5-47*
 - └─ 5. Clear Track Color - - - - - *section 5.6.2.6 on page 5-47*
 - └─ 6. Clear Track Number
 - └─□7. File Operations - - - - - *section 5.6.2.7 on page 5-48*
 - └─ 1. Select Card Slot
 - └─ 2. Load Mode
 - └─ 3. Load - - - - - *page 5-48*
 - └─ 4. Save - - - - - *page 5-49*
 - └─ 5. Erase - - - - - *page 5-51*
 - └─ 6. Card T.TRK Display - - - - - *page 5-52*
- └─□3. Trial Maneuver - - - - - *section 5.7 on page 5-53*
 - └─ 1. Trial Function
 - └─ 2. Course(EBL)
 - └─ 3. Speed(VRM)
 - └─ 4. Vector Time
 - └─ 5. Time to Maneuver
 - └─□6. Own Ship's Dynamic Trait
 - └─ 1. Reach
 - └─ 3. Turn Radius
 - └─ 4. Acceleration
 - └─ 5. Deceleration
- └─ 4. Target Number Display - - - - - *section 5.2.4 on page 5-18*
- └─□9. TT Test Menu - - - - - *section 5.2.7 on page 5-21*
 - └─ 1. Test Video- - - - - *section 5.2.7.1 on page 5-22*
 - └─ 2. TT Simulator - - - - - *section 5.2.7.2 on page 5-23*
 - └─ 3. Status - - - - - *section 5.2.7.3 on page 5-24*
 - └─ 4. Gate Display - - - - - *section 5.2.7.4 on page 5-25*



C.4

AIS

└─□1. Association Setting - - - - -	section 5.4.2 on page 5-37
└─ 1. Association	
└─ 2. Priority	
└─ 3. Bearing	
└─ 4. Range	
└─ 5. Course	
└─ 6. Speed	
└─ 7. Applicable AIS Target	
└─□2. Target Track Setting - - - - -	section 5.6.2 on page 5-44
└─ 1. Target Track Function - - - - -	section 5.6.2.2 on page 5-44
└─□2. Target Track Color- - - - -	section 5.6.2.1 on page 5-44
└─ 1. All	
└─ 2. Target Track No.1	
└─ 3. Target Track No.2	
└─ 4. Target Track No.3	
└─ 5. Target Track No.4	
└─ 6. Target Track No.5	
└─ 7. Target Track No.6	
└─ 8. Target Track No.7	
└─ 9. Next	
└─ 1. Target Track No.8	
└─ 2. Target Track No.9	
└─ 3. Target Track No.10	
└─ 4. Other	
└─□3. Target Track Display- - - - -	section 5.6.2.4 on page 5-46
└─ 1. All	
└─ 2. Target Track No.1	
└─ 3. Target Track No.2	
└─ 4. Target Track No.3	
└─ 5. Target Track No.4	
└─ 6. Target Track No.5	
└─ 7. Target Track No.6	
└─ 8. Target Track No.7	
└─ 9. Next	
└─ 1. Target Track No.8	
└─ 2. Target Track No.9	
└─ 3. Target Track No.10	
└─ 4. Other	
└─ 4. Track Memory Interval - - - - -	section 5.6.2.5 on page 5-47
└─ 5. Clear Track Color - - - - -	section 5.6.2.6 on page 5-47
└─ 6. Clear Track Number	
└─□7. File Operations - - - - -	section 5.6.2.7 on page 5-48
└─ 1. Select Card Slot	
└─ 2. Load Mode	
└─ 3. Load - - - - -	page 5-48
└─ 4. Save - - - - -	page 5-49
└─ 5. Erase - - - - -	page 5-51
└─ 6. Card T.TRK Display - - - - -	page 5-52
└─□3. Trial Maneuver - - - - -	section 5.7 on page 5-53
└─ 1. Trial Function	
└─ 2. Course(EBL)	
└─ 3. Speed(VRM)	
└─ 4. Vector Time	
└─ 5. Time to Maneuver	
└─□6. Own Ship's Dynamic Trait	
└─ 1. Reach	
└─ 2. Turn Radius	
└─ 3. Acceleration	
└─ 4. Deceleration	
└─□4. AIS Filter Setting - - - - -	section 5.3.7 on page 5-32
└─ 1. Filter Type- - - - -	section 5.3.7.2 on page 5-32
└─ 2. Make AIS Filter - - - - -	section 5.3.7.3 on page 5-33

