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DVOR

MAINTENANCE GUIDANCE

TOSHIBA

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MAINTENANCE GUIDANCE

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Safety Precautions

1. Danger prevention

The equipment has a high-tension cubicle, a charger and batteries where large currents flow so that they are very dangerous. Before doing maintenance work, be sure to switch the power off and let the capacitors discharge.

When making adjustments or measuring high voltage, put one of your hands in the pocket, for example, so that most of the your body will not be exposed to the electric circuits at the same time. It is advised that work be performed not by a single person.

2. Measures Against Electric Shock

(1) If any one gets an electric shock, immediately switch the power off, and ground that circuit concerned. If it is not possible to switch the power off, remove the victim from the electrical conductor as quickly as possible by using a belt, dry towel, or a piece of wooden board.

(2) If a strong electric current run through the body, the respiratory nervous center under the brains might be struck, resulting possibly in a sudden stoppage of breathing, irregular pulsation, and falling into unconsciousness. By immediately taking such steps as artificial breathing and heart massaging correctly and patiently, the victim will return to normal in most cases.

Never be upset or give up, taking him as dead.

(3) To see whether the victim is breathing, lay him his face up, see if the chest and abdomens move.

To check whether the heart is beating, touch the neck artery with your finger. If he is not breathing, try artificial breathing. If the heart is not beating, massage the heart. Whichever the case take action as soon as possible.

If both breathing and heart beating have stopped, conduct artificial breathing and heart massaging simultaneously.

3. First Aid

(1) Important Points

a. Do artificial breather and/or heart massaging on the spot.
b. Do not roughly carry the victim
c. Contact the doctor quickly.

(2) Artificial Breathing

Mouth-to-mouth resuscitation

a. The victim is likely to be unconscious. Pull his chin up to expand the respiratory tube. (Figure 1)

b. Then watch the move of the chest and abdomens.
If they are still start artificial breathing at once.

(1) Pull the chin up, and the head down.
(2) Place a blanket on the Pack.

Figure 1

c. Pinch the nose of the victim with the thumb and index finger of one hand so that air will not leak from the nose.
Hold the back of the head with the other hand, and raise it. (Figure 2)

Pinch the nose with one

Figure 2

d. With your mouth on the mouth of the victim, blow into his heart while watching the chest.
Open your mouth wide each time you breathe into his heart, taking care not to let air leak.

e. Leave your mouth from his each time you blow, but keep his nose pinched with your hand.

f. For the first few times, blow a little hard about one half the amount of a deep breath (about 1 liter); and then blow at a rate of about 12 times per minute.

g. Each time you blow, be sure to check that the chest of victim swells. (Practice this well, using a doll, for example.)

(3) Closed chest type heart massage
If the heart is not beating, it is necessary to bring it back to work again as soon as possible. This is a very effective method of bringing the heart back to work by pressing it from the outside.

a. Do it quickly.

b. Lay the victim down, his face up, on a floor, table or a hard place.

c. Place the bottom part of the palm of one hand about one-third away from the lowest rib, and put the other hand on it.

d. Without bending the elbow, press lightly with the weight of your body until the chest of the victim is depressed about 4 to 8cm and immediately release the hands. (Figure 3) And when pressed by hand, the heart shrinks so the blood in it is pushed out.

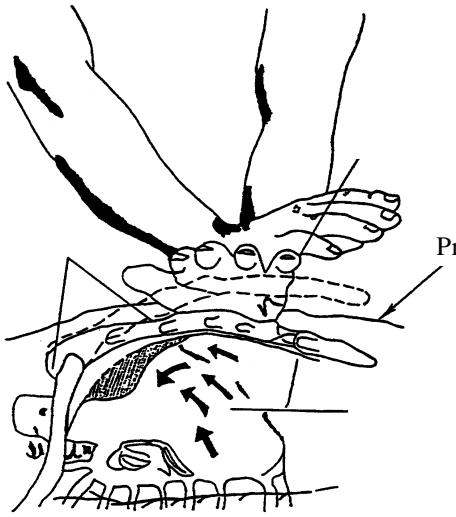

Figure 3 The Chest Depressed by Hands

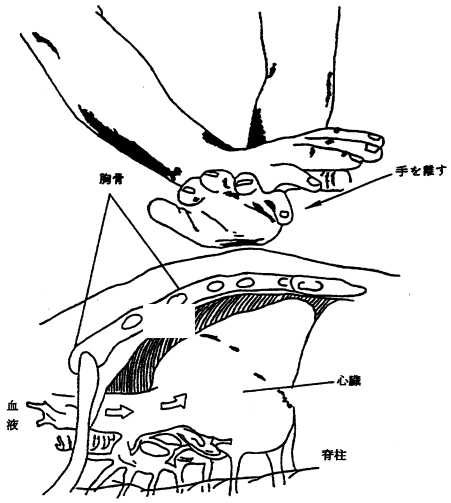

Figure 4 Hands Released

e. Repeat this process rhythmically at a rate of about once every second. Never do it impulsively.

f. If the chest is pressed too hard, the ribs might be broken.

g. Heart massage should be done simultaneously with mouth-to-mouth resuscitation at the ratio of 15 heart massages to 2 artificial breathings.

h. If there are two persons available, one should do heart massage, and the other artificial breathing. (Figure 5) In this case, the ratio of heart massage to artificial breathing should be 5 to l.

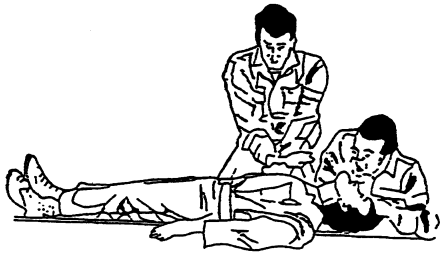

Figure 5 Heart Massage and Artificial Breathing by Persons

4. Other Precautions

(1) The victim must be taken to the hospital or clinic as soon as possible. While he is on the stretcher, or in an ambulance, keep massaging the heart and artificial resuscitation.

(2) When the victim begins to naturally breathe again, or his hands and feet are warn again, or his pulses can be felt again, wrap him with a blanket to keep him warm and quiet.

(3) If he is still unconscious while his heart and breathing are back to normal, keep him on the side to maintain his respiratory tube wide so that he will not be choked by something vomited, nor be suffocated again.

(4) Have him examined by the doctor as soon as possible.

For safe operation and maintenance

For safe handling of DVOR

Be sure to know details of this manual, related drawing and all documents

At all times, keep this manual readily available for operators.

Particularly important points for the prevention of faults and accidents are given in “DANGER,” “CAUTION,” and “*NOTE*” notices on the applicable page of this manual. Be sure to read them before using DVOR.

△

Erroneous handling may result in danger, leading to serious personal injury or death. Or, the operations halt may be caused by off-the-air.

Remarks: After-effect such as loss of eyesight, injury, burn, fracture of a bone, electric shock, etc. requiring hospitalization may remain, or you may have to attend a hospital for a long time. Or, there is a possibility of affecting the navigation safety by having an adverse effect on aircraft underway by off-the-air.

△

If you handle the equipment erroneously, dangerous situation may result or you may be subjected to minor personal injury. Or only material damages may be caused.

Remarks: You may suffer a burn or electric shock which requires medical treatment and attending a hospital. Material damages may lead to damage of the equipment.

NOTE

Instructions intended to prevent mechanical damage and to ensure optimum performance.

CHAPTER 1 Checkup method

1.1 Overview

Maintenance guidance is a guidebook for smoothly checking and servicing the DVOR (referred to as "this equipment" hereinafter).

You shall carry out the maintenance of this equipment periodically. The maintenance man to whom it had full knowledge of this equipment, and check was permitted needs to carry out check for operation mistake prevention.

You shall carry out the maintenance after checking that grounding is ensured.

NOTE

Before operating the equipment, the user needs to understand the functions of each operating part completely by referring to the descriptions of the operation and indicators.

Configuration of this guidance is shown below:

CHAPTER 1 Checkup method

General items required for checkups and services.

CHAPTER 2 Periodical replacement parts

Criteria for periodical replacement parts are clearly mentioned.

CHAPTER 3 Repair methods

Methods for repairing mechanical parts are explained.

CHAPTER 4 Trouble shooting

Methods for trouble shooting for errors occurred.

Maintenance personnel shall well understand the Operation guidance and Maintenance guidance in order to always maintain this equipment in good condition.

If you stop a transmission system, you must obtain a relevant authority's

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To comply with RF exposure compliance requirements, a separation distance of at least 15m must be maintained between the CAR antenna of DVOR and all

△

The equipment uses a heavy current and high frequency power, which would risk the user's life; therefore, be sure to

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(1) You shall follow a stop procedure, in stopping this equipment. You shall check having turned off all the switches of Breaker Panel, the breaker of a power unit (when it was installed separately), and the breaker

1.2 Routine check

Checking this equipment constantly or regularly so that it operates in best condition.

Routine checks prevent major malfunctions and extend the operation life of this equipment. “Category” in the electric check item table and the mechanical check item table should be the check interval using the following symbols.

Category	Check interval	Verification before check
<S>	Daily	
<A>	Weekly	Press the [TEST LED] switch on the Breaker Panel to test the LED. However, CPU Unit is excluded.
		Check each control state.
<B>	Once/ 1-1.5 months	Perform B check for the items with no failure found in A check.
<C>	Once/ 3 months	
<D>	Once/ 6 months	
<E>	Yearly	

<S>: In S check, confirms the equipment is normally operated by confirming the display of RCMS that is a remote side.

<A>: Most A check consists of visual checks and checks with testers. Check by selecting switches for items having switches.

<B>: In B check, observe the output waveform and check the transmit frequency of each terminal to be checked.

<C>: In C check, check the parts which use the rotary parts of the blower.

<D>: In D check, check mainly the devices used outdoors.

<E>: In E check, check the state of each cable connected to devices and devices mainly used outdoors.

1.2.1 Test instruments

Measuring equipment required for checkups are explained here.

1.2.1.1 Measuring equipment

Measuring equipment is required for checking this equipment. Read well the instruction manuals of the measuring equipment before using them in order to understand correct way to use. Take extra care not to break measuring equipment due to erroneous operations. It is required to perform checkups by fully utilizing the performance of measuring equipment. To that end, measuring equipment shall be calibrated on a routine basis. Table 1.2.1.1-1 shows Test equipment list used for this equipment.

Table 1.2.1.1-1 Test equipment list

No.	Name	Quantity	Note
1	Oscilloscope	1	Bandwidth: 250MHz or more
2	Tester	1	
3	Insulation-resistance meter	1	
4	Phase shifter	2	108MHz to 118MHz
5	Through line type wattmeter 250W element	1 1	Model 43 (BIRD Electronic Corporation) Recommended

1.3 Electric check items

The test item, electric check item, electric checkup method and adjustment method of each configuration are explained here.

* The test item describes the usage of the monitor terminal and the check terminal that has placed to a front panel of each unit.
* Primary objectives of the electric check items are to check waveforms of monitor terminals connected to the front panel of each unit, levels of check terminals, LED displays and dial indicators.
* The check method outlines the check procedures, used measuring instruments and procedures in accordance with the check item tables.
* Adjustment methods explains adjustment methods for parts considered to require adjustments in the checks in accordance with electric check items.
  Use measurement equipment shown in 1.2.1 for adjustments. Confirm that they operate normally before adjustments.
  See the operation guidance for adjustments.

△

Take extra care that some adjustments may

1.3.1 LED

1.3.1.1 LED electric check item table

Table 1.3.1.1-1 LED electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.1.1.1 Check of display state <A>	The [TEST LED] switch of breaker panel is pressed and check the display state of LED. However, CPU Unit is excluded.	Each Unit should be turned on.	See 1.3.1.2.1	-

1.3.1.2 LED checkup method

1.3.1.2.1 Check of LED display state

(1) Used measuring equipment

None

(2) Check method

(2-1) The [TEST LED] switch on the breaker panel(DC) is pressed and check the display state of the LED of each Unit.

However, CPU Unit is excluded.

1.3.2 LCD Unit

1.3.2.1 LCD Unit electric check item table

Table 1.3.2.1-1 LCD Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.2.1.1 Check of display state <A>	Check display state of POWER LED in front of the main body. Check that characters and colors are displayed on the liquid crystal panel.	It should be turned on. It should be displayed. It should correspond to the current operation state of the equipment. No alarm should be displayed.	See 1.3.2.2.1	-

1.3.2.2 LCD Unit checkup method

1.3.2.2.1 Check of LCD Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the POWER LED on the front of the main body.

(2-2) Confirm that characters and colors are displayed on the LCD panel.

The display turns off after definite period of time. If display turned off, touch at any place of the panel, then the display turns on.

(2-3) Confirm that they correspond to the current operation state of the equipment.

(2-4) Confirm no alarm is displayed.

1.3.3 CPU Unit (Controller of DVOR Equipment)

1.3.3.1 CPU Unit electric check item table

Table 1.3.3.1-1 CPU Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.3.1.1 Check of display state <A>	Check display state of the LEDs, [RESET/PW].	[RESET/PW] should be turned on.	See 1.3.3.2.1	-

1.3.3.2 CPU Unit checkup method

1.3.3.2.1 Check of CPU Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [RESET/PW] LED.

1.3.4 IO Unit (Controller of DVOR Equipment)

1.3.4.1 IO Unit electric check item table

Table 1.3.4.1-1 IO Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.4.1.1 Check of display state <A>	Check display state of the LEDs [ALM].	It should be turned off.	See 1.3.4.2.1	-

1.3.4.2 IO Unit checkup method

1.3.4.2.1 Check of IO Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [ALM] LED.

1.3.5 CONT Unit (Controller of DVOR Equipment)

1.3.5.1 CONT Unit electric check item table

Table 1.3.5.1-1 CONT Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.5.1.1 Check of display state <A>	Check display state of the LEDs, [SYS1], [SYS2], [TX1], [TX2], [SPEECH ON/OFF] and [PRI CONT].	It should correspond to the current operation state of the equipment.	See 1.3.5.2.1	-
1.3.5.1.2 Check of display state <A>	Check display state of the LEDs, [ALM], [EXEC ALM], [WRN], [XFR], [SHT DN] and [ALM BYP ON/OFF].	They should be turned off.	See 1.3.5.2.1	-

1.3.5.2 CONT Unit checkup method

1.3.5.2.1 Check of CONT Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [ALM] LED.

(2-2) Check the display state of the [SYS1] LED.

(2-3) Check the display state of the [SYS2] LED.

(2-4) Check the display state of the [TX1] LED.

(2-5) Check the display state of the [TX2] LED.

(2-6) Check the display state of the [EXEC ALM] LED.

(2-7) Check the display state of the [WRN] LED.

(2-8) Check the display state of the [XFR] LED.

(2-9) Check the display state of the [SHT DN] LED.

(2-10) Check the display state of the [ALM BYP ON/OFF] LED.

(2-11) Check the display state of the [SPEECH ON/OFF] LED.

(2-12) Check the display state of the [PRI CONT] LED.

1.3.6 TSG Unit (Controller of DVOR Equipment)

1.3.6.1 TSG Unit test item table

Table 1.3.6.1-1 TSG Unit test item table

Unit name	Test item name	Description
TSG Unit	9960Hz FM	9960Hz FM signal waveform Frequency: 9960±480Hz Output voltage: 0.1-3Vp-p
	OUTPUT	AM waveform of RF signal 9960Hz + 30Hz + ID Output voltage: 0.1-3.0Vp-p
	AM	30Hz AM signal waveform reference phase signal 30Hz demodulation Frequency: 30± 0.5Hz (33± 1msec) Output voltage: 0.1-3.0Vp-p
	9960Hz	9960Hz signal waveform 9960Hz demodulation Frequency: 9960Hz±480 (before FM detection) Output voltage: 0.1-3.0Vp-p
	FM	30Hz FM signal variable phase signal 30Hz demodulation Frequency: 30± 0.5Hz (33± 1msec) (after FM detection) Output voltage: 0.1-3.0Vp-p
	GND	Earth terminal for measurement
	30Hz REF	30Hz AM GATE signal Frequency: 30± 0.5Hz (33± 1msec) Output voltage: 3.4± 1.0V LVTTL
	30Hz VAR	30Hz FM GATE signal Frequency: 30± 0.5Hz (33± 1msec) Output voltage: 3.4± 1.0V LVTTL
	MNT	FPGA configuration maintenance terminal

1.3.6.2 TSG Unit electric check item table

Table 1.3.6.2-1 TSG Unit electric check item table

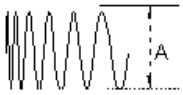
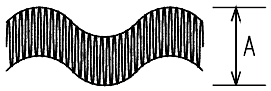
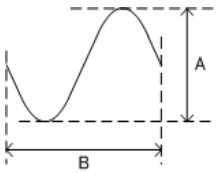
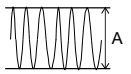
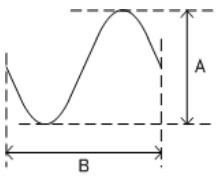
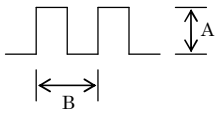
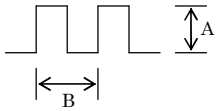
No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.6.2.1 Check of display state <A>	Check display state of the LEDs [TSG ALM].	It should be turned off.	See 1.3.6.3.1	-
1.3.6.2.2 Check of display state <A>	Check display state of the LEDs [OP].	It should correspond to the current operation state of the device.	See 1.3.6.3.1	-
1.3.6.2.3 9960Hz FM signal waveform observation <B>	Observe it on an oscilloscope connected to the front check terminal [9960Hz FM].	 A:0.1-3.0Vp-p	See 1.3.6.3.2	-
1.3.6.2.4 AM waveform of RF signal observation <B>	Observe it on an oscilloscope connected to the front check terminal [OUTPUT].	 A: 0.1-3.0Vp-p	See 1.3.6.3.3	-
1.3.6.2.5 30Hz AM signal waveform observation (Reference phase signal) <B>	Observe it on an oscilloscope connected to the front check terminal [AM].	 A: 0.1-3.0Vp-p B: 33±1ms	See 1.3.6.3.4	-
1.3.6.2.6 9960Hz signal waveform observation <B>	Observe it on an oscilloscope connected to the front check terminal [9960Hz].	 A: 0.1-3.0Vp-p	See 1.3.6.3.5	-
1.3.6.2.7 30Hz FM signal waveform observation (Variable phase signal) <B>	Observe it on an oscilloscope connected to the front check terminal [FM].	 A: 0.1-3.0Vp-p B: 33±1ms	See 1.3.6.3.6	-

Table 1.3.6.2-1 TSG Unit electric check item table (Continued)

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.6.2.8 30Hz AM GATE signal waveform observation <B>	Observe it on an oscilloscope connected to the front check terminal [30Hz REF] (upper side).	 A:3.4±1.0V B:33±1ms	See 1.3.6.3.7	-
1.3.6.2.9 30Hz FM GATE signal waveform observation <B>	Observe it on an oscilloscope connected to the front check terminal [30Hz VAR] (lower side).	 A:3.4±1.0V B:33±1ms	See 1.3.6.3.8	-

1.3.6.3 TSG Unit checkup method

1.3.6.3.1 Check of TSG Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [TSG ALM] LED.

(2-2) Check the display state of the [OP] LED.

1.3.6.3.2 TSG Unit 9960Hz FM signal waveform

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 50 μ sec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [9960Hz FM].

(2-3) Confirm that 9960Hz FM signal waveform is within the setting range with an oscilloscope.

1.3.6.3.3 TSG Unit AM waveform of RF signal

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 200mV/div

(2-2) Connect the oscilloscope to the front check terminal [OUTPUT].

(2-3) Confirm that AM detection waveform of RF signal is within the setting range with an oscilloscope.

1.3.6.3.4 TSG Unit 30Hz AM signal waveform (Reference phase signal)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [AM].

(2-3) Confirm that 30Hz AM signal waveform is within the setting range with an oscilloscope.

1.3.6.3.5 TSG Unit 9960Hz signal waveform

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 20 μ sec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [9960Hz].

(2-3) Confirm that 9960Hz FM signal waveform is within the setting range with an oscilloscope.

1.3.6.3.6 TSG Unit 30Hz FM signal waveform (Variable phase signal)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [FM].

(2-3) Confirm that 30Hz FM signal waveform is within the setting range with an oscilloscope.

1.3.6.3.7 TSG Unit 30Hz AM GATE signal waveform

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 1.0V/div

(2-2) Connect the oscilloscope to the front check terminal [30Hz REF] (upper side).

(2-3) Confirm that 30Hz AM GATE signal waveform is within the setting range with an oscilloscope.

1.3.6.3.8 TSG Unit 30Hz FM GATE signal waveform

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 1.0V/div

(2-2) Connect the oscilloscope to the front check terminal [30Hz VAR] (lower side).

(2-3) Confirm that 30Hz FM GATE signal waveform is within the setting range with the oscilloscope.

1.3.7 MON Unit (Controller of DVOR Equipment)

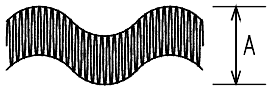
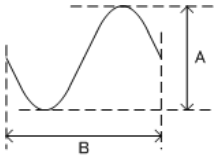
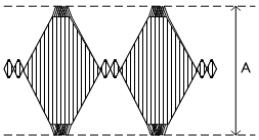
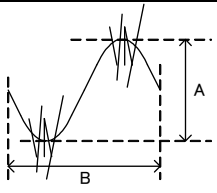
1.3.7.1 MON Unit test item table

Table 1.3.7.1-1 MON Unit test item table

Unit name	Test item name	Description
MON Unit	INPUT	AM detection waveform of RF signal 9960Hz + 30Hz + ID Output voltage: 0.1-3.0Vp-p
	AM	30Hz AM Signal waveform reference phase signal 30Hz demodulation Frequency: 30±0.5Hz (33±1msec) Output voltage: 0.1-3.0Vp-p
	9960Hz	9960Hz FM signal waveform variable phase signal 9960Hz demodulation Frequency: 9960Hz±480 (before FM detection) Output voltage: 0.1-4.0Vp-p
	FM	30Hz FM signal variable phase signal 30Hz demodulation Frequency: 30Hz (after FM detection) Output voltage: 0.1-3.0Vp-p
	GND	Earth terminal for measurement
	MNT	FPGA configuration maintenance terminal

1.3.7.2 MON Unit electric check item table

Table 1.3.7.2-1 MON Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.7.2.1 Check of display state <A>	Check display state of the LEDs [MON ALM].	It should be turned off.	See 1.3.7.3.1	-
1.3.7.2.2 Check of display state <A>	Check display state of the LEDs, [SIG SEL], [ALM BYPASS], [SLF CHK], [BEARING], [RF LVL], [30Hz AM], [9960Hz FM], [FM DEV], [ID] and [OP].	It should correspond to the current operation state of the device.	See 1.3.7.3.1	-
1.3.7.2.3 AM detection waveform of RF signal observation <B>	Observe it on an oscilloscope connected to the front check terminal [INPUT].	 A:0.1-3.0Vp-p	See 1.3.7.3.2	-
1.3.7.2.4 30Hz AM signal waveform observation (Reference phase signal) <B>	Observe it on an oscilloscope connected to the front check terminal [AM].	 A: 0.1-3.0Vp-p B:33±1ms	See 1.3.7.3.3	-
1.3.7.2.5 9960Hz FM signal waveform observation (Variable phase signal) <B>	Observe it on an oscilloscope connected to the front check terminal [9960Hz].	 A:0.1-4.0Vp-p	See 1.3.7.3.4	-
1.3.7.2.6 30Hz FM signal waveform observation (variable phase signal) <B>	Observe it on an oscilloscope connected to the front check terminal [FM].	 A:0.1-3.0Vp-p B:33±1ms	See 1.3.7.3.5	-

1.3.7.3 MON Unit checkup method

Input of MON Unit is switched over to 2 systems of the field monitor and self check.
Change and check [FD] or [SG] in parameter [INPUT MODE] on [MON Page 1] of [Adjustment] screen of LCD Unit.

1.3.7.3.1 Check of MON Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [MON ALM] LED.
(2-2) Check the display state of the [SIG SEL] LED.
(2-3) Check the display state of the [ALM BYPASS] LED.
(2-4) Check the display state of the [SLF CHK] LED.
(2-5) Check the display state of the [BEARING] LED.
(2-6) Check the display state of the [RF LVL] LED.
(2-7) Check the display state of the [30Hz AM] LED.
(2-8) Check the display state of the [9960Hz FM] LED.
(2-9) Check the display state of the [FM DEV] LED.
(2-10) Check the display state of the [ID] LED.
(2-11) Check the display state of the [OP] LED.

1.3.7.3.2 MON Unit AM detection waveform of RF signal

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [INPUT].
(2-3) Confirm that AM detection waveform of RF signal is within the setting range with an oscilloscope.

1.3.7.3.3 MON Unit 30Hz AM signal waveform (Reference phase signal)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [AM].

(2-3) Confirm that 30Hz AM Signal waveform is within the setting range with an oscilloscope.

1.3.7.3.4 MON Unit 9960Hz FM signal waveform (Variable phase signal)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [9960Hz].

(2-3) Confirm that 9960Hz FM signal waveform is within the setting range with an oscilloscope.

1.3.7.3.5 MON Unit 30Hz FM signal waveform (Variable phase signal)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [FM].

(2-3) Confirm that 30Hz FM signal waveform is within the setting range with an oscilloscope.

1.3.8 BMON Unit (Controller of DVOR Equipment)

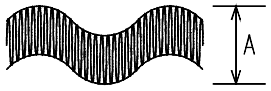
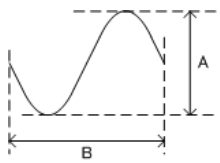
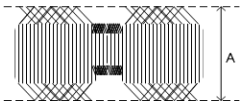
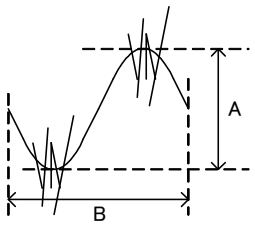
1.3.8.1 BMON Unit test item table

Table 1.3.8.1-1 BMON Unit test item table

Unit name	Test item name	Description
BMON Unit	INPUT	AM detection waveform of RF signal 9960Hz + 30Hz + ID Output voltage: 0.1-3.0Vp-p
	AM	30Hz AM signal waveform reference phase signal 30Hz demodulation Frequency: 30±0.5Hz (33±1msec) Output voltage: 0.1-3.0Vp-p
	9960Hz	9960Hz FM signal waveform variable phase signal 9960Hz demodulation Frequency :9960±480Hz (before FM detection) Output voltage: 0.1-4.0Vp-p
	FM	30Hz FM signal variable phase signal 30Hz demodulation Frequency: 30±0.5Hz (33±1msec) Output voltage: 0.1-3.0Vp-p
	GND	Earth terminal for measurement
	MNT	FPGA configuration maintenance terminal

1.3.8.2 BMON Unit electric check item table

Table 1.3.8.2-1 BMON Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.8.2.1 Check of display state <A>	Check display state of the LEDs [BMON ALM].	It should be turned off.	See 1.3.8.3.1	-
1.3.8.2.2 Check of display state <A>	Check display state of the LEDs, [SIG SEL], [ALM BYPASS], [SLF CHK], [ANT SEL], [BEARING] and [OP].	It should correspond to the current operation state of the device.	See 1.3.8.3.1	-
1.3.8.2.3 AM detection waveform of RF signal observation <B>	Observe it on an oscilloscope connected to the front check terminal [INPUT].	 A:0.1-3.0Vp-p	See 1.3.8.3.2	-
1.3.8.2.4 30Hz AM signal waveform observation (Reference phase signal) <B>	Observe it on an oscilloscope connected to the front check terminal [AM].	 A: 0.1-3.0Vp-p B:33±1ms	See 1.3.8.3.3	-
1.3.8.2.5 9960Hz FM signal waveform observation (Variable phase signal) <B>	Observe it on an oscilloscope connected to the front check terminal [9960Hz].	 A: 0.1-4.0Vp-p -	See 1.3.8.3.4	-
1.3.8.2.6 30Hz FM signal waveform observation (variable phase signal) <B>	Observe it on an oscilloscope connected to the front check terminal [FM].	 A:1.8±1.0Vp-p B:33±1ms	See 1.3.8.3.5	-

1.3.8.3 BMON Unit checkup method

There is a signal of BMON1 and BMON2 for a signal of BMON Unit.
The signal by which a check terminal is output is changed to press the [SIG SEL] switch of the front panel of BMON Unit.
Signal change circumstances are shown to a [SIG SEL] lamp.
When a [SIG SEL] lamp goes off, a check terminal is connected to BMON1, and when lighting up, it is connected to BMON2.
Input of BMON Unit is switched over to 2 systems of the field monitor and self check.
On [BMON] of [Adjustment] screen of LCD Unit, make the set time of parameter [FLD CHK TIMER] or [SELF CHK TIMER] long and check it.

1.3.8.3.1 Check of BMON Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [BMON ALM] LED.
(2-2) Check the display state of the [SIG SEL] LED.
(2-3) Check the display state of the [ALM BYPASS] LED.
(2-4) Check the display state of the [SLF CHK] LED.
(2-5) Check the display state of the [ANT SEL] LED.
(2-6) Check the display state of the [BEARING] LED.
(2-7) Check the display state of the [OP] LED.

1.3.8.3.2 BMON Unit AM detection waveform of RF signal

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [INPUT].
(2-3) Confirm that AM detection waveform of RF signal is within the setting range with an oscilloscope.

1.3.8.3.3 BMON Unit 30Hz AM signal waveform (Reference phase signal)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [AM].

(2-3) Confirm that 30Hz AM signal waveform is within the setting range with an oscilloscope.

1.3.8.3.4 BMON Unit 9960Hz FM signal waveform (Variable phase signal)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [9960Hz].

(2-3) Confirm that 9960Hz FM signal waveform is within the setting range with an oscilloscope.

1.3.8.3.5 BMON Unit 30Hz FM signal waveform (Variable phase signal)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [FM].

(2-3) Confirm that 30Hz FM signal waveform is within the setting range with an oscilloscope.

1.3.9 DRIVE Unit (Controller of DVOR Equipment or Distributor)

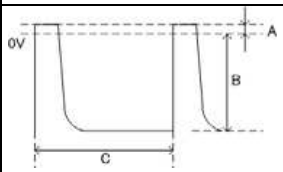
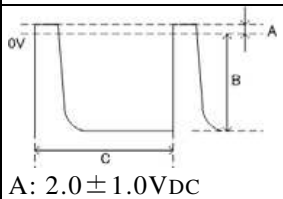
1.3.9.1 DRIVE Unit test item table

Table 1.3.9.1-1 DRIVE Unit test item table

Unit name	Test item name	Description
DRIVE Unit	NO.1/25	Distributor's changeover signal (SIN) to SB Antenna Frequency: 15Hz Changeover time: 1/720 seconds H level: +2±0.8V_{DC} L level: -42±2.0V_{DC}
	NO.2/26	Distributor's changeover signal (COS) to SB Antenna Frequency: 15Hz Changeover time: 1/720 seconds H level: +2±0.8V_{DC} L level: -42±2.0V_{DC}
	GND	Earth terminal for measurement

1.3.9.2 DRIVE Unit electric check item table

Table 1.3.9.2-1 DRIVE Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.9.2.1 Check of display state <A>	Check display state of the LEDs [ALM].	It should be turned off.	See 1.3.9.3.1	-
1.3.9.2.2 Check of display state <A>	Check display state of the LEDs, [SYS1], [SYS2] and [TEST].	It should correspond to the current operation state of the device.	See 1.3.9.3.1	-
1.3.9.2.3 Check the SB ANT 1-48 distributor switching signal output display states. <A>	Check the display state of the front LEDs [SB ANT 1 - 48].	They are turned on when distributor switching signal is generated.	See 1.3.9.3.2	-
1.3.9.2.4 Check SIN 0°and SIN 180° distributor switching signal output display state. <A>	Check the display state of the front LEDs, [S0] and [S180].	The LEDs are turned on when the distributor switching signals (SIN 0°and SIN 180°) are generated.	See 1.3.9.3.3	-
1.3.9.2.5 Check COS 0°and COS 180° distributor switching signal output display state. <A>	Check the display state of the front LEDs, [C0] and [C180].	They are turned on when the distributor switching signals (COS 0°and COS 180°) are generated.	See 1.3.9.3.4	-
1.3.9.2.6 NO.1/25 signal waveform observation <B>	Observe it on an oscilloscope connected to the front check terminal [NO.1/25].	 A: 2.0±1.0VDC B: -43±3.0VDC C: 16.7±0.5msec	See 1.3.9.3.4.5	
1.3.9.2.7 NO.2/26 signal waveform observation <B>	Observe it on an oscilloscope connected to the front check terminal [NO.2/26].	 A: 2.0±1.0VDC B: -43±3.0VDC C: 16.7±0.5msec	See 1.3.9.3.4.6	

1.3.9.3 DRIVE Unit checkup method

1.3.9.3.1 Check of DRIVE Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [ALM] LED.

(2-2) Check the display state of the [SYS1] LED.

(2-3) Check the display state of the [SYS2] LED.

(2-4) Check the display state of the [TEST] LED.

1.3.9.3.2 Check of DRIVE Unit SB ANT1-48 distributor switching signal output display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Confirm that front LEDs [SB ANT 1-48] are evenly turned on.

1.3.9.3.3 Check of DRIVE Unit SIN 0°and SIN 180°distributor switching signal output display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Confirm that both front LEDs [S0] and [S180] are evenly turned on.

1.3.9.3.4 Check of DRIVE Unit COS0°and COS180°distributor switching signal output display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Confirm that both front [C0] and [C180] LEDs are evenly turned on.

1.3.9.3.5 DRIVE Unit NO.1/25 signal waveform

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 2msec/div

Voltage: 10V/div

(2-2) Connect the oscilloscope to the front check terminal [NO.1/25].

(2-3) Confirm that NO.1/25 signal waveform is within the setting range with an oscilloscope.

1.3.9.3.6 DRIVE Unit NO.2/26 signal waveform

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 2msec/div

Voltage: 10V/div

(2-2) Connect the oscilloscope to the front check terminal [NO.2/26].

(2-3) Confirm that NO.2/26 signal waveform is within the setting range with an oscilloscope.

1.3.10 PIN Unit (Controller of DVOR Equipment or Distributor)

1.3.10.1 PIN Unit electric check item table

Table 1.3.10.1-1 PIN Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.10.1.1 Check of display state <A>	Check display state of the LEDs [ALM].	It should be turned off.	See 1.3.10.2.1	-

1.3.10.2 PIN Unit checkup method

1.3.10.2.1 Check of PIN Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [ALM] LED.

1.3.11 MAT Unit (Controller of DVOR Equipment or Distributor)

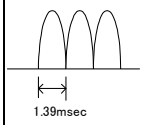
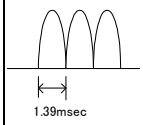
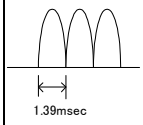
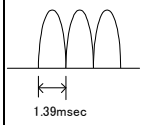
1.3.11.1 MAT Unit test item table

Table 1.3.11.1-1 MAT Unit test item table

Unit name	Test item name	Description
MAT Unit (U10)	SB MON1	LSB SIN signal A wavelength with frequency from 108 to 118MHz Modulation frequency: 720±0.5Hz (1.39ms)
	SB MON2	USB SIN signal A wavelength with frequency from 108 to 118MHz Modulation frequency: 720±0.5Hz (1.39ms)
MAT Unit (U13)	SB MON1	USB COS signal A wavelength with frequency from 108 to 118MHz Modulation frequency: 720±0.5Hz (1.39ms)
	SB MON2	LSB COS signal A wavelength with frequency from 108 to 118MHz Modulation frequency: 720±0.5Hz (1.39ms)

1.3.11.2 MAT Unit electric check item table

Table 1.3.11.2-1 MAT Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.11.2.1 Check of display state <A>	Check display state of the LEDs, [ALM].	It should be turned off.	See 1.3.11.3.1	-
1.3.11.2.2 LSB SIN signal waveform observation (U10) <B>	Check it with an oscilloscope at the front check terminal [SB MON1].		See 1.3.11.3.2	See 1.3.11.4.1
1.3.11.2.3 USB SIN signal waveform observation (U10) <B>	Check it with an oscilloscope at the front check terminal [SB MON2].		See 1.3.11.3.3	See 1.3.11.4.2
1.3.11.2.4 USB COS signal waveform observation (U13) <B>	Check it with an oscilloscope at the front check terminal [SB MON1].		See 1.3.11.3.4	See 1.3.11.4.3
1.3.11.2.5 LSB COS signal waveform observation (U13) <B>	Check it with an oscilloscope at the front check terminal [SB MON2].		See 1.3.11.3.5	See 1.3.11.4.4

1.3.11.3 MAT Unit checkup method

1.3.11.3.1 Check of MAT Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [ALM] LED.

1.3.11.3.2 MAT Unit LSB SIN signal waveform (U10)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front monitor connector [SB MON1].

(2-3) Confirm that LSB SIN signal waveform is normal with the oscilloscope.

1.3.11.3.3 MAT Unit USB SIN signal waveform (U10)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front monitor connector [SB MON2].

(2-3) Confirm that USB SIN signal waveform is normal with the oscilloscope.

1.3.11.3.4 MAT Unit USB COS signal waveform (U13)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front monitor connector [SB MON1].

(2-3) Confirm that USB COS signal waveform is normal with the oscilloscope.

1.3.11.3.5 MAT Unit LSB COS signal waveform (U13)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front monitor connector [SB MON2].

(2-3) Confirm that LSB COS signal waveform is normal with the oscilloscope.

1.3.11.4 MAT Unit adjustment method

1.3.11.4.1 Adjustment of MAT Unit LSB SIN reflective wave power (U10)

(1) Adjust the upper three variable capacitors for input signal matching to minimize the reflective detected voltage level at [REFL] of [LSB.SIN] on the Changeover panel.

1.3.11.4.2 Adjustment of the MAT Unit USB SIN reflective wave power (U10)

(1) Adjust the lower three variable capacitors for input signal matching to minimize the reflective detected voltage level at [REFL] of [USB.SIN] on the Changeover panel.

1.3.11.4.3 Adjustment of MAT Unit USB COS reflective wave power (U13)

(1) Adjust the upper three variable capacitors for input signal matching to minimize the reflective detected voltage level at [REFL] of [USB.COS] on the Changeover panel.

1.3.11.4.4 Adjustment of the MAT Unit LSB COS reflective wave power (U13)

(1) Adjust the lower three variable capacitors for input signal matching to minimize the reflective detected voltage level at [REFL] of [LSB.COS] on the Changeover panel.

1.3.12 DC Unit (Controller of DVOR Equipment and Distributor)

1.3.12.1 DC Unit test item table

Table 1.3.12.1-1 DC Unit test item table

Unit name	Test item name	Description
DC Unit	+5V	+5V output voltage Output voltage: +5.6±0.3V
	+24V	+24V output voltage Output voltage: +24.5±0.5V
	-48V	-48V output voltage Output voltage: -48±2.4V
	GND	Earth terminal for measurement

1.3.12.2 DC Unit electric check item table

Table 1.3.12.2-1 DC Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.12.2.1 Check of display state <A>	Check display state of LEDs, [ALM], [+5V], [+24V] and [-48V].	[ALM] should be turned off. [+5V], [+24V] and [-48V] should be turned on in green.	See 1.3.12.3.1	-
1.3.12.2.2 +5V output voltage <A>	Measure it by connecting a tester to the front check terminal [+5V].	+5.6±0.3V	See 1.3.12.3.2	-
1.3.12.2.3 +24V output voltage <A>	Measure it by connecting a tester to the front check terminal [+24V].	+24.5±0.5V	See 1.3.12.3.3	-
1.3.12.2.4 -48V output voltage <A>	Measure it by connecting a tester to the front check terminal [-48V].	-48±2.4V	See 1.3.12.3.4	-

1.3.12.3 DC Unit checkup method

1.3.12.3.1 Check of DC Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [ALM] LED.

(2-2) Check the display state of the [+5V] LED.

(2-3) Check the display state of the [+24V] LED.

(2-4) Check the display state of the [-48V] LED.

1.3.12.3.2 Check of DC Unit +5V output voltage.

(1) Used measuring equipment

Tester

(2) Check method

(2-1) Measure it with a tester at the front check terminal [+5V].

1.3.12.3.3 Check of DC Unit +24V output voltage.

(1) Used measuring equipment

Tester

(2) Check method

(2-1) Measure it with a tester at the front check terminal [+24V].

1.3.12.3.4 Check of DC Unit -48V output voltage.

(1) Used measuring equipment

Tester

(2) Check method

(2-1) Measure it with a tester at the front check terminal [-48V].

1.3.13 CAR Unit (Transmitter of DVOR Equipment)

1.3.13.1 CAR Unit test item table

Table 1.3.13.1-1 CAR Unit test item table

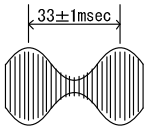
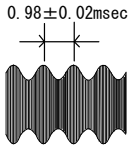
Unit name	Test item name	Description
CAR Unit	RF MON	Carrier signal A wavelength with frequency from 108 to 118MHz Modulation frequency: 30Hz and 1020Hz

△

Don’t set CAR SIG LEVEL as more than

1.3.13.2 CAR Unit electric check item table

Table 1.3.13.2-1 CAR Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.13.2.1 Check of display state <A>	Check display state of the LEDs [ALM].	It should be turned off.	See 1.3.13.3.1	-
1.3.13.2.2 Check of display state <A>	Check display state of the LEDs [OP].	It should correspond to the current operation state of the device.	See 1.3.13.3.1	-
1.3.13.2.3 Carrier signal waveform observation (30Hz) <B>	Measure the front monitor connector [RF MON] with an oscilloscope.	The waveform should be normal.  Modulation depth: 30±2%	See 1.3.13.3.2	-
1.3.13.2.4 Carrier station identification signal waveform observation (1020Hz) <B>	Measure the front monitor connector [RF MON] with an oscilloscope.	The waveform should be normal.  Modulation depth: 8±1%	See 1.3.13.3.3	-

1.3.13.3 CAR Unit checkup method

1.3.13.3.1 Check of CAR Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [ALM] LED.

(2-2) Check the display state of the [OP] LED.

1.3.13.3.2 CAR Unit carrier signal waveform (30Hz)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 10msec/div

Voltage: 200mV/div

(2-2) Open the [Adjustment] screen and then, the [SG] screen of the LCD Unit.

(2-3) Set [SPACE] to the Setup Value column of the Parameter [ID SEL].

(2-4) Connect the oscilloscope to the front monitor connector [RF MON].

(2-5) Confirm that the Carrier signal waveform (30 Hz) is normal with the oscilloscope.

1.3.13.3.3 CAR Unit carrier station identification signal waveform (1020Hz)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 10msec/div

Voltage: 200mV/div

(2-2) Open the [Adjustment] screen and then, the [SG] screen of the LCD Unit.

(2-3) Set [MARK] in the Setup Value column of the Parameter [ID SEL]. Set [0] to the Setup Value column of the Parameter [30Hz MOD].

(2-4) Connect the oscilloscope and the front monitor connector [RF MON].

(2-5) Confirm that the Carrier station identification signal waveform (1020 Hz) is normal with the oscilloscope.

1.3.14 SB Unit (Transmitter of DVOR Equipment)

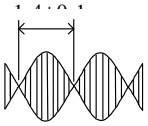
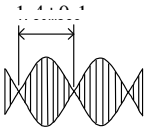
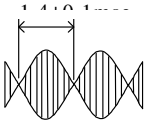
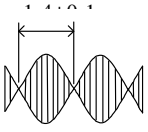
1.3.14.1 SB Unit test item table

Table 1.3.14.1-1 SB Unit test item table

Unit name	Test item name	Description
SB Unit (U3)	SIN RF MON	USB SIN signal A wavelength with frequency from 108 to 118MHz Modulation frequency: 720±0.5Hz (1.39ms)
	COS RF MON	USB COS signal A wavelength with frequency from 108 to 118MHz Modulation frequency: 720±0.5Hz (1.39ms)
SB Unit (U4)	SIN RF MON	LSB SIN signal A wavelength with frequency from 108 to 118MHz Modulation frequency: 720±0.5Hz (1.39ms)
	COS RF MON	LSB COS signal A wavelength with frequency from 108 to 118MHz Modulation frequency: 720±0.5Hz (1.39ms)

1.3.14.2 SB Unit electric check item table

Table 1.3.14.2-1 SB Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.14.2.1 Check of display state <A>	Check display state of the LEDs [ALM]	It should be turned off.	See 1.3.14.3.1	-
1.3.14.2.2 Check of display state <A>	Check display state of the LEDs [OP]	It should correspond to the current operation state of the device.	See 1.3.14.3.1	-
1.3.14.2.3 USB SIN signal waveform observation (U3) <B>	Measure the front monitor connector [SIN RF MON] with an oscilloscope.	The waveform should be normal. 	See 1.3.14.3.2	-
1.3.14.2.4 USB COS signal waveform observation (U3) <B>	Measure the front monitor connector [COS RF MON] with an oscilloscope.	The waveform should be normal. 	See 1.3.14.3.3	-
1.3.14.2.5 LSB SIN signal waveform observation (U4) <B>	Measure the front monitor connector [SIN RF MON] with an oscilloscope.	The waveform should be normal. 	See 1.3.14.3.4	-
1.3.14.2.6 LSB COS signal waveform observation (U4) <B>	Measure the front monitor connector [COS RF MON] with an oscilloscope.	The waveform should be normal. 	See 1.3.14.3.5	-

1.3.14.3 SB Unit checkup method

1.3.14.3.1 Check of SB Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [ALM] LED.

(2-2) Check the display state of the [OP] LED.

1.3.14.3.2 SB Unit USB SIN signal waveform (U3)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 0.5msec/div

Voltage: 200mV/div

(2-2) Connect the oscilloscope to the front monitor connector [SIN RF MON].

(2-3) Confirm that USB SIN signal waveform is normal with the oscilloscope.

1.3.14.3.3 SB Unit USB COS signal waveform (U3)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 0.5msec/div

Voltage: 200mV/div

(2-2) Connect the oscilloscope to the front monitor connector [COS RF MON].

(2-3) Confirm that USB COS signal waveform is normal with the oscilloscope.

1.3.14.3.4 SB Unit LSB SIN signal waveform (U4)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 0.5msec/div

Voltage: 200mV/div

(2-2) Connect the oscilloscope to the front monitor connector [SIN RF MON].

(2-3) Confirm that LSB SIN signal waveform is normal with the oscilloscope.

1.3.14.3.5 SB Unit LSB COS signal waveform (U4)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 0.5msec/div

Voltage: 200mV/div

(2-2) Connect the oscilloscope to the front monitor connector [COS RF MON].

(2-3) Confirm that LSB COS signal waveform is normal with the oscilloscope.

1.3.15 SG Unit (Transmitter of DVOR Equipment)

1.3.15.1 SG Unit test item table

Table 1.3.15.1-1 SG Unit test item table

Unit name	Test item name	Description
SG Unit	30Hz	30Hz AM signal Frequency: 30Hz Output voltage: 4.0±0.5Vp-p
	720Hz	Half-wave sine wave monitor Frequency: 720Hz Output voltage: 1.9±0.5Vp-p
	1020Hz	ID 1020Hz sine wave Frequency: 1020Hz Output voltage: 4.0±0.5Vp-p
	9960Hz	9960Hz Frequency: 9960Hz Output voltage: 2±0.5V LVTTL
	1440Hz FRAME	Distributor frame Frequency: 30Hz pulse Output voltage: 3.3±0.5V LVTTL
	ID KEY	ID modulation monitor output ID tone signal Output voltage: 3.3±0.5V LVTTL
	GND	Earth terminal for measurement
	MNT	FPGA configuration maintenance terminal

1.3.15.2 SG Unit electric check item table

Table 1.3.15.2-1 SG Unit electric check item table

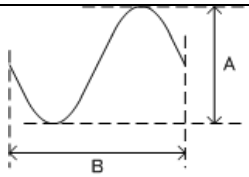
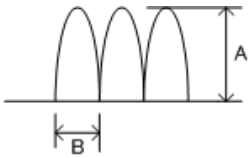
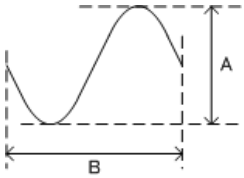
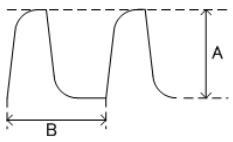
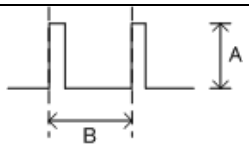
No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.15.2.1 Check of display state <A>	Check display state of the LEDs, [SG ALM] and [RF PWR ALM].	They should be turned off.	See 1.3.15.3.1	-
1.3.15.2.2 Check of display state <A>	Check display state of the LEDs, [SB ANT ALM], [SG TEST], [ID], [ID SEL] and [OP].	It should correspond to the current operation state of the device.	See 1.3.15.3.1	-
1.3.15.2.3 Value of SB LEVEL <A>	Check the front dial value.	Default	See 1.3.15.3.2	See 1.3.15.4.1
1.3.15.2.4 30Hz AM signal waveform observation <B>	Observe it on an oscilloscope connected to the front check terminal [30Hz].	 A:4.0±0.5Vp-p B:33±1msec	See 1.3.15.3.3	-
1.3.15.2.5 Half-wave sine wave signal waveform observation <B>	Check it with an oscilloscope at the front check terminal [720Hz].	 A:1.9±0.5Vp-p B:1.4±0.1msec	See 1.3.15.3.4	-
1.3.15.2.6 1020Hz(ID) signal waveform observation <B>	Check it with an oscilloscope at the front check terminal [1020Hz].	 A:4.0±0.5Vp-p B:0.98±0.02msec	See 1.3.15.3.5	-
1.3.15.2.7 9960Hz FM signal waveform observation <B>	Observe it on an oscilloscope connected to the front check terminal [9960Hz].	 A:2.0±0.5V B:100±2μsec	See 1.3.15.3.6	-

Table 1.3.15.2-1 SG Unit electric check item table (Continued)

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.15.2.8 Phase control pulse signal <B>	Check it with an oscilloscope at the front check terminal [1440Hz FRAME].	 A:3.3±0.5V B:33±1msec	See 1.3.15.3.7	-
1.3.15.2.9 ID tone signal waveform observation <B>	Check it with an oscilloscope at the front check terminal [ID KEY].	 A:3.3±0.5V	See 1.3.15.3.8	-

1.3.15.3 SG Unit checkup method

1.3.15.3.1 Check of SG Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [SG ALM] LED.

(2-2) Check the display state of the [RF PWR ALM] LED.

(2-3) Check the display state of the [SB ANT ALM] LED.

(2-4) Check the display state of the [SG TEST] LED.

(2-5) Check the display state of the [ID] LED.

(2-6) Check the display state of the [ID SEL] LED.

(2-7) Check the display state of the [OP] LED.

1.3.15.3.2 SG Unit SB LEVEL

(1) Used measuring equipment

None

(2) Check method

(2-1) Confirm that SB LEVEL is set to the default.

1.3.15.3.3 SG Unit 30Hz AM signal waveform

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 5msec/div

Voltage: 1V/div

(2-2) Connect the oscilloscope to the front check terminal [30Hz].

(2-3) Confirm that 30Hz AM signal waveform is within the setting range with an oscilloscope.

1.3.15.3.4 SG Unit Half-wave sine wave signal waveform

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 500 μ sec/div

Voltage: 500mV/div

(2-2) Connect the oscilloscope to the front check terminal [720Hz].

(2-3) Confirm that Half-wave sine wave signal waveform is within the setting range with an oscilloscope.

1.3.15.3.5 SG Unit 1020Hz(ID) signal waveform

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 200 μ sec/div

Voltage: 1V/div

(2-2) Connect the oscilloscope to the front check terminal [1020Hz].

(2-3) Confirm that 1020Hz(ID) signal waveform is within the setting range with an oscilloscope.

1.3.15.3.6 SG Unit 9960Hz FM signal waveform

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 0.5msec/div

Voltage: 50mV/div

(2-2) Connect the oscilloscope to the front check terminal [9960Hz].

(2-3) Confirm that 9960Hz FM signal waveform is within the setting range with an oscilloscope.

1.3.15.3.7 SG Unit phase control pulse signal waveform

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 0.5msec/div

Voltage: 50mV/div

(2-2) Connect the oscilloscope to the front check terminal [1440Hz FRAME].

(2-3) Confirm that phase control pulse signal waveform is within the setting range with an oscilloscope.

1.3.15.3.8 SG Unit ID tone signal waveform

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 0.5msec/div

Voltage: 50mV/div

(2-2) Connect the oscilloscope to the front check terminal [ID KEY].

(2-3) Confirm that ID tone signal waveform is within the setting range with an oscilloscope.

1.3.15.4 SG Unit adjustment method

1.3.15.4.1 SG Unit SB LEVEL

(1) Open the [Maintenance Measurement] screen and then, the [MON] screen of the LCD Unit.

(2) Turn the front dial watching the [9960Hz FM MOD].

1.3.16 TX DC Unit (Transmitter of DVOR Equipment)

1.3.16.1 TX DC Unit test item table

Table 1.3.16.1-1 TX DC Unit test item table

Unit name	Test item name	Description
TX DC Unit	+48V	+48V output voltage Output voltage: +48±2.4V
	+24V	+24V output voltage Output voltage: +24±1.2V
	GND	Earth terminal for measurement

1.3.16.2 TX DC Unit electric check item table

Table 1.3.16.2-1 TX DC Unit electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.16.2.1 Check of display state <A>	Check display state of LEDs [ALM] and [+48V].	[ALM] should be turned off. [+48V] should be turned on in green.	See 1.3.16.3.1	-
1.3.16.2.2 +48V output voltage <A>	Measure it by connecting a tester to the front check terminal [+48V].	+48±2.4V	See 1.3.16.3.2	-
1.3.16.2.3 +24V output voltage <A>	Measure it by connecting a tester to the front check terminal [+24V].	+24±1.2V	See 1.3.16.3.3	-

1.3.16.3 TX DC Unit checkup method

1.3.16.3.1 Check of TX DC Unit display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [ALM] LED.

(2-2) Check the display state of the [+48V] LED.

1.3.16.3.2 Check of TX DC Unit +48V output voltage

(1) Used measuring equipment

Tester

(2) Check method

(2-1) Measure it with a tester at the front check terminal [+48V].

1.3.16.3.3 Check of TX DC Unit +24V output voltage

(1) Used measuring equipment

Tester

(2) Check method

(2-1) Measure it with a tester at the front check terminal [+24V].

1.3.17 Changeover of DVOR Equipment

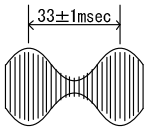
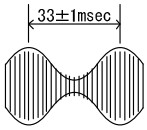
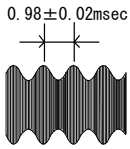
1.3.17.1 Changeover test item table

Table 1.3.17.1-1 Changeover test item table

Unit name	Test item name	Description
Changeover	FWD RF MON	Carrier signal (operating transmitter) A wavelength with frequency from 108 to 118MHz Modulation frequency: 30Hz and 1020Hz (There is [FWD RF MON] of test item after Model No.SR5042C.)
	STBY RF MON	Carrier signal (standby transmitter) A wavelength with frequency from 108 to 118MHz Modulation frequency: 30Hz and 1020Hz
	U BEAT SIN	USB SIN beat frequency signal waveform Frequency: 9960Hz
	U BEAT COS	USB COS beat frequency signal waveform Frequency: 9960Hz
	L BEAT SIN	LSB SIN beat frequency signal waveform Frequency: 9960Hz
	L BEAT COS	LSB COS beat frequency signal waveform Frequency: 9960Hz

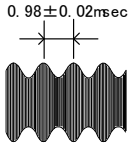
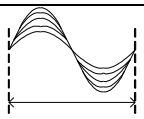
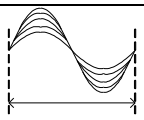
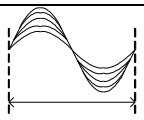
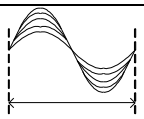
1.3.17.2 Changeover electric check item table

Table 1.3.17.2-1 Changeover electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.17.2.1 Check of display state <A>	Check display state of the LEDs [ALM].	It should be turned off.	See 1.3.17.3.1	-
1.3.17.2.2 PH OFFSET value <A>	Check the front [PH OFFSET] value.	Default	See 1.3.17.3.2	See 1.3.17.4.1
1.3.17.2.3 Listening to ID. <A>	Adjust the [VOL] volume. Listen to the ID tone from the speaker.	It should correspond to the station code of each airport.	See 1.3.17.3.3	-
1.3.17.2.4 Carrier signal waveform of transmission system observation (30Hz) <B>	Measure the front monitor connector [FWD RF MON] with an oscilloscope. (*1)	The waveform should be normal.  Modulation depth: 30±2%	See 1.3.17.3.4	-
1.3.17.2.5 Carrier signal waveform of stand-by transmission system observation (30Hz) <B>	Measure the front monitor connector [STBY RF MON] with an oscilloscope.	The waveform should be normal.  Modulation depth: 30±2%	See 1.3.17.3.5	-
1.3.17.2.6 Carrier station identification signal waveform of transmission system observation (1020Hz) <B>	Measure the front monitor connector [FWD RF MON] with an oscilloscope. (*1)	The waveform should be normal.  Modulation depth: 8±1%	See 1.3.17.3.6	-

(*1) Do not carry out this procedure in operation.

Table 1.3.17.2-1 Changeover electric check item table (Continued)

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.17.2.7 Carrier station identification signal waveform of stand-by transmission system observation (1020Hz) <B>	Measure the front monitor connector [STBY RF MON] with an oscilloscope.	The waveform should be normal.  Modulation depth: 8±1%	See 1.3.17.3.7	-
1.3.17.2.8 USB SIN beat frequency signal waveform observation (9960Hz) <B>	Measure the front monitor connector [U BEAT SIN] with an oscilloscope.	 A:100±2μsec	See 1.3.17.3.8	-
1.3.17.2.9 USB COS beat frequency signal waveform observation (9960Hz) <B>	Measure the front monitor connector [U BEAT COS] with an oscilloscope.	 A:100±2μsec	See 1.3.17.3.9	-
1.3.17.2.10 LSB SIN beat frequency signal waveform observation (9960Hz) <B>	Measure the front monitor connector [L BEAT SIN] with an oscilloscope.	 A:100±2μsec	See 1.3.17.3.10	-
1.3.17.2.11 LSB COS beat frequency signal waveform observation (9960Hz) <B>	Measure the front monitor connector [L BEAT COS] with an oscilloscope.	 A:100±2μsec	See 1.3.17.3.11	-

1.3.17.3 Changeover checkup method

1.3.17.3.1 Check of Changeover display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the display state of the [ALM] LED.

1.3.17.3.2 Changeover PH OFFSