KODEN

SERVICE MANUAL

MARINE RADAR

MDC-5000/5200/5500
SERIES

MDC-7000/7900
SERIES

This product is specifically desingned to be installed on boats and other means of maritime transport. If your country forms part to the EU, please contact your dealer for advice before attempting to install elsewhere.

MDC-50_52_55_70(P)_79(P).SER.SM.E 0093855002-00

MDC-5000/5200/5500/7000(P)/7900(P) Series Service Manual
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When part of the document needs to be revised, the document has advanced revision number.
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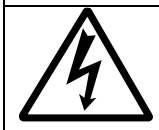
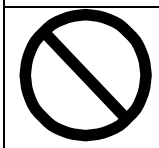
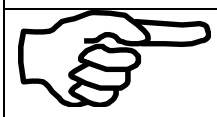
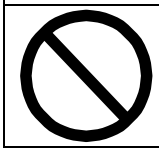
For Your Safe Operation

Symbols used in this Service Manual

This manual uses the following symbols. Understand the meaning of each symbol and implement the maintenance and inspection.

Symbol	Meaning
	**Mark for warning** This symbol denotes that there is a risk of death or serious injury when not dealing with it correctly.
	**Mark for danger high voltage** This symbol denotes that there is a risk of death or serious injury caused by electric shock when not dealing with it correctly.
	**Mark for caution** This symbol denotes that there is a risk of slight injury or damage of device when not dealing with it correctly.
	**Mark for prohibition** This symbol denotes prohibition of the specified conduct. Description of the prohibition is displayed near the mark.
IMPORTANT	**Mark for important matters** This mark denotes that there is a possibility that data loss may interfere the operation or that the expected result may not be obtained when the radar is not dealt correctly.
	**Mark for reference** This mark shows the part to be referred to concerning this description.

Caution Item on Equipment

	**Caution on a high voltage inside.** A high voltage, which may risk your life, is used. This high voltage remains in the circuit after you have powered off switch. To prevent touching the high voltage circuit inadvertently, the protective cover is provided to the high voltage circuit and the high voltage caution label is affixed. Ensure to power off switch for your safety and discharge the electricity remaining in the capacitor before starting to check. An engineer authorized by our company should inspect and maintain the circuit.
	**Be sure to switch off the power in the boat.** If the power switch is inadvertently powered on during work, you will be electrified. To prevent such accident from occurring, ensure to switch off the power in the boat and the power of equipment. Furthermore, it is safer to hang the caution tag with description of [Under Work] near the power switch of equipment.
	**Caution on dust** Inhaling dust may cause respiratory disease. When cleaning the inside of equipment, be careful not to inhale dust. Wearing a safety mask is recommended.
	**Caution on location of equipment** Do not install the equipment where it is excessively damp and suffers from excessive water drops.
	**Caution on static electricity** The static electricity may be generated from the carpet on the floor in the cabin or clothes made of synthetic fiber. The static electricity may destroy the electronic parts on the circuit board. Handle the circuit board, taking the suitable anti-static measures.
	**Prohibited matter** Any Display and Scanner unit combination other than specified in the manual is prohibited and will void manufacturer's warranty.

Caution Items on Handling

Caution on the rotating aerial

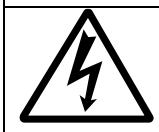
The radar antenna may start to rotate without notice. Please stand clear from the antenna for your safety.

Caution on electromagnetic disturbance

The operating Antenna & Scanner unit radiates high-energy electromagnetic wave. It may cause harmful effect for human body due to its continuous radiation. As International regulation says, electromagnetic waves less than 100 watt/m^2 does not have a harmful effect on human bodies, but some kind of medical devices such as heart pacemakers are sensitive even under the low energy electromagnetic wave. Any personnel with such a device should keep away from the electromagnetic wave generating position at all times.

Specified power density and distance from the radar (in accordance with the provision as specified in IEC 60945)

Model name	Transmission power / Antenna length	100W/m^2	50W/m^2	10W/m^2
MDC-5004 MDC-5204/5240 MDC-5504/5540	4kW / 3 feet Antenna	0.9 m	1.3 m	2.8 m
	4kW / 4 feet Antenna	1.0 m	1.4 m	3.1 m
	4kW / 6 feet Antenna	1.2 m	1.7 m	3.7 m
MDC-5006/5060 MDC-5206/5260 MDC-5506/5560 MDC-7006/7060 MDC-7906/7960	6kW / 4 feet Antenna	1.5 m	2.1 m	4.5 m
	6kW / 6 feet Antenna	1.7 m	2.4 m	5.4 m
MDC-5012/5010 MDC-5212/5210 MDC-5512/5510 MDC-7012/7010 MDC-7912/7910 MDC-7012P MDC-7912P	12kW / 4 feet Antenna	2.1 m	2.9 m	6.4 m
	12kW / 6 feet Antenna	2.4 m	3.4 m	7.6 m
	12kW / 9 feet Antenna	2.9 m	4.1 m	9.0 m
MDC-5025/5020 MDC-5225/5220 MDC-5525/5520 MDC-7025/7020 MDC-7925/7920 MDC-7025P MDC-7925P	25kW / 4 feet Antenna	2.9 m	4.1 m	9.2 m
	25kW / 6 feet Antenna	3.5 m	4.9 m	10.9 m
	25kW / 9 feet Antenna	4.1 m	5.8 m	13.0 m

 **Warning**	Do not disassemble or modify. It may lead to trouble, fire, smoking or electric shock. In case of trouble, contact our dealer or our company.
 **Warning**	In case of smoke or fire, switch off the power in the boat and the power of equipment. It may cause fire, electric shock or damage.
	Caution on the remaining high voltage. A high voltage may remain in the capacitor for several minutes after you have powered off. Before inspecting inside, wait at least 5 minutes after powering off or discharging the remaining electricity in an appropriate manner. Then, start the work.
 **Caution**	The information displayed in this unit is not provided directly for your navigation. For your navigation, be sure to see the specified material.
 **Caution**	Use the specified fuse. If un-specified fuse is used, it may cause a fire, smoke or damage.

Break in procedure of stored radar

Caution	Following procedure is recommended for “Break In” of the stored radar. Otherwise the radar sometimes exhibits unstable transmitting operation such as arcing at its initial operation after long period of storage and make the operation more difficult. 1. Extend preheat time as long as possible (preferably 20 to 30 minutes). 2. Set the pulse width to the shortest one and start the operation. When the operation in the shortest pulse is stable then go to operation in longer pulse and repeat the similar step until the operation reaches to the final pulse condition.

Disposal of used cells and this radar

Warning	A high-energy density lithium ion battery cell is built in this radar. Improper disposal of the lithium ion battery cell is discouraged as the cell has possibility of short-circuiting. If it gets wet, generation of heat, explosion or ignition may occur resulting in injury or fire.

Treatment of the used lithium ion cells

To dispose built-in lithium ion battery cells (CR2032) in this radar, insulate each terminal with scotch tape, etc. and wrap in a plastic bag, etc.

The disposal and collection rules may be different depending on each municipal district. Obey the directions of each district.

Disposal of this radar

This radar shall be disposed according to the municipal regulations or rules.

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Chapter 1 Fault diagnosis

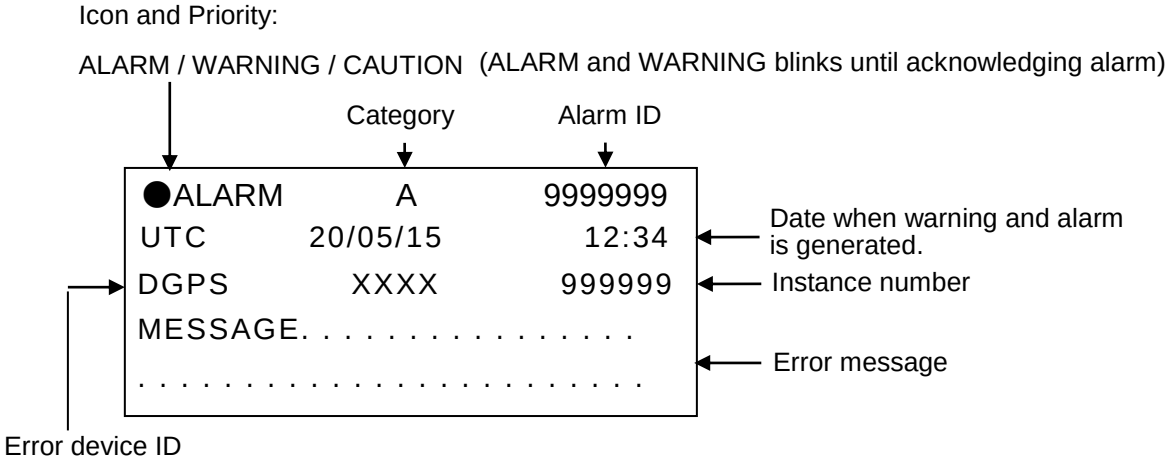
1.1 About alarms

Alarm and warning display may appear at the lower right of the radar screen as shown in the following figure, when a malfunction or operation error has been detected in the device.

In case of occurrence of multiple numbers of alarms, it is possible to confirm all of them in [LIST].

Alarms occurred since Power ON can be confirmed by [HISTORY LIST]. (MDC-7000/7900 series only)

☞ Refer to “Chapter 3 Alarm” in the Operation manual for the [LIST] and [HISTORY LIST].



☞ Refer to “Chapter 1 Display and Operation 1.1 Radar Display [Alarm display area]” in the Opearation manual.

1.2 Malfunction detection step

As a first step of on-board repair, refer to the following tables describing outlines of malfunction diagnostics procedure.

Table 1.1 basic malfunctions

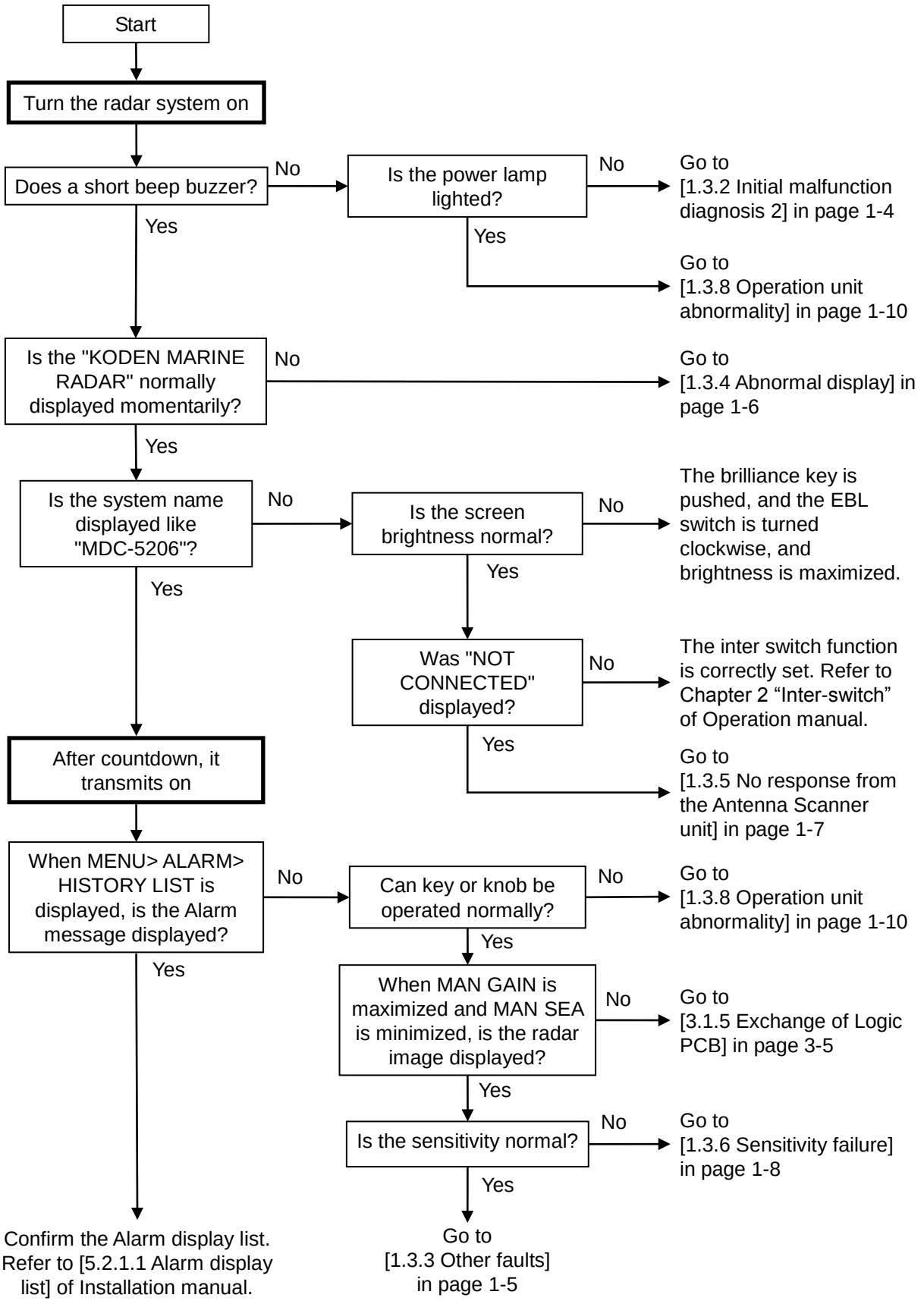
Failure status	Possible cause	Measure
No power.	1. Power cable is disconnected. 2. Operation unit cable is disconnected. 3. Supply voltage is out of range. 4. Main power fuse is blown.	1. Connect power cable firmly and secure connector. 2. Connect operation cable firmly and secure connector. 3. Use proper power source. 4. Change fuse with new one.
Power is applied but no display	1. Display brilliance is adjusted to the minimum. 2. Connector of internal cable is disconnected. 3. Failure of LCD unit or Backlight power PCB	1. Adjust properly. 2. Confirm by a serviceman. 3. Request repair.

Table 1.2 possible malfunctions

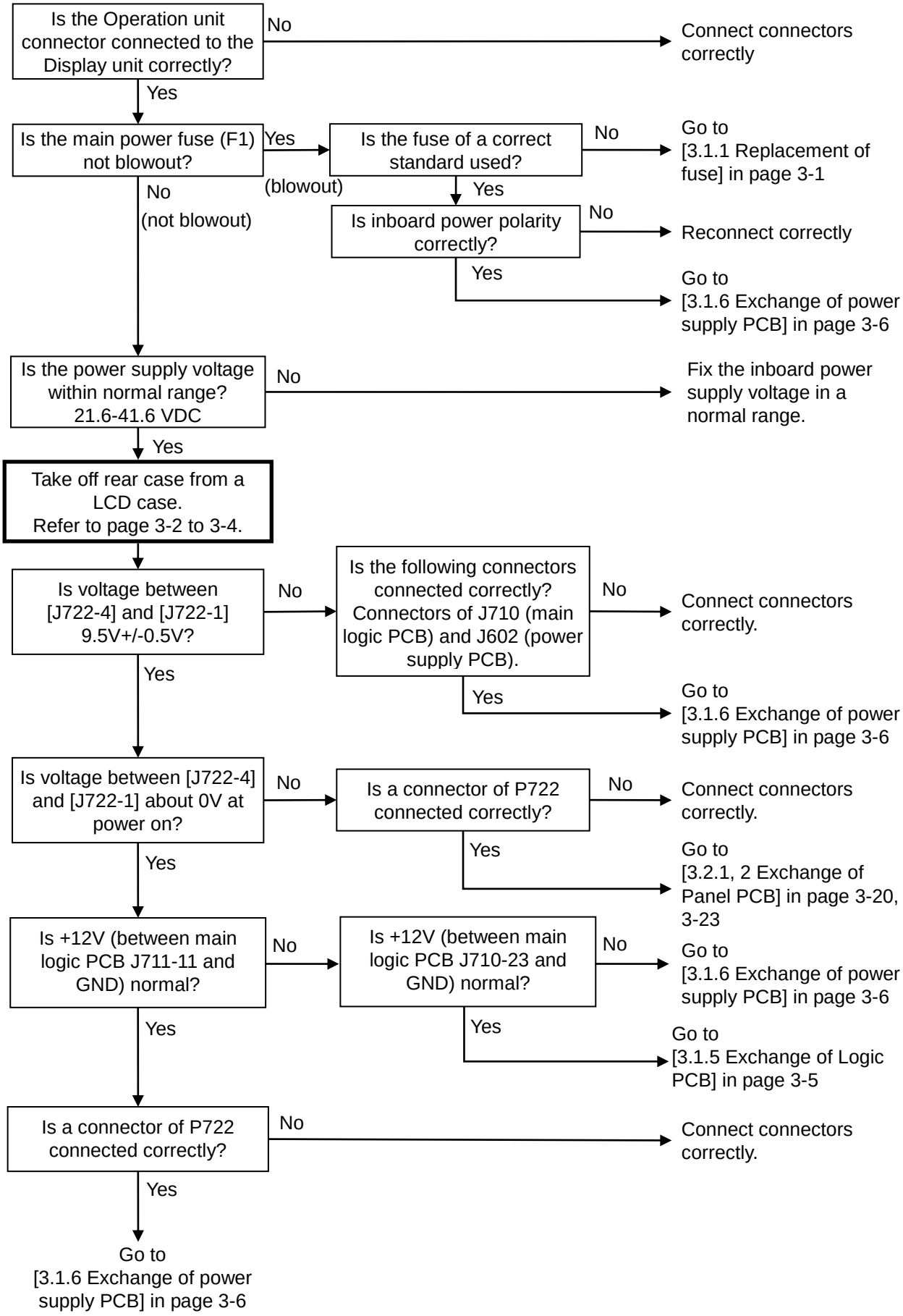
Error status	Possible cause	Measure
Display brilliance is dark.	1. Adjustment of display brilliance is incorrect. 2. Failure of LCD driver circuit 3. Failure of Backlight power PCB	1. Adjust properly. 2. Request repair 3. Request repair
No radar echo is displayed.	1. Receiver is detuned. 2. Video contrast adjustment error 3. Failure of transceiver	1. Readjust by referring to “Tune adjustment of Installation manual”. 2. Readjust by GAIN, SEA or RAIN knobs, or readjust by referring to “Tune adjustment of Installation manual”. 3. Request repair
Radar echo is too weak.	1. Receiver is detuned. 2. Failure of Magnetron or MIC (front-end)	1. Readjust by referring to “Tune adjustment of Installation manual”. 2. Request repair
Error message “Head line signal abnormal.” is displayed.	1. No heading line signal input.	1. Check [BP/HG] signal between an Antenna Scanner unit and a Display unit.
Antenna does not rotate.	1. Motor fuse is blown. 2. Motor power is not supplied. 3. Inter-switch mode is difference.	1. Replace fuse with a new one. 2. Check motor power connection. 3. Set inter-switch mode to master mode.

1.3 Malfunction diagnosis flowchart

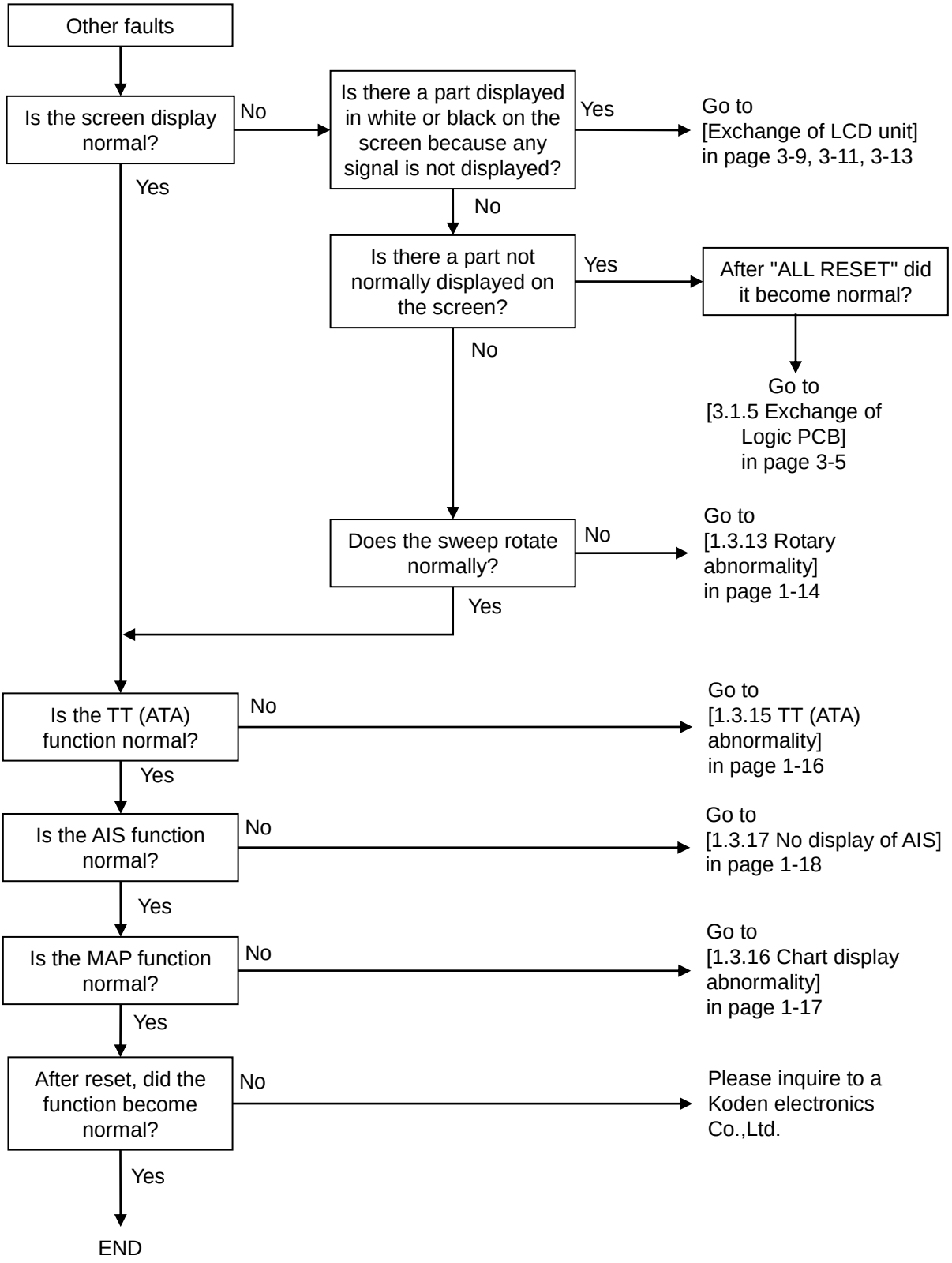
1.3.1 Initial malfunction diagnosis 1



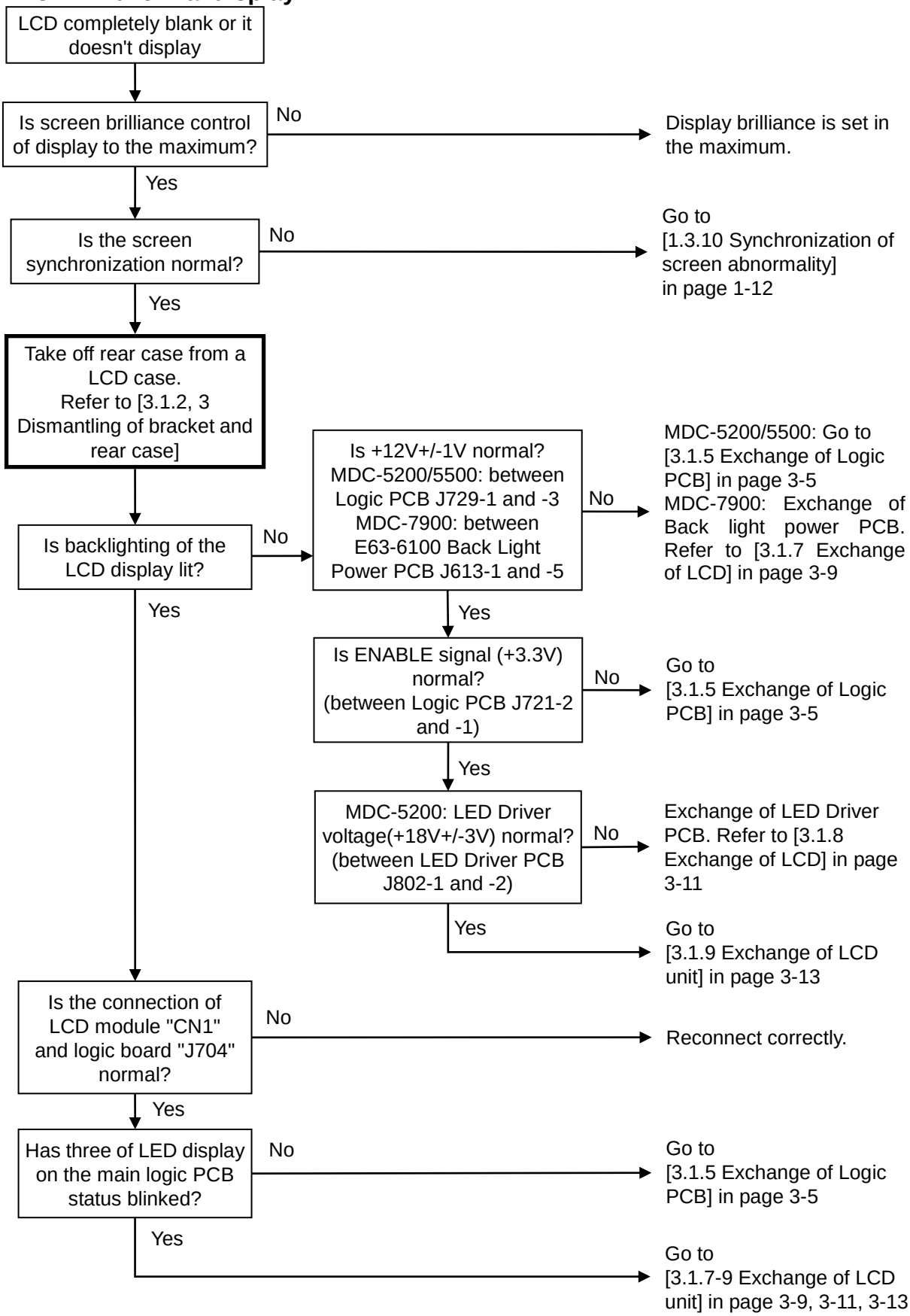
1.3.2 Initial malfunction diagnosis 2



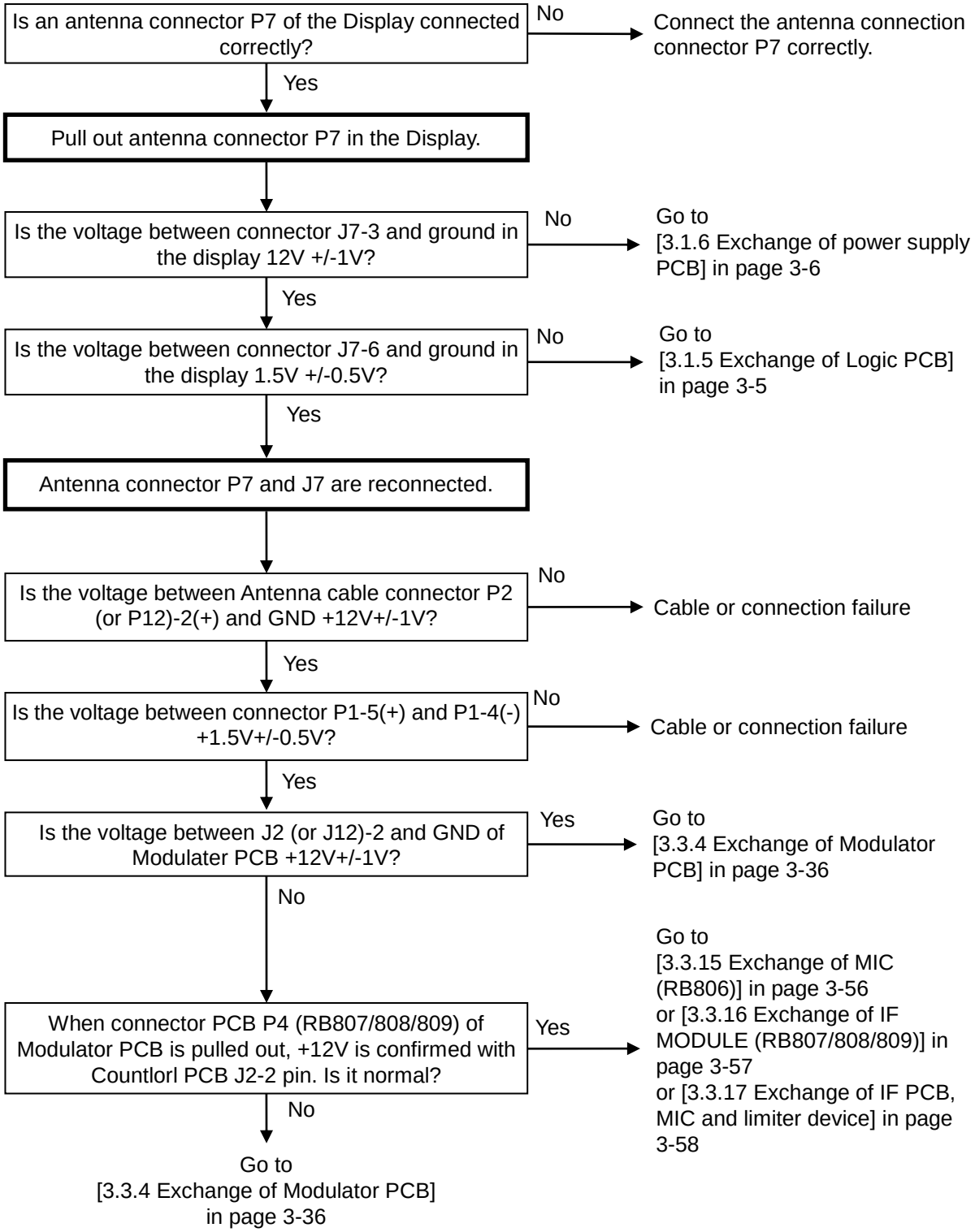
1.3.3 Other faults (Display unit)



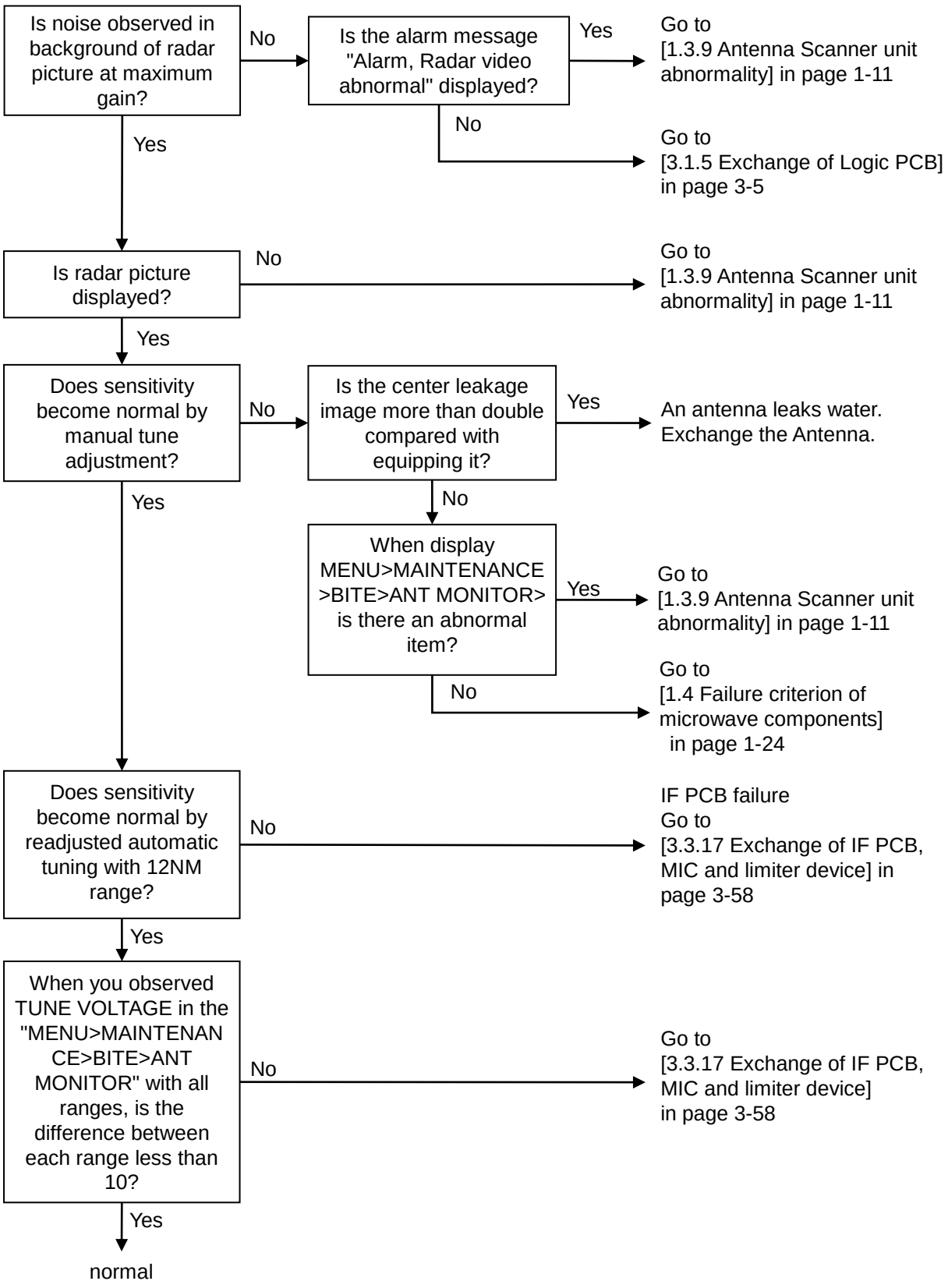
1.3.4 Abnormal display



1.3.5 No response from the Antenna Scanner unit

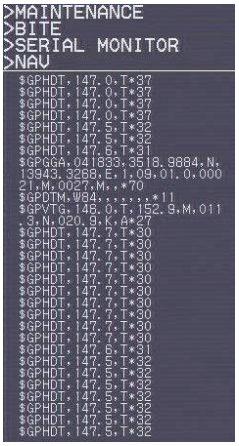


1.3.6 Sensitivity failure



1.3.7 No display of ship's bearing, speed and latitude/longitude

Is the navigation data (NMEA0183/IEC 61162-1) normally input from the connectors and displayed? When a connector number to be checked is selected in the process of MENU > MAINTENANCE > BITE > SERIAL MONITOR, a sentence of NAV data input is displayed on the serial monitor screen?



No → Is the polarity of signals (A and B) normal?

No → Set the polarity normal.

Yes → Is it displayed on the monitor when connected to a different port?

No → The external connecting device that outputs serial signal may be faulty.

Yes → Logic PCB may be faulty. Go to [3.1.5 Exchange of Logic PCB] in page 3-5

Yes → Is the data format input from the connectors (J3（NAV）, J5(EPFS), and J6(SDME) a proper format?

No → Select a data format conforming to the format that receives MENU > MAINTENANCE > I/O > BAUDRATE > 4800, 9600, 19200 or 38400 IEC61162-1 or IEC61162-2

Yes → Are the mode display, positioning status and speed status in the input sentence all effective?

No → The external connecting device that outputs serial signal may be unstable. Check the external connecting device.

Yes → Is MENU > MAINTENANCE > I/O > HDG, STW, COG/SOG, LAT/LON correctly set?

No → Set the input settings of HDG, STW, LAT/LON and COG/SOG correctly.

Yes → Logic PCB may be faulty. Go to [3.1.5 Exchange of Logic PCB] in page 3-5

1.3.8 Operation unit abnormality

Can the power supply to the radar be switched ON? (Is the lamp of power source ON, and does the buzzer sound?)

No → Is the connection of the following logic PCBs normal?
(1) J710 and power supply PCB
(2) J722 and operation unit

No → Connect them in normal way.

Yes → Operation unit is faulty. Go to [Exchange of Panel PCB] in page 3-20, 3-23

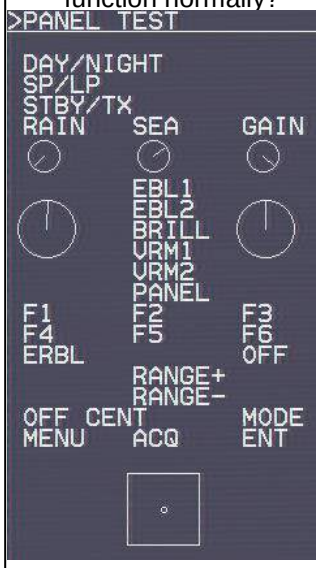
Yes → When "MENU" key is pressed, is the menu displayed?

No → [MENU] key is faulty.

Yes → Are MENU > MAINTENANCE > BITE > PANEL TEST displayed?

No (Cursor can not operate) → Track ball is faulty.

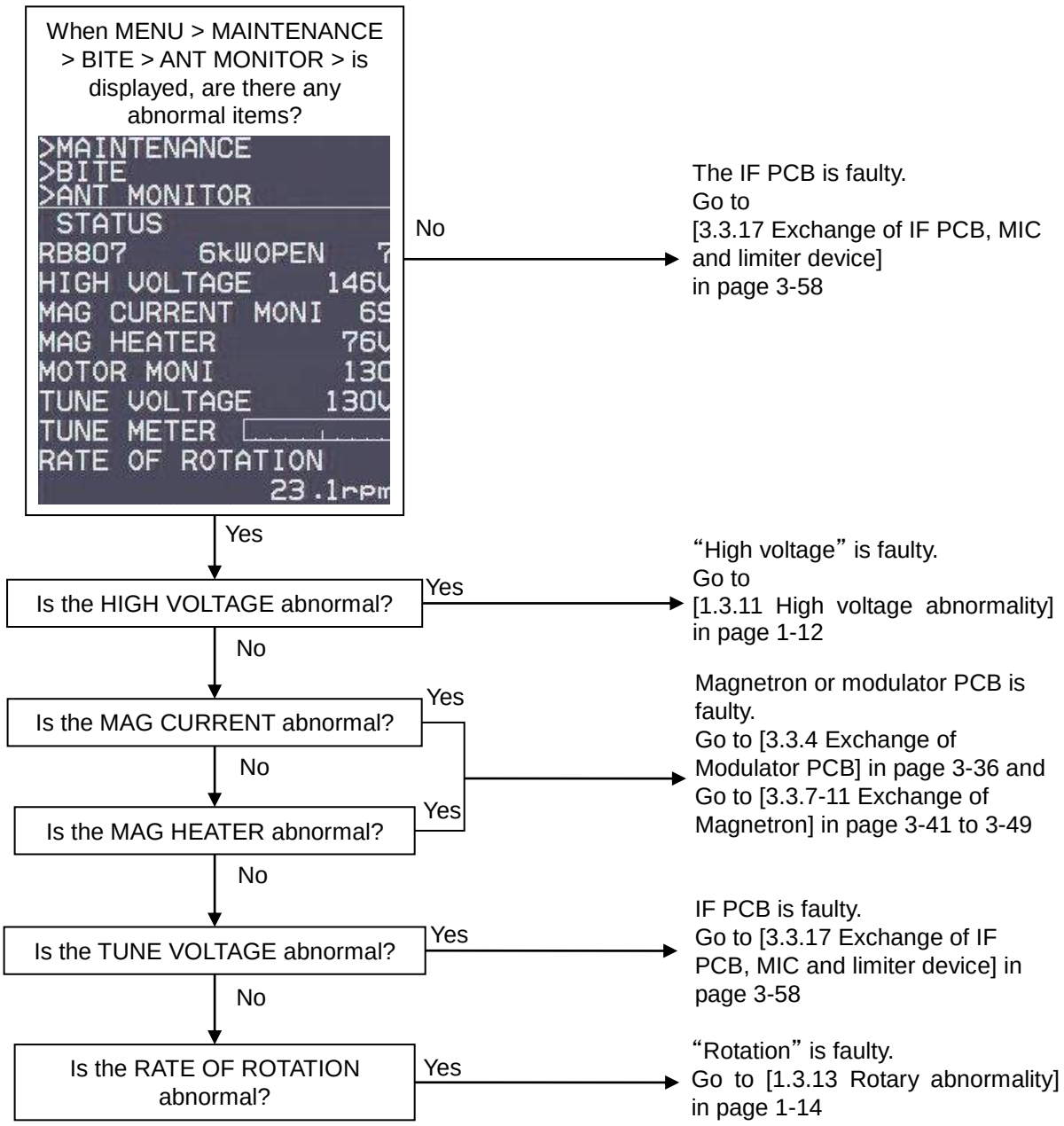
Yes → When they are operated at testing Operation unit, do all keys and knobs function normally?



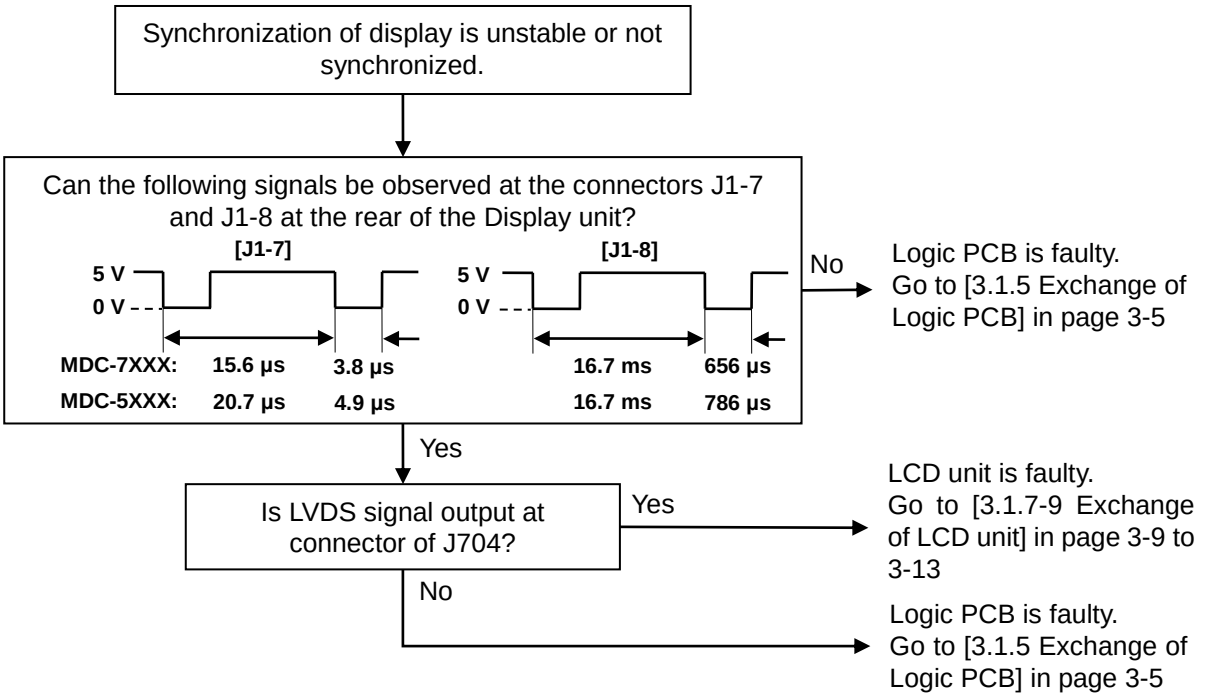
No → Exchange inoperative keys or encoder.

Yes → Normal

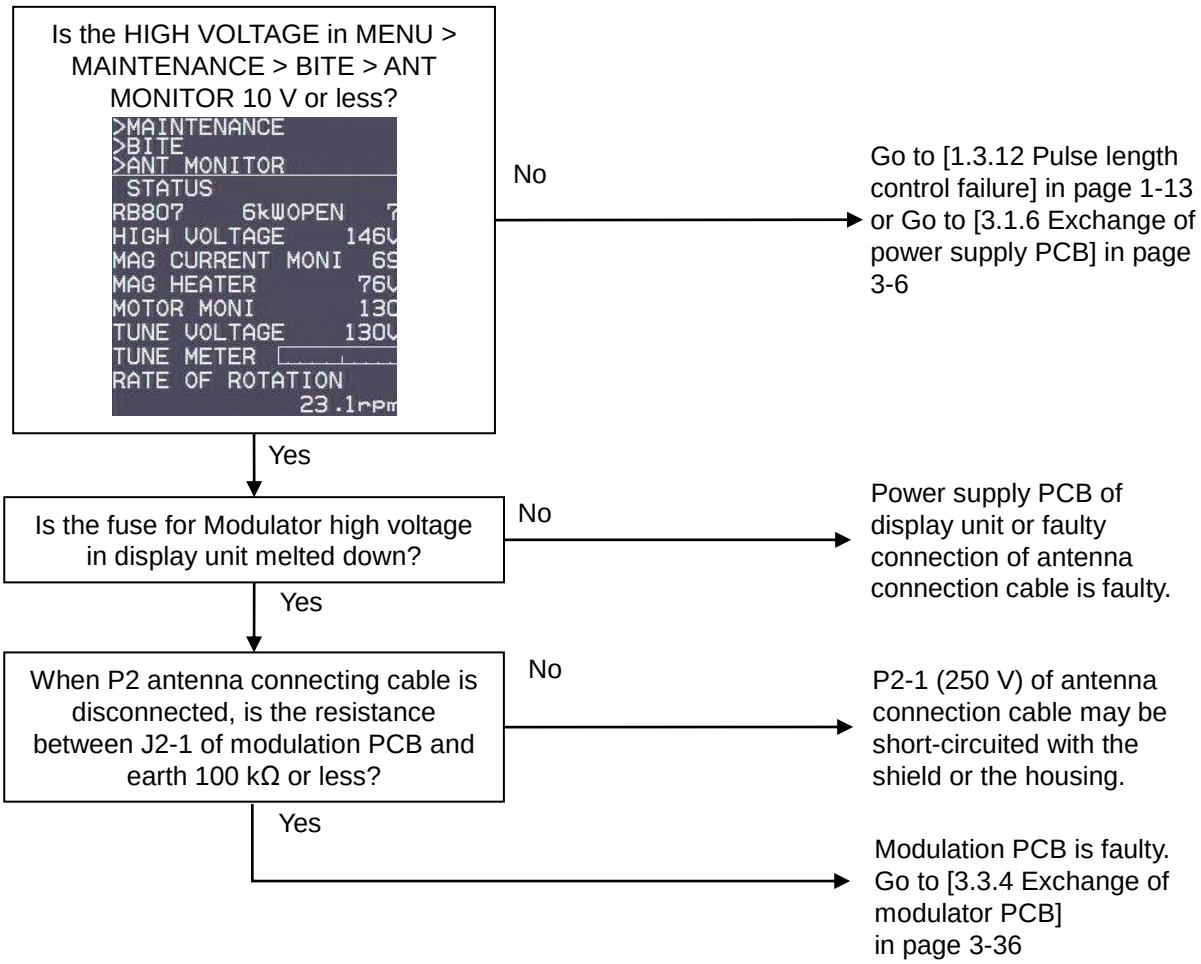
1.3.9 Antenna Scanner unit abnormality



1.3.10 Synchronization of screen abnormality

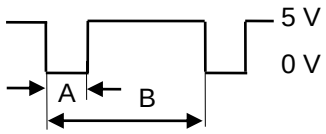


1.3.11 High voltage abnormality

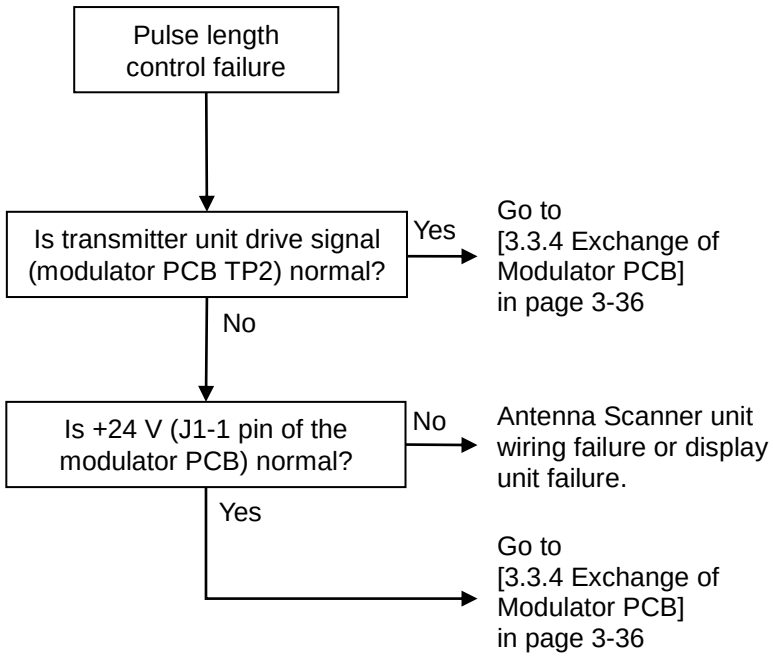


1.3.12 Pulse length control failure

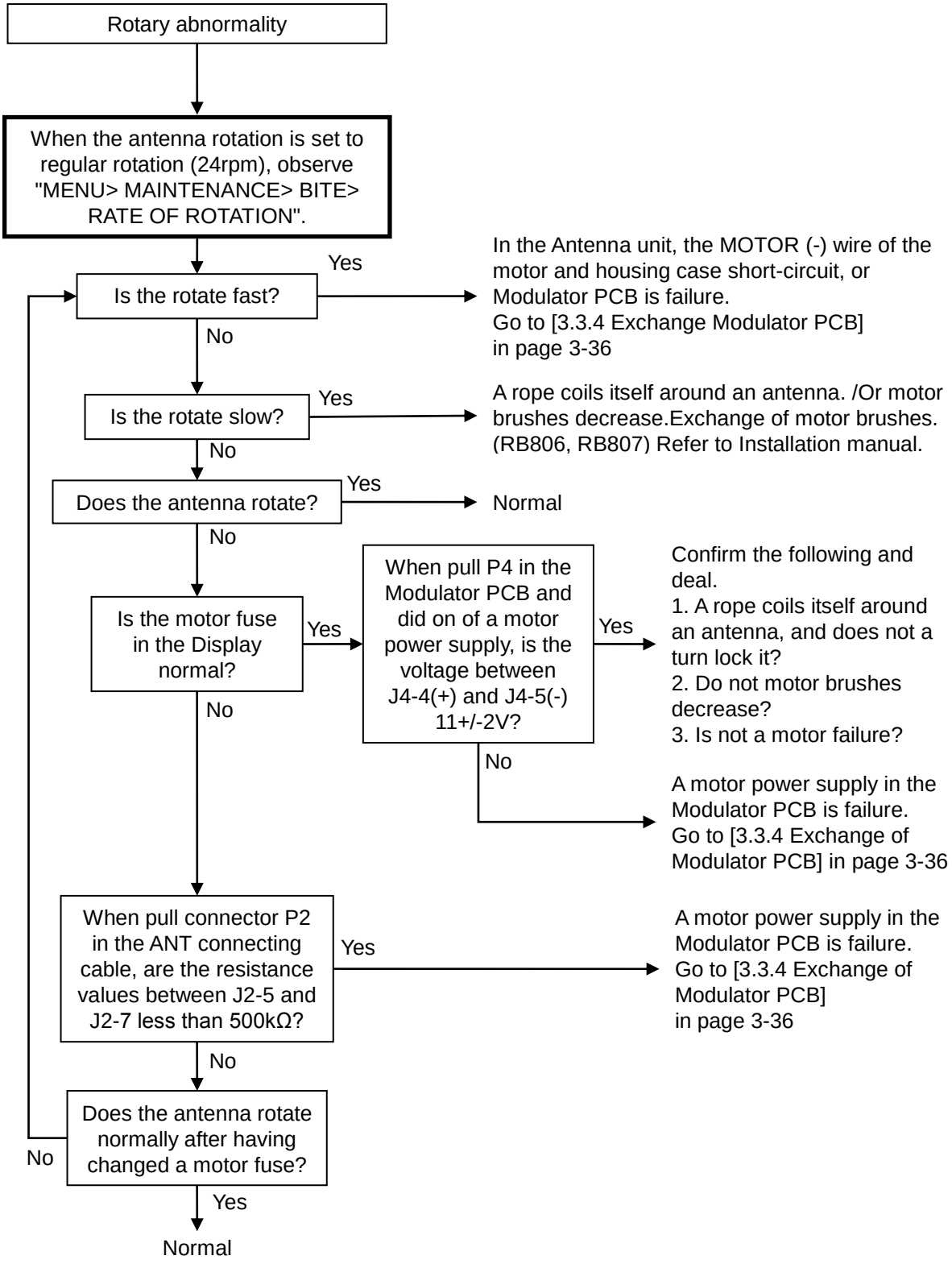
TP2 wave form



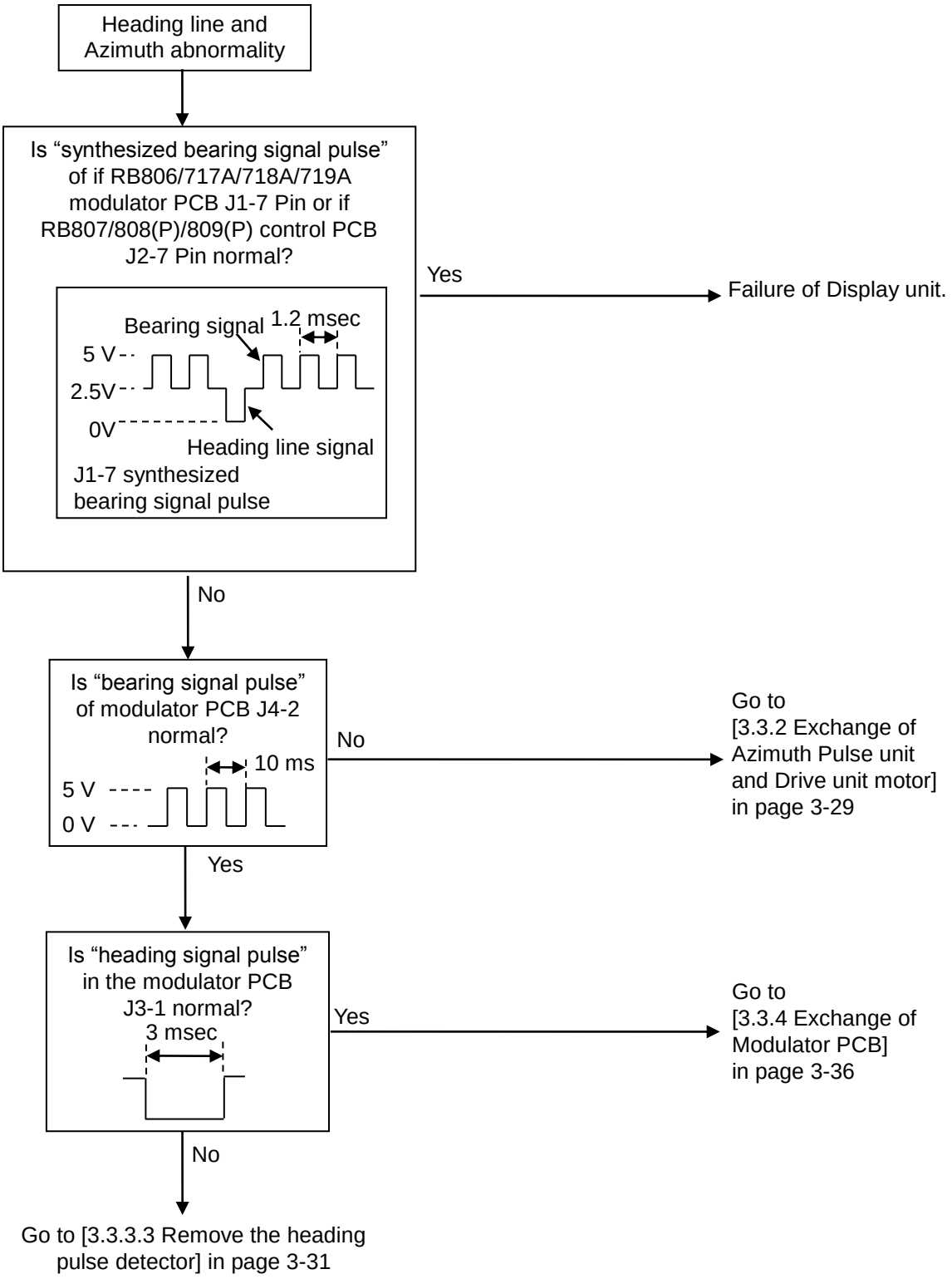
Pulse length	A(ns)	B(ms)
S1	80	0.45～0.55
L2	1100	1.8～2.2



1.3.13 Rotary abnormality



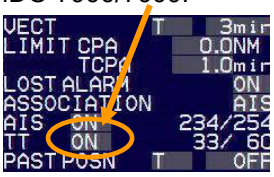
1.3.14 Heading line and Azimuth abnormality



1.3.15 TT (ATA) abnormality

TT (ATA) is abnormal?

Is TT ON?
MDC-7900/7000:



MDC-5000/5200/5000:
MENU>TT>TT>ON

No

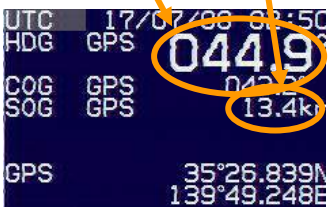
Place change to ON, and push "ENT" key. Then, does the display CAUTION?

No → Normal

Yes

Yes

Are HDG and SPD displayed on screen?

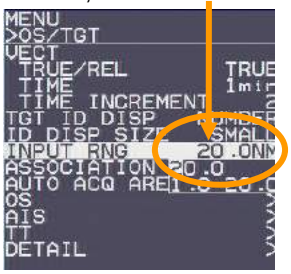


No → Go to [1.3.7 No display of ship's bearing, speed and lat/lon] in page 1-9

Yes

When cursor is placed on a target and "ACQ" key is pushed, is a circle of dotted line displayed on the target?

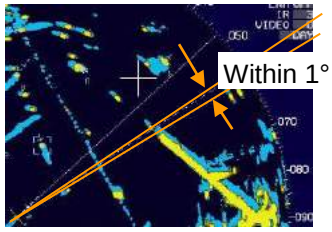
No → Follow MENU > TARGET > INPUT RNG, set at 20.0 NM.



Yes

Can the vector of the target indicate a stable bearing?

No → When TRAIL/TRUE/6 min is set, is the ship's trail generated in the angular direction of the fixed target within 1 degree?



No → The interval of transmission of HDT may be longer or the performance of the compass is not good enough. Improve the compass device.

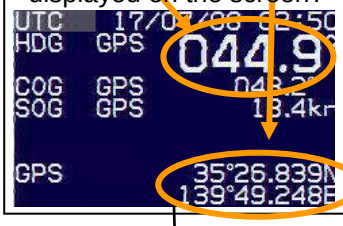
Yes → Change STAB to SEA.

Yes

Normal

1.3.16 Chart display abnormality

Display of chart is abnormal.

Is chart displayed on the screen?
- No → Is the chart card correctly inserted into the holder?
  - No → Insert the chart card correctly into the card holder.
  - Yes → Are HDG and LAT/LON displayed on the screen?
    - 

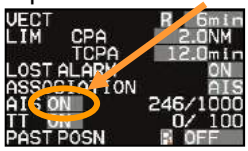
    - No → Go to [1.3.7 No display of ship's bearing, speed and lat/lon] in page 1-9
    - Yes → In the process of MENU > MAP > CHART, are ON?
      - No → Select "ON" in MENU > MAP > CHART respectively.
      - Yes → In the process of MENU > MAINTENANCE> BITE > SD CARD, Is displayed?
        - No → Check the contacts of the card socket and the connection of the logic PCB J726.
        - Yes → Does the radar image match with the map?
          - No → Is GPS WGS84?
            - Yes → Select MENU > MAP > DATUM > "W84" and then select MAP > OFFSET > "DTM".
            - No → When GPS has output DTM sentence, input MENU > MAP > DATUM > W84. Also select MAP > OFFSET > "DTM".
              When GPS has not output DTM sentence, select MENU > MAP > OFFSET > "MAN". Push "MODE" key a few times and select "N UP RM" for display. Viewing the screen, select a proper correction value of in MAP > "OFFSET" so as to match the echo with the map.
          - Yes → Normal
  - Yes → Normal

1.3.17 No display of AIS

AIS is not displayed.

Note: About self diagnosis:
When any setting is changed and "AIS self diagnosis" is used for confirmation of the change, close the MENU once and start displaying again.

MDC-7000/7900: Is AIS in the picture below ON?



MDC-5000/5200/5500: Is AIS MENU ON?
MENU>TT>AIS>ON

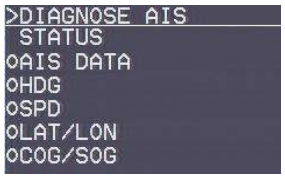
No → Place change to ON, and push "ENT" key. Then, does the display CAUTION?

No → Check that COG/SOG are normal.

Yes

Yes

4 minutes after switching ON of AIS, operate as follows:
When the screen below is displayed after selection of MENU > MAINTENANCE > BITE > "DIAGNOSE AIS", will circle marks (O) be indicated on all items?



No → Is x AIS DATA?

Yes → Check AIS connection.

No → Is x HDG?

Yes → Go to [1.3.7 No display of ship's bearing, speed and lat/lon] in page 1-9

No → Is x SPD?

Yes → Go to [1.3.7 No display of ship's bearing, speed and lat/lon] in page 1-9

No → Is x LAT/LON?

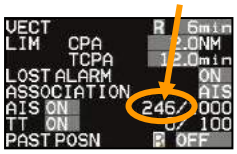
Yes → Go to [1.3.7 No display of ship's bearing, speed and lat/lon] in page 1-9

No → Is x COG/SOG?

Yes → Go to [1.3.7 No display of ship's bearing, speed and lat/lon] in page 1-9

Yes

Is the position of 246 in AIS 246/1000 below at other than 0?



No → Setting RNG at 20.0NM in MENU > TARGET > INPUT RNG, is the position of 246 at other than 0?

Yes → When the filter CPA/TCPA is set at OFF and RNG at 64NM, is AIS displayed?

No → No ship equipped with AIS device is within 20.0NM, confirm when a ship equipped has approached.

Yes → Normal

No → VDM sentence is wrong. Check at AIS device side.

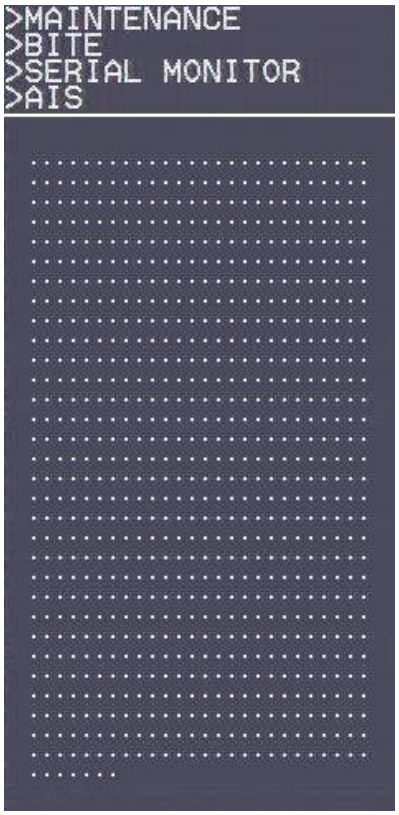
Confirmation of AIS connection

How to confirm the AIS signals:

1. Select monitor function

   MENU > MAINTENANCE > BITE > SERIAL MONITOR > AIS

   As shown in the right side picture, the serial sentence of VDM will be displayed.



Example of screen when the format of serial signal does not match

Example of monitoring serial signals of AIS on the screen

2. Result of monitoring

   a. When the format of serial sentence does not match, change the I/O baud rate of the port connected to the radar in AIS device to IEC 61162-2 or 38400 bps at AIS device side.

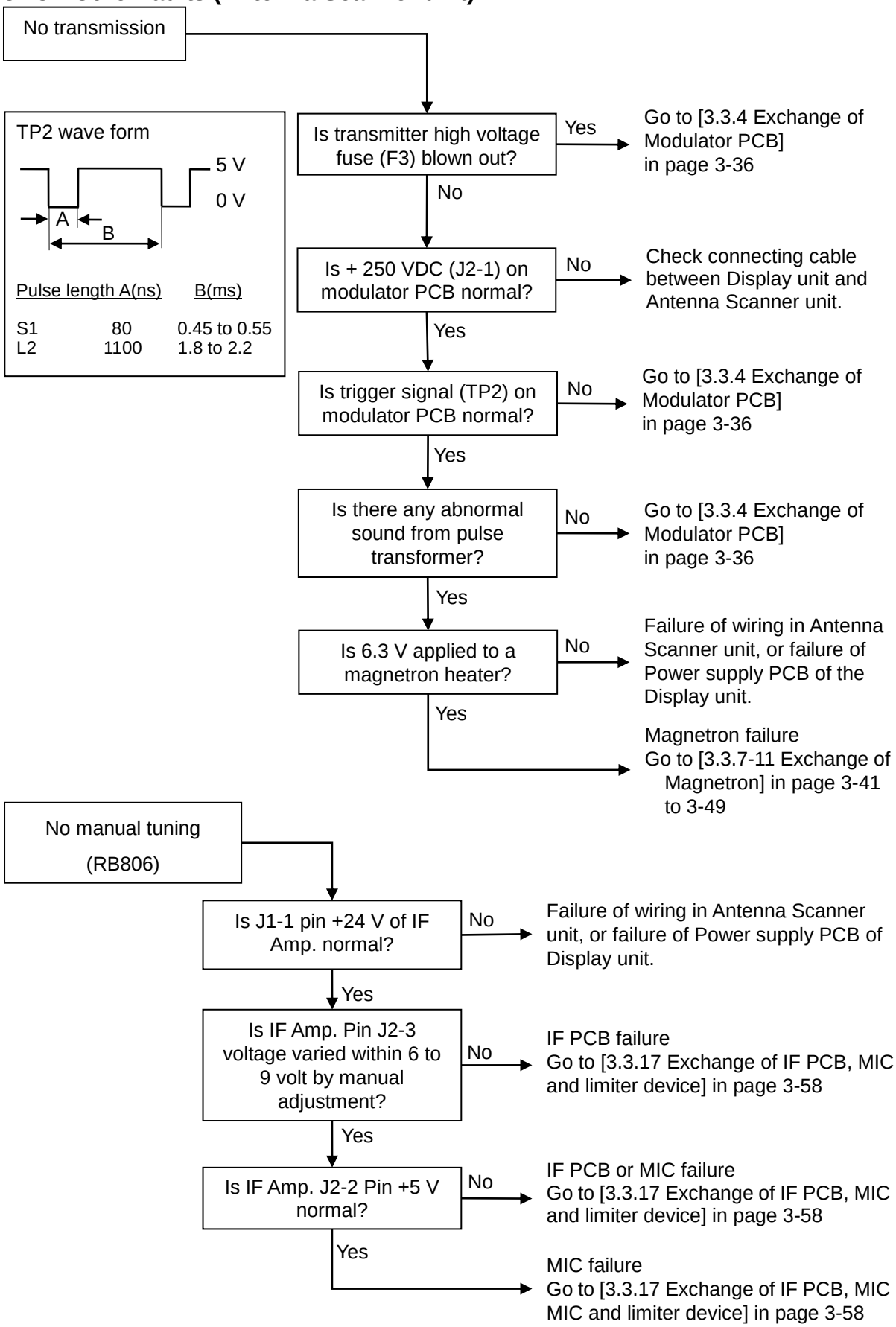
   b. When nothing is displayed on the screen, interchange the blue wire with the white wire of Blue/White twisted cable (CW-387) connected to Tx-A and Tx-B of AIS device respectively.

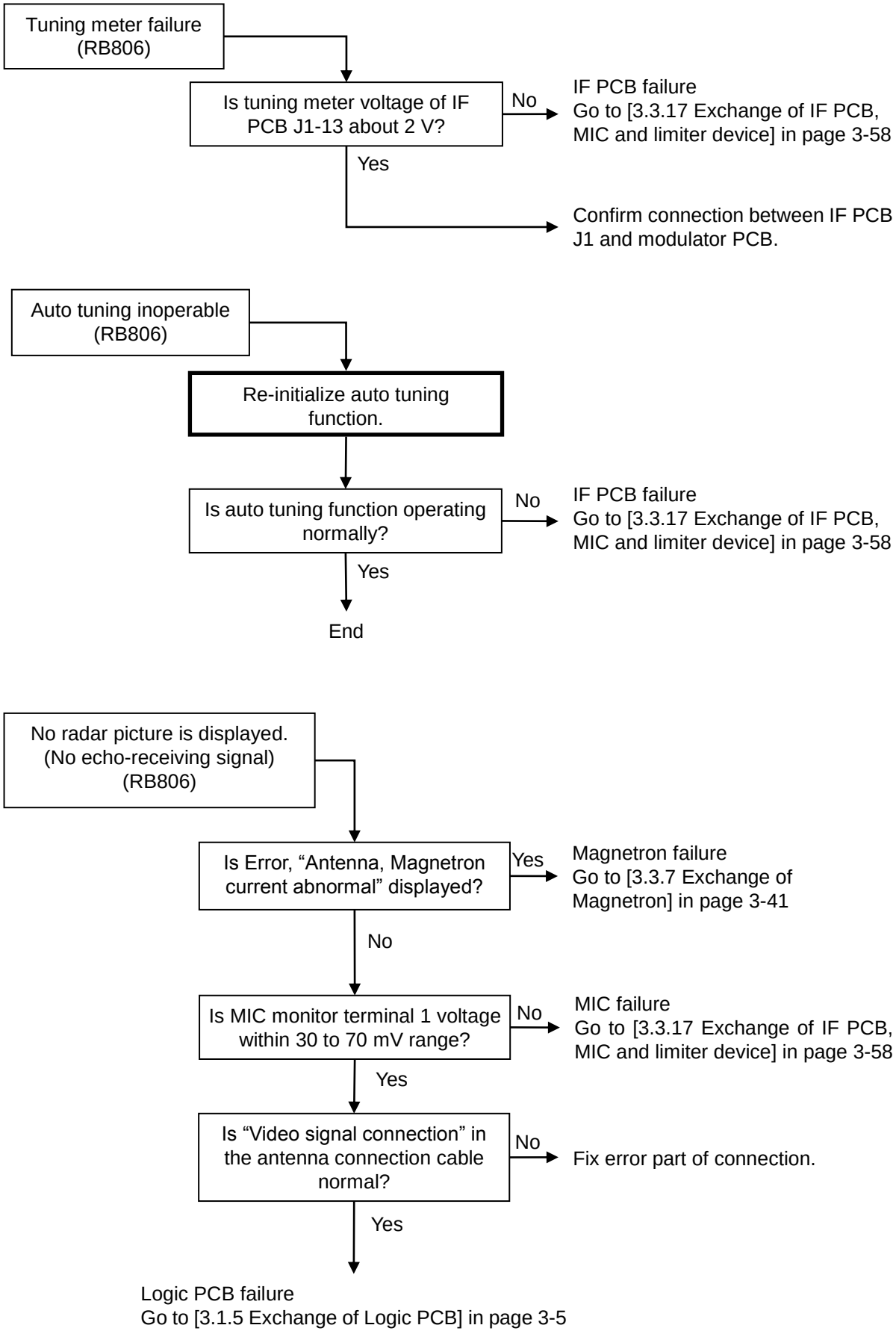
      If the screen is improved with this interchange, carry out the same interchange at CW-387 and connect to J2-AIS again.

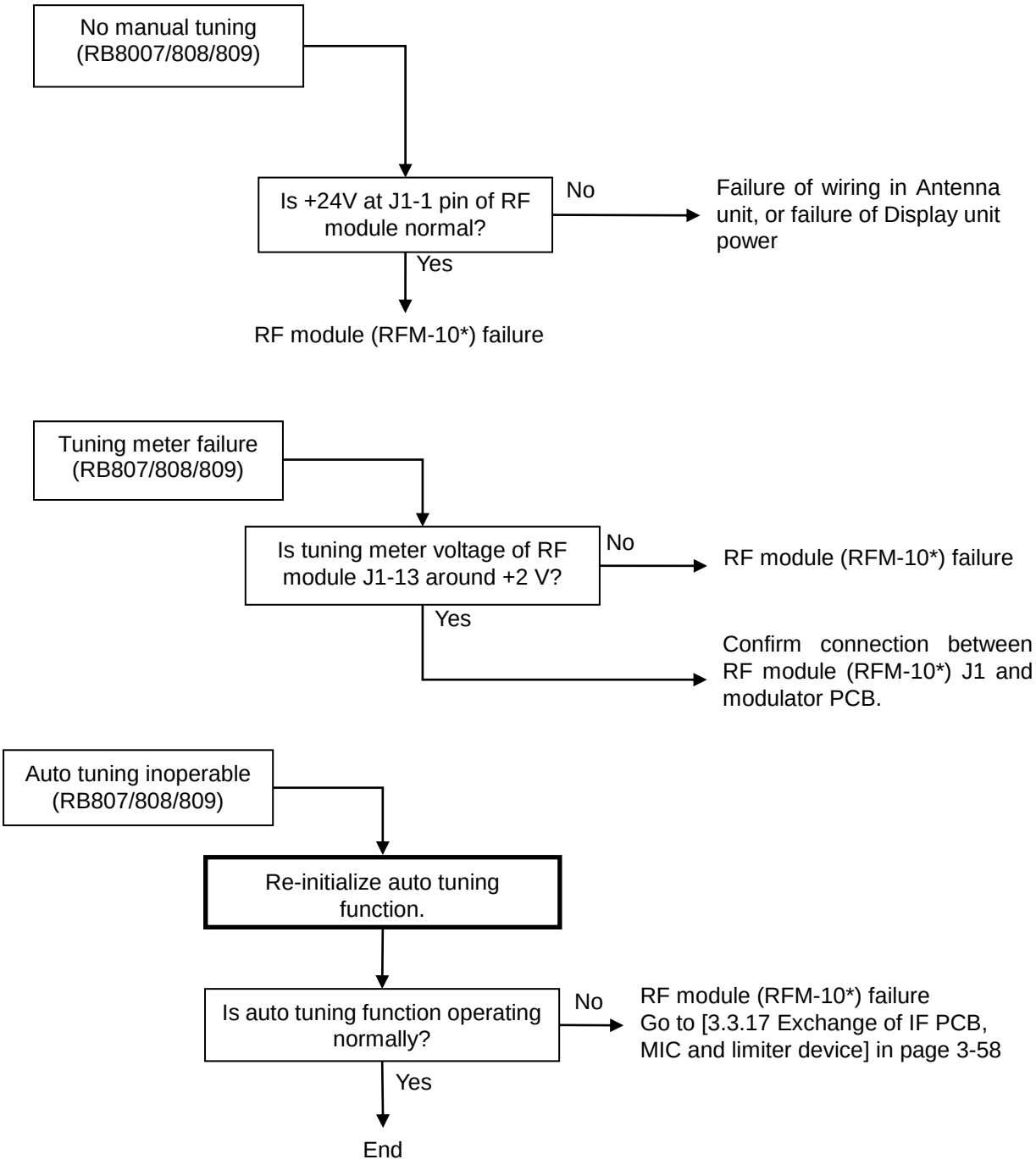
      If the screen is no improvement with this interchange, investigate the connecting port of AIS device and AIS device itself.

   c. When AIS symbol is not displayed even with display of a VDM sentence, confirm “No display of AIS” in accordance with the faults diagnosis flow. [Go to 1.3.17 No display of AIS in page 1-18.]

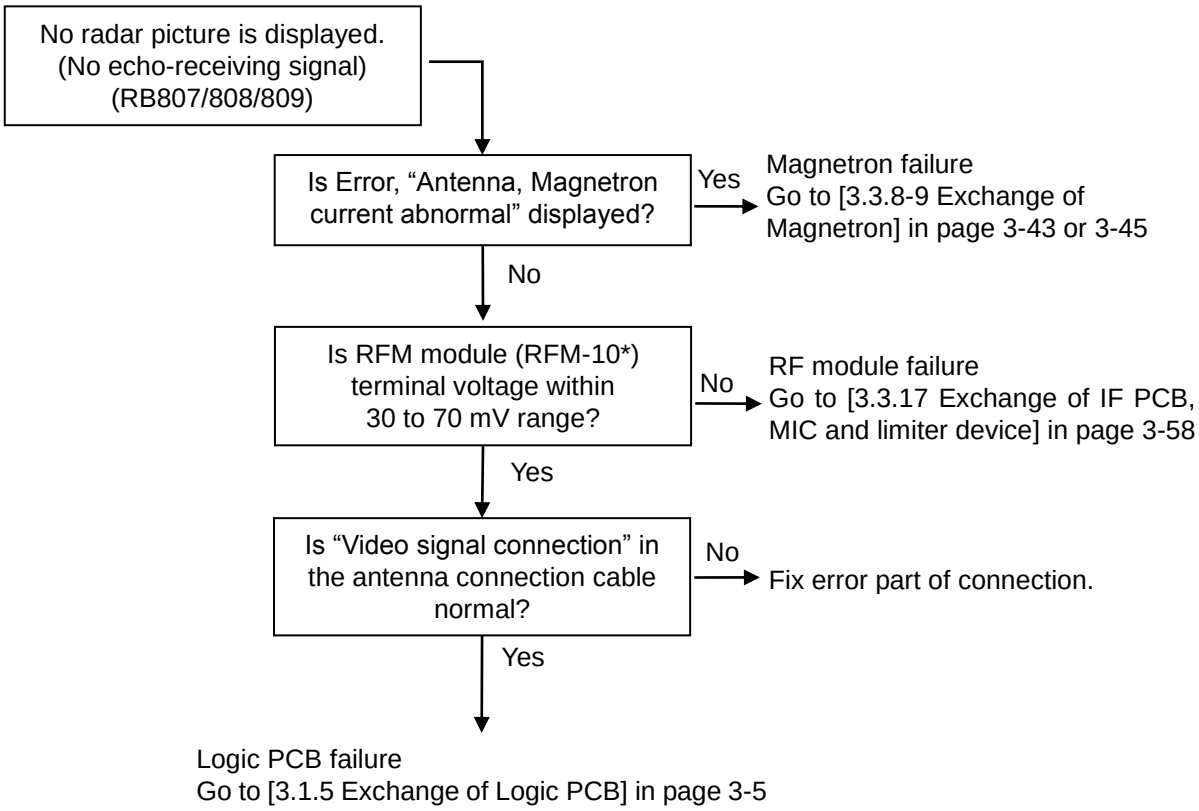
1.3.18 Other faults (Antenna Scanner unit)




Tuning meter failure (RB806)
Is tuning meter voltage of IF PCB J1-13 about 2 V?
No
IF PCB failure
Go to [3.3.17 Exchange of IF PCB, MIC and limiter device] in page 3-58
Yes
Confirm connection between IF PCB J1 and modulator PCB.
Auto tuning inoperable (RB806)
Re-initialize auto tuning function.
Is auto tuning function operating normally?
No
IF PCB failure
Go to [3.3.17 Exchange of IF PCB, MIC and limiter device] in page 3-58
Yes
End
No radar picture is displayed. (No echo-receiving signal) (RB806)
Is Error, “Antenna, Magnetron current abnormal” displayed?
Yes
Magnetron failure
Go to [3.3.7 Exchange of Magnetron] in page 3-41
No
Is MIC monitor terminal 1 voltage within 30 to 70 mV range?
No
MIC failure
Go to [3.3.17 Exchange of IF PCB, MIC and limiter device] in page 3-58
Yes
Is “Video signal connection” in the antenna connection cable normal?
No
Fix error part of connection.
Yes
Logic PCB failure
Go to [3.1.5 Exchange of Logic PCB] in page 3-5



*Subject to version change



*Subject to version change

1.4 Failure criterion of microwave components

1.4.1 Magnetron

The following phenomenon listed below may arise at the initial stage of magnetron's lifetime and can not finally transmit at all.

a. Images may drop out from the center in broken lines and straight lines.

b. A target may be split into two in the direction of distance or may be thin down like images applied with RAIN Rejection.

c. When pulse width is changed manually from LP to SP, detuning may be caused.

d. Desensitization may be caused.

e. Current value of magnetron may fall outside of the specified values.

f. When lead wires of a magnetron are disconnected from the pulse transformer, the resistance between lead wires may be 15 Ω or more.

1.4.2 Front-end module

a. There would be no best point in manual tuning or automatic tuning.

b. There would be no images except strong signals from land.

1.4.3 Limiter

a. Sensitivity would become extremely worse (Buoys up to 3 miles displayed could fade out and buoys within only 1 mile could be displayed).

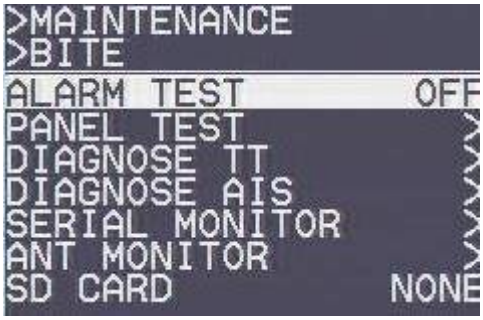
Chapter 2 MAINTENANCE MENU

2.1 BITE

Other items except the card item are the same items of BITE in MAINTENANCE MENU.

This is the function to find out faults easily.

There are items of ALARM TEST, PANEL TEST, DIAGNOSE TT, DIAGNOSE AIS, SERIAL MONITOR, ANT MONITOR and SD CARD as shown in the right picture.



2.1.1 PANEL TEST

It can check whether there is any fault in the function of Operation unit (MRO-108, MRO-110 and MRD-111).

How to operate:

1. Push “MENU” key, then the menu will be displayed.
2. “MAINTENANCE” => “BITE” => “PANEL TEST” =>
3. The panel layout as shown in the right picture will be displayed.

   When any key is pushed, “●” mark will be indicated at the left side of the key if the key is normal. If nothing is indicated, the key is faulty.

   When a knob is turned, the indicating line will be turned in proportion to the turning of the knob if the key is normal. If the line will not turn, the corresponding volume or encoder may be faulty.

   The “◦” mark of the track ball or joystick shown at the bottom will move to the direction of turning if the function is normal. If the mark will not move, the track ball or joystick may be faulty.

2.1.2 DIAGNOSE TT

This is the function to check TT (ATA) function.

How to operate:

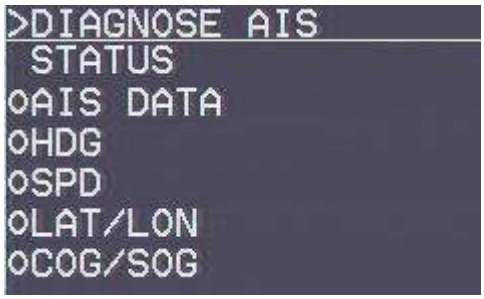
1. Push “MENU” key to display the menu.
2. “MAINTENANCE” => “BITE” => “DIAGNOSE TT” =>

3. When the function is normal, “○” mark will be displayed at the left side of each item as shown in the right picture.

   When there is any fault, mark “x” will be displayed. TT (ATA) will not function if there is even one “x” mark.

   - In the case of “x HDG”, no HDT sentence has been input into J3, J5, J6 or gyro port at the rear side of the Display unit. Check the input.

2.1.3 DIAGNOSE AIS



This is the function to check whether AIS function has any fault or not.

How to operate:

1. Push “MENU” key to display the menu.
2. “MAINTENANCE” => “BITE” => “DIAGNOSE AIS” =>
3. When the function is normal, “○” mark will be displayed at the left side of each item as shown in the right picture.

   When there is any fault, mark “x” will be displayed. AIS will not function if there is even one “x” mark.

- In the case of “x AIS DATA”, VDM sentence is not input into the connector J2 (AIS) at the rear side of the Display unit.
- In the case of “x HDG”, HDT sentence is not input into J3, J5, J6 or gyro port at the rear side of the Display unit. Check the input.
- In the case of “x SPD”, VBW or VHW sentence is not input in J3, J5, J6 at the rear side of the Display unit. Check the input.
- In the case of “x LAT/LON”, GNS or GGA, GLL or RMC sentence is not input in J3, J5, J6 at the rear side of the Display unit. Check the input.
- In the case of “x COG/SOG”, VTG sentence is not input in J3, J5, J6 at the rear side of the Display unit. Check the input.

2.1.4 SERIAL MONITOR

How to operate:

1. Push “MENU” key to display the menu.

2. “MAINTENANCE” => “BITE” => “SERIAL MONITOR” =>
   The content of the input will be displayed as shown in the right picture, and the display will scroll when the screen is fully occupied.

3. When “ENT” key is pushed, the scrolling will stop. Then, push “ENT” key to start the scrolling again.

The bottom line of the screen is the latest data.
Comparing the details of data input contained at the end of the instruction manual with the sentence monitored, confirm the correctness.

Note: When ship's bearing, speed and positioning sentence data is invalid, display of data, TT (ATA) function and AIS function will be unavailable.

Ship's bearing (HDG) : Required
  MDC-7X00P:THS>HDT
  Others :THS>HDT>HDG>HDM>VTG(T)[COG]>VTG(M)[COG]>RMC[COG]>RMA[COG]
Speed (STW,COG/SOG) : Required
  VBW>VTG(D)(Track/Speed against ground)>VHW(Speed against water)
Own Ship Latitude/Longitude (LAT/LON) : Required
  MDC-7X00P:GLL>GGA>GNS>RMC
  Others :GLL>GGA>GNS>RMC>RMA
Geodetic system (DATUM) : Required
  DTM
Date, Time : Required
  MDC-7X00P:ZDA(Present Date, Time)
  Others :ZDA(Present Date, Time)>RMC(Positioning Time)>GGA(Positioning Time)
Destination LAT/LON, ID
  RMB>BWC>RTE/WPL
Destination Bearing/Distance
  RMB>BWC
Cross Track Distance
  RMB>XTE
Route
  RTE/WPL
Depth
  DPT>DBT
Water Temperature
  MTW
Own Ship LOP value
  GLC
Wind Direction, Speed
  MWD

2.1.5 ANT MONITOR

This is the function to check the status of Antenna Scanner unit.

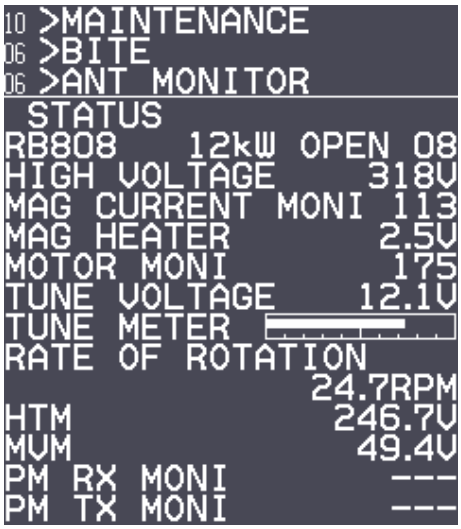
How to operate:

1. Push “MENU” key to display the menu.

2. Follow “MAINTENANCE” => “BITE” => “ANT MONITOR” =>

3. The status of Antenna Scanner unit as shown at right will be displayed.

The normal range is as shown in the table below. However, even if values are within the ranges, there may be cases where enough performance cannot be obtained and vice versa. This is just a guideline.



RB807/RB808/RB809

Item \ Scanner	RB807	RB808/RB809
HIGH VOLTAGE	200 – 320	300 – 420
MAG CURRENT	20 - 220	
MAG HEATER	1 - 12	
TUNE VOLTAGE	Difference between tuned voltage of each pulse range is ± 10	
RATE OF ROTATION	When antenna is set at low rotation: 20 - 28 rpm	

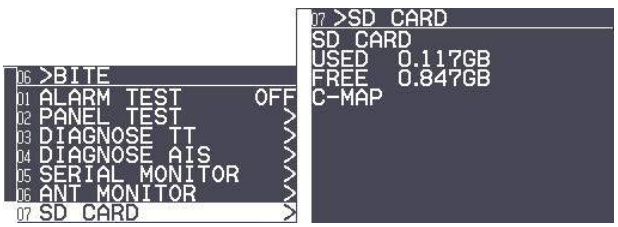
RB806/RB717A/718A/719A

Item \ Scanner	RB806/RB717A/718A/719A
HIGH VOLTAGE	100 - 300
MAG CURRENT	2 - 45
MAG HEATER	10 - 124
TUNE VOLTAGE	Difference between tuned voltage of each pulse range is ± 10
RATE OF ROTATION	When antenna is set at low rotation: 20 - 28 rpm

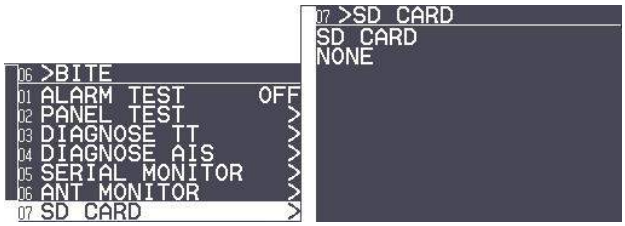
2.1.6 SD CARD

MDC-5200/5500 series

When C-MAP SD card is inserted, “C-MAP” will be displayed. If not, “NONE” will be displayed.



C-MAP SD card is inserted



C-MAP SD card is not inserted

MDC-5000/7000/7900 series

When SD card is inserted, “C-MAP” and/or “USED/FREE size" will be displayed. If not, “NONE” will be displayed.

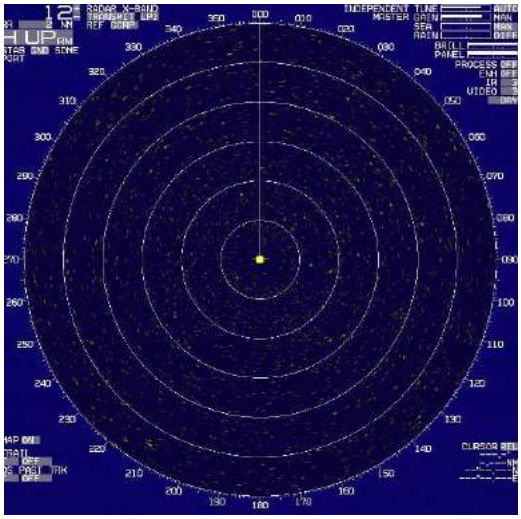
CAUTION: Backup SD-card must be inserted in the upper card reader [SD Card (1)].
C-MAP SD-card must be inserted in the lower card reader [SD Card (2)].

C-MAP/backup SD card is inserted

C-MAP/backup SD card is not inserted

2.2 ECHO

2.2.1 GAIN OFFSET



This is the function to adjust noise amount that varies per range.

In order to use the maximum gain performance, at scale 8 of gain knob, the background noise (thin small spots) in images will be displayed over the screen at the level where it will not interfere with detection of targets as shown in the right picture. When this displayed background noise will not vary even with changes of ranges without adjustment of gain knob, the setting will be the best.

If the background noise will change with changes of ranges, set “GAIN OFFSET”.

Note:
Background noise will change in inverse ratio to IF bandwidth, and IF bandwidth will work with pulse width. For the purpose, there is MAINTENANCE > PRESET > GAIN OFFSET in order to set the background noise amount per pulse width separately. Therefore, set the gain offset bandwidth first. Then, set the gain offset range. Otherwise, when pulse width is switched over by “SP/LP” key, the amount of background noise may become different.

2.2.2 SEA CURVE

This is the function to set the gradient of STC curves.
The range is 1 to 8. As the numerical figure becomes small, STC curves will become steeper (nearer images will disappear).

The default value is 4

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Chapter 3 How to exchange components

Turn off all power supply before start of works and disconnect all cables from connectors.

Searching for corresponding pages for an exchange of a component (From chapter 3 “How to exchange components” in index, open the corresponding pages and follow the procedures in them.)

3.1 Display unit

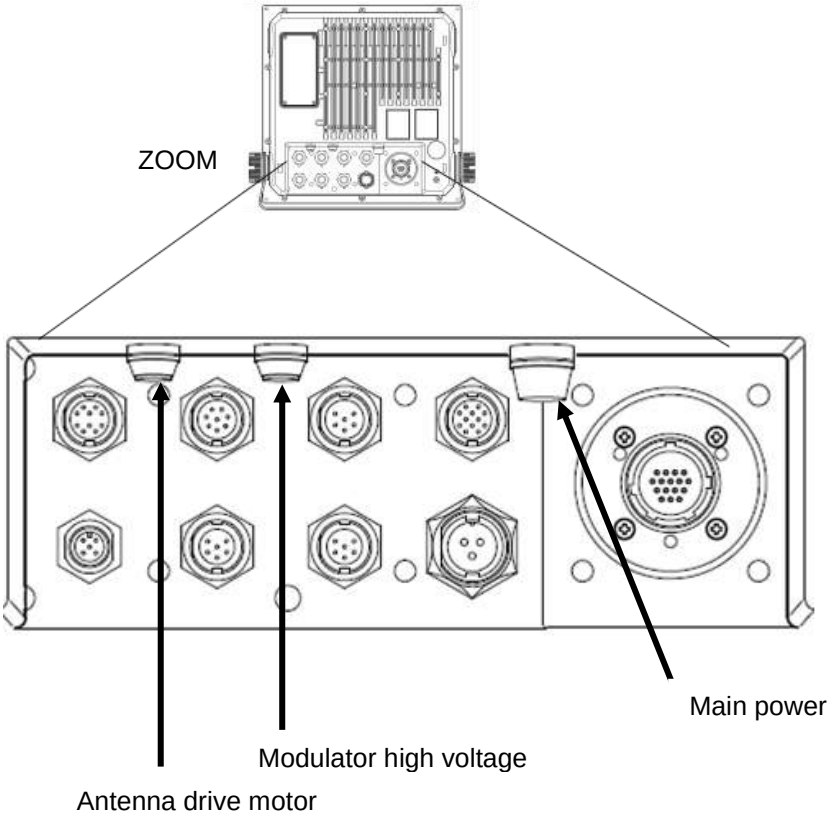
3.1.1 Replacement of fuse

The locations of the fuses are on the back panel of Display unit.

Fuse type and rating

Application	Type, dimension (mm)	Fuse characteristic	Rating
Main power	Tubular (Φ6.4 x 30)	Normal blow	15 A
Modulator high voltage	Tubular (Φ5.2 x 20)	Normal blow	0.8 A
Antenna drive motor (For MDC-5000/5200/5500 series)	Tubular (Φ5.2 x 20)	Normal blow	5 A
Antenna drive motor (For MDC-7000(P)/7900(P) series)	Tubular (Φ5.2 x 20)	Normal blow	10 A

Fuse locations:

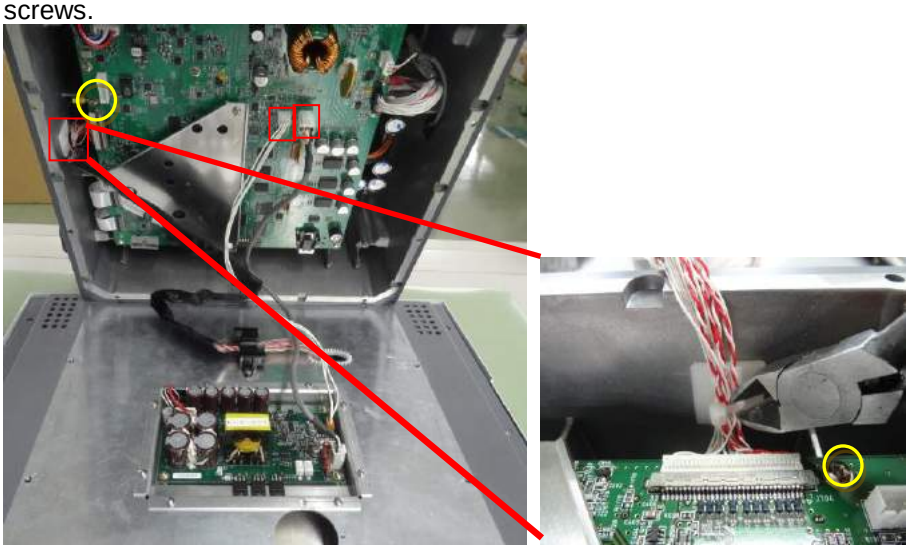


3.1.2 Dismantling of bracket and rear case (MRD-108 / MRD-108P)

1. Loosen four (4) knob bolts and dismantle the Display unit from the mounting bracket.

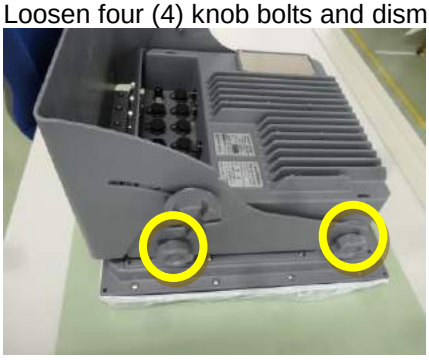
2. Open the unit by removing ten (10) screws.

3. Disconnect connectors J704, J726 and J729. Cut one (1) wire binding bands. Removing one (1) screws.



3.1.3 Dismantling of bracket and rear case (MRD-109)

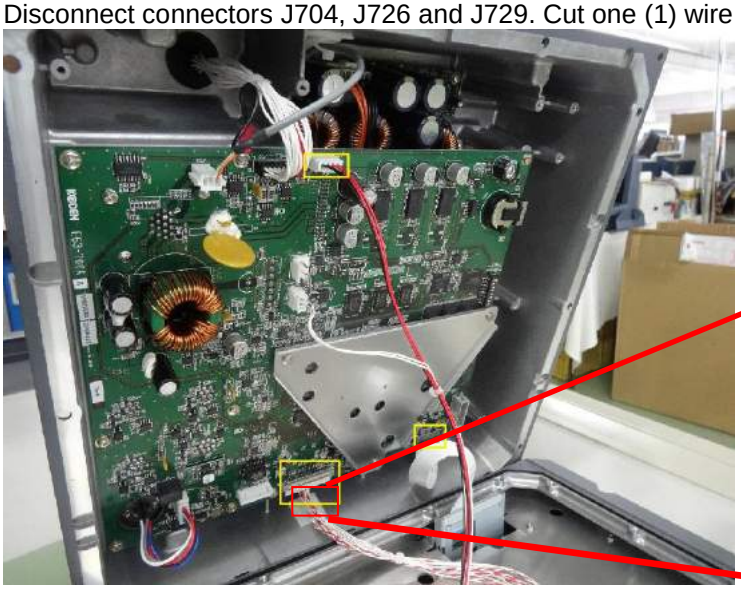
1. Loosen four (4) knob bolts and dismantle the Display unit from the mounting bracket.

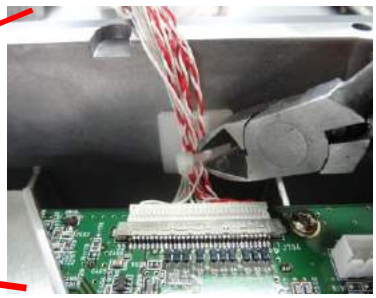


* (These are necessary works for replacement of components in Display unit)

2. Open the unit by removing ten (10) screws.

3. Disconnect connectors J704, J726 and J729. Cut one (1) wire binding bands.





Go to page 3-5 for 3.1.5 Exchange of Logic PCB
Go to page 3-6 for 3.1.6 Exchange of power supply PCB
Go to page 3-11 for 3.1.8 Exchange of LCD unit.

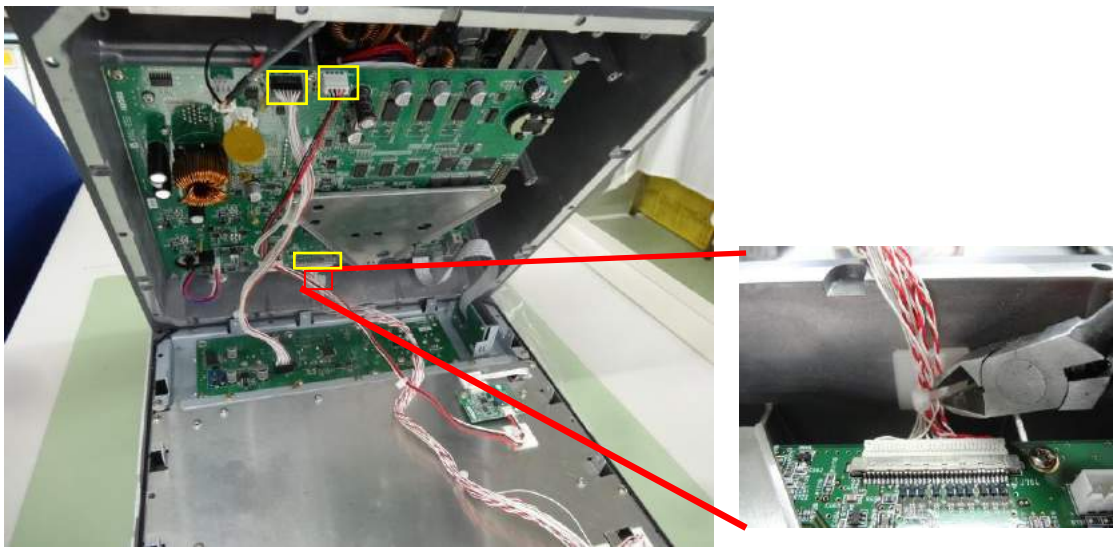
3.1.4 Dismantling of bracket and rear case (MRD-111)

1. Loosen two (2) knob bolts and dismantle the Display unit from the mounting bracket

* (These are necessary works for replacement of components in Display unit)

2. Open the unit by removing ten (10) screws

3. Disconnect connectors J704, J726 and J729. Cut one (1) wire binding bands.



Go to page 3-5 for 3.1.5 Exchange of Logic PCB
Go to page 3-6 for 3.1.6 Exchange of power supply PCB
Go to page 3-13 for 3.1.9 Exchange of LCD unit.

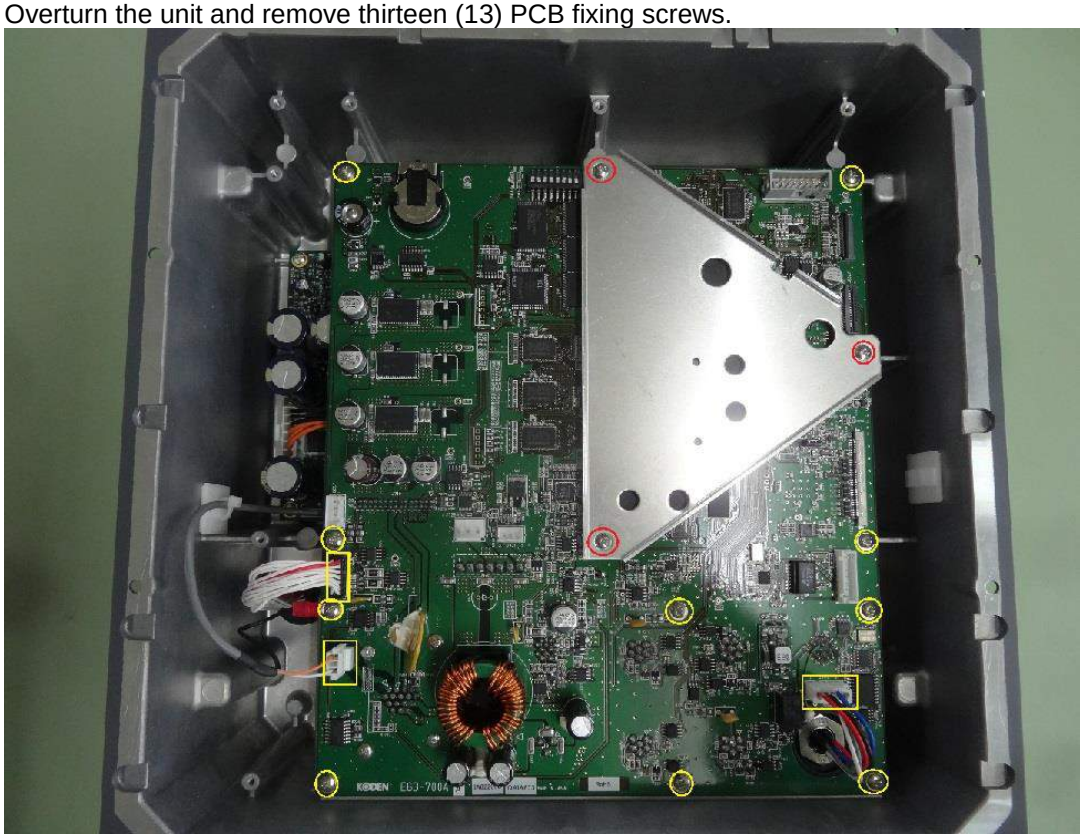
3.1.5 Exchange of Logic PCB (MRD-108/108P/109/111/MRM-108/108P/110)

1. After dismantling the bracket and rear case as shown in page 3-2 to 3-4, perform as follows:
2. Overturn the unit and remove four (4) screws.

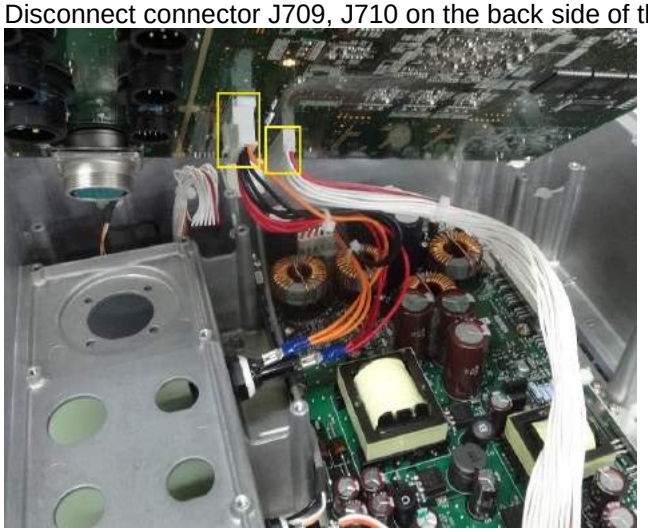
3. Remove eight (8) connector nuts.

4. Remove seven (7) washers and cap for connectors.

5. Overturn the unit and remove thirteen (13) PCB fixing screws.



6. Disconnect connectors J720, J701 and J722.
7. Disconnect connector J709, J710 on the back side of the Logic PCB.

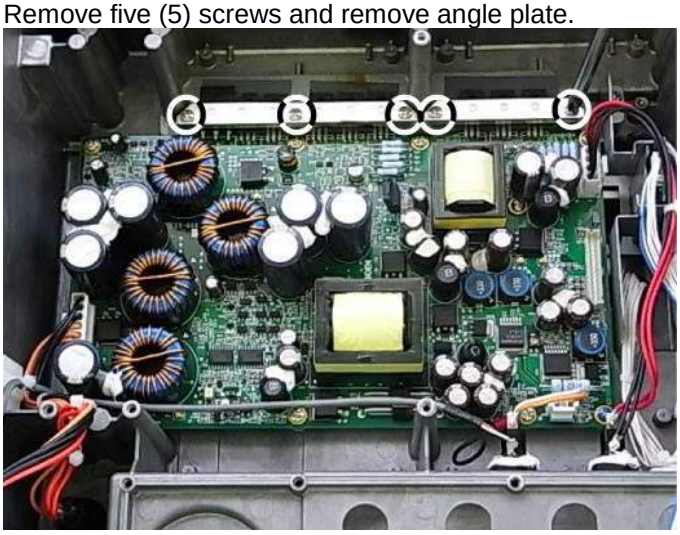


8. Remove the logic PCB (E63-700*)
9. Exchange the logic PCB (E63-700*) with a new one.
10. Reassemble in reversed steps and dismantle the bracket and rear case as shown in page 3-2 to 3-4.

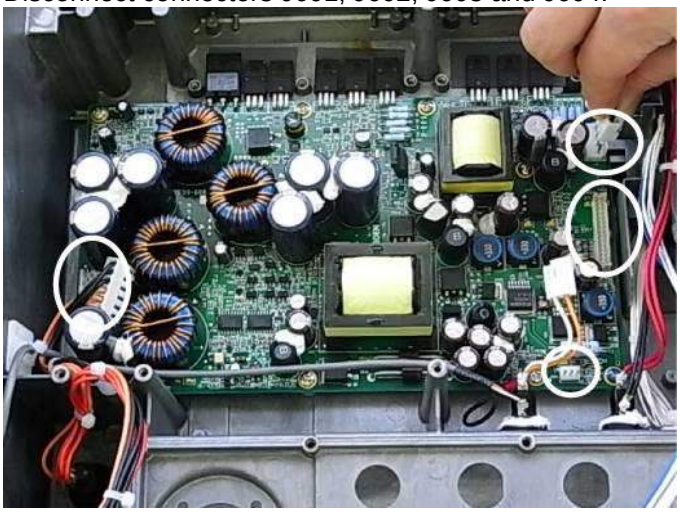
*Subject to version change

3.1.6 Exchange of power supply PCB (MRD-108/108P/109/111, MRM-108/108P/110)

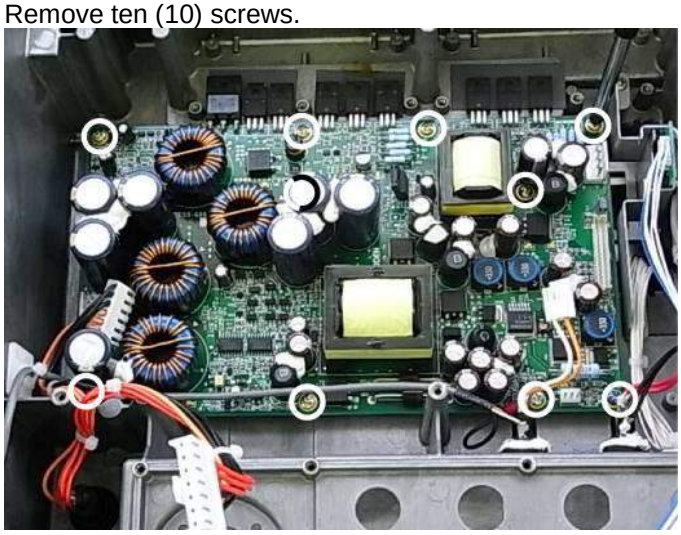
1. After exchange of the logic PCB (page 3-5), perform as follows:
2. Remove five (5) screws and remove angle plate.



3. Disconnect connectors J601, J602, J603 and J604.



4. Remove ten (10) screws.



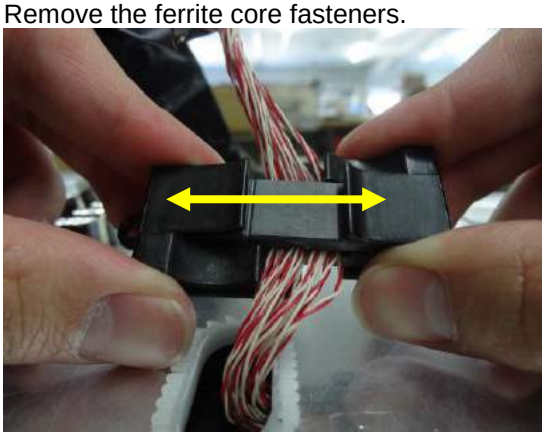
5. Exchange power supply PCB (E63-600*) with a new one.
6. Reassemble in reversed steps, follow the exchange of the logic PCB (page 3-5) and dismantle the bracket and rear case as shown in page 3-2 to 3-4.

*Subject to version change

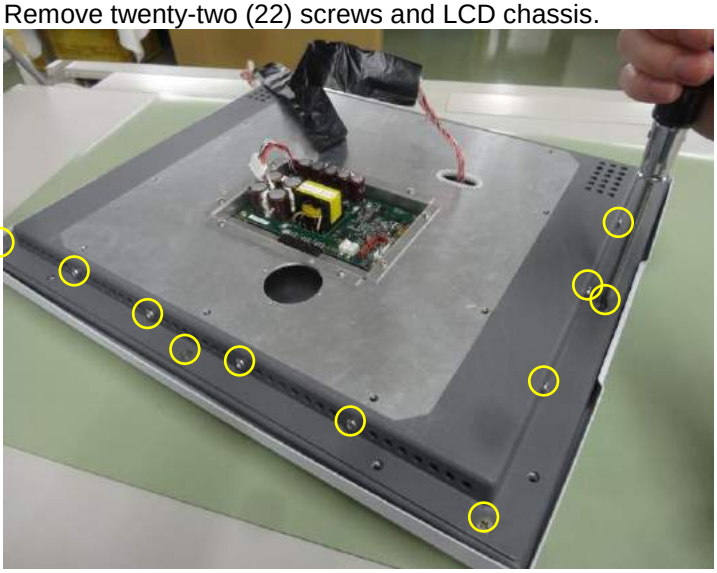
3.1.7 Exchange of LCD unit (MRD-108/108P)

1. After dismantling the bracket and rear case as shown in page 3-2, perform as follows:
2. Disconnect connector J613, and remove the two (2) screws fixing the ferrite core.

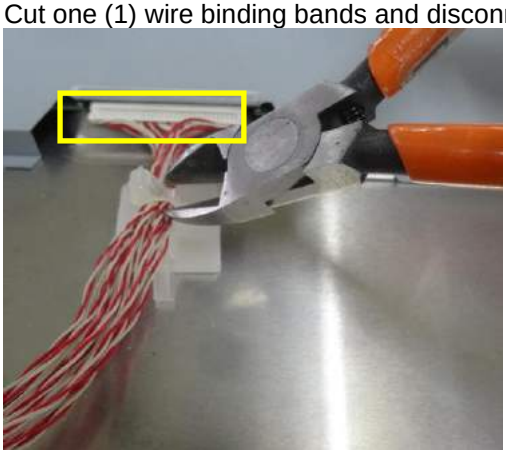
3. Remove the ferrite core fasteners.



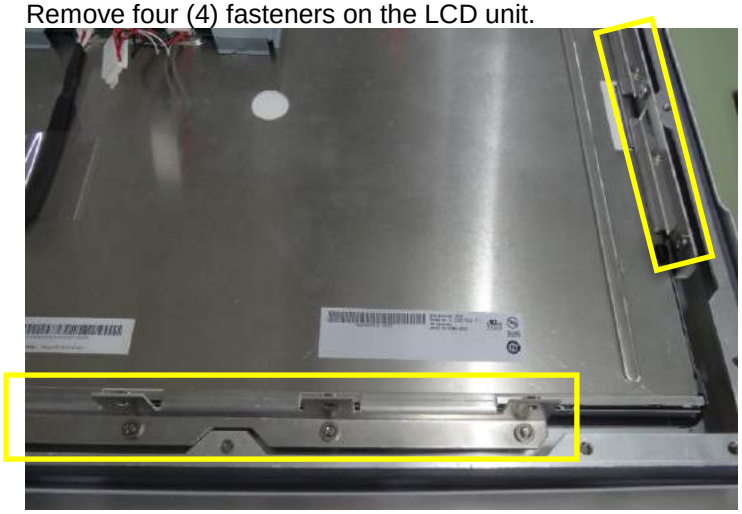
4. Remove twenty-two (22) screws and LCD chassis.



5. Cut one (1) wire binding bands and disconnector connecter CN1.

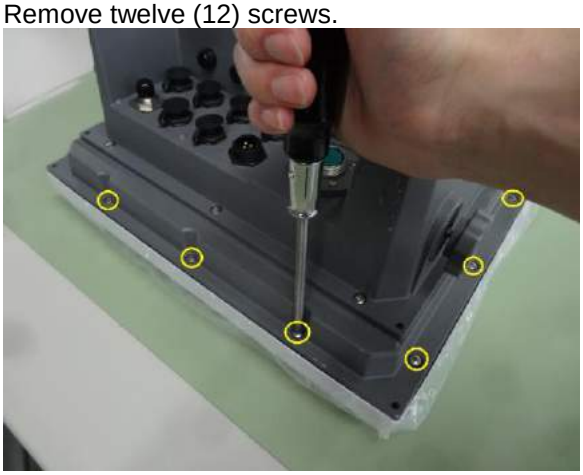


6. Remove four (4) fasteners on the LCD unit.

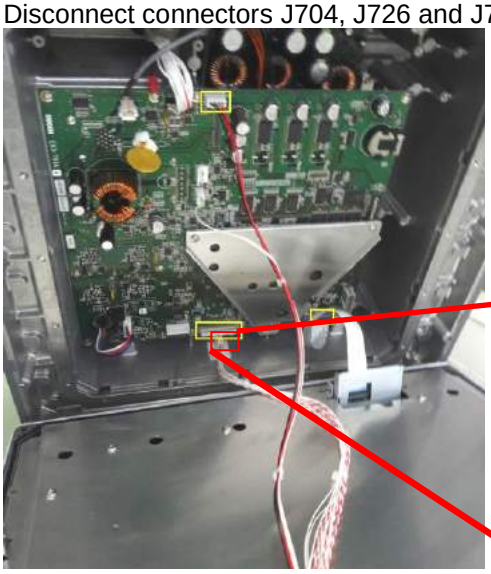


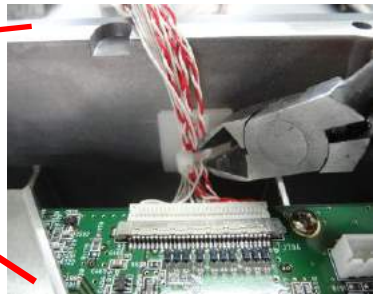
3.1.8 Exchange of LCD unit (MRD-109)

1. Remove twelve (12) screws.

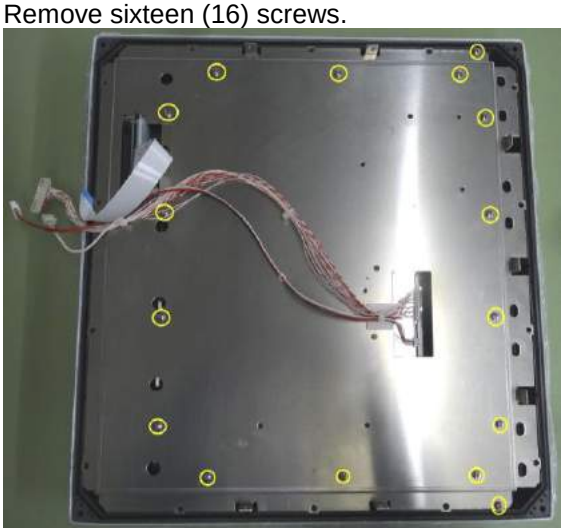


2. Disconnect connectors J704, J726 and J729. Cut one (1) wire binding bands.

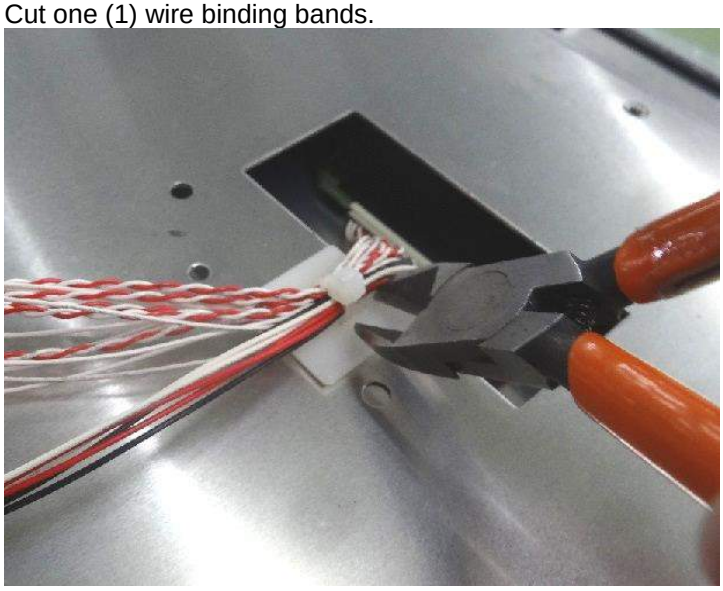




3. Remove sixteen (16) screws.



4. Cut one (1) wire binding bands.



5. Remove chassis (E69MB1201*).

6. Exchange LCD unit (LQ150X1LX9K) with a new one.

7. Reassemble in reverse steps, the exchange of logic PCB (page 3-5) and dismantle the bracket and rear case (page 3-3).

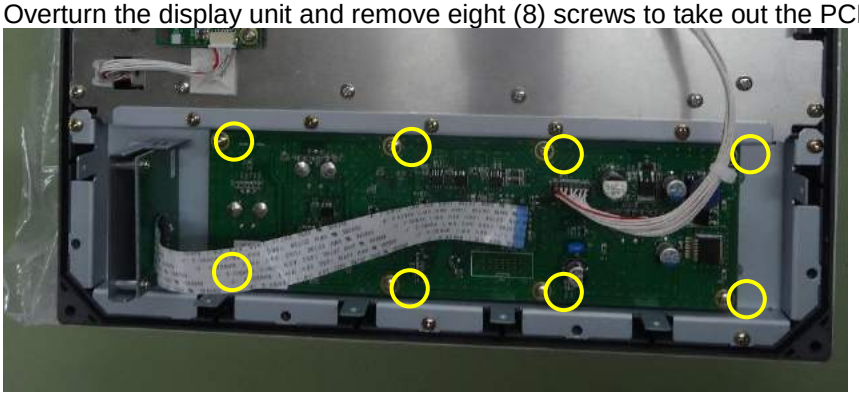
*Subject to version change

3.1.9 Exchange of LCD unit (MRD-111)

1. After dismantling the bracket and rear case (MRD-111) as shown in page 3-4, perform as follows:
2. Remove one (1) big flat caps and three (3) small flat caps.

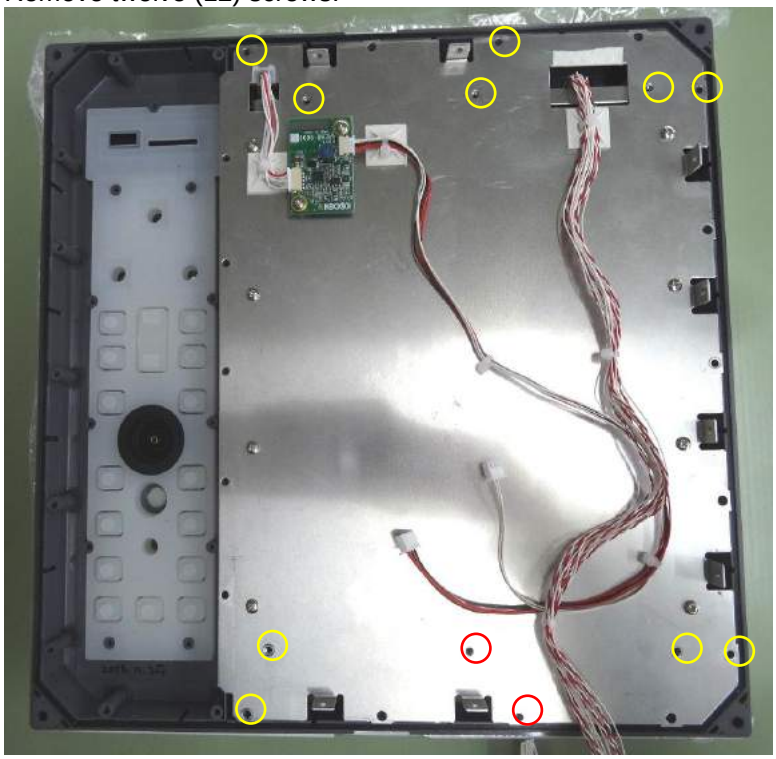
3. Remove one (1) big knobs and three (3) small knobs after loosening knob tightening screws.

4. Overturn the display unit and remove eight (8) screws to take out the PCB.



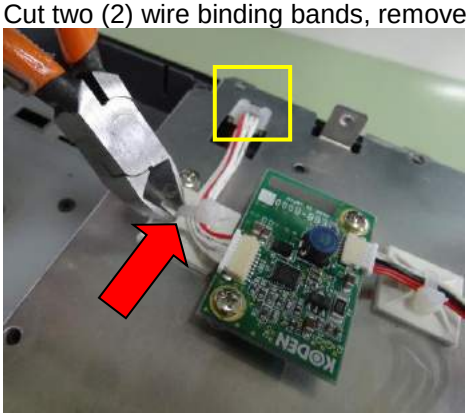
5. Remove twenty (20) screws and key board chassis (E54MB1305*).

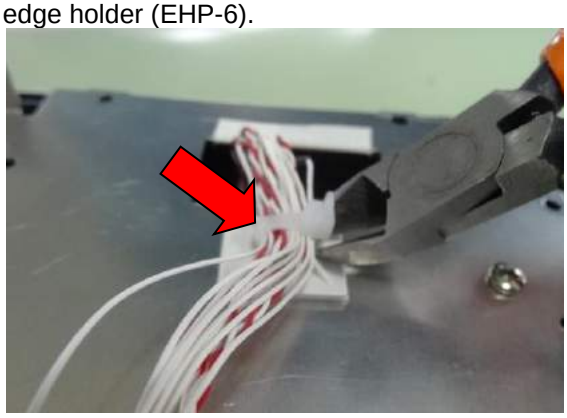
6. Remove twelve (12) screws.



*Subject to version change

7. Cut two (2) wire binding bands, remove edge holder (EHP-6).





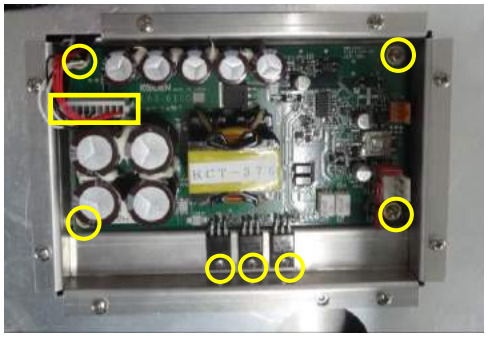
8. Disconnect connectors J802 (E68-600*).

9. Remove LCD chassis (E54MB1304*).
10. Exchange LCD unit (NL10276BC24-37UC) with a new one.
11. Reassemble in reversed steps and dismantle the bracket and rear case as shown in page 3-4.

*Subject to version change

3.1.10 Exchange of backlight power PCB (MRD-108/108P)

1. After dismantling the bracket and rear case as shown in page 3-2, perform as follows:
2. Disconnect connecter J613 and remove seven (7) screws.

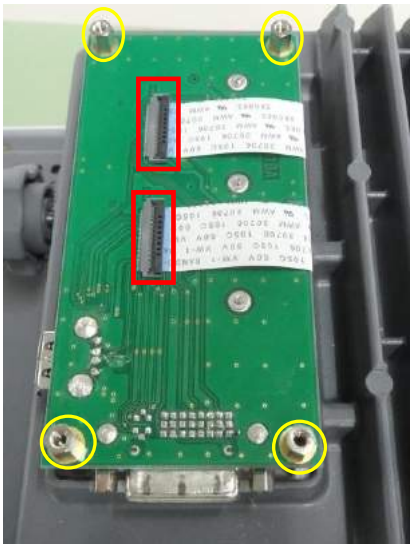


3. Exchange for backlight power PCB with a new one.
4. Reassemble in reversed steps and dismantle the bracket and rear case as shown in page 3-2.

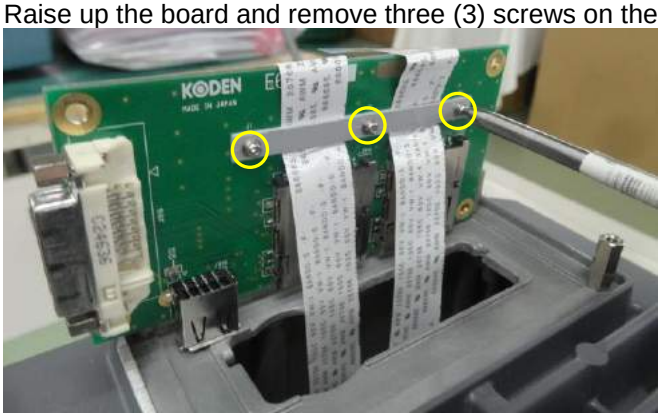
3.1.11 Exchange of Rear card connector PCB (MRD-108/108P/MRM-108/108P/110)

1. Remove four (4) screws.

2. Remove the two harness and four spacers.



3. Raise up the board and remove three (3) screws on the back.



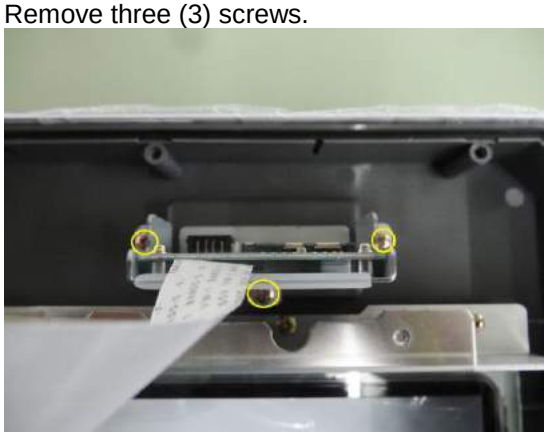
Caution:
Please make sure not to drop the removed screws in the cabinet.

Please do not give too much force when raising up the board. The flat cable will be pulled out.

4. Exchange for Rear card connector PCB with a new one.
5. Reassemble in reversed steps and dismantle the bracket and rear case as shown in page 3-2.

3.1.12 Exchange of Connector PCB (MRD-109)

1. After dismantling the step 5 to 3.1.8 Exchange of LCD unit (MRD-109) perform as follows:
2. Remove three (3) screws.



3. Remove two (2) screws.

4. Exchange for Connector PCB with a new one.
5. Reassemble in reversed steps and dismantle the bracket and rear case as shown in page 3-3.

3.1.13 Exchange of Connector PCB (MRD-111)

1. After dismantling the bracket and rear case (MRD-111) as shown in page 3-4, perform as follows:
2. Remove two (2) screws.

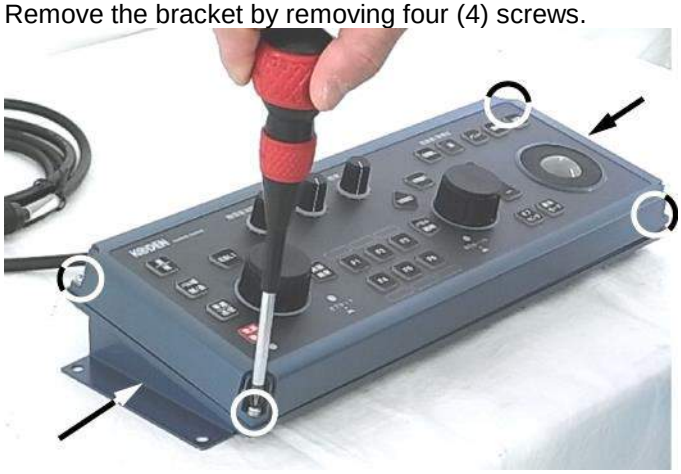
3. Exchange for Connector PCB with a new one.
4. Reassemble in reversed steps and dismantle the bracket and rear case as shown in page 3-4.

3.2 Operation unit

3.2.1 Exchange of Panel PCB (MRO-108/108P)

1. Remove four (4) corner caps by sliding up.

2. Remove the bracket by removing four (4) screws.

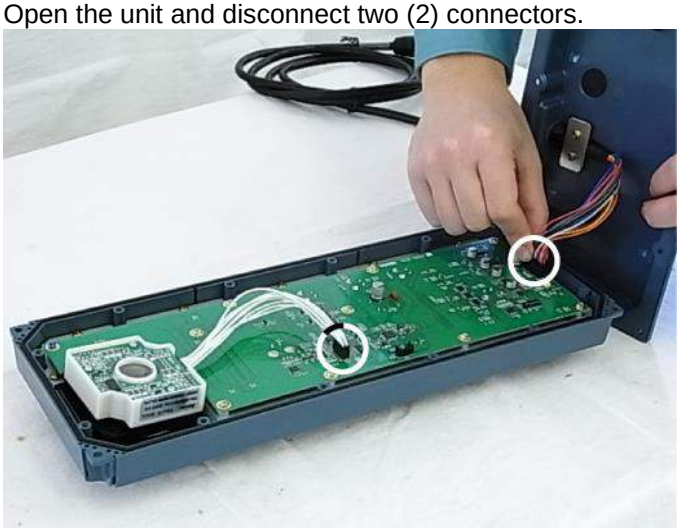


3. Remove two (2) big flat caps and three (3) flat caps.

4. Remove two (2) big knobs and three (3) small knobs after loosening knob tightening screws.

5. Overturn the Operation unit and remove twelve (12) screws.

6. Open the unit and disconnect two (2) connectors.



7. Remove eleven (11) screws to take out the PCB.

8. Exchange panel PCB (E63-900*) with a new one.
9. Reassemble in reverse steps.

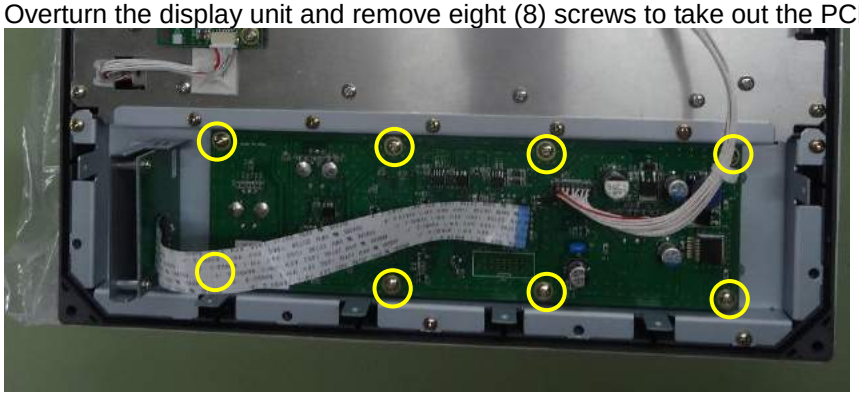
*Subject to version change

3.2.2 Exchange of Panel PCB (MRD-111)

1. After dismantling the bracket and rear case (MRD-111) as shown in page 3-4, perform as follows:
2. Remove one (1) big flat caps and three (3) small flat caps.

3. Remove one (1) big knobs and three (3) small knobs after loosening knob tightening screws.

4. Overturn the display unit and remove eight (8) screws to take out the PCB.



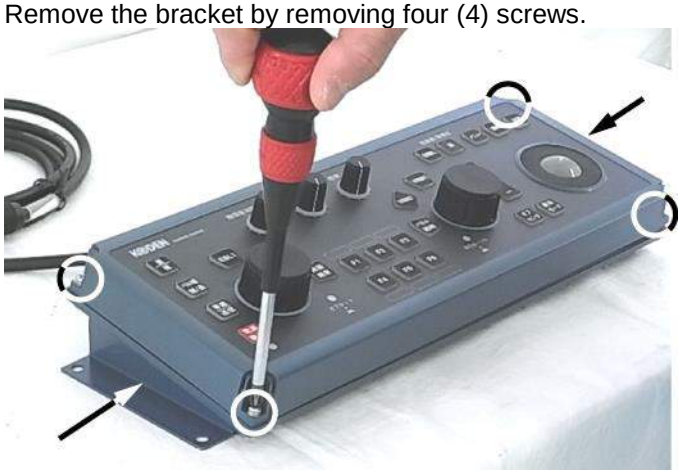
5. Exchange panel PCB (E68-900*) with a new one.
6. Reassemble in reverse steps.

*Subject to version change

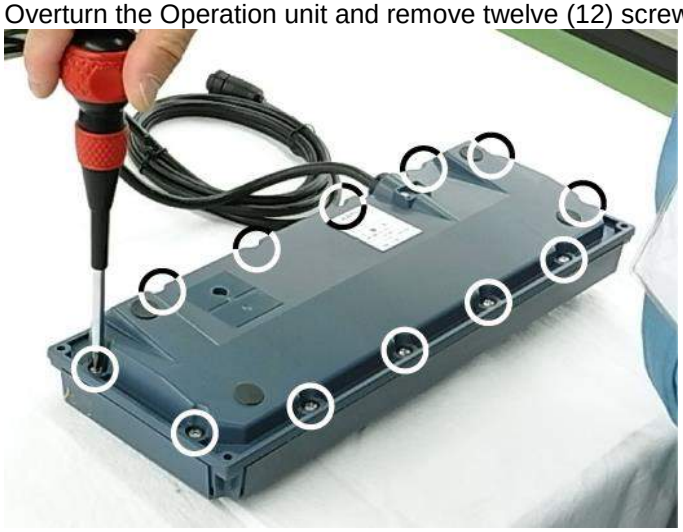
3.2.3 Exchange of track ball (MRO-108/108P)

1. Remove four (4) corner caps by sliding up.

2. Remove the bracket by removing four (4) screws.



3. Overturn the Operation unit and remove twelve (12) screws.



4. Open the unit and disconnect the connector on the trackball.

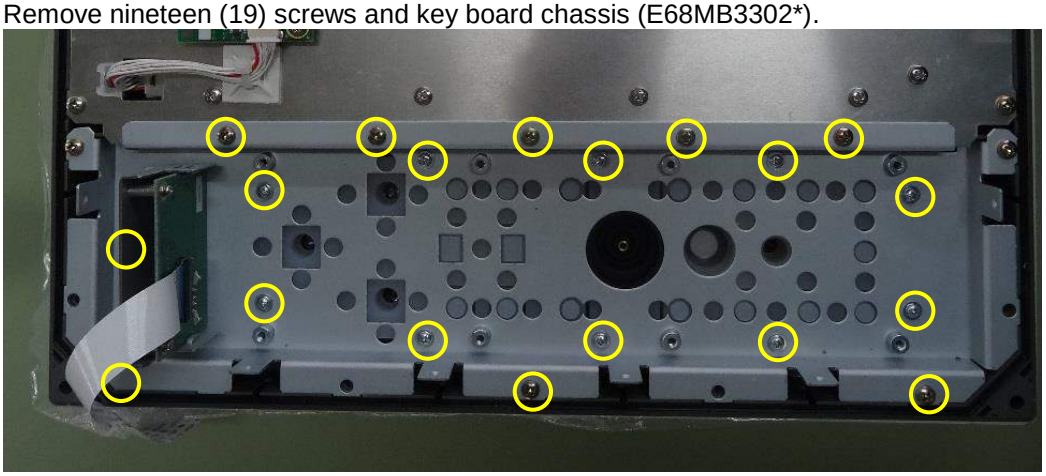
5. Exchange the track ball (TRD-101S (FB) K) with a new one.
   As the V-ring on the new track ball is not yet fixed, fix it first.

6. Reassemble in reverse steps.

3.2.4 Exchange of Sillcon key (MRD-111)

1. After dismantling the Exchange of Panel PCB (MRD-111) up to step 4 as shown in page 3-23, perform as follows:

2. Remove nineteen (19) screws and key board chassis (E68MB3302*).



3. Exchange sillcon key (E54MC1202*).

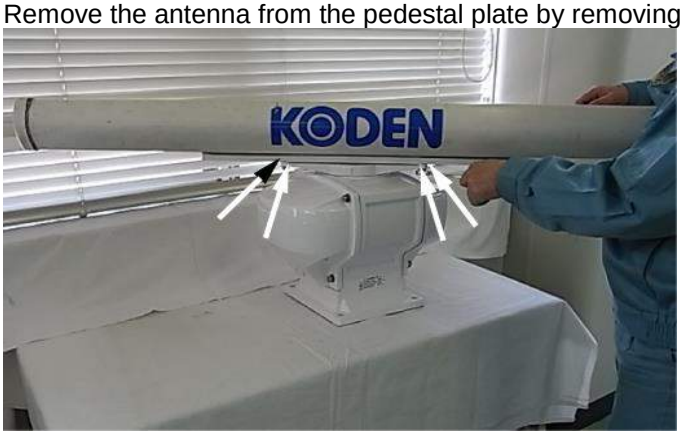
4. Reassemble in reverse steps.

*Subject to version change

3.3 Antenna Scanner unit

3.3.1 Dismantling of antenna and antenna cover

1. Remove the antenna from the pedestal plate by removing four (4) screws.



2. Remove the cover of stern side by removing four (4) screws.

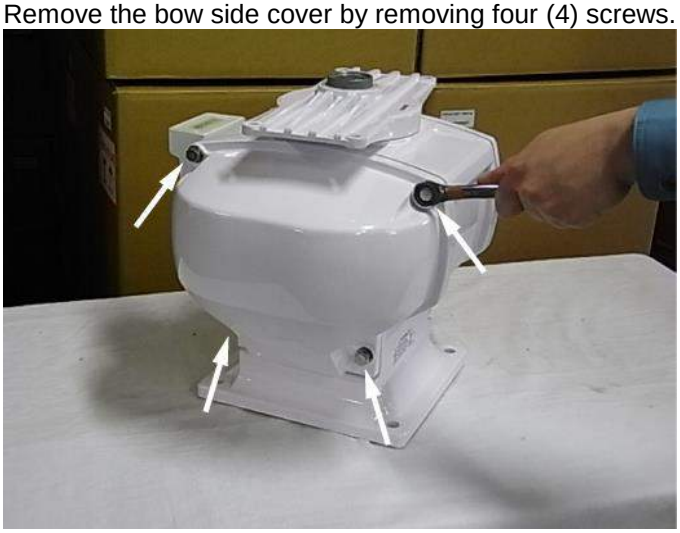
3. Go to page 3-29 for exchange of Azimuth Pulse unit and Drive unit motor and go to page 3-31 for exchange of V ring.

4. Remove the TR unit by removing two (2) screws and disconnect connectors J1, J2, J3, J4 and J502.

Go to page 3-36 for exchange of Modulator PCB
Go to page 3-39 for exchange of Fan (RB809, RB719A)
Go to page 3-43 for exchange of Magnetron (RB807,RB808/808P)
Go to page 3-45 for exchange of Magnetron (RB809/809P)
Go to page 3-47 for exchange of Magnetron (RB717A,RB718A)
Go to page 3-49 for exchange of Magnetron (RB719A)
Go to page 3-51 for exchange of Transformer (RB809/809P)
Go to page 3-53 for exchange of Transformer (RB717A,RB718A)
Go to page 3-54 for exchange of Transformer (RB719A)
Go to page 3-58 for exchange of IF PCB, MIC and limiter device

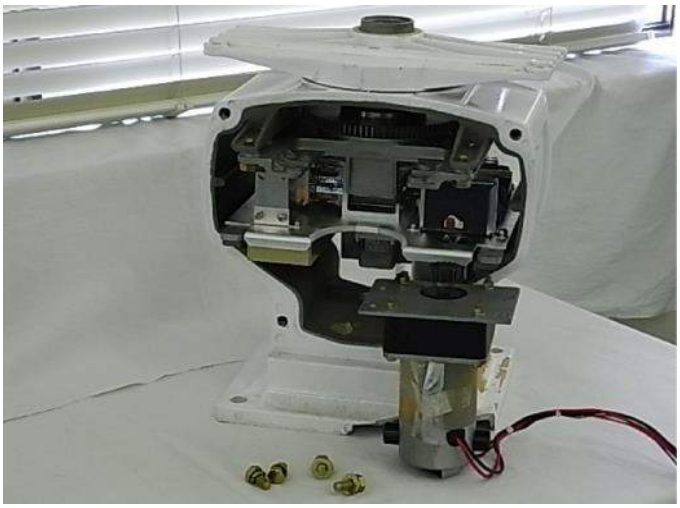
3.3.2 Exchange of Azimuth Pulse unit and Drive unit motor (RB806 / 807 / 717A / 718A / 719A)

1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Remove the bow side cover by removing four (4) screws.



3. Remove the four (4) screws holding Drive unit motor ASSY and disconnect connector J4.

4. Remove the Drive unit motor ASSY.



5. Go to page 3-31 for exchange of V ring.
6. Remove Azimuth Pulse unit (249U155426-03B) by removing two (2) screws.

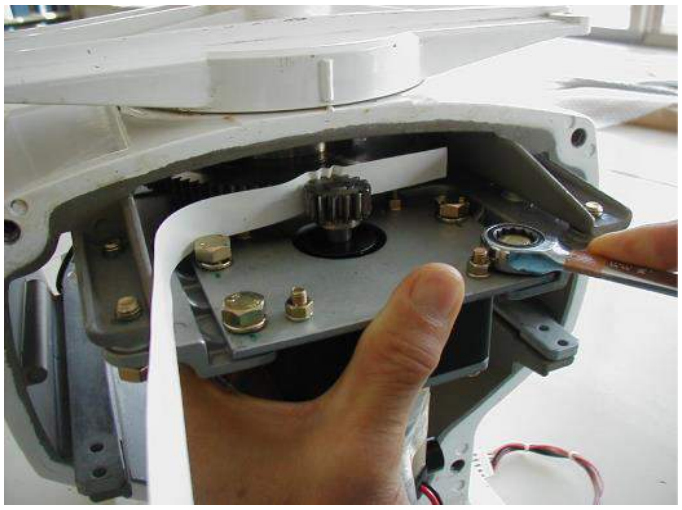
7. Exchange Drive unit motor (239H53917B)

Note:

In order to provide appropriate gap between gears, insert paper tape with 0.1mm thickness between the main gear and pinion gear, and push Drive unit motor ASSY toward main gear and tighten screws lightly.

Adjust location of Drive unit motor ASSY so that rotation of the main shaft can remove the paper tape by moving out.

Then tighten the screws firmly.



8. Reassemble in reverse steps, and follow the dismantling of antenna and antenna cover (page 3-27).

3.3.3 Exchange of V ring

* As exchange of V ring is rather complicated, it is recommended not to perform the work at site but to ask to KODEN.

1. After the exchange of Azimuth Pulse unit and Drive unit motor (page 3-29), perform as follows:
2. Remove the TR unit by removing two (2) screws and disconnect connectors J3, J4 and J502.

3. Remove the heading pulse detector by removing two (2) screws.

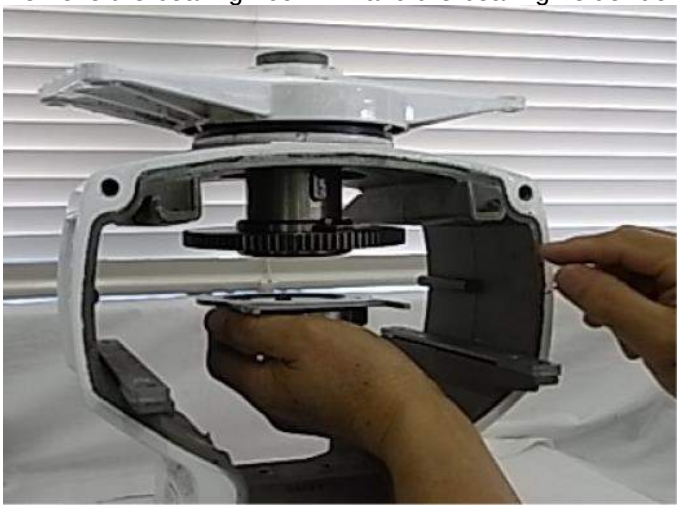
4. Remove the bearing holding parts by removing four (4) screws.

5. Remove six (6) screws.

6. Remove the bearing case by sliding down.

7. Remove the bearing fixing plate by removing six (6) screws.

8. Remove the bearing #6912ZZ and the bearing holder downward.



9. Remove the main gear downward.

10. Remove the key from the main shaft.

11. Remove the main shaft by lifting up.

12. Remove the V ring after wiping off dirty grease.

13. Remove dirty object to clean.

14. Install a new V ring.

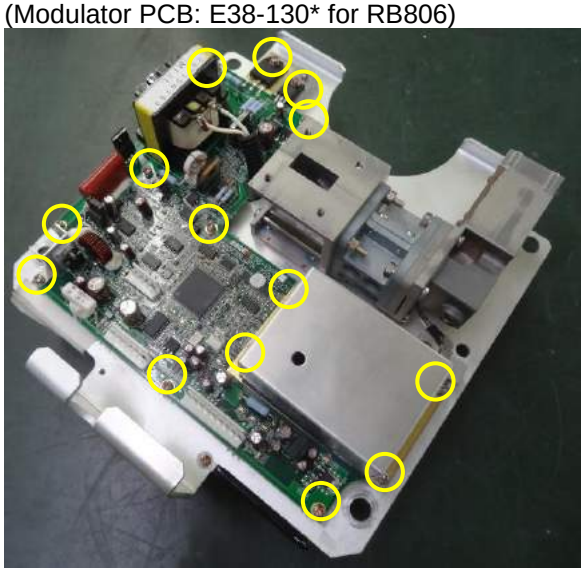
15. Put enough grease to seal side evenly without air bubbles.

16. Reassemble in reverse steps, refer to “Exchange of Azimuth Pulse unit and Drive unit motor (page 3-29)” and “Dismantling of antenna and antenna cover (page 3-27)”.

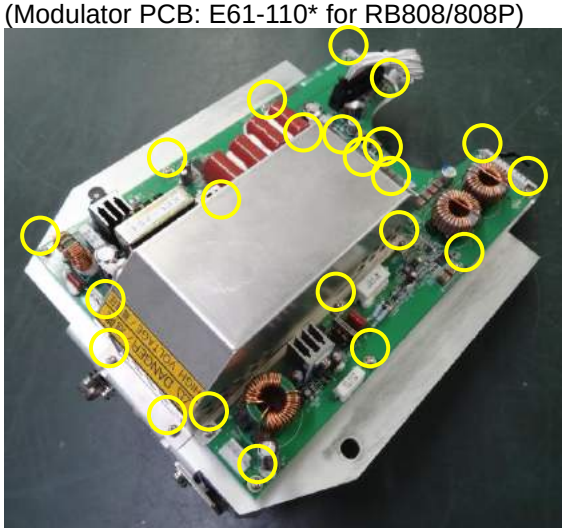
3.3.4 Exchange of Modulator PCB

1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:

2. RB806
   Remove the fourteen (14) screws, disconnect connector J13 and unsolder two wires.
   Exchange modulator PCB with a new one.
   (Modulator PCB: E38-130* for RB806)

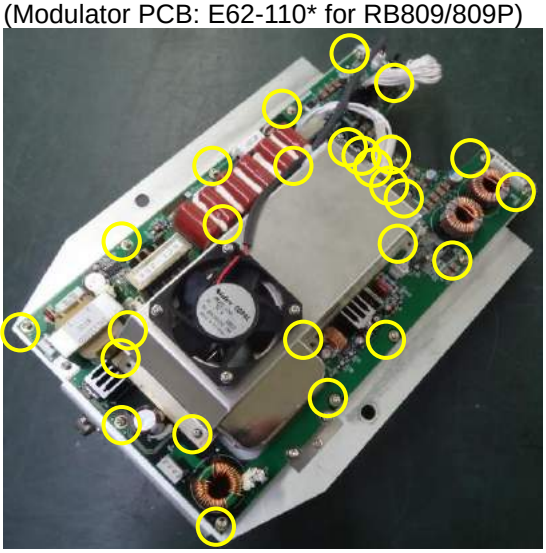


   RB807, RB808
   Remove the twenty-two (22) screws, disconnect connector J4 and unsolder two wires.
   Exchange modulator PCB with a new one.
   (Modulator PCB: E71-110* for RB807)
   (Modulator PCB: E61-110* for RB808/808P)

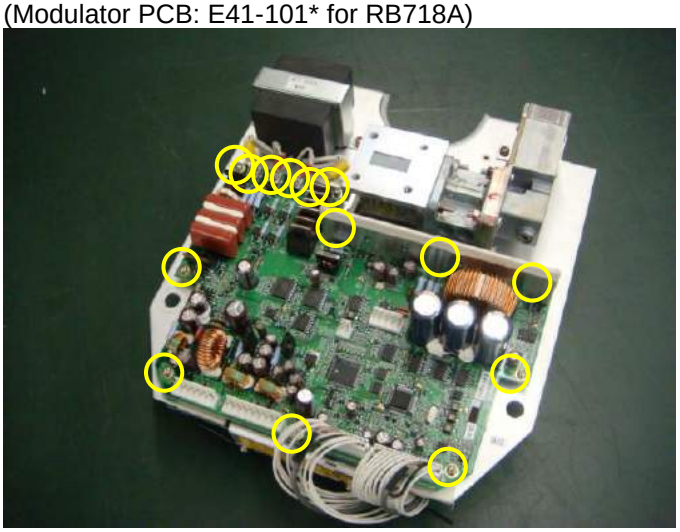


*Subject to version change

RB809
Remove the twenty-six (26) screws and disconnect connector J4, J5, J6, J7 and J10.
Exchange modulator PCB with a new one.
(Modulator PCB: E62-110* for RB809/809P)

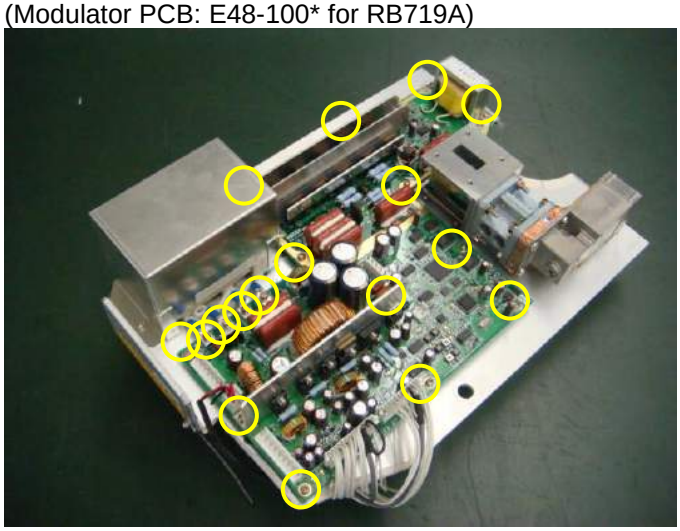


RB717A, RB718A
Remove the fourteen (14) screws and disconnect connector J5 and J6.
Exchange modulator PCB with a new one.
(Modulator PCB: E41-100* for RB717A)
(Modulator PCB: E41-101* for RB718A)



*Subject to version change

RB719A
Remove the seventeen (17) screws and disconnect connector J5, J6 and J7.
Exchange modulator PCB with a new one.
(Modulator PCB: E48-100* for RB719A)

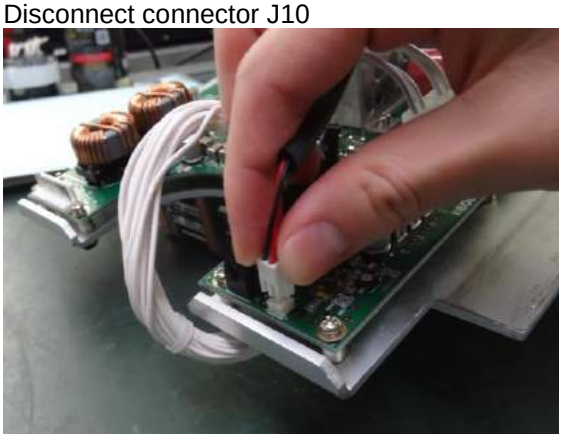


3. Reassemble in reverse steps and dismantle the antenna and antenna cover (page 3-27).

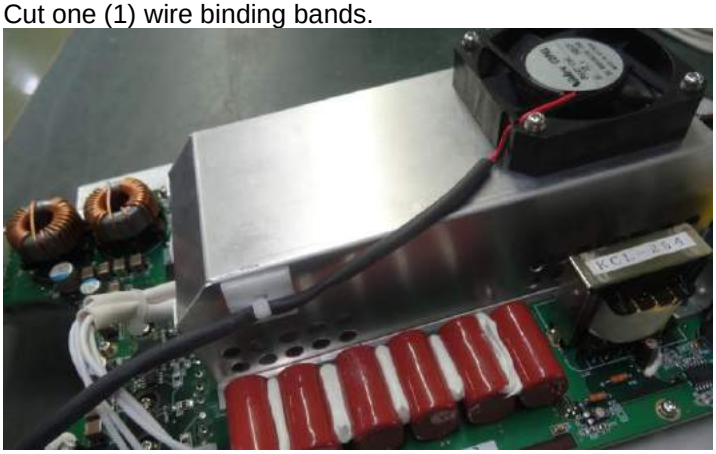
*Subject to version change

3.3.5 Exchange of Fan (RB809 only)

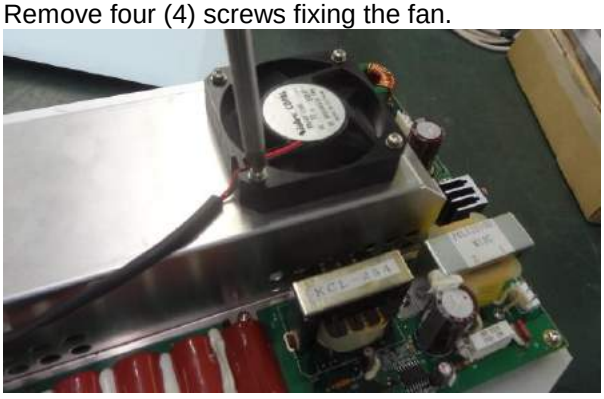
1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Disconnect connector J10



3. Cut one (1) wire binding bands.



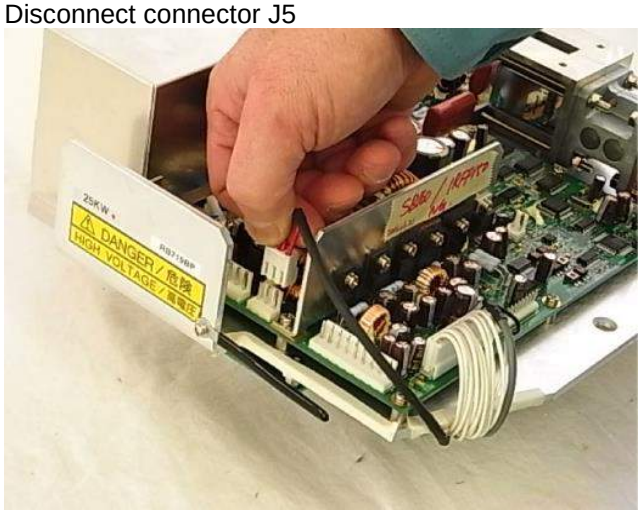
4. Remove four (4) screws fixing the fan.



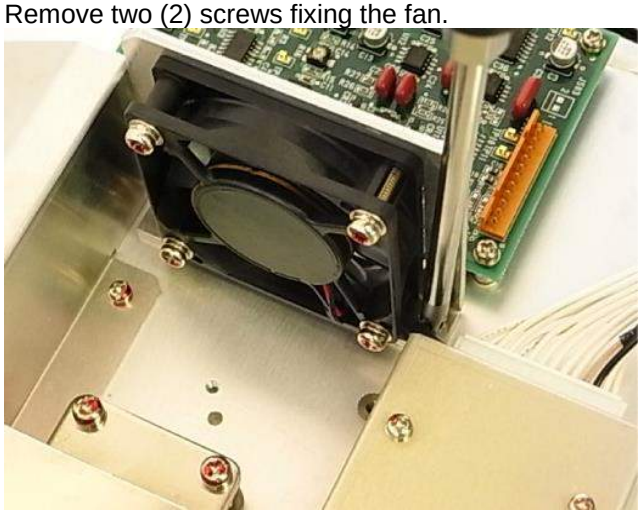
5. Exchange the fan (FBA06T12H).
6. Reassemble in reverse steps order and dismantle the antenna and antenna cover (page 3-27).

3.3.6 Exchange of Fan (RB719A only)

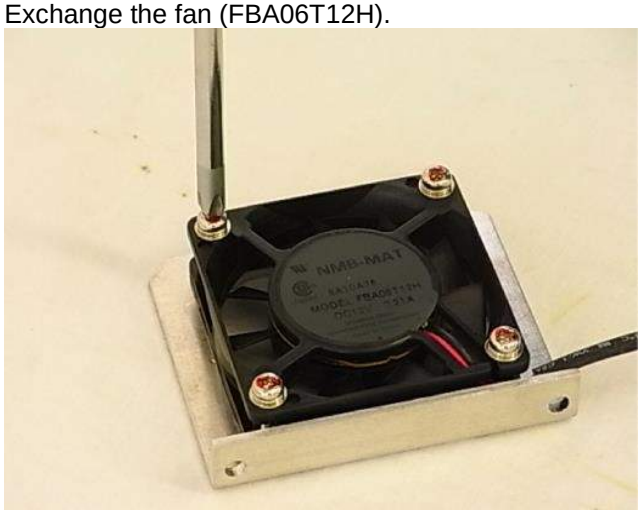
1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Disconnect connector J5



3. Remove two (2) screws fixing the fan.



4. Exchange the fan (FBA06T12H).

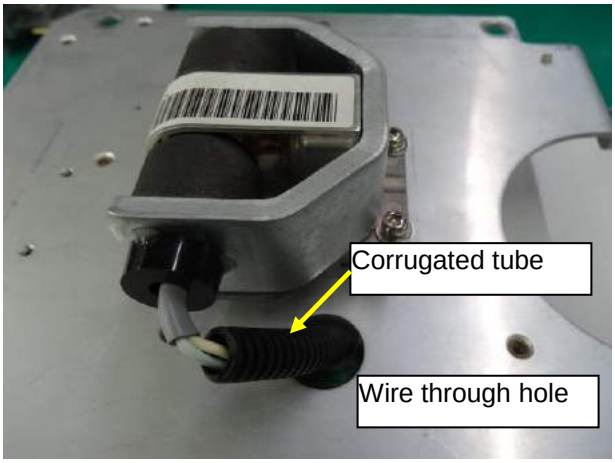


5. Reassemble in reverse steps order and dismantle the antenna and antenna cover (page 3-27).

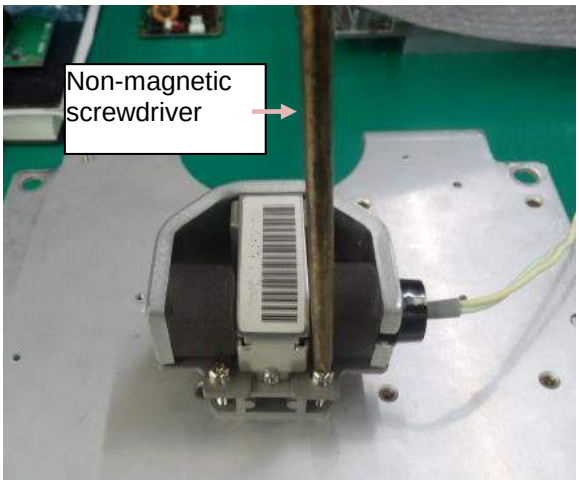
3.3.7 Exchange of Magnetron (RB806)

1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Unsolder two wires.

3. Pull out to wire through hole for wire, remove the corrugated tube.



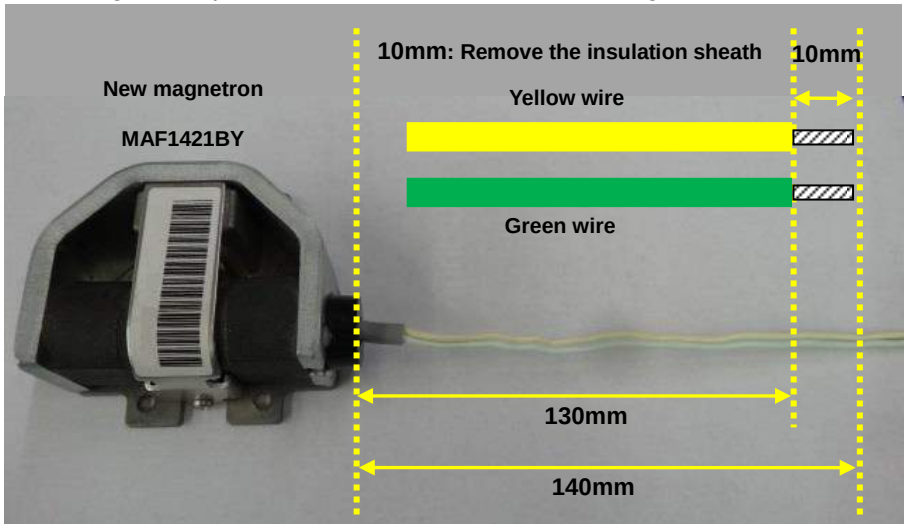
4. Remove four screws by non-magnetic screwdriver.



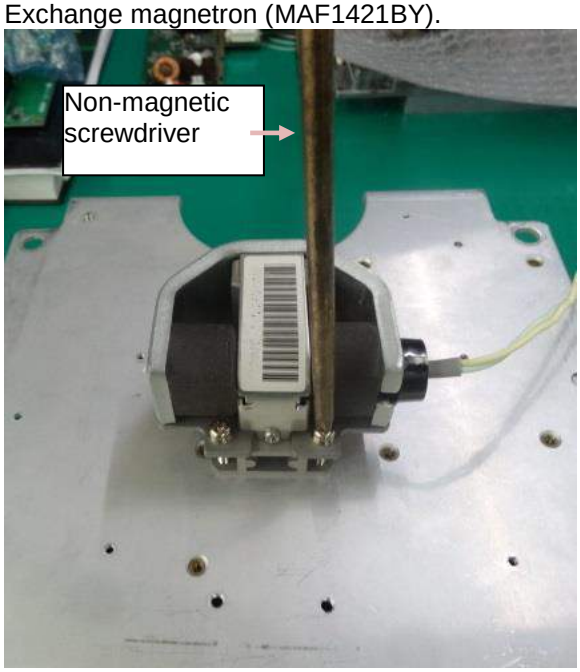
Caution:

Use a non-magnetic screwdriver, because the contact of the metal tool with the magnetron will cause deterioration of its performance.

5. Following above picture cut the excess wires from magnetron.



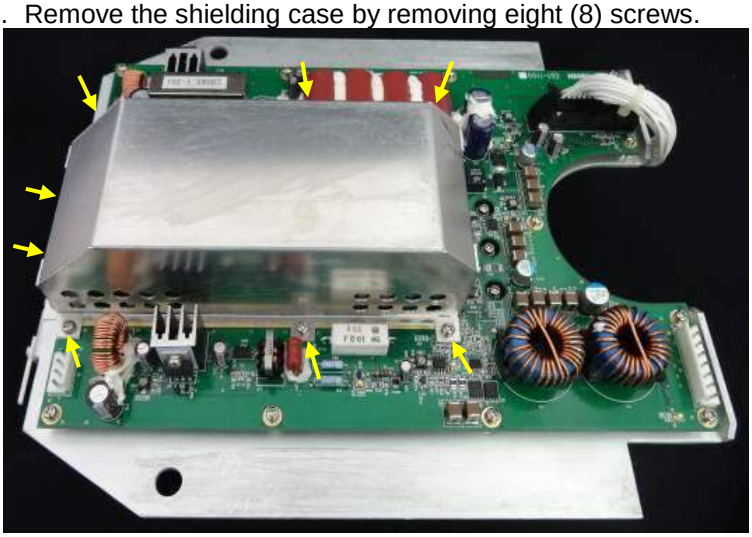
6. Exchange magnetron (MAF1421BY).



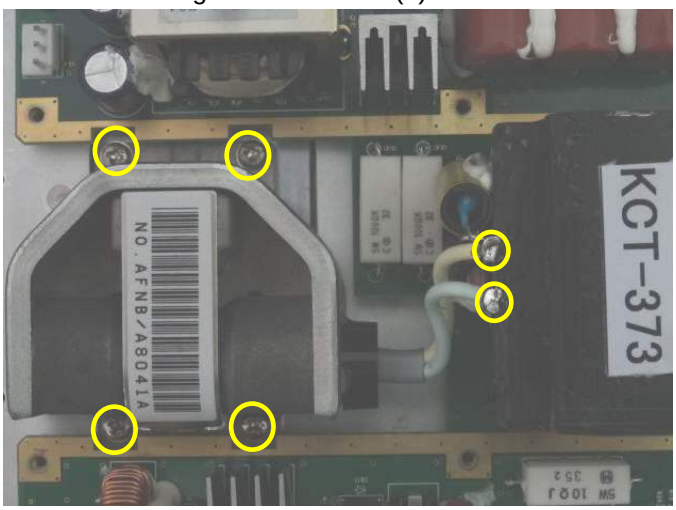
7. Reassemble in reverse steps and dismantle the antenna and antenna cover (page3-27).

3.3.8 Exchange of Magnetron (RB807,RB808/808P)

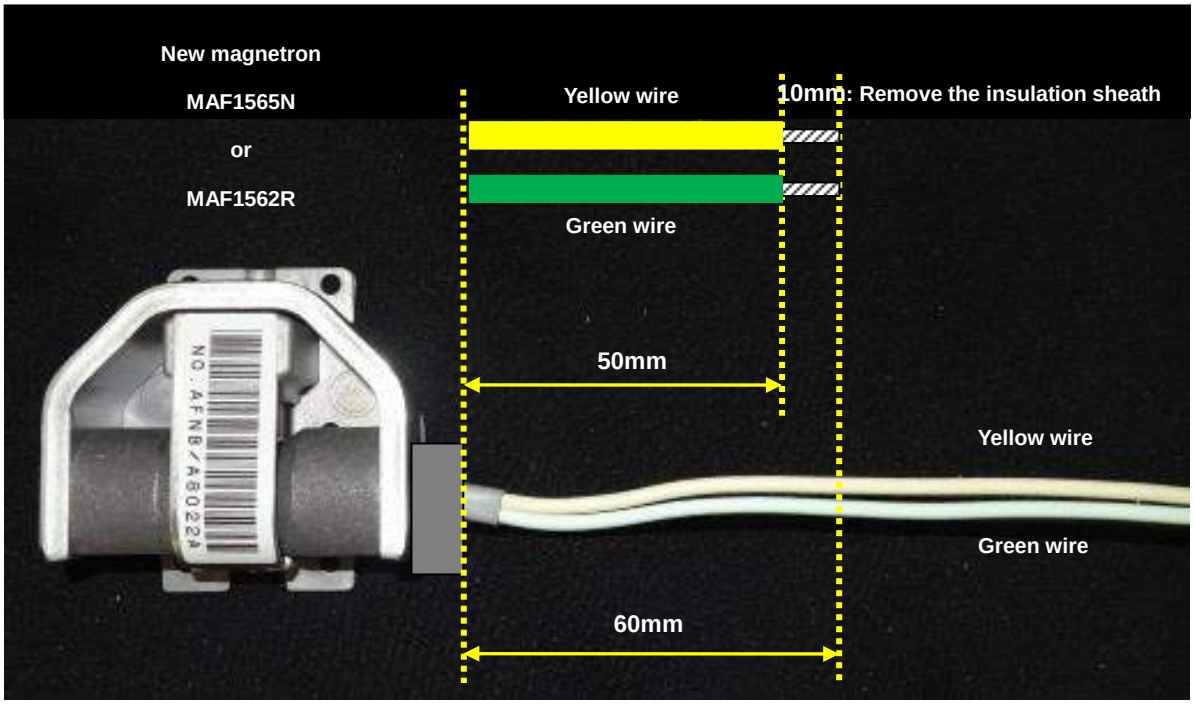
1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Remove the shielding case by removing eight (8) screws.



3. Remove the magnetron lead two (2) wires from the terminal with a soldering iron and four (4) screws.



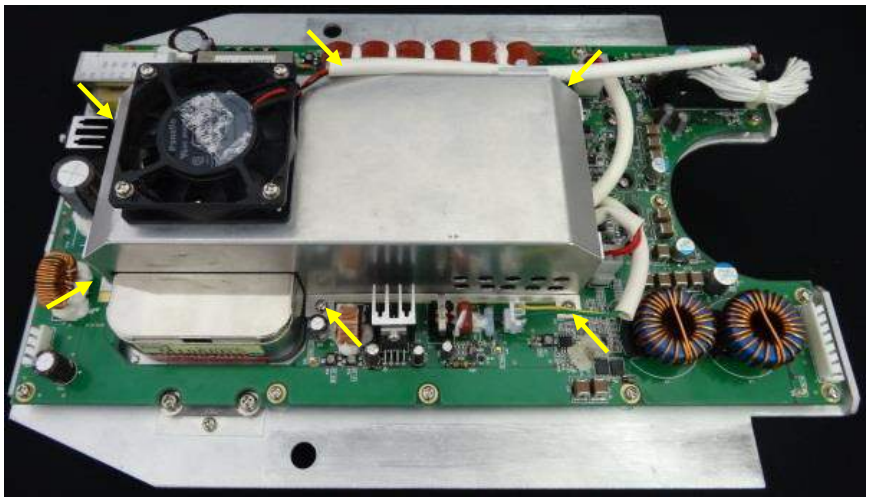
4. Cut the excess wires from magnetron and exchange the magnetron MAF1565N or MAF1562R.



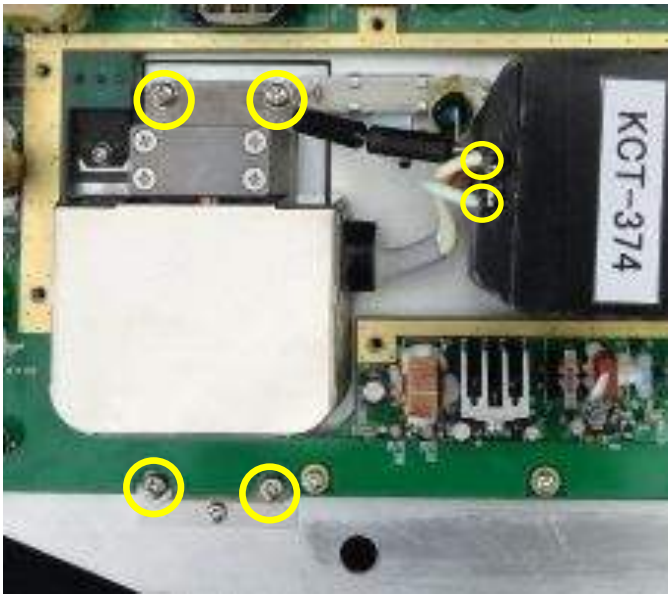
5. Reassemble in reverse steps and dismantle the antenna and antenna cover (page 3-27).

3.3.9 Exchange of Magnetron (RB809/809P)

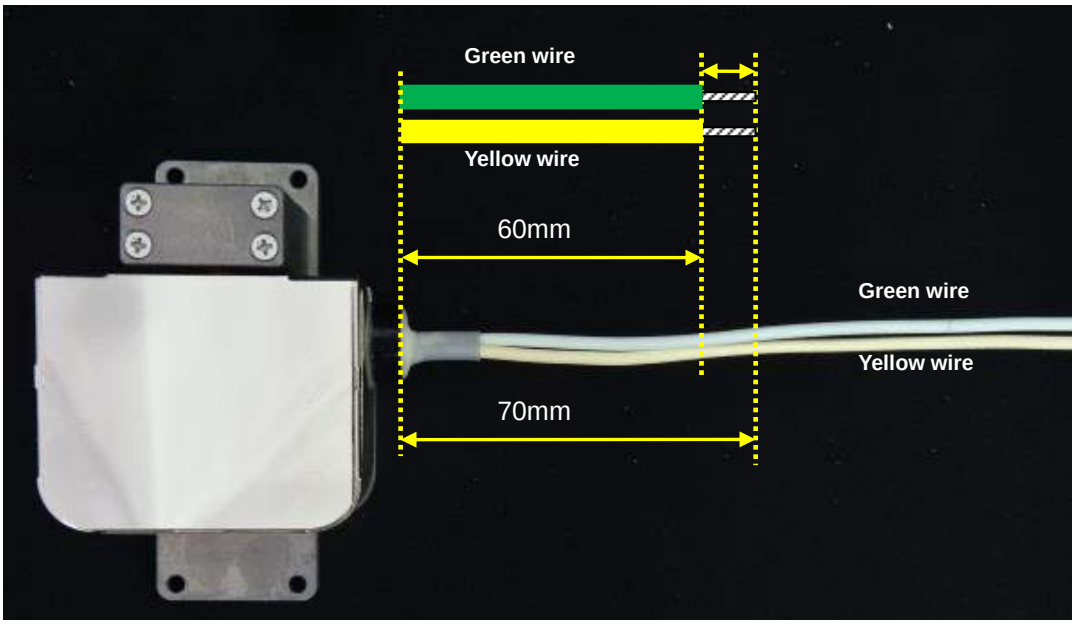
1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Remove the shielding case by removing eight (8) screws.



3. Remove the magnetron lead two (2) wires from the terminal with a soldering iron and four (4) screws.



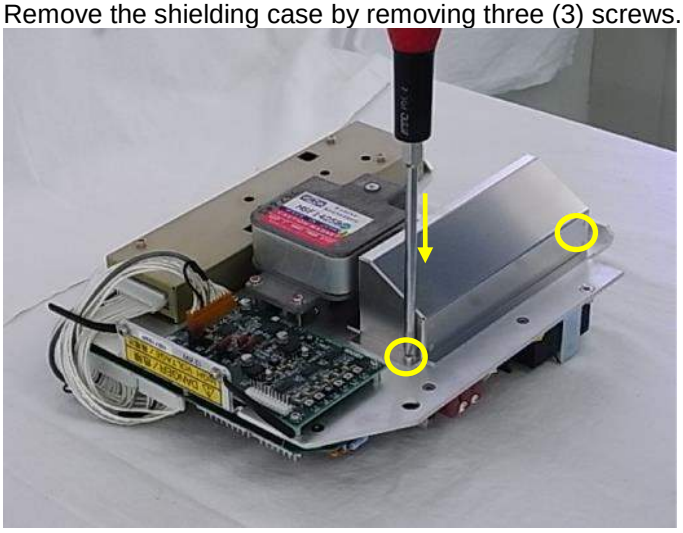
4. Cut the excess wires from magnetron and exchange the magnetron M1568BS



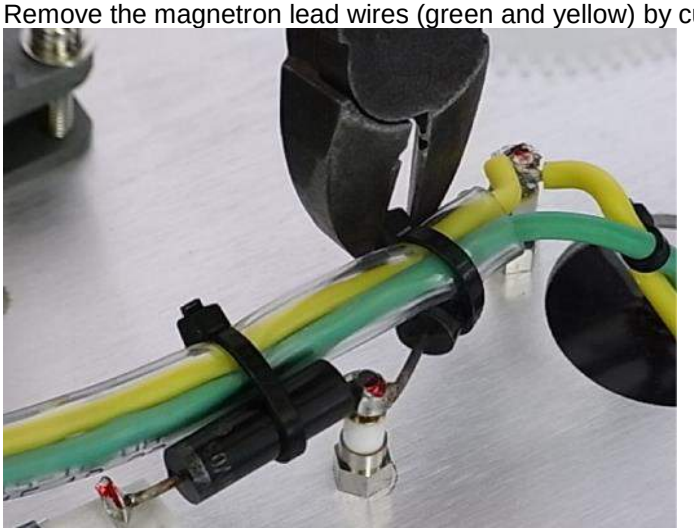
5. Reassemble in reverse steps and dismantle the antenna and antenna cover (page 3-27).

3.3.10 Exchange of Magnetron (RB717A, RB718A)

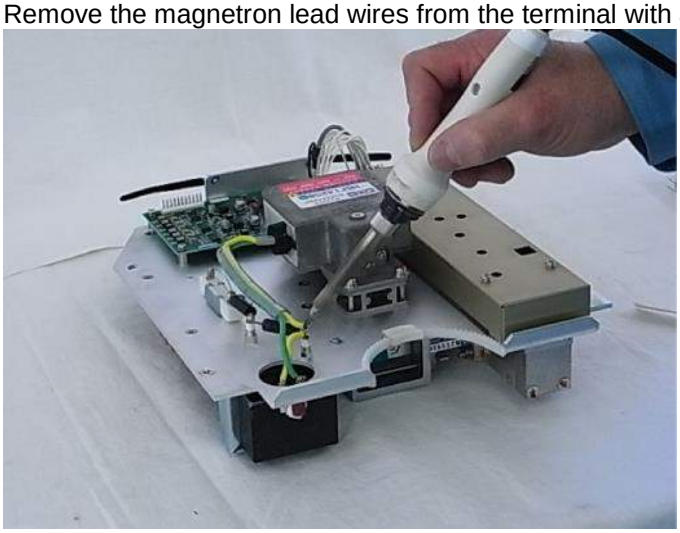
1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Remove the shielding case by removing three (3) screws.



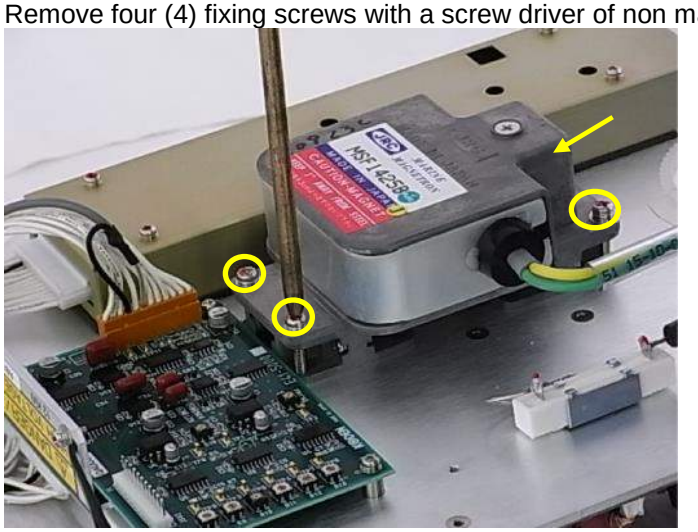
3. Remove the magnetron lead wires (green and yellow) by cutting three (3) wire binding bands.



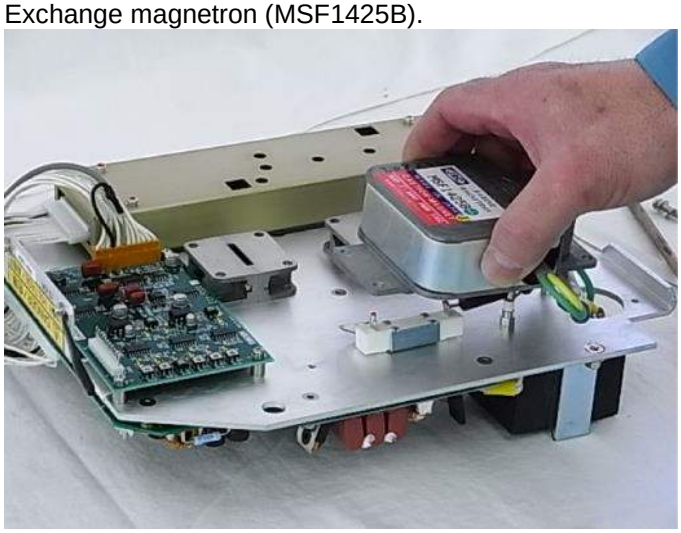
4. Remove the magnetron lead wires from the terminal with a soldering iron.



5. Remove four (4) fixing screws with a screw driver of non magnetic material.



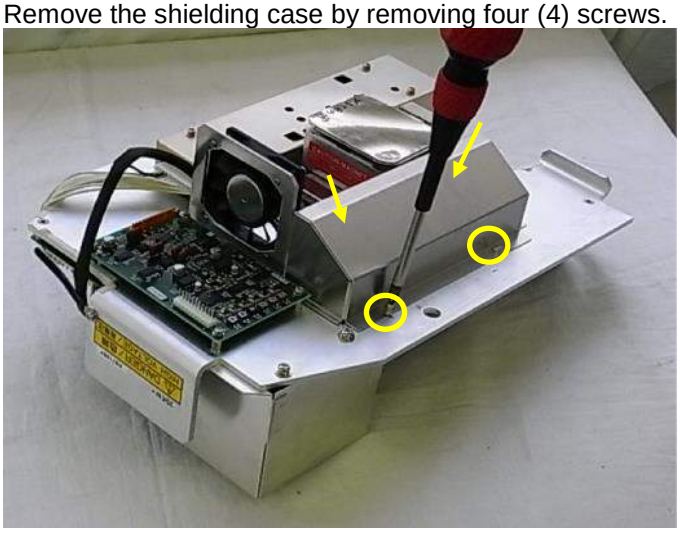
6. Exchange magnetron (MSF1425B).



7. Reassemble in reverse steps and dismantle the antenna and antenna cover (page 3-27).

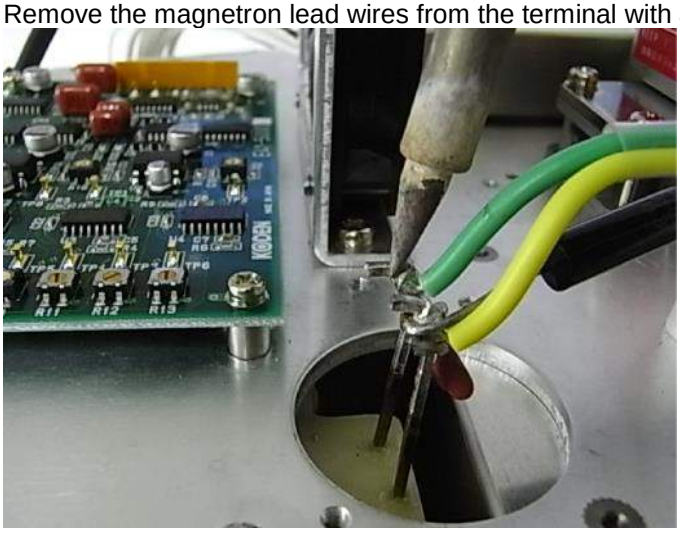
3.3.11 Exchange of Magnetron (RB719A)

1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Remove the shielding case by removing four (4) screws.

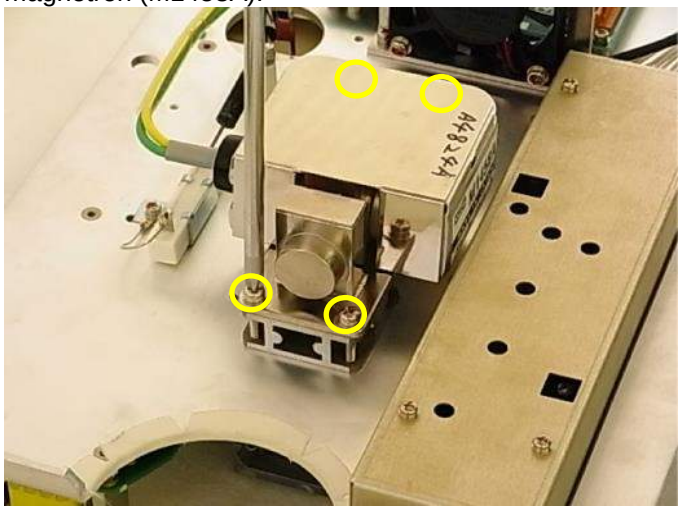


3. Remove the insulating tube from the magnetron lead wires (green and yellow) by cutting two wire binding bands.

4. Remove the magnetron lead wires from the terminal with a soldering iron.



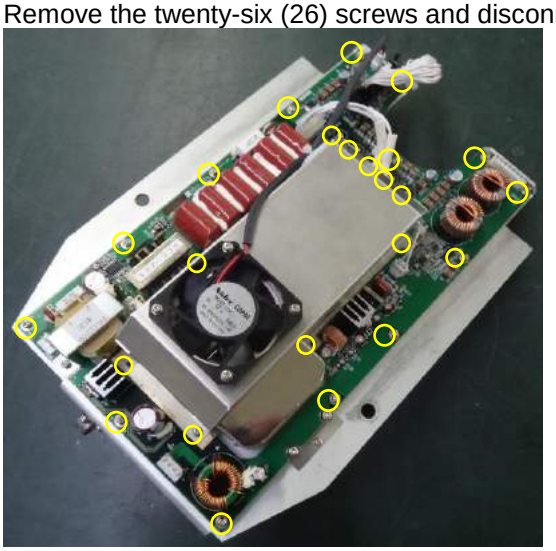
5. Remove four (4) fixing screws with a screw driver of non magnetic material and exchange the magnetron (M1458A).



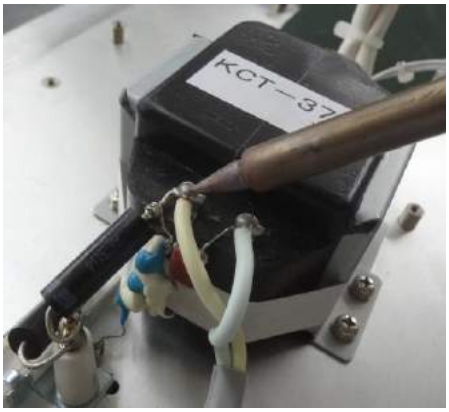
6. Reassemble in reverse steps and dismantle the antenna and antenna cover (page 3-27).

3.3.12 Exchange of Transformer (RB809/809P)

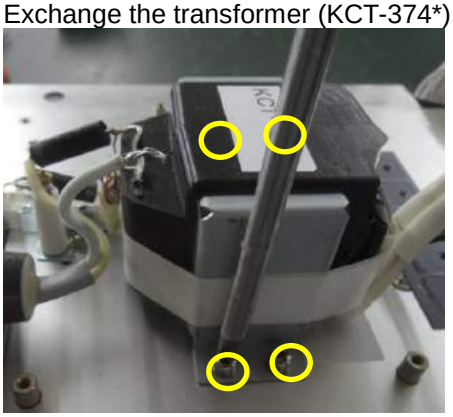
1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Remove the twenty-six (26) screws and disconnect connector J4, J5, J6, J7 and J10.



3. Remove magnetron lead wires, capacitor and diode from the transformer terminal with soldering iron.



4. Remove four (4) screws and a nut.
   Exchange the transformer (KCT-374*).



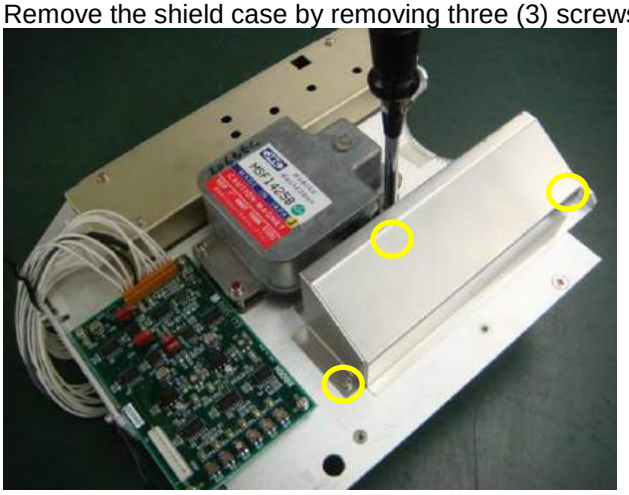
*Subject to version change

5. Mounting a capacitor (ECQE1104KF) on transformer terminal.

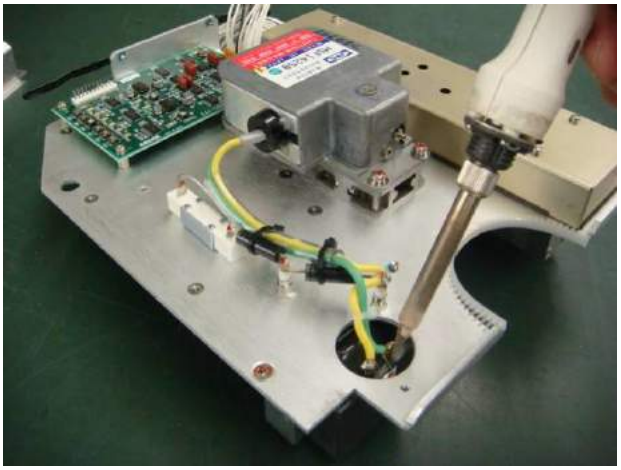
6. Reassemble by reversed step order and dismantle the antenna and antenna cover (page 3-27).

3.3.13 Exchange of Transformer (RB717A, RB718A)

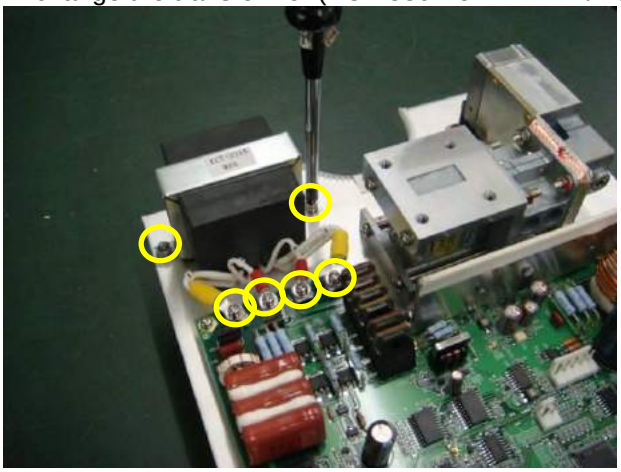
1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Remove the shield case by removing three (3) screws.



3. Remove magnetron lead wires, capacitor and diode from the transformer terminal with soldering iron.



4. Overturn the TR unit.
5. Remove six (6) screws and a nut.
   Exchange the transformer (KCT-330* for RB717A/KCT-331* for RB718A).

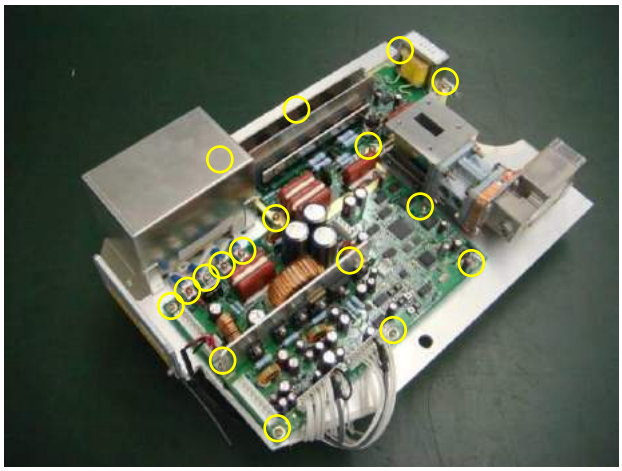


*Subject to version change

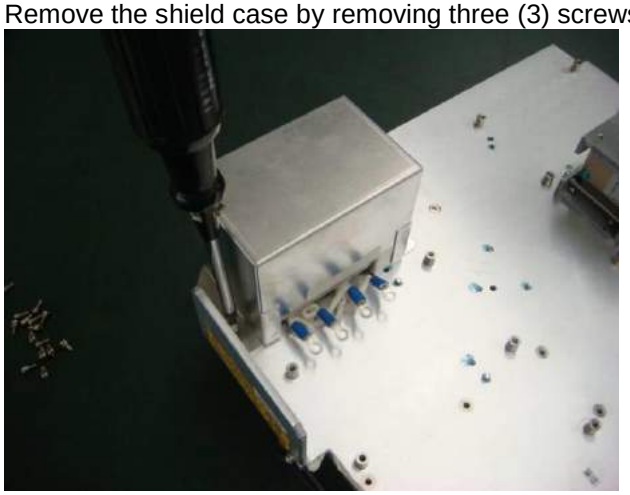
6. Reassemble by reversed step order and dismantle the antenna and antenna cover (page 3-27).

3.3.14 Exchange of Transformer (RB719A)

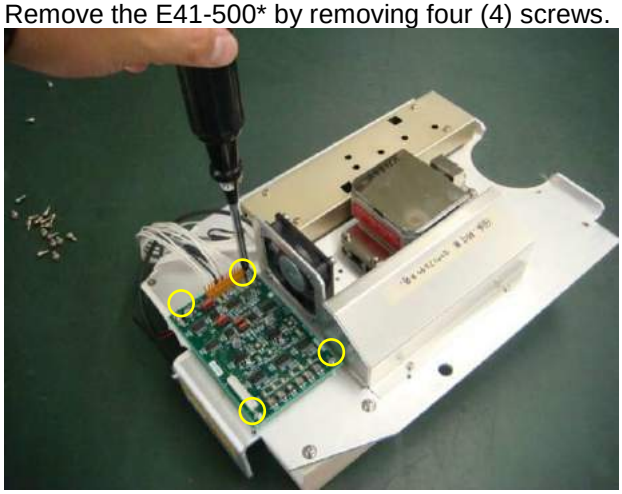
1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Remove the modulator PCB by removing seventeen (17) screws and disconnect connectors J5, J6 and J7.



3. Remove the shield case by removing three (3) screws.

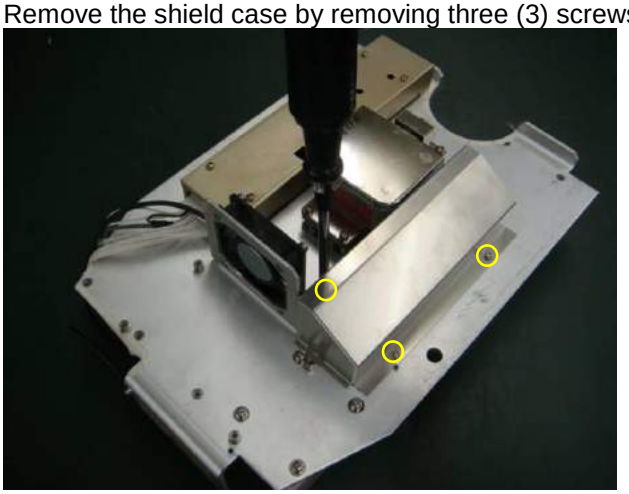


4. Overturn the TR unit.
5. Remove the E41-500* by removing four (4) screws.

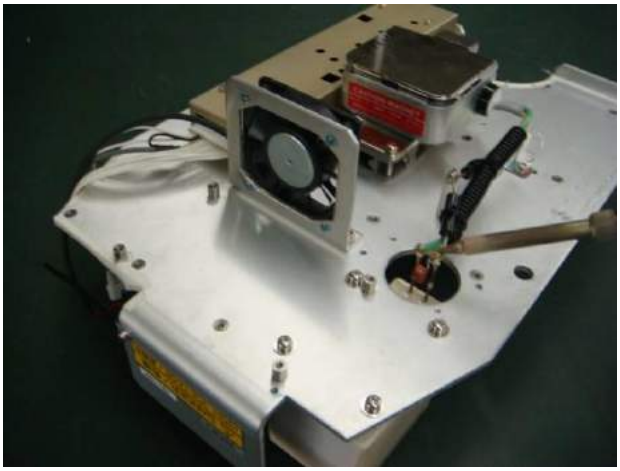


*Subject to version change

6. Remove the shield case by removing three (3) screws.



7. Remove magnetron lead wires, capacitor and diode from the transformer terminals with a soldering iron.



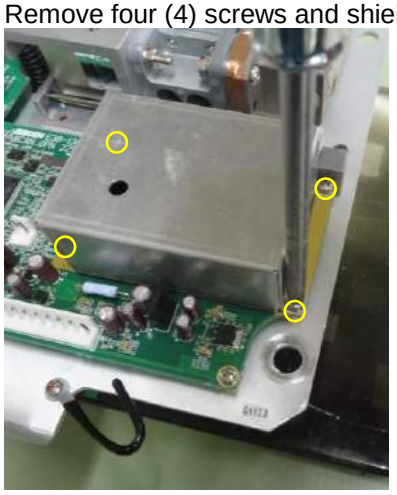
8. Remove four screws and exchange the transformer (KCT-341*).

9. Reassemble in reversed steps and dismantle the antenna and antenna cover (page 3-27).

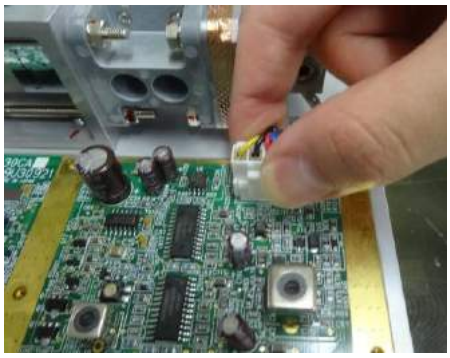
*Subject to version change

3.3.15 Exchange of MIC (RB806)

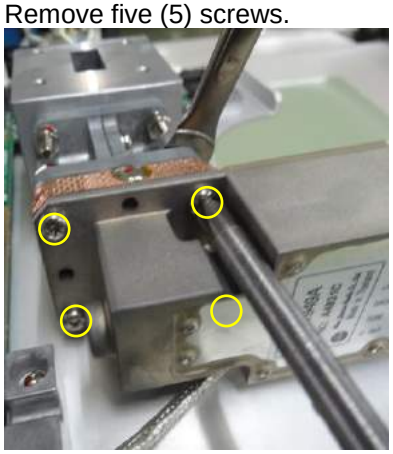
1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Remove four (4) screws and shield case.

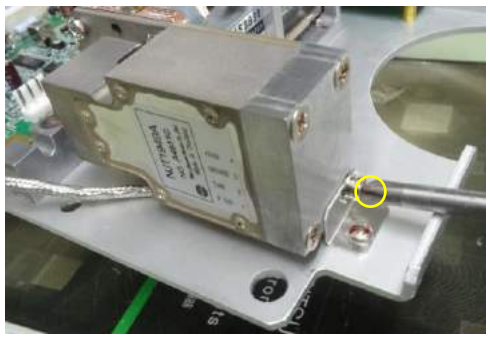


3. Disconnect connecter J13.



4. Remove five (5) screws.

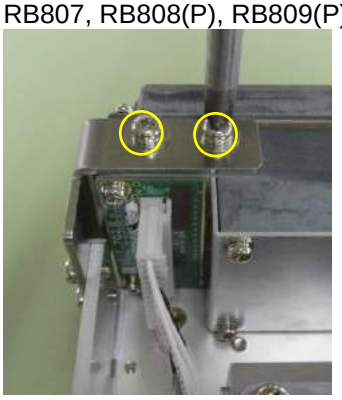




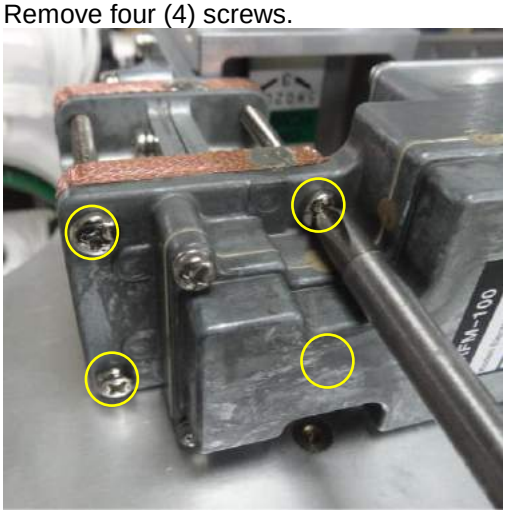
5. Exchange MIC UNIT a new one.
6. Reassemble by reversed step order and dismantle the antenna and antenna cover (page 3-27).

3.3.16 Exchange of IF MODULE (RB807/808/808P/809/809P)

1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:
2. Remove the module by removing two (2) screws.
   RB807, RB808(P), RB809(P)



3. Remove four (4) screws.



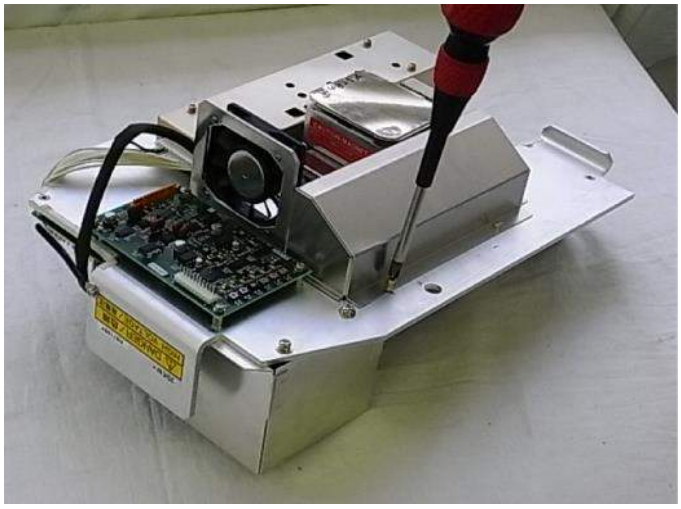
4. Reassemble in reverse steps, and dismantle the antenna and antenna cover (page 3-27).

3.3.17 Exchange of IF PCB, MIC and limiter device

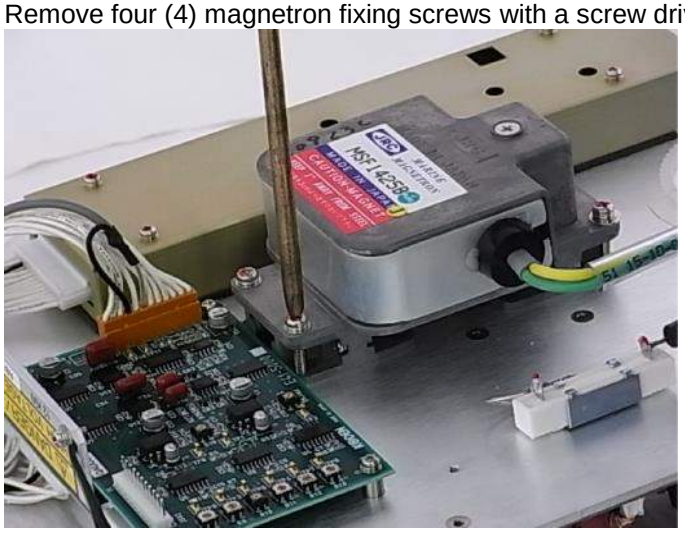
1. After dismantling the antenna and antenna cover (page 3-27), perform as follows:

2. Remove the shield case by removing three (3) screws.
   RB717A, RB718A

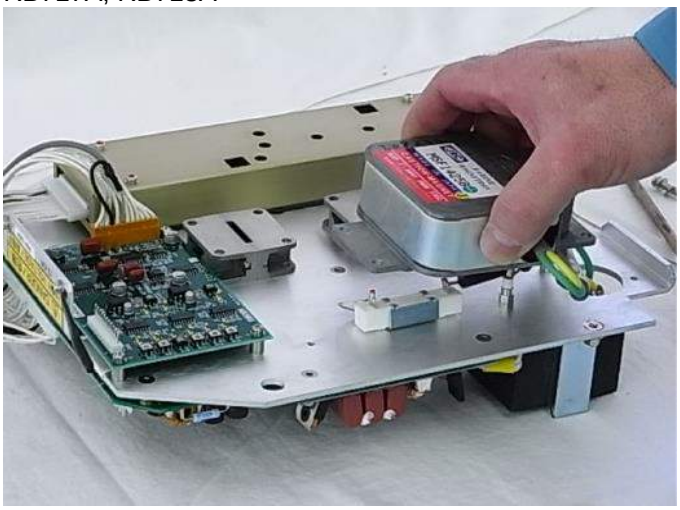
   RB719A



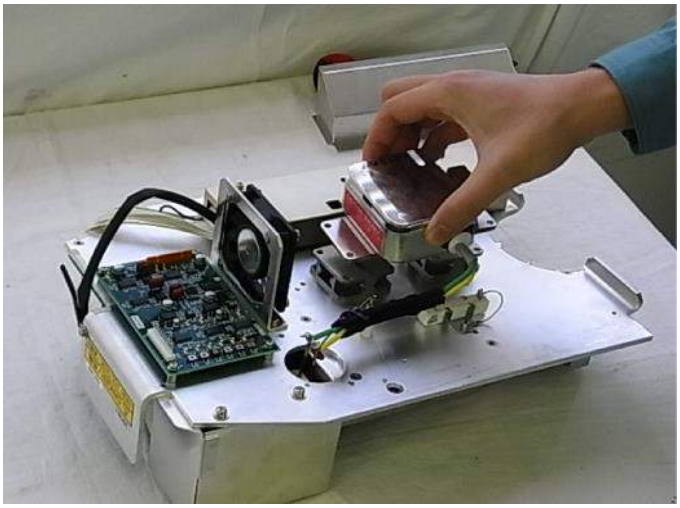
3. Remove four (4) magnetron fixing screws with a screw driver of non magnetic material.



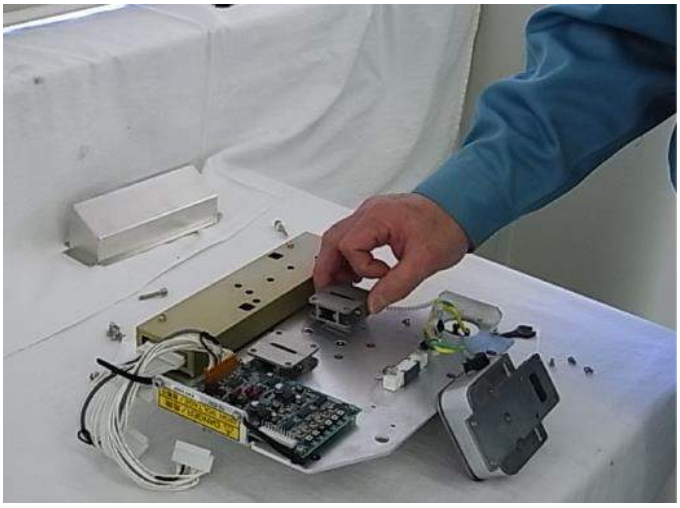
4. Remove the magnetron.
   RB717A, RB718A



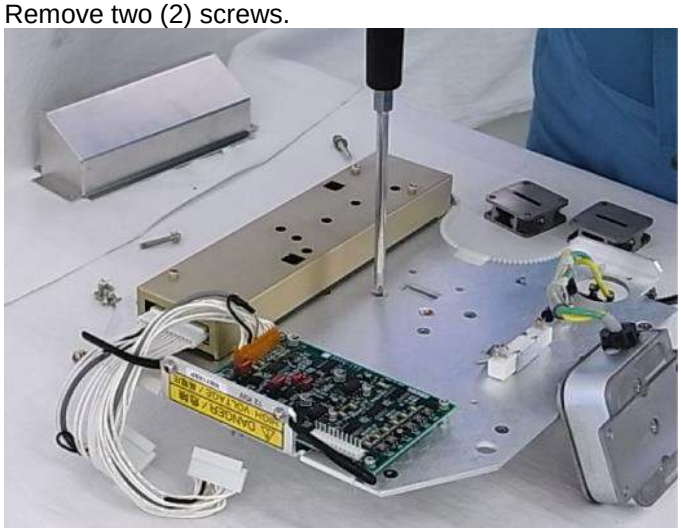
   RB719A



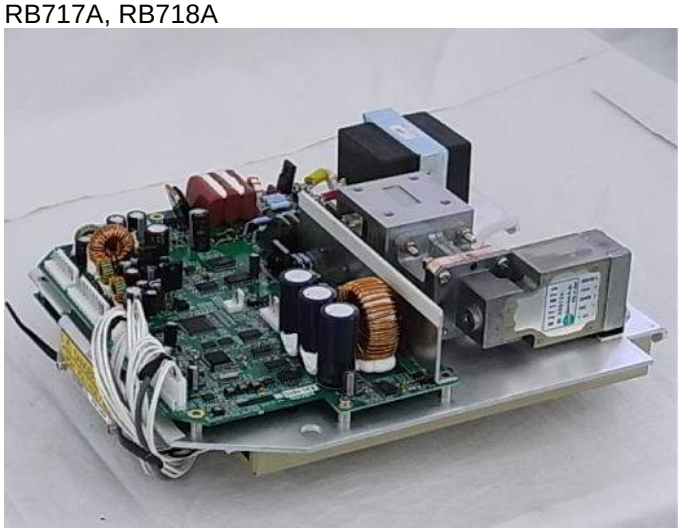
5. Remove the filter.



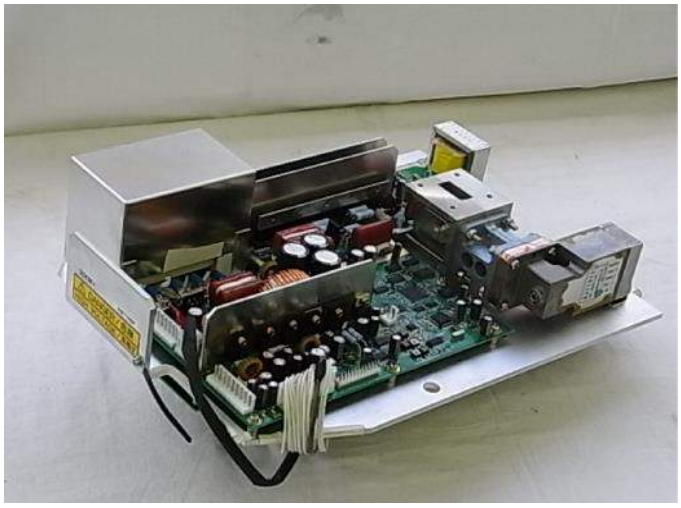
6. Remove two (2) screws.



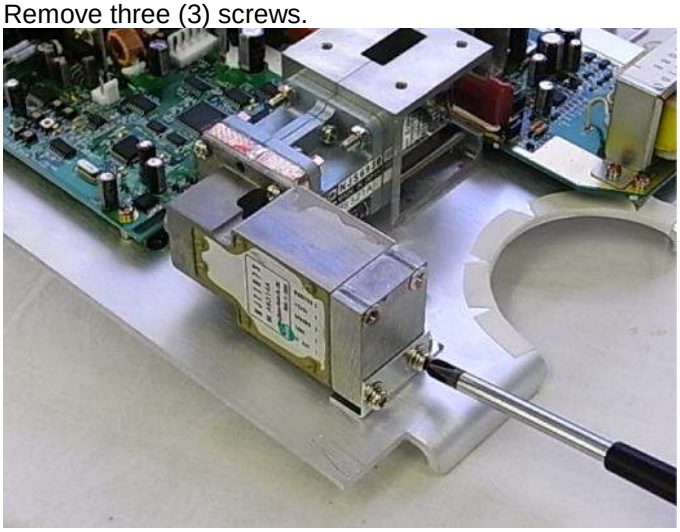
7. Overturn the TR unit.
   RB717A, RB718A



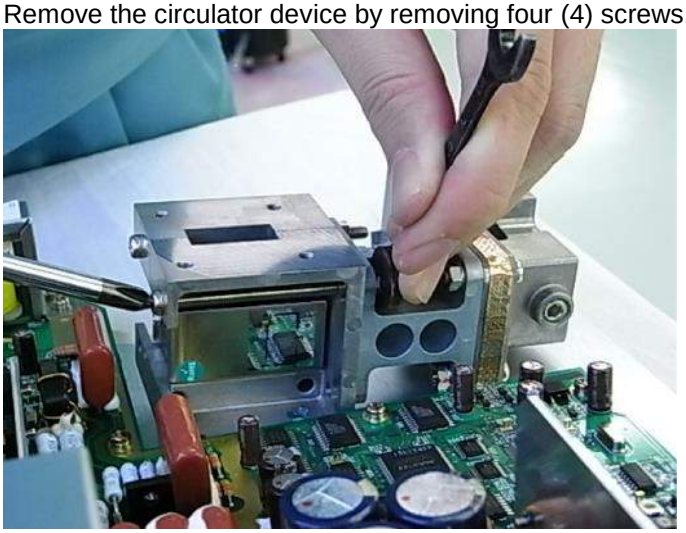
   RB719A



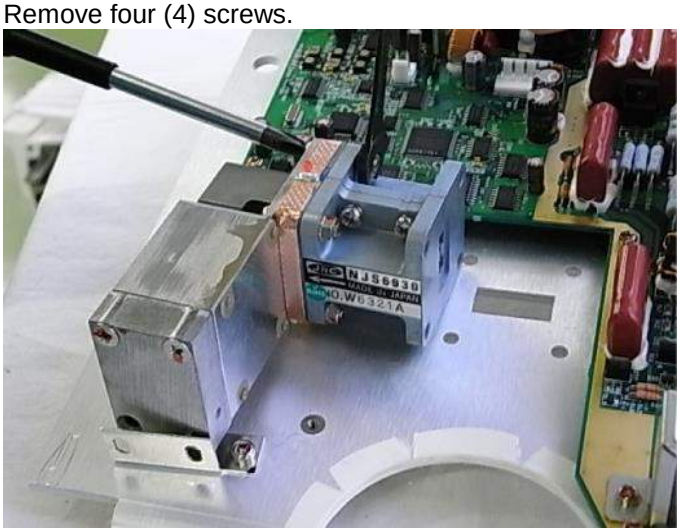
8. Remove three (3) screws.



9. Remove the circulator device by removing four (4) screws.

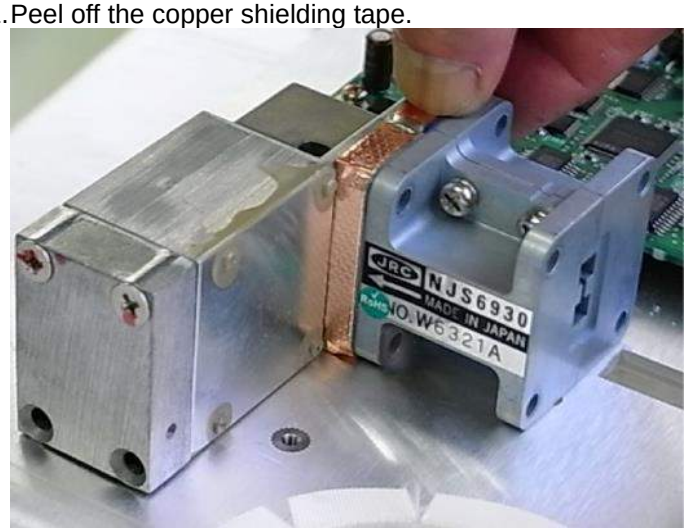


10. Remove four (4) screws.

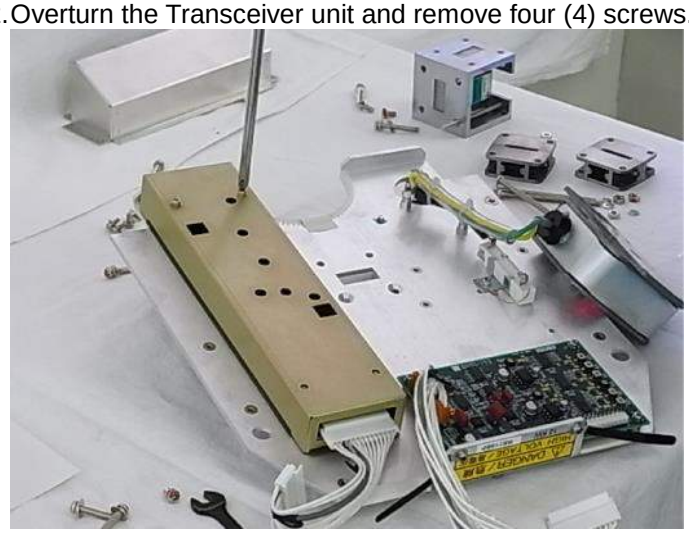


Note: At the time of assembling, cover the gap between MIC and the limiter with electric conductive tape for shielding. Solder the end tips to prevent self peeling.

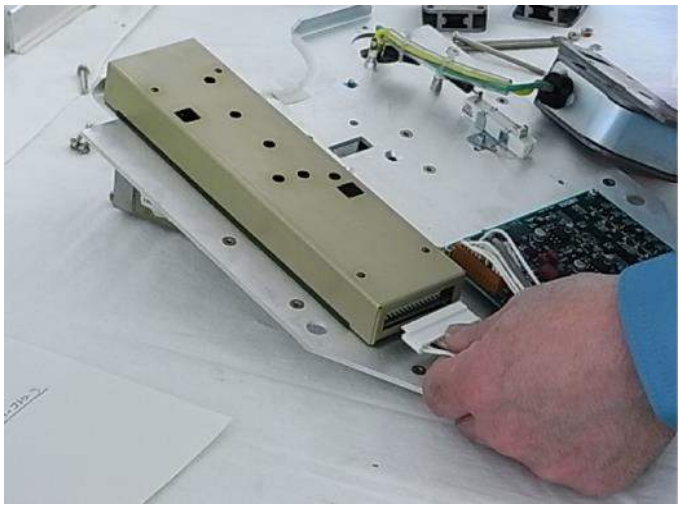
11. Peel off the copper shielding tape.



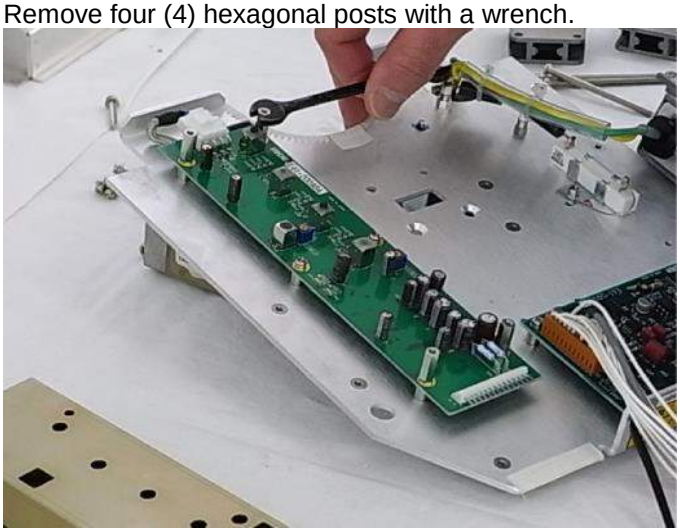
12. Overturn the Transceiver unit and remove four (4) screws.



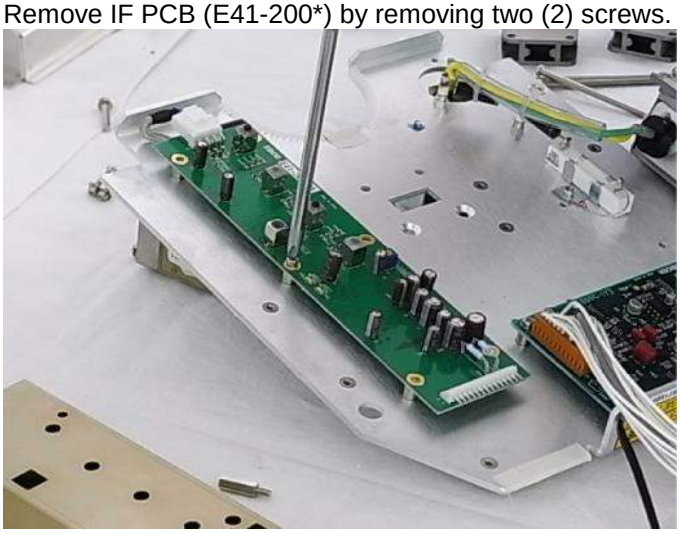
13. Disconnect connector J1 and remove shield case.



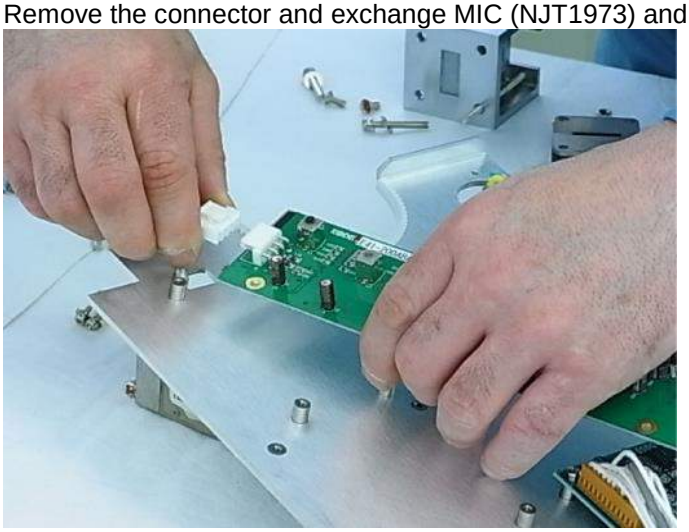
14. Remove four (4) hexagonal posts with a wrench.



15. Remove IF PCB (E41-200*) by removing two (2) screws.



16. Remove the connector and exchange MIC (NJT1973) and limiter device.



17. Reassemble in reverse steps, and dismantle the antenna and antenna cover (page 3-27).

Note: At the time of assembling, cover the gap between MIC and the limiter with electric conductive tape for shielding. Solder the end tips to prevent self peeling.

*Subject to version change

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Chapter 4 Spare parts and Circuit diagram

4.1 Spare parts

Unit	Parts Code	Name	Type	Page No.
Display unit / Processor unit				
MRD-108 MRD-108P	0060772230	LOGIC PCB	E63-700*	4-4 23
	0060772410	POWER SUPPLY PCB	E63-600*	4-4 44
	0060772260	Rear Card connector PCB	E63-910*	4-4 55
	0060772450	Rear Card connector PCB	E63-911*	4-4 55
	0050281049	LCD	G190EG03 V1	4-4 2
	0060772060	Backlight Power PCB	E63-610*	4-4 19
MRM-108 MRM-108P	0060772230	LOGIC PCB	E63-700*	4-5 5
	0060772410	POWER SUPPLY PCB	E63-600*	4-5 8
	0060772260	Rear Card connector PCB	E63-910*	4-5 28
	0060772450	Rear Card connector PCB	E63-911*	4-5 28
MRD-109	0060772230	LOGIC PCB	E63-700*	4-6 34
	0060772410	POWER SUPPLY PCB	E63-600*	4-6 39
	0060772250	Connector PCB	E68-910*	4-6 8
	0059543094	LCD module	LQ150X1LX9K	4-6 20
MRD-111	0060772230	LOGIC PCB	E63-700*	4-8 35
	0060772280	LOGIC PCB	E68-700*	4-7 35
	0060772410	POWER SUPPLY PCB	E63-600*	4-7/8 40
	0060772250	Connector PCB	E68-910*	4-7/8 30
	0060772240	Panel PCB	E68-900*	4-7/8 26
	0060771760	INV.PCB	E54-850*	4-7 33
	0060772400	LED Driver PCB	E68-800*	4-8 33
	0059543065	LCD module	NL10276BC24-13C	4-7 6
	0050281059	LCD module	NL10276BC24-37UC	4-8 5
MRM-110	0060772235	LOGIC PCB	E73-700*	4-9 5
	0060772410	POWER SUPPLY PCB	E63-600*	4-9 8
	0060772260	PCB assembly	E63-910*	4-9 28
Operation unit				
MRO-108 MRO-108P	0060772100	PANEL PCB	E63-900*	4-10 6
	0059502052	TRACKBALL	TRD-101S(FB)K	4-10 14
MRO-110	0060772430	PANEL PCB	E73-900*	4-11 13
Scanner (RB806, RB807)				
RB806 (4 kW)	0062706021	TR UNIT [4 kW]	RB806-TR unit	4-12 A0005
	0060771540	MODULATOR PCB[4kW]	E38-130*	4-14 A1
	0059111002	FRONT END MODULE	NJT1949A	4-14 A2
	0058670014	MAGNETRON	MAF1421BY	4-14 V1
	0050351107	LIMITER DIODE	NJS6930	4-14 U2
	0058330333	CIRCULATOR	NJC3901D	4-14 W1
	0063703175	15W MOTOR	239H53917B	4-15 1
	0056280012	MOTOR BRUSH	24Z125209	4-15 1-8
	0030050034	AZI.PULSE UNIT	249U155426-04	4-15 3
RB807 (6 kW)	0030050033	TR UNIT [6 kW]	RB807-TR unit	4-16 13
	0065103241	HARNESS	E62ELA040B	4-17 30
	0060772270	MODULATOR PCB [6kW]	E71-110*	4-18 31
	0030050031	RFM-10*	RFM-10*	4-18 15
	0058670016	MAGNETRON	MAF1562R	4-18 23
	0060772160	PCB ASSY	E61-120*	4-18 3
	0050351107	DIORD LIMITER	NJS6930	4-18 13
	0058330331	CIRCULATOR	FCX68R	4-18 11
	0071803361	SPURIOUS FILTER	NJC9952	4-18 21
	0063703175	15W MOTOR	239H53917B	4-15 1
	0056280012	MOTOR BRUSH	24Z125209	4-15 1-8
	0030050034	AZI.PULSE UNIT	249U155426-04	4-15 3

*Subject to version change

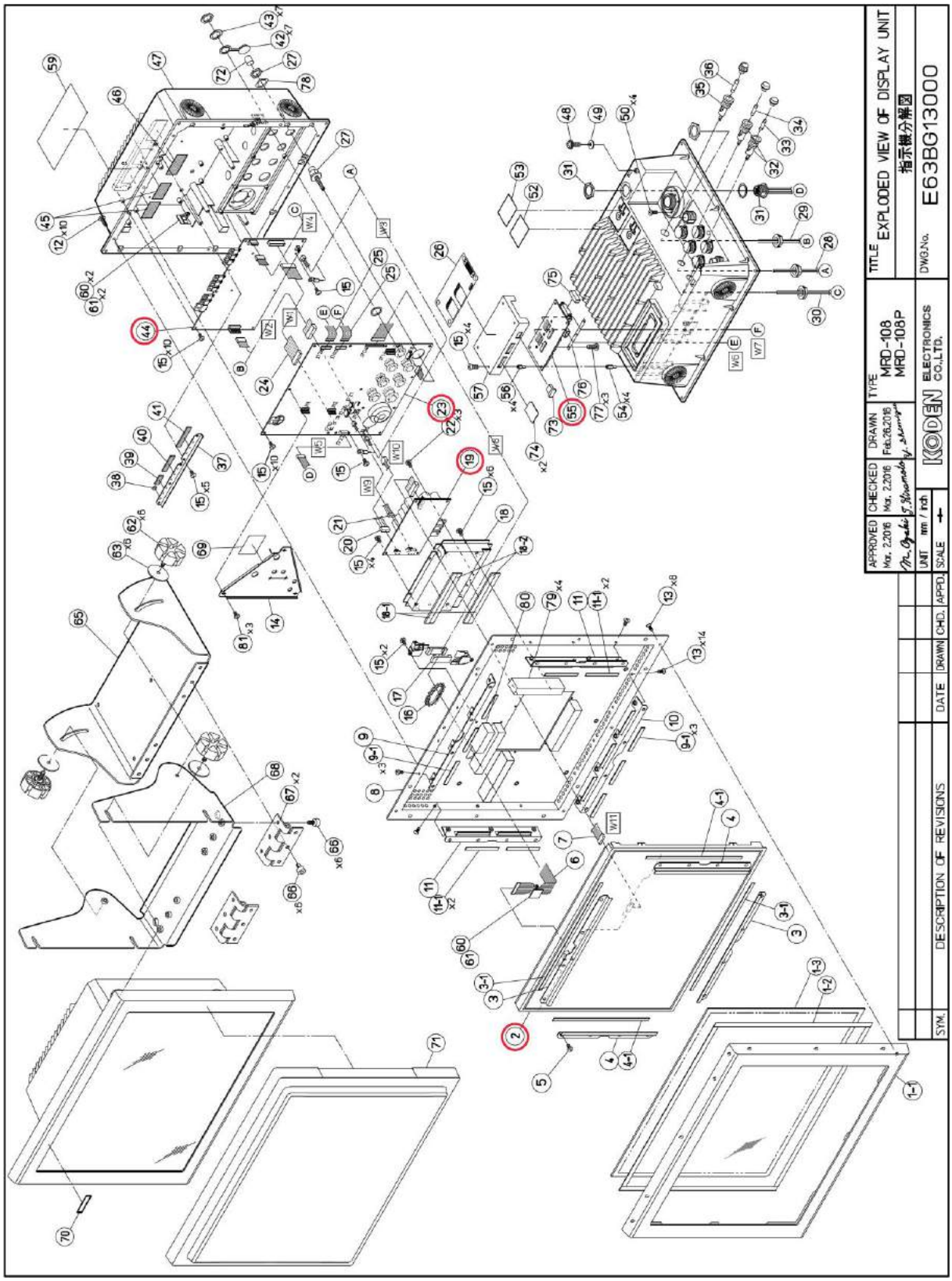
Unit	Parts Code	Name	Type	Page No.
Scanner (RB808, RB808P, RB809, RB809P)				
RB808 RB808P (12 kW)	0030050031	RFM-10*	RFM-10*	4-22 7
	0058330331	CIRCULATOR	FCX68R	4-22 10
	0050351107	DIORD LIMITER	NJS6930	4-22 8
	0060772160	PCB ASSY	E61-120*	4-22 3
	0071803361	SPURIOUS FILTER	NJC9952	4-22 11
	0030050030	TR UNIT [12IW]	RB808-TR UNIT	4-19/20 13
	0060772110	PCB ASSY	E61-110*	4-22 2
	0058670036	MAGNETRON	MAF1565N	4-22 14
	0060772140	PCB ASSY	E61-500*	4-23 4
	0056210034	BLUSHLESS MOTOR	VGKC12-25N50L2T6	4-23 1
	0035103241	HARNESS	E62ELA040B	4-21 30
RB808P (12 kW)	0030050032	PERFORMANCE MONITOR	KPM-20(C) **	4-20 20
RB809 RB809P (25 kW)	0030050027	TR UNIT	RB809-TR	4-24/25 13
	0060772150	PCB ASSY	E62-110*	4-26 2
	0030050031	RFM-10*	RFM-10*	4-26 7
	0058670037	MAGNETRON	M1568BS	4-26 14
	0056401376	PLUSE TRANSFORMER	KCT-374*	4-26 4
	0056210034	BLUSHLESS MOTOR	VGKC12-25N50L2T6	4-23 1
	0058330331	CIRCULATOR	FCX68R	4-26 10
	0060772160	PCB ASSY	E61-120*	4-26 3
	0060772140	PCB ASSY	E61-500*	4-23 4
	0050351107	DIORD LIMITER	NJS6930	4-26 8
	0071803361	SPURIOUS FILTER	NJC9952	4-26 11
	0065103241	HARNESS	E62ELA040B	4-21 30
RB809P (25 kW)	0030050032	PERFORMANCE MONITOR	KPM-20(C) **	4-25 20

**The exchange of performance monitor kit will be performed at KODEN.

*Subject to version change

Unit	Parts Code	Name	Type	Page No.
Scanner (RB806, RB717A, RB718A, RB719A)				
RB806 RB717A RB718A RB719A Common	0062703175	DRIVE UNIT MOTOR	239H53917B	4-30 1
	0035830007	AZI PULSE UNIT	249U155426-03B	4-30 3
	0056280012	MOTOR BRUSH	24Z125209	4-30 1-8
	0059111005	MIC	NJT1973	4-33 11 / 4-29 C0012
	0050351107	Limiter	NJS6930	4-33 7 / 4-29 C0011
	0060720130	IF PCB	E41-200*	4-33 18 / 4-29 C0018
	0082202190	V ring	24E112007	4-32 13 / 4-28 B1001
RB717A (6 kW)	0030050002	TR UNIT [6 kW]	RB717A-TR	4-27 A0005
	0060710380	MODULATOR PCB [6 kW]	E41-100*	4-29 C0002
	0056401330	TRANSFORMER	KCT-330*	4-29 C0004
	0058670015	MAGNETRON	MSF1422B[J]	4-29 C0023
RB718A (12 kW)	0030050023	TR UNIT [12kW]	RB718A-TR	4-27 A0005
	0060710490	MODULATOR PCB [12 kW]	E41-101*	4-29 C0002
	0056401331	TRANSFORMER	KCT-331*	4-29 C0004
	0058670034	MAGNETRON	MSF1425B[J]	4-29 C0023
RB719A (25 kW)	0030050024	TR UNIT [25kW]	RB719A-TR	4-31 13
	0060710480	MODULATOR PCB [25 kW]	E48-100*	4-33 2
	0056401341	TRANSFORMER	KCT-341*	4-33 4
	0058670033	MAGNETRON	MSF1458A	4-33 22