- | 3. Filter Display - - - - - *section 5.3.7.4 on page 5-34*
- | 4. ENT
- | 6. Filter Mode - - - - - *section 5.3.7.5 on page 5-34*
- | 5. Target Number Display - - - - - *section 5.3.6 on page 5-31*
- | 6. AIS Alarm Setting - - - - - *section 5.3.9 on page 5-36*
 - | 1. Lost Alarm- - - - - *section 5.3.9.1 on page 5-36*
 - | 2. CPA/TCPA Alarm - - - - - *section 5.3.9.2 on page 5-36*
- | 7. Message - - - - - *section 5.3.5.5 on page 5-29*
 - | 1. Addressed Message
 - | 2. Broadcast Message
- | 8. Display Lost TGT Data - - - - - *section 5.3.5.6 on page 5-31*
- | 9. Own Ship's AIS Data - - - - - *section 5.3.5.7 on page 5-31*

C.5 AZ

- | 1. AZ 1- - - - - *section 5.2.1.1 on page 5-14*
- | 2. AZ 2- - - - - *section 5.2.1.1 on page 5-14*
- | 3. Make AZ 1 - - - - - *section 5.2.1.1 on page 5-14*
- | 4. Make AZ 2 - - - - - *section 5.2.1.1 on page 5-14*
- | 5. ENT



C.6

Track

- └─ 1. DISP Own Track Color - - - - - section 3.5.2 on page 3-40
 - └─ 1. All
 - └─ 2. White
 - └─ 3. Cyan
 - └─ 4. Blue
 - └─ 5. Green
 - └─ 6. Yellow
 - └─ 7. Pink
 - └─ 8. Red
- └─ 2. Clear Own Track Color - - - - - section 3.5.5 on page 3-42
- └─ 3. Track Type - - - - - section 3.5.6 on page 3-42
- └─ 4. Num/Vector Display - - - - - section 3.5.6 on page 3-42
- └─ 5. File Operations
 - └─ 1. Select Card Slot
 - └─ 2. Load Mode
 - └─ 3. Load
 - └─ 4. Save
 - └─ 5. Erase
 - └─ 6. Card Own Track Display
- └─ 6. Water Depth Setting - - - - - section 3.5.7 on page 3-44
 - └─ 1. Depth setting (MIN)
 - └─ 2. Depth setting
 - └─ 3. Depth setting
 - └─ 4. Depth setting
 - └─ 5. Depth setting
 - └─ 6. Depth setting (MAX)
- └─ 7. Water TEMP Setting - - - - - section 3.5.8 on page 3-45
 - └─ 1. Temperature setting (MIN)
 - └─ 2. Temperature setting
 - └─ 3. Temperature setting
 - └─ 4. Temperature setting
 - └─ 5. Temperature setting
 - └─ 6. Temperature setting (MAX)
- └─ 8. Current Setting - - - - - section 3.5.9 on page 3-46
 - └─ 1. Current Size
 - └─ 2. Layer A
 - └─ 3. Layer B
 - └─ 4. Layer C

C.7 Route

- └ 1. Select Route - - - - - section 3.7.1 on page 3-67
- └ □ 2. WPT/Route Setting
 - └ 1. Waypoint Alarm - - - - - section 3.7.4.1 on page 3-79
 - └ 2. Route Alarm - - - - - section 3.7.4.2 on page 3-80
 - └ □ 3. Set Route Sequence- - - - - section 3.7.2 on page 3-68
 - └ 1. Planned Speed - - - - - section 3.7.3.5 on page 3-77
 - └ 2. Add - - - - - section 3.7.2.2 on page 3-69
 - └ 3. Correct Position - - - - - section 3.7.2.3 on page 3-70
 - └ 4. Correct Planned Speed - - - - - section 3.7.2.4 on page 3-71
 - └ 5. Delete - - - - - section 3.7.2.5 on page 3-72
 - └ 6. Insert - - - - - section 3.7.2.6 on page 3-73
 - └ 7. New Monitor Route - - - - - section 3.7.2.1 on page 3-68
 - └ 6. Waypoint Input - - - - - section 3.7.3 on page 3-75
 - └ 7. Save Temporary Route
 - └ 8. Off-Track Limit Line - - - - - section 3.7.6.1 on page 3-83
 - └ □ 9. Next
 - └ 1. SEL. NUM/Comment Size - - - - - section 3.7.6.2 on page 3-83
 - └ 2. Waypoint Vector - - - - - section 3.7.6.3 on page 3-84
 - └ 3. Status of Origin/DEST - - - - - section 3.7.6.4 on page 3-85
 - └ 4. WPT Number Display - - - - - section 3.7.6.5 on page 3-85
- └ □ 3. WPT/Route Operations - - - - - section 3.7.5 on page 3-81
 - └ 1. Route Sequence- - - - - section 3.7.5.1 on page 3-81
 - └ 2. Waypoint Switch Mode - - - - - section 3.7.6.6 on page 3-86
 - └ 3. Waypoint Skip - - - - - section 3.7.5.2 on page 3-82
 - └ 4. Waypoint Back Skip - - - - - section 3.7.5.2 on page 3-82
 - └ 5. Set/Cancel Waypoint
 - └ 6. Clear WPT/Route Data
- └ □ 4. File Operations - - - - - section 3.7.8 on page 3-87
 - └ 1. Select Card Slot - - - - - section 3.7.8.1 on page 3-87
 - └ 2. Load - - - - - section 3.7.8.3 on page 3-88
 - └ 3. Save - - - - - section 3.7.8.2 on page 3-87
 - └ 4. Erase - - - - - section 3.7.8.4 on page 3-89



C.8

U.Map

└	1. Own Ship Position - - - - -	section 3.6.3.1 on page 3-52
└	┌ 2. Edit User Map - - - - -	section 3.6.3 on page 3-52
	└ 1. Make with Cursor - - - - -	section 3.6.1.1 on page 3-47
	└ 1. Type	
	└ 2. Color	
	└ 2. Make with L/L - - - - -	section 3.6.1.3 on page 3-49
	└ 1. Type	
	└ 2. Color	
	└ 3. L/L	
	└ 4. Comment	
	└ 5. Enter	
	└ 9. New Line Input/9.New Mark Input	
	└ 3. Move - - - - -	section 3.6.3.2 on page 3-53
	└ 4. Delete - - - - -	section 3.6.3.3 on page 3-55
	└ 5. Insert/Move Vertex - - - - -	section 3.6.3.4 on page 3-56
	└ 6. Delete Vertex - - - - -	section 3.6.3.6 on page 3-58
	└ 7. Delete by Type by Color - - - - -	section 3.6.3.7 on page 3-59
	└ 3. Shift - - - - -	section 3.6.4.1 on page 3-60
	└ 4. Shift Clear - - - - -	section 3.6.4.2 on page 3-61
	┌ 5. Mark Display Setting - - - - -	section 3.6.2 on page 3-50
	└ 1. Display Mark Type - - - - -	section 3.6.2.1 on page 3-50
	└ 1. All	
	└ 2. ○	
	└ 3. △	
	└ 4. ▽	
	└ 5. □	
	└ 6. ◇	
	└ 7. Wreck (mark)	
	└ 8. △△	
	└ 9. Next	
	└ 1. ▽▽	
	└ 2. △▽	
	└ 3. ▽△	
	└ 4. +	
	└ 5. ×	
	└ 6. Y	
	└ 7. Hand drum (mark)	
	└ 8. Light house (mark)	
	└ 9. Next	
	└ 1. Trapezoid (mark)	
	└ 2. filled Trapezoid (mark)	
	└ 3. Hat(mark)	
	└ 4. ●●	
	└ 5. ●	
	└ 6. Filled Triangle(mark)	
	└ 7. !	
	└ 8. anchor(mark)	
	└ 9. Next	
	└ 1. slash-anchor(mark)	
	└ 2. circle-dotted line(mark)	
	└ 3. non-dangerous wreck(mark)	
	└ 4. ◎	
	└ 5. mariner's event mark(mark)	
	└ 6. ·	
	└ 7. Wavy line (mark)	
	└ 8. Solid line (mark)	
	└ 9. Dashed-dotted line (mark)	
	└ 2. Display Mark Color - - - - -	section 3.6.2.2 on page 3-51
	└ 1. All	
	└ 2. White	
	└ 3. Cyan	
	└ 4. Blue	

			5. Green	
			6. Yellow	
			7. Pink	
			8. Red	
			3. Mark Size - - - - -	section 3.6.2.3 on page 3-51
			4. Comment Font Size - - - - -	section 3.6.2.4 on page 3-52
			6. Geodetic - - - - -	section 3.6.6 on page 3-65
			7. File Operations - - - - -	section 3.6.5 on page 3-61
			1. Select Card Slot	
			2. Load Mode - - - - -	section 3.6.5.1 on page 3-61
			3. Load - - - - -	section 3.6.5.1 on page 3-61
			4. Unload - - - - -	section 3.6.5.2 on page 3-62
			5. Save - - - - -	section 3.6.5.3 on page 3-62
			6. Erase - - - - -	section 3.6.5.4 on page 3-63
			7. Card Mark Display - - - - -	section 3.6.5.5 on page 3-64



C.9

Serviceman Menu

- Serviceman Menu - - - - - section 7.1.1 on page 7-1
- 1. Adjust Menu
- 1. Tune Adjustment - - - - - section 7.1.3 on page 7-5
- 2. Bearing Adjustment - - - - - section 7.1.4 on page 7-7
- 3. Range Adjustment - - - - - section 7.1.5 on page 7-7
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- └☐9. Next
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 - └ 3. No.3 Connection/No.3 Master
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 - └ 5. No.5 Connection/No.5 Master¹
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1. Only for ISW Extended Mode

アスベストは使用しておりません
Not use the asbestos

CODE No.7ZPRD0685

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