

**VHF AUTOMATIC DIGITAL
DIRECTION FINDER**

MODEL TD-L1550A

INSTRUCTION MANUAL

TAIYO MUSEN CO., LTD.

Registered No. : SPP3012
Date : Feb. 2009
EDITION : 1

TABLE OF CONTENT

Chapter I OPERATION MANUAL

1. OUTLINE	
1.1 General Description	OM 1
1.2 Specifications	OM 2
1.3 Component	OM 3
2. QUICK REFERENCE	
2.1 Layout of Operation Panel	OM 3
2.2 Functions of Keys and Displays	OM 4
2.3 Quick Reference for Operation	OM 5
3. OPERATION	
3.1 Major Key Function and Channel Memory	OM 8
3.2 Details of Operation	OM 9

Chapter II INSTALLATION MANUAL

1. ANTENNA	
1.1 Site Selection	IM 1
1.2 Examples of Installation	IM 3
1.3 Flange	IM 4
1.4 Antenna Cable	IM 5
1.5 Installation of Adcock Antenna	IM 7
2. MAIN UNIT	
2.1 Position of Main Unit	IM 9
2.2 Installation	IM 10
2.3 Cable Connection	IM 10
3. CHECK AFTER INSTALLATION	
3.1 Antenna	IM 12
3.2 Main Unit	IM 12
3.3 Performance Check	IM 13
4. DIAGRAMS	
Diagram 1 Connection Diagram	IM 14
Diagram 2 Main Unit	IM 16
Diagram 3 Antenna Unit	IM 16
Diagram 4 Speaker Unit	IM 17

Chapter III MAINTENANCE

- 1. CIRCUITS
 - 1.1 Description of Printed Circuit Board SM 1

- 2. PERFORMANCE TEST
 - 2.1 Test Equipment SM 1
 - 2.2 Test Arrangement SM 1
 - 2.3 Test SM 2

- 3. ADJUSTMENT
 - 3.1 Stabilizer SM 6
 - 3.2 Synthesizer SM 6
 - 3.3 Second IF Frequency SM 6
 - 3.4 Second Local Oscillator SM 7
 - 3.5 RF and IF Amplifier SM 7
 - 3.6 AGC SM 7
 - 3.7 FM Detection and Volume Control SM 7
 - 3.8 Adjustment for Level Indicator SM 8
 - 3.9 Adjustment for Direction Measurement SM 8
 - 3.10 Wave Check of Balanced Modulation SM 8

- 4. TEST RECORD SHEET SM 9

- 5. DIAGRAMS
 - 5.1 Block Diagram SM 10
 - 5.2 Connection Diagrams SM 11
 - 5.3 Layout Diagrams SM 16
 - 5.4 Wiring Diagrams SM19

- 6. PARTS LIST
 - 6.1 PCA RCV (720593) SM 21
 - 6.2 PCA CPU (720594) SM 27
 - 6.3 PCB Display (720595) SM 30
 - 6.4 Chassis SM 32

Chapter I OPERATION MANUAL

1. OUTLINE

1.1 General Description

TD-L1550A is an automatic direction finder, designed for reception and direction measurement of radio waves in International VHF band and U.S. weather channels or Scandinavian fishing channels.

The following is its major features.

- Manual, spot and scan reception are selectable and all operations are commanded by keyboard on its front panel.
- The channel number with the type of station, ship, coast or weather, can be stored in 100 addresses with two digit number (named Address No.), from 00 to 99.
- The direction of incoming radio signal with respect to bow direction of own ship is indicated with 2 types, a linear indicator for quick recognition and a numeric display.
- H type Adcock antenna allows precise direction measurement with high sensitivity.
- As a power source, 10V - 16V DC is provided and an adapter is available for AC power source on option.

1.2 Specifications

- (1) Antenna
 - Adcock antenna H type 4-element Adcock antenna, EA-351A
- (2) Signal
 - Frequency International VHF band (spot reception)
U.S. weather channel or Scandinavian fishing channel
Distress frequency, 121.5 MHz
 - Wave Form F3E, A3E (121.5 MHz only)
- (3) Receiver
 - a. Reception type Double super heterodyne with PLL synthesizer
 - b. IF 21.4 MHz and 455 MHz
 - c. Sensitivity 0.5 $\mu\text{V}/\text{m}$ (12 dB SINAD, except 121.5 MHz)
 - d. Image Ratio 55 dB or more (except 121.5 MHz)
 - e. Selectivity - 6 dB at ± 5 kHz and - 40 dB at ± 12.5 kHz
- (4) Display
 - a. Direction Numeric display 1° step for direction
It is also used for address number of memory
 - b. Linear indicator 10° , 20° or 30° step and a green center light
 - c. Channel Numeric display
 - d. Level Indicator 6 steps for signal strength
 - e. Type Indicator Ship, coast or weather, fishing, EPIRB (121.5 MHz)
 - f. Scan Indicator Red light
- (5) Audio Output 2W (4Ω)
- (6) Control
 - a. Memory 100 sets of channel and type of station
 - b. Scanning Max. 10 groups, each consisting of up to 10 channels
- (7) Power, Size and Environment
 - a. Power Source 10V - 16V DC, minus side grounded
(AC power supply is available on option)
 - b. Size 212(H) X 207(W) X 95(D) mm, 2.7 kgs.
 - c. Environment 0 - 45 $^\circ\text{C}$

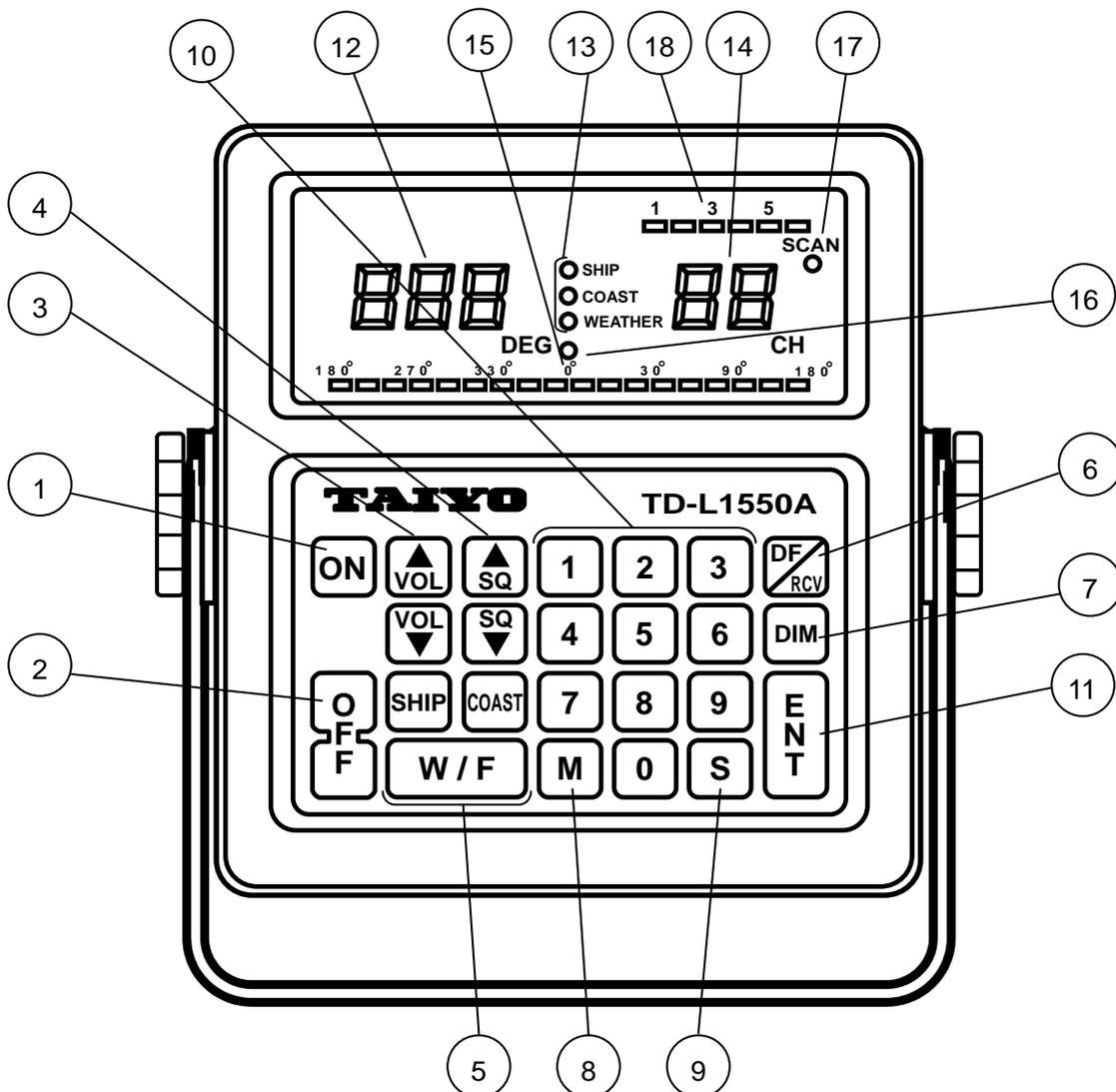
1.3 Component

List of components supplied is shown below.

Components	Quantity	Remarks
Main unit	1	
Adcock antenna	1	Type EA-351A
Speaker box	1	4Ω, with cable and plug
Antenna cable	1 pair	with plugs
Power cable	3 m	
Instruction manual	1	
Spare parts	1 set	Fuse (2A, 5.2 mm ø, 20mm)

2. QUICK REFERENCE

2.1 Layout of Operation Panel (Figure shows its function below.)



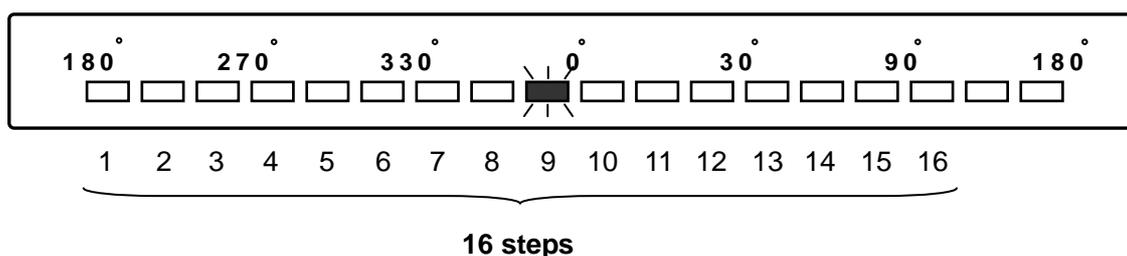
2.2 Function of Keys and Displays

Following table gives names and function of keys and displays.

No .	Notation	Name	Function
①	ON	Power - On	To turn on the power
②	OFF	Power - Off	To turn off the power (press upper and lower parts)
③	VOL	Volume	To change the volume of the external speaker
④			(16 steps)
⑤	SQ	Squelch	To change squelch, \triangle : close ∇ : open (16 steps)
	TYPE	Type select	To select SHIP, COAST or WEATHER
⑥	DF/RCV	Mode select	To select DF or Reception
⑦	DIM	Dimmer	To change brightness (4 steps)
⑧	M	Memory	Function key for memory storage
⑨	S	Scan start	To start scan reception or change memorized CH
⑩	0 - 9	Numeric	Numeric key Some of keys used as function key
⑪	ENT	Enter	Enter key to execute a function
⑫	DEG	Direction display	To indicate the bearing of signal (3 digits)
⑬		Type indicator	3 LEDs to indicate SHIP, COAST or WEATHER
⑭	CH	Channel display	2 letters/numbers for various channels indication International VHF channel : 01 to 88 Weather channels : U1, U2, U3, U4 Fishing channels : F1, F2, F3 121.5 MHz : EP
⑮	SCAN	Linear indicator	To indicate the bearing of signal
⑯		Bow indicator	To indicate the direction of the bow as 0 degree
⑰		Scan indicator	A red LED is lit during scanning reception
⑱		Level indicator	To indicate the level of signal

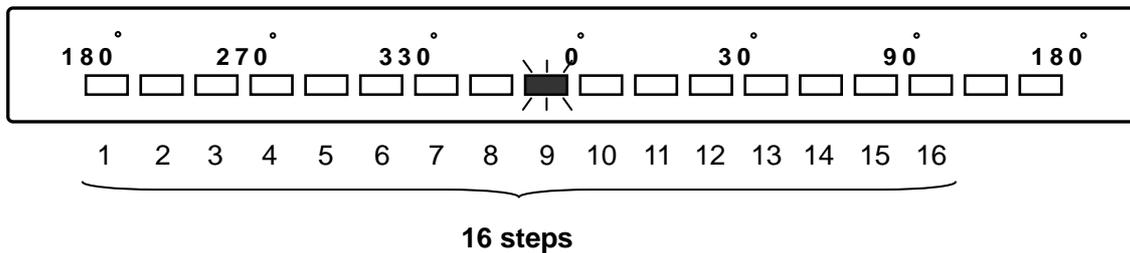
2.2.1 Change of Volume Level

16 steps of volume level are selectable. The volume level can be changed by  or  .
Check the current volume level by the liner indicator on the display. (Refer to below drawing)



2.2.2 Change of Squelch level

16 steps of squelch level are selectable. The squelch level can be changed by  or . Check the current squelch level by the liner indicator on the display. (Refer to below drawing)



2.2.3 Change of Dimmer Level

4 steps of dimmer level are selectable. Squelch level can be changed by . Check the brightness of the display and select suitable one by pressing  button repeatedly.

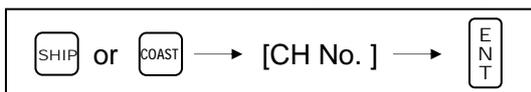
2.3 Quick Reference for Operation

There are 3 modes of reception, "MANUAL", "SPOT" and "SCAN" reception. When "DF" mode is selected, the direction of incoming signal is displayed both by the numeric display and the linear indicator and its sound can be heard. In case of selecting REV (reception) mode, the direction is not displayed. Following explains operation procedures as quick reference.

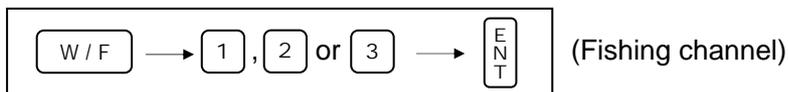
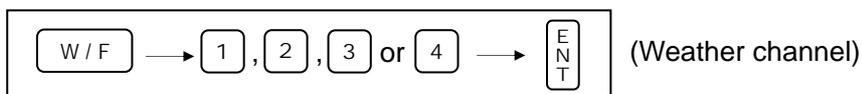
(1) Manual reception

International VHF channels with types of stations and their frequencies have been stored in the main unit. Refer to the table on page OM7 for VHF channels. In manual mode, call up a frequency by pressing the type of station and the channel number.

(a) International VHF channel (from 01 to 88)

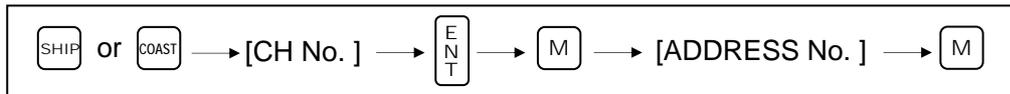


(b) Weather or emergency (WEATHER or FISHING should have been specified)



(2) Spot reception

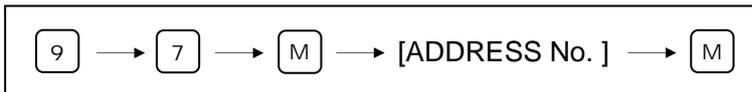
(a) Enter a channel by following procedure to a memory with address number :



(b) Recall a channel from a memory with an address number by following procedure :

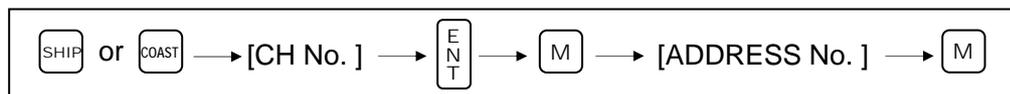


(c) Delete stored memory by following procedure :



(3) Scan reception

(a) Enter a channel by following procedure to a memory with address number :

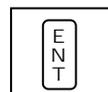


Then, iterate the procedure for inputting other channels as many as necessary.

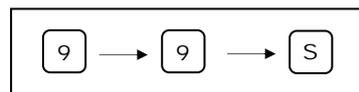
(b) Start scanning by following procedure :



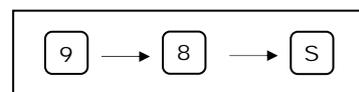
(c) Stop scanning by following procedure :



(d) Scanning pass by following procedure :



(e) Release scanning pass by following procedure :



VHF-MARINE RADIOTELEPHONE CHANNELS

Channel Designation	Frequency (MHz)		Channel Designation	Frequency (MHz)	
	Ship	Coast		Ship	Coast
00	(156.000)	----	60	156.025	160.625
01	156.050	160.650	61	156.075	160.675
02	156.100	160.700	62	156.125	160.725
03	156.150	160.750	63	156.175	160.775
04	156.200	160.800	64	156.225	160.825
05	156.250	160.850	65	156.275	160.875
06	156.300	----	66	156.325	160.925
07	156.350	160.950	67	156.375	156.375
08	156.400	----	68	156.425	156.425
09	156.450	156.450	69	156.475	156.475
10	156.500	156.500	70	156.525	----
11	156.550	156.550	71	156.575	156.575
12	156.600	156.600	72	156.625	----
13	156.650	156.650	73	156.675	156.675
14	156.700	156.700	74	156.725	156.725
15	156.750	156.750	77	156.875	----
16	156.800	156.800	78	156.925	161.525
17	156.850	156.850	79	156.975	161.575
18	156.900	161.500	80	157.025	161.625
19	156.950	161.550	81	157.075	161.675
20	157.000	161.600	82	157.125	161.725
21	157.050	161.650	83	157.175	161.775
22	157.100	161.700	84	157.225	161.825
23	157.150	161.750	85	157.275	161.875
24	157.200	161.800	86	157.325	161.925
25	157.250	161.850	87	157.375	161.975
26	157.300	161.900	88	157.425	162.025
27	157.350	161.950	98	(121.875)	----
28	157.400	162.00	99	121.500	----
31	(157.550)	----			
Fishing 1	155.625		Weather 1	162.550	
2	155.775		2	162.400	
3	155.825		3	161.475	
Distress Frequency	121.500		4	161.650	

Note : Channel "00", "31" and "98" are optional channels. Those channels are available on request before shipping from the factory.

3. OPERATION

3.1 Major Key Function and Channel Memory

(1) Functions

Following explains function keys and numeric keys on the keyboard.

- S : To start scan
To increase the number of memory address when "Squelch" is open
- M : To store or recall memory address
(to clear its function, press DIM or DF/RCV)
- E
N
T : To execute a command
- SHIP , COAST , W / F
: "TYPE" key to select type of station so as to designate a VHF channel with numeric keys
- 0 ~ 9 **key** : To select channel number or address code number
To select pattern of scan hold/auto start
To define function ("97": To delete memory, "98": To release scanning pass, "99": To skip an address during scan reception)

(2) International VHF channels and other channels

International VHF channels on the table of page OM7 have been stored in the main unit at the factory. When one of channels from 01 to 88 is retrieved, its type and channel number are displayed on the type indicator, SHIP or COAST, and the channel display. When one of W/S channels is selected, one of following characters appears on the channel display.

WEATHER : U1, U2, U3, U4 FISHING : F1, F2, F3 121.5 MHz : EP

Note : WEATHER or FISHING channel shall be selected upon request and set either channel at the factory before the shipment.

(3) Memory

Up to 100 channels can be stored in memory addresses from 00 to 99. A group of addresses consists of 10 addresses and is represented by a group number as shown below.

Group number	0	1	2	3	----	7	8	9
Address number	00-09	10-19	20-29	30-39	----	70-79	80-89	90-99

Note : Data stored in the memory is protected by a built-in lithium battery and thus, the main unit can keep the memory, even if the power of the main unit is OFF.

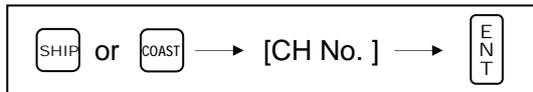
3.2 Details of Operation

When power is turned on, DF operation is set automatically and the data used last time appears at the type indicator and on the channel display.

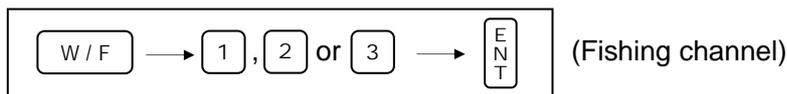
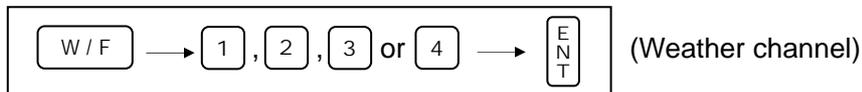
3.2.1 Manual Channel Selection

- Select a type by pressing one of type keys, **SHIP**, **COAST**, **W / F**.
- Press numeric keys so that the channel number appears on the channel display.
- Press **ENT** to execute.

Above procedure is described as :

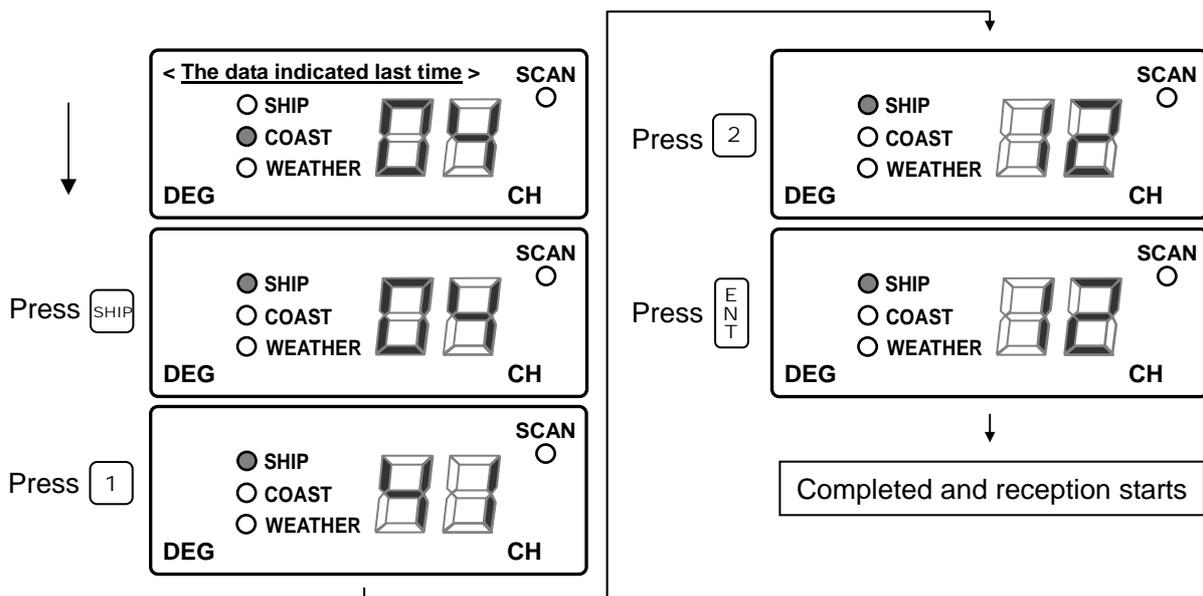
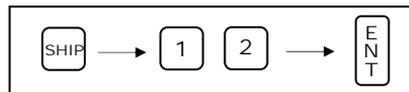


For Weather CH or distress frequency (WEATHER or FISHING CH has been preset.) :



Note : Procedure (a) and/or (b) may be omitted, when there is no change in type or channel number.
In case of erroneous input, a short beep sounds. Re-try with correct input.

Example : Set Channel 12 - Ship as :



OPERATION FOR OPTIONAL CHANNELS

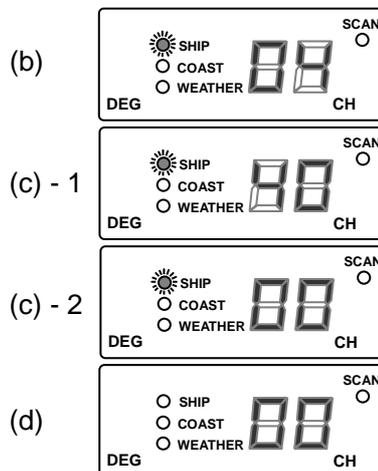
3.2.2 Manual Channel Selection (for Optional Channels)

Following channels are available on option at factory setting before shipment.

1. Selection of 156.000 MHz

- (a) Press to turn on the power of main unit
- (b) Press key to make the LED of SHIP blinks
- (c) Press and keys
- (d) Press key to execute

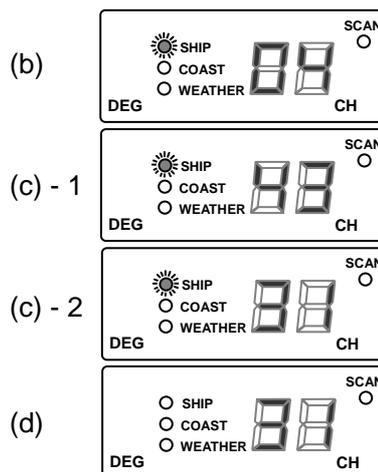
Then, the LED of SHIP is turned OFF and "00" is shown in channel display.



2. Selection of 157.550 MHz

- (a) Press to turn on the power of main unit
- (b) Press key to make the LED of SHIP blinks
- (c) Press and keys
- (d) Press key to execute

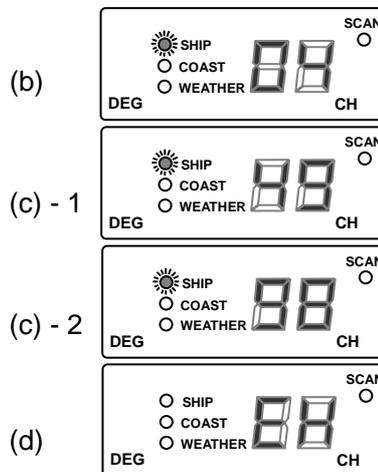
Then, the LED of SHIP is turned OFF and "31" is shown in channel display.



3. Selection of 121.875 MHz

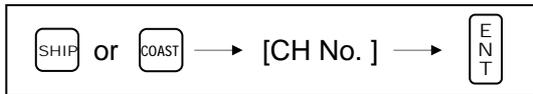
- (a) Press to turn on the power of main unit
- (b) Press key to make the LED of SHIP blinks
- (c) Press and keys
- (d) Press key to execute

Then, the LED of SHIP is turned OFF and "EH" is shown in channel display.



3.2.3 Store a Channel in the Memory

(a) Set a channel by 3.2.1 as :

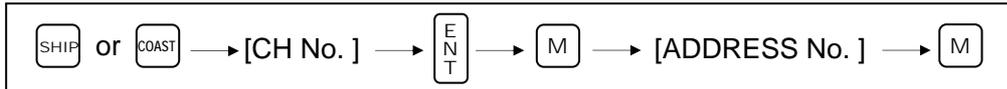


(b) Press **M** . The address number used last time, appears in “DEG” display

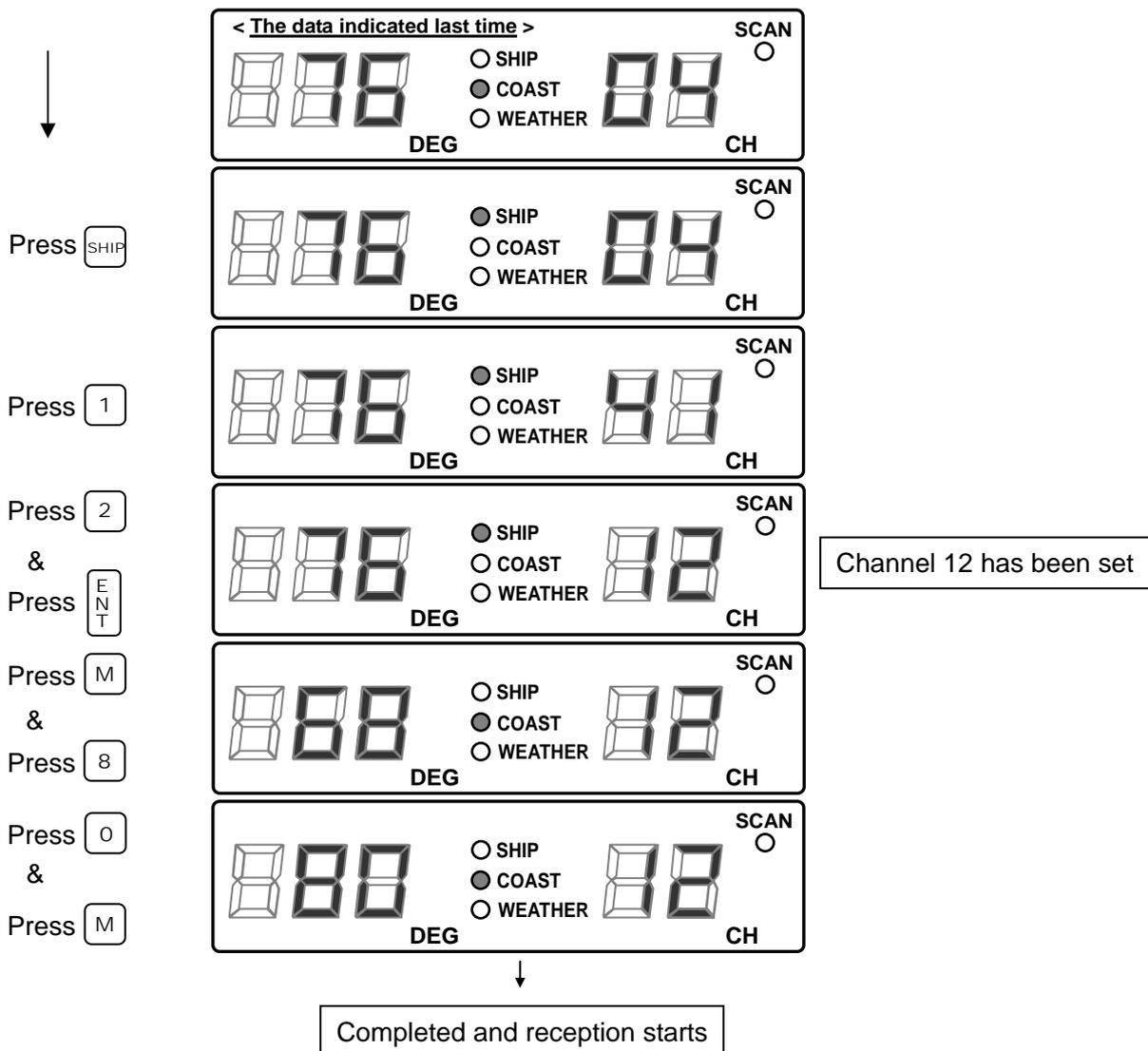
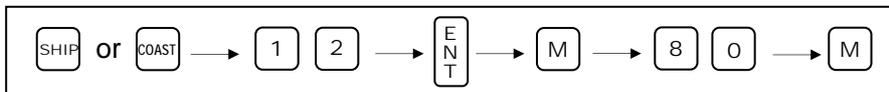
(c) Enter new address number

(d) Press **M** to execute command

Above procedure is described as :



Example : Store Channel 12 – Ship in Address 80 as :



3.2.4 Spot Reception

Spot reception is selected by calling up a channel by address number.

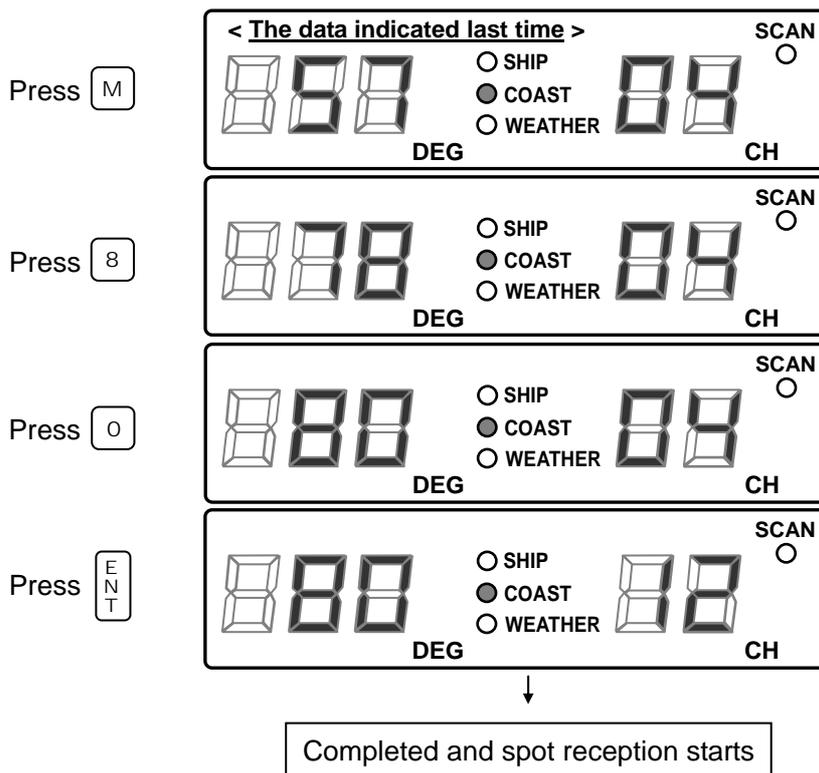
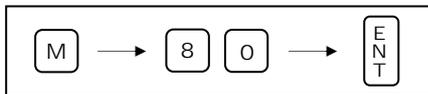
- (a) Press **M** . The data used last time, its address and channel, appear on the displays.
- (b) Enter address number with numeric keys
- (c) Press **ENT** to execute

Above procedure is described as :



Note : A short beep announces the address is not vacant. Select other address or overwrite the new data to that address referring to "3.2.3 Store a channel in the memory".

Example : Call address 80 up where Channel 12 - Ship has been already stored



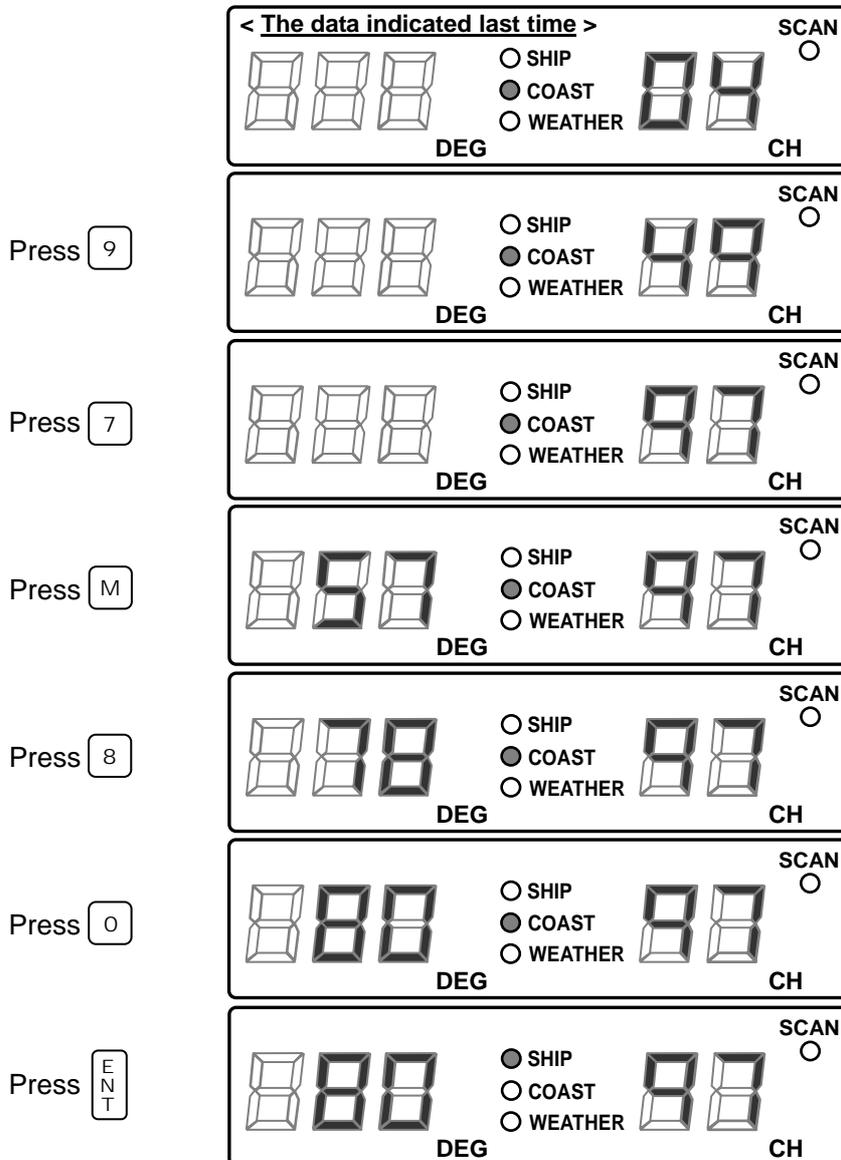
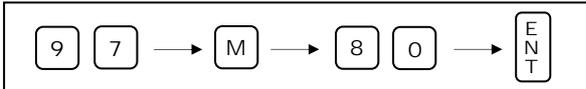
3.2.5 Delete Memory

Memorized channel(s) can be deleted one by one or whole channels can be deleted at one time. Before deleting memorized channel(s), re-confirm if they are really unnecessary, or record them for the future possibility to use.

(1) Following procedure describes to delete one address.



Example : Delete memory in Address 80



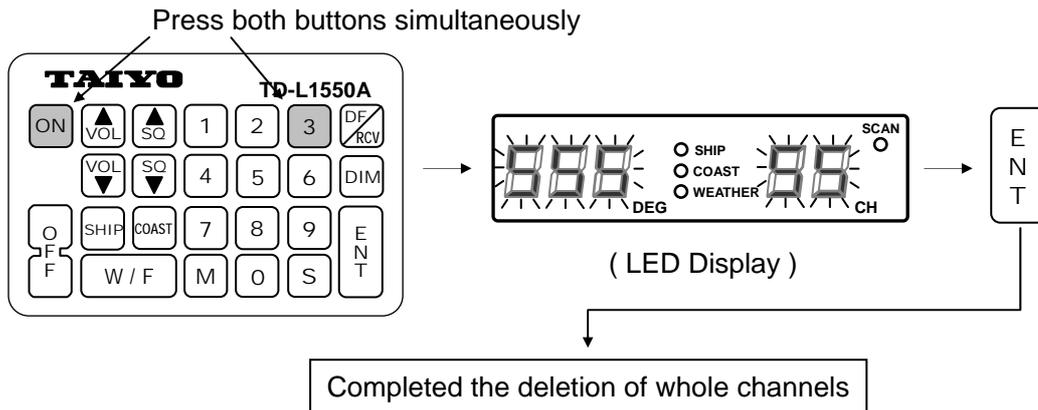
Address No."57" is the data used last time

Note : 97, 98 and 99 are not channel numbers but used in the computer program.

(2) To delete whole memory

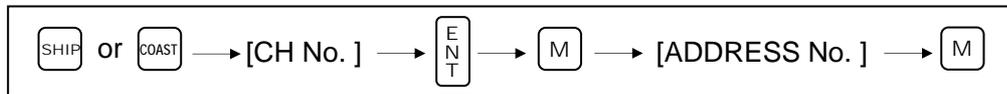
- (a) Press  to turn off power
- (b) Press  and  keys simultaneously. Then, 555 appears on the left and 55 appears on the right, and they blink.
- (c) Press . Then, whole channels are deleted.

Above procedure is described as :



3.2.6 Scan Reception

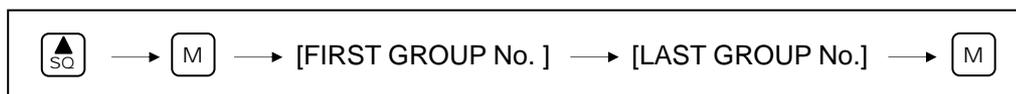
Channels which are going to be used for scan reception shall be stored beforehand by the procedure given in 3.2.2. Repeat the procedure as many as necessary.



Then, go to the next procedure.

- (a) Press  so as to close squelch and no sound can be heard
- (b) Press  to define the range of group number
- (c) Press two numeric keys to define the first group number and the last group number
- (d) Press . Then, scan reception starts. Scan indicator (LED) is lit while scanning.
- (e) When a signal is detected, scan stops automatically (refer to 3.2.10). Press  to re-start scanning.

Above procedure is described as :



The scan starts from the first group to the last group as shown in the following examples.

- Example 1 :  →  →  →  : Scanning from 20 to 49 and repeats
- Example 2 :  →  →  →  : Scanning from 00 to 89 and repeats
- Example 3 :  →  →  →  : Scanning from 70 to 99 and 00 to 29
Then, the scan repeats from 70.

Note : Scanning stops when squelch opens. In this case, press **S** .
Then, the address number increases by 1 and re-start scanning.

3.2.7 Scan Stop

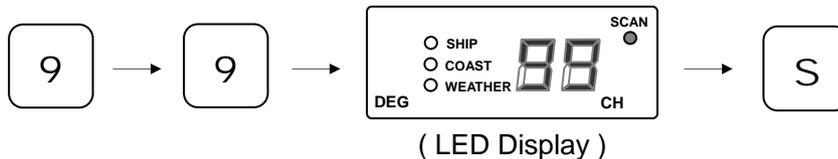
Press **S** to suspend while scanning.

3.2.8 Scan Pass

To skip an address number while scanning, set "Scan pass". Then, that address is passed automatically from next scan.

- (1) Confirm that the scanning stops. If not, stop scanning by pressing **S** .
- (2) Press **9** twice, then 99 appears on the channel display.
- (3) Press **S** and scan pass is set. Scan re-starts.

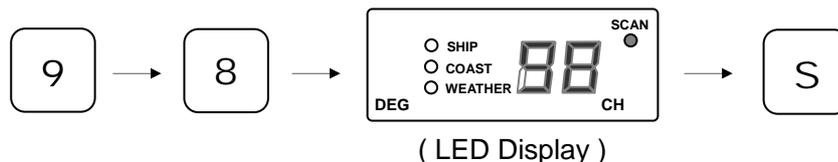
Above procedure is described as :



3.2.9 Release Scan Pass

- (1) Confirm that scan stops. If not, stop scanning by pressing **S** .
- (2) Press **9** , **8** , then 98 appears on the channel display.
- (3) Press **S** . Then all scan pass is cleared and scan starts again.

Above procedure is rewritten as :



3.2.10 Scan Hold/Auto Re-start

Scan hold/auto re-start is available by pressing one of 5 numeric keys, 0, 1, 2, 3 or 4, while scanning (when scan indicator is lit).

- 0** : Scan is suspended while a signal is received. Scan indicator does not lit.
- 1** : Scan is suspended for 1 sec. once a signal is received and then, re-starts scanning automatically. Scanning also re-starts when the signal stops. Scan indicator is always lit even when a signal is received.
- 2** : Same as the case when pressing **1** except for the suspending time, 2 sec.
- 3** : Same as the case when pressing **1** except for the suspending time, 4 sec.
- 4** : Same as the case when pressing **1** except for the suspending time, 8 sec.

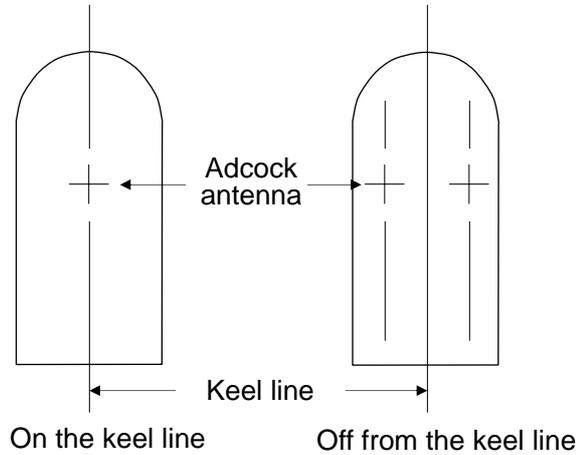
Chapter II INSTALLATION MANUAL

1. ANTENNA

1.1 Site Selection

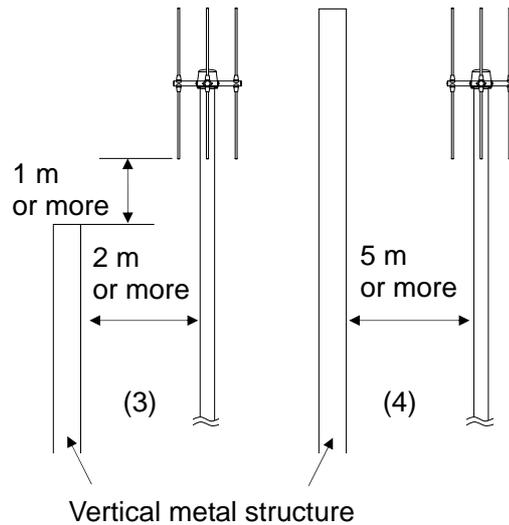
Following conditions are recommended to install antenna for accurate measurement.

- (1) The best position is on the keel line.
In the case of not installing on the keel line, find the position whose distance is as less as possible from the keel line.



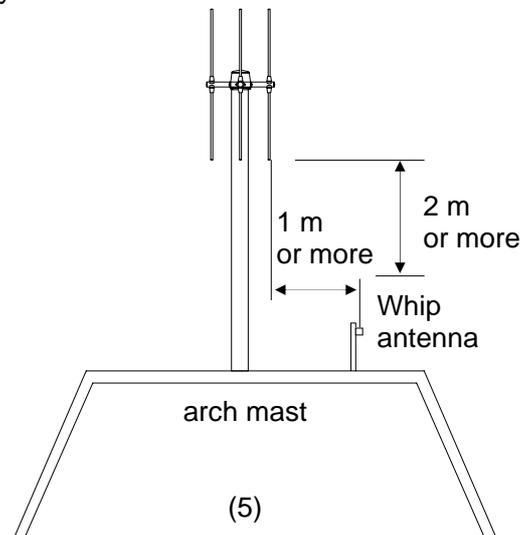
- (2) Select the highest position on the vessel.

- (3) The antenna shall be installed vertically 1 m or higher from the top part of metal structure. (e.g., mast, whip antenna, etc.)
For horizontal distance, keep 2 m or more away from the structure.



- (4) When vertical metal structure is too high, keep 5 m or more horizontal distance away.

- (5) When the antenna is installed on an arch mast together with a whip antenna or like, keep 2 m or more vertical distance away and 1 m or more horizontal distance away from it.



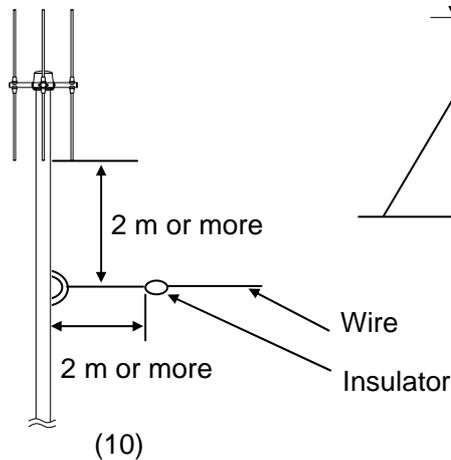
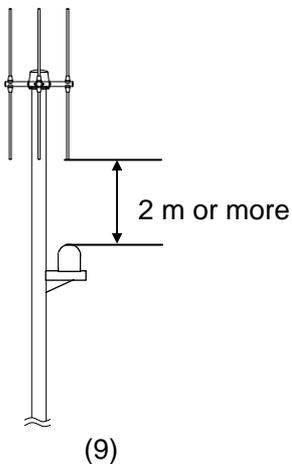
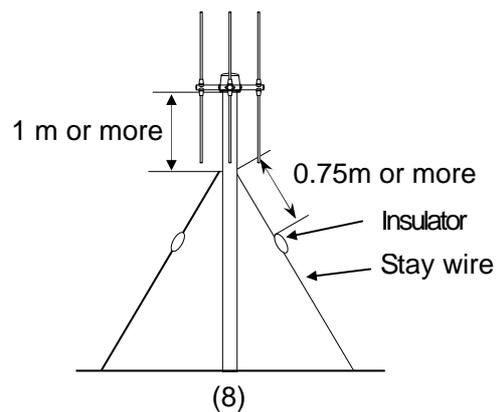
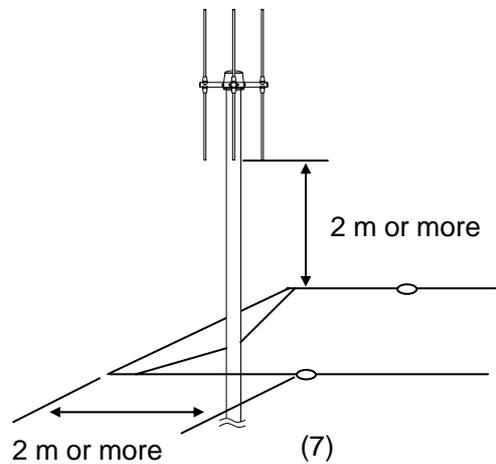
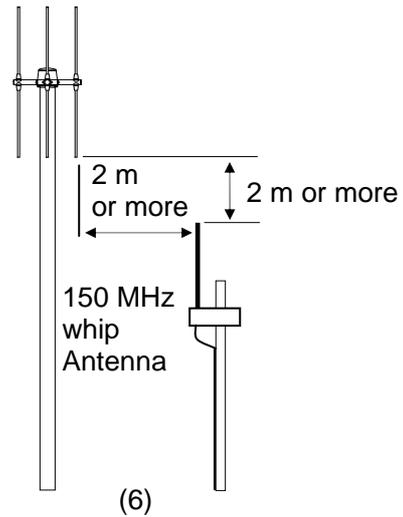
(6) The antenna shall be installed 2 m or higher than a VHF communication antenna.

(7) The antenna shall be installed 2 m or higher than a main communication antenna and keep 2 m or more horizontal distance away.

(8) When wire is used as stay for a mast or stanchion on which the antenna is installed, keep 1m ore more the distance away from the wire.

(9) Keep 2 m or more vertical distance away from a navigation lamp when the lamp and the antenna are installed on the same mast.

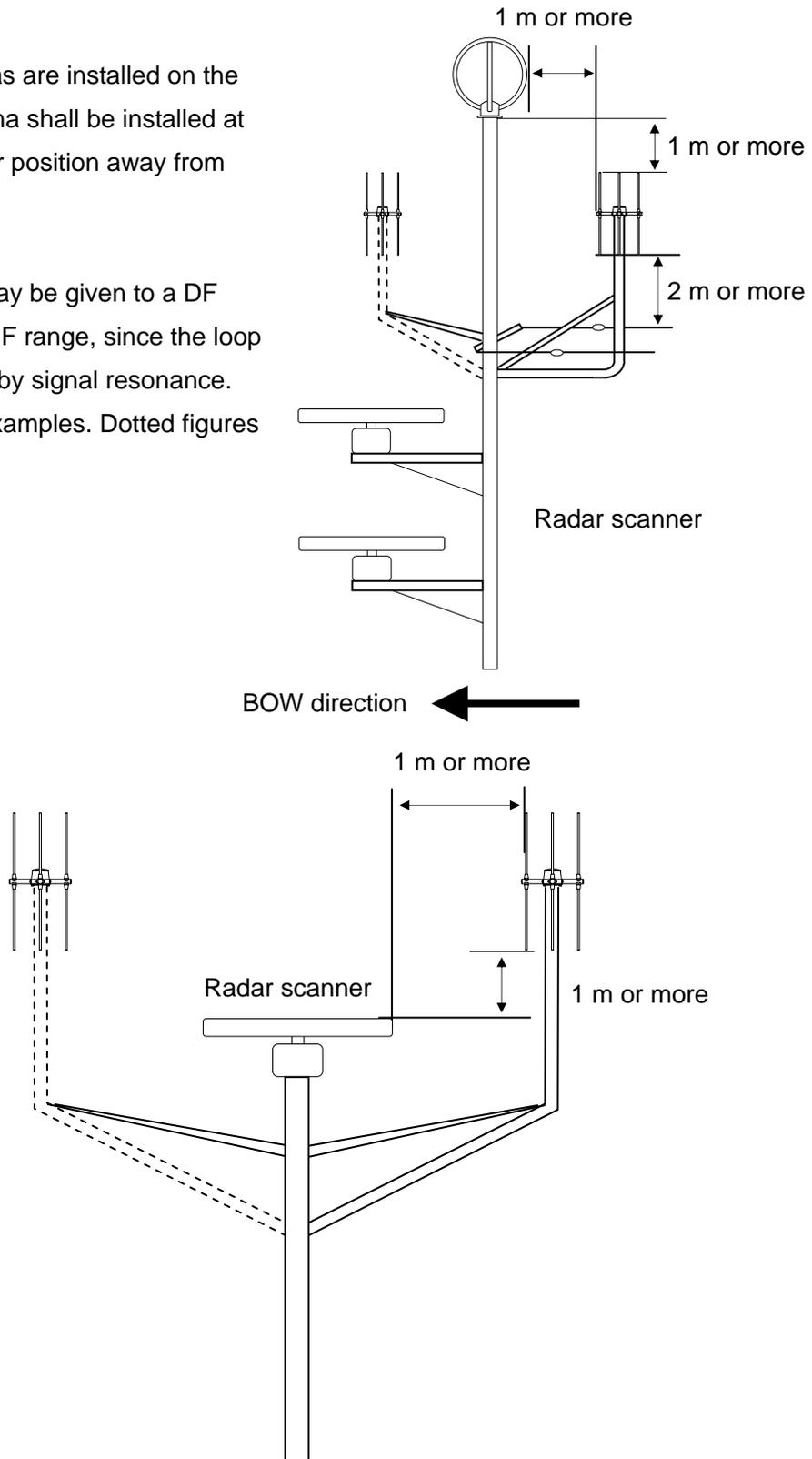
(10) When the mast on which the antenna is installed, is connected with a wire, keep 2 m or more vertical distance away from the wire. Also, insert an insulator on the wire keeping 2 m or more distance away from the mast.



1.2 Examples of Installation

When several antennas are installed on the same mast, DF antenna shall be installed at vertically 2 m or higher position away from other antennas.

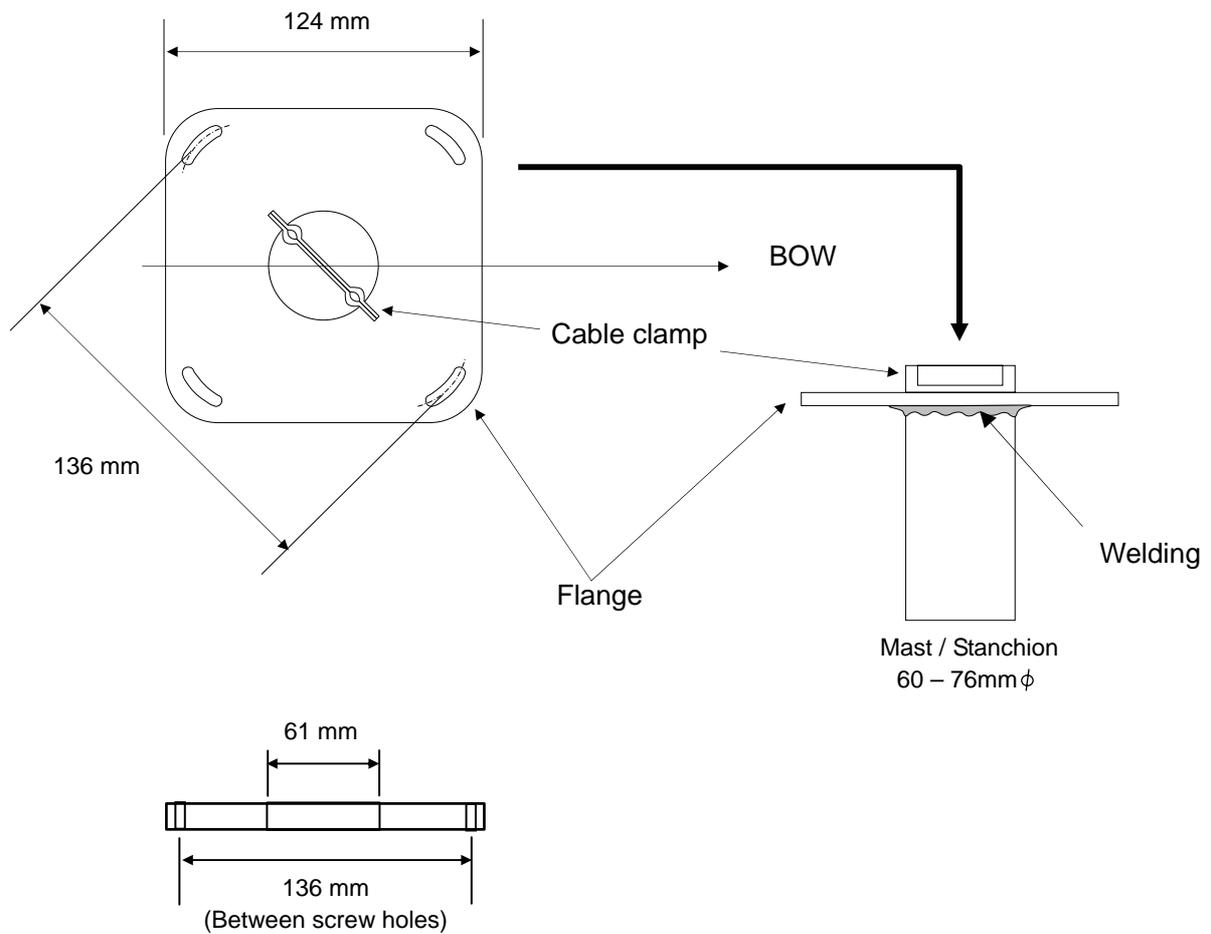
The top of the mast may be given to a DF loop antenna for MF/HF range, since the loop antenna is vulnerable by signal resonance. Figures show some examples. Dotted figures are alternatives.



1.3 Flange

Weld the flange attached to the Adcock antenna with the mast, stanchion or like. Or, when necessary, make a flange as shown in figures.

Note: (1) Pay attention to make the bow direction line parallel to the keel line.
(2) Antenna cable is not heat proof. Keep the cable away from the heat while welding.



1.4 Antenna Cable

1.4.1 Note for cable installation

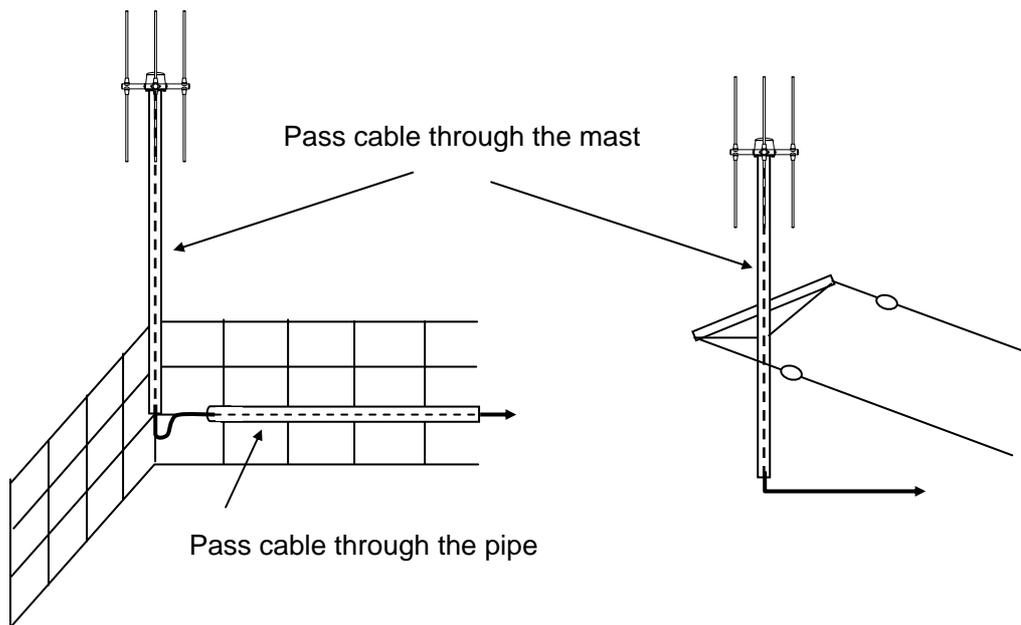
Pay following attention to install antenna cable.

- (1) Cable is cut and processed by a specified length when ordered. Do not cut or extend cable. When cable length needs to be changed, keep the length of two lines the exactly the same. The difference of the length between cables shall be within 10 mm.

Cable : **RG-58A/U** twin cable
(or, **RG-58A/U** armored twin cable)

Plug : **BNC-P-55U** plugs and **M-203-P** plug

- (2) Protect cable against the heat. Weld flange and others before setting cable. Pay special attention for welding when the cable has been already set.
- (3) Protect cable against mechanical damage. When mechanical damage is anticipated, protect it with steel or plastic pipe. Otherwise, use armored cable.
- (4) Keep enough distance away from cables for communication antenna, radar cable or power cable. Lay cable in metallic pipe, e.g., in steel mast, whenever possible as shown in figures on this page.
- (5) Avoid to extend antenna cable in the air or along stays or wires.



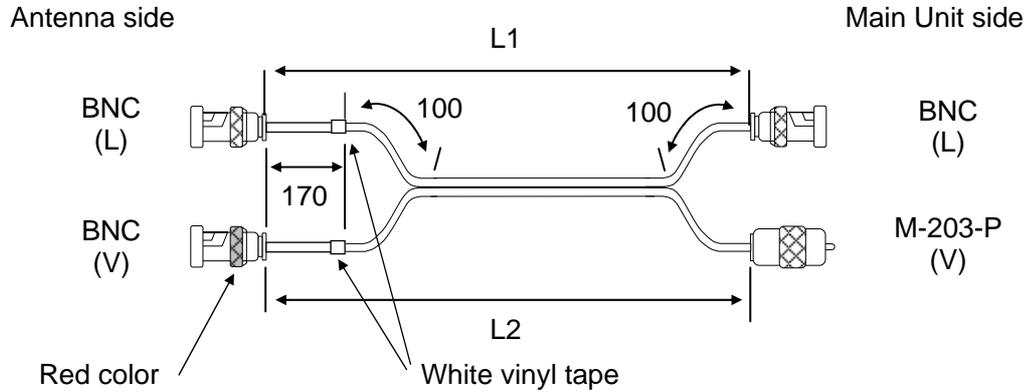
A. Antenna installed on the compass deck

B. Antenna installed to a mast

1.4.2 Plugs

Antenna cable is supplied with plugs. Following shows procedure to connect plugs to antenna cable for your reference, when necessary.

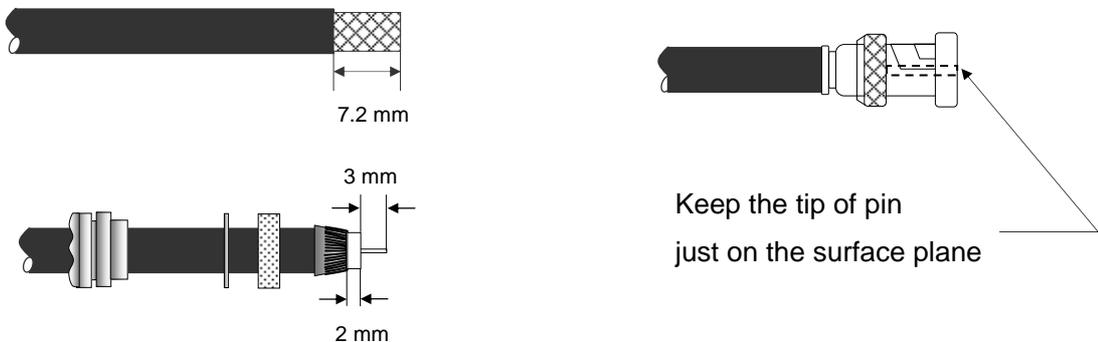
(1) Standard antenna cable RG-58A/U twin cable



Note : Keep the difference of the length between V-line (sense signal line) and L-line (Adcock signal line) shall be 10 mm or smaller.

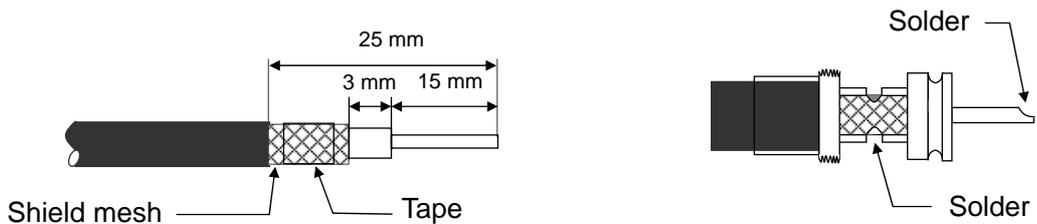
(2) BNC plug

Cut and remove, outer PVC layer by 7.2 mm, loosen armor shield. Remove inner insulator and solder to the pin.



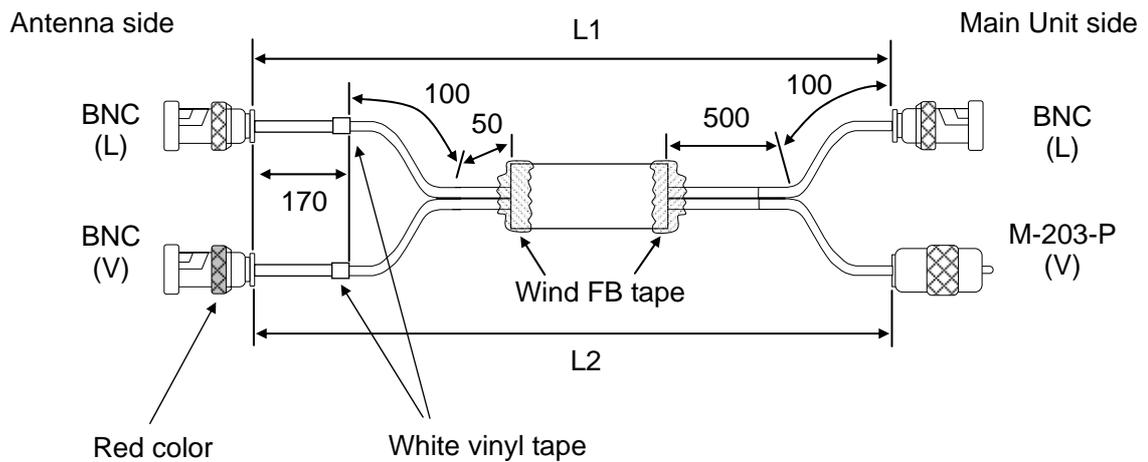
(3) M plug

Cut and remove, outer PVC layer by 25 mm, armor shield by 18 mm, inner polyethylene layer by 15 mm.



Wind cellophane tape between shield mesh and polyethylene to protect polyethylene from heat

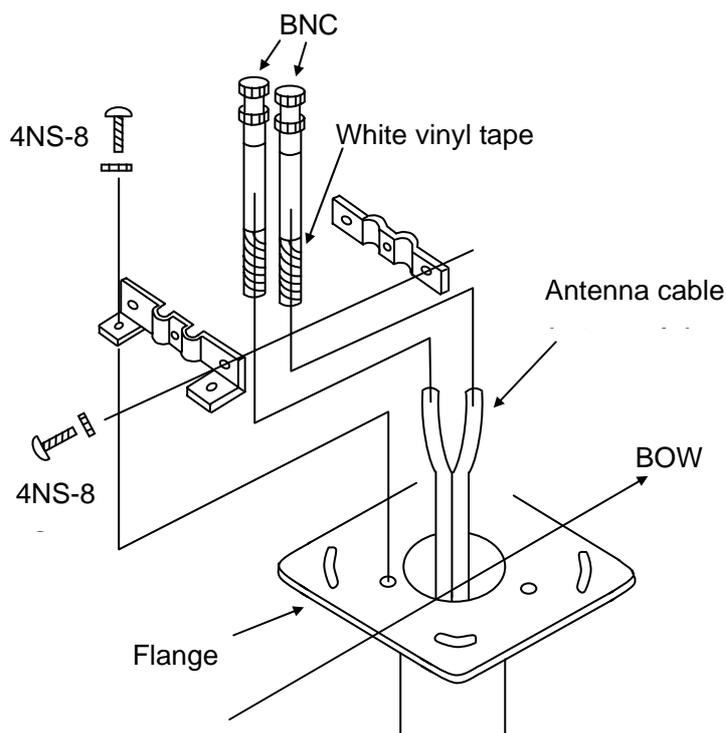
- (4) Armored antenna cable RG-58A/U armored twin cable (option)



Note: Keep the difference of length of V-line and L-line smaller than 10 mm.

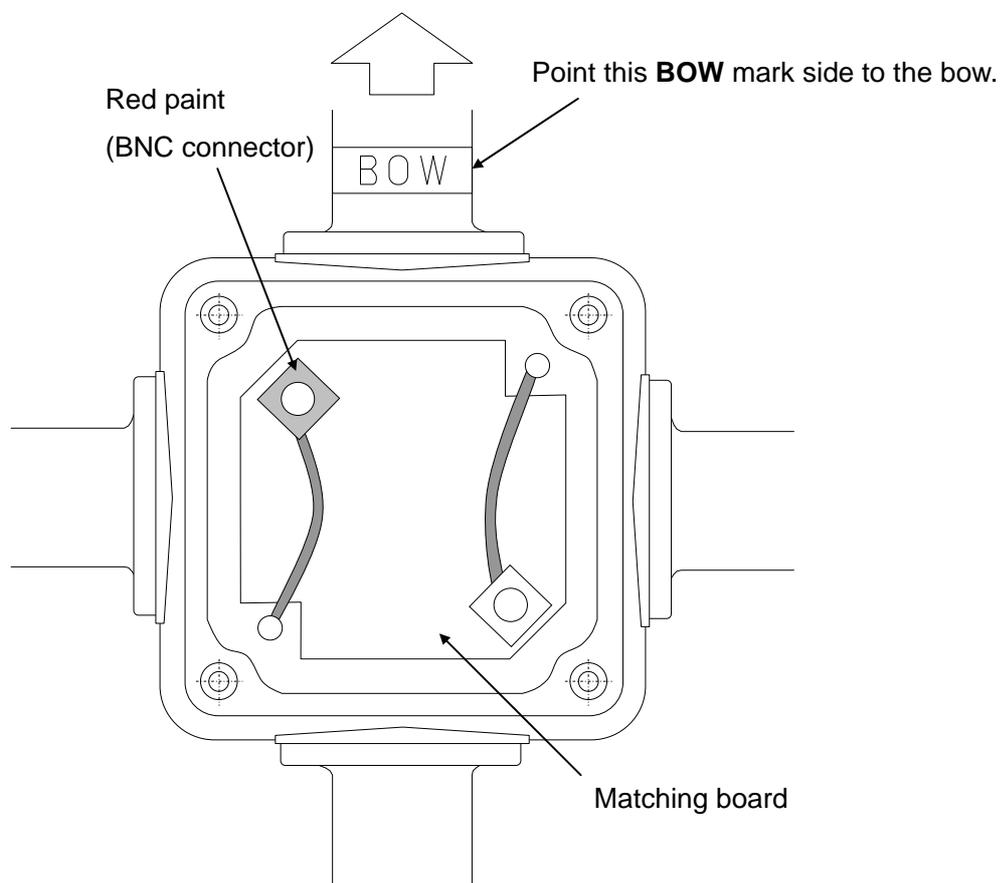
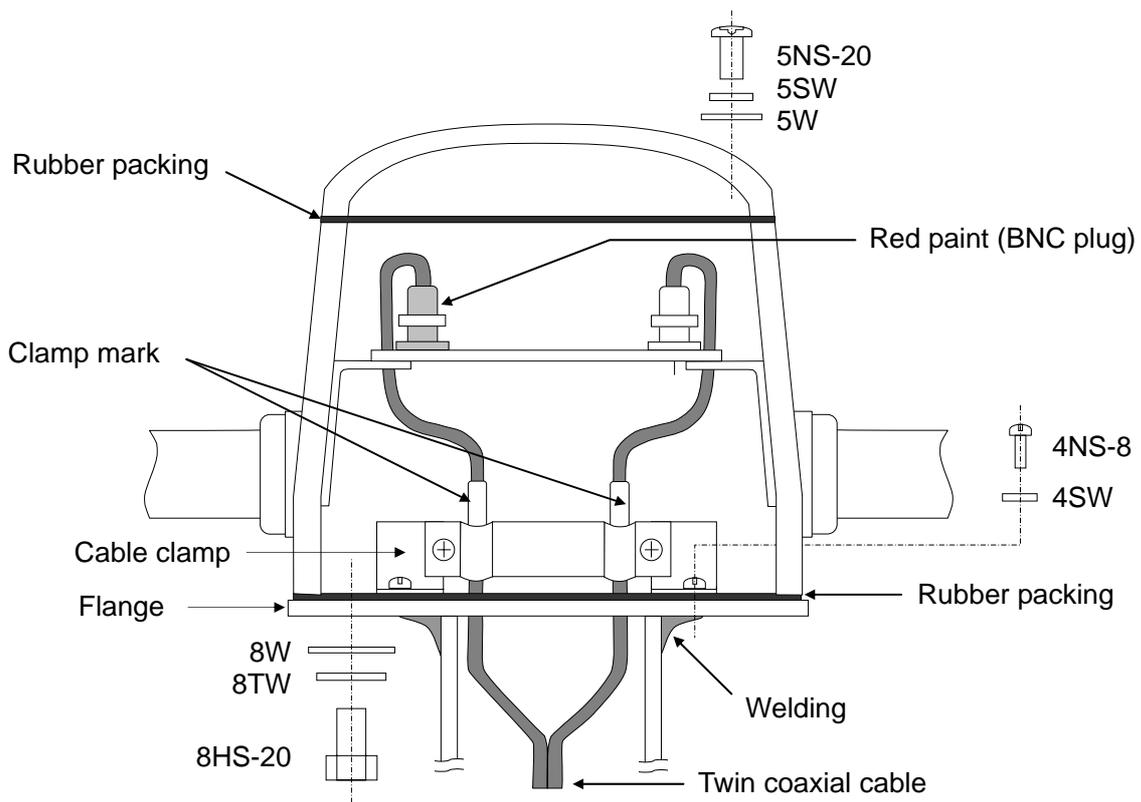
1.5 Installation of Adcock Antenna

- (1) Fix antenna cable with cable with cable holder. Then fasten the holder to the flange.



- (2) Fix antenna to the flange with bolts, nuts and washers.
 (3) Connect BNC plugs of antenna cable to receptacles. Confirm that line with red mark is connected to the red receptacle.
 (4) Confirm also the "BOW" mark direction is parallel to the keel line.

Note: Pay attention to rain or splash so as to avoid moisture or dust from entering inside of the antenna.

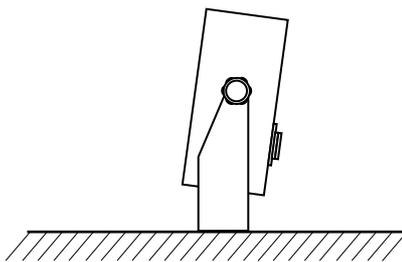
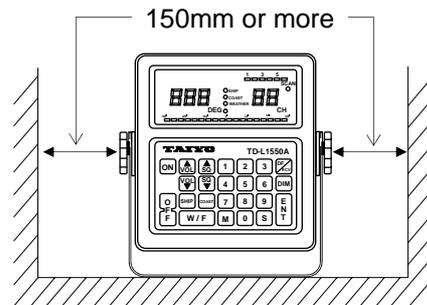
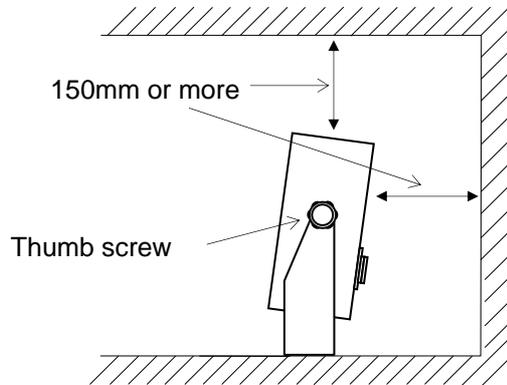


2. MAIN UNIT

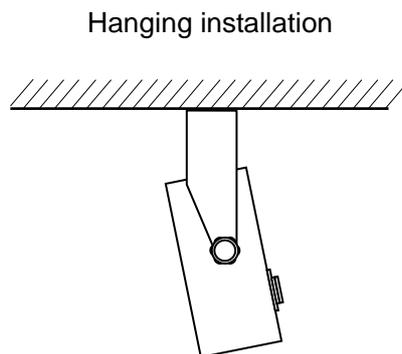
2.1 Position of Main Unit

Select a position (table, rack, etc.) for the main unit satisfying following conditions:

- (1) Convenient for operation, easy to maintain and with a good view of the display.
- (2) Avoid direct sunshine, water splash, high temperature and strong vibration.
- (3) Keep 150 mm or more distance away from both sides and rear side of the main unit. Also, keep enough distance away from any noise sources, such as radio transmitters, inverter, radar, etc.
- (4) Hanging installation to ceiling is available. Use a plate with enough strength to reinforce the ceiling so as not to drop the main unit.



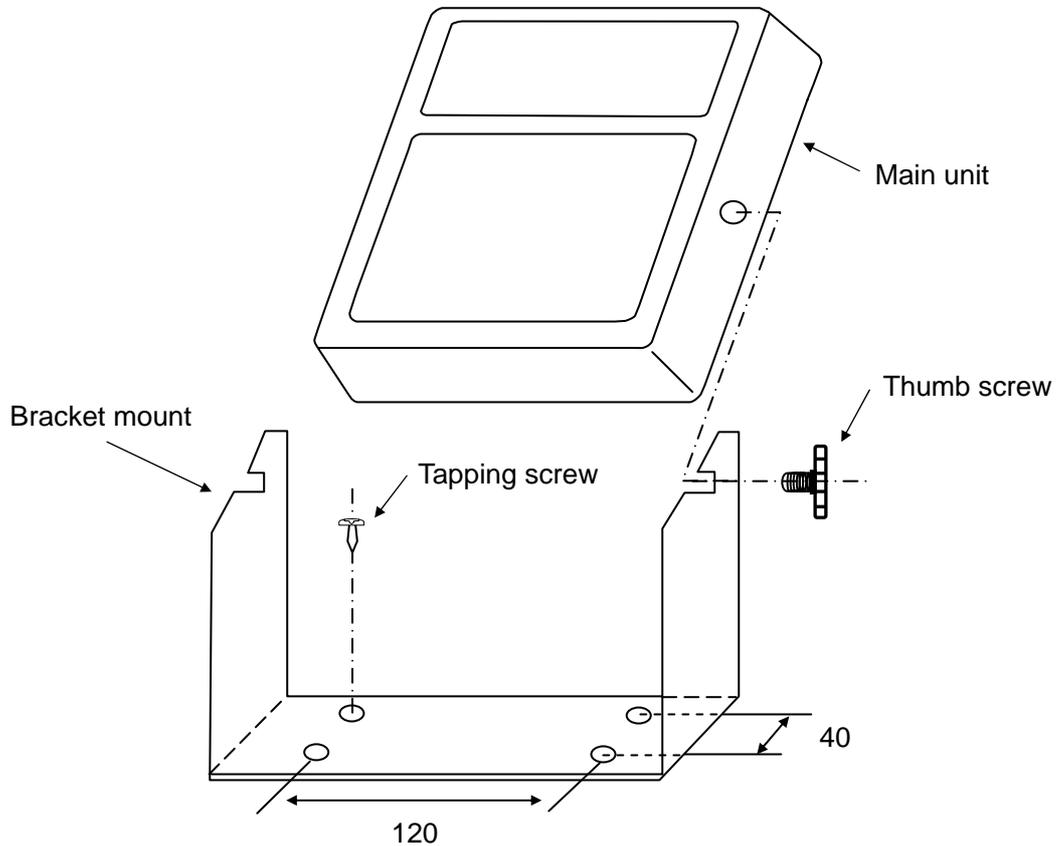
Installation on table



Hanging installation

2.2 Installation

- (1) Loosen two thumb screws which have connected the main unit and bracket mount and separate them.
- (2) Fix the unit holder to a chosen spot, e.g., table, ceiling with 4 tapping screws.
- (3) Connect the main unit and the bracket mount with thumb screws.



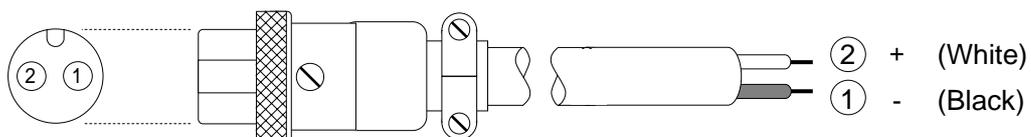
Note : In case of tightening thumb screws into the main unit, insert the bracket mount between them. If not, the tip of the screw might damage the shield board of the main unit inside and thus, it has a possibility to cause the breakdown of the main unit itself.

2.3 Cable Connection

2.3.1 Power

- (1) Power cable

Power cable, 3m is supplied with a connector, 16P-2F.

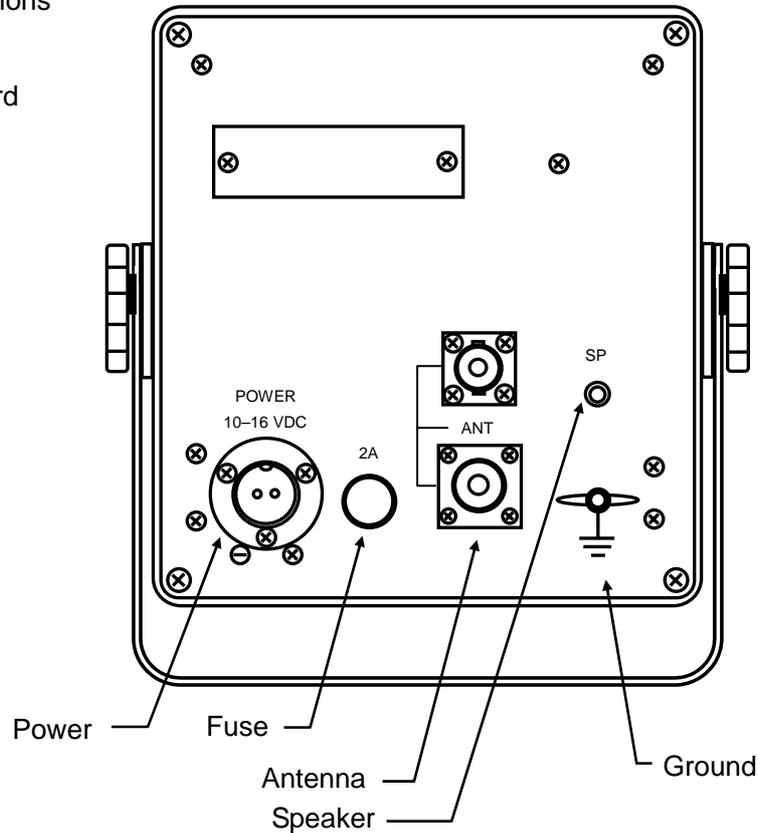


(2) Power cable connection

Connect to a DC source 10 V ~ 16 V. Minus side is grounded inside the main unit.
Avoid higher voltage, or the main unit may be damaged. Other power source shall be specified at the time of order and DC adapter or AC power source shall be supplied (option).