*Subject to version change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指示機分解図
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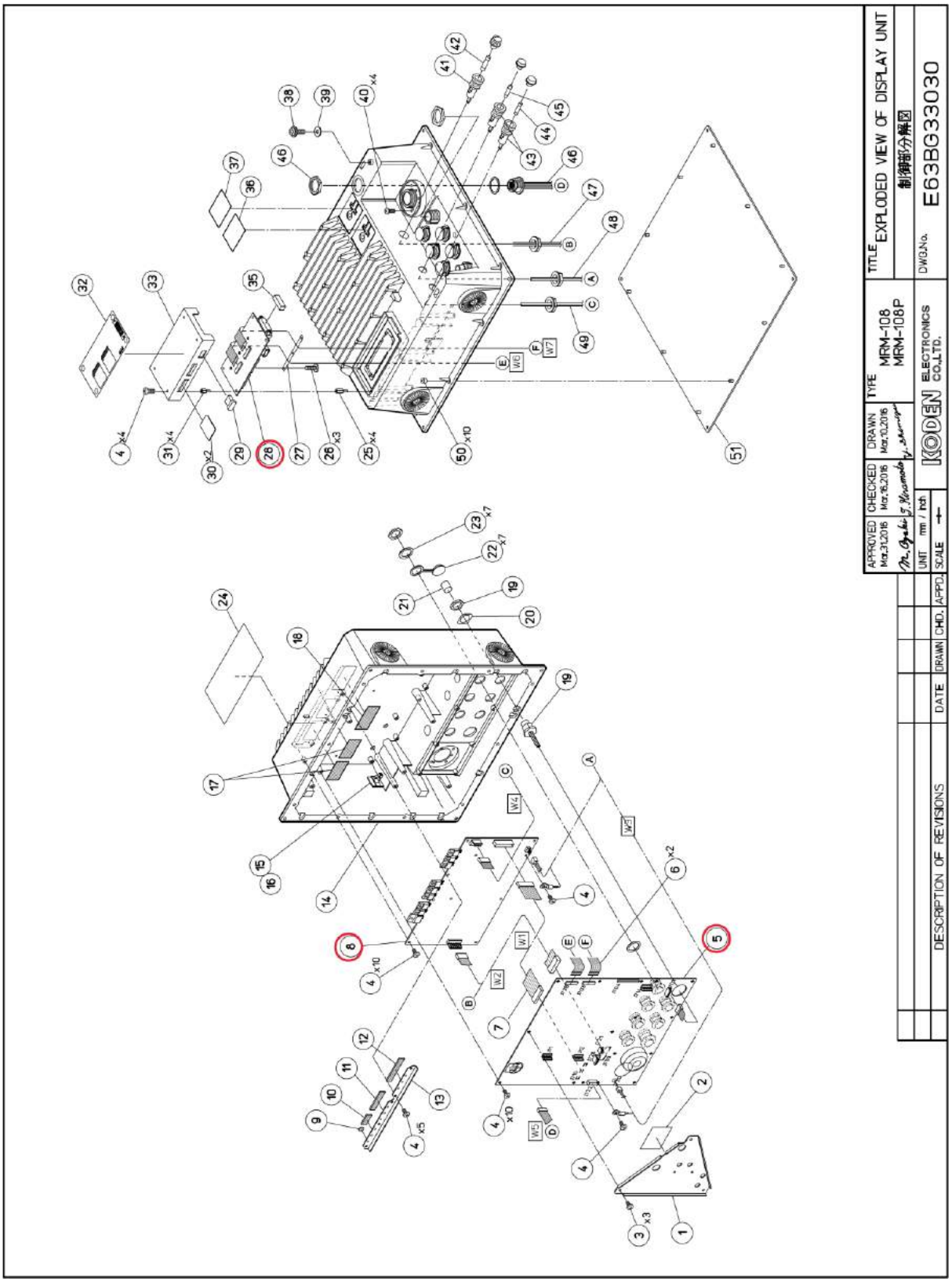
DWG.No. E63BG13000
KODEN ELECTRONICS CO.,LTD.
DRAWN Feb.26.2016
CHECKED Mar. 2.2016
APPROVED Mar. 2.2016
UNIT mm / inch
SCALE
DESCRIPTION OF REVISIONS
DATE
DRAWN
CHD.
APPD.
SYM.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KODEN ELECTRONICS CO.,LTD.
APPROVED May.31.2016
CHECKED May.16.2016
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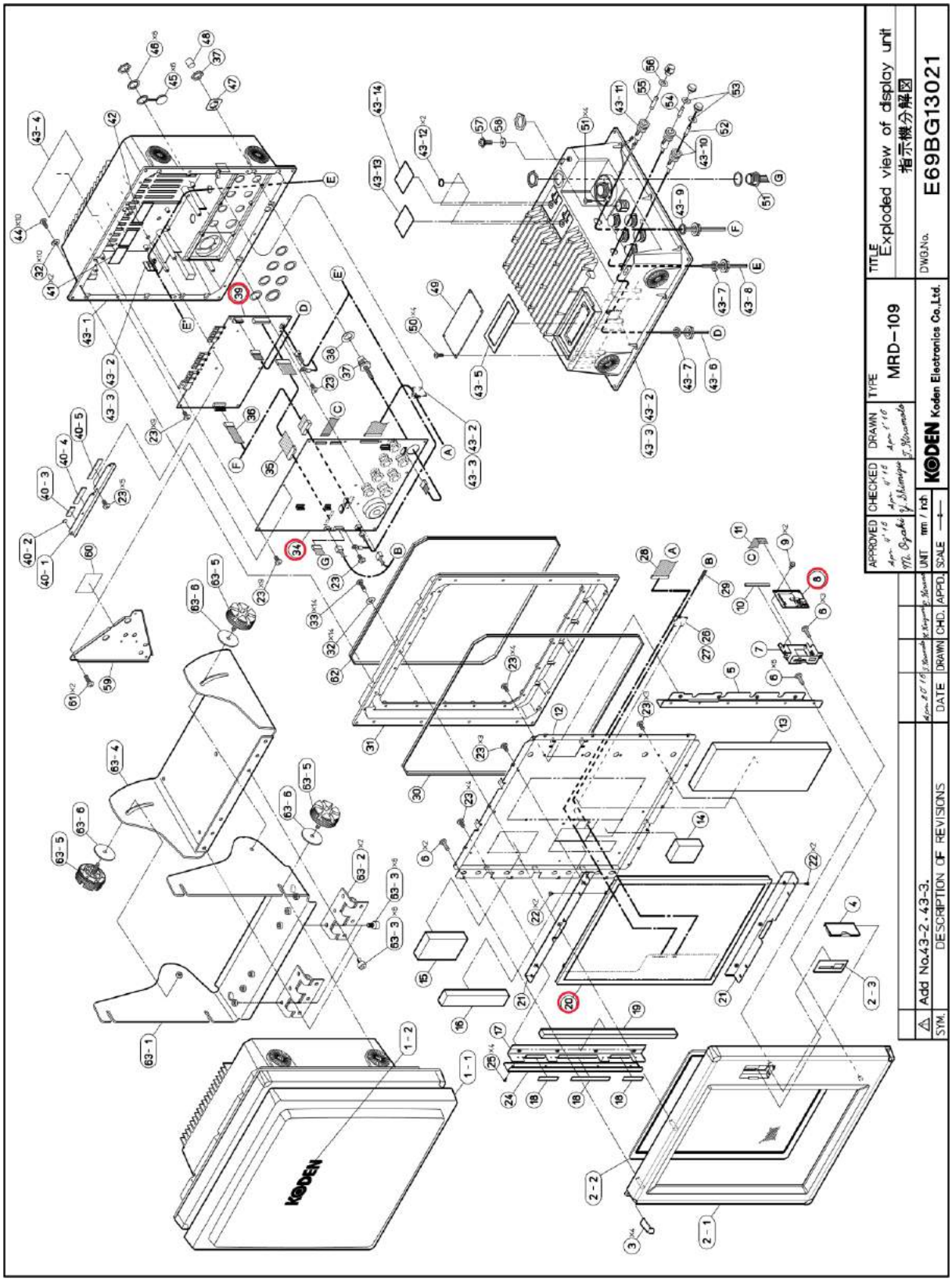
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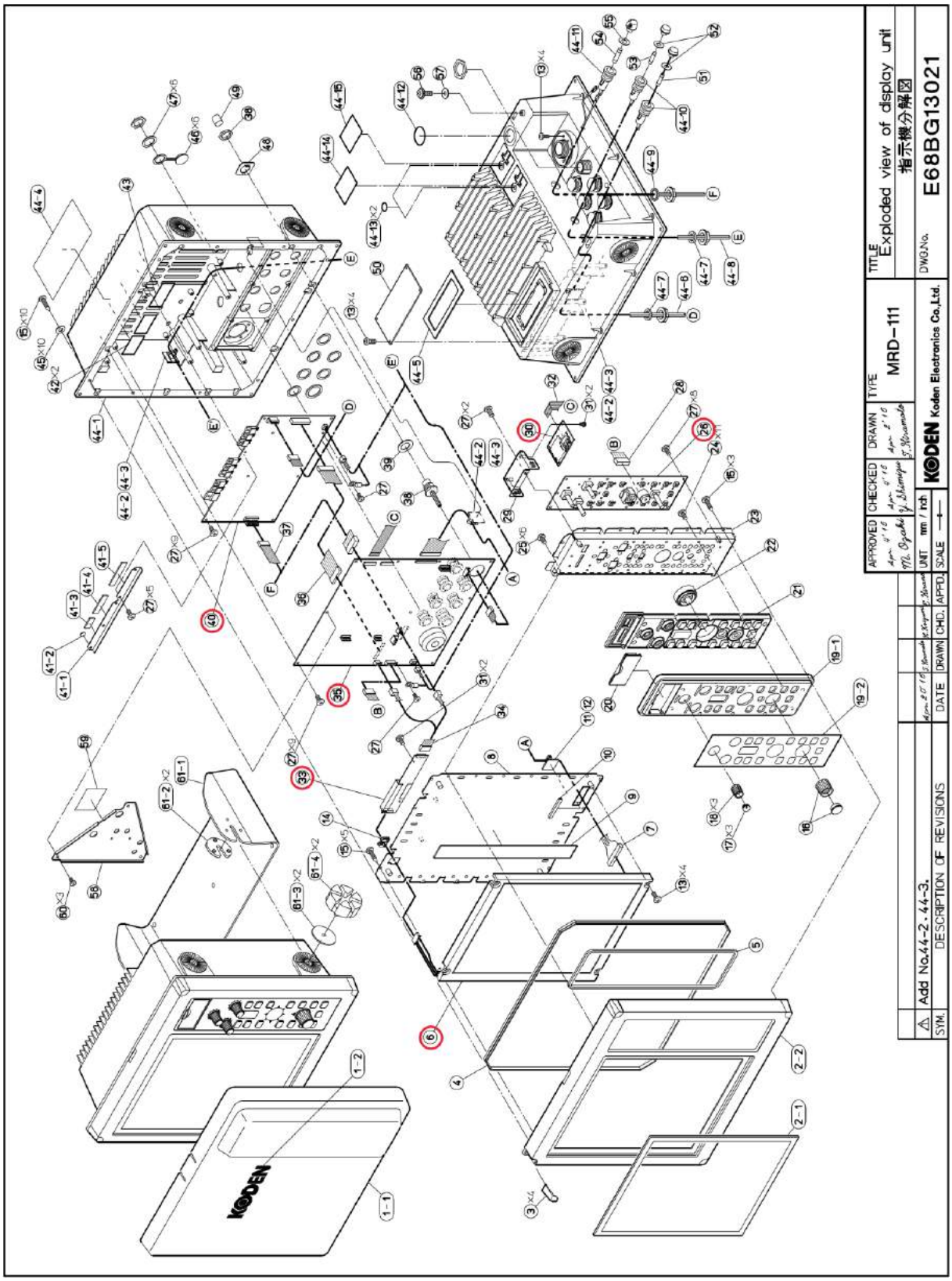
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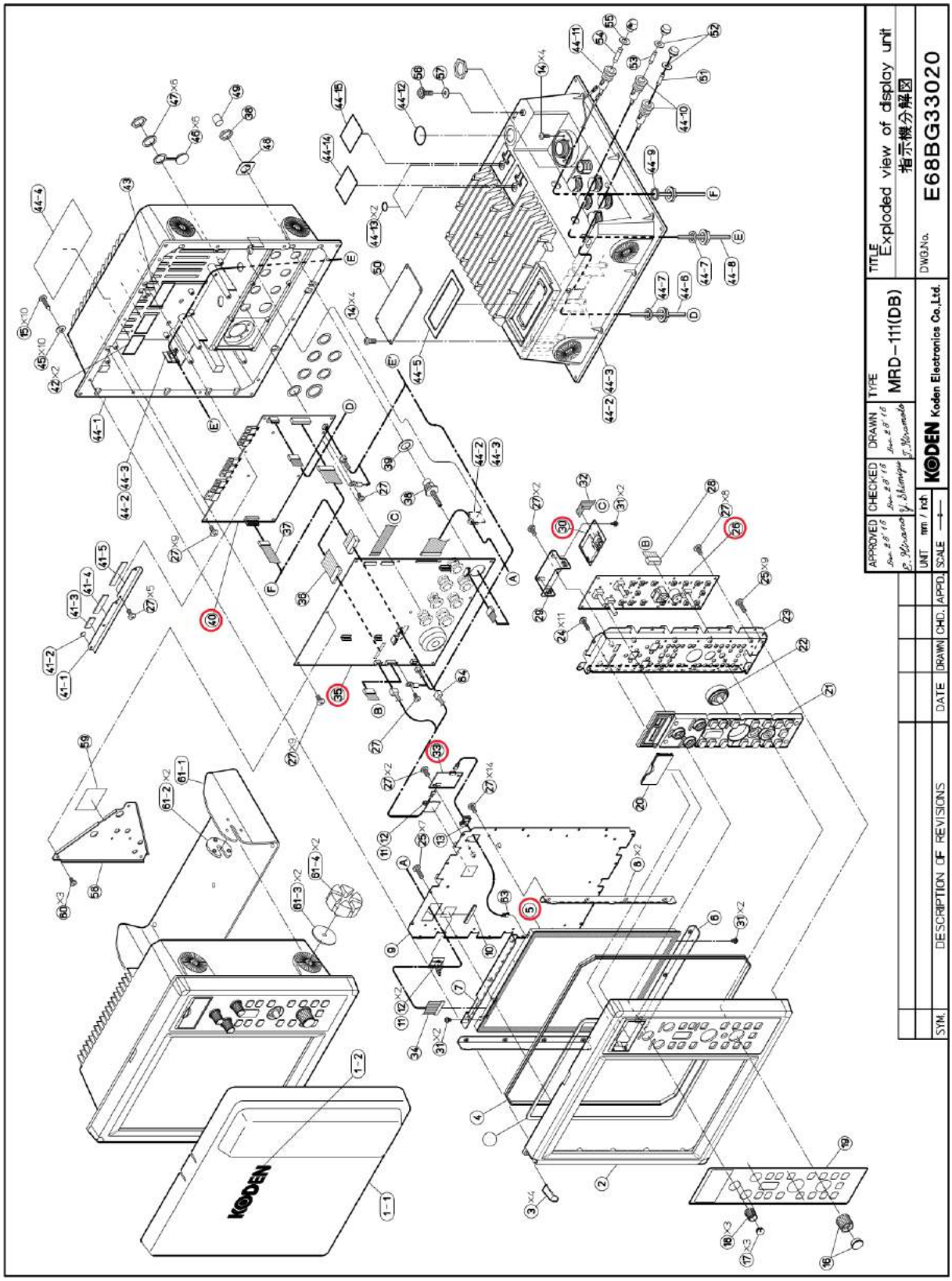
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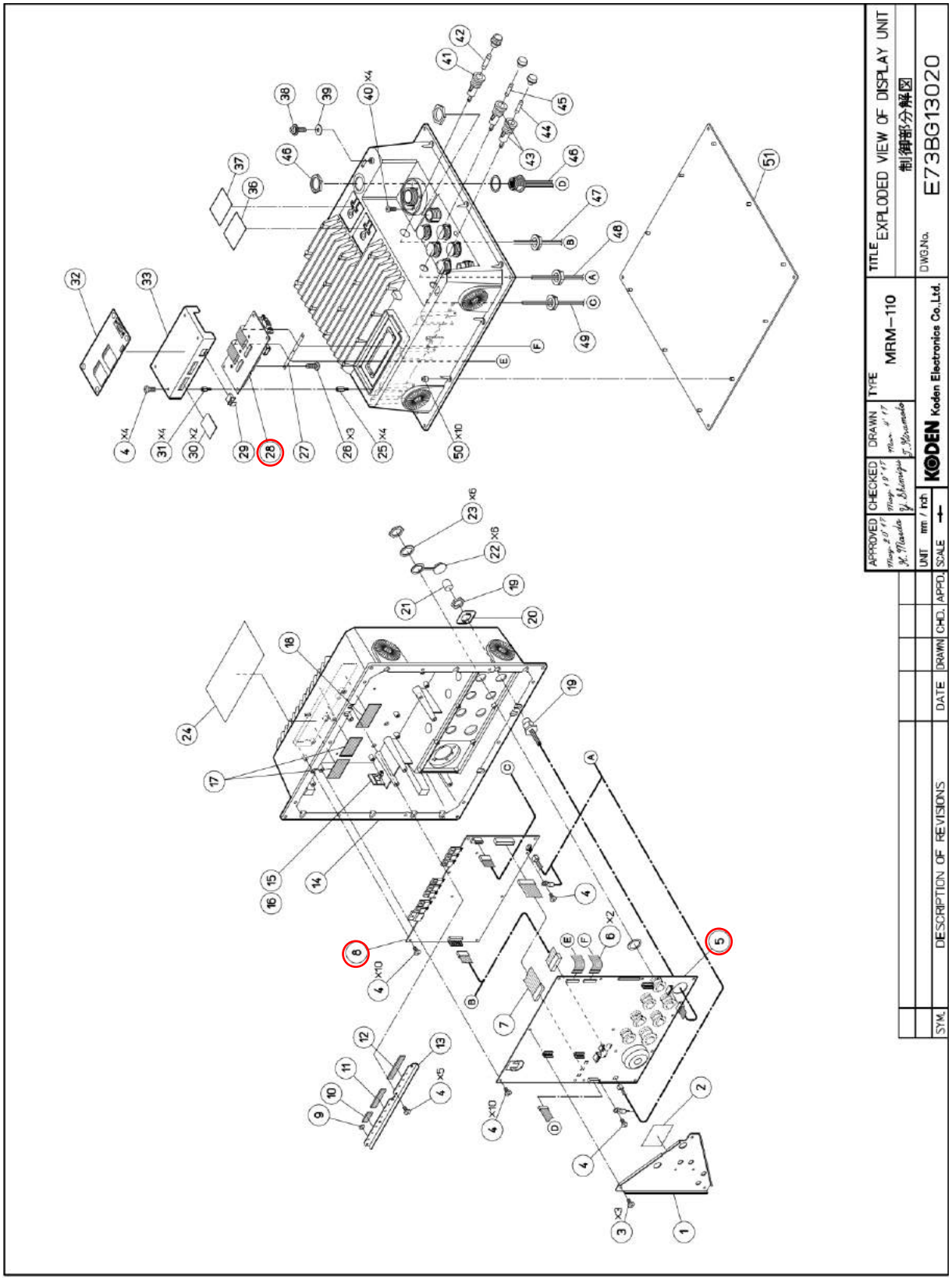
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CHECKED
DRAWN
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SCALE
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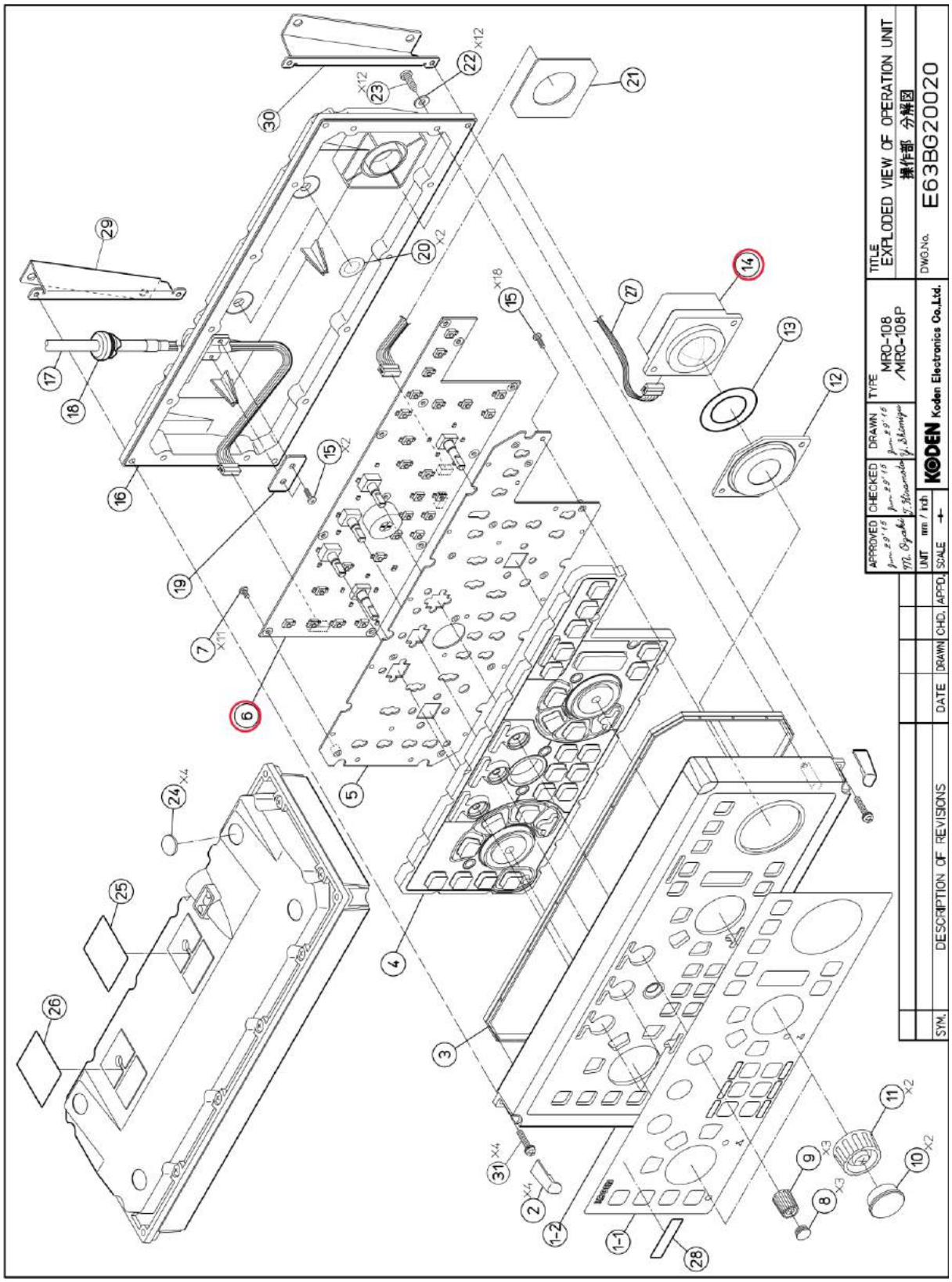
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/MRO-108P
KODEN Koden Electronics Co.,Ltd.
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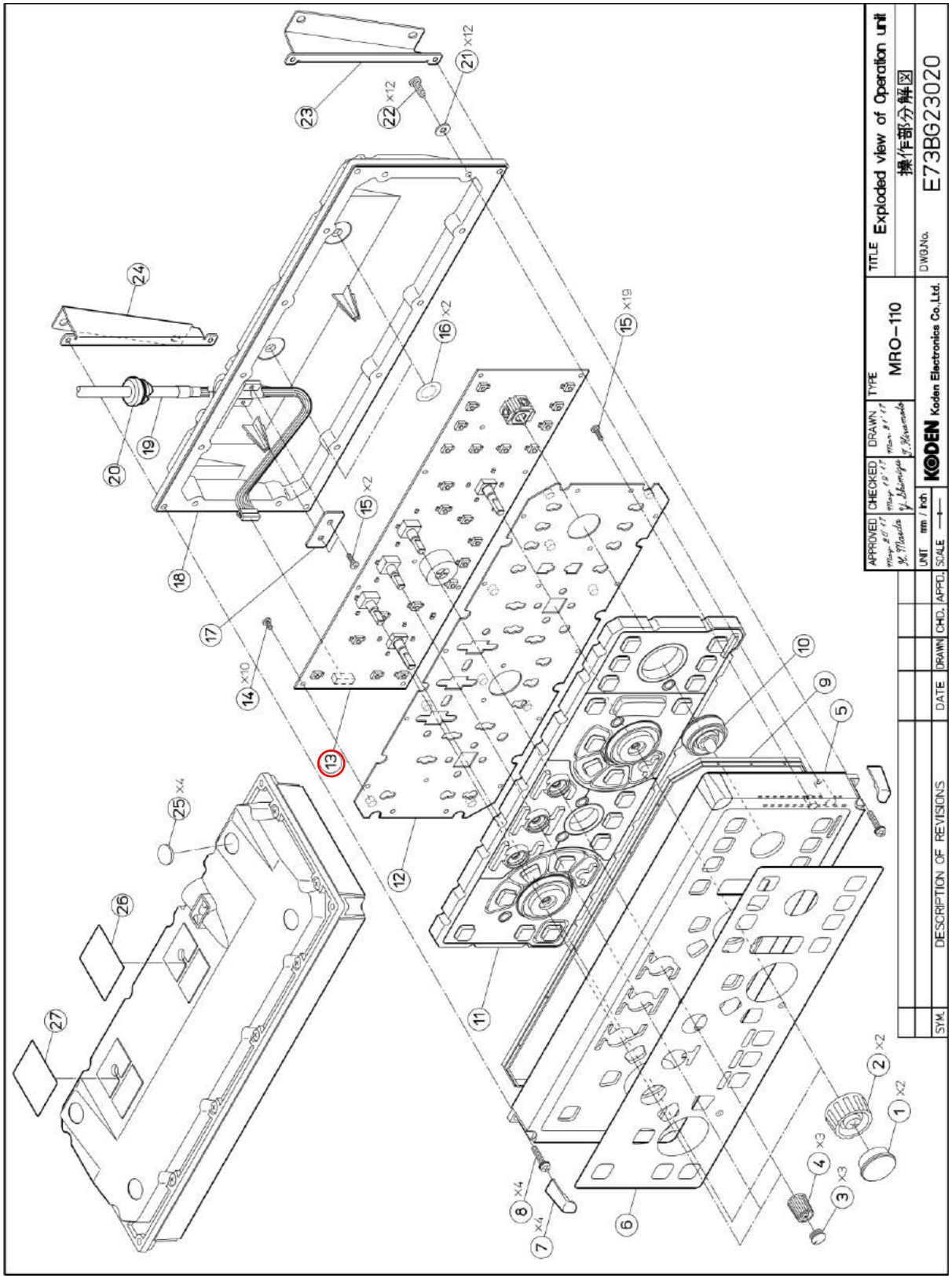
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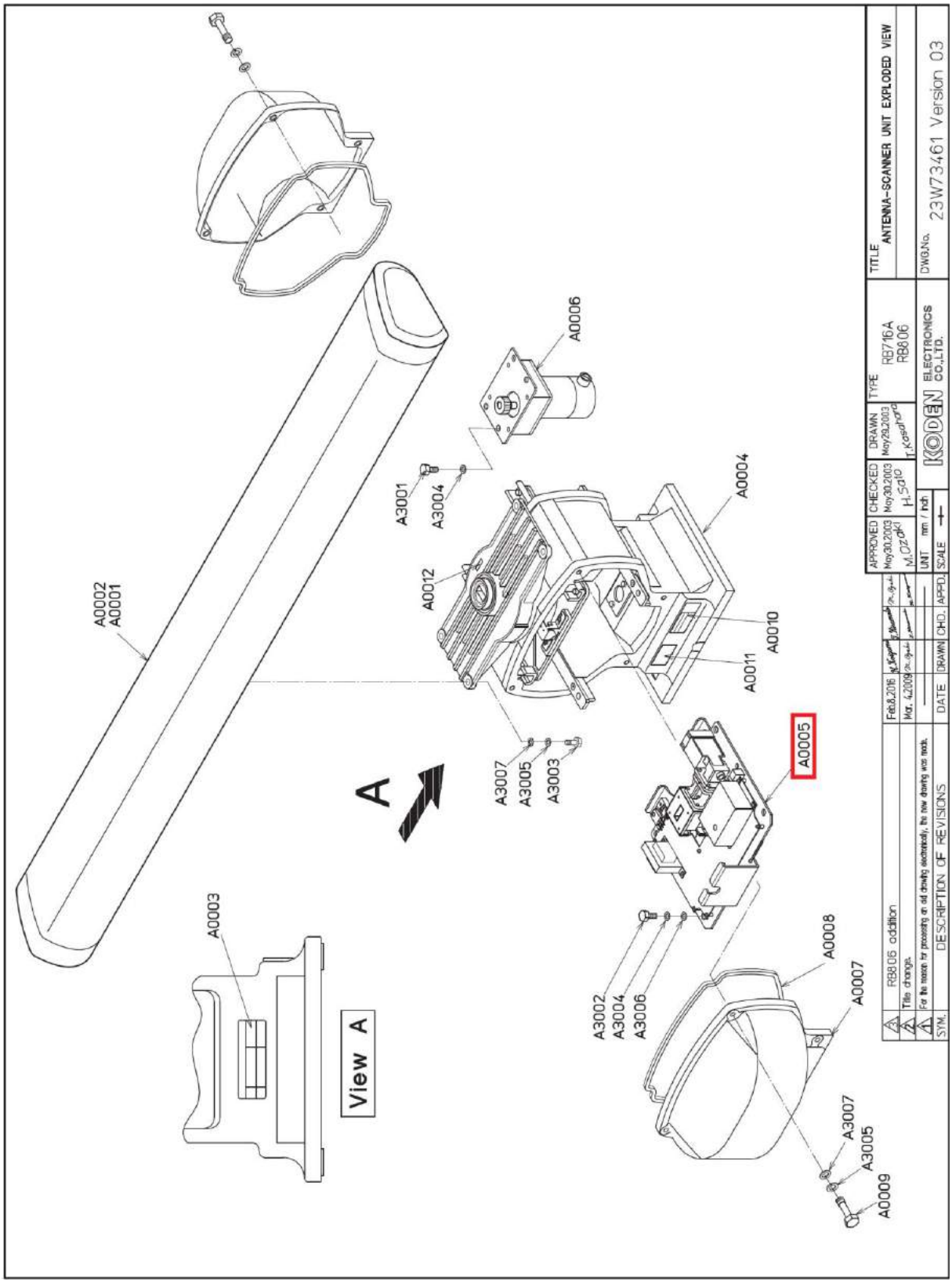
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ANTENNA-SCANNER UNIT EXPLODED VIEW
TYPE
RB716A
RB806
DWG.No.
23W73461 Version 03
KODEN ELECTRONICS CO.,LTD.
APPROVED May30,2003
CHECKED May30,2003
DRAWN May29,2003
UNIT mm / inch
SCALE
RB806 addition
Feb.8,2016
Title change.
Mar. 4,2009
For the reason for proceeding an old drawing electronically, the new drawing was made.
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DESCRIPTION OF REVISIONS
DATE
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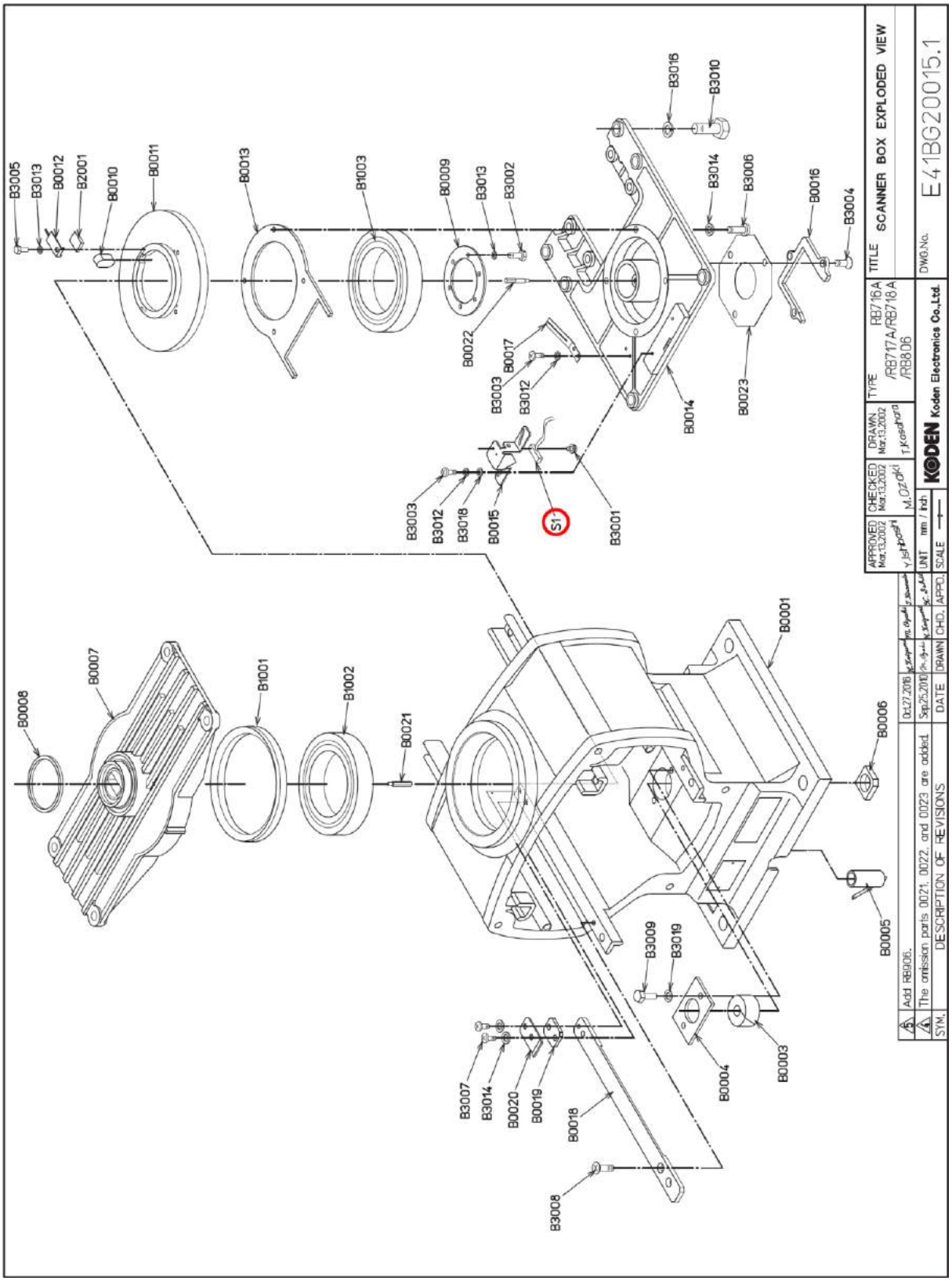
CHD.
APPD.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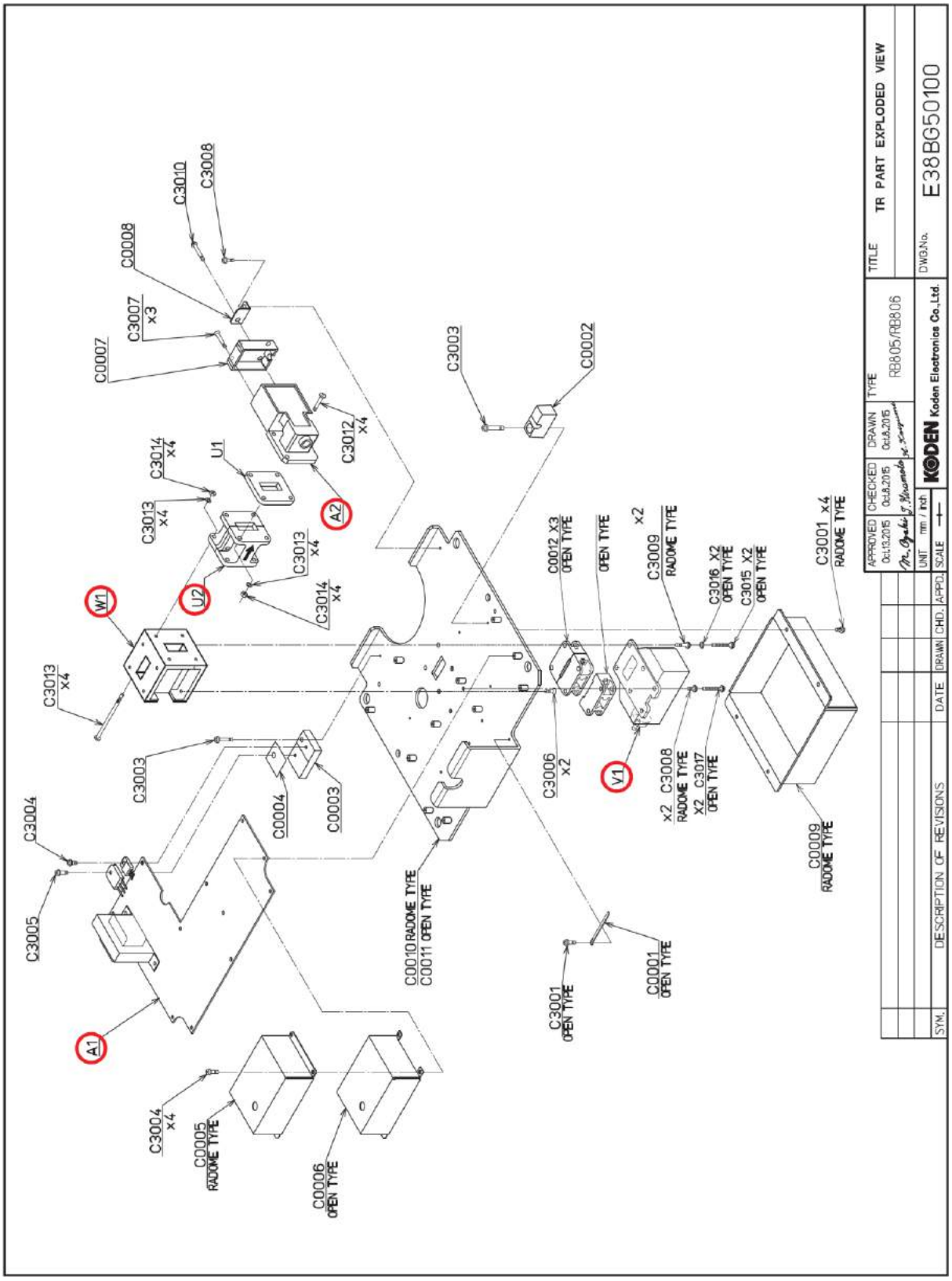
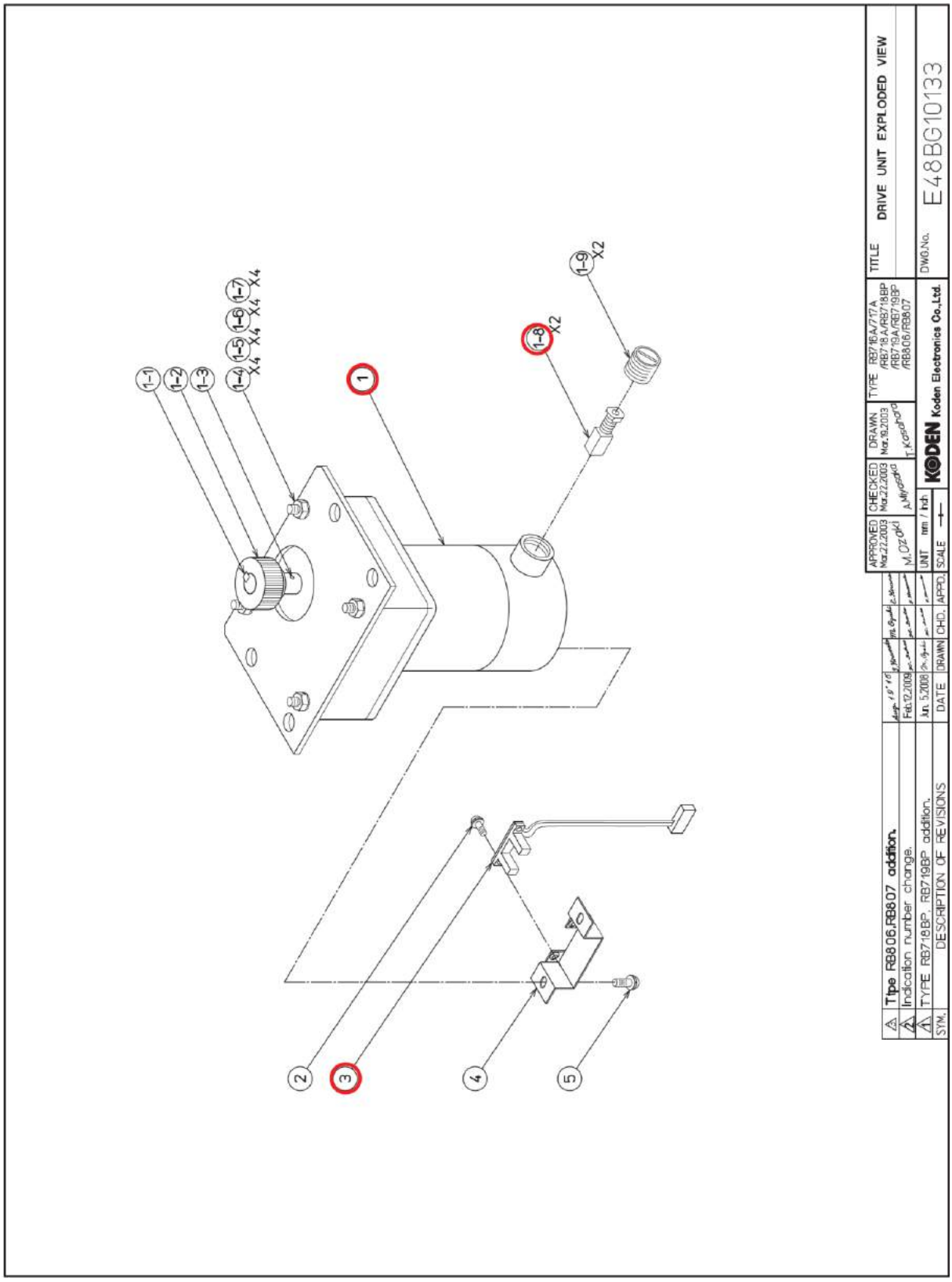
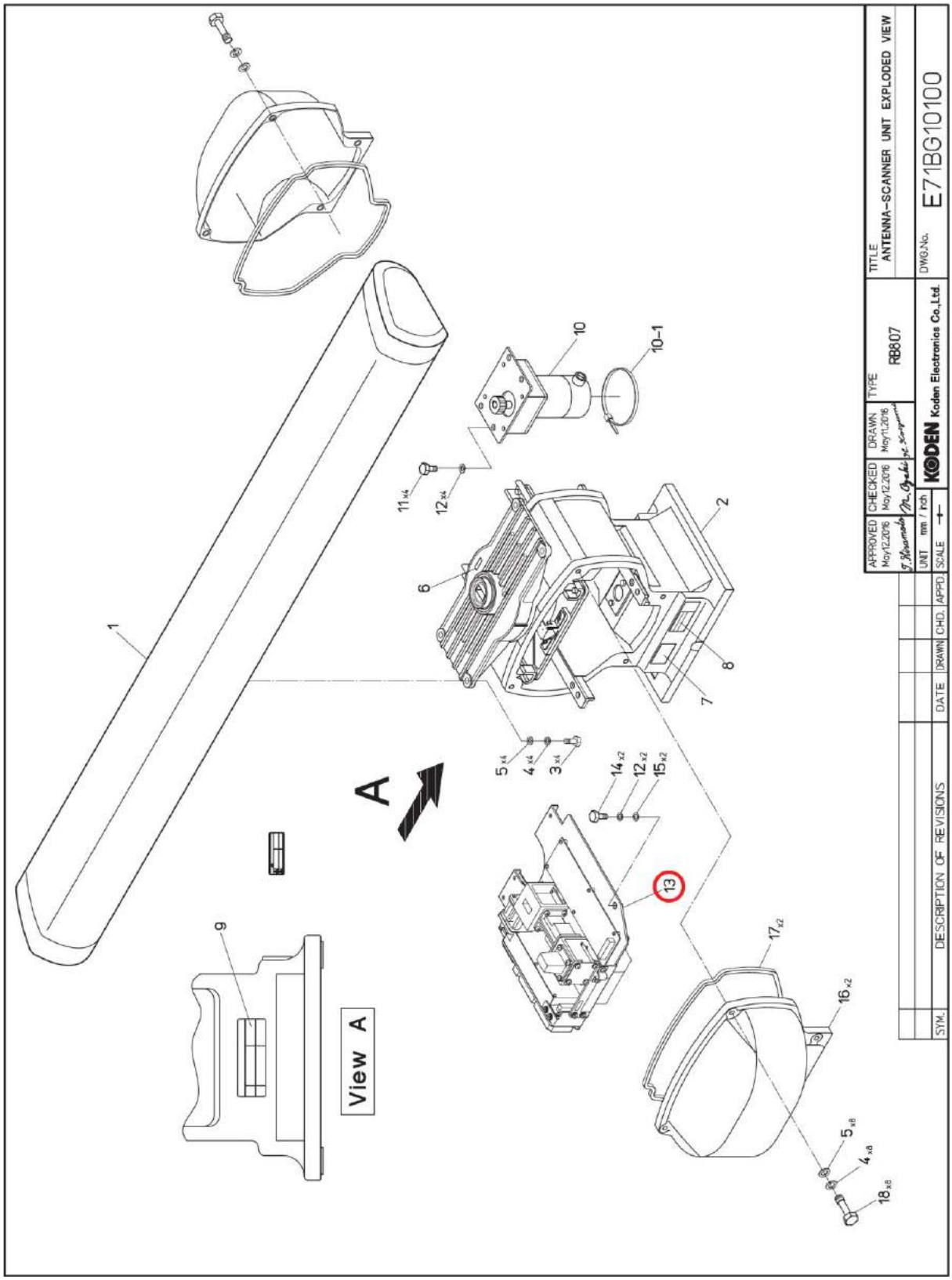
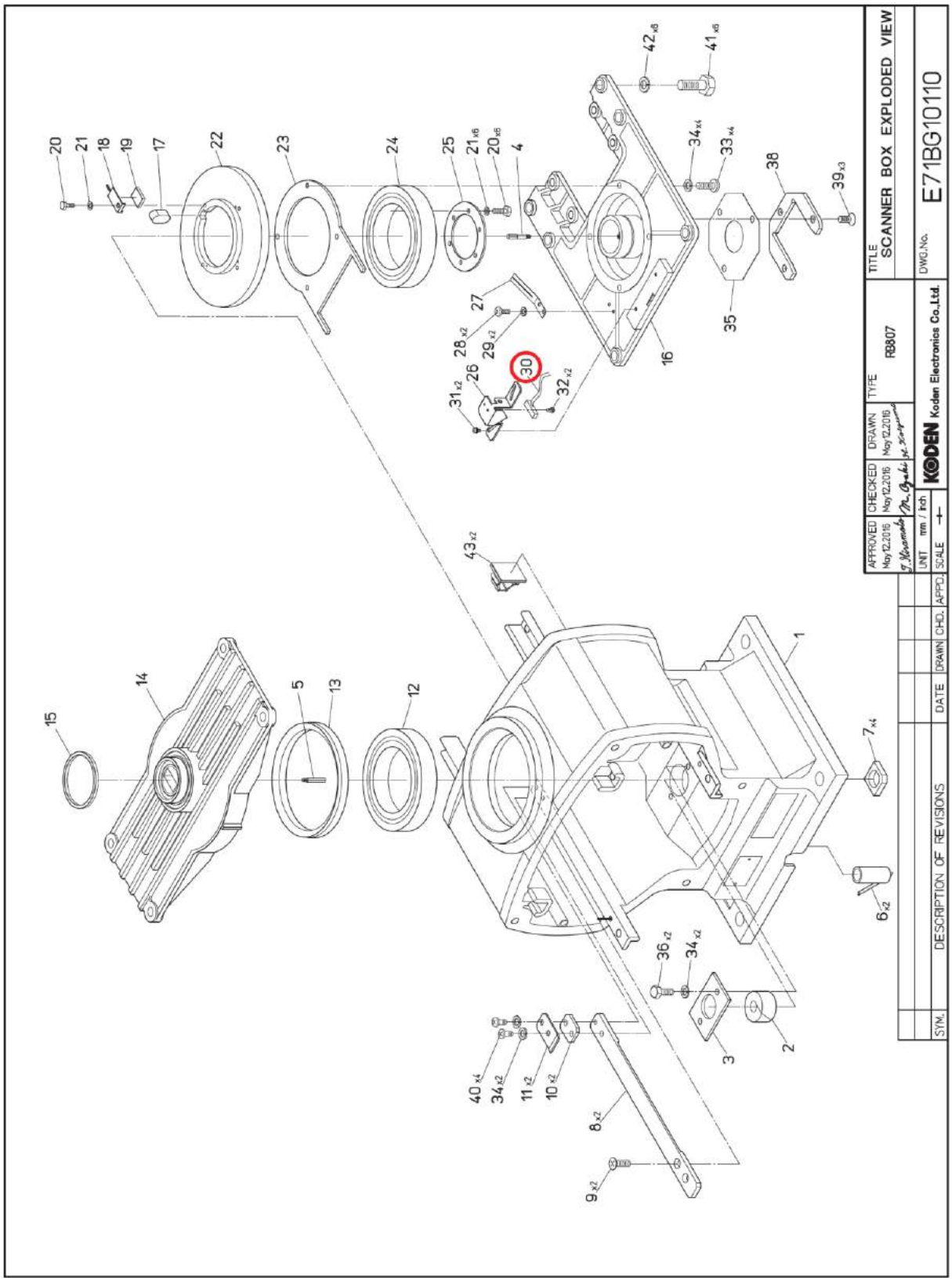
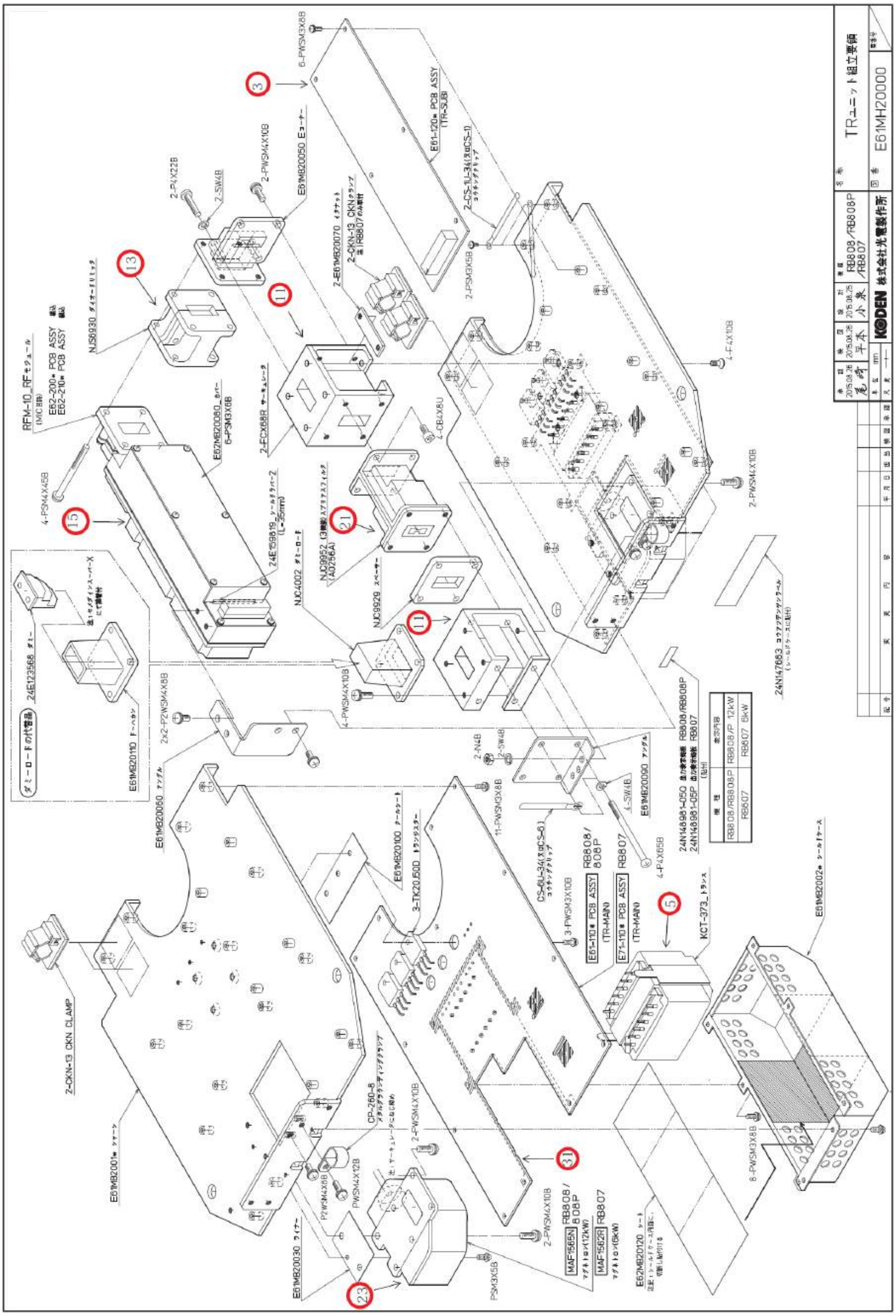
B0017
B3003
B3012
B0014
B0023
B3003
B3012
B3018
B0015
S1
B3001
B0008
B0007
B1001
B1002
B0021
B0001
B0006
B0005
B3009
B3019
B3007
B3014
B0020
B0019
B0018
B0004
B0003
B3008
TITLE SCANNER BOX EXPLODED VIEW
TYPE RB716A/RB718A RB717A/RB806
DRAWN Mar.13.2002
CHECKED Mar.13.2002
APPROVED Mar.13.2002
KODEN Koden Electronics Co.,Ltd.
DWG.No. E41B620015.1
UNIT mm / inch
SCALE
DRAWN CHD. APPD.
DATE
SYM. DESCRIPTION OF REVISIONS
Add RB906.
The omission parts 0021, 0022, and 0023 are added.
Sep.25.2001
Oct.27.2016

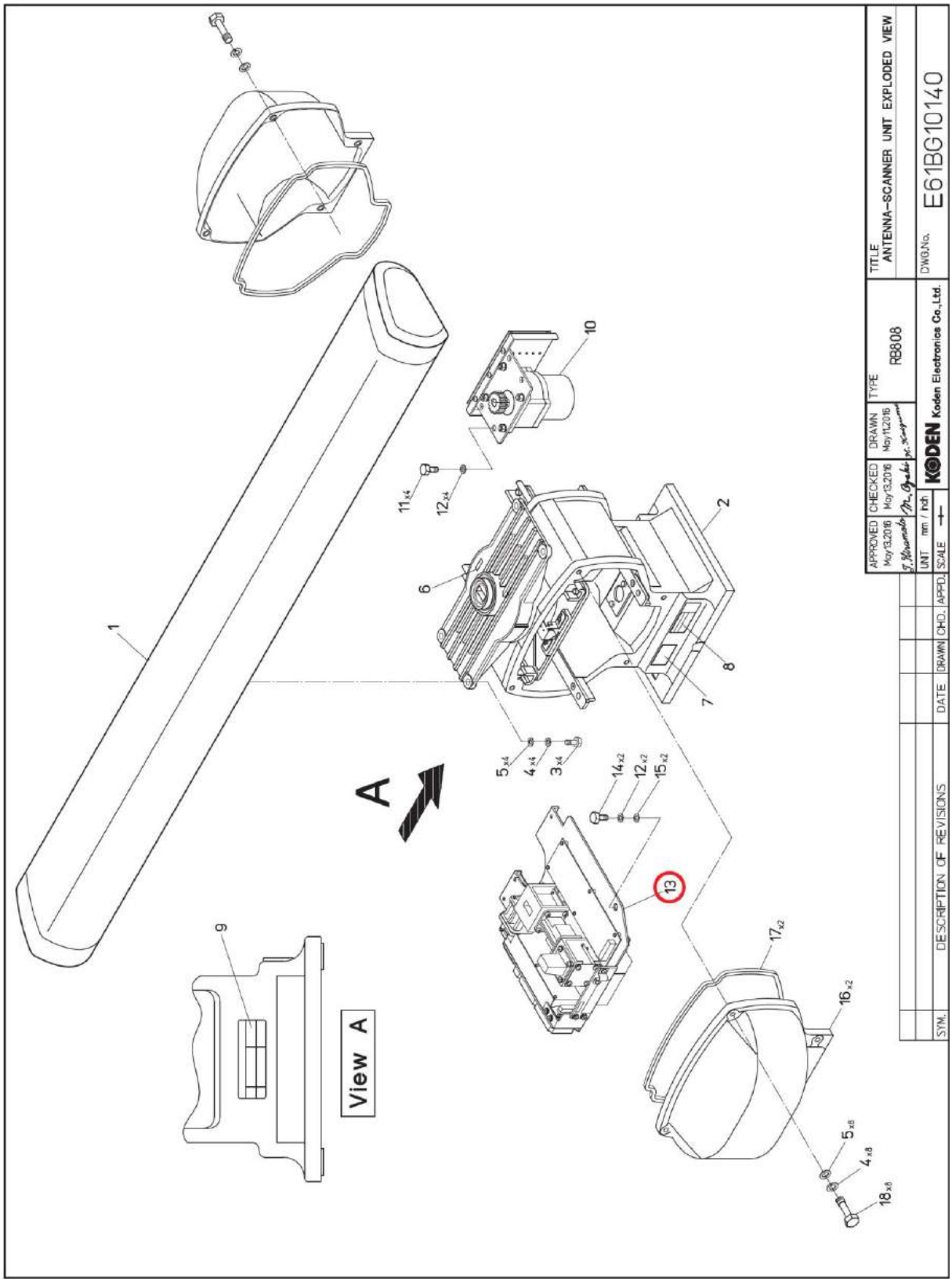

C3010
C3008
C0008
C3007 x3
C0007
C3012 x4
C3014 x4
U1
C3013 x4
A2
U2
W1
C3013 x4
C3014 x4
C3013 x4
C3003
C0002
C0012 X3 OPEN TYPE
OPEN TYPE
x2
C3009 RADOME TYPE
C3016 X2 OPEN TYPE
C3015 X2 OPEN TYPE
C3001 x4 RADOME TYPE
C3003
C0004
C0003
C3004
C3005
C0010 RADOME TYPE
C0011 OPEN TYPE
C3006 x2
V1
x2 C3008 RADOME TYPE
x2 C3017 OPEN TYPE
C0009 RADOME TYPE
A1
C3001 OPEN TYPE
C0001 OPEN TYPE
C3004 x4
C0005 RADOME TYPE
C0006 OPEN TYPE
APPROVED Oct.13.2015
CHECKED Oct.8.2015
DRAWN Oct.8.2015
TYPE RB805/RB806
TITLE TR PART EXPLODED VIEW
UNIT mm / inch
SCALE —
DWG.No. E38BG50100
KODEN Koden Electronics Co.,Ltd.
SYM. DESCRIPTION OF REVISIONS DATE DRAWN CHD. APPD.

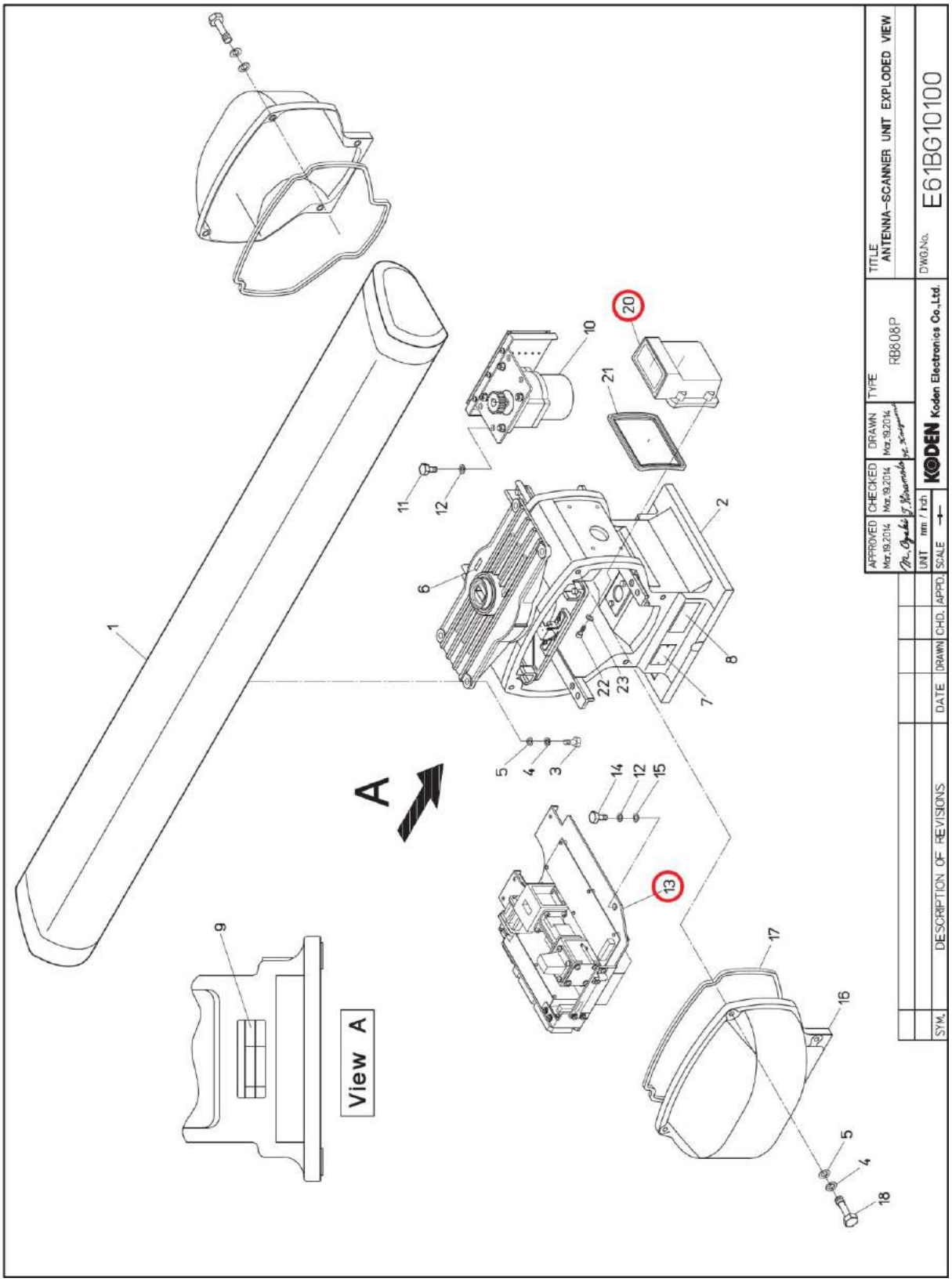

TITLE DRIVE UNIT EXPLODED VIEW
TYPE RB716A/717A RB718A/RB718BP RB719A/RB719P RB806/RB807
DRAWN May.19.2003
CHECKED May.22.2003
APPROVED May.22.2003
KODEN Koden Electronics Co.,Ltd.
DWG.No. E48BG10133
UNIT mm / inch
SCALE
DATE DRAWN CHD. APPD.
SYM. DESCRIPTION OF REVISIONS
TYPE RB718BP, RB719BP addition. Jun. 5.2006
Indication number change. Feb.12.2009
Type RB806,RB807 addition.
1-1 1-2 1-3 1-4 X4 1-5 X4 1-6 X4 1-7 X4
1 1-8 X2 1-9 X2
2 3 4 5

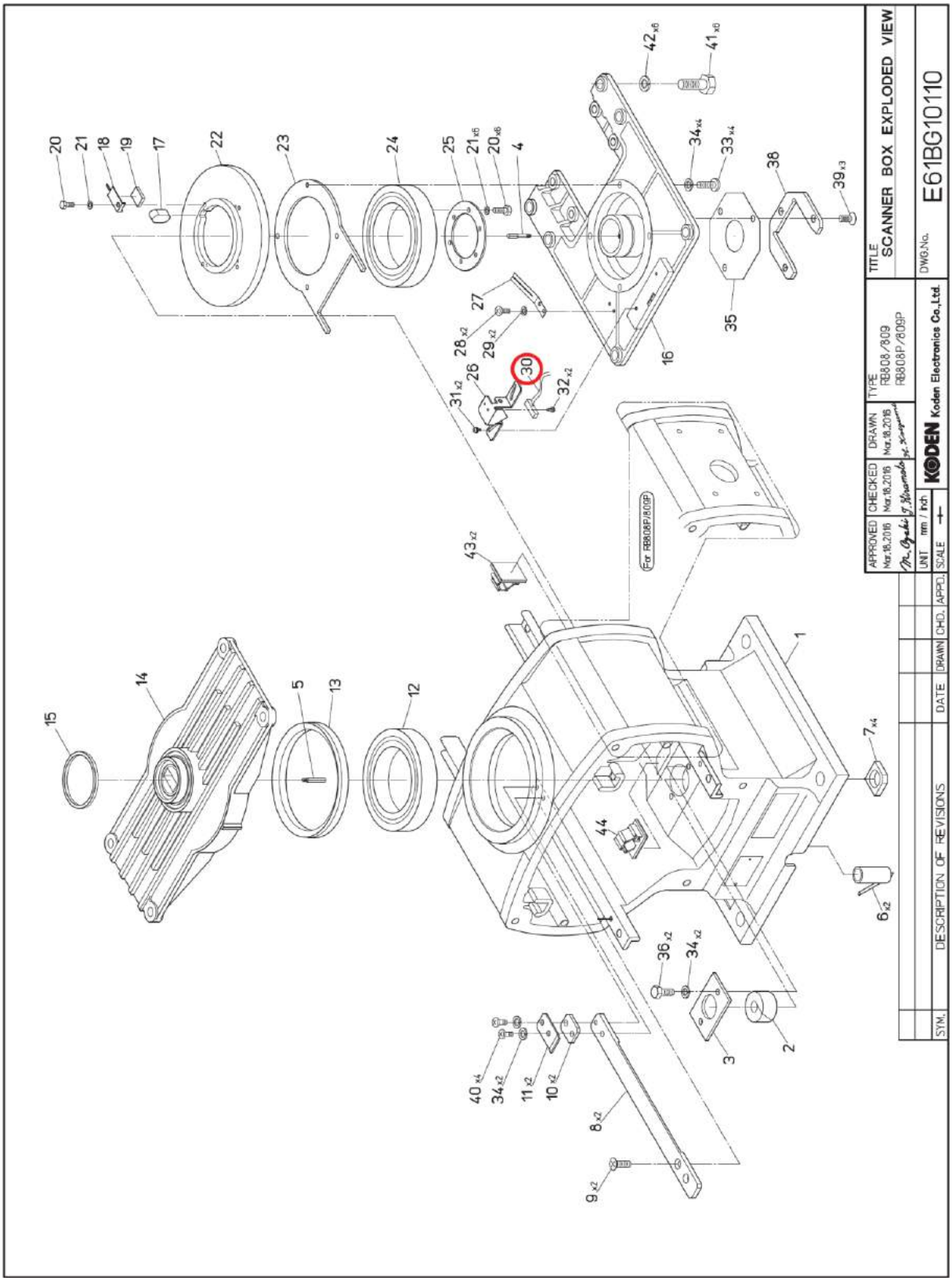

TITLE
ANTENNA-SCANNER UNIT EXPLODED VIEW
DWG.No.
E71BG10100
TYPE
RB807
KODEN Koden Electronics Co.,Ltd.
APPROVED May12,2016
CHECKED May12,2016
DRAWN May11,2016
UNIT mm
SCALE
DESCRIPTION OF REVISIONS
DATE
DRAWN
CHD.
APPD.
SYM.
View A
A

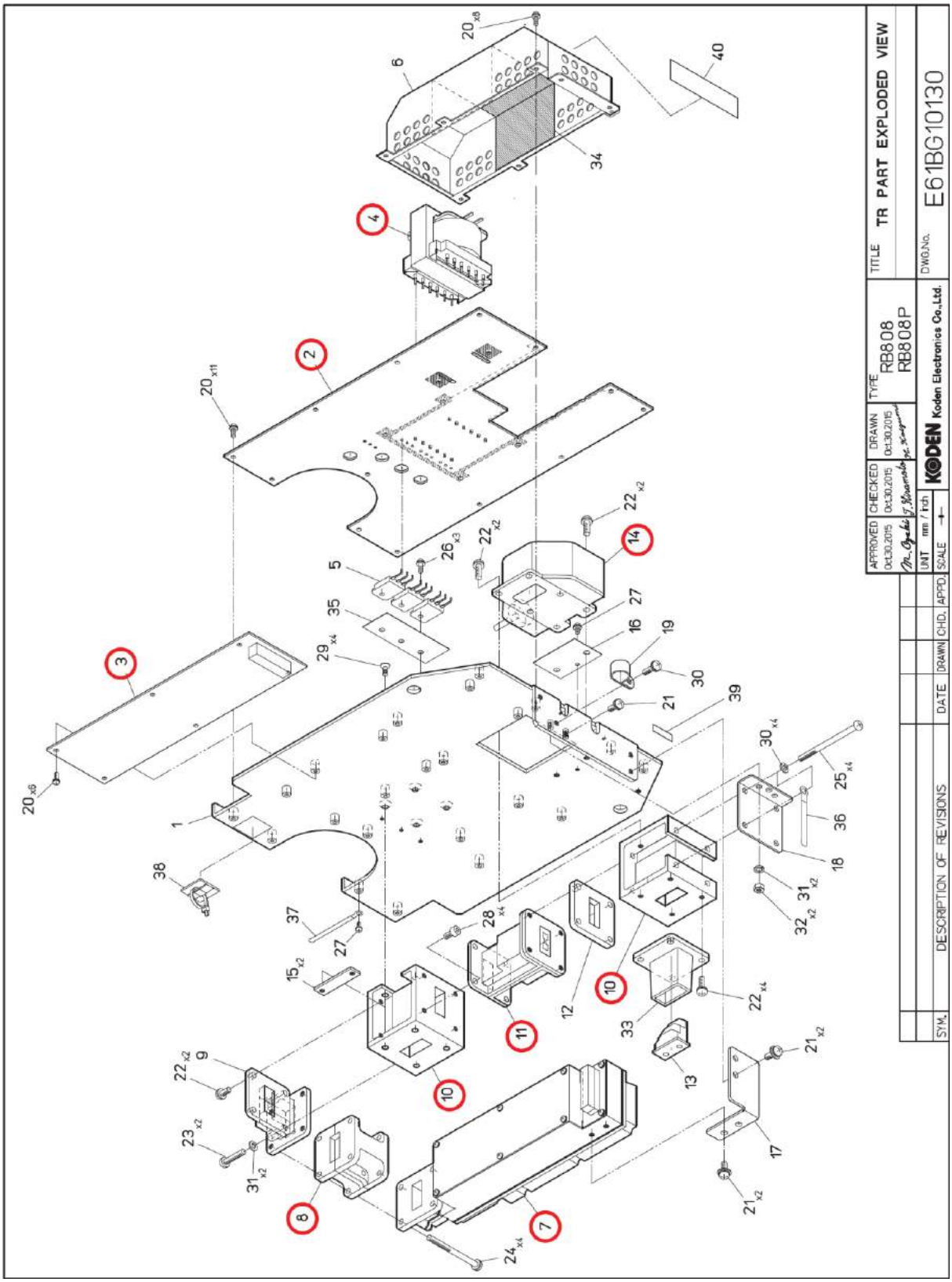

TITLE
SCANNER BOX EXPLODED VIEW
DWG.NO.
E71BG10110
TYPE
R8807
KODEN Koden Electronics Co.,Ltd.
APPROVED May.12.2016
CHECKED May.12.2016
DRAWN May.12.2016
UNIT mm / inch
SCALE
SYM.
DESCRIPTION OF REVISIONS
DATE
DRAWN
CHD.
APPD.

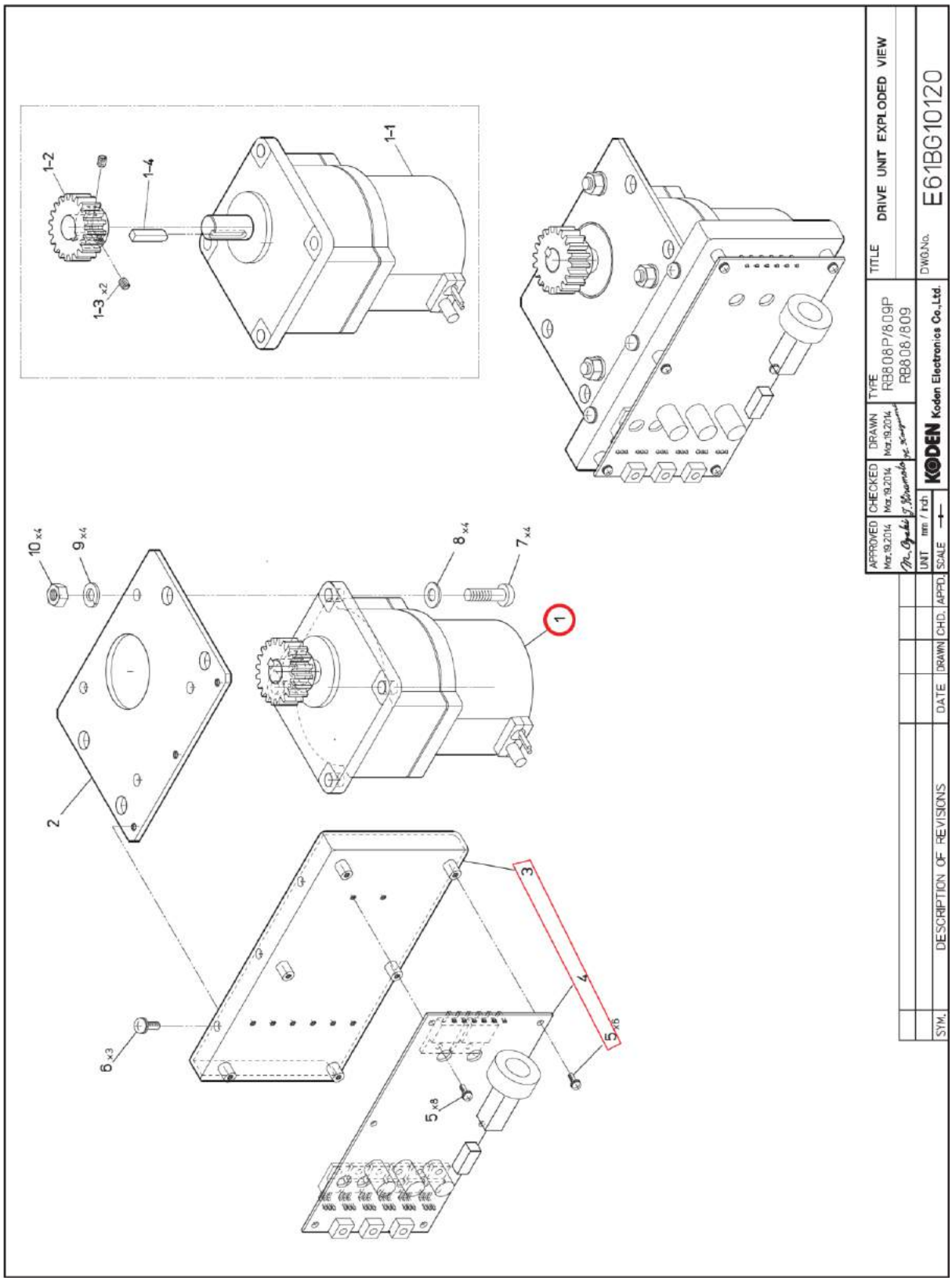

6-PWSM3X8B
E61-120* PCB ASSY (TR-SUB)
2-CS-1U-34(スロCS-1)
2-PSM3X5B
E61MB20050 Eコーナー
2-PWSM4X10B
2-P4X22B
2-SW4B
2-E61MB20070
2-CKN-13 CKNクランプ
RFM-10_RFモジュール (MIC回路)
E62-200* PCB ASSY
E62-210* PCB ASSY
NJS6930
E62MB20080 カバー
6-PSM3X6B
2-FCX68R サーキュレータ
4-CB4X8U
4-F4X10B
4-PSM4X45B
24E159819
NJC9952 (3端子) (A0256A)
NJC4002 ダミーロード
NJC9929 スペーサー
ダミーロードの代替品 24E123568
E61MB20110
2x2-P2WSM4X8B
4-PWSM4X10B
E61MB20060 アングル
2-N4B
2-SW4B
11-PWSM3X8B
E61MB20100
3-TK20J50D トランジスター
CS-6U-34(スロCS-6)
3-PWSM3X10B
E61-110* PCB ASSY (TR-MAIN) RB808/808P
E71-110* PCB ASSY (TR-MAIN) RB807
4-SW4B
E61MB20090 アングル
4-P4X65B
24N148981-050
24N148981-05P
RB808/RB808P RB807
RB808/RB808P RB808/P 12kW
RB807 RB807 6kW
24N147683
2-PWSM4X10B
KCT-373_トランス
E61MB2002* シールドケース
2-CKN-13 CKN CLAMP
E61MB2001*
CP-260-8
2-PWSM4X10B
P2WSM4X8B
PWSM4X12B
E61MB20030 ライナー
2-PWSM4X10B
MAF1565N マグネトロン(12kW) RB808/808P
MAF1562R マグネトロン(6kW) RB807
E62MB20120 シート
PSM3X5B
8-PWSM3X8B
TRユニット組立要領
E61MH20000
RB808/RB808P/RB807
KODEN 株式会社光電製作所
2015.08.26
2015.08.25
mm


TITLE
ANTENNA-SCANNER UNIT EXPLODED VIEW
DWG.No.
E61BG10140
TYPE
RB808
DRAWN
May/11/2016
CHECKED
May/13/2016
APPROVED
May/13/2016
KODEN Koden Electronics Co.,Ltd.
UNIT mm / inch
SCALE
DESCRIPTION OF REVISIONS
DATE
DRAWN
CHD.
APPD.
SYM.
View A
A


A
View A
TITLE
ANTENNA-SCANNER UNIT EXPLODED VIEW
TYPE
RB808P
DWG.No.
E61BG10100
KODEN Koden Electronics Co.,Ltd.
APPROVED
CHECKED
DRAWN
DESCRIPTION OF REVISIONS
DATE
DRAWN
CHD.
APPD.


TITLE
SCANNER BOX EXPLODED VIEW
DWG.No.
E61BG10110
TYPE
RB808/809
RB808P/809P
KODEN Koden Electronics Co.,Ltd.
APPROVED
CHECKED
DRAWN
UNIT mm / inch
SCALE
SYM.
DESCRIPTION OF REVISIONS
DATE
DRAWN
CHD.
APPD.
For RB808P/809P


TR PART EXPLODED VIEW
RB808
RB808P
KODEN Koden Electronics Co.,Ltd.
E61BG10130
DESCRIPTION OF REVISIONS
DATE
DRAWN
CHD.
APPD.
APPROVED
CHECKED
DRAWN
Oct.30.2015
UNIT mm / inch
SCALE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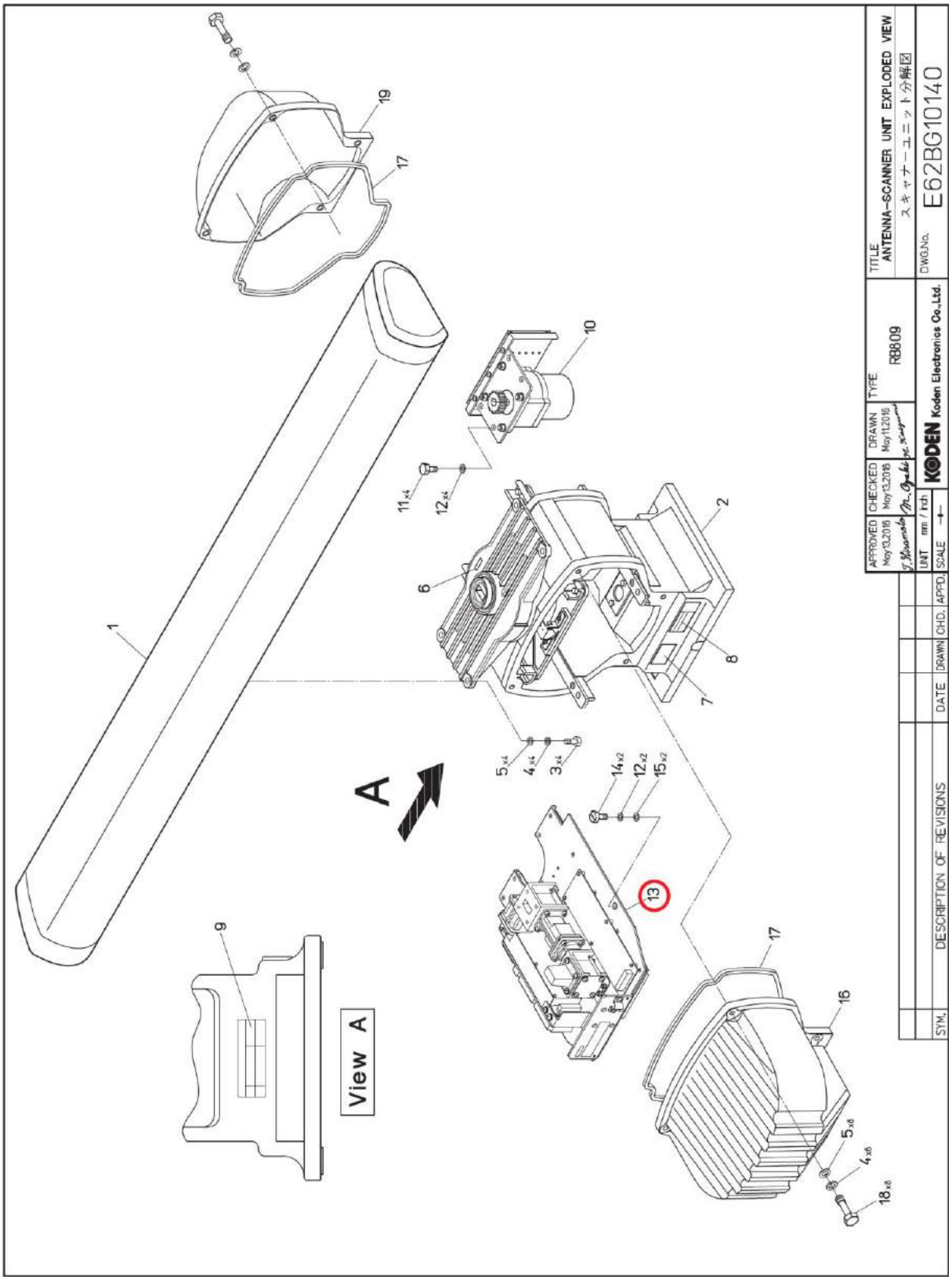
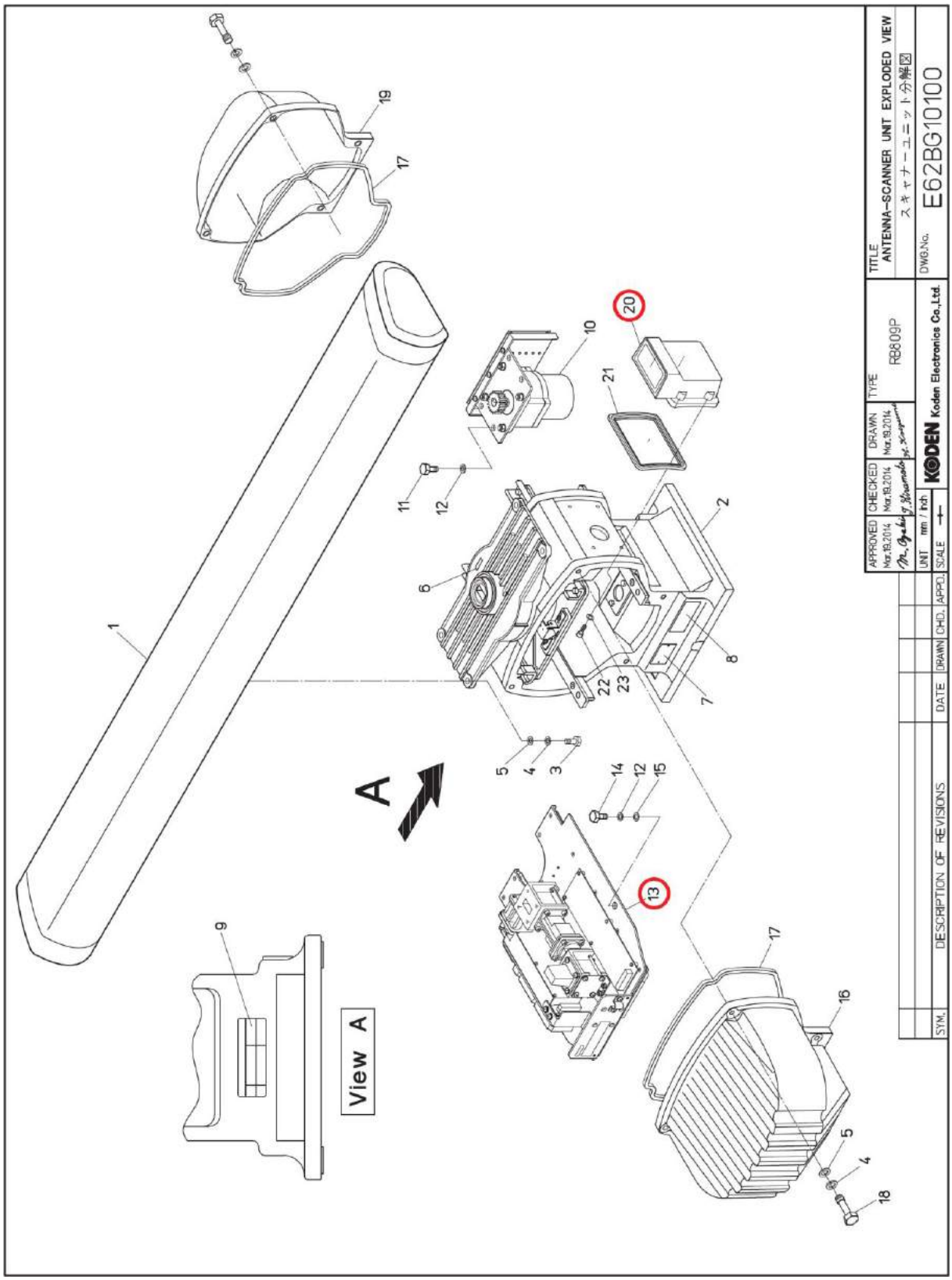
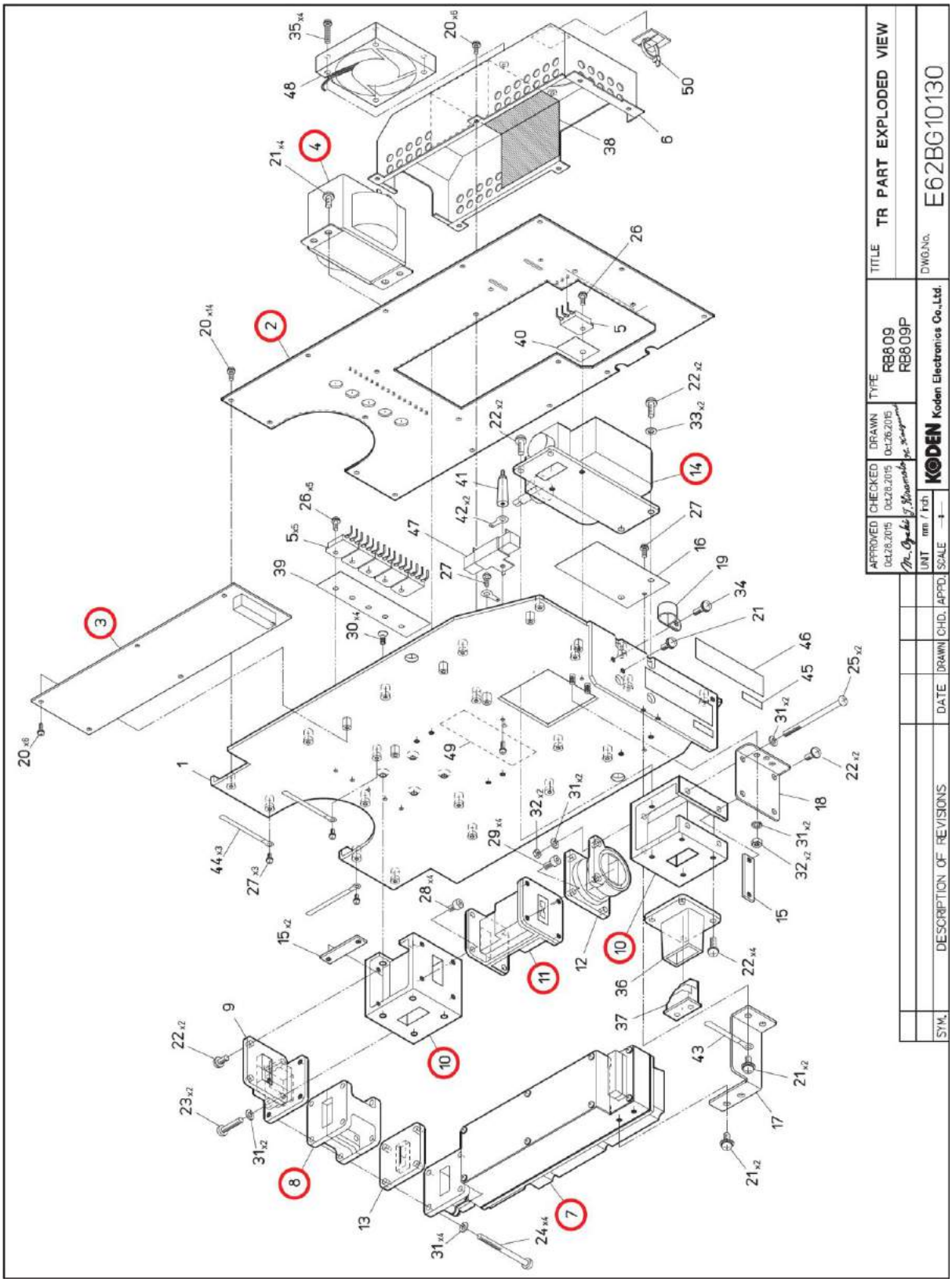
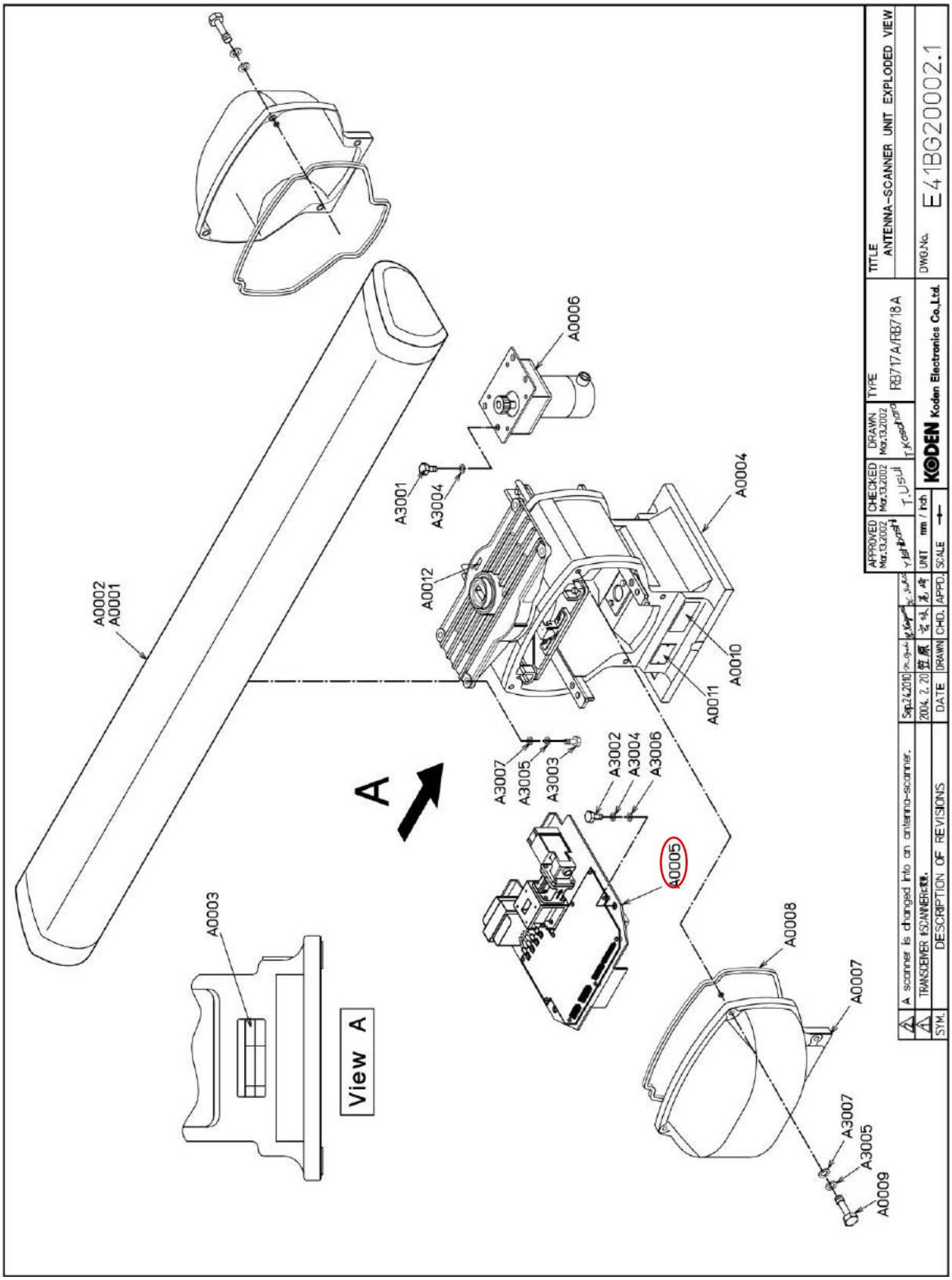
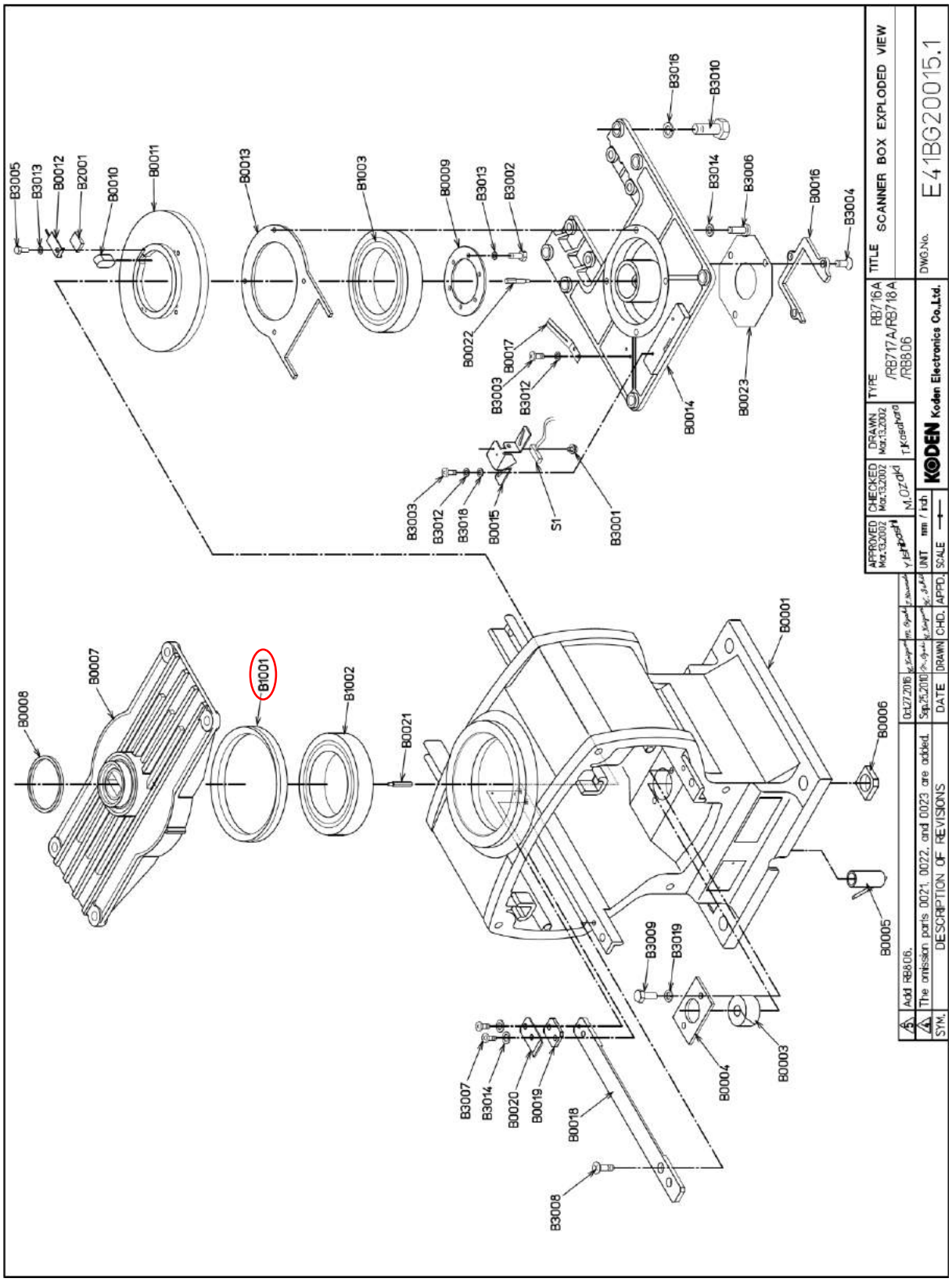
1-2
1-3 x2
1-4
2
3
4
5 x6
5 x8
6 x3
7 x4
8 x4
9 x4
10 x4
1
APPROVED
CHECKED
DRAWN
TYPE
RB808P/809P
RB808/809
TITLE
DRIVE UNIT EXPLODED VIEW
DWG.No.
E61BG10120
KODEN Koden Electronics Co.,Ltd.
UNIT mm / inch
SCALE
SYM.
DESCRIPTION OF REVISIONS
DATE
DRAWN
CHD.
APPD.


TITLE
ANTENNA-SCANNER UNIT EXPLODED VIEW
スキャナーユニット分解図
DWG.No.
E62BG10140
TYPE
RB809
DRAWN
May/11/2016
CHECKED
May/13/2016
APPROVED
May/13/2016
KODEN Koden Electronics Co.,Ltd.
UNIT mm / Inch
SCALE
SYM.
DESCRIPTION OF REVISIONS
DATE
DRAWN
CHD.
APPD.
View A
A


A
View A
TITLE
ANTENNA-SCANNER UNIT EXPLODED VIEW
スキャナーユニット分解図
TYPE
RB809P
DWG.No.
E62BG10100
KODEN Koden Electronics Co.,Ltd.
APPROVED
CHECKED
DRAWN
UNIT mm / inch
SCALE
SYM.
DESCRIPTION OF REVISIONS
DATE
DRAWN
CHD.
APPD.


TR PART EXPLODED VIEW
TITLE
E62BG10130
DWG.No.
RB609
RB809P
TYPE
KODEN Koden Electronics Co.,Ltd.
APPROVED Oct.28.2015
CHECKED Oct.28.2015
DRAWN Oct.26.2015
UNIT mm / inch
SCALE
DESCRIPTION OF REVISIONS
DATE
DRAWN
CHD.
APPD.
SYM.


A0002
A0001
A0006
A3001
A3004
A0012
A0004
A0010
A0011
A3007
A3005
A3003
A3002
A3004
A3006
A
A0005
A0003
View A
A0008
A0007
A3007
A3005
A0009
TITLE
ANTENNA-SCANNER UNIT EXPLODED VIEW
TYPE
RB717A/RB718A
DWG.No.
E41BG20002.1
KODEN Koden Electronics Co.,Ltd.
APPROVED Mar.13.2002
CHECKED Mar.13.2002
DRAWN Mar.13.2002
UNIT mm / inch
SCALE
A scanner is changed into an antenna-scanner.
TRANSDUCER (SCANNER) ass'y.
SYM. DESCRIPTION OF REVISIONS DATE DRAWN CHD. APPD.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B0012
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B0010
B0011
B0013
B1003
B0009
B3013
B3002
B3016
B3010
B3014
B3006
B0016
B3004
B0022
B0017
B3003
B3012
B0014
B0023
B3003
B3012
B3018
B0015
S1
B3001
B0001
B0007
B1001
B1002
B0021
B0008
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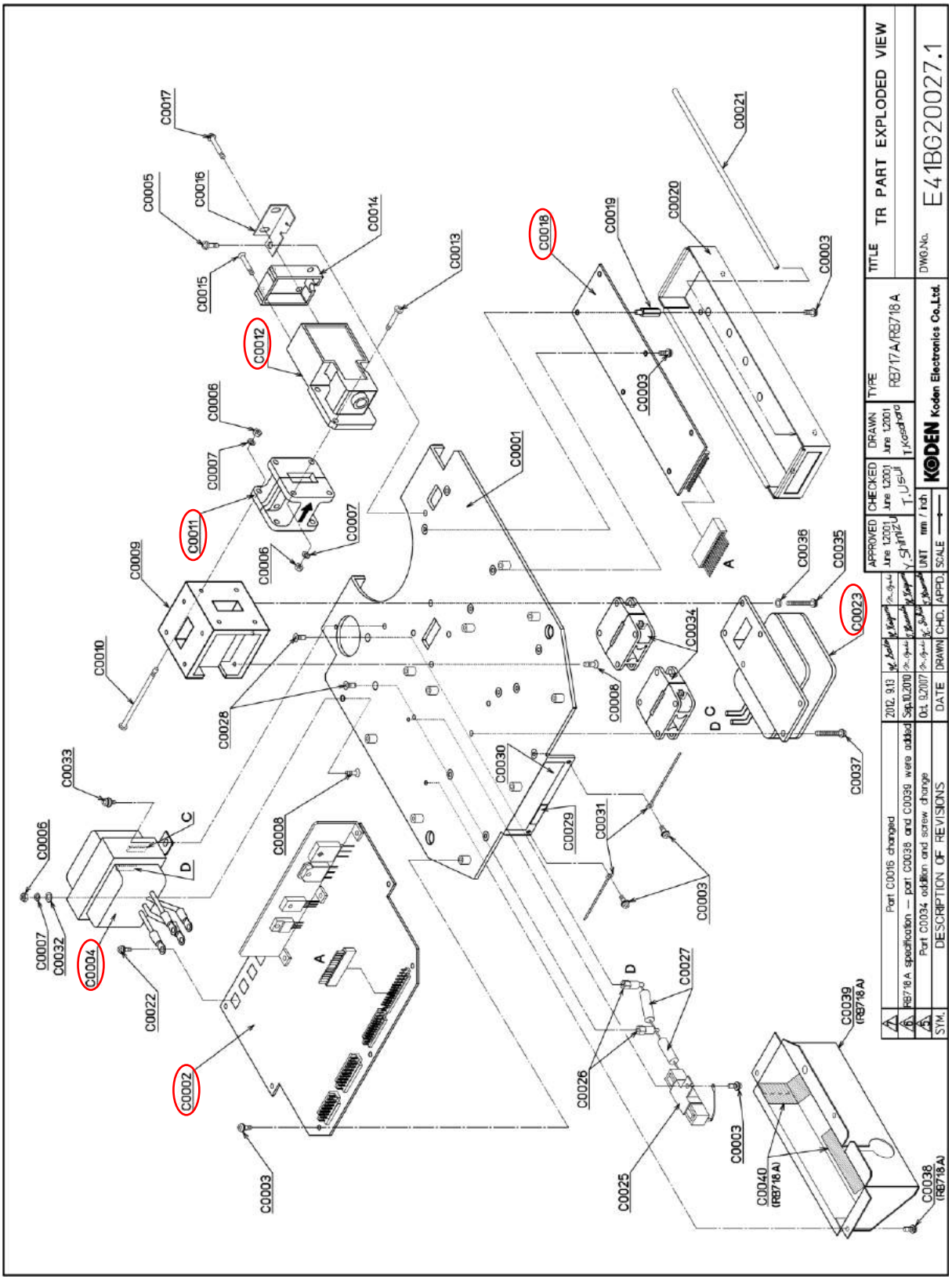
B0005
B3009
B3019
B0004
B0003
B3007
B3014
B0020
B0019
B0018
B3008
TITLE SCANNER BOX EXPLODED VIEW
TYPE RB716A /RB717A/RB718A /RB806
DWG.No. E41BG20015.1
KODEN Koden Electronics Co.,Ltd.
DRAWN Mar.13.2002
CHECKED Mar.13.2002
APPROVED Mar.13.2002
UNIT mm / inch
SCALE
APPD.
CHD.
DRAWN
DATE
DESCRIPTION OF REVISIONS
SYM.
Add RB806. Oct/7/2016
The omission parts 0021, 0022, and 0023 are added. Sep.25.2010


C0001
C0002
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C0004
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C0012
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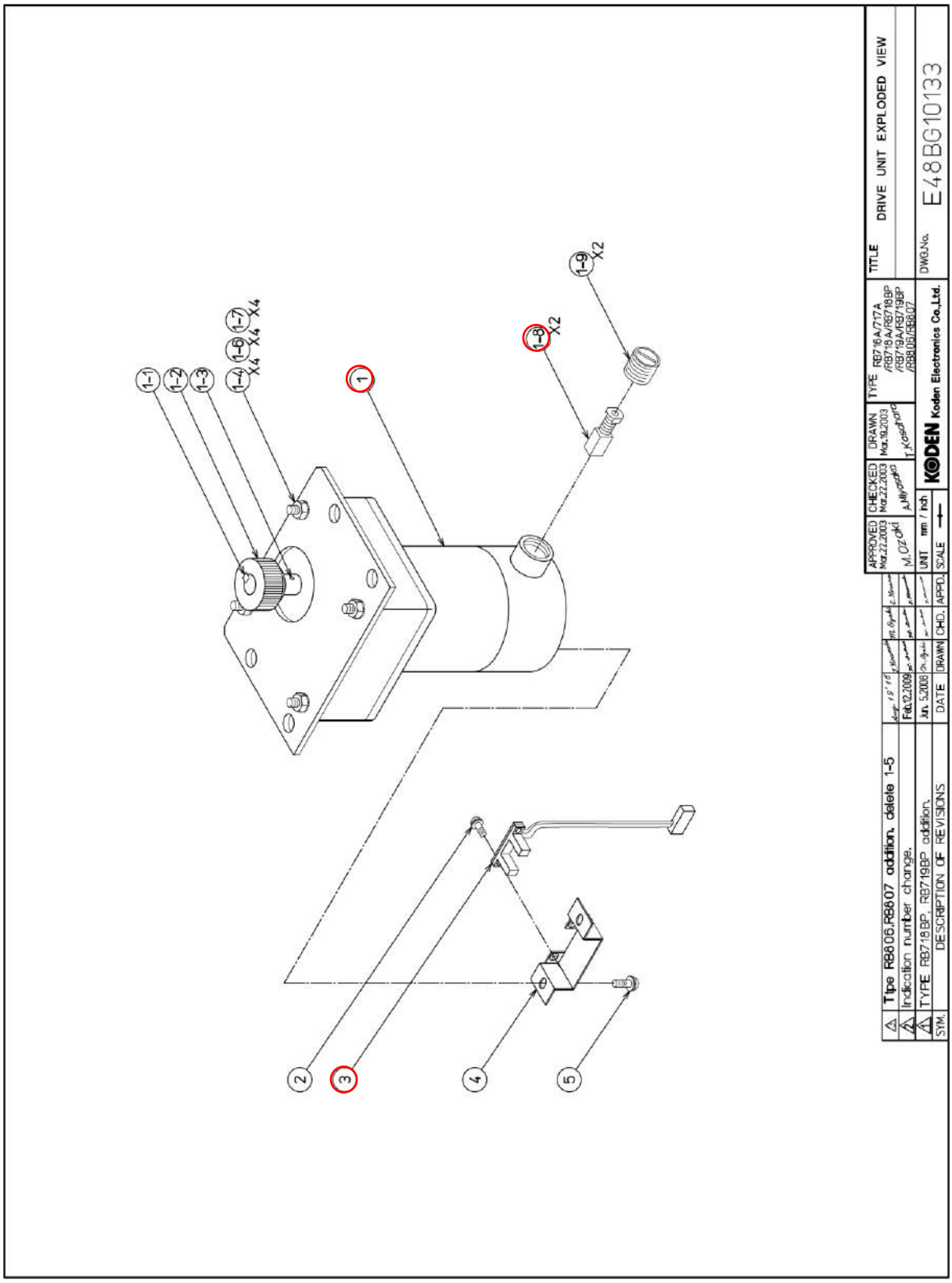
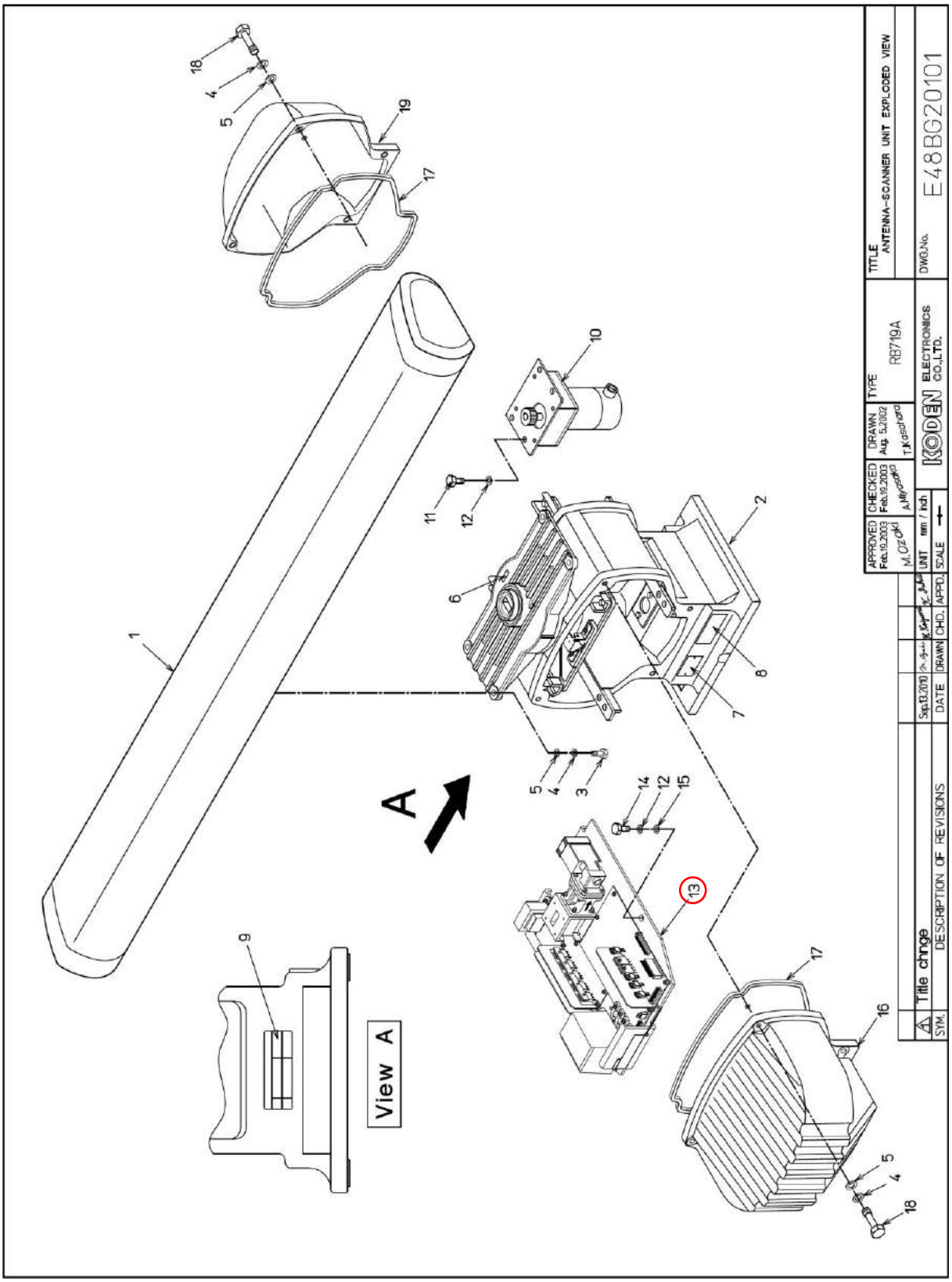
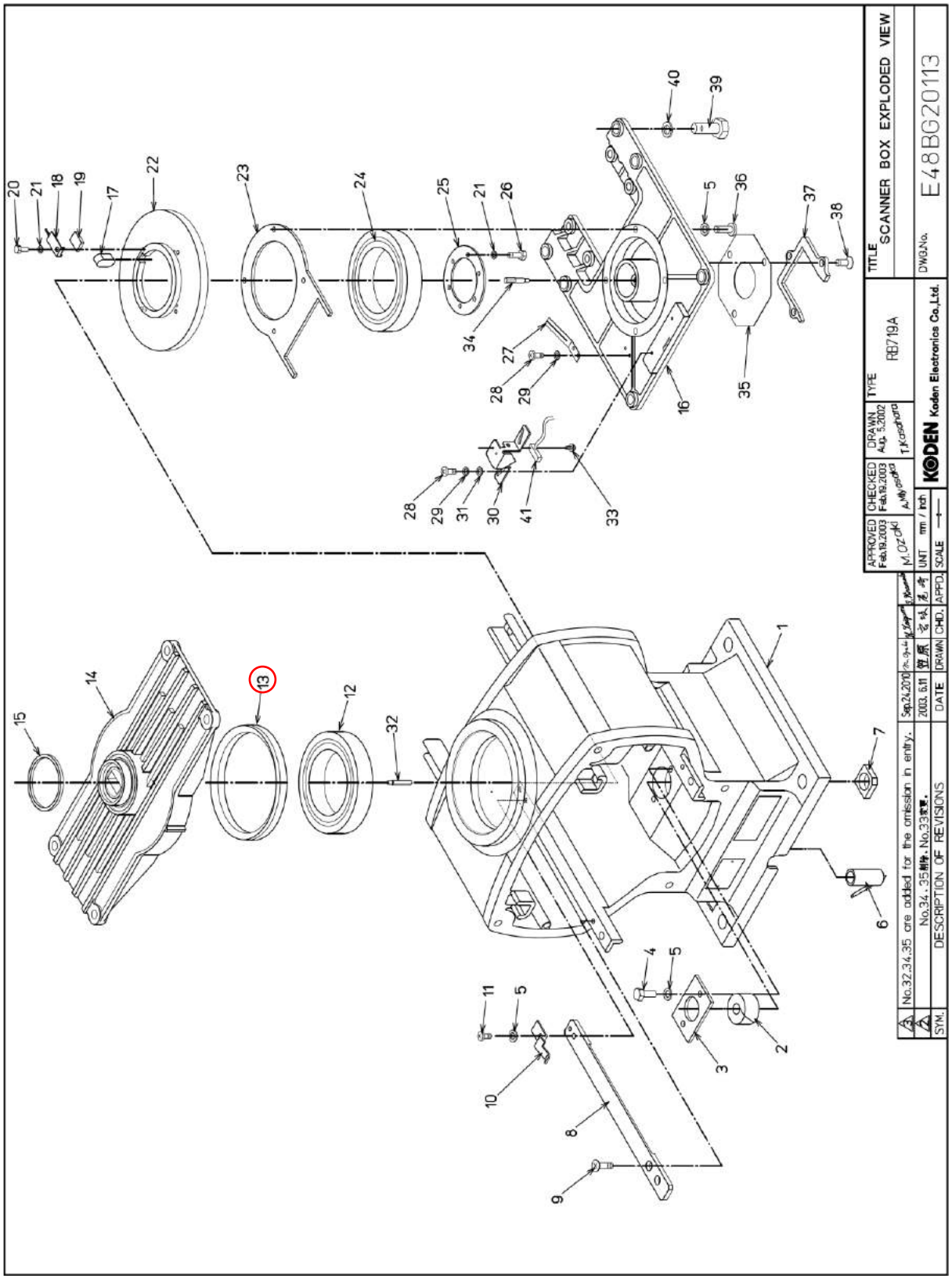
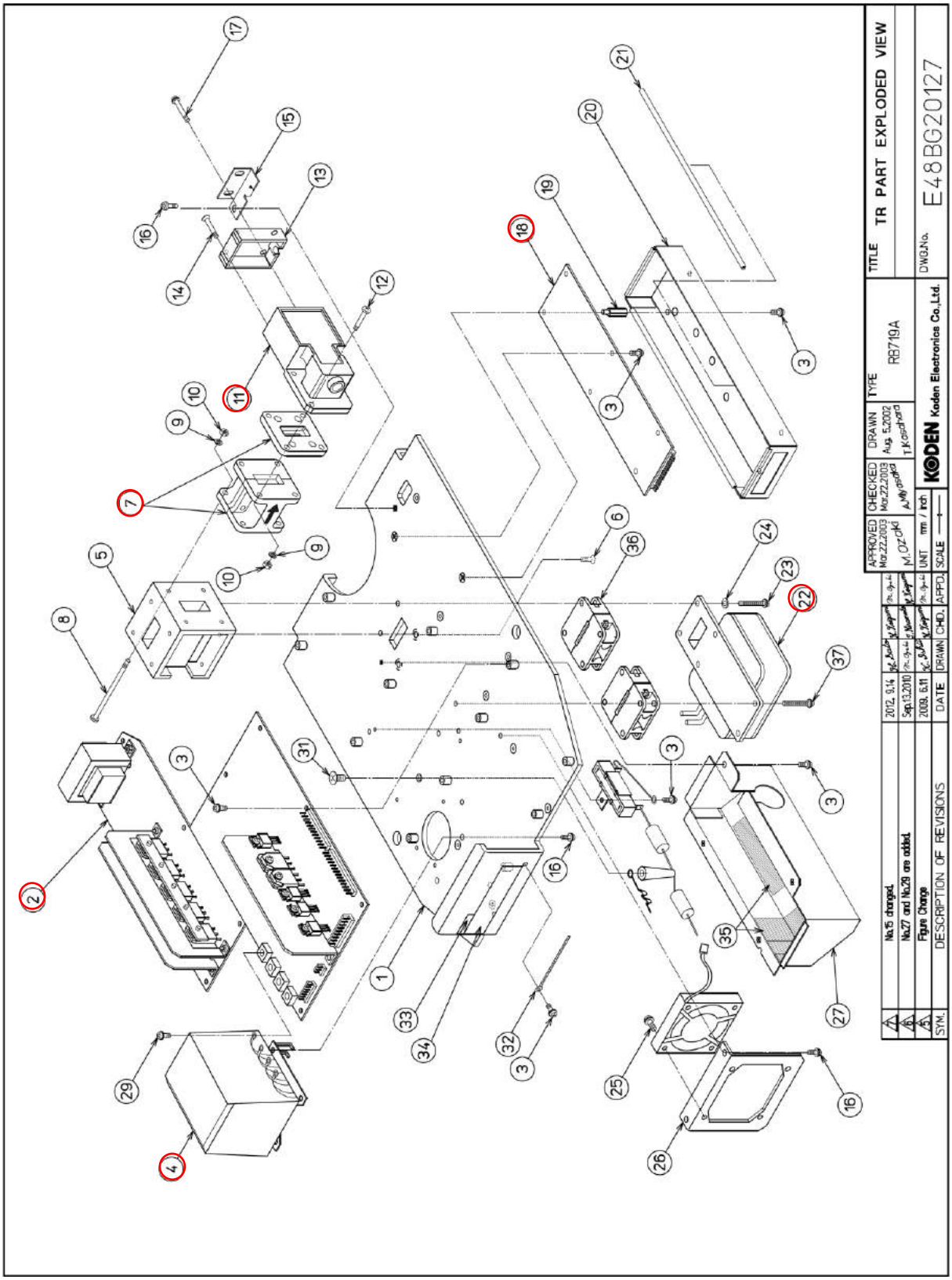
C0030
C0031
C0032
C0033
C0034
C0035
C0036
C0037
C0038 (RB718A)
C0039 (RB718A)
C0040 (RB718A)
TITLE TR PART EXPLODED VIEW
TYPE RB717A/RB718A
DWG.No. E41BG20027.1
KODEN Koden Electronics Co.,Ltd.
DESCRIPTION OF REVISIONS


1-1
1-2
1-3
1-4 X4
1-6 X4
1-7 X4
1
1-8 X2
1-9 X2
2
3
4
5
TITLE DRIVE UNIT EXPLODED VIEW
TYPE RB716A/717A /RB718A/RB718BP /RB719A/RB719BP /RB806/RB807
DWG.No. E48BG10133
DRAWN Mar.19.2003 T.Kashihara
CHECKED Mar.22.2003 A.Miyazaki
APPROVED Mar.22.2003 M.OZAKI
KODEN Koden Electronics Co.,Ltd.
UNIT mm / inch
SCALE
APPD.
CHD.
DRAWN
DATE
DESCRIPTION OF REVISIONS
SYM.
TYPE RB718BP, RB719BP addition. Jan. 5.2008
Indication number change. Feb.12.2009
Type RB806,RB807 addition, delete 1-5


A
View A
TITLE
ANTENNA-SCANNER UNIT EXPLODED VIEW
DWG.No.
E48BG20101
TYPE
RB719A
DRAWN
CHECKED
APPROVED
SCALE
UNIT
mm / inch
Title chnge
DESCRIPTION OF REVISIONS
DATE
SYM.
ELECTRONICS CO.,LTD.


TITLE SCANNER BOX EXPLODED VIEW
DWG.No. E48BG20113
TYPE RB719A
KODEN Koden Electronics Co.,Ltd.
DRAWN Aug.5.2002
CHECKED Feb.19.2003
APPROVED Feb.19.2003
No.32,34,35 are added for the omission in entry. Sep.24.2010
No.34,35 No.33 2003.6.11
SYM. DESCRIPTION OF REVISIONS DATE DRAWN CHKD. APPD.
UNIT mm / inch SCALE


TITLE TR PART EXPLODED VIEW
DWG.No. E48BG20127
TYPE RB719A
KODEN Koden Electronics Co.,Ltd.
APPROVED CHECKED DRAWN
UNIT mm / inch
SCALE
No.5 changed. 2012. 9.14
No.27 and No.29 are added. Sep.13.2010
Figure Change 2009. 6.11
SYM. DESCRIPTION OF REVISIONS DATE DRAWN CHKD. APPD.

4.2 Circuit diagram

Inter connection diagram of Scanner unit

Model	Scanner Unit	Drawing No.	page
MDC-5004/5204/5504	RB806 (4 kW)	E38CGB010*	4-35
MDC-5006/5206/5506/7006/7906	RB807 (6 kW)	E71CFA110*	4-37
MDC-5012/5212/5512/7012/7912	RB808 (12 kW)	E61CGB004*	4-39
MDC-7012P/7912P	RB808P (12 kW)	E61CGB003*	4-40
MDC-5025/5225/5525/7025/7925	RB809 (25 kW)	E62CGB004*	4-41
MDC-7025P/7925P	RB809P (25 kW)	E62CGB003*	4-42
MDC-5240/5540	RB716A (4 kW)	E38CGB010*	4-36
MDC-5060/5260/5560/7060/7960	RB717A (6 kW)	E41CGB011*	4-38
MDC-5010/5210/5510/7010/7910	RB718A (12 kW)	E41CGB011*	4-38
MDC-5020/5220/5520/7020/7920	RB719A (25 kW)	E48CGB004*	4-43

Inter connection diagram

Model	Unit	Drawing No.	page
MDC-7906/7912(P)/7925(P)/7960/7910/7920	MRD-108(P)	E63CGB002*	4-44
MDC-7006/7012(P)/7025(P)/7060/7010/7020	MRM-108(P)	E63CGB003*	4-45
MDC-5204/5206/5212/5225/5240/5260/5210/5220	MRD-111	E68CGB003*	4-46
MDC-5504/5506/5512/5525/5540/5560/5510/5520	MRD-109	E69CGB002*	4-47
MDC-5004/5006/5012/5025/5060/5010/5020	MRM-110	E73CGB002*	4-48

*Subject to version change

Circuit diagram

(MDC-7000(P)/7900(P))

Name	PCB ASSY	Drawing No.	page
Power PCB	E63-600*	E63-600*	4-49,50
BACK LIGHT POWER PCB	E63-610* (MRD-108(P))	E63-610*	4-51
CONNECTOR PCB	E63-911*	E63CGB911*	4-55
PANEL BOARD	E63-900*	E63CGB900*	4-52

Circuit diagram

(MDC-5000)

Name	PCB ASSY	Drawing No.	page
Power PCB	E63-600*	E63-600*	4-49,50
CONNECTOR PCB	E63-911*	E63CGB911*	4-55
PANEL BOARD	E73-900*	E73CGB900*	4-54

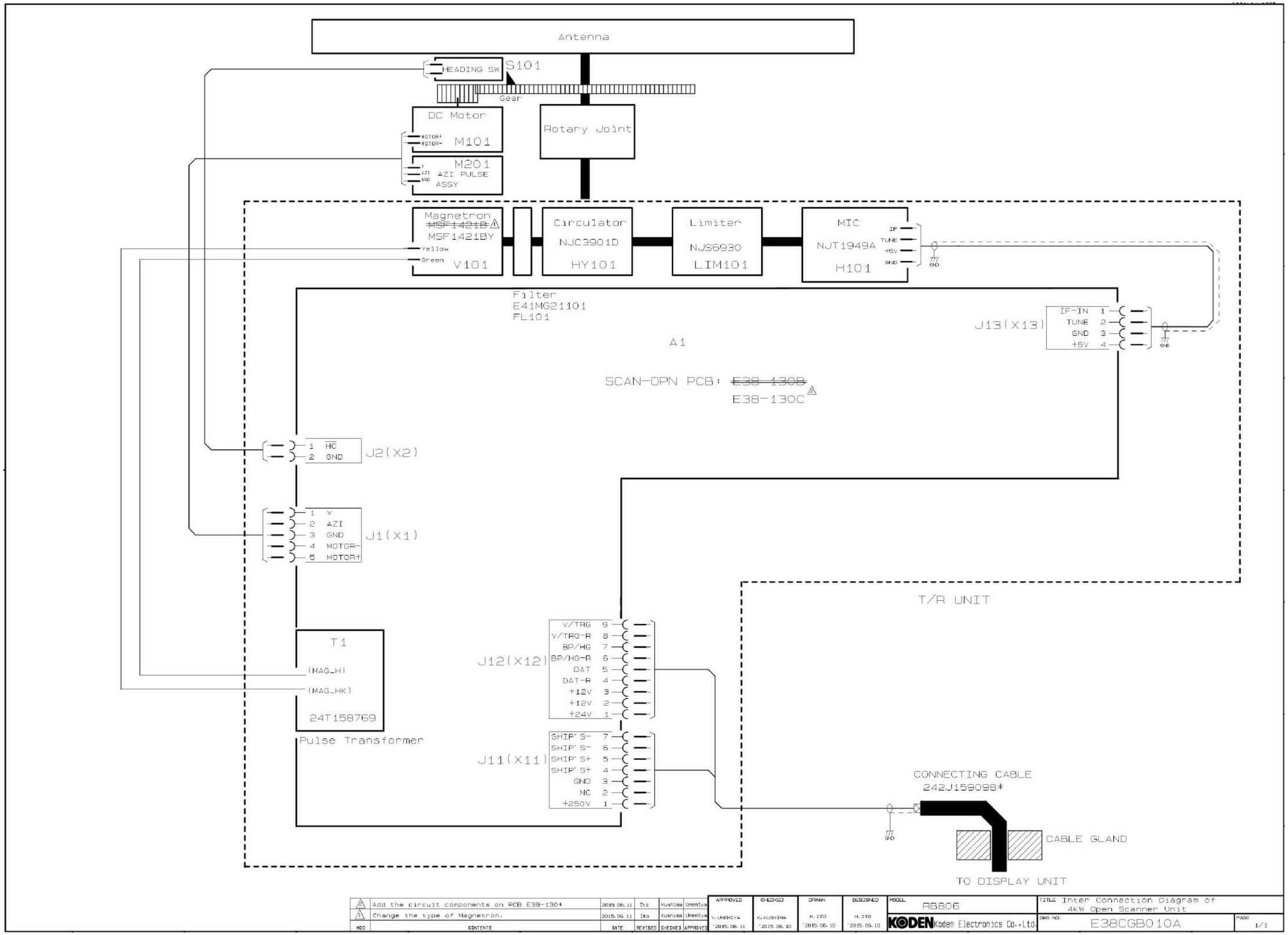
Circuit diagram

(MDC-5200/5500)

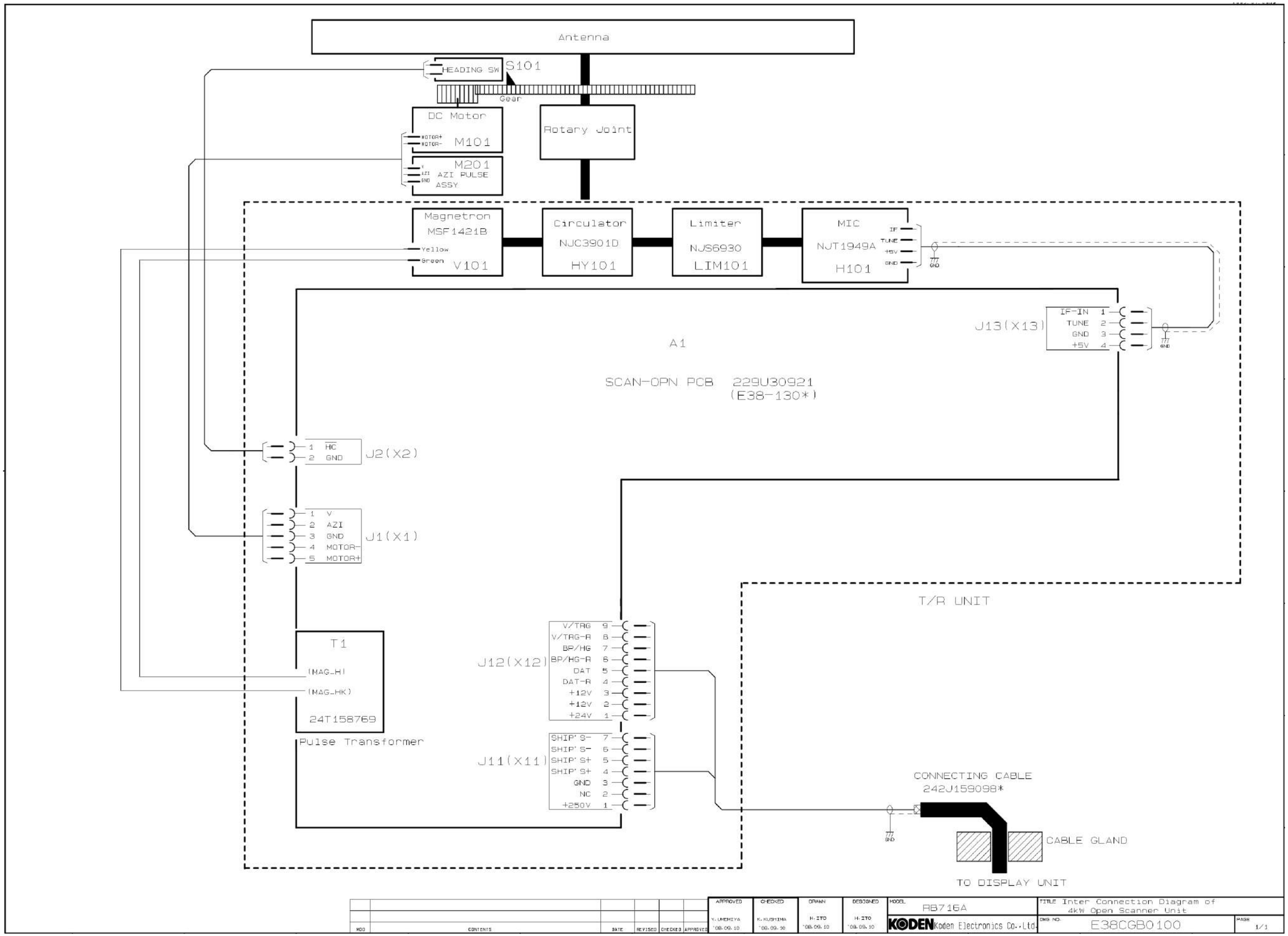
Name	PCB ASSY	Drawing No.	page
Power PCB	E63-600*	E63-600*	4-49,50
CONNECTOR PCB	E68-910*	E68CGB910*	4-56
PANEL BOARD	E63-900* (MRO-108) E68-900* (MRD-111)	E63CGB900* E68CGB900*	4-52 4-53

*Subject to version change

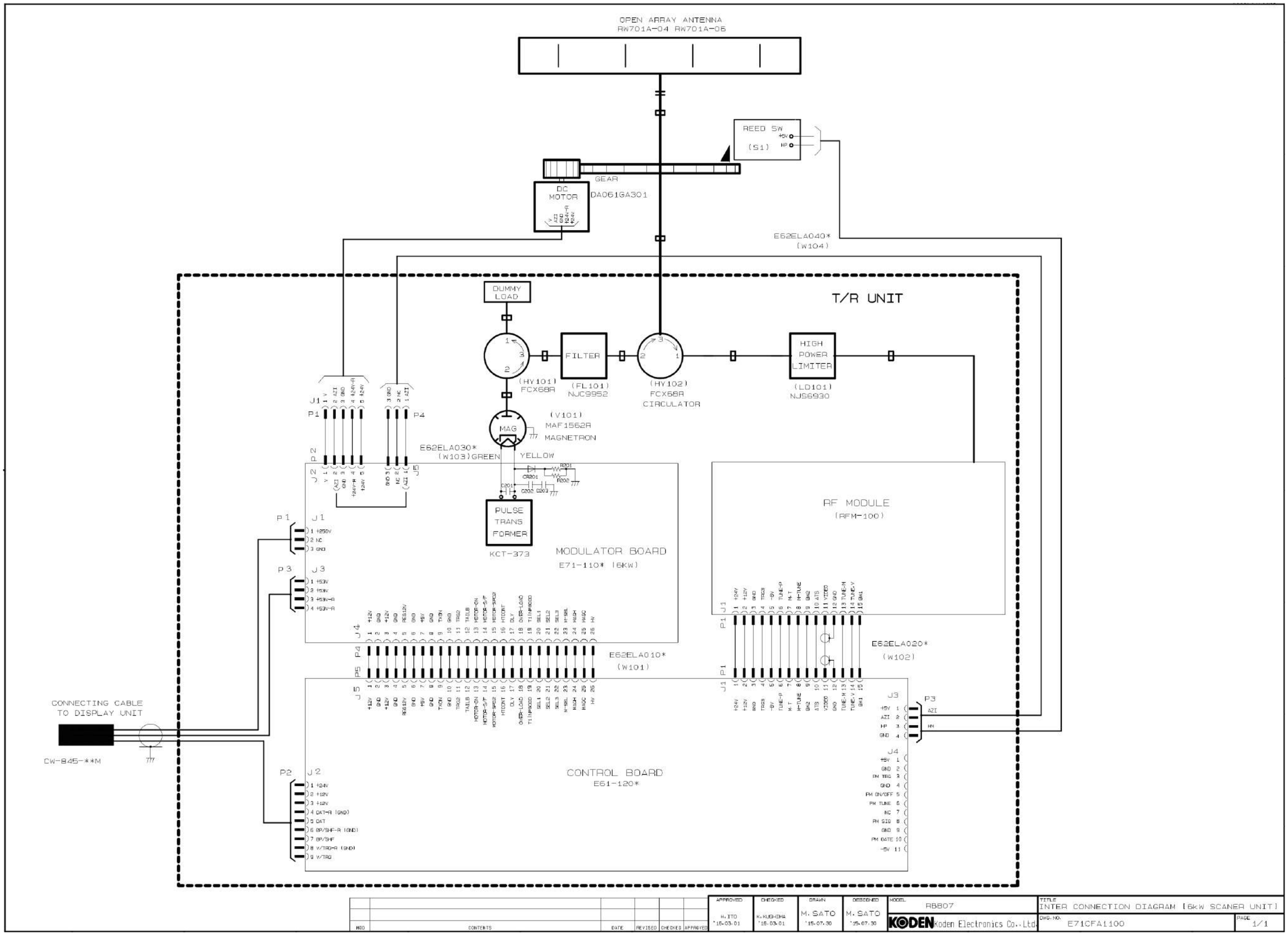
4.2.1 Interconnection diagam of 4kW Scanner Unit (RB806)



4.2.2 Interconnection diagam of 4 kW Scanner Unit (RB716A)



4.2.3 Interconnection diagam of 6 kW Scanner Unit (RB807)

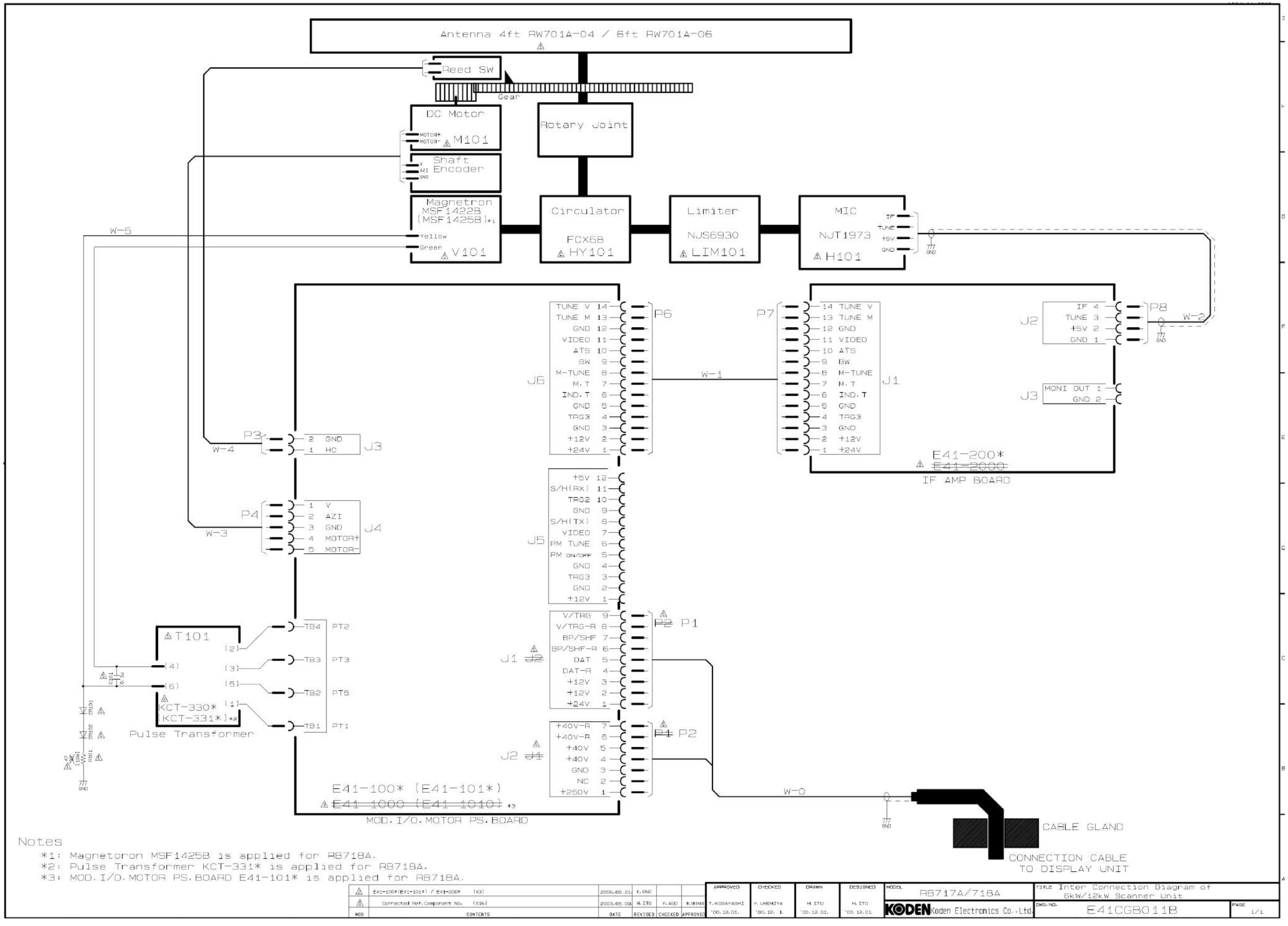


NO	CONTENTS	DATE	REVISED	CHECKED	APPROVED

APPROVED	CHECKED	DRAWN	DESIGNED	MODEL	TITLE
H.ITO '15.03.01	K.KUGIMA '15.03.01	M.SATO '15.07.30	M.SATO '15.07.30	RB807	INTER CONNECTION DIAGRAM (6kW SCANER UNIT)

KODEN Koden Electronics Co.,Ltd. DWG.NO. E71CFA1100 PAGE 1/1

4.2.4 Interconnection diagam of 6 kW/12 kW Scanner Unit (RB717A/718A)



Notes

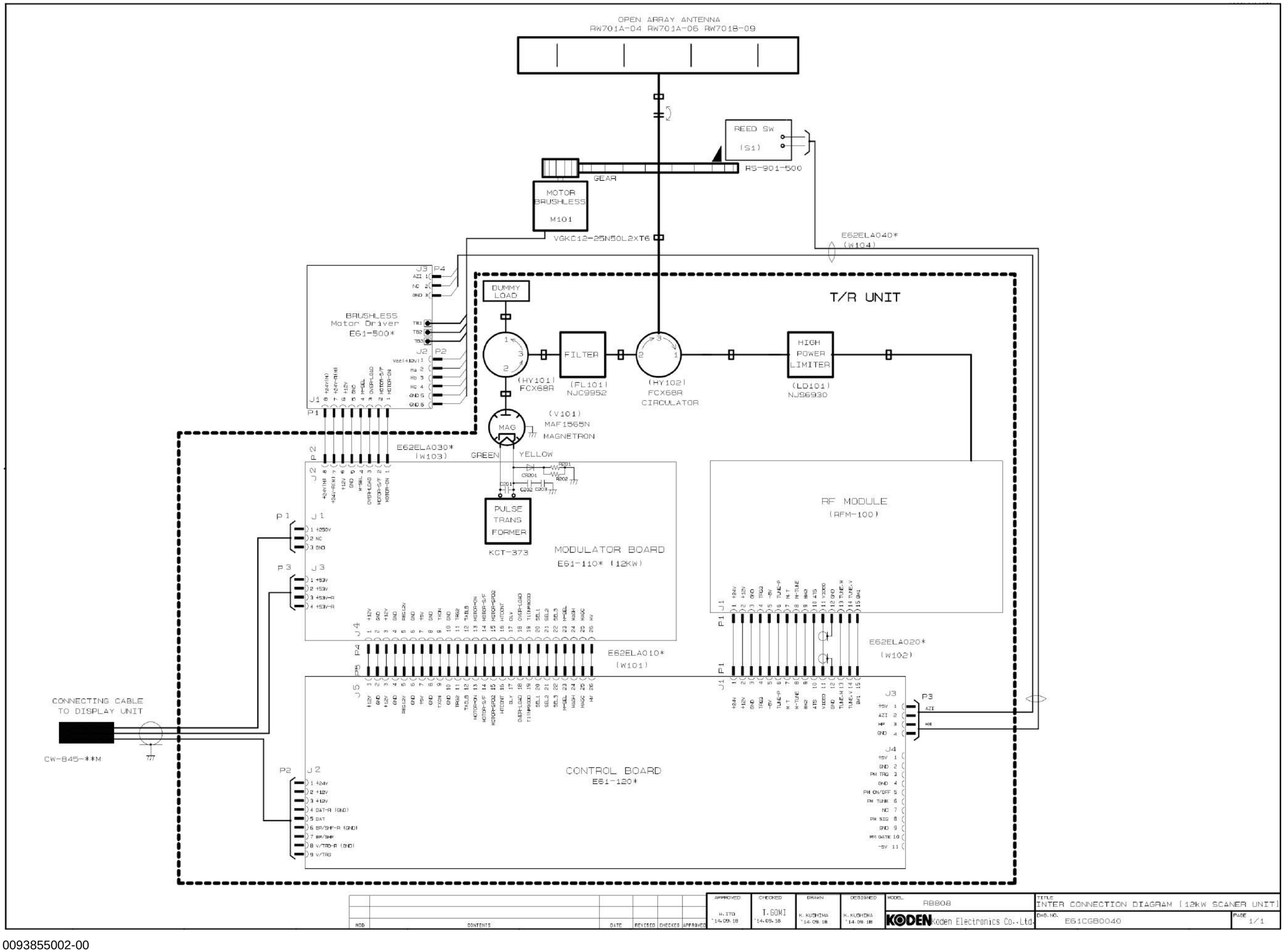
*1: Magnetoron MSF1425B is applied for RB718A.
2: Pulse Transformer KCT-331 is applied for RB718A.
3: MOD. I/O. MOTOR PS. BOARD E41-101 is applied for RB718A.

MOD	CONTENTS	DATE	REVISED	CHECKED	APPROVED
A	E41-100*(E41-101*) / E41-200* (X3)	2006.08.21	K.ONO		
A	Corrected Ref.Component No. (X16)	2003.05.09	H.ITO	Y.ABO	H.NIHEI

APPROVED	CHECKED	DRAWN	DESIGNED	MODEL	TITLE
T.KOBAYASHI '00.12.01.	Y.UMEMIYA '00.12. 1.	H.ITO '00.12.01.	H.ITO '00.12.01.	RB717A/718A	Inter Connection Diagram of 6kW/12kW Scanner Unit

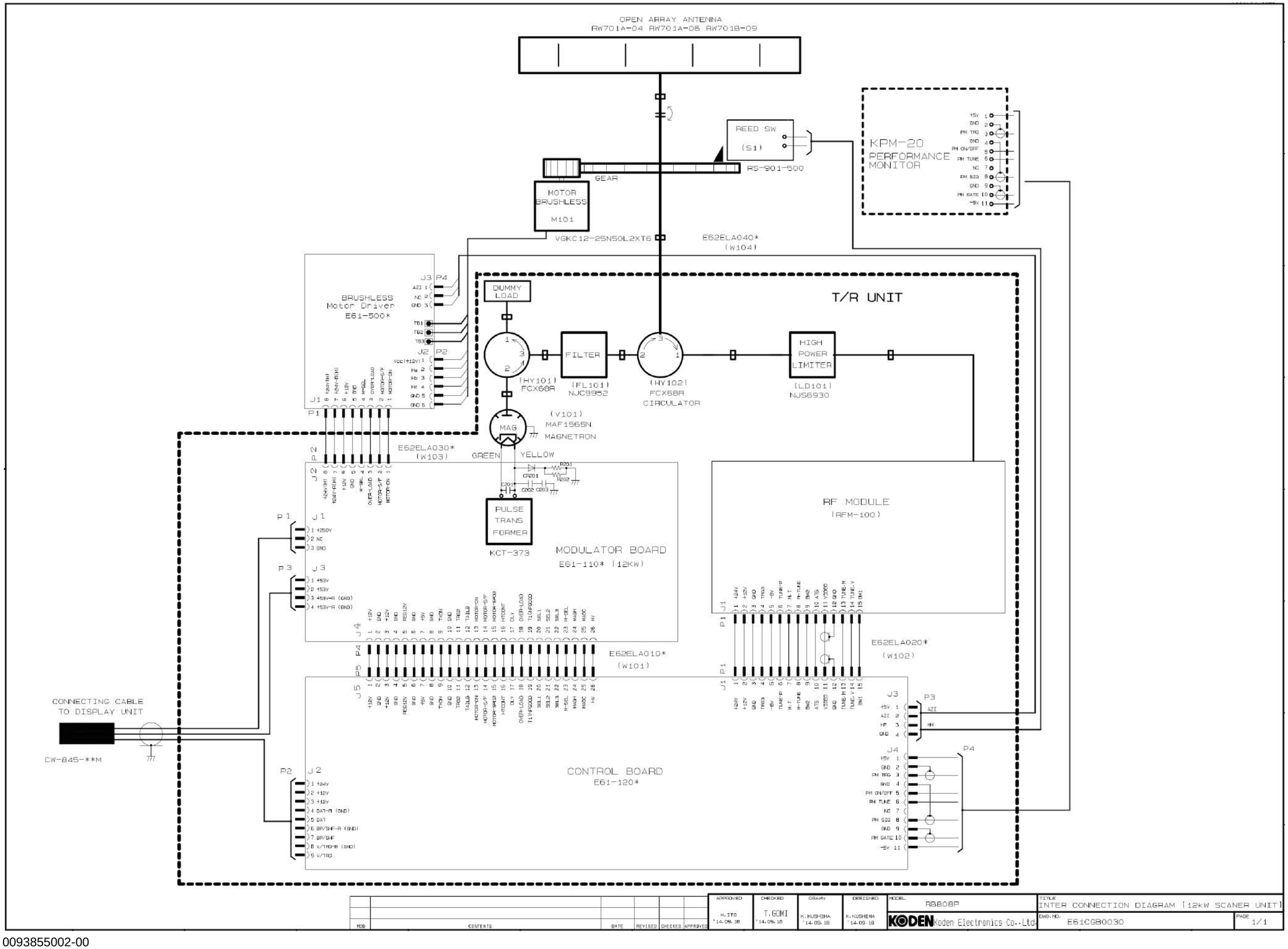
KODEN Koden Electronics Co.,Ltd. DWG-NO. E41CGB011B PAGE 1/1

4.2.5 Interconnection diagam of 12 kW Scanner Unit (RB808)



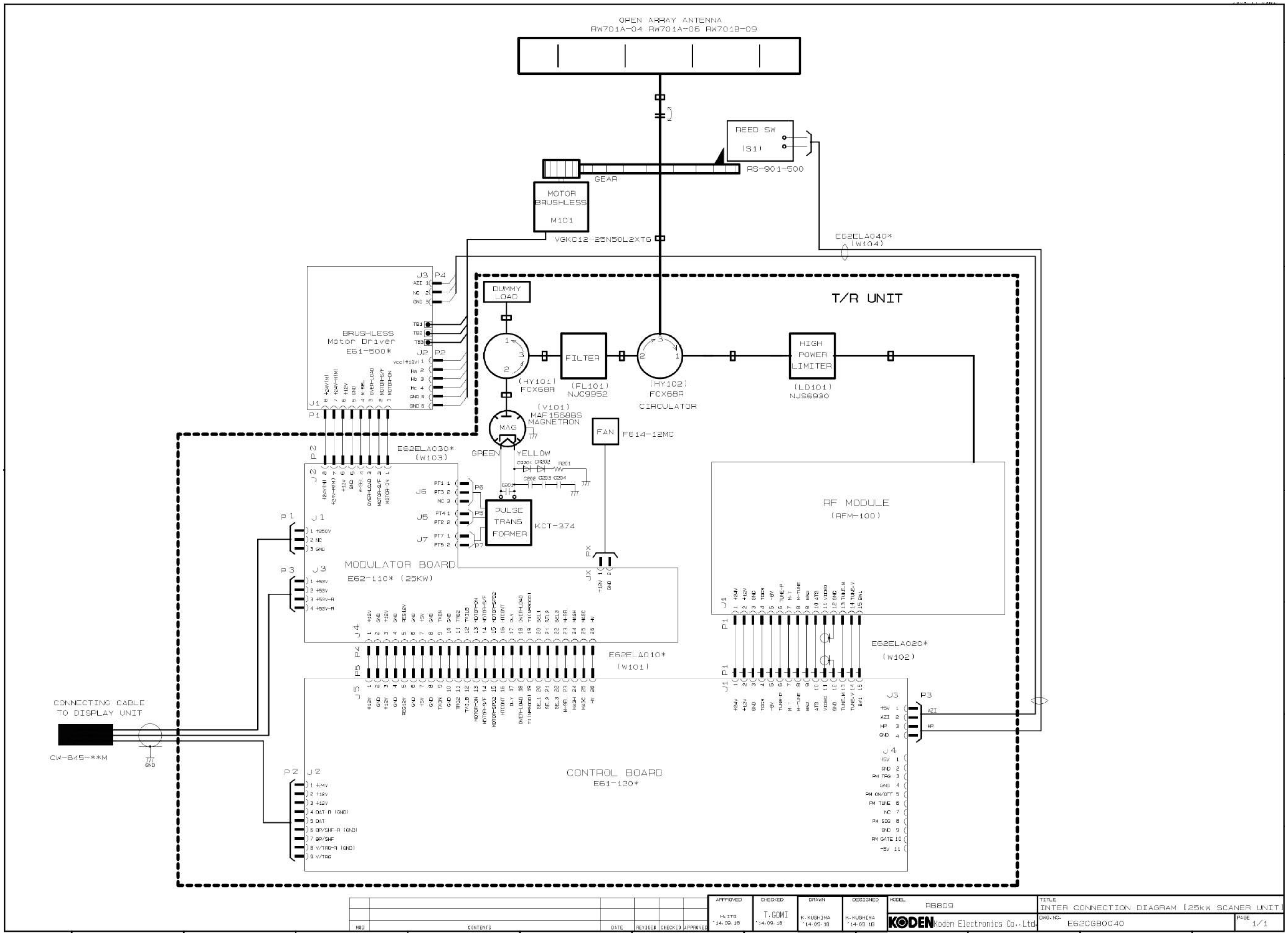
NOD	CONTENTS	DATE	REVISED	CHECKED	APPROVED	APPROVED	CHECKED	DRAWN	DESIGNED	MODEL	TITLE
						H.ITO '14.09.18	T.GOMI '14.09.18	K.KUSHIMA '14.09.18	K.KUSHIMA '14.09.18	RB808	INTER CONNECTION DIAGRAM (12kW SCANER UNIT)
						KODEN Koden Electronics Co.,Ltd.				DWG.NO. E61CGB0040	PAGE 1/1

4.2.6 Interconnection diagam of 12 kW Scanner Unit (RB808P)

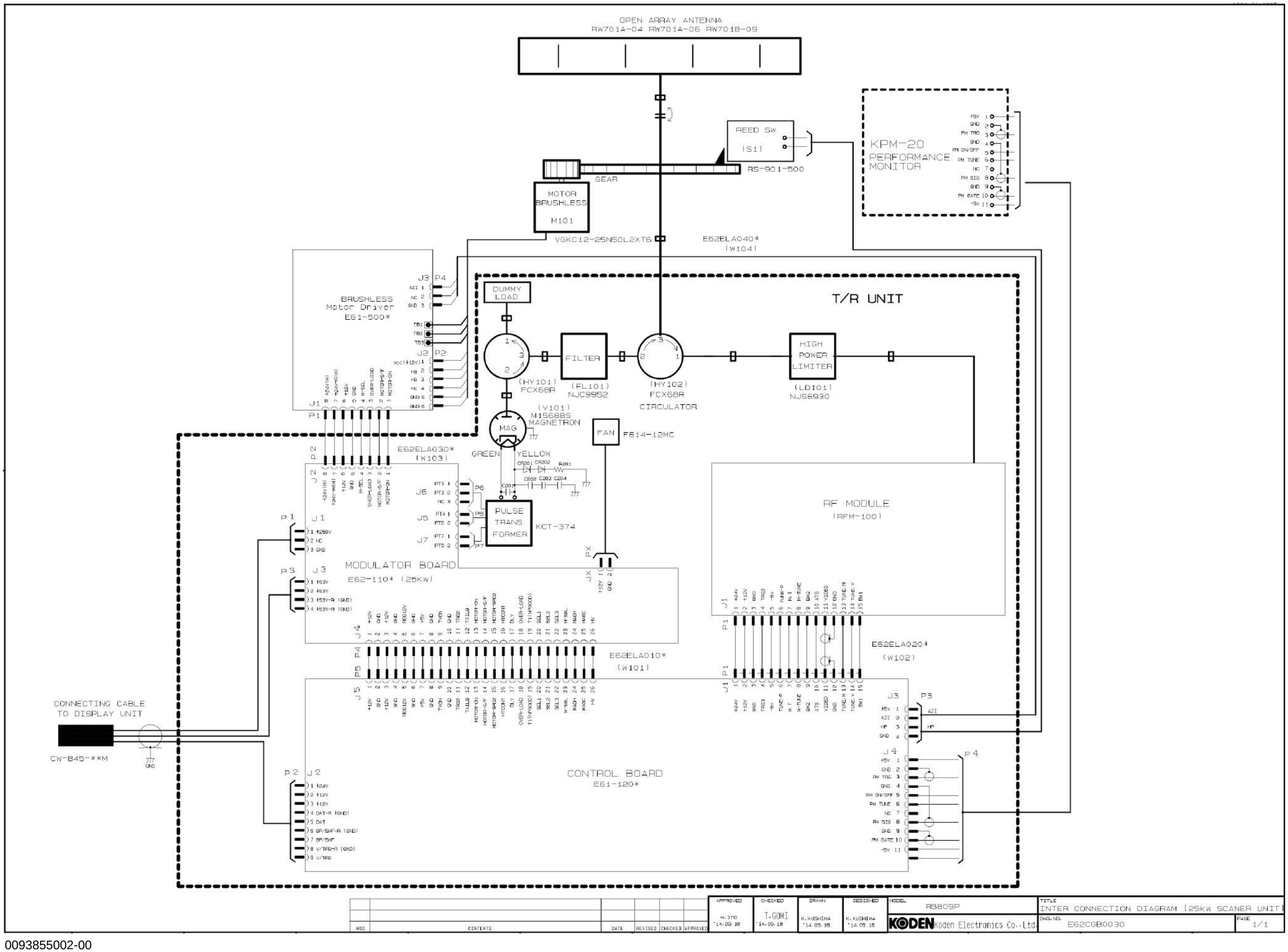


APPROVED	CHECKED	DRAWN	DESIGNED	MODEL	TITLE
H.ITO '14.09.30	T.GOMI '14.09.18	K.KUSHIMA '14.09.18	K.KUSHIMA '14.09.18	RB808P	INTER CONNECTION DIAGRAM (12kW SCANER UNIT)
KODEN Koden Electronics Co.,Ltd.				DWG.NO. E61CGB0030	PAGE 1/1

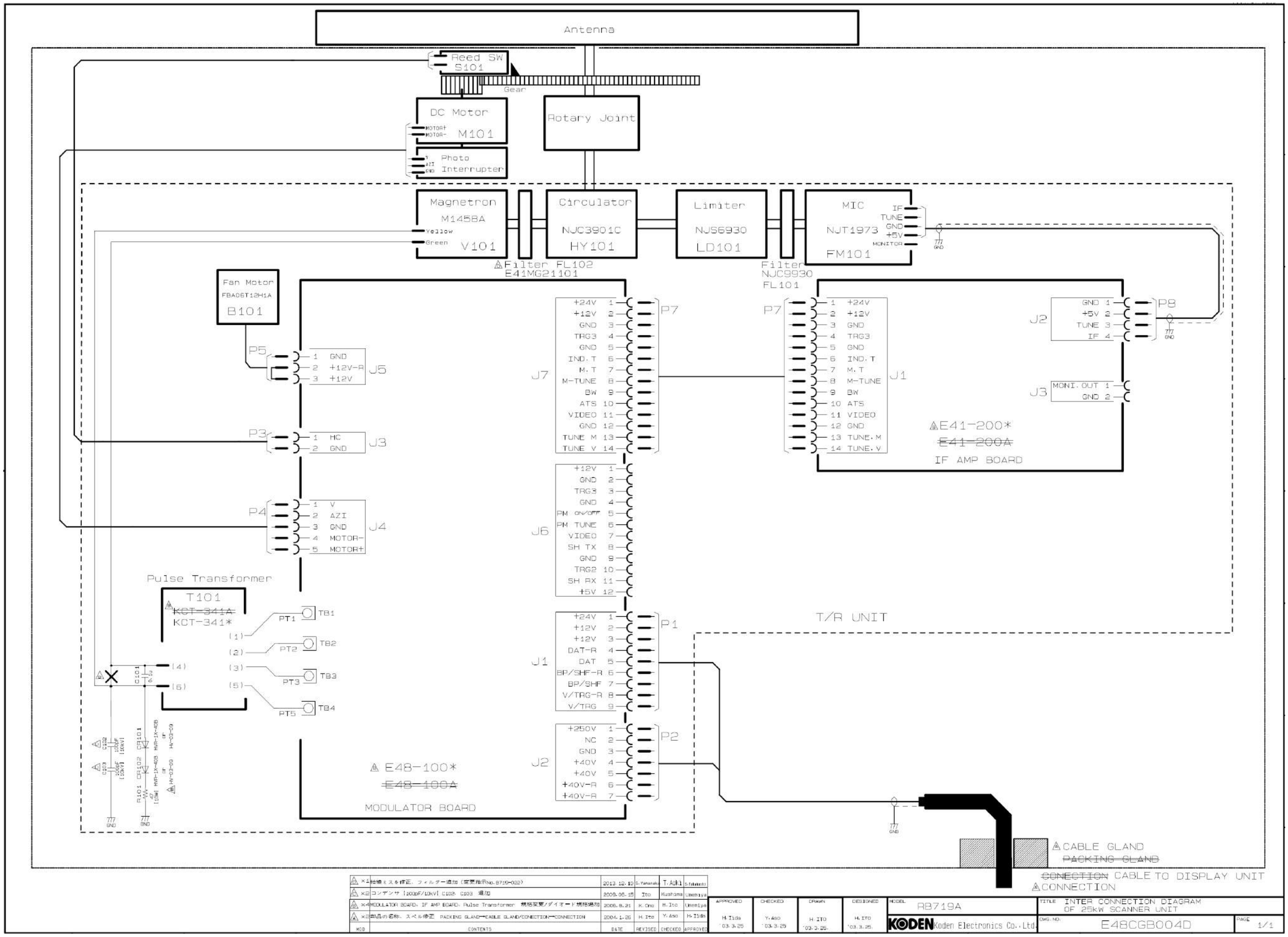
4.2.7 Interconnection diagam of 25 kW Scanner Unit (RB809)



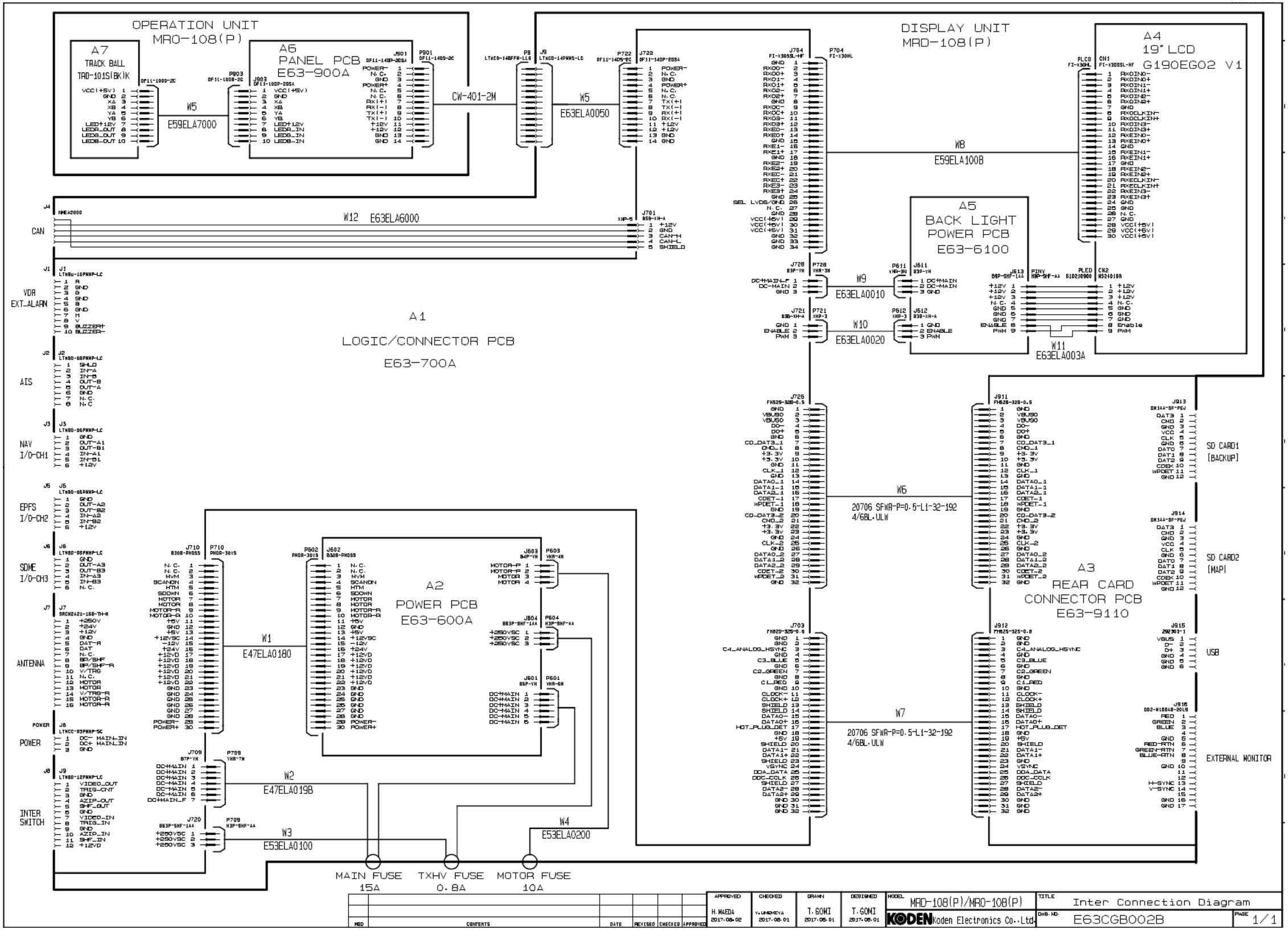
4.2.8 Interconnection diagam of 25 kW Scanner Unit (RB809P)



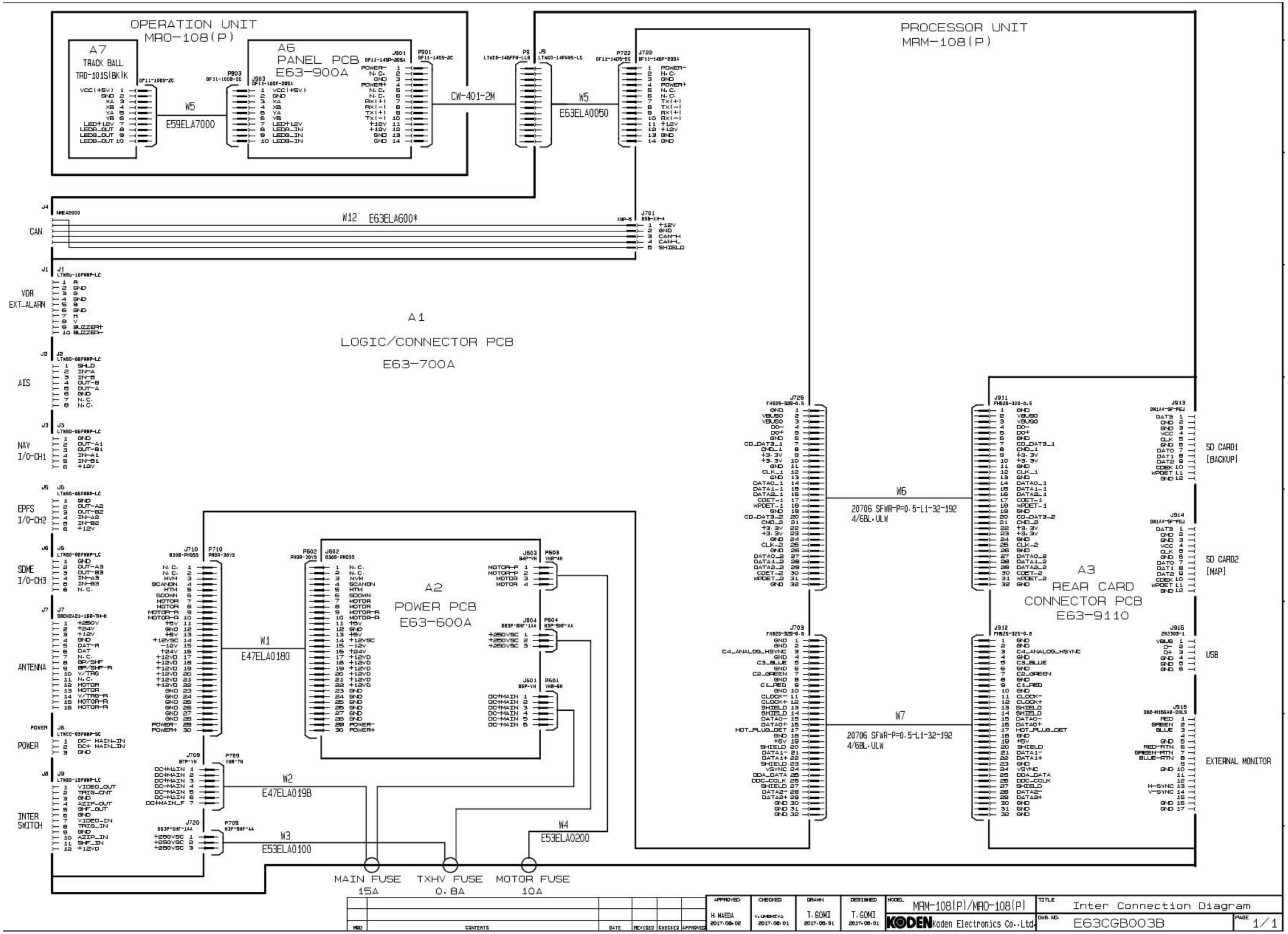
4.2.9 Interconnection diagram of 25 kW Scanner Unit (RB719A)



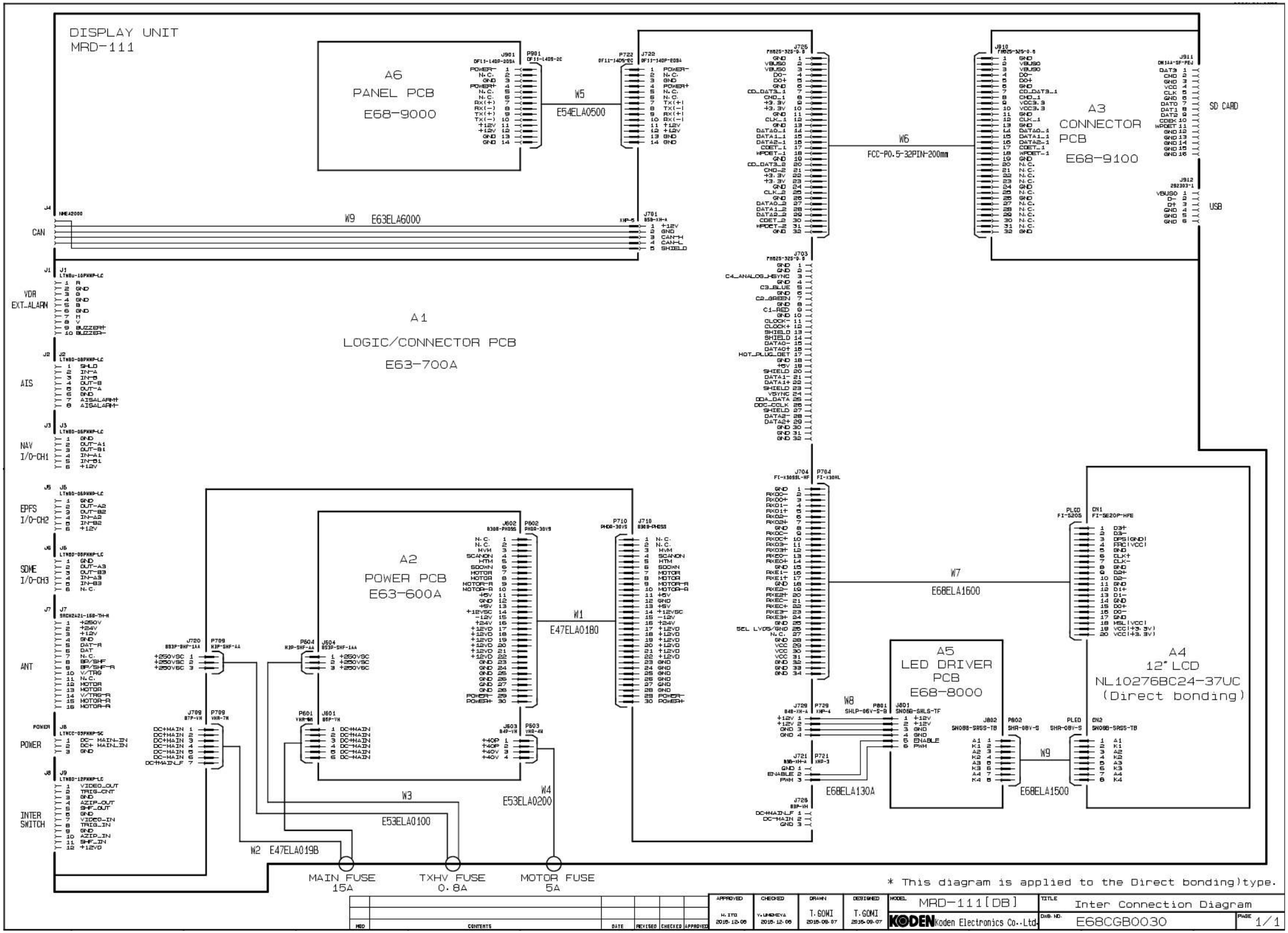
4.2.10 Inter connection diagram MRD-108/MRD-108P



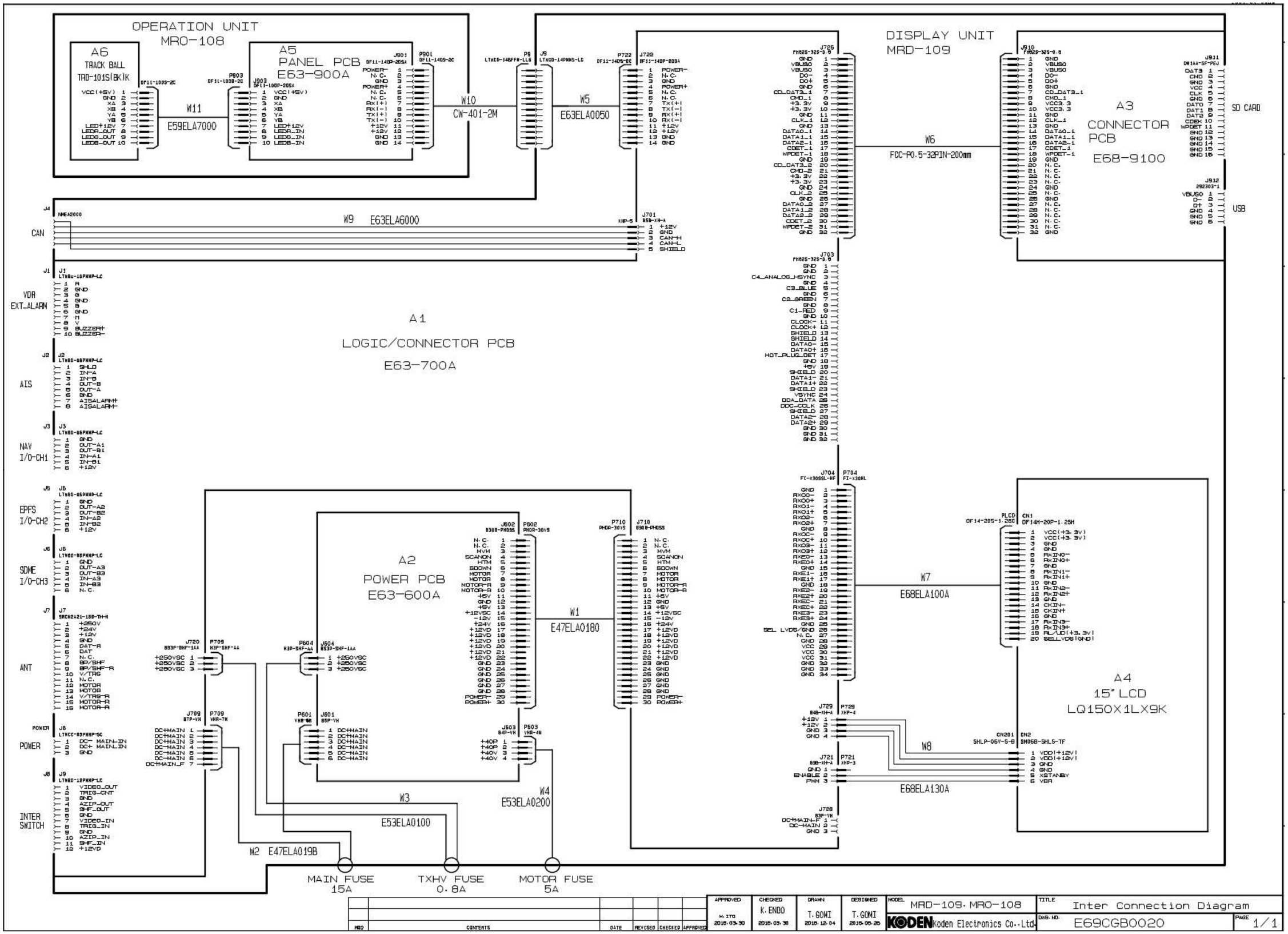
4.2.11 Inter connection diagram MRM-108/MRM-108P



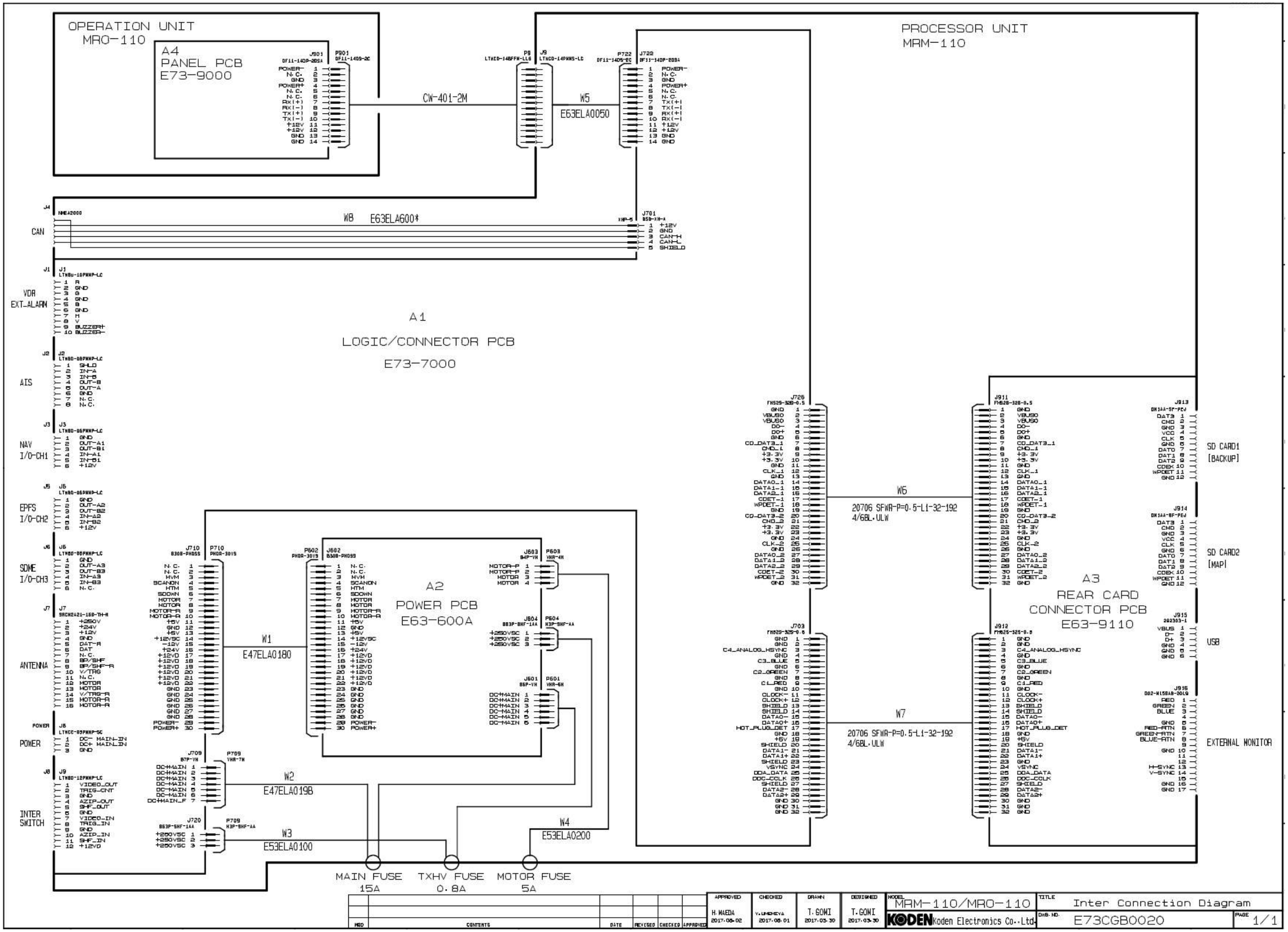
4.2.12 Inter connection diagram MRD-111



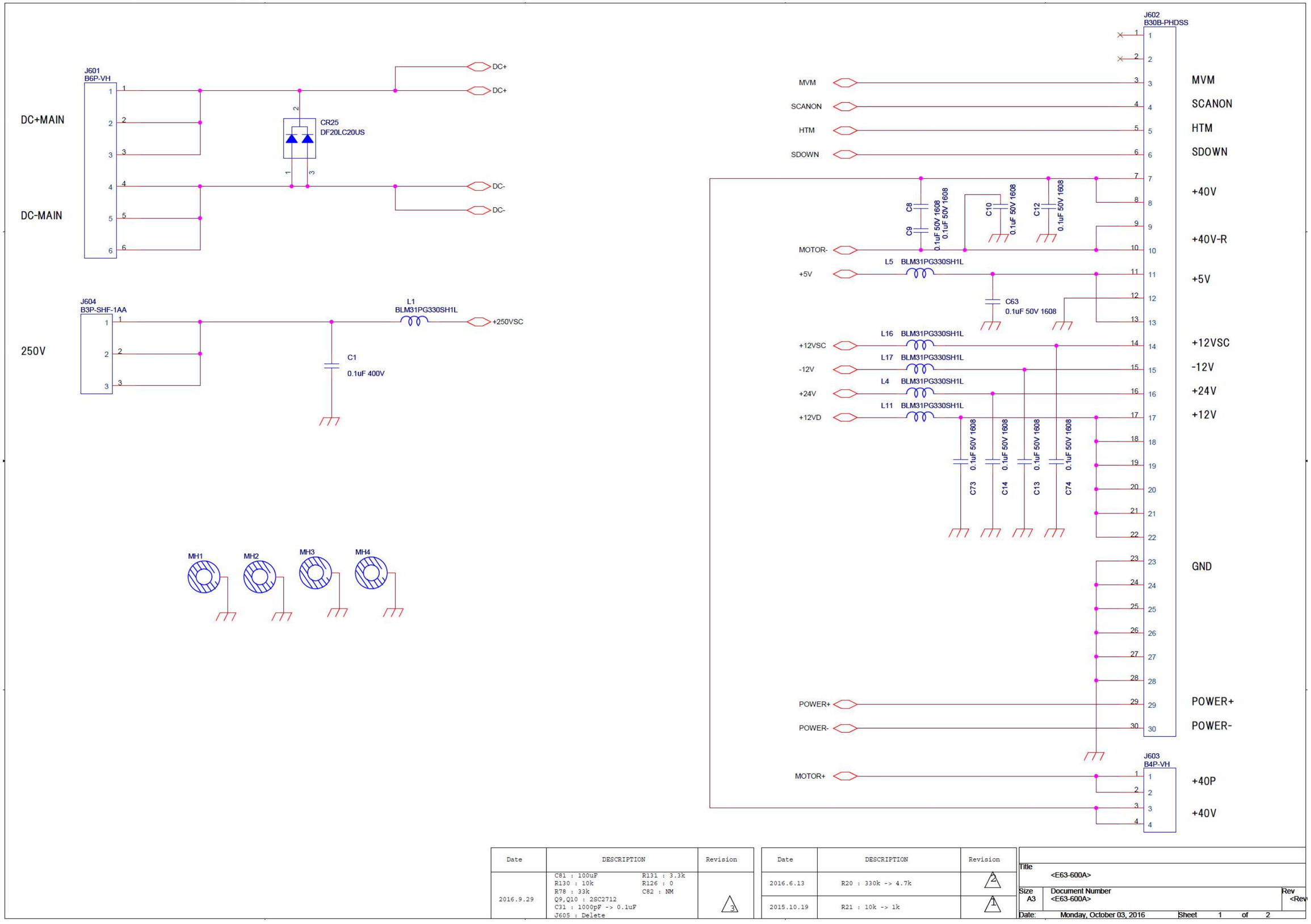
4.2.13 Inter connection diagram MRD-109



4.2.14 Inter connection diagram MRM-110



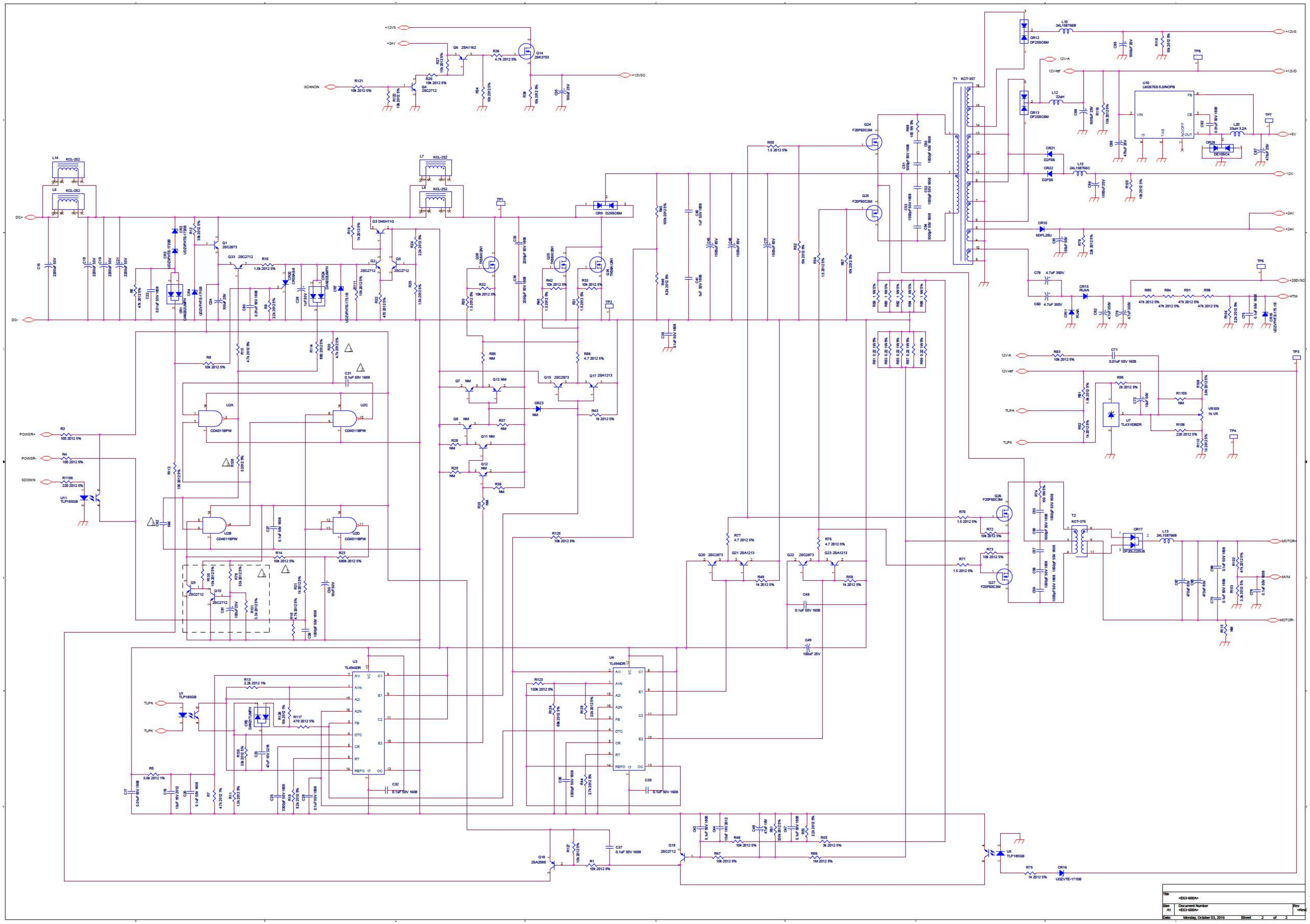
4.2.15 Circuit diagram Power supply PCB



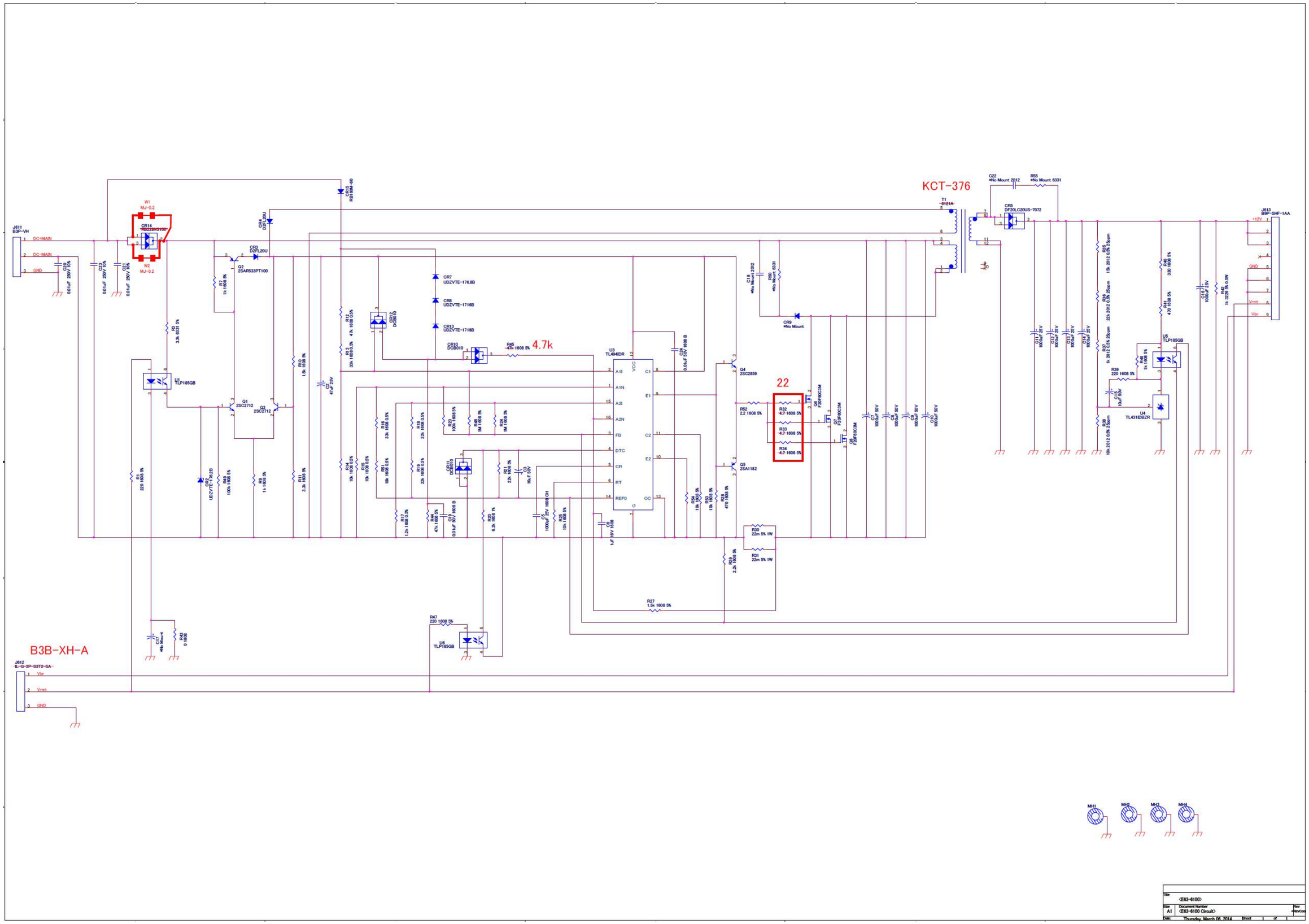
Date	DESCRIPTION	Revision
2016.9.29	C81 : 100uF R130 : 10k R78 : 33k Q9,Q10 : 2SC2712 C31 : 1000pF -> 0.1uF J605 : Delete R131 : 3.3k R126 : 0 C82 : NM	3

Date	DESCRIPTION	Revision
2016.6.13	R20 : 330k -> 4.7k	2
2015.10.19	R21 : 10k -> 1k	1

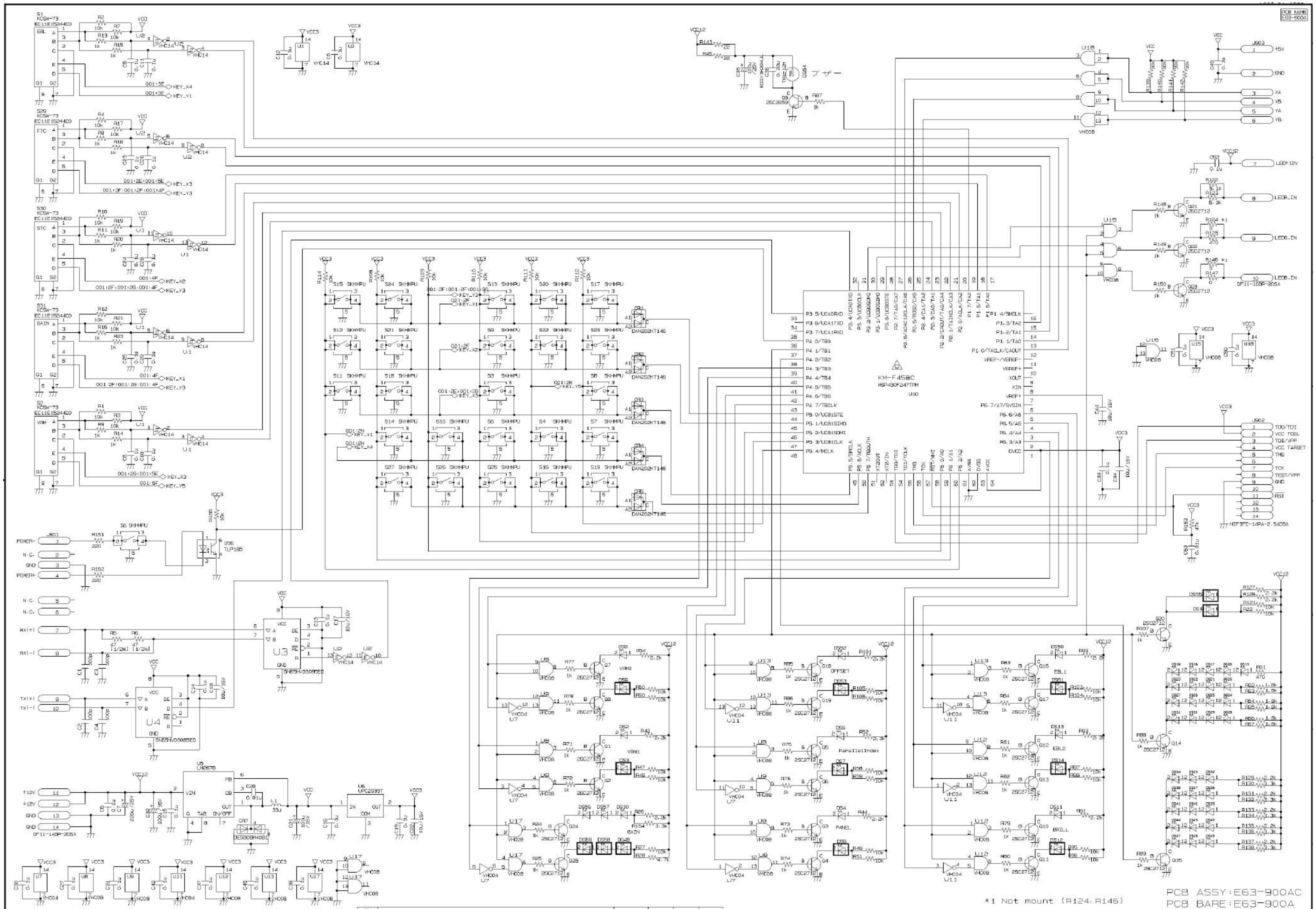
Title <E63-600A>
Size A3 | Document Number <E63-600A> | Rev <Rev
Date: Monday, October 03, 2016 | Sheet 1 of 2


+12VS
+24V
Q6 2SA1162
R36 4.7k 2012 5%
Q14 2SK3703
+12VSC
SCANON
R121 10k 2012 5%
Q4 2SC2712
L14 KCL-252
L6 KCL-252
L7 KCL-252
L8 KCL-252
DC+
DC-
Q1 2SC2873
Q33 2SC2712
Q3 D45H11G
Q2 2SC2712
Q5 2SC2712
CR9 D25SC6M
Q36 TK56A12N1
Q35 TK56A12N1
Q34 TK56A12N1
TP1
TP2
Q15 2SC2873
Q17 2SA1213
U2A CD4011BPW
U2B CD4011BPW
U2C CD4011BPW
U2D CD4011BPW
POWER+
POWER-
SDOWN
U11 TLP185GB
Q9 2SC2712
Q10 2SC2712
U3 TL494IDR
U1 TLP185GB
TLPA
TLPK
U4 TL494IDR
Q18 2SA2088
Q19 2SC2712
Q20 2SC2873
Q21 2SA1213
Q22 2SC2873
Q23 2SA1213
Q24 F20F60C3M
Q25 F20F60C3M
T1 KCT-357
CR12 DF25SC6M
CR13 DF25SC6M
L10 24L158766B
L12 22uH
U10 LM2676S-5.0/NOPB
L20 33uH 3.2A
CR28 DE10SC4
CR21 D2FS6
CR22 D2FS6
L15 24L158766C
CR10 M3FL20U
CR15 RU4A
+12VS
12V-A
12V-ref
+12VD
+5V
-12V
+24V
+24V
+250VSC
HTM
U7 TL431IDBZR
VR109 1k VR
TP3
TP4
TP6
TP7
TP8
Q26 F20F60C3M
Q27 F20F60C3M
T2 KCT-375
CR17 DF20LC20US
L13 24L158766B
MOTOR+
MVM
MOTOR-
U5 TLP185GB
CR16 UDZVTE-1715B
Title <E63-600A>
Size A1
Document Number <E63-600A>
Rev <RevC
Date: Monday, October 03, 2016
Sheet 2 of 2

4.2.16 Circuit diagram of BACK LIGHT POWER PCB



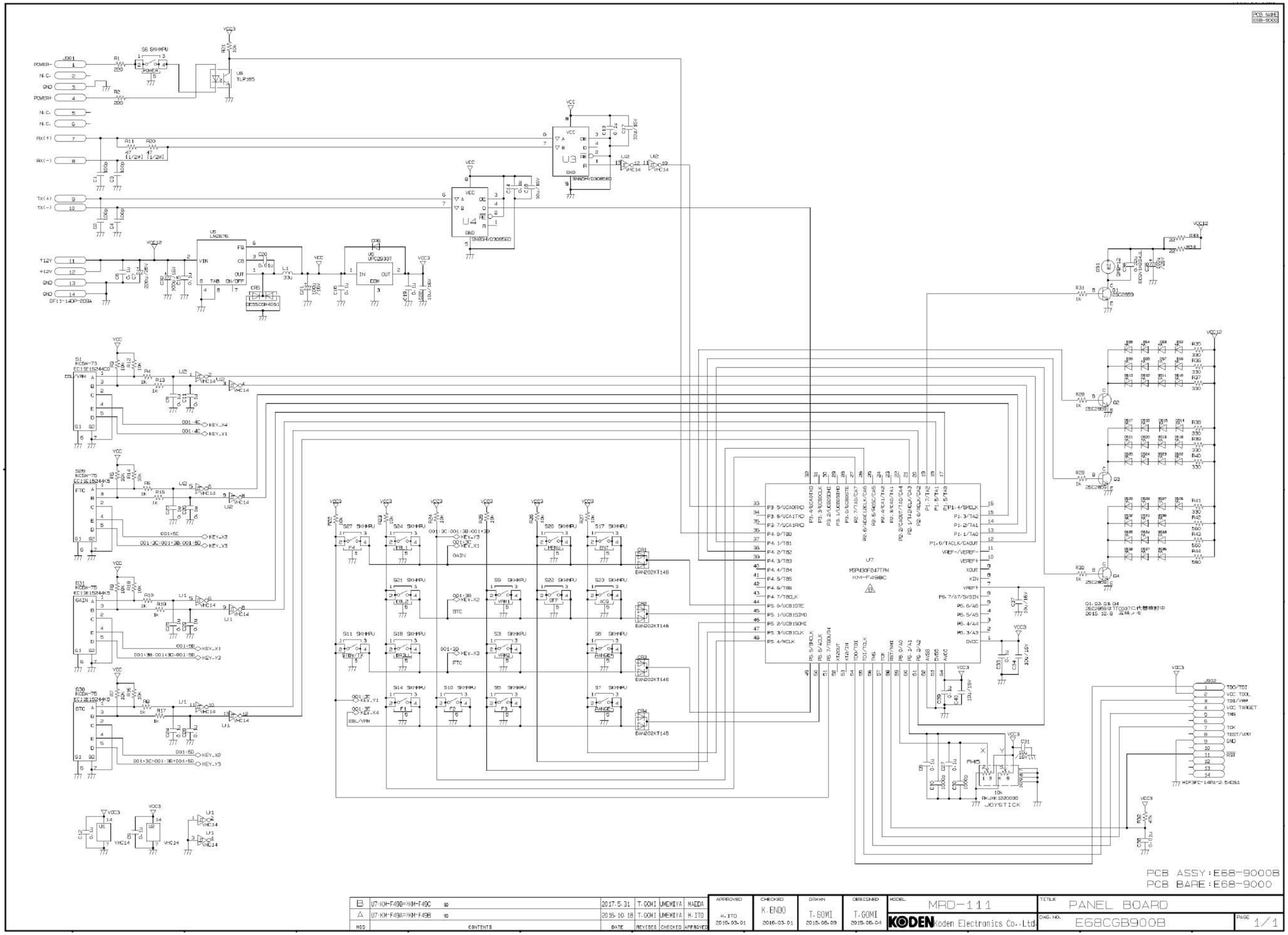
4.2.17 Circuit diagram of PANEL BOARD (E63-900*)



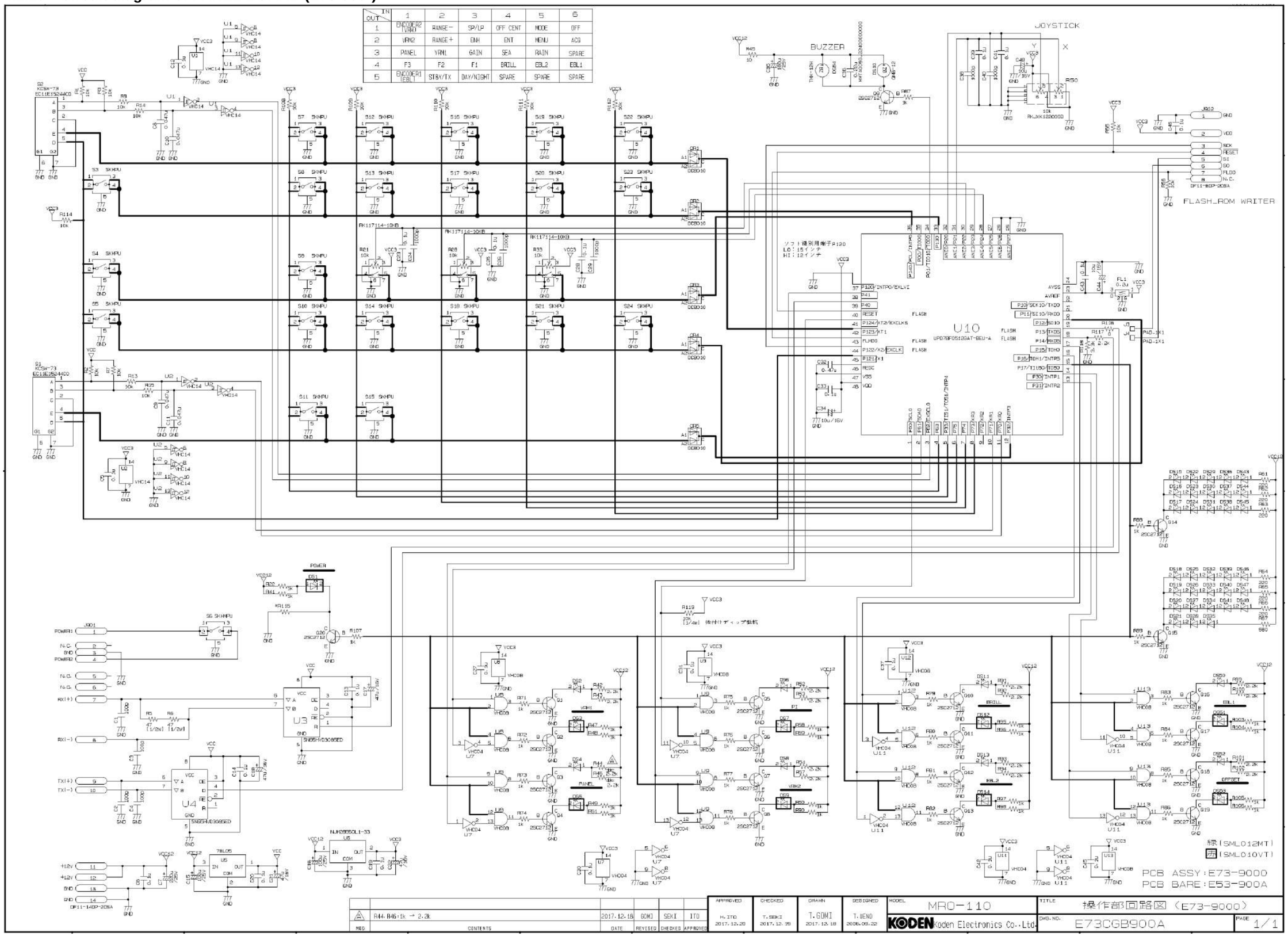
D	U10:KM-F45B=>KM-F45C 9F	2017.5.31	T.GOMI	UMEMIYA	MAEDA
C	U10:KM-F45A=>KM-F45B 9F	2016.10.18	T.GOMI	UMEMIYA	H.ITO
B	C8, C9, C10, C11, C23, C24, C25, C26, C28, C29: 0.047uF=>0.1uF, R8, R9, R11, R13, R14, R15, R16, R18, R20, R23: 10kohm=>1kohm, S29-S31: KCSW-74=>KCSW-75, U10: KM-F45=>KM-F45A	2015.12.17	T.GOMI	K.ENDO	H.ITO
NO.	CONTENTS	DATE	REVISED	CHECKED	APPROVED

APPROVED	CHECKED	DRAWN	DESIGNED	MODEL	TITLE
Y. UMEMIYA 2013.12.06	K.ENDO 2013.12.05	T.GOMI 2013.12.26	T.GOMI 2013.09.26	MRO-108	PANEL BOARD
KODEN Koden Electronics Co., Ltd.				DWG. NO. E63CGB900D	PAGE 1/1

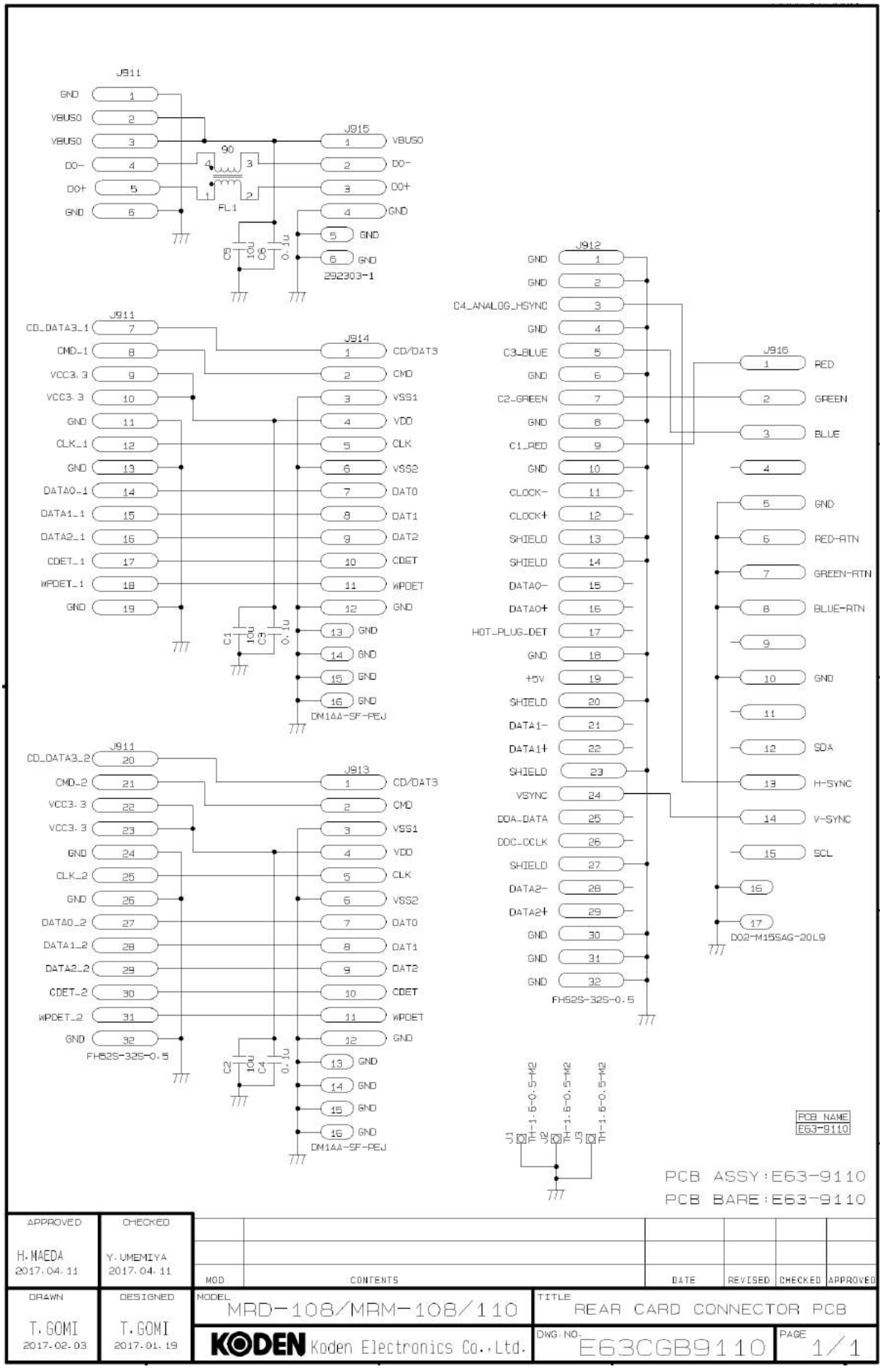
4.2.18 Circuit diagram of PANEL BOARD (E68-900*)



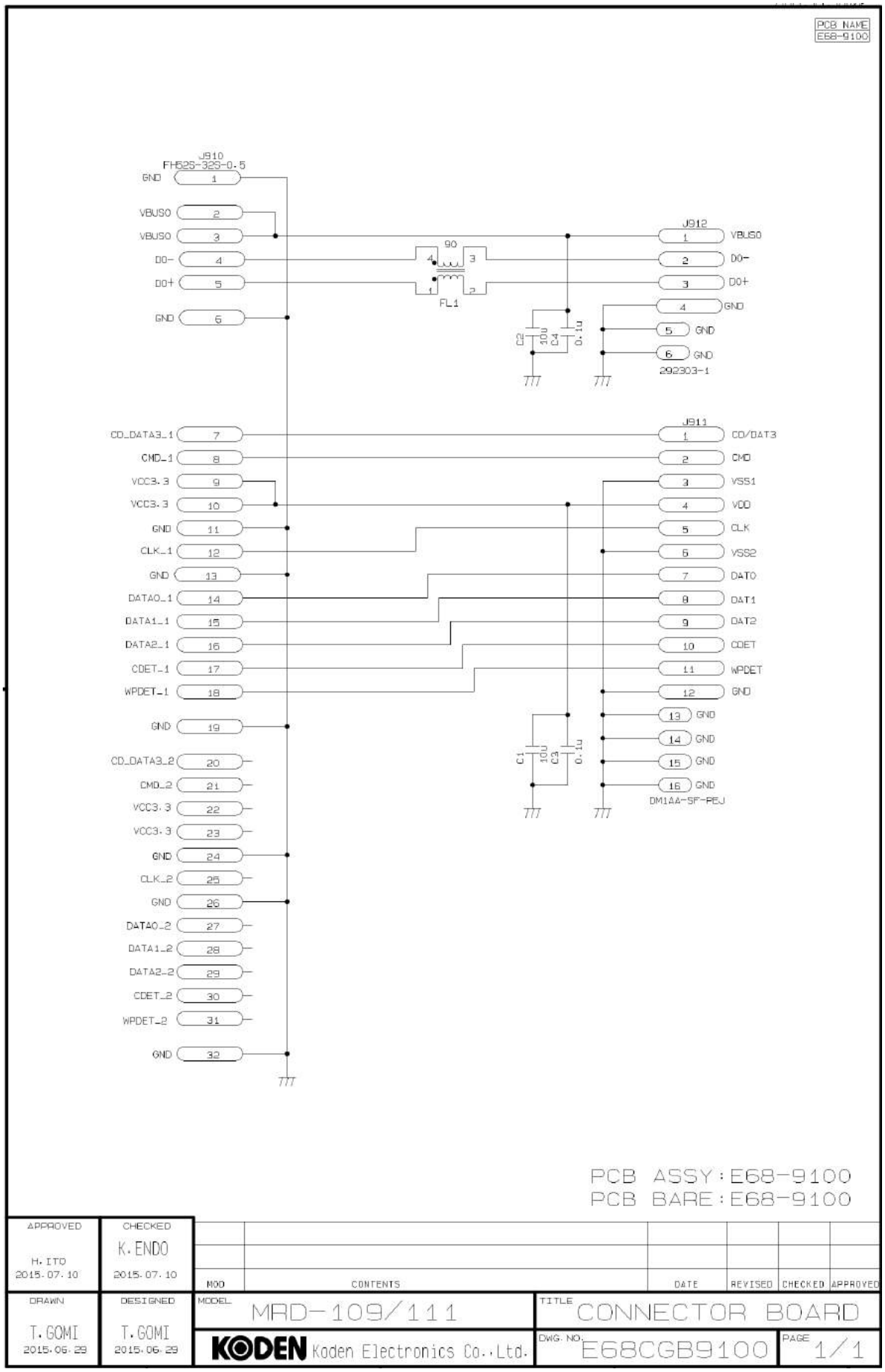
4.2.19 Circuit diagram of PANEL BOARD (E73-900*)



4.2.20 Circuit diagram of CONNECTOR PCB (E63-911*)



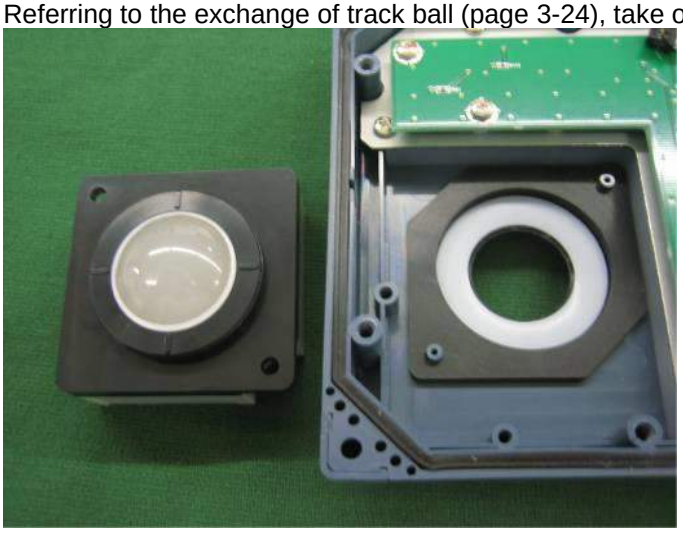
4.2.21 Circuit diagram of CONNECTOR PCB (E68-910*)



Annex

A.1 Clean up the trackball

1. Referring to the exchange of track ball (page 3-24), take off the track ball.



2. Remove the track ball cover attached to the case, and clean it.
   *Cleaning can be done with a rag soaked in fresh water and squeezed. Do not apply any detergent.

3. Take off O-ring from the track ball.

4. Clean the O-ring, the ball and the contact of ball.

5. After cleaning, reassemble the track ball referring to the exchange of track ball (page 3-24).

A.2 Interface

All input from external sensors such as GYRO and LOG are made with serial signal of IEC 61162-1 or 2. Therefore, it is necessary to put an interface unit between, when GYRO or LOG without output of IEC 61162-1 or 2 is connected.

1. Relation between functions and input signal

For radars, some signals are needed depending on their functions. The table below shows the relation.

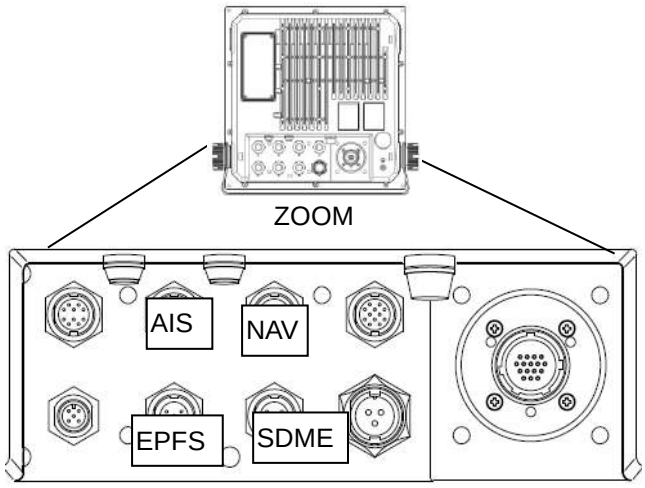
The mark ○ in the table shows that the marked signal is necessary for performing the function.

Function \ Necessary signal		HDG	STW	COG/SOG	POSITION (LAT/LON)	DTM (WGS84)
EBL TRUE		○	-	-	-	-
CURSOR LAT/LON		○	-	-	○	-
TRUE TRAIL		○	-	-	○	-
RELATIVE TRAIL		-	-	-	-	-
OS PAST TRK		○	-	-	○	-
GND STAB		○	-	○	-	-
SEA STAB		○	○	-	-	-
TT (ATA)		○	○	○ Note 1	-	-
AIS		○	○	○	○	○
MAP	COAST LINE NAV LINE ROUTE EVENT MARK AREA	○	-	-	○	-

Note 1: When TT (ATA) is used setting the stable mode at GND STAB under the condition that item of MAINTENANCE > I/O > COG/SOG has been set at EPFS, the vector of a tracking target may wobble. This is because COG of own ship may wobble due to the error in measuring position, when the speed of own ship is rather slow. Therefore, the vector of a tracking target may wobble as ATA calculates the course of the tacking target using this COG.

Consequently, it is strongly recommended that speed against water shall be applied in IMO resolution A.823 (19) on ARPA.

2. Kind of input/output ports



As the serial input/output ports of MDC-5000/5200/5500/7900(P)/7000(P) Series, total 4 ports for J3(NAV), J5(EPFS), J6(SDME) and J2(AIS) are provided as shown above.

MDC-7900/7000/7900P/7000P		MDC-5000/5200/5500	
NAV	IEC 61162-2	J3	38400bps
EPFS	IEC 61162-1	J5	4800bps
SDME	IEC 61162-1	J6	4800bps
AIS	IEC 61162-2	J2	38400bps

For 3 ports for J3(NAV), J5(EPFS) and J6(SDME) the format is selectable from either one in IEC 61162-1 and IEC 61162-2.

Alternating method of format at radar side:
MDC-7900/7000/7900P/7000P
MENU > MAINTENANCE > I/O > FORMAT > NAV 61162-2 > 61162-1 or 61162-2 [ENT]
MENU > MAINTENANCE > I/O > FORMAT > EPFS 61162-1 > 61162-1 or 61162-2 [ENT]
MENU > MAINTENANCE > I/O > FORMAT > SDME 61162-1 > 61162-1 or 61162-2 [ENT]
MDC-5000/5200/5500
MENU > MAINTENANCE > I/O > BAUDRATE > J3 38400bps > 4800, 9600 or 19200 [ENT]
MENU > MAINTENANCE > I/O > BAUDRATE > J5 4800bps > 9600, 19200 or 38400 [ENT]
MENU > MAINTENANCE > I/O > BAUDRATE > J6 4800bps > 9600, 19200 or 38400 [ENT]

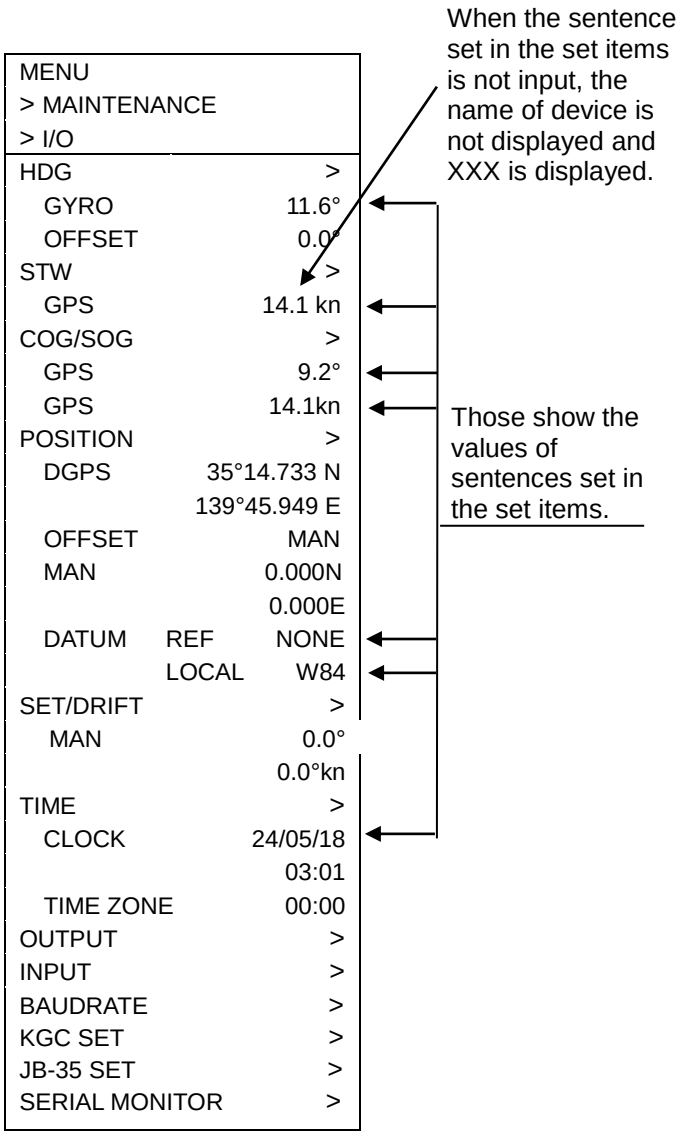
These 3 ports are designated as J3(NAV), J5(EPFS) and J6(SDME) for descriptive purposes, either port can accept input of HDG, STW, COG/SOG, POSITION (LAT/LON), TIME, DTM or ROUTE at the initial status of delivery from Plant.

Serial format IEC 61162-1 or IEC 61162-2 standard:

Baudrate	IEC 61162-1	4,800 bps
	IEC 61162-2	38,400 bps
Data length		8 bit
Parity		None
Stop bit		1 bit
Sentence length		Max. 82 characters
Checksum		Yes

3. Setup Interface

Setup of input shall be performed in the menu screen, MENU > MAINTENANCE > I/O, in the figure below.



MDC-7900

3.1 Input and setup of HDG

To improve the accuracy of TT (ATA) function, signals with fast transmission cycle are necessary.

Input conditions:

Transmission cycle	**25 ms ~ 100 ms**
Baudrate (Format)	4800bps (IEC 61162-1), 9600bps, 19200bps or 3840bps (IEC 61162-2)
Talker device	GA, GP, GL, GN, IN, SN, HE, HN, HC
Sentence formatter	THS > HDT
Input port	J3 (NAV), J5 (EPFS), J6 (SDME)

When input is correct, they will be displayed regardless of the setup of radars.

Offset (compensation) of HDG:

When values of HDG to be input have deviations, they can be compensated with adding a fixed value to the input values.

Compensation method:
MENU > MAINTENANCE > I/O > HDG > OFFSET > 0.0 - 359.9

3.2 Input and setup of STW

When it is in sea stabilization, the speed used for TM, trail, TT (ATA) and AIS shall be set.

Input conditions:

Transmission cycle	1 s
Baudrate (Format)	4800bps (IEC 61162-1), 9600bps, 19200bps or 3840bps (IEC 61162-2)
Talker device	GA, GP, GL, GN, IN, SN, VD, VM, VW
Sentence formatter	VBW > VHW
Input port	J3, J5, J6 (SDME)

Setting method of STW:

In the case of MDC-7900P/7000P Series (IMO), when a sentence is input from LOG.
MENU > MAINTENANCE > I/O > STW > STW > SDME [ENT]

If the speed sensor breaks down, select manual speed [MAN] and input manual speed values.
MENU > MAINTENANCE > I/O > STW > STW > MAN [ENT]

MENU > MAINTENANCE > I/O > STW > MAN > 0.0 to 100.0 [ENT]

Note: Speed can be manually input with selecting MAN for emergency purpose. However, AIS cannot be used in this case.

3.3 Input and setup of COG/SOG

When it is in ground stabilization, the speed used for TM, trail, TT (ATA) and AIS shall be set.

Input conditions:

Transmission cycle	1 s
Baudrate (Format)	4800bps (IEC 61162-1), 9600bps, 19200bps or 3840bps (IEC 61162-2)
Talker device	GA, GP, GL, GN, IN, SN, VD, VM, VW
Sentence formatter	VBW > VTG
Input port	J3 (NAV), J5 (EPFS), J6 (SDME)

Setting method of COG/SOG:

When a sentence from navigation equipment (Talker devices: GA, GP, GL, GN, IN, SN) has been input, select EPFS.
MENU > MAINTENANCE > I/O > COG/SOG > COG/SOG > EPFS (or AUTO) [ENT]

If a sentence from LOG (Talker devices: VD, VM, VW) has been input, select SDME.
MENU > MAINTENANCE > I/O > COG/SOG > COG/SOG > SDME (or AUTO) [ENT]

When there is no input of VBW from SDME and there is VHW, and when SET/DRIFT signal (VDR) from a tide meter has been input, then select CURRENT.
MENU > MAINTENANCE > I/O > COG/SOG > COG/SOG > CURRENT [ENT]

Note: When CURRENT is selected, AIS cannot be used.

Example of sentence:

VTG	Course and ground
	$GPVTG, 30.0, T, 30.0, M, 2.3, N, 4.2, K, D *21 Start of sentence Talker device Sentence formatter Course over ground, true bearing These fields are not used Speed over ground, knots Speed over ground, km/h Mode indicator Check sum Note: Mode indicator: A=Autonomous D=Differential E=Estimated M=Manual input S=Simulator N=Data not valid

Note: When mode indicator shows E, M, S, N, COG/SOG will be displayed with XX.XXX in red and its associated functions will become unusable.

3.4 Input and setup of SET/DRIFT

When CURRENT is selected for COG/SOG used at ground stabilization, SET/DRIFT (VDR) to be added to STW is set to get COG/SOG.

Input conditions:

Transmission cycle	1 s
Baudrate (Format)	4800bps (IEC 61162-1), 9600bps, 19200bps or 3840bps (IEC 61162-2)
Talker device	GA, GP, GL, GN, IN, SN, VD, VM, VW
Sentence formatter	VDR
Input port	J3 (NAV), J5 (EPFS), J6 (SDME)

Setting method of SET/DRIFT:

When a VDR sentence has been input, select SDME.
MENU > MAINTENANCE > I/O > SET/DRIFT > SET/DRIFT > SDME (or VDR) [ENT]

3.5 Input and setup of POSITION (LAT/LON)

Input conditions:

Transmission cycle	1 s
Baudrate (Format)	4800bps (IEC 61162-1), 9600bps, 19200bps or 3840bps (IEC 61162-2)
Talker device	GA, GP, GL, GN, IN, SN
Sentence formatter	GLL > GGA > GNS > RMC
Input port	J3 (NAV), J5 (EPFS), J6 (SDME)

Setting method of POSITION:

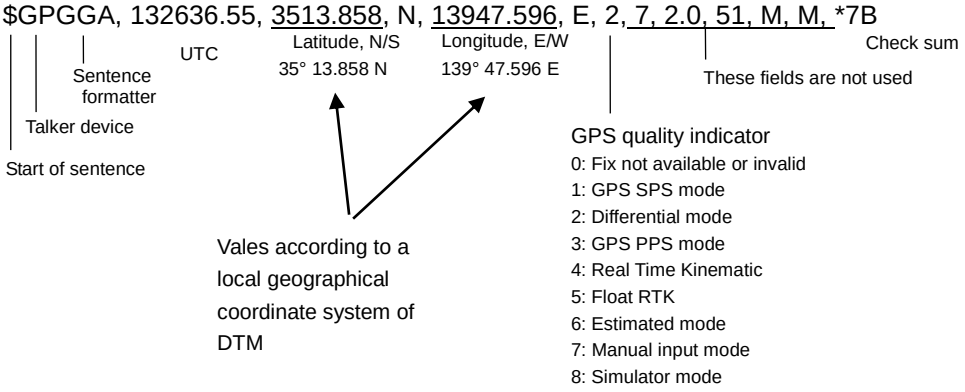
When navigation equipment is connected, select EPFS.

MENU > MAINTENANCE > I/O > POSITION > POSITION > EPFS [ENT] (MDC-7900P/7000P)
AUTO [ENT] (Others)

Note: Latitude and longitude can be manually input with selecting MAN. However, AIS cannot be used in this case.

Example of sentence:

GGA	Global positioning system (GPS) fixed data



In the case of this sentence, when Talker device is outside of the input conditions and when GPS quality indicator is 0 or 4 to 8, the latitude and longitude will be displayed with XX°XX.XXX in red.

Position offset

When MAP function is used and the referred geographical coordinate system is different from that of latitude and longitude input from GPS, etc., this is a function to align the position in MAP function with offsetting.

The latitude and longitude of the own ship's position is always those of the local geographical system of DTM.

When GPS outputs DTM:

MENU>MAINTENANCE>I/O>POSITION>OFFSET>OFFSET>EPFS [ENT](MDC-7900P/7000P)
> DTM [ENT] (Others)

Note: Setup of EPFS will become effective when DATUM of MAP menu and local geographical system of DTM agree with each other.

When offset is manually done:

MENU > MAINTENANCE >I/O>POSITION>OFFSET>OFFSET>MAN [ENT]
MENU > MAINTENANCE >I/O>POSITION>OFFSET>LAT MAN 0.000N>1.000N - 1.000S [ENT]
MENU > MAINTENANCE >I/O>POSITION>OFFSET>LON MAN 0.000E>1.000E - 1.000W [ENT]
Alternatively, offset can be set in the MAP menu.

3.6 Input and setup of DTM

DTM signal is usually input from GPS. DTM will inform about the type of Local datum system and the offset value of the reference datum system (WGS84).

Caution: The reference of AIS is WGS84. When the Local datum system of DTM output from GPS is other than WGS84, the latitude and longitude of GGA, etc. output by the same GPS will be with same the Local datum system and then they are different from the latitude and longitude of AIS. In the result, the position of AIS target displayed on radar will differ, and the risk of collision increases. Therefore, AIS cannot be used unless the Local datum system of DTM is WGS84.

Input conditions:

Transmission cycle	1 s
Baudrate (Format)	4800bps (IEC 61162-1), 9600bps, 19200bps or 3840bps (IEC 61162-2)
Tarker device	GP, GL, GN, IN, SN
Sentence formatter	DTM
Input port	J3 (NAV), J5 (EPFS), J6 (SDME)

Setting method of DTM:

MENU > MAINTENANCE >I/O > POSITION OFFSET > EPFS (or DTM) [ENT]

Example of sentence:

DTM	Datum reference
	$GPDTM, P90, 1, N 1, E, W84*43 Start of sentence Talker device Sentence formatter Local datum system Lat offset, min, N/S Lon offset, min, E/W Reference datum (W84) Check sum Datum: W84: WGS84 W72: WGS72 S85: SGS85 P90: PE90 999: user

3.7 Input and setup of TIME

Input conditions:

Transmission cycle	1 s
Baudrate (Format)	4800bps (IEC 61162-1), 9600bps, 19200bps or 3840bps (IEC 61162-2)
Tarker device	GA, GP, GL, GN, IN, SN
Sentence formatter	ZDA > RMC > GGA
Input port	J3 (NAV), J5 (EPFS), J6 (SDME)

Setting method of POSITION:

When ZDA is input from navigation equipment, select EPFS.

MENU > MAINTENANCE > I/O > TIME > TIME > EPFS (or ZDA) [ENT]

When an incorporated clock is used, select CLOCK.

MENU > MAINTENANCE > I/O > TIME > TIME > CLOCK [ENT]
MENU > MAINTENANCE> I/O > TIME > CLOCK SET > DATE > DD/MM/YY [ENT]
MENU > MAINTENANCE > I/O > TIME > CLOCK SET > TIME > hh:mm [ENT]
Note: DD = day, MM = month, YY = year, hh = hour, mm = minute

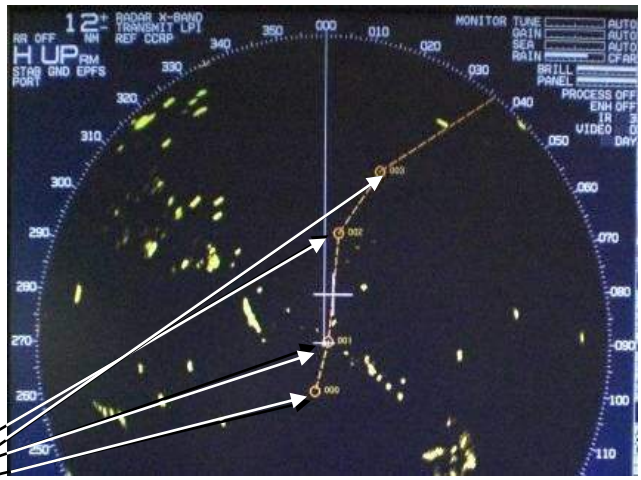
3.8 Input and display of ROUTE

Input conditions:

Transmission cycle	1 s
Baudrate (Format)	4800bps (IEC 61162-1), 9600bps, 19200bps or 3840bps (IEC 61162-2)
Tarker device	GP, GL, GN, IN, SN
Sentence formatter	RTE/WPL
Input port	J3 (NAV), J5 (EPFS), J6 (SDME)

Setting of radar display:

When sentences of RTE and WPL are correctly input, route can be displayed on the radar screen as shown in the example.



Route Image sample

Setting method:
Display of MAP shall be ON.
MDC-7000(P)/7900(P):
DISP > ON at the lower left corner

MDC-5000/5200/5500:
MENU > MAP > DISP > ON [ENT]

MONITORED (External I/O) ROUTE shall be ON.
MENU > MAP > MONITORED ROUTE > ON [ENT]

When identifier (ID) is displayed on WP,
WPT ID DISP shall be ON.
MENU>MAP>WPT ID DISP>ON [ENT]

Examples of sentences:

$GP**RTE**, 1, 1, **W**, 000, 001, 002, 003, 004 *1B

Display of the case W:

$GP**WPL**, 3511.976, N, 13947.060, E, 000,*7B

$GP**WPL**, 3513.926, N, 13947.848, E, 001 *7C

$GP**WPL**, 3518.156, N, 13948.570, E, 002 *71

$GP**WPL**, 3520.509, N, 13950.795, E, 003 *75

$GP**WPL**, 3525.821, N, 14002.405, E, 004 *73

Note 1: The number of WPL is needed to be the same as that of WP identifier for RTE.
Note 2: The designations of WP identifiers for RTE and WPL shall agree with each other.
Note 3: The message mode of RTE will be those in “W”.

4. Confirmation of input signal

MDC-5000/5200/5500/7900(P)/7000(P) series has a function to monitor serial input and is capable to confirm input port.

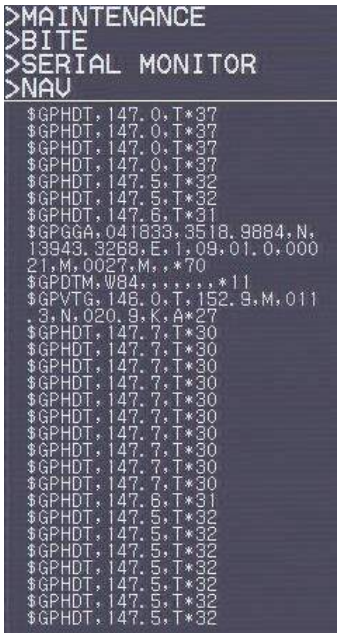
Setting method:

MENU > MAINTENANCE > BITE > SERIAL MONITOR > NAV (J3)

When signal is correctly input in the port, the input sentence will be displayed readable as shown in the picture on the right. The input sentence will be scrolled upward, and pushing of [ENT] key will stop scrolling.

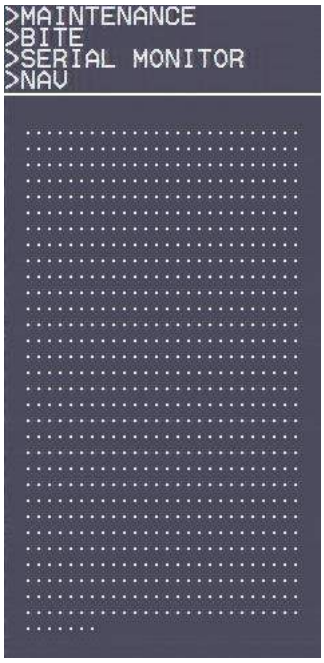
Compare the input sentence with “Input data” of Installation Manual to confirm that they are correct.

Example of agreement of format



Example of a case when no data has been input or when A-B of input is inversed

Example of a case when 4800bps (IEC 61162-1) is input in the port for 38400bps (IEC 61162-2)

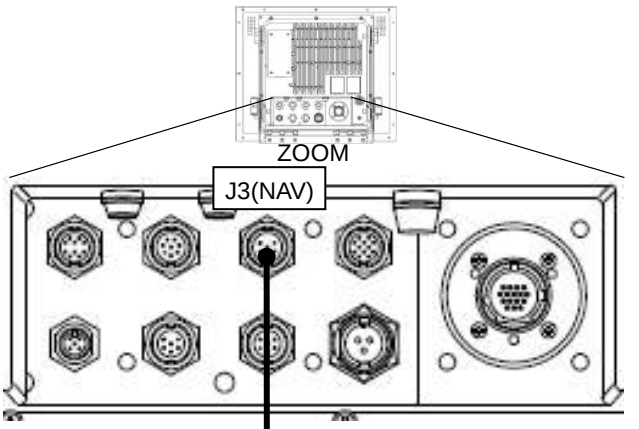


MENU > MAINTENANCE > BITE > SERIAL MONITOR > NAV (For IMO)
MENU > MAINTENANCE > BITE > SERIAL MONITOR > J3 (For non-IMO)

5. Connection of gyro convertor S2N

Connection table of CW-376 cable

CW-376			S2N
Pin No.	Signal name	Wire color	Name of signal
1	Shield	Blue+shield	NC
2	OUT-A	White	NC
3	OUT-B	Red	NC
4	IN-A	Orange	NMEA OUT A
5	IN-B	Black	NMEA OUT C
6	J3,J5:12V J6:NC	Green	NC



CW-376-5M

S2N Gyro convertor

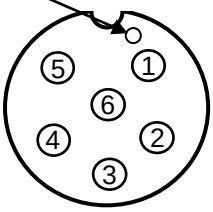
R1 R2 S1 S2 S3

Gyro synchronous or step signal

Cables to be from owner supplied

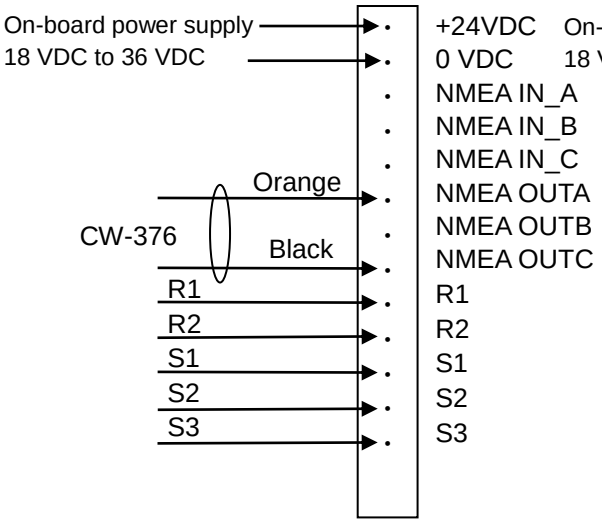
On-board power supply
18 VDC to 36 VDC

CW-376 cable connector pin assignment
Pin 1 Indicated

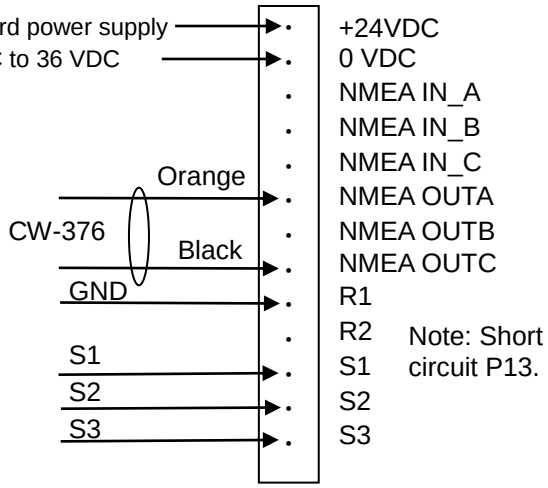


Connection diagram of S2N (As for the detail, refer to S2N Technical Description/Installation manual)

Connection of synchronous method



Connection of stepper method



Note: Short circuit P13.

Setup of S2N

To adapt the output of S2N to MDC-5000/5200/5500/7900(P)/7000(P) series, setup S2N in accordance with the table below:

Item	Menu No.	Set value	Item	Menu No.	Set value
Baud rate	3.1	38400	Heading talker id	3.6	HE
Heading update rate	3.4	20	Transmit checksum	3.7	on
Heading sentence	3.5	HDT			

Setting method of S2N:

Meaning of marks [=>], [↵→], [D/+] in the example:

[=>]: Pushing of [Set] once,

[←]: Pushing of [Exit] once,

[D/+]: Pushing of [Dim/+] once,

[ ]: Contents displayed on LED of S2N. In the display, xx is optional numerical figures.

Setting example in the case when the gyro ES-2 (Tokyo Keiki make) is set:

Start: [A x.x] **=>** => [Align] D/+ [Setup] => [P 1] D/+ [P 2] => [P 2.1] => [Step] D/+ [Synch] => [P 2.1] ← [P 2] D/+ [P 3] => [P 3.1] => [4800] D/+ D/+ D/+ [38400] => [P 3.1] D/+ D/+ D/+ [P 3.4] => [1] D/+ D/+ D/+ D/+ [20] => [P 3.4] D/+ [P 3.5] => [Hdt] => [P 3.5] D/+ [P 3.6] => [He] => [P 3.6] D/+ [P 3.7] => [Off] D/+ [On] => [P 3.7] ← [P 3] ***D/+ [P 4] => [P 4.1] => [22] D/+ [90] => [P 4.1] D/+ [P 4.2] => [180] D/+ D/+ D/+ [36] => [P 4.2] D/+ [P 4.3] => [Dc] D/+ [Ac] => [P 4.3]*** ←← [Align] => [A x.x]. At the time of this display, input the values of ship's bearing read from compass with D/+ D/-, and push [Set] key to end.

Note: In the setting example, the parts *in italic* may depend on the type of gyro to be used.

Setting of radar menu:

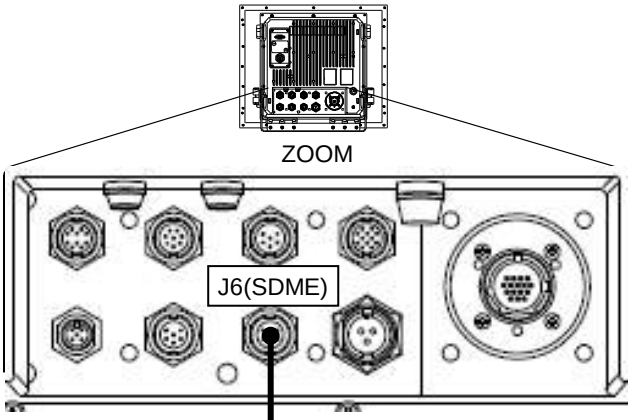
When the above setup is correct, MDC-5000/5200/5500/7900(P)/7000(P) series will operate under the factory default setup conditions.

The factory default setup values are as follows:
MENU > MAINTENANCE > I/O > FORMAT > GYRO > 61162-2 (For IMO)
MENU > MAINTENANCE > I/O > BAUDRATE > OP1 > Setting value (For non-IMO)

6. Gyro/Log interface: Connection of ADPC-101 unit (non-IMO)

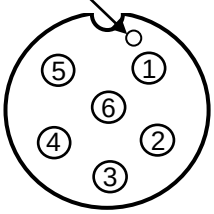
Connection table of CW-376 cable

CW-376			ADPC-101
Pin No.	Signal name	Wire color	Signal name
1	Shield	Blue+shield	NC
2	OUT-A	White	NC
3	OUT-B	Red	NC
4	IN-A	Orange	RS-422 TX+
5	IN-B	Black	RS-422 TX-
6	J3,J5:12V J6:NC	Green	NC



Cable (option)
CW-376-5M

CW-376 cable connector pin assignment
Pin 1 Indicated



Gyro/Log interface
ADPC-101

Cables to be from owner supplied

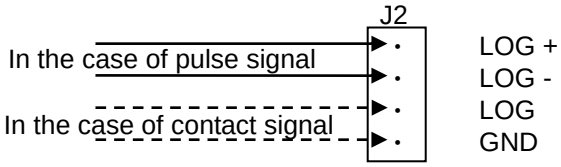
On-board power supply
10.8 VDC to 31.2 VDC

LOG pulse signal

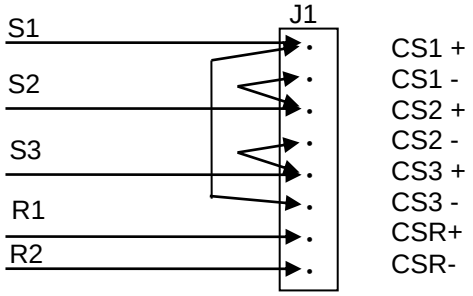
R1 R2 S1 S2 S3

Gyro synchronous or step signal

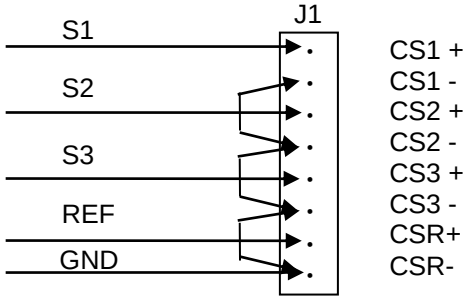
Connection diagram of ADPC-101 (for detail, refer to ADPC-101 Technical manual)



Connection when GYRO is synchronous method



Connection when GYRO is step method



Setup of ADPC-101

After connection, setup the following values in accordance with the manual for ADPC-101:

Menu item	Set value
GYRO ratio	Gear ratio of gyro
GYRO sign	Positive. Select negative when rotation is inverse.
GYRO type	Select synchronous method or step method for gyro.
GYRO ref polarity	Positive. Select negative when to be shifted by 180˚.
LOG impulse/mile	Number of pulse per mile
LOG bounce delay	50 ms. Increase the value when chattering is detected.

Menu item	Set value
COM baud rate	38400
COM parity	NO
COM stop bits	1 bit
NMEA REFRESH	10
NMEA GYRO fmt	HEHDT
NMEA LOG fmt	VMVBW

Setting of radar menu:
When the above setup is correct, MDC-5000/5200/5500/7900(P)/7000(P) series will operate under the factory default setup conditions.

The factory default setup values are as follows:

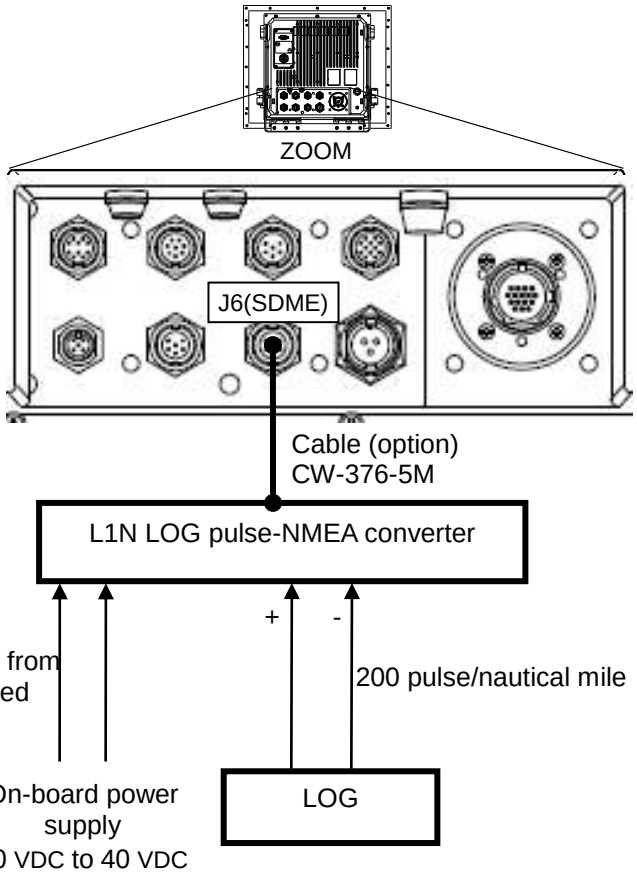
MENU > MAINTENANCE > I/O > FORMAT > GYRO 61162-2 (For IMO)
MENU > MAINTENANCE > I/O > BAUDRATE > OP1 > Setting value (For non-IMO)

MENU > MAINTENANCE > I/O > STW > STW > SDME (For IMO)
MENU > MAINTENANCE > I/O > STW > STW > (For non-IMO)

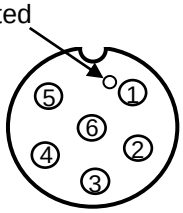
7. Connection of LOG pulse NMEA converter L1N (200 pulse/nautical mile only)

Connection table of CW-376 cable

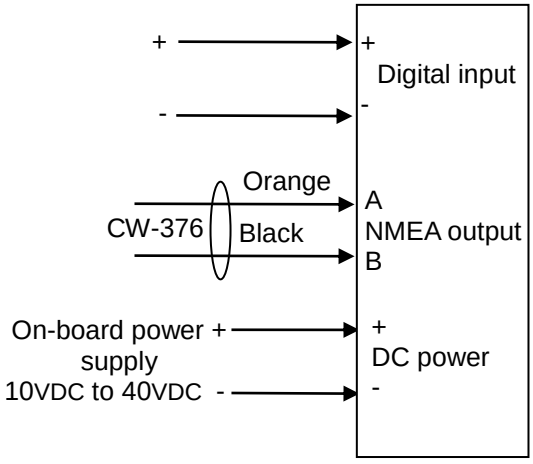
CW-376			L1N
Pin No.	Signal name	Wire color	Signal name
1	shield	Blue and shield	NC
2	OUT-A	White	NC
3	OUT-B	Red	NC
4	IN-A	Orange	NMEA OUT A
5	IN-B	Black	NMEA OUT B
6	Ground	Green	NC



CW-376 cable connector pin assignment
Pin 1 Indicated



Connection diagram of L1N (For detail, refer to the manual for L1N Log pulse-NMEA converter)

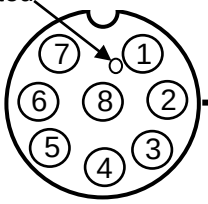


Setting of radar menu:
When the above setup is correct, MDC-5000/5200/5500/7900(P)/7000(P) series will operate under the factory default setup conditions.

The factory default setup values are as follows:
MENU > MAINTENANCE > I/O > FORMAT > SDME > 61162-1 (For IMO)
MENU > MAINTENANCE > I/O > STW > STW > SDME (For non-IMO)

8. Connection of AIS

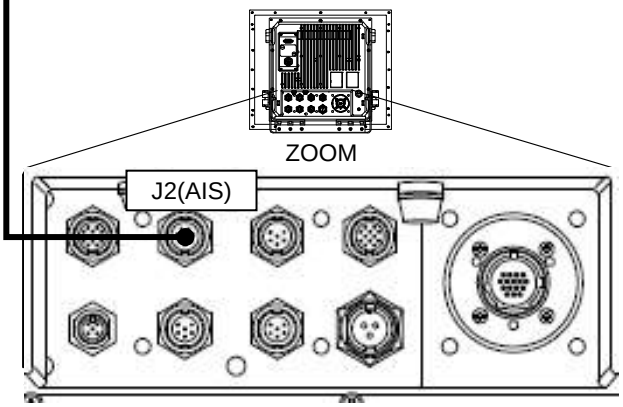
CW-387 cable connector pin assignment
Pin 1 Indicated



Connection table of CW-387 cable

Terminal No.	Color of wire		Name of signal
1	Shield		Frame ground
2	Blue	Twist cable	IN-A
3	White		IN-B
4	Yellow	Twist cable	OUT-B
5	Brown		OUT-A
6	Green*		GND
7	Red	Twist cable	NC
8	Grey		NC

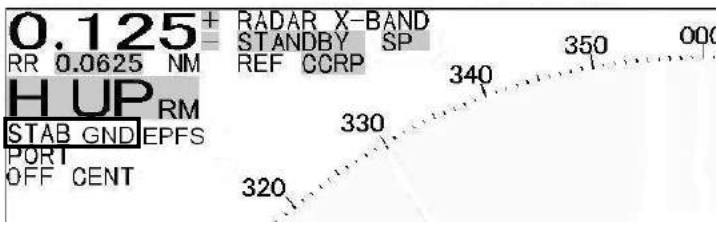
*Green/Black twisted cable (Black is not used.)



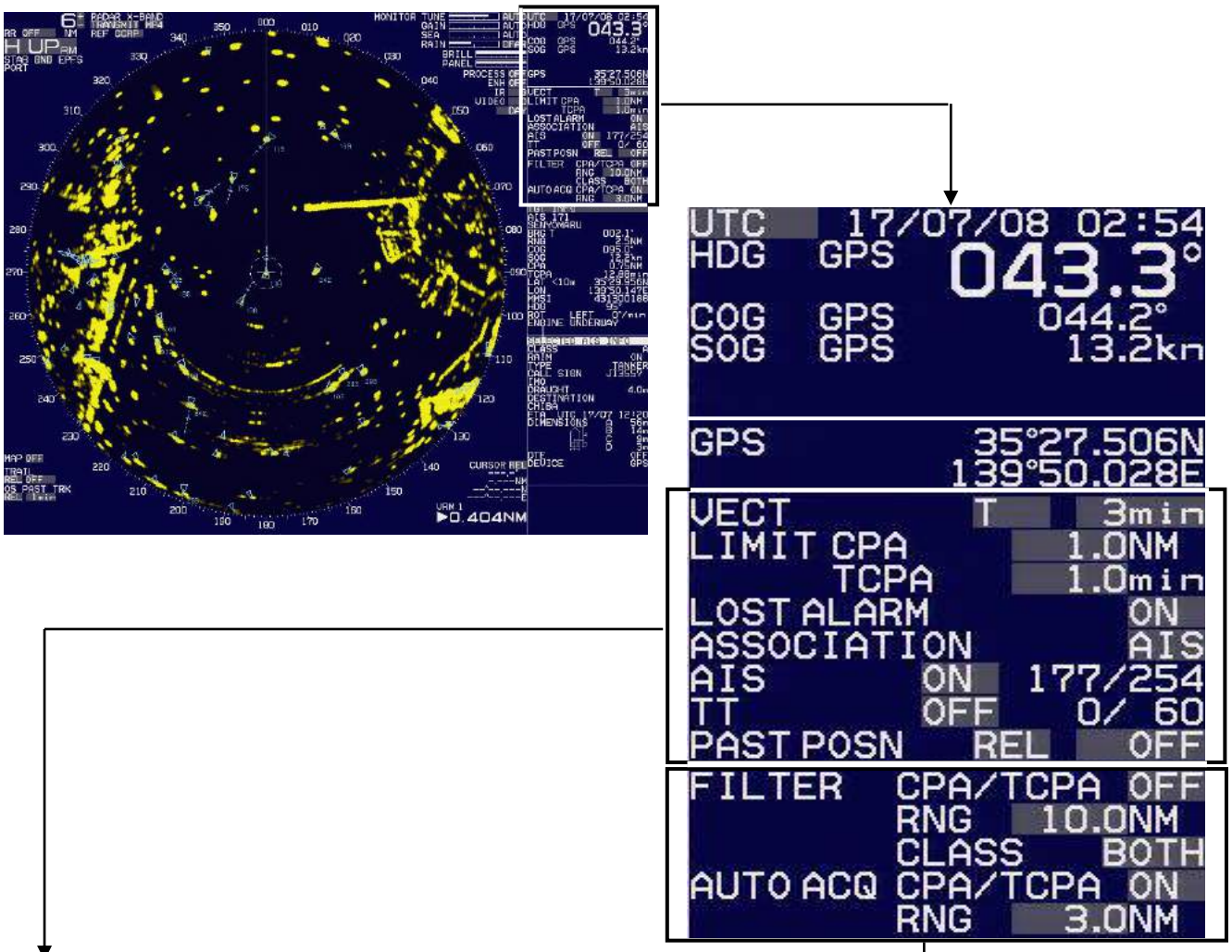
AIS cable connection

MENU >MAINTENANCE >I/O	
HDG	GYRO
GPS	**44.7°**
OFFSET	0.0°
STW	SDME
	XXX.X kn
COG/SOG	EPFS
GPS	**44.7°**
GPS	**13.3kn**
POSITION	EPFS
GPS	**35°27.511N**
	139°50.065E
OFFSET	EPFS
	GPS
	0.000N
	0.000E
DATUM REF	W84
LOCAL	**W84**
SET/DRIFT	SDME
	0.0°
	0.0°
TIME	EPFS
GPS	08/07/17
	02:10
TIME ZONE	09:00
CLOCK SET	>
DETAIL	>

To connect AIS, at least HDG, COG/SOG, POSITION and DTM (WGS84) must be input.
The presence or not of these signals can be confirmed in the MENU > MAINTENANCE > I/O menu as shown in the left table.
The values encircled with rectangles in the left table are the necessary parts to indicate AIS. Please confirm that they have been input.
When there is no input of STW, stabilization mode shall be set with STAB GND as shown at the upper left of the figure below. With STAB SEA, AIS can be displayed.



Operation and example of display of AIS



Setting columns of TT (ATA) and AIS:

VECT : Vector length and mode of symbol
LIMIT CPA•TCPA : Constant to judge dangerous targets
LOST ALARM : ON/OFF of Lost alarm display
ASSOCIATION : Integrate to AIS or TT (ATA) symbol that is setup
AIS : ON/OFF of AIS display
TT : ON/OFF of TT (ATA) display
PAST POSN : Time setting of display period of trails of tacking targets

Setting columns of AIS:

FILTER CPA/TCPA : Only activated AIS is displayed.
FILTER RNG : Symbols within the setup distance are displayed.
FILTER CLASS : The type of AIS to be displayed is designated.
AUTO ACQ CPA/TCPA : AIS targets agreed with the values of LIMIT CPA/TCPA are activated.
AUTO ACQ RNG : AIS targets within the designated distance are activated.

A.3 System Program

Version confirmation

Currently installed firmware version can be found by using following menu operation.

1 Press MENU key to display “Menu”.
Select [MAINTENANCE] => [VERSION] =>

(MDC-5000 series)

MRM-110

KM-F71 xx.xx ⇦ Firmware version of Display unit

MRO-110

KM-E49 yy.yy ⇦ Firmware version of Operation unit

(MDC-5200 series)

MRD-111

KM-F54 xx.xx

PANEL

KM-F49 yy.yy

(MDC-5500 series)

MRD-109

KM-F54 xx.xx ⇦ Firmware version of Display unit

MRO-108

KM-F45 yy.yy ⇦ Firmware version of Operation unit

(MDC-7900/7000/7900P/7000P series)

MRD/MRM-108/108P

KM-F44 xx.xx ⇦ Firmware version of Display/Processor unit

MRO-108/108P

KM-F45 yy.yy ⇦ Firmware version of Operation unit

How to update the system program

1 Prepare SD memory card with latest program.

File name: KM-FXX_Verxxxx

File type: MOT

2 Turn off the power.

3 Insert SD memory card into the SD card slot.

4 Press POWER ON/OFF key to turn on, radar will start update procedure automatically.

Message of “LOADING IN PROGRESS”, “PLEASE DO NOT POWER OFF” etc., and time bar will be displayed.

During updating, EBL1 and VRM1, EBL2 and VRM2, BRILL and PANEL key’s lamps flash red. (MRO-110/108/108P)

Few minutes later, when program update is complete, “LOADING COMPLETE” and “PLEASE EJECT SD CARD” messages will appear on the display.

5 Remove SD memory card from the card reader, and new system program will run automatically.

The list of updated program file will be shown on the display.

In some cases, message of “SHUTDOWN” is displayed, and power will be turned off.

In this case, please press POWER ON/OFF key again, and message of “INITIALIZING” may be displayed.

CAUTION: Put the cover firmly after the SD card Insert /Remove. Water protection of the Display unit is not guaranteed when the card reader cover is removed.

KODEN

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