2.1.1 Main unit connections

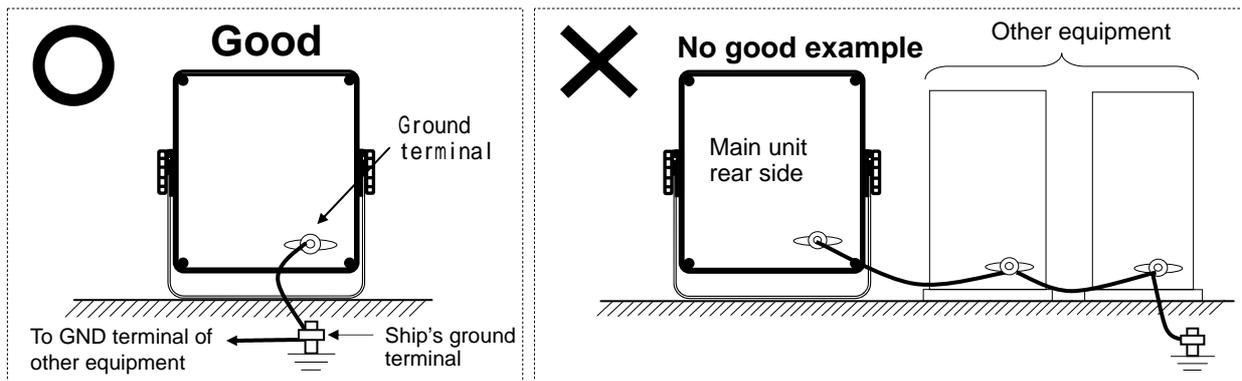
Connect antenna cable, power cable, speaker cord and ground cable to receptacles on the rear panel of the main unit.



2.1.2 Grounding

Grounding influences to the sensitivity and noise suppression and hence, good grounding is required. For the steel ship, connect the shortest dedicated grounding line (KIV copper belt, 30 mm wide and 0.5 mm thick) to the ship grounding terminals.

In case of non-metallic ship, FRP or wood, provide a copper plate, 300 mm x 450 mm or larger at the bottom of ship for grounding.



3. CHECK AFTER INSTALLATION

3.1 Antenna

- (1) Check that the antenna is installed in enough distance away from other antennas for transmitter, whip antenna, radar antenna, stays, cables, etc.
- (2) Check that the NS direction of the antenna is correct and parallel to the keel line.
- (3) Check that connectors are well fabricated.
- (4) Check conduction and insulation of the antenna cable.
- (5) Check that cable holder is fastened to the flange tightly.
- (6) Check the BNC connections on the antenna side is done correctly. Check red mark.
- (7) Check assembly and confirm if antenna elements are well fastened.
- (8) Check that cable is not laid in the air but laid along poles and rails with cable bands.
- (9) Check that the loop antenna cable is not laid parallel to other cables and lines.
- (10) Check that the antenna cable is not exposed to high temperature.
- (11) Check that the antenna cable is protected against mechanical damage with pipe.
- (12) Check that the inlet of the antenna cable is watertight.

3.2 Main Unit

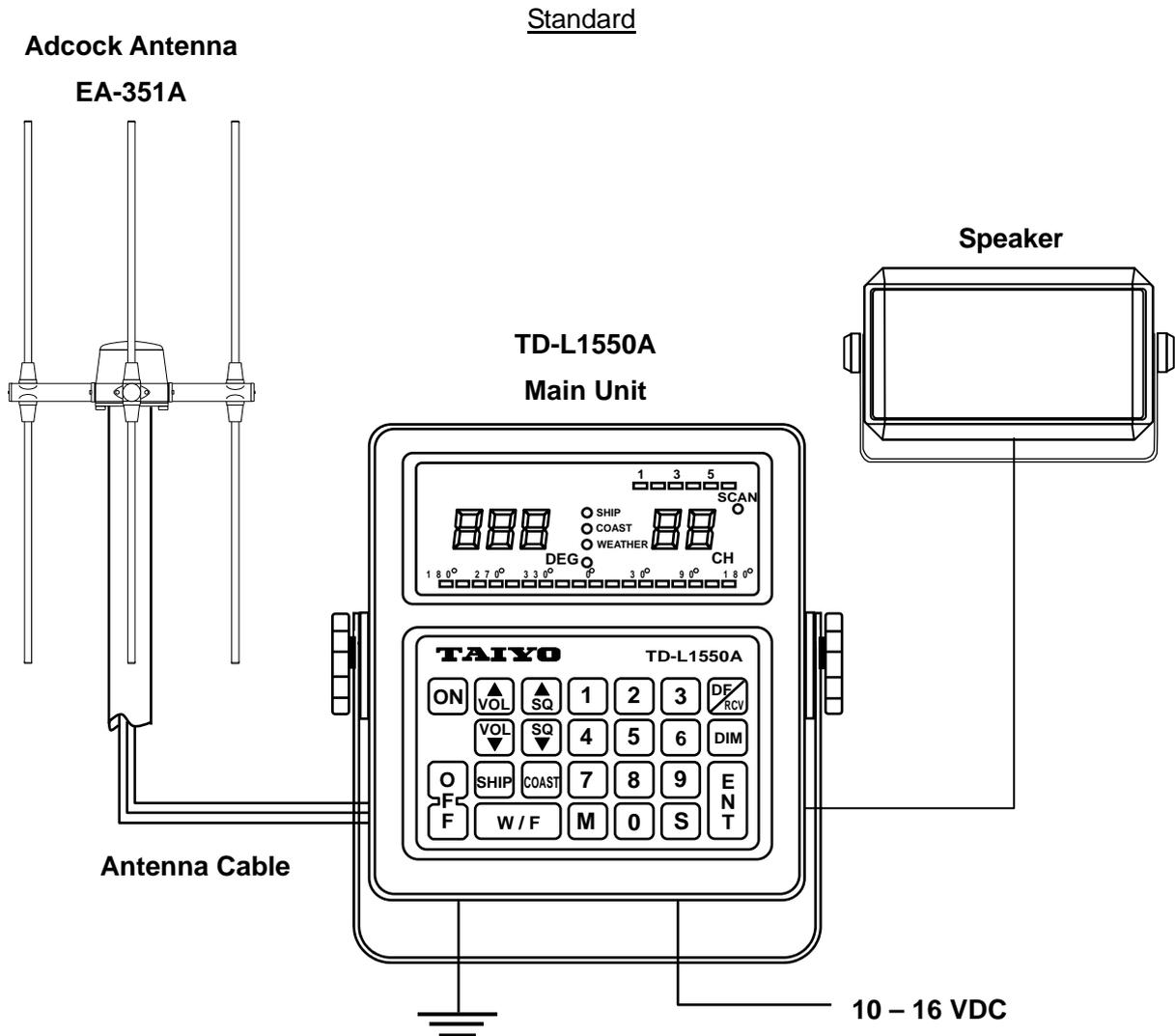
- (1) Check that the ground terminal of the main unit is directly connected to the grounding point of the ship with copper belt.
- (2) Check that the end of the cable have been processed according to the installation manual.
- (3) Check the position of the main unit.
 - (a) not exposed to direct sunshine, heat radiation.
 - (b) Not close to heat source.
 - (c) Kept off from splash, rain fall, dew or high humidity and strong vibration.
 - (d) Installed at a position where its display is easily visible and ample space is provided for operation and maintenance.
- (4) Connection of cables are done correctly and there are enough margin in their length for check.
 - (a) Power cable
 - (b) Antenna cable
 - (c) Speaker cord
 - (d) Ground cable

3.3 Performance Check

- (1) Measure and make an error correction curve.
- (2) Check functions
 - (a) Spot reception of VHF channels.
 - (b) Volume control
 - (c) Squelch control
 - (d) Scan reception
- (3) Mutual interference with other electronic equipment as shown below is required.
 - (a) Radio transmitter
 - (b) Receivers
 - (c) Radar
 - (d) Sonar
 - (e) Other navigation equipment

4. DIAGRAMS

Diagram 1 Connection Diagram



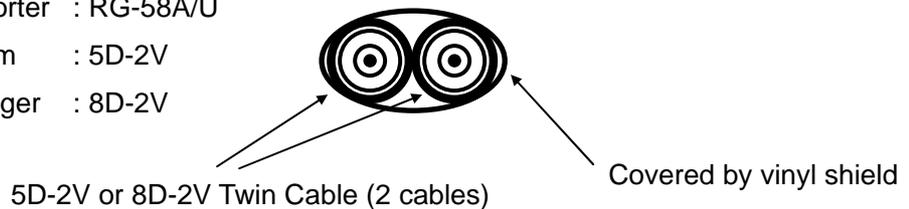
Recommend to use following antenna cable depending on required length in order to avoid from attenuation.

Antenna cable: Twin coaxial cable

16 m or shorter : RG-58A/U

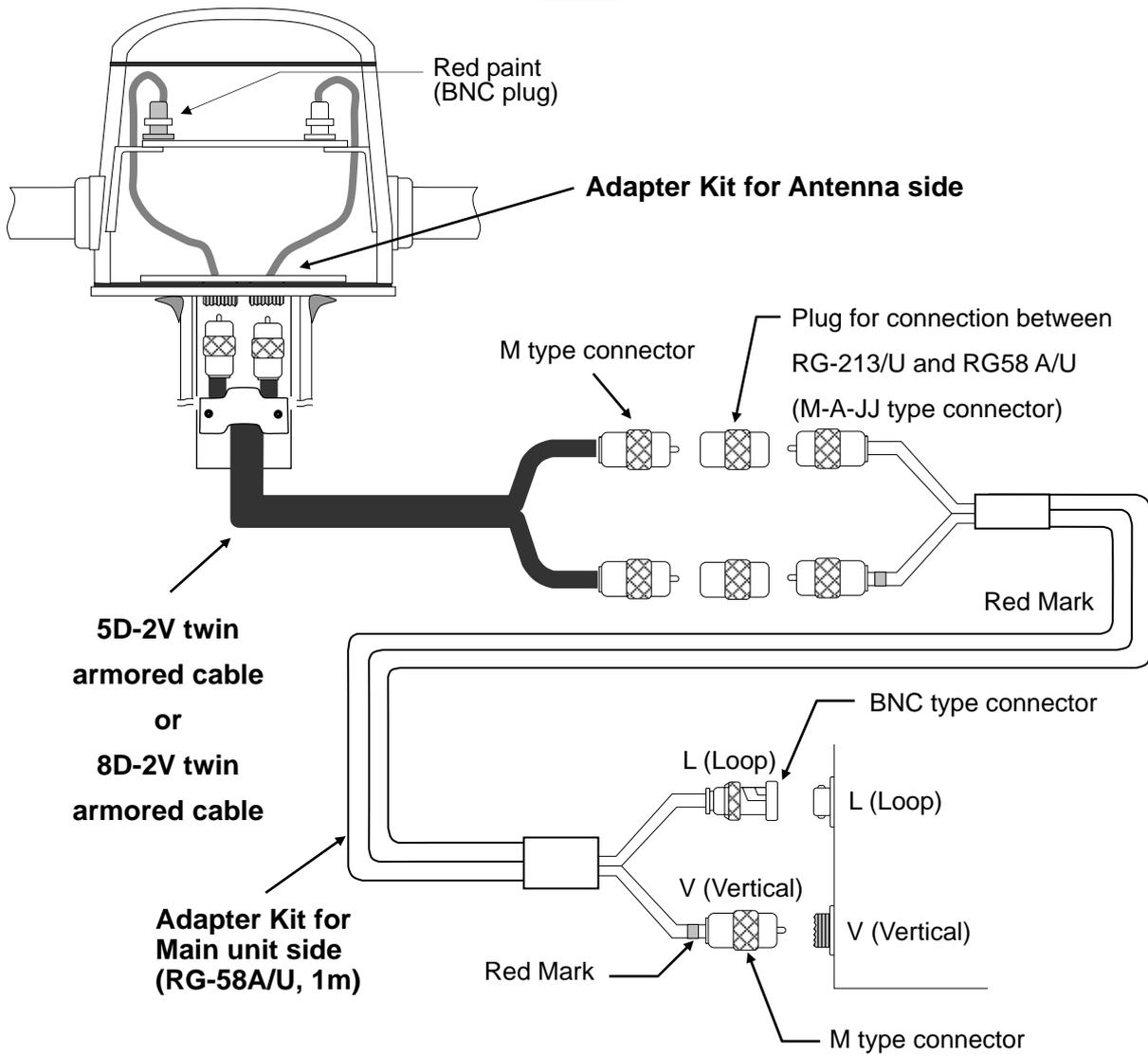
17 m ~ 29 m : 5D-2V

30 m or longer : 8D-2V



Note : When using 5D-2V or 8D-2V, additional cable adapter kit for both cable ends is required as those have larger diameter than that of RG-58A/U.
Refer to option page below.

Option



Note : Adapter Kit for main unit side has connectors for both cable ends.
 Adapter cable kit is composed by the following 4 kinds of parts. Each quantity is described as below chart.

List of component for Cable Adapter Kit

Parts	Parts Name	Q'ty
	Adapter Kit for Antenna Side	1
	Adapter Kit for Main Unit Side (1m) (Both ends are processed with connectors.)	1
	M-A-JJ Connector	2
	N Type Connector (N-P-8U)	4

Diagram 2 Main Unit

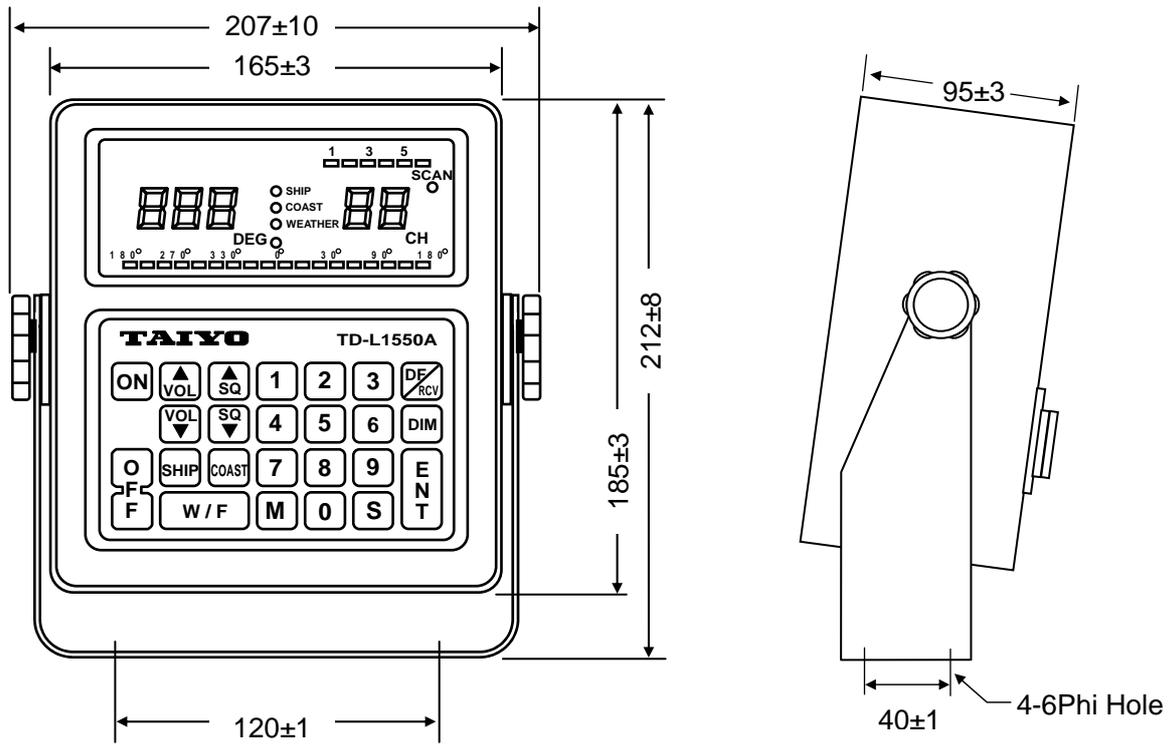


Diagram 3 Antenna Unit

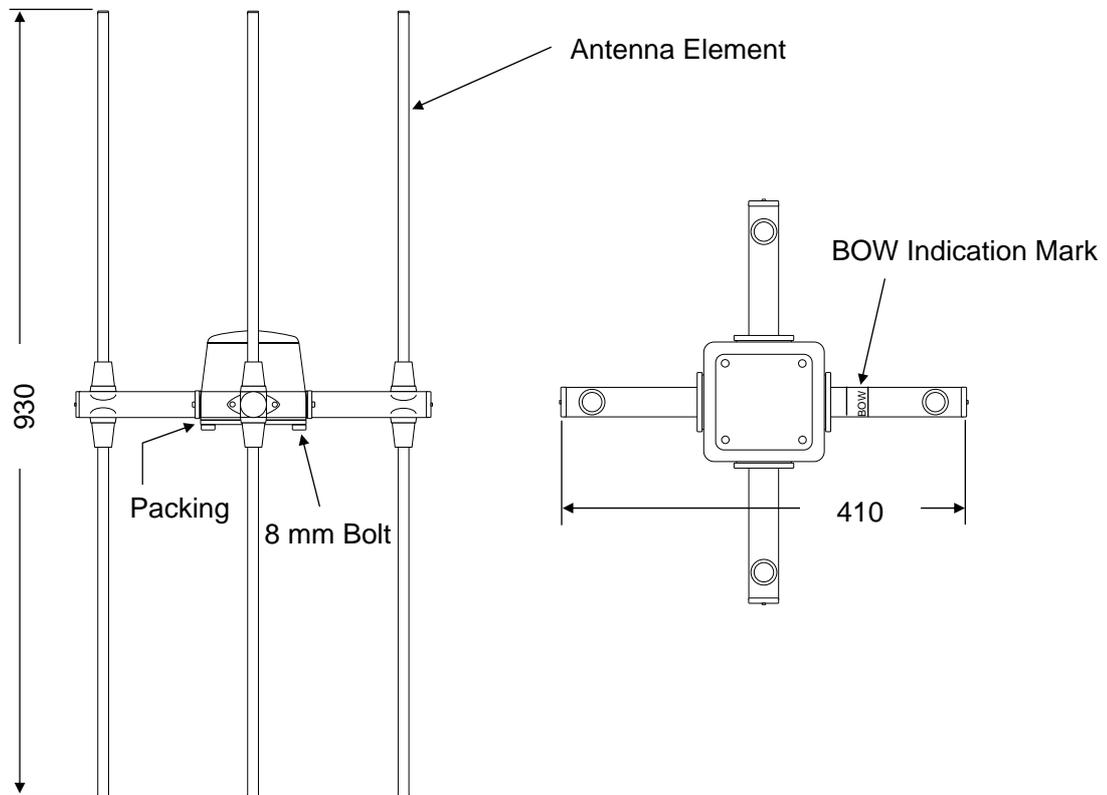
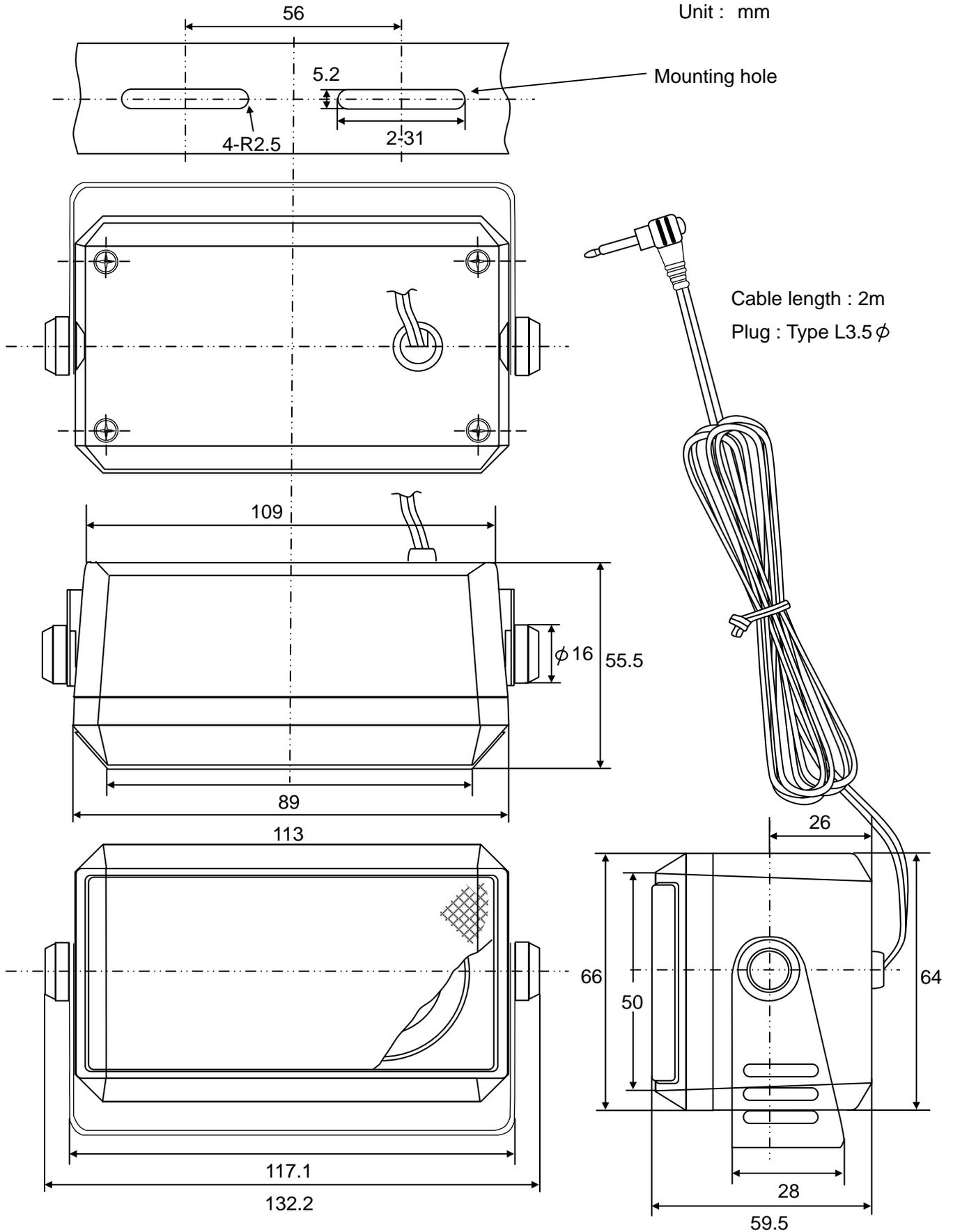


Diagram 4 Speaker Unit

Weight : 350 g

Unit : mm



Chapter III MAINTENANCE

1. CIRCUITS

1.1 Description of Printed Circuit Board

The block diagram of the circuit is shown in diagrams and functions of printed circuit boards in the circuit are explained in the following table.

PB No.	Drawing No.	Name and Functions
720593	323995	Receiver Unit, Antenna Circuit, RF amp., IF amplifiers, Synthesized local oscillator, detector, AF amp.
720594	323996	Microprocessor Unit, data processing
720595	323997	Display Unit
131075	343405	Keyboard Unit

2. PERFORMANCE TEST

2.1 Test Equipment

Performance check of the direction finder requires following test equipment.

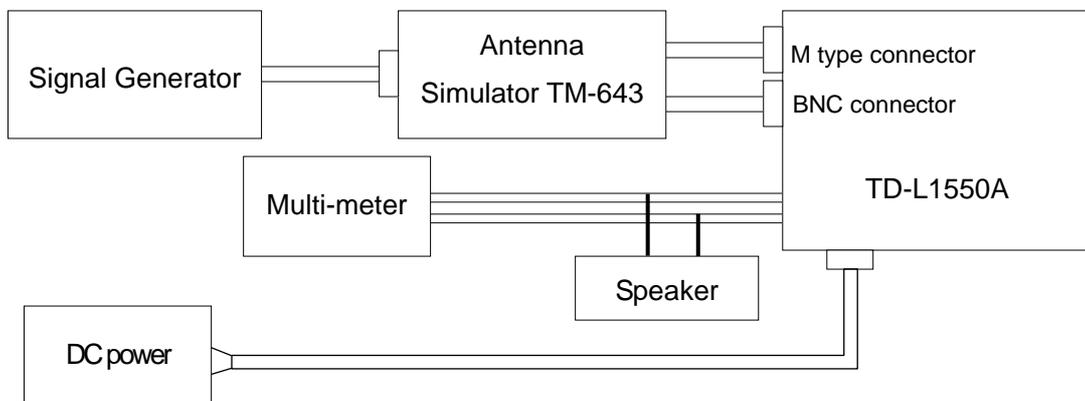
- (1) Antenna Simulator, TM-643 (abbreviated as DUMMY)
- (2) Signal Generators (abbreviated as SG)

It shall cover 400 kHz to 200 MHz with variable output up to 1V, and within output impedance of 50Ω.

- (3) Multi-meter

2.2 Test Arrangement

Refer to below connection diagram for testing.



2.3 Test

2.3.1 Sensitivity

(1) Arrangement

SG : No modulation

Main Unit : RCV mode, SQ minimum (open). SG signal to M connector.
Measure output at speaker terminals with AF voltmeter.

DUMMY : BNC connector.

(2) Set SG at 156.025 MHz, main unit at SHIP-60.

Make SG output off and adjust volume to make output 1 V (noise).

Make SG output on. Read SG when speaker output is 0.1 V (-20 dB)

Check and confirm if SG reading is 10 dB μ V (-103 dBm) or smaller.

(3) Set SG at 157.425 MHz, main unit at SHIP-88.

Read SG when speaker output is 0.1 V (-20 dB)

Check and confirm if SG reading is 10 dB μ V (-103 dBm) or smaller.

(4) Set SG at 162.550 MHz, main unit at WEATHER-1.

Read SG when speaker output is 0.1 V (-20 dB)

Check and confirm if SG reading is 10 dB μ V (-103 dBm) or smaller.

(5) Set SG at 121.500MHz, main unit at SHIP-99 (EP).

Arrange SG to AM 1 kHz, 30% modulation.

Make SG output on and adjust volume to make output 0.3 V.

Make SG modulation off. Read SG when speaker output is 0.15 V (-6 dB).

Check and confirm if SG reading is 10 dB μ V (-103 dBm) or smaller.

2.3.2 Level Indicator

(1) Arrangement.

SG : No modulation, 157.425 MHz.

Main Unit : RCV mode, SQ minimum (open), SHIP-88

DUMMY : Feed output to the DUMMY. Turn V signal (Adcock signal) on.

(2) Adjust SG output to make one LED of the level indicator on

Check and confirm if input is -2 ± 5 dB μ V (-115 ± 5 dBm). Since there is a loss of 36 dB at the dummy circuit, the SG reading shall be 34 ± 5 dB μ V.

(3) Adjust SG output to make all LEDs (6) of the level indicator on.

Check and confirm if input is 52 ± 5 dB μ V (-61 ± 5 dBm) (SG reading : 88 ± 5 dB μ V).

2.3.3 Voice Level

- (1) SG : 157.425 MHz, FM 1 kHz modulation, 3 kHz deviation, 60 dB μ V (-53 dBm).

Main Unit : RCV mode, SQ minimum (open), SHIP-88.

Make volume control maximum and read output voltage at speaker terminals.

Check and confirm if reading is 3.0 V or more.

- (2) SG : 121.500 MHz, AM 1 kHz 70% modulation, 60 dB μ V (-53 dBm).

Main Unit : RCV mode, SQ minimum (open), SHIP-99 (EP)

DUMMY : Feed output to the DUMMY. Turn V signal on.

Make volume control maximum and read output voltage at speaker terminals.

Check and confirm if reading is 3.0 V or more.

2.3.4 Squelch

- (1) SG : 156.025 MHz, FM 1 kHz modulation, 3 kHz deviation.

Main Unit : RCV mode, SQ minimum (open), SHIP-60, volume maximum.

DUMMY : Feed SG output to the DUMMY. Turn V signal on.

Make SG off and adjust SQ key so that noise begins to cease.

Make SG on and read SG output when sound becomes audible.

Check and confirm if input is 3dB μ V (-110 dBm) or less. (SG output 39dB μ V or less).

- (2) SG : 156.025 MHz, FM 1 kHz modulation, 3 kHz deviation.

Main Unit : RCV mode, SQ minimum (open), SHIP-60, volume maximum.

DUMMY : Feed SG output to the DUMMY. Turn V signal on.

Make SG off and adjust SQ key so that the level indicator is at the maximum.

Then, supply SG signal and read input when sound is heard.

Check and confirm if input is 12 dB μ V (-101 dBm) or less. (SG output 48dB μ V or less).

2.3.5 Direction Measurement

- (1) Arrangement

SG : No modulation, 60 dB μ V (-53 dBm).

Main Unit : DF mode.

DUMMY : Feed SG output to the DUMMY

- (2) Set SG at 156.025 MHz, main unit at SHIP-60 and then, set DUMMY as follows.

NS and V are "ON" : Check and confirm if direction reading is $0^\circ \pm 3^\circ$

NS, EW and V are "ON" : Check and confirm if direction reading is $45^\circ \pm 3^\circ$

EW and V are "ON" : Check and confirm if direction reading is $90^\circ \pm 3^\circ$

- (3) SG at 157.425MHz, main unit at SHIP-88 and then, set DUMMY as follows.
- | | | |
|-------------------------|---|----------------------------|
| NS and V are "ON" : | Check and confirm if direction reading is | $0^{\circ} \pm 3^{\circ}$ |
| NS, EW and V are "ON" : | Check and confirm if direction reading is | $45^{\circ} \pm 3^{\circ}$ |
| EW and V are "ON" : | Check and confirm if direction reading is | $90^{\circ} \pm 3^{\circ}$ |
- (4) SG at 152.550 MHz, main unit at WEATHER-1 and then, set DUMMY as follows.
- | | | |
|-------------------------|---|----------------------------|
| NS and V are "ON" : | Check and confirm if direction reading is | $0^{\circ} \pm 3^{\circ}$ |
| NS, EW and V are "ON" : | Check and confirm if direction reading is | $45^{\circ} \pm 3^{\circ}$ |
| W and V are "ON" : | Check and confirm if direction reading is | $90^{\circ} \pm 3^{\circ}$ |
- (5) SG at 121.500 MHz, main unit at SHIP-99 (EP) and then, set DUMMY as follows.
- | | | |
|-------------------------|---|----------------------------|
| NS and V are "ON" : | Check and confirm if direction reading is | $0^{\circ} \pm 3^{\circ}$ |
| NS, EW and V are "ON" : | Check and confirm if direction reading is | $45^{\circ} \pm 3^{\circ}$ |
| EW and V are "ON" : | Check and confirm if direction reading is | $90^{\circ} \pm 3^{\circ}$ |

2.3.6 Sensitivity for Direction Measurement

(1) Arrangement

SG : No modulation
 Main Unit : DF mode
 DUMMY : Feed SG output to the DUMMY

(2) Set SG at 156.025 MHz, main unit at SHIP-60.

Read SG output when direction indicator shows a stagger of 5° .
 Check and confirm if input is -6 dB μ V (-119 dBm) or less. (SG output 30 dB μ V or less).

(3) Similar test at 157.425 MHz, main unit at SHIP-88, at 162.550 MHz, main unit at WEATHER-1.

(4) Set SG at 121.500 MHz, main unit at SHIP-99.

Read SG output when direction indicator shows a stagger of 5° .
 Check and confirm if input is 0 dB μ V (-113 dBm) or less. (SG output 36 dB μ V or less).

2.3.7 Function Check

(1) Power : Check the power on-off

(2) LEDs :

(a) Turn on power while pressing 1 key.
 Check and confirm if "3" appears for all numeric displays.

(b) Then, press ENT key. After 10 seconds, numeric are updated.

(3) Check sum

Turn on the power pressing DF
RCV key. Check and confirm if the blinking check sum number appears on the channel display after several seconds.

(4) Check keys

- (a) Numeric keys, type keys and function keys :

Check and confirm if pip sound is heard.

- (b)  key : Check and confirm if the brightness changes cyclically.

- (c) ,  and  keys :

Check and confirm if corresponding LED is lit at the channel display.

- (d) , ,  and  keys :

Check and confirm if the bar LED at bearing indicator moves right or left.

Press  key, then the LED moves towards right and press  key, it moves towards left except two LEDs on the right which do not lit.

- (e) Press  →   →  keys:

Check and confirm if channel LEDs are put out and "EP" appears.

- (f)  key : Check and confirm if weather LED is lit and weather of fishing channels can be set. "U" is for weather and "F" for fishing.

- (g)  key : Check and confirm if pip sound for correct input and beep sound for erroneous input.

- (h)  key : Check and confirm if memory address number blinks, pressing once. Check and confirm if the address number stores at direction display, pressing twice.

- (i)  key : Check and confirm if SCAN LED is lit and SCAN starts. When pressing is continued, bar LED is turned off.

- (j)  key : Check and confirm if DF or RCV mode is selected and switch them in turn. In RCV mode, direction displays are turned off.

(5) SCAN Auto start/stop

- (a) Prepare for SCAN reception by entering channels and make SQ maximum. Start SCAN by pressing  and confirm its function with SCAN LED.

Check auto start/stop with , ,  or  by tuning to an arbitrary channel.

- (b) Check that SCAN stops when one of following keys, , , ,  or  is pressed.

- (6) Confirm that a channel is write-in by  → [CHANNEL NUMBER] → 

- (7) Confirm that a channel is retrieved by  → [CHANNEL NUMBER] → 

- (8) Turn power off and turn on to check that memory is back-upped.

(9) Check memory delete

(a) Check that an address can be deleted by $\boxed{9} \boxed{7} \rightarrow \boxed{S}$.

(b) Turn on power while pressing $\boxed{3}$ key and then press $\boxed{\begin{matrix} E \\ N \\ T \end{matrix}}$:

Check and confirm if "5" appears for all numeric displays and whole memory is cleared.

Note: Take note of address-channel before deletion.

(10) Scan pass and its release

(a) Check that Scan is suspended by scan pass : $\boxed{9} \boxed{9} \rightarrow \boxed{S}$

(b) Check that Scan pass is released by scan pass release : $\boxed{9} \boxed{8} \rightarrow \boxed{S}$

3. ADJUSTMENT

3.1 Stabilizer

Adjust and check DF stabilized voltage in PCA RCV, 720593.

- (1) Confirm that the voltage at J4-10 to be 9.0 ± 0.3 V.
- (2) Confirm that the voltage at C166+ to be 5.0 ± 0.2 V.
- (3) Confirm that the voltage at C168+ to be 3.3 ± 0.2 V.
- (4) Confirm that the voltage at U1-4 to be 6.2 ± 0.5 V.

3.2 Synthesizer

Adjust and check the lock voltage in PCA RCV, 720593.

- (1) Arrange to receive SHIP-99 (EP). Adjust L6 to make voltage at TP-6 to be 3.0 ± 0.1 V.
- (2) Arrange to receive SHIP-01. Check that the voltage at TP-6 to be 2.2 ± 0.1 V.
- (3) Arrange to receive WEATHER-1. Check that the voltage at TP-6 to be 2.8 ± 0.2 V.
- (4) Arrange to receive SHIP-01. Adjust C73 to have a frequency at TP-2 to be 134.650 MHz \pm 100 Hz.
- (5) Fix C73 with paraffin.

3.3 Second IF Frequency

Adjust and the second IF circuit to tune at 455 kHz in PCA RCV, 720593.

- (1) Supply SG output, 455 kHz, 1kHz 70% modulation, 50 dB μ Vemf, to TP-3.
- (2) Adjust T10 and T11 to make the output at TP4 maximum (about 40 mV).
- (3) Then, supply SG output, 455 kHz, 1 kHz 70% modulation, 70 dB μ Vemf, to TP-3
- (4) Adjust T12 to make the output maximum (about 25 mV) between T12 and CR21.

3.4 Second Local Oscillator

Adjust the frequency of the second local oscillator to get the second IF of 455 kHz in PCA RCV, 720593.

- (1) Supply SG output, 21.4 MHz, CW 50 dB μ Vemf, to TP-1.
- (2) Adjust C54 to make the output at TP-4 is 455.00 kHz \pm 50 kHz.

3.5 RF and IF Amplifier

Adjust RF and IF circuits to have optimum frequency characteristics in PCA RCV, 720593.

- (1) Supply SG output, 162.000 MHz, 1 kHz 70% modulation, -10 dB μ Vemf, to J2 and terminate J1 with 47 Ω . Set main unit to RCV mode and arrange to receive COAST-28. Measure output at TP-4 and make it maximum by adjusting T8, T7, T6, T5, T4, T3, T13 and T2.
- (2) Set SG to 121.500 MHz, 1 kHz 70% modulation, -5 dB μ Vemf, and supply output to J2. Set main unit to RCV mode and arrange to receive SHIP-99 (EP). Make the voltage at TP-4 maximum by adjusting C35, C31, C27, C23 and C10.
- (3) Set SG to 162.000 MHz, 1 kHz 70% modulation, 0 dB μ Vemf, and supply output to J1 and terminate J2 with 47 Ω . Set main unit to DF mode and arrange to receive COAST-28. Make the voltage at TP-4 maximum by adjusting T1.
- (4) Set SG to 121.500 MHz, 1kHz 70% modulation, 10 dB μ Vemf, and supply output to J1 and terminate J2 with 47 Ω . Set main unit to DF mode and arrange to receive SHIP-99 (EP). Make the voltage at TP-4 maximum by adjusting C9.
- (5) Repeat (1) and (3)

3.6 AGC

Check AGC function in PCA RCV, 720593.

- (1) Supply SG output, 157.425 MHz, 1 kHz 70% modulation, 70 dB μ Vemf, to J2 and terminate J1 with 47 Ω . Set main unit to RCV mode and arrange to receive SHIP-88. Measure output at TP5. Its value is about 75 mV.

3.7 FM Detection and Volume Control

Check AGC function in PCA RCV, 720593.

- (1) Supply SG output, 157.425 MHz, 1 kHz 70% modulation, 24 dB μ Vemf, to J2 and terminate J1 with 47 Ω . Set main unit to RCV mode and arrange to receive SHIP-88. Turn R64 to 1/4 rotation. Measure output at J7-2 and make it maximum by adjusting T9.
- (2) Make the level indicator maximum by controlling SG output. Adjust R64 so that the output at J5-1 is 3.5 \pm 0.2 V.

3.8 Adjustment for Level Indicator

Adjust level indicator circuit in PCA RCV, 720593.

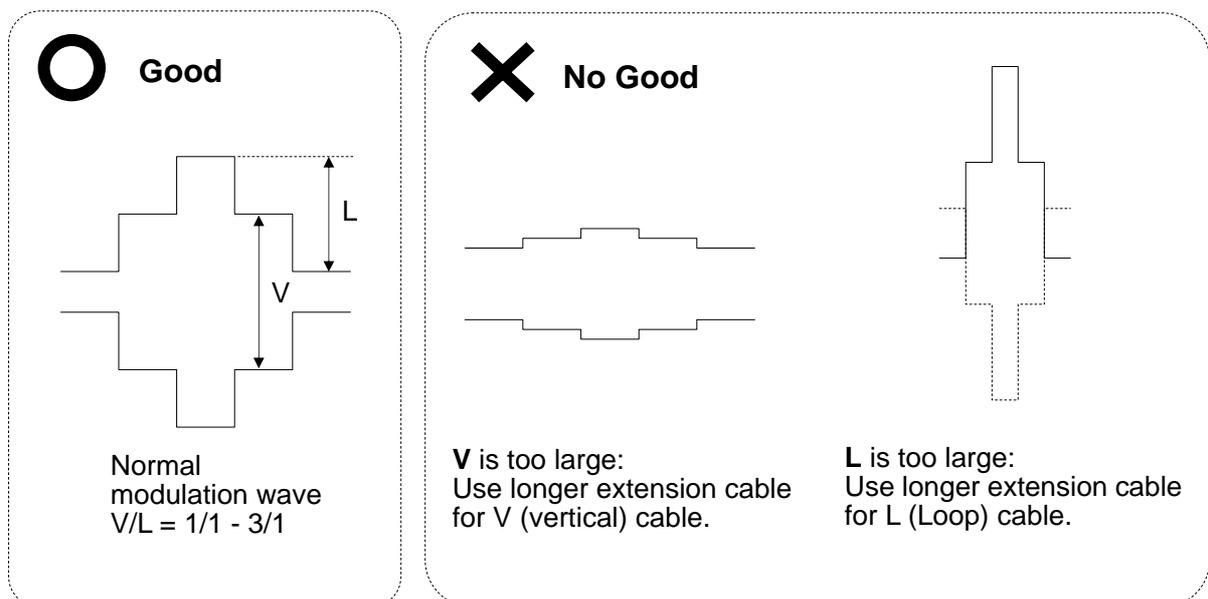
- (1) Supply SG output, 157.425 MHz CW. Set the main unit to RCV mode and arrange to receive SHIP-88. Connect DUMMY and set NS and V on. Supply SG signal of 34 dB μ V/m.
Adjust R147 have one LED of the level indicator is lit.
- (2) Adjust R148 that all LEDs are lit at an SG output of 88 dB μ V/m.
- (3) Iterate (1) and (2) so that SG output is within 2 dB of above-cited values.

3.9 Adjustment for Direction Measurement

- (1) Supply SG output, 157.425 MHz CW, 60 dB μ Vemf. Set the main unit to RCV mode and arrange to receive SHIP-88. Connect DUMMY and set NS and V on and EW off.
Adjust R120 have a direction display of 0° and 1° alternatively.
- (2) Make V, NS and EW on and confirm that the display is 45° \pm 3°.
- (3) Make V and EW on and SN off. Confirm that the display is 90° \pm 3°.
- (4) Repeat (1), (2) and (3) for SHIP-60 (156.025 MHz) and W-1 (162.550 MHz) and confirm that it is within an error of \pm 5°.
- (5) Repeat (1), (2) and (3) for EP (121.500 MHz) and confirm that it is within an error of \pm 5°.

3.10 Wave Check of Balanced Modulation

- (1) Supply SG output, 156.025 MHz CW, 60 dB μ Vemf. Set the main unit to RCV mode and arrange to receive SHIP-60. Connect DUMMY and set V, NS and EW on.
 - (2) Observe and check balanced modulation wave at TP-4 in IF circuit.
 - (3) Repeat (2) for COAST-60 (160.025 MHz) and W-1 (162.550 MHz).
- Note : refer to the below figure for the proper balanced modulation.



4. TEST RECORD SHEET

Model Name	TD-L1550A	Serial No.	
-------------------	-----------	-------------------	--

1. Sensitivity ("RCV" mode)

Signal	Channel	Frequency	Sensitivity	Criteria	Result	
FM	SHIP-60	156.025 MHz	dB	≤ 10 dB	Good	No good
FM	SHIP-88	157.425 MHz	dB	≤ 10 dB	Good	No good
FM	WEATHER 1	162.550 MHz	dB	≤ 10 dB	Good	No good
FM	EP	121.500 MHz	dB	≤ 10 dB	Good	No good

2. Bearing Accuracy ("DF" mode)

Signal	Channel	Frequency	0°	45°	90°	Criteria	Result	
FM	SHIP-60	156.025 MHz				± 3°	Good	No good
FM	SHIP-88	157.425 MHz				± 3°	Good	No good
FM	WEATHER 1	162.550 MHz				± 3°	Good	No good
AM	EP	121.500 MHz				± 5°	Good	No good

3. Function check

	Judgment	
2-1. LED	Good	No good
2-2. Check keys	Good	No good
2-1. LED	Good	No good
2-1. LED	Good	No good
2-2. Check keys	Good	No good

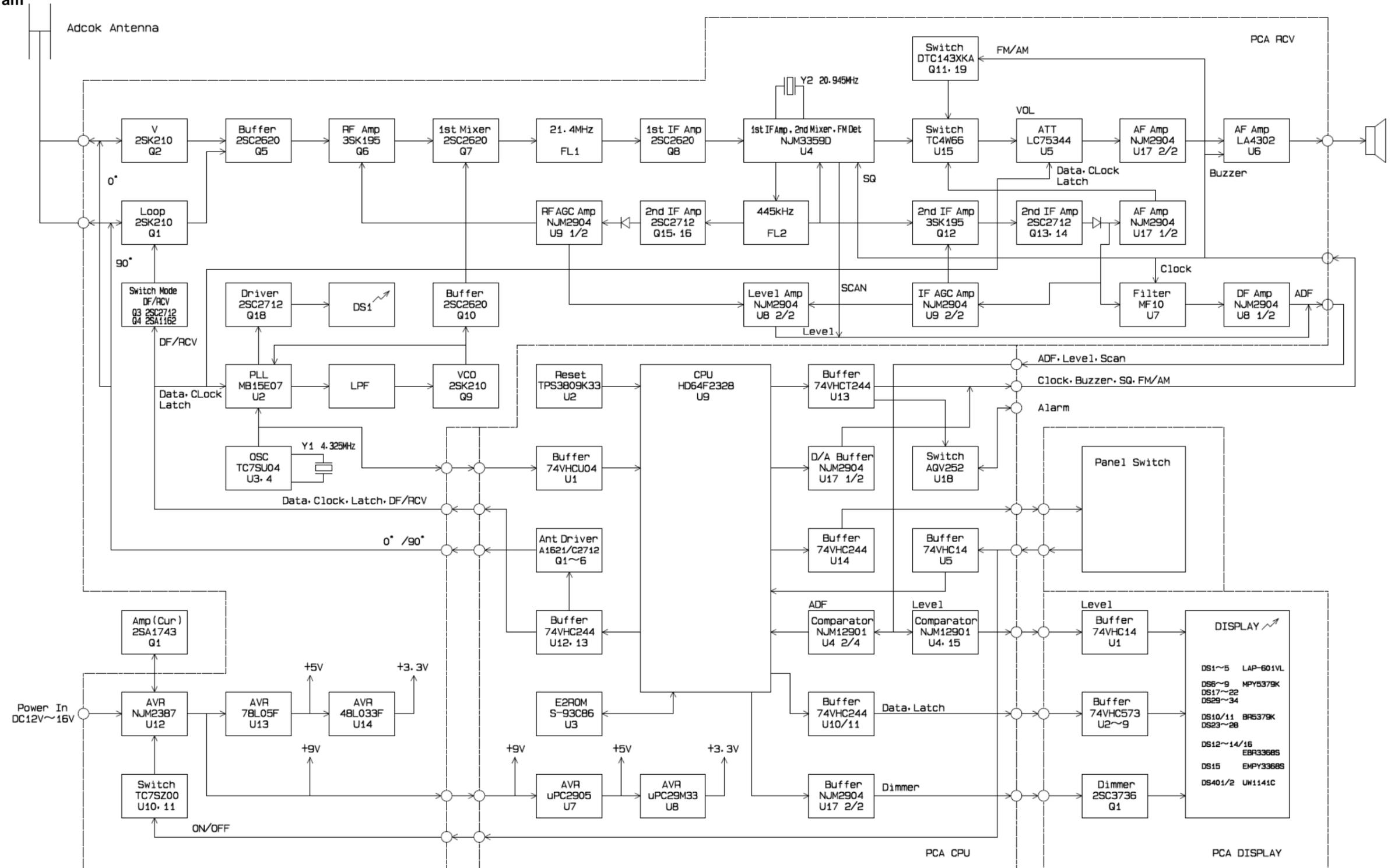
Test Date :

Tested by :

Inspected by :

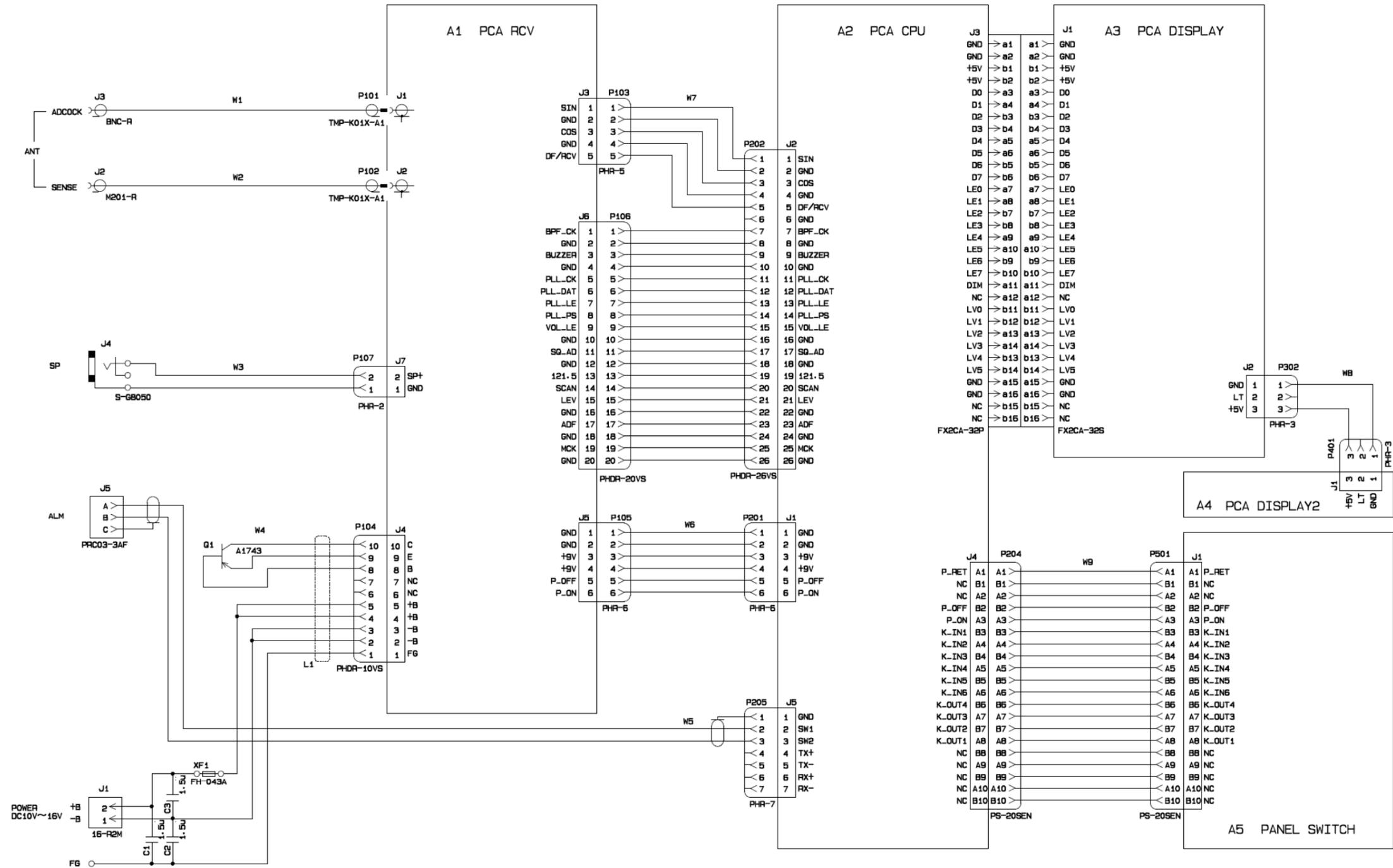
5. DIAGRAMS

5.1 Block Diagram

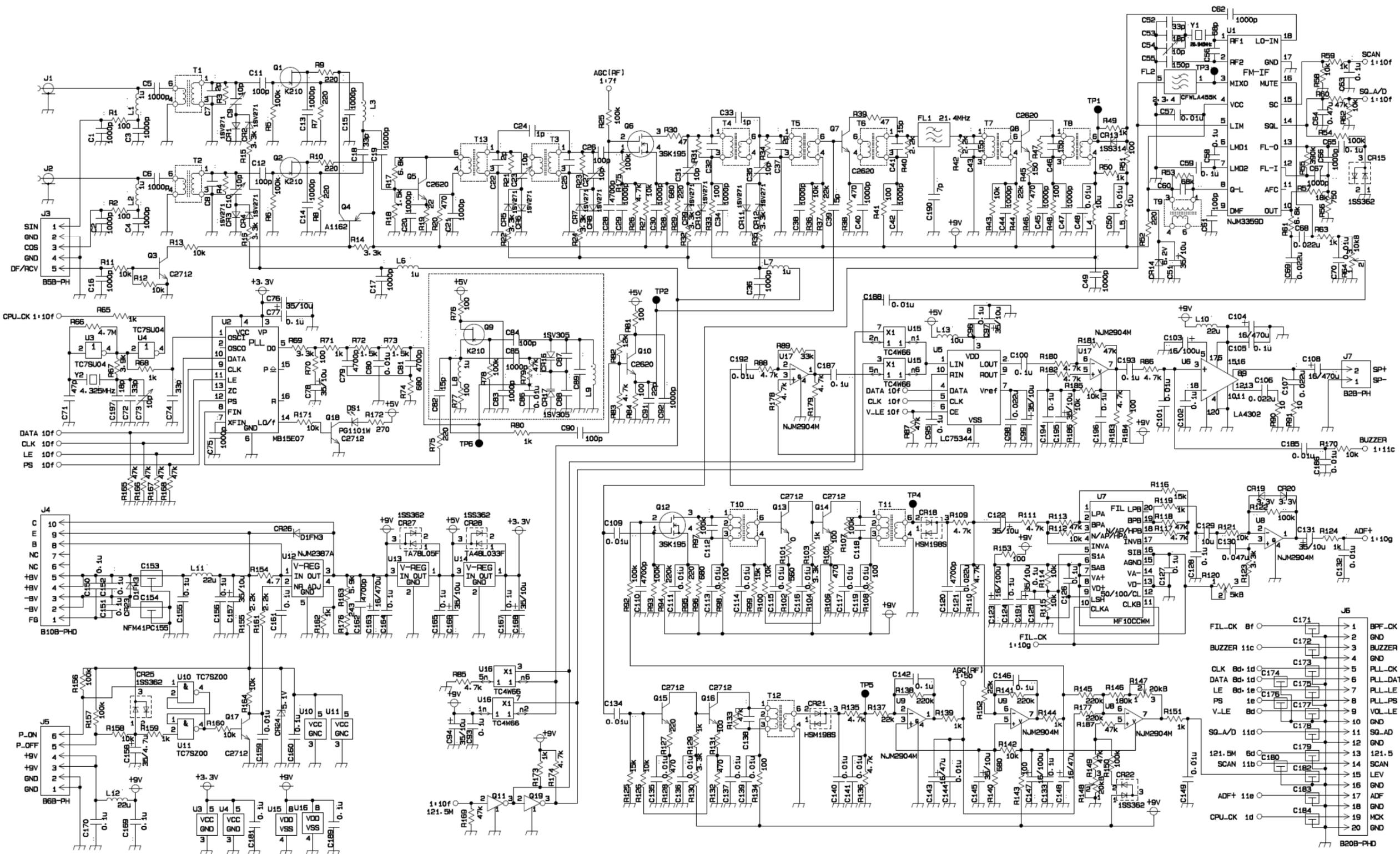


DIVISION	5.1 BLOCK DIAGRAMS
TITLE	BLOCK DIAGRAMS TD-L1550A
DRAWING NO	0 2 0 5 3 4
TAIYO MUSEN CO. LTD	

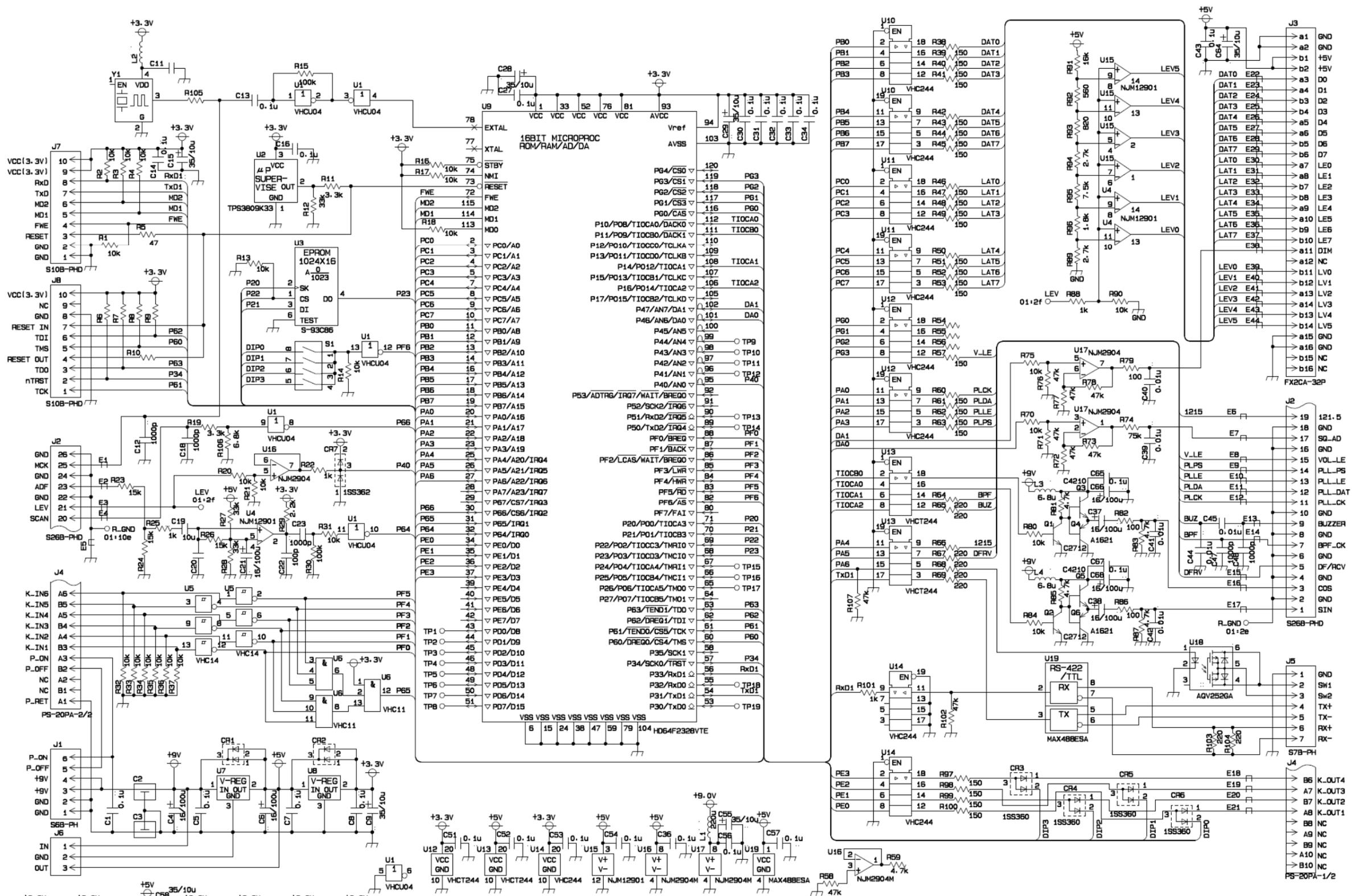
5.2 Connection Diagrams



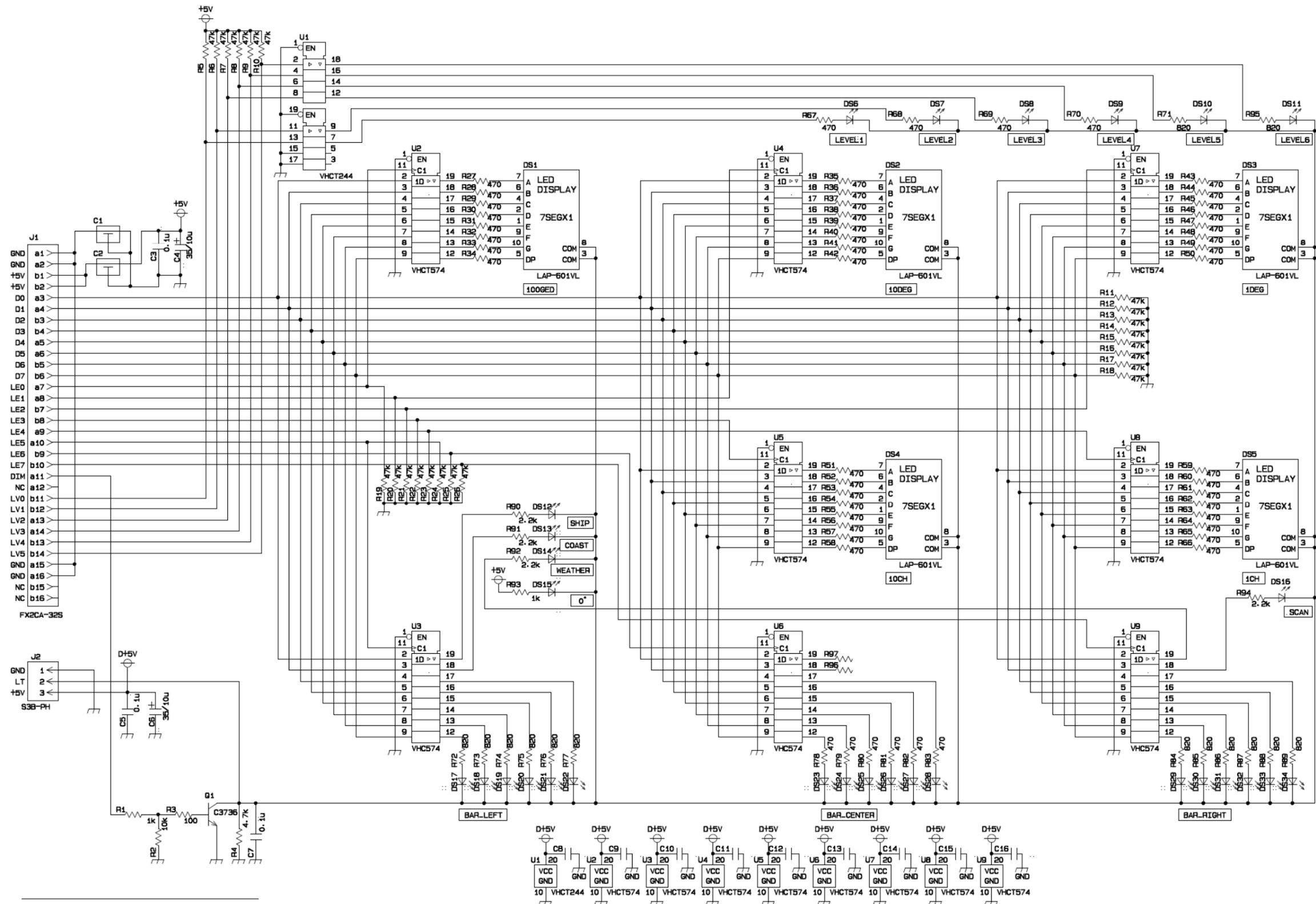
DIVISION	5.2 CONNECTION DIAGRAMS
TITLE	MAIN UNIT
DRAWING NO	3 2 3 9 9 4
TAIYO MUSEN CO.,LTD	



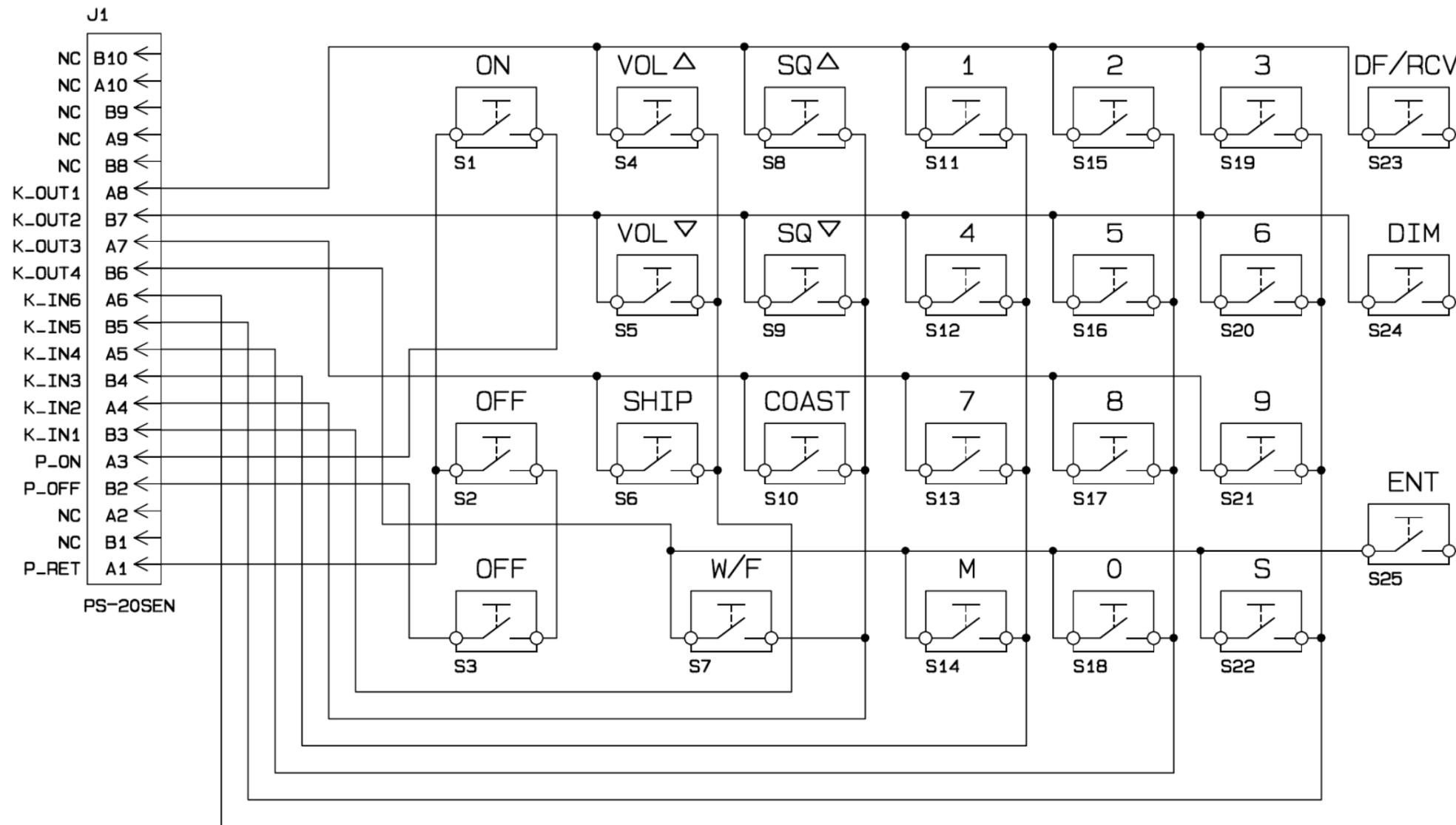
DIVISION	5.2 CONNECTION DIAGRAMS
TITLE	RECIVER UNIT
DRAWING NO	3 2 3 9 9 5
TAIYO MUSEN CO.,LTD	



DIVISION	5.2 CONNECTION DIAGRAMS
TITLE	CPU UNIT
DRAWING NO	3 2 3 9 9 6
TAIYO MUSEN CO. LTD	

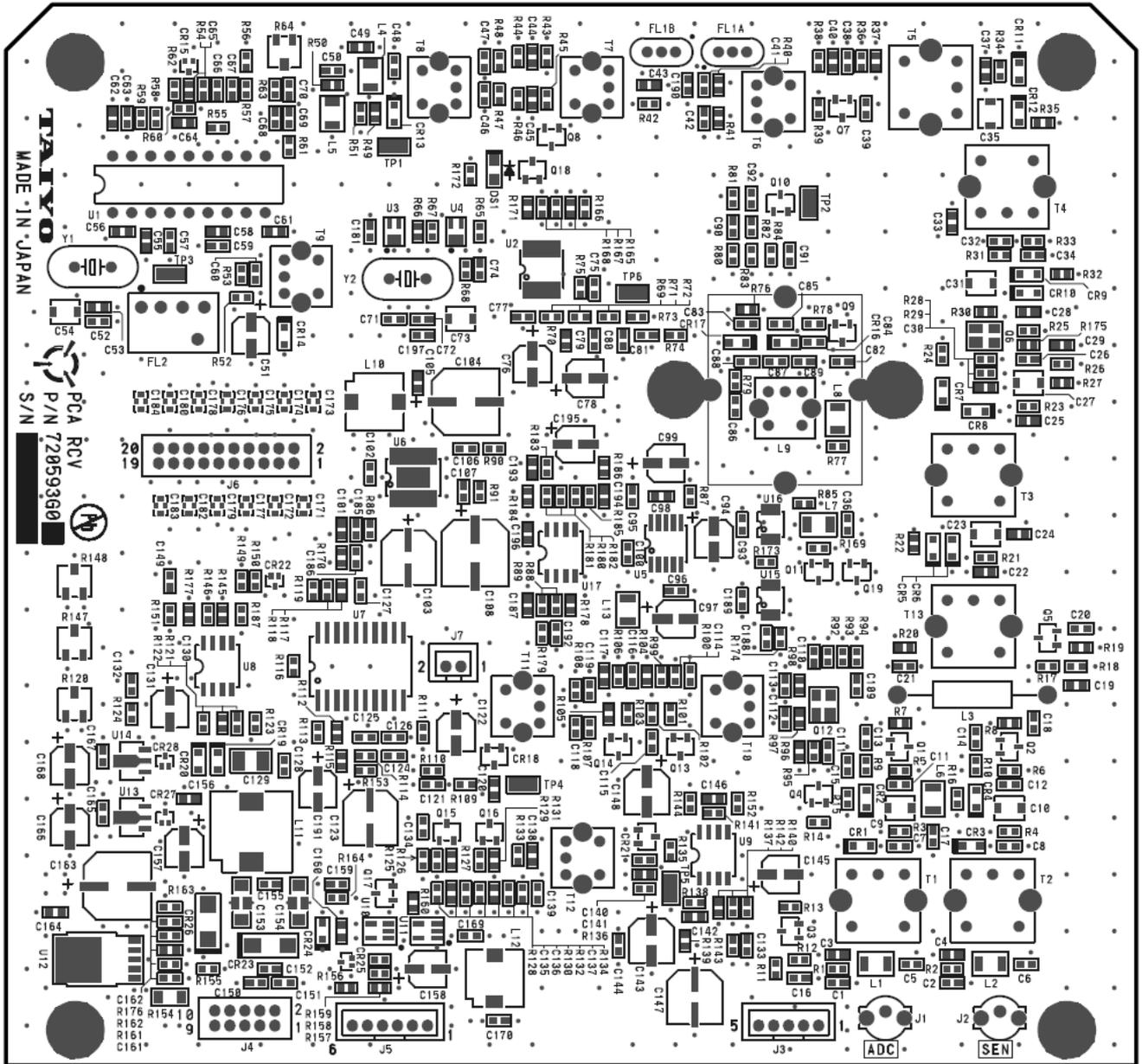


DIVISION	5.2 CONNECTION DIAGRAMS
TITLE	DISPLAY UNIT
DRAWING NO	3 2 3 9 9 7
TAIYO MUSEN CO.,LTD	

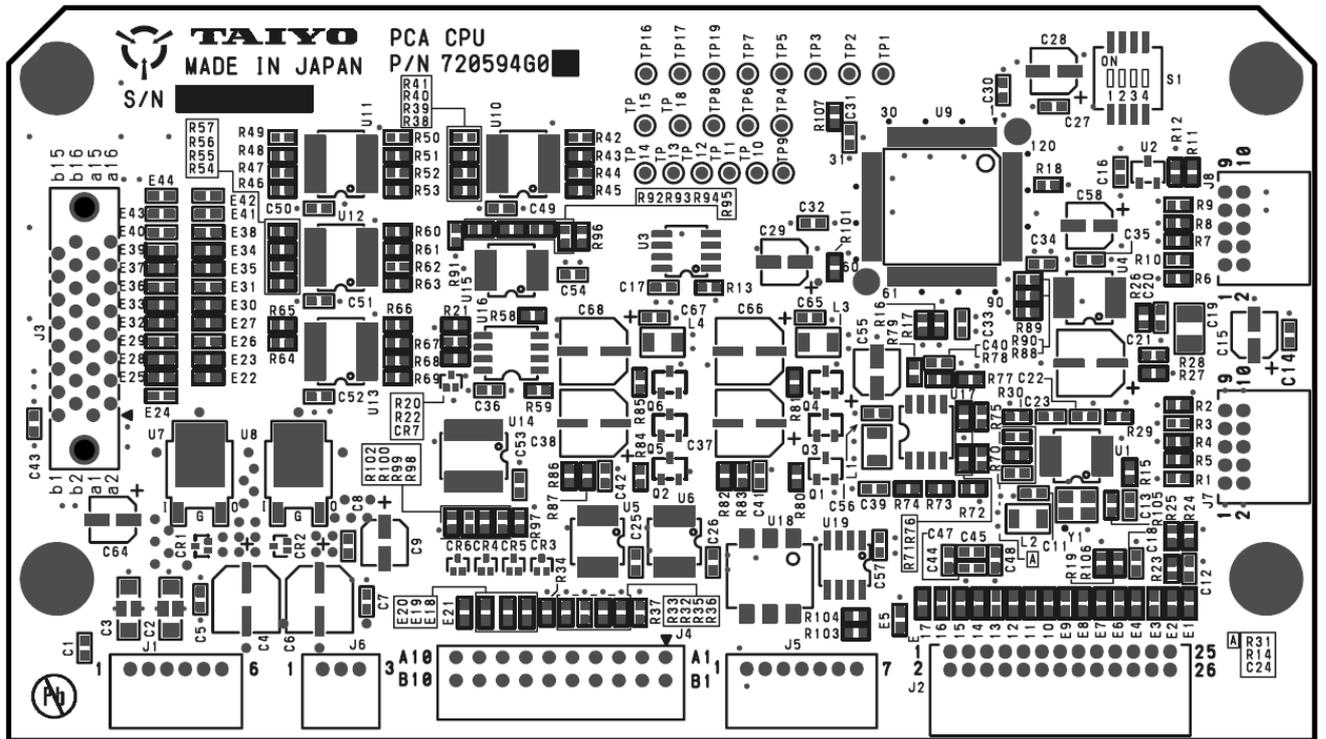


DIVISION	5.2 CONNECTION DIAGRAMS
TITLE	KEYBOARD UNIT
DRAWING NO	3 4 3 4 0 5
TAIYO MUSEN CO.,LTD	

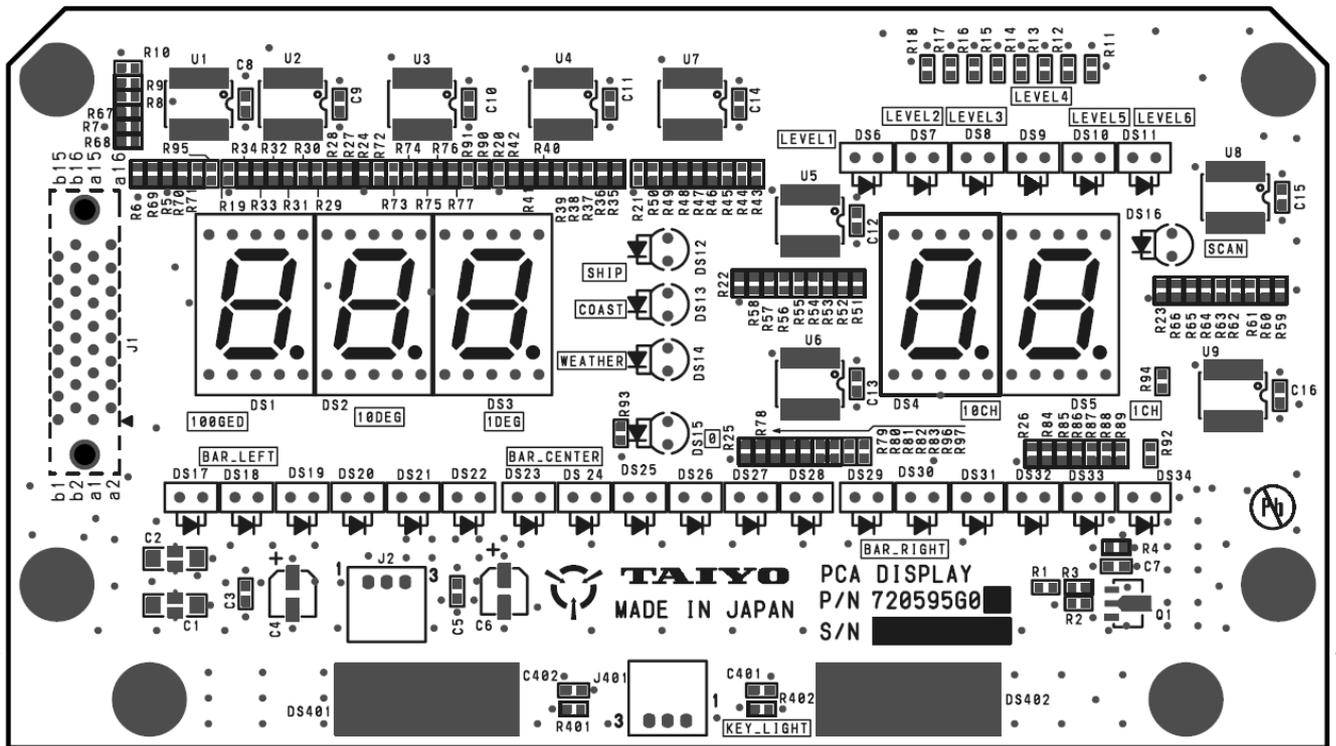
5.3 Layout Diagrams



DIVISION	5.3 LAYOUT DIAGRAMS
TITLE	RECIVER UNIT
DRAWING NO	7 2 0 5 9 3
TAIYO MUSEN CO.,LTD	

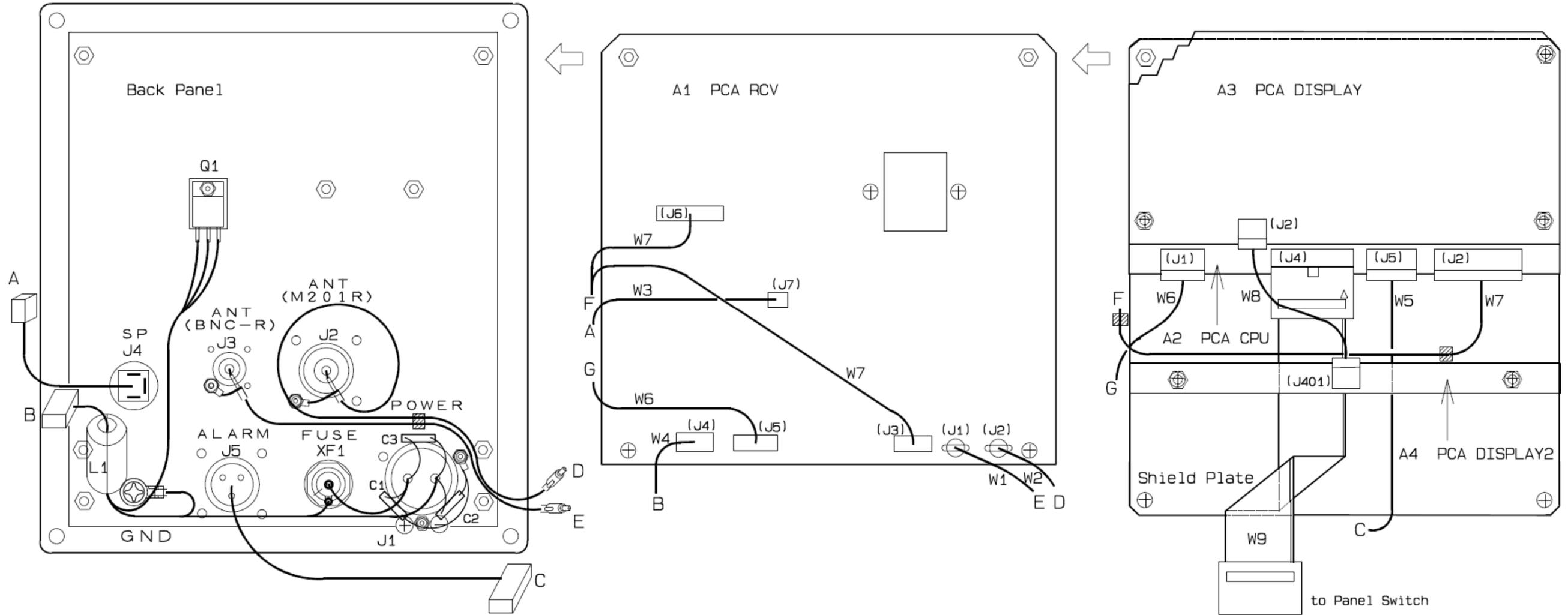


DIVISION	5.3 LAYOUT DIAGRAMS
TITLE	CPU UNIT
DRAWING NO	7 2 0 5 9 4
TAIYO MUSEN CO.,LTD	



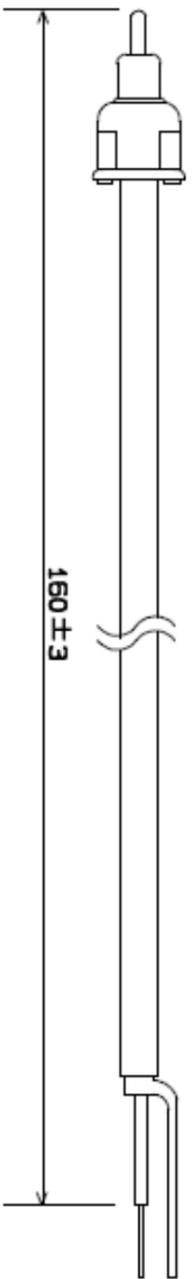
DIVISION	5.3 LAYOUT DIAGRAMS
TITLE	DISPLAY UNIT
DRAWING NO	7 2 0 5 9 5
TAIYO MUSEN CO.,LTD	

5.4 Wiring Diagrams

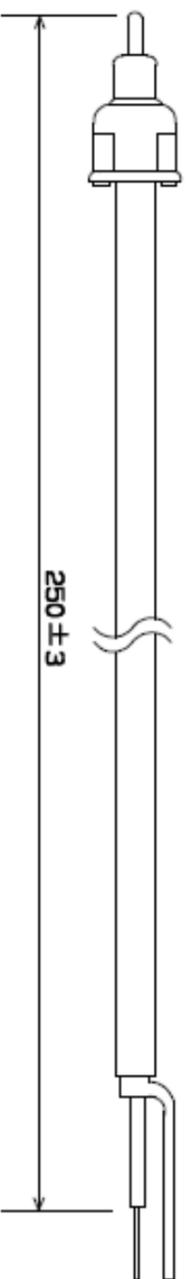


DIVISION	5.4 WIRING DIAGRAMS
TITLE	WIRING DIAGRAM 1/2
DRAWING NO	0 4 4 3 4 6
TAIYO MUSEN CO.,LTD	

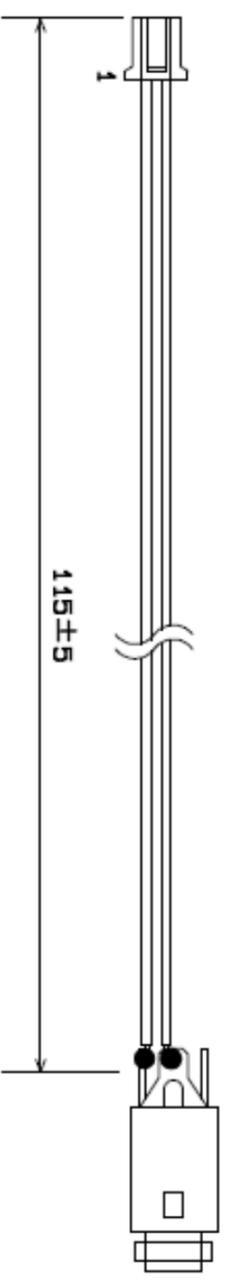
1. W1 ASSY (343407)



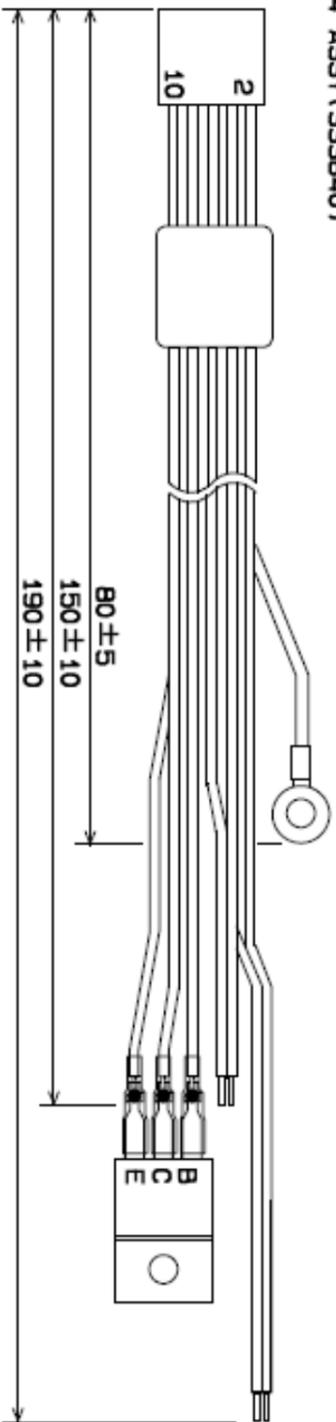
2. W2 ASSY (343408)



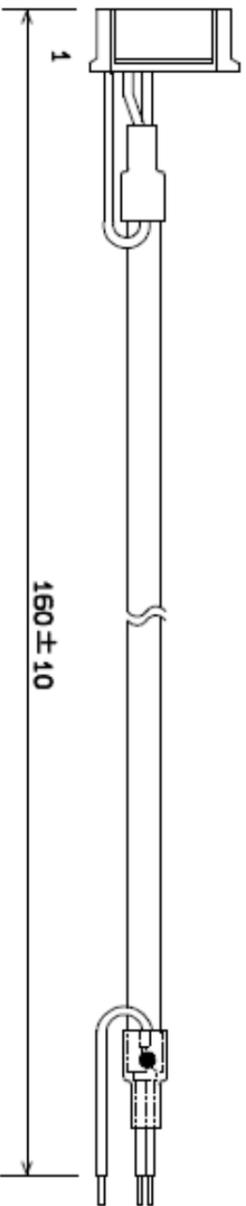
3. W3 ASSY (343409)



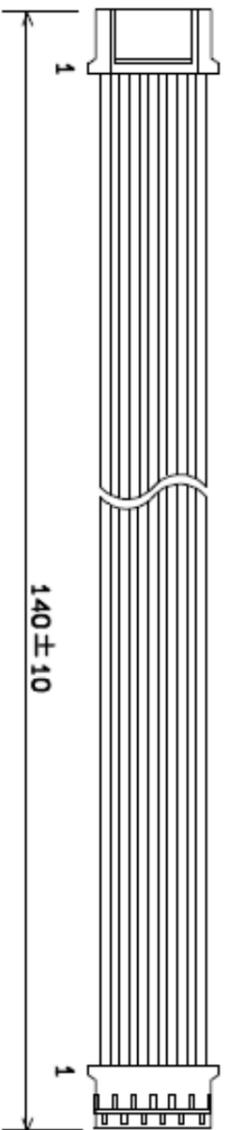
4. W4 ASSY (333840)



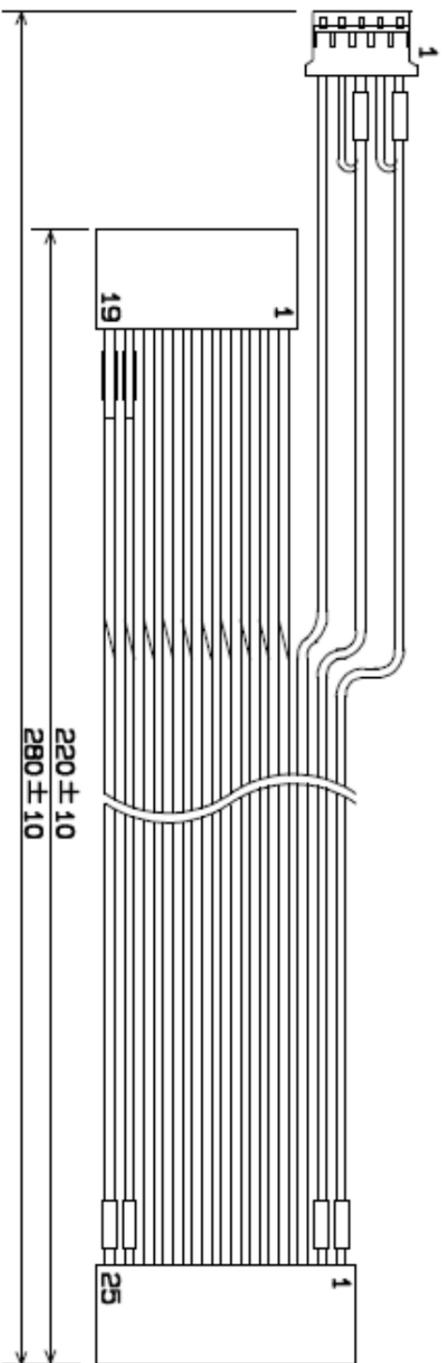
5. W5 ASSY (343410)



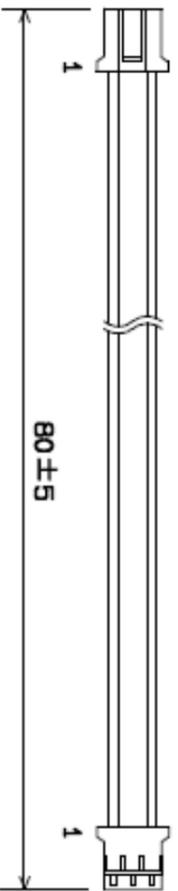
6. W6 ASSY (343411)



7. W7 ASSY (333841)



8. W8 ASSY (343412)



DIVISION	5.4 WIRING DIAGRAMS
TITLE	WIRING DIAGRAM 2/2
DRAWING NO	0 4 4 3 4 6
TAIYO MUSEN CO.,LTD	

6. PARTS LIST

6.1 PCA RCV (720593)

No.	Name	Description	No.	Name	Description
C1	Ceramic capacitor	1000pF,50V	C51	Electrolytic cap.	10μF,35V
C2	Ceramic capacitor	1000pF,50V	C52	Ceramic capacitor	33pF,50V
C3	Ceramic capacitor	1000pF,50V	C53	Ceramic capacitor	18pF,50V
C4	Ceramic capacitor	1000pF,50V	C54	Ceramic trimmer cap.	10pF,25V
C5	Ceramic capacitor	1000pF,50V	C55	Ceramic capacitor	150pF,50V
C6	Ceramic capacitor	1000pF,50V	C56	Ceramic capacitor	68pF,50V
C7	Ceramic capacitor	2pF,50V	C57	Ceramic capacitor	0.01μF,50V
C8	-----		C58	Ceramic capacitor	0.1μF,25V
C9	Ceramic trimmer cap.	10pF,25V	C59	Ceramic capacitor	0.1μF,25V
C10	Ceramic trimmer cap.	10pF,25V	C60	-----	
C11	Ceramic capacitor	100pF,50V	C61	Ceramic capacitor	100pF,50V
C12	Ceramic capacitor	100pF,50V	C62	Ceramic capacitor	1000pF,50V
C13	Ceramic capacitor	1000pF,50V	C63	Ceramic capacitor	0.1μF,25V
C14	Ceramic capacitor	1000pF,50V	C64	Ceramic capacitor	0.47μF,10V
C15	Ceramic capacitor	1000pF,50V	C65	Ceramic capacitor	0.1μF,25V
C16	Ceramic capacitor	1000pF,50V	C66	Ceramic capacitor	1000pF,50V
C17	Ceramic capacitor	1000pF,50V	C67	Ceramic capacitor	1000pF,50V
C18	Ceramic capacitor	33pF,50V	C68	Ceramic capacitor	0.022μF,50V
C19	Ceramic capacitor	1000pF,50V	C69	Ceramic capacitor	0.022μF,50V
C20	Ceramic capacitor	1000pF,50V	C70	Ceramic capacitor	0.01μF,50V
C21	Ceramic capacitor	1000pF,50V	C71	Ceramic capacitor	47pF,50V
C22	Ceramic capacitor	2pF,50V	C72	Ceramic capacitor	33pF,50V
C23	Ceramic trimmer cap.	10pF,25V	C73	Ceramic trimmer cap.	10pF,25V
C24	Ceramic capacitor	1pF,50V	C74	Ceramic capacitor	33pF,50V
C25	-----		C75	Ceramic capacitor	1000pF,50V
C26	Ceramic capacitor	100pF,50V	C76	Electrolytic cap.	10μF,35V
C27	Ceramic trimmer cap.	10pF,25V	C77	Ceramic capacitor	0.1μF,25V
C28	Ceramic capacitor	4700pF,50V	C78	Electrolytic cap.	10μF,35V
C29	Ceramic capacitor	1000pF,50V	C79	Ceramic capacitor	4700pF,50V
C30	Ceramic capacitor	1000pF,50V	C80	Ceramic capacitor	0.01μF,50V
C31	Ceramic trimmer cap.	10pF,25V	C81	Ceramic capacitor	4700pF,50V
C32	-----		C82	Ceramic capacitor	15pF,50V
C33	Ceramic capacitor	1pF,50V	C83	Ceramic capacitor	1000pF,50V
C34	Ceramic capacitor	1000pF,50V	C84	Ceramic capacitor	100pF,50V
C35	Ceramic trimmer cap.	10pF,25V	C85	Ceramic capacitor	1000pF,50V
C36	Ceramic capacitor	1000pF,50V	C86	Ceramic capacitor	0.01μF,50V
C37	Ceramic capacitor	2pF,50V	C87	-----	
C38	Ceramic capacitor	1000pF,50V	C88	-----	
C39	Ceramic capacitor	5pF,50V	C89	-----	
C40	Ceramic capacitor	1000pF,50V	C90	Ceramic capacitor	100pF,50V
C41	Ceramic capacitor	15pF,50V	C91	Ceramic capacitor	22pF,50V
C42	Ceramic capacitor	1000pF,50V	C92	Ceramic capacitor	1000pF,50V
C43	Ceramic capacitor	15pF,50V	C93	Ceramic capacitor	0.1μF,25V
C44	Ceramic capacitor	1000pF,50V	C94	Electrolytic cap.	10μF,35V
C45	Ceramic capacitor	1000pF,50V	C95	Ceramic capacitor	0.1μF,25V
C46	Ceramic capacitor	15pF,50V	C96	Ceramic capacitor	0.1μF,25V
C47	Ceramic capacitor	1000pF,50V	C97	Electrolytic cap.	10μF,35V
C48	Ceramic capacitor	0.01μF,50V	C98	Ceramic capacitor	0.022μF,50V
C49	Ceramic capacitor	1000pF,50V	C99	Electrolytic cap.	10μF,35V
C50	Ceramic capacitor	0.01μF,50V	C100	Ceramic capacitor	0.1μF,25V

6.1 PCA RCV (720593) continued

No.	Name	Description	No.	Name	Description
C101	Ceramic capacitor	0.01 μ F,50V	C151	Ceramic capacitor	0.1 μ F,50V
C102	Ceramic capacitor	0.1 μ F,25V	C152	Ceramic capacitor	0.1 μ F,50V
C103	Electrolytic cap.	100 μ F,16V	C153	EMI Filter(cap.)	NFM41PC155B Murata
C104	Electrolytic cap.	470 μ F,16V	C154	EMI Filter(cap.)	NFM41PC155B Murata
C105	Ceramic capacitor	0.1 μ F,25V	C155	Ceramic capacitor	0.1 μ F,50V
C106	Ceramic capacitor	0.022 μ F,50V	C156	Ceramic capacitor	0.1 μ F,50V
C107	Ceramic capacitor	0.022 μ F,50V	C157	Electrolytic cap.	10 μ F,35V
C108	Electrolytic cap.	470 μ F,16V	C158	Electrolytic cap.	4.7 μ F,35V
C109	Ceramic capacitor	0.01 μ F,50V	C159	Ceramic capacitor	0.01 μ F,50V
C110	Ceramic capacitor	4700pF,50V	C160	Ceramic capacitor	0.1 μ F,25V
C111	Ceramic capacitor	0.01 μ F,50V	C161	Ceramic capacitor	0.1 μ F,50V
C112	-----		C162	Ceramic capacitor	4700pF,50V
C113	Ceramic capacitor	0.01 μ F,50V	C163	Electrolytic cap.	470 μ F,16V
C114	Ceramic capacitor	0.01 μ F,50V	C164	Ceramic capacitor	0.1 μ F,25V
C115	Ceramic capacitor	0.01 μ F,50V	C165	Ceramic capacitor	0.1 μ F,25V
C116	Ceramic capacitor	0.01 μ F,50V	C166	Electrolytic cap.	10 μ F,35V
C117	Ceramic capacitor	0.01 μ F,50V	C167	Ceramic capacitor	0.1 μ F,25V
C118	-----		C168	Electrolytic cap.	10 μ F,35V
C119	Ceramic capacitor	0.01 μ F,50V	C169	Ceramic capacitor	0.1 μ F,25V
C120	Ceramic capacitor	4700pF,50V	C170	Ceramic capacitor	0.1 μ F,25V
C121	Ceramic capacitor	0.022 μ F,50V	C171	EMI Filter(cap.)	NFM21CC102R Murata
C122	Electrolytic cap.	10 μ F,35V	C172	EMI Filter(cap.)	NFM21CC102R Murata
C123	Electrolytic cap.	100 μ F,16V	C173	EMI Filter(cap.)	NFM21CC102R Murata
C124	Ceramic capacitor	0.1 μ F,25V	C174	EMI Filter(cap.)	NFM21CC102R Murata
C125	Ceramic capacitor	0.1 μ F,25V	C175	EMI Filter(cap.)	NFM21CC102R Murata
C126	Ceramic capacitor	0.1 μ F,25V	C176	EMI Filter(cap.)	NFM21CC102R Murata
C127	Ceramic capacitor	0.1 μ F,25V	C177	EMI Filter(cap.)	NFM21CC102R Murata
C128	Ceramic capacitor	0.1 μ F,25V	C178	EMI Filter(cap.)	NFM21CC102R Murata
C129	Ceramic capacitor	10 μ F,25V	C179	EMI Filter(cap.)	NFM21CC102R Murata
C130	Ceramic capacitor	0.047 μ F,50V	C180	EMI Filter(cap.)	NFM21CC102R Murata
C131	Electrolytic cap.	10 μ F,35V	C181	Ceramic capacitor	0.1 μ F,25V
C132	Ceramic capacitor	0.01 μ F,50V	C182	EMI Filter(cap.)	NFM21CC102R Murata
C133	Ceramic capacitor	0.1 μ F,25V	C183	EMI Filter(cap.)	NFM21CC102R Murata
C134	Ceramic capacitor	0.01 μ F,50V	C184	EMI Filter(cap.)	NFM21CC102R Murata
C135	Ceramic capacitor	0.01 μ F,50V	C185	Ceramic capacitor	0.01 μ F,50V
C136	Ceramic capacitor	0.01 μ F,50V	C186	Ceramic capacitor	0.01 μ F,50V
C137	Ceramic capacitor	0.01 μ F,50V	C187	Ceramic capacitor	0.1 μ F,25V
C138	-----		C188	Ceramic capacitor	0.01 μ F,50V
C139	Ceramic capacitor	0.01 μ F,50V	C189	Ceramic capacitor	0.1 μ F,25V
C140	Ceramic capacitor	0.01 μ F,50V	C190	Ceramic capacitor	7pF,50V
C141	Ceramic capacitor	0.01 μ F,50V	C191	Electrolytic cap.	10 μ F,35V
C142	Ceramic capacitor	0.1 μ F,25V	C192	Ceramic capacitor	0.01 μ F,50V
C143	Electrolytic cap.	47 μ F,16V	C193	Ceramic capacitor	0.1 μ F,25V
C144	Ceramic capacitor	0.01 μ F,50V	C194	Ceramic capacitor	0.1 μ F,25V
C145	Electrolytic cap.	10 μ F,35V	C195	Electrolytic cap.	10 μ F,35V
C146	Ceramic capacitor	0.1 μ F,25V	C196	Ceramic capacitor	0.1 μ F,25V
C147	Electrolytic cap.	100 μ F,16V	C197	Ceramic capacitor	18pF,50V
C148	Electrolytic cap.	47 μ F,16V			
C149	Ceramic capacitor	0.01 μ F,50V			
C150	Ceramic capacitor	0.1 μ F,50V			

6.1 PCA RCV (720593) continued

No.	Name	Description	No.	Name	Description
CR1	Diode	1SV271 Toshiba	CR16	Vari.Cap.Diode	1SV305 Toshiba
CR2	Diode	1SV271 Toshiba	CR17	Vari.Cap.Diode	1SV305 Toshiba
CR3	Diode	1SV271 Toshiba	CR18	Diode	HSM198S Renesas
CR4	Diode	1SV271 Toshiba	CR19	Zener Diode	02DZ3.3X Toshiba
CR5	Diode	1SV271 Toshiba	CR20	Zener Diode	02DZ3.3X Toshiba
CR6	Diode	1SV271 Toshiba	CR21	Diode	HSM198S Renesas
CR7	Diode	1SV271 Toshiba	CR22	Diode	1SS362 Toshiba
CR8	Diode	1SV271 Toshiba	CR23	Diode	D1FM3 Shindengen
CR9	Diode	1SV271 Toshiba	CR24	Zener Diode	02DZ5.1Y Toshiba
CR10	Diode	1SV271 Toshiba	CR25	Diode	1SS362 Toshiba
CR11	Diode	1SV271 Toshiba	CR26	Diode	D1FM3 Shindengen
CR12	Diode	1SV271 Toshiba	CR27	Diode	1SS362 Toshiba
CR13	Diode	1SS314 Toshiba	CR28	Diode	1SS362 Toshiba
CR14	Zener Diode	02DZ6.2Y Toshiba			
CR15	Diode	1SS362 Toshiba			

No.	Name	Description	No.	Name	Description
DS1	LED	PG1101W			

No.	Name	Description	No.	Name	Description
FL1	Crystal Filter	21.4MHz(Pair)	FL2	Ceramic Filter	455kHz

No.	Name	Description	No.	Name	Description
J1	Coaxial Connector	TMP-J01X-V6	J5	PH Connector	B6B-PH-K-S
J2	Coaxial Connector	TMP-J01X-V6	J6	PHD Connector	B20B-PHDSS
J3	PH Connector	B5B-PH-K-S	J7	PH Connector	B2B-PH-K-S
J4	PHD Connector	B10B-PHDSS			

No.	Name	Description	No.	Name	Description
L1	Inductor	1 μ H	L8	Inductor	10 μ H
L2	Inductor	1 μ H	L9	Inductor	OSC Coil(292)
L3	Inductor	P.Shift Coil(364)	L10	Inductor	22 μ H
L4	Inductor	10 μ H	L11	Inductor	22 μ H
L5	Inductor	10 μ H	L12	Inductor	22 μ H
L6	Inductor	10 μ H	L13	Inductor	10 μ H
L7	Inductor	10 μ H			

No.	Name	Description	No.	Name	Description
Q1	Transistor	2SK210 Toshiba	Q11	Transistor	DTC143XKA Rohm
Q2	Transistor	2SK210 Toshiba	Q12	Transistor	3SK195 Toshiba
Q3	Transistor	2SC2712 Toshiba	Q13	Transistor	2SC2712 Toshiba
Q4	Transistor	2SA1162 Toshiba	Q14	Transistor	2SC2712 Toshiba
Q5	Transistor	2SC2620 Renesas	Q15	Transistor	2SC2712 Toshiba
Q6	Transistor	3SK195 Toshiba	Q16	Transistor	2SC2712 Toshiba
Q7	Transistor	2SC2620 Renesas	Q17	Transistor	2SC2712 Toshiba
Q8	Transistor	2SC2620 Renesas	Q18	Transistor	2SC2712 Toshiba
Q9	Transistor	2SK210 Toshiba	Q19	Transistor	DTC143XKA Rohm
Q10	Transistor	2SC2620 Renesas			

6.1 PCA RCV (720593) continued

No.	Name	Description	No.	Name	Description
R1	Resistor	100Ω 0.1W 50V	R51	Resistor	100Ω 0.1W 50V
R2	Resistor	100Ω 0.1W 50V	R52	Resistor	220Ω 0.1W 50V
R3	-----		R53	Resistor	68kΩ 0.1W 50V
R4	-----		R54	Resistor	100kΩ 0.1W 50V
R5	Resistor	100kΩ 0.1W 50V	R55	Resistor	390kΩ 0.1W 50V
R6	Resistor	100kΩ 0.1W 50V	R56	Resistor	750Ω 0.1W 50V
R7	Resistor	220Ω 0.1W 50V	R57	Resistor	18kΩ 0.1W 50V
B8	Resistor	220Ω 0.1W 50V	R58	Resistor	10kΩ 0.1W 50V
R9	Resistor	220Ω 0.1W 50V	R59	Resistor	1kΩ 0.1W 50V
R10	Resistor	220Ω 0.1W 50V	R60	Resistor	47kΩ 0.1W 50V
R11	Resistor	10kΩ 0.1W 50V	R61	Resistor	6.8kΩ 0.1W 50V
R12	Resistor	10kΩ 0.1W 50V	R62	Resistor	10kΩ 0.1W 50V
R13	Resistor	10kΩ 0.1W 50V	R63	Resistor	1kΩ 0.1W 50V
R14	Resistor	3.3kΩ 0.1W 50V	R64	Variable Resistor	10kΩ 1/4W
R15	Resistor	3.3kΩ 0.1W 50V	R65	Resistor	1kΩ 0.1W 50V
R16	Resistor	3.3kΩ 0.1W 50V	R66	Resistor	4.7MΩ 0.1W 50V
R17	Resistor	6.8kΩ 0.1W 50V	R67	Resistor	3.9kΩ 0.1W 50V
R18	Resistor	1.5kΩ 0.1W 50V	R68	Resistor	1kΩ 0.1W 50V
R19	Resistor	22Ω 0.1W 50V	R69	Resistor	3.3kΩ 0.1W 50V
R20	Resistor	470Ω 0.1W 50V	R70	Resistor	100Ω 0.1W 50V
R21	-----		R71	Resistor	1kΩ 0.1W 50V
R22	Resistor	3.3kΩ 0.1W 50V	R72	Resistor	1.5kΩ 0.1W 50V
R23	-----		R73	Resistor	1.5kΩ 0.1W 50V
R24	Resistor	3.3kΩ 0.1W 50V	R74	Resistor	680Ω 0.1W 50V
R25	Resistor	100kΩ 0.1W 50V	R75	Resistor	220Ω 0.1W 50V
R26	Resistor	4.7kΩ 0.1W 50V	R76	Resistor	100Ω 0.1W 50V
R27	Resistor	10kΩ 0.1W 50V	R77	Resistor	100Ω 0.1W 50V
R28	Resistor	680Ω 0.1W 50V	R78	Resistor	100kΩ 0.1W 50V
R29	Resistor	220Ω 0.1W 50V	R79	Resistor	47kΩ 0.1W 50V
R30	Resistor	47Ω 0.1W 50V	R80	Resistor	1kΩ 0.1W 50V
R31	-----		R81	Resistor	100Ω 0.1W 50V
R32	Resistor	3.3kΩ 0.1W 50V	R82	Resistor	12kΩ 0.1W 50V
R33	Resistor	100Ω 0.1W 50V	R83	Resistor	4.7kΩ 0.1W 50V
R34	-----		R84	Resistor	100Ω 0.1W 50V
R35	Resistor	3.3kΩ 0.1W 50V	R85	Resistor	4.7kΩ 0.1W 50V
R36	Resistor	10kΩ 0.1W 50V	R86	Resistor	4.7kΩ 0.1W 50V
R37	Resistor	22kΩ 0.1W 50V	R87	Resistor	47kΩ 0.1W 50V
R38	Resistor	470Ω 0.1W 50V	R88	Resistor	4.7kΩ 0.1W 50V
R39	Resistor	47Ω 0.1W 50V	R89	Resistor	33kΩ 0.1W 50V
R40	Resistor	2.2kΩ 0.1W 50V	R90	Resistor	100Ω 0.1W 50V
R41	Resistor	100Ω 0.1W 50V	R91	Resistor	100Ω 0.1W 50V
R42	Resistor	2.2kΩ 0.1W 50V	R92	Resistor	100kΩ 0.1W 50V
R43	Resistor	10kΩ 0.1W 50V	R93	Resistor	100kΩ 0.1W 50V
R44	Resistor	22kΩ 0.1W 50V	R94	Resistor	220kΩ 0.1W 50V
R45	Resistor	150Ω 0.1W 50V	R95	Resistor	220Ω 0.1W 50V
R46	Resistor	470Ω 0.1W 50V	R96	Resistor	680Ω 0.1W 50V
R47	-----		R97	Resistor	100kΩ 0.1W 50V
R48	Resistor	100Ω 0.1W 50V	R98	Resistor	100Ω 0.1W 50V
R49	Resistor	1kΩ 0.1W 50V	R99	Resistor	15kΩ 0.1W 50V
R50	Resistor	1kΩ 0.1W 50V	R100	Resistor	10kΩ 0.1W 50V

6.1 PCA RCV (720593) continued

No.	Name	Description	No.	Name	Description
R101	Resistor	0Ω 0.1W 50V	R151	Resistor	1kΩ 0.1W 50V
R102	Resistor	560Ω 0.1W 50V	R152	Resistor	22kΩ 0.1W 50V
R103	Resistor	1kΩ 0.1W 50V	R153	Resistor	100Ω 0.1W 50V
R104	Resistor	3.3kΩ 0.1W 50V	R154	Resistor	4.7Ω 0.1W 50V
R105	Resistor	100Ω 0.1W 50V	R155	Resistor	2.2kΩ 0.1W 50V
R106	Resistor	470Ω 0.1W 50V	R156	Resistor	100kΩ 0.1W 50V
R107	Resistor	100kΩ 0.1W 50V	R157	Resistor	100kΩ 0.1W 50V
R108	Resistor	100Ω 0.1W 50V	R158	Resistor	10kΩ 0.1W 50V
R109	Resistor	4.7kΩ 0.1W 50V	R159	Resistor	1kΩ 0.1W 50V
R110	Resistor	4.7kΩ 0.1W 50V	R160	Resistor	10kΩ 0.1W 50V
R111	Resistor	4.7kΩ 0.1W 50V	R161	Resistor	2.2kΩ 0.1W 50V
R112	Resistor	10kΩ 0.1W 50V	R162	Resistor	1kΩ±1% 0.1W 50V
R113	Resistor	47kΩ 0.1W 50V	R163	Resistor	5.9kΩ±1% 0.1W 50V
R114	Resistor	10kΩ 0.1W 50V	R164	Resistor	10kΩ 0.1W 50V
R115	Resistor	10kΩ 0.1W 50V	R165	Resistor	47kΩ 0.1W 50V
R116	Resistor	15kΩ 0.1W 50V	R166	Resistor	47kΩ 0.1W 50V
R117	Resistor	4.7kΩ 0.1W 50V	R167	Resistor	47kΩ 0.1W 50V
R118	Resistor	47kΩ 0.1W 50V	R168	Resistor	47kΩ 0.1W 50V
R119	Resistor	1kΩ 0.1W 50V	R169	Resistor	47kΩ 0.1W 50V
R120	Variable Resistor	5kΩ 1/4W	R170	Resistor	10kΩ 0.1W 50V
R121	Resistor	10kΩ 0.1W 50V	R171	Resistor	10kΩ 0.1W 50V
R122	Resistor	100kΩ 0.1W 50V	R172	Resistor	270Ω 0.1W 50V
R123	Resistor	3.3kΩ 0.1W 50V	R173	Resistor	1kΩ 0.1W 50V
R124	Resistor	1kΩ 0.1W 50V	R174	Resistor	4.7kΩ 0.1W 50V
R125	Resistor	15kΩ 0.1W 50V	R175	Resistor	100kΩ 0.1W 50V
R126	Resistor	10kΩ 0.1W 50V	R176	Resistor	243Ω±1% 0.1W 50V
R127	Resistor	220Ω 0.1W 50V	R177	Resistor	220kΩ 0.1W 50V
R128	Resistor	470Ω 0.1W 50V	R178	Resistor	4.7kΩ 0.1W 50V
R129	Resistor	1kΩ 0.1W 50V	R179	Resistor	4.7kΩ 0.1W 50V
R130	Resistor	3.3kΩ 0.1W 50V	R180	Resistor	4.7kΩ 0.1W 50V
R131	Resistor	100Ω 0.1W 50V	R181	Resistor	47kΩ 0.1W 50V
R132	Resistor	470Ω 0.1W 50V	R182	Resistor	4.7kΩ 0.1W 50V
R133	Resistor	47kΩ 0.1W 50V	R183	Resistor	4.7kΩ 0.1W 50V
R134	Resistor	100Ω 0.1W 50V	R184	Resistor	100Ω 0.1W 50V
R135	Resistor	4.7kΩ 0.1W 50V	R185	Resistor	10kΩ 0.1W 50V
R136	Resistor	4.7kΩ 0.1W 50V	R186	Resistor	10kΩ 0.1W 50V
R137	Resistor	22kΩ 0.1W 50V	R187	Resistor	47kΩ 0.1W 50V
R138	Resistor	220kΩ 0.1W 50V			
R139	Resistor	1kΩ 0.1W 50V			
R140	Resistor	680Ω 0.1W 50V			
R141	Resistor	220kΩ 0.1W 50V			
R142	Resistor	10kΩ 0.1W 50V			
R143	Resistor	100Ω 0.1W 50V			
R144	Resistor	1kΩ 0.1W 50V			
R145	Resistor	220kΩ 0.1W 50V			
R146	Resistor	180kΩ 0.1W 50V			
R147	Variable Resistor	20kΩ 1/4W			
R148	Variable Resistor	20kΩ 1/4W			
R149	Resistor	47kΩ 0.1W 50V			
R150	Resistor	100kΩ 0.1W 50V			

6.1 PCA RCV (720593) continued

No.	Name	Description	No.	Name	Description
T1	HF Transformer	150MHz(021)	T8	IF Transformer	21.4MHz(291)
T2	HF Transformer	150MHz(021)	T9	IF Transformer	455kHz(305)
T3	HF Transformer	150MHz(021)	T10	IF Transformer	455kHz(305)
T4	HF Transformer	150MHz(021)	T11	IF Transformer	455kHz(306)
T5	HF Transformer	150MHz(021)	T12	IF Transformer	455kHz(306)
T6	IF Transformer	21.4MHz(291)	T13	HF Transformer	150MHz(021)
T7	IF Transformer	21.4MHz(291)			

No.	Name	Description	No.	Name	Description
TP1	Check Terminal	HK-2-S	TP4	Check Terminal	HK-2-S
TP2	Check Terminal	HK-2-S	TP5	Check Terminal	HK-2-S
TP3	Check Terminal	HK-2-S	TP6	Check Terminal	HK-2-S

No.	Name	Description	No.	Name	Description
U1	IC	NJM3359D JRC	U11	IC	TC7SZ00F Toshiba
U2	IC	MB15E07PFV Fujitu	U12	IC	NJM2387ADL NJRC
U3	IC	TC7SU04F Toshiba	U13	IC	TA78L05F Toshiba
U4	IC	TC7SU04F Toshiba	U14	IC	TA48L033F Toshiba
U5	IC	LC75344M Sanyo	U15	IC	TC4W66F Toshiba
U6	IC	LA4302T Sanyo	U16	IC	TC4W66F Toshiba
U7	IC	MF10CCWM Natio.Semi	U17	IC	NJM2904M NJRC
U8	IC	NJM2904M NJRC			
U9	IC	NJM2904M NJRC			
U10	IC	TC7SZ00F Toshiba			

No.	Name	Description	No.	Name	Description
Y1	Crystal OSC	HC49/U 20.945MHz	Y2	Crystal OSC	HC43/U 4.325MHz

6.2 PCA CPU (720594)

No.	Name	Description	No.	Name	Description
C1	Ceramic capacitor	0.1µF,25V	C36	Ceramic capacitor	0.1µF,25V
C2	EMI Filter(cap.)	NFM41PC155B Murata	C37	Electrolytic cap.	100µF,16V
C3	EMI Filter(cap.)	NFM41PC155B Murata	C38	Electrolytic cap.	100µF,16V
C4	Electrolytic cap.	100µF,16V	C39	Ceramic capacitor	0.01µF,50V
C5	Ceramic capacitor	0.1µF,25V	C40	Ceramic capacitor	0.01µF,50V
C6	Electrolytic cap.	100µF,16V	C41	Ceramic capacitor	0.01µF,50V
C7	Ceramic capacitor	0.1µF,25V	C42	Ceramic capacitor	0.01µF,50V
C8	Ceramic capacitor	0.1µF,25V	C43	Ceramic capacitor	0.01µF,50V
C9	Electrolytic cap.	10µF,35V	C44	Ceramic capacitor	0.01µF,50V
C10	-----		C45	Ceramic capacitor	0.01µF,50V
C11	-----		C46	-----	
C12	Ceramic capacitor	1000pF,50V	C47	Ceramic capacitor	1000pF,50V
C13	Ceramic capacitor	0.1µF,25V	C48	Ceramic capacitor	1000pF,50V
C14	Ceramic capacitor	0.1µF,25V	C49	Ceramic capacitor	0.1µF,25V
C15	Electrolytic cap.	10µF,35V	C50	Ceramic capacitor	0.1µF,25V
C16	Ceramic capacitor	0.1µF,25V	C51	Ceramic capacitor	0.1µF,25V
C17	Ceramic capacitor	0.1µF,25V	C52	Ceramic capacitor	0.1µF,25V
C18	Ceramic capacitor	1000pF,50V	C53	Ceramic capacitor	0.1µF,25V
C19	Ceramic capacitor	10µF,25V	C54	Ceramic capacitor	0.1µF,25V
C20	Ceramic capacitor	0.1µF,25V	C55	Electrolytic cap.	10µF,35V
C21	Electrolytic cap.	100µF,16V	C56	Ceramic capacitor	0.1µF,25V
C22	Ceramic capacitor	100pF,50V	C57	Ceramic capacitor	0.1µF,25V
C23	Ceramic capacitor	1000pF,50V	C58	Electrolytic cap.	10µF,35V
C24	Ceramic capacitor	0.1µF,25V	C59	-----	
C25	Ceramic capacitor	0.1µF,25V	C60	-----	
C26	Ceramic capacitor	0.1µF,25V	C61	-----	
C27	Ceramic capacitor	0.1µF,25V	C62	-----	
C28	Electrolytic cap.	10µF,35V	C63	-----	
C29	Electrolytic cap.	10µF,35V	C64	Electrolytic cap.	10µF,35V
C30	Ceramic capacitor	0.1µF,25V	C65	Ceramic capacitor	0.1µF,25V
C31	Ceramic capacitor	0.1µF,25V	C66	Electrolytic cap.	100µF,16V
C32	Ceramic capacitor	0.1µF,25V	C67	Ceramic capacitor	0.1µF,25V
C33	Ceramic capacitor	0.1µF,25V	C68	Electrolytic cap.	100µF,16V
C34	Ceramic capacitor	0.1µF,25V			
C35	Ceramic capacitor	0.1µF,25V			

No.	Name	Description	No.	Name	Description
CR1	Diode	1SS361 Toshiba	CR5	Diode	1SS360 Toshiba
CR2	Diode	1SS361 Toshiba	CR6	Diode	1SS360 Toshiba
CR3	Diode	1SS360 Toshiba	CR7	Diode	1SS362 Toshiba
CR4	Diode	1SS360 Toshiba			

No.	Name	Description	No.	Name	Description
E1	Ferrite Chip Beads	BK1608HS800	E9	Ferrite Chip Beads	BK1608HS800
E2	Ferrite Chip Beads	BK1608HS800	E10	Ferrite Chip Beads	BK1608HS800
E3	Ferrite Chip Beads	BK1608HS800	E11	Ferrite Chip Beads	BK1608HS800
E4	Ferrite Chip Beads	BK1608HS800	E12	Ferrite Chip Beads	BK1608HS800
E5	Ferrite Chip Beads	BK1608HS800	E13	Ferrite Chip Beads	BK1608HS800
E6	Ferrite Chip Beads	BK1608HS800	E14	Ferrite Chip Beads	BK1608HS800
E7	Ferrite Chip Beads	BK1608HS800	E15	Ferrite Chip Beads	BK1608HS800
E8	Ferrite Chip Beads	BK1608HS800	E16	Ferrite Chip Beads	BK1608HS800

6.2 PCA CPU (720594) continued

No.	Name	Description	No.	Name	Description
E17	Ferrite Chip Beads	BK1608HS800	E31	Ferrite Chip Beads	BK1608HS800
E18	Ferrite Chip Beads	BK1608HS800	E32	Ferrite Chip Beads	BK1608HS800
E19	Ferrite Chip Beads	BK1608HS800	E33	Ferrite Chip Beads	BK1608HS800
E20	Ferrite Chip Beads	BK1608HS800	E34	Ferrite Chip Beads	BK1608HS800
E21	Ferrite Chip Beads	BK1608HS800	E35	Ferrite Chip Beads	BK1608HS800
E22	Ferrite Chip Beads	BK1608HS800	E36	Ferrite Chip Beads	BK1608HS800
E23	Ferrite Chip Beads	BK1608HS800	E37	Ferrite Chip Beads	BK1608HS800
E24	Ferrite Chip Beads	BK1608HS800	E38	Ferrite Chip Beads	BK1608HS800
E25	Ferrite Chip Beads	BK1608HS800	E39	Ferrite Chip Beads	BK1608HS800
E26	Ferrite Chip Beads	BK1608HS800	E40	Ferrite Chip Beads	BK1608HS800
E27	Ferrite Chip Beads	BK1608HS800	E41	Ferrite Chip Beads	BK1608HS800
E28	Ferrite Chip Beads	BK1608HS800	E42	Ferrite Chip Beads	BK1608HS800
E29	Ferrite Chip Beads	BK1608HS800	E43	Ferrite Chip Beads	BK1608HS800
E30	Ferrite Chip Beads	BK1608HS800	E44	Ferrite Chip Beads	BK1608HS800

No.	Name	Description	No.	Name	Description
J1	PH Connector	S6B-PH-K-S	J5	PH Connector	S7B-PH-K-S
J2	PHD Connector	S26B-PHDSS	J6	-----	
J3	FX Connector	FX2CA-32P-1.27DSAL	J7	PHD Connector	S10B-PHDSS
J4	PS Connector	PS-20PE-D4LT1-PN1	J8	-----	

No.	Name	Description	No.	Name	Description
L1	Inductor	1 μ H	L3	Inductor	10 μ H
L2	-----		L4	Inductor	OSC Coil(292)

No.	Name	Description	No.	Name	Description
Q1	Transistor	2SC2712 Toshiba	Q4	Transistor	2SA1621 Toshiba
Q2	Transistor	2SC2712 Toshiba	Q5	Transistor	2SC4210 Toshiba
Q3	Transistor	2SC4210 Toshiba	Q6	Transistor	2SA1621 Toshiba

No.	Name	Description	No.	Name	Description
R1	Resistor	10k Ω 0.1W 50V	R21	Resistor	10k Ω 0.1W 50V
R2	Resistor	10k Ω 0.1W 50V	R22	Resistor	1k Ω 0.1W 50V
R3	Resistor	10k Ω 0.1W 50V	R23	Resistor	15k Ω 0.1W 50V
R4	Resistor	10k Ω 0.1W 50V	R24	Resistor	15k Ω 0.1W 50V
R5	Resistor	47 Ω 0.1W 50V	R25	Resistor	1k Ω 0.1W 50V
R6	-----		R26	Resistor	15k Ω 0.1W 50V
R7	-----		R27	Resistor	33k Ω 0.1W 50V
B8	-----		R28	Resistor	33k Ω 0.1W 50V
R9	-----		R29	Resistor	2.2k Ω 0.1W 50V
R10	-----		R30	Resistor	100k Ω 0.1W 50V
R11	Resistor	3.3k Ω 0.1W 50V	R31	Resistor	10k Ω 0.1W 50V
R12	Resistor	33k Ω 0.1W 50V	R32	Resistor	10k Ω 0.1W 50V
R13	Resistor	10k Ω 0.1W 50V	R33	Resistor	10k Ω 0.1W 50V
R14	Resistor	10k Ω 0.1W 50V	R34	Resistor	10k Ω 0.1W 50V
R15	Resistor	100k Ω 0.1W 50V	R35	Resistor	10k Ω 0.1W 50V
R16	Resistor	10k Ω 0.1W 50V	R36	Resistor	10k Ω 0.1W 50V
R17	Resistor	10k Ω 0.1W 50V	R37	Resistor	10k Ω 0.1W 50V
R18	Resistor	10k Ω 0.1W 50V	R38	Resistor	150 Ω 0.1W 50V
R19	Resistor	3.3k Ω 0.1W 50V	R39	Resistor	150 Ω 0.1W 50V
R20	Resistor	10k Ω 0.1W 50V	R40	Resistor	150 Ω 0.1W 50V

6.2 PCA CPU (720594) continued

No.	Name	Description	No.	Name	Description
R41	Resistor	150Ω 0.1W 50V	R76	Resistor	47kΩ 0.1W 50V
R42	Resistor	150Ω 0.1W 50V	R77	Resistor	47kΩ 0.1W 50V
R43	Resistor	150Ω 0.1W 50V	R78	Resistor	47kΩ 0.1W 50V
R44	Resistor	150Ω 0.1W 50V	R79	Resistor	100Ω 0.1W 50V
R45	Resistor	150Ω 0.1W 50V	R80	Resistor	10kΩ 0.1W 50V
R46	Resistor	150Ω 0.1W 50V	R81	Resistor	4.7kΩ 0.1W 50V
R47	Resistor	150Ω 0.1W 50V	R82	Resistor	100Ω 0.1W 50V
R48	Resistor	150Ω 0.1W 50V	R83	Resistor	4.7kΩ 0.1W 50V
R49	Resistor	150Ω 0.1W 50V	R84	Resistor	10kΩ 0.1W 50V
R50	Resistor	150Ω 0.1W 50V	R85	Resistor	4.7kΩ 0.1W 50V
R51	Resistor	150Ω 0.1W 50V	R86	Resistor	100Ω 0.1W 50V
R52	Resistor	150Ω 0.1W 50V	R87	Resistor	4.7kΩ 0.1W 50V
R53	Resistor	150Ω 0.1W 50V	R88	Resistor	1kΩ 0.1W 50V
R54	-----		R89	Resistor	2.7kΩ 0.1W 50V
R55	-----		R90	Resistor	10kΩ 0.1W 50V
R56	-----		R91	Resistor	16kΩ 0.1W 50V
R57	Resistor	150Ω 0.1W 50V	R92	Resistor	560Ω 0.1W 50V
R58	Resistor	47kΩ 0.1W 50V	R93	Resistor	820Ω 0.1W 50V
R59	Resistor	4.7kΩ 0.1W 50V	R94	Resistor	2.7kΩ 0.1W 50V
R60	Resistor	150Ω 0.1W 50V	R95	Resistor	7.5kΩ 0.1W 50V
R61	Resistor	150Ω 0.1W 50V	R96	Resistor	1.8kΩ 0.1W 50V
R62	Resistor	150Ω 0.1W 50V	R97	Resistor	150Ω 0.1W 50V
R63	Resistor	150Ω 0.1W 50V	R98	Resistor	150Ω 0.1W 50V
R64	Resistor	220Ω 0.1W 50V	R99	Resistor	150Ω 0.1W 50V
R65	Resistor	220Ω 0.1W 50V	R100	Resistor	150Ω 0.1W 50V
R66	Resistor	220Ω 0.1W 50V	R101	Resistor	1kΩ 0.1W 50V
R67	Resistor	220Ω 0.1W 50V	R102	Resistor	47kΩ 0.1W 50V
R68	Resistor	220Ω 0.1W 50V	R103	Resistor	220Ω 0.1W 50V
R69	Resistor	220Ω 0.1W 50V	R104	Resistor	220Ω 0.1W 50V
R70	Resistor	10kΩ 0.1W 50V	R105	-----	
R71	Resistor	47kΩ 0.1W 50V	R106	Resistor	6.8kΩ 0.1W 50V
R72	Resistor	47kΩ 0.1W 50V	R107	Resistor	47kΩ 0.1W 50V
R73	Resistor	47kΩ 0.1W 50V			
R74	Resistor	75kΩ 0.1W 50V			
R75	Resistor	10kΩ 0.1W 50V			

No.	Name	Description	No.	Name	Description
S1	Dip Switch	HDS404			

No.	Name	Description	No.	Name	Description
U1	IC	TC74VHC04F Toshiba	U11	IC	TC74VHC244F Toshiba
U2	IC	TPS3809K33DBV Texas	U12	IC	TC74VHCT244F Toshiba
U3	IC	S-93C86BD4I Seiko	U13	IC	TC74VHCT244F Toshiba
U4	IC	NJM12901V NJRC	U14	IC	TC74VHC244F Toshiba
U5	IC	TC74VHC14F Toshiba	U15	IC	NJM12901V NJRC
U6	IC	TC74VHC11F Toshiba	U16	IC	NJM2904M NJRC
U7	IC	UPC2905AT NEC	U17	IC	NJM2904M NJRC
U8	IC	UPC29M33AT NEC	U18	Photo MOS Relay	AQV252GA
U9	IC	HD64F2328BVT Renesas	U19	-----	
U10	IC	TC74VHC244F Toshiba			

6.3 PCA DISPLAY (720595)

No.	Name	Description	No.	Name	Description
C1	EMI Filter(cap.)	NFM41PC155B Murata	C11	Ceramic capacitor	0.1μF,25V
C2	EMI Filter(cap.)	NFM41PC155B Murata	C12	Ceramic capacitor	0.1μF,25V
C3	Ceramic capacitor	0.1μF,25V	C13	Ceramic capacitor	0.1μF,25V
C4	Electrolytic cap.	10μF,35V	C14	Ceramic capacitor	0.1μF,25V
C5	Ceramic capacitor	0.1μF,25V	C15	Ceramic capacitor	0.1μF,25V
C6	Electrolytic cap.	10μF,35V	C16	Ceramic capacitor	0.1μF,25V
C7	Ceramic capacitor	0.1μF,25V	C401	Ceramic capacitor	0.1μF,25V
C8	Ceramic capacitor	0.1μF,25V	C402	Resistor	0Ω 0.1W 50V
C9	Ceramic capacitor	0.1μF,25V			
C10	Ceramic capacitor	0.1μF,25V			

No.	Name	Description	No.	Name	Description
DS1	LED	LAP-601VL Rohm	DS21	LED	BR5379K Stanley
DS2	LED	LAP-601VL Rohm	DS22	LED	BR5379K Stanley
DS3	LED	LAP-601VL Rohm	DS23	LED	MPY5379K Stanley
DS4	LED	LAP-601VL Rohm	DS24	LED	MPY5379K Stanley
DS5	LED	LAP-601VL Rohm	DS25	LED	MPY5379K Stanley
DS6	LED	MPY5379K Stanley	DS26	LED	MPY5379K Stanley
DS7	LED	MPY5379K Stanley	DS27	LED	MPY5379K Stanley
DS8	LED	MPY5379K Stanley	DS28	LED	MPY5379K Stanley
DS9	LED	MPY5379K Stanley	DS29	LED	BR5379K Stanley
DS10	LED	BR5379K Stanley	DS30	LED	BR5379K Stanley
DS11	LED	BR5379K Stanley	DS31	LED	BR5379K Stanley
DS12	LED	EBR3368S Stanley	DS32	LED	BR5379K Stanley
DS13	LED	EBR3368S Stanley	DS33	LED	BR5379K Stanley
DS14	LED	EBR3368S Stanley	DS34	LED	BR5379K Stanley
DS15	LED	EMPY3368S Stanley			
DS16	LED	EBR3368S Stanley	DS401	LED	UW1141C Stanley
DS17	LED	BR5379K Stanley	DS402	LED	UW1141C Stanley
DS18	LED	BR5379K Stanley			
DS19	LED	BR5379K Stanley			
DS20	LED	BR5379K Stanley			

No.	Name	Description	No.	Name	Description
J1	FX Connector	FX2CA-32S-1.27DSAL	J401	PH Connector	S3B-PH-K-S
J2	PH Connector	S3B-PH-K-S			

No.	Name	Description	No.	Name	Description
Q1	Transistor	2SC3736 NEC			

No.	Name	Description	No.	Name	Description
R1	Resistor	1kΩ 0.1W 50V	R11	Resistor	47kΩ 0.1W 50V
R2	Resistor	10kΩ 0.1W 50V	R12	Resistor	47kΩ 0.1W 50V
R3	Resistor	100Ω 0.1W 50V	R13	Resistor	47kΩ 0.1W 50V
R4	Resistor	4.7kΩ 0.1W 50V	R14	Resistor	47kΩ 0.1W 50V
R5	Resistor	47kΩ 0.1W 50V	R15	Resistor	47kΩ 0.1W 50V
R6	Resistor	47kΩ 0.1W 50V	R16	Resistor	47kΩ 0.1W 50V
R7	Resistor	47kΩ 0.1W 50V	R17	Resistor	47kΩ 0.1W 50V
B8	Resistor	47kΩ 0.1W 50V	R18	Resistor	47kΩ 0.1W 50V
R9	Resistor	47kΩ 0.1W 50V	R19	Resistor	47kΩ 0.1W 50V
R10	Resistor	47kΩ 0.1W 50V	R20	Resistor	47kΩ 0.1W 50V

6.3 PCA DISPLAY (720595) continued

No.	Name	Description	No.	Name	Description
R21	Resistor	47kΩ 0.1W 50V	R61	Resistor	470Ω 0.1W 50V
R22	Resistor	47kΩ 0.1W 50V	R62	Resistor	470Ω 0.1W 50V
R23	Resistor	47kΩ 0.1W 50V	R63	Resistor	470Ω 0.1W 50V
R24	Resistor	47kΩ 0.1W 50V	R64	Resistor	470Ω 0.1W 50V
R25	Resistor	47kΩ 0.1W 50V	R65	Resistor	470Ω 0.1W 50V
R26	Resistor	47kΩ 0.1W 50V	R66	Resistor	470Ω 0.1W 50V
R27	Resistor	470Ω 0.1W 50V	R67	Resistor	470Ω 0.1W 50V
R28	Resistor	470Ω 0.1W 50V	R68	Resistor	470Ω 0.1W 50V
R29	Resistor	470Ω 0.1W 50V	R69	Resistor	470Ω 0.1W 50V
R30	Resistor	470Ω 0.1W 50V	R70	Resistor	470Ω 0.1W 50V
R31	Resistor	470Ω 0.1W 50V	R71	Resistor	820Ω 0.1W 50V
R32	Resistor	470Ω 0.1W 50V	R72	Resistor	820Ω 0.1W 50V
R33	Resistor	470Ω 0.1W 50V	R73	Resistor	820Ω 0.1W 50V
R34	Resistor	470Ω 0.1W 50V	R74	Resistor	820Ω 0.1W 50V
R35	Resistor	470Ω 0.1W 50V	R75	Resistor	820Ω 0.1W 50V
R36	Resistor	470Ω 0.1W 50V	R76	Resistor	820Ω 0.1W 50V
R37	Resistor	470Ω 0.1W 50V	R77	Resistor	820Ω 0.1W 50V
R38	Resistor	470Ω 0.1W 50V	R78	Resistor	470Ω 0.1W 50V
R39	Resistor	470Ω 0.1W 50V	R79	Resistor	470Ω 0.1W 50V
R40	Resistor	470Ω 0.1W 50V	R80	Resistor	470Ω 0.1W 50V
R41	Resistor	470Ω 0.1W 50V	R81	Resistor	470Ω 0.1W 50V
R42	Resistor	470Ω 0.1W 50V	R82	Resistor	470Ω 0.1W 50V
R43	Resistor	470Ω 0.1W 50V	R83	Resistor	470Ω 0.1W 50V
R44	Resistor	470Ω 0.1W 50V	R84	Resistor	820Ω 0.1W 50V
R45	Resistor	470Ω 0.1W 50V	R85	Resistor	820Ω 0.1W 50V
R46	Resistor	470Ω 0.1W 50V	R86	Resistor	820Ω 0.1W 50V
R47	Resistor	470Ω 0.1W 50V	R87	Resistor	820Ω 0.1W 50V
R48	Resistor	470Ω 0.1W 50V	R88	Resistor	820Ω 0.1W 50V
R49	Resistor	470Ω 0.1W 50V	R89	Resistor	820Ω 0.1W 50V
R50	Resistor	470Ω 0.1W 50V	R90	Resistor	2.2kΩ 0.1W 50V
R51	Resistor	470Ω 0.1W 50V	R91	Resistor	2.2kΩ 0.1W 50V
R52	Resistor	470Ω 0.1W 50V	R92	Resistor	2.2kΩ 0.1W 50V
R53	Resistor	470Ω 0.1W 50V	R93	Resistor	1kΩ 0.1W 50V
R54	Resistor	470Ω 0.1W 50V	R94	Resistor	2.2kΩ 0.1W 50V
R55	Resistor	470Ω 0.1W 50V	R95	Resistor	820Ω 0.1W 50V
R56	Resistor	470Ω 0.1W 50V	R96	-----	
R57	Resistor	470Ω 0.1W 50V	R97	-----	
R58	Resistor	470Ω 0.1W 50V			
R59	Resistor	470Ω 0.1W 50V	R401	Resistor	220Ω 0.1W 50V
R60	Resistor	470Ω 0.1W 50V	R402	Resistor	220Ω 0.1W 50V

No.	Name	Description	No.	Name	Description
U1	IC	NJM3359D JRC	U6	IC	TC7SZ00F Toshiba
U2	IC	MB15E07PFV Fujitsu	U7	IC	NJM2387ADL NJRC
U3	IC	TC7SU04F Toshiba	U8	IC	TA78L05F Toshiba
U4	IC	TC7SU04F Toshiba	U9	IC	TA48L033F Toshiba
U5	IC	LC75344M Sanyo	U10	IC	TC4W66F Toshiba

6.4 Chassis

No.	Name	Description	No.	Name	Description
A1	PCA RCV	720593	A4	PCA DISPLAY2	720595
A2	PCA CPU	720594	A5	PANEL SW	131075
A3	PCA DISPLAY	720595			

No.	Name	Description	No.	Name	Description
C1	Ceramic capacitor	1.5 μ F,50V	C3	Ceramic capacitor	1.5 μ F,50V
C2	Ceramic capacitor	1.5 μ F,50V			

No.	Name	Description	No.	Name	Description
F1	Fuse	MF51NR250V2A	XF1	Fuse holder	FH-043A EDK

No.	Name	Description	No.	Name	Description
J1	Circular connector	16-R2M Tajimi	J4	Mini jack	S-G8050 SMK
J2	Coaxial connector	M201-R Tajimi	J5	Circular connector	PRC03-21A10-3AF
J3	Coaxial connector	BNC-R Tajimi			

No.	Name	Description	No.	Name	Description
L1	Clamp filters	ZCAT1730-0730A TDK			

No.	Name	Description	No.	Name	Description
P101	Coaxial connector	TMP-K01X-A1 Taiko	P201	PH connector	PHR-6 JST
P102	Coaxial connector	TMP-K01X-A1 Taiko	P202	PHD connector	PHDR-26VS JST
P103	PH connector	PHR-5 JST	P204	PS connector	PS-20SEN-D4P1-1C JAE
P104	PHD connector	PHDR-10VS JST	P205	PH connector	PHR-7 JST
P105	PH connector	PHR-6 JST	P302	PH connector	PHR-3 JST
P106	PHD connector	PHDR-20VS JST	P401	PH connector	PHR-3 JST
P107	PH connector	PHR-2 JST	P501	PS connector	PS-20SEN-D4P1-1C JAE

No.	Name	Description	No.	Name	Description
Q1	Transistor	2SA1743 NEC			

Cable harness

No.	Name	Description	No.	Name	Description
W1	W1 ASSY	343407	W6	W6 ASSY	343411
W2	W2 ASSY	343408	W7	W7 ASSY	333841
W3	W3 ASSY	343409	W8	W8 ASSY	343412
W4	W4 ASSY	333840	W9	Connector ASSY	PS-D20CM-14X-1D JAE
W5	W5 ASSY	343410			

FOR SERVICE REQUIREMENT

For any inquiry of service, please contact to a dealer where you purchased this equipment.

When the dealer's contact address is uncertain, please contact to following address.

TAIYO MUSEN CO., LTD.

2-11-18, Higashi-Kojiya, Ota-ku, Tokyo 144-0033 JAPAN

Overseas Trading Dept.

TEL: 81-3-5735-1247

FAX: 81-3-5735-1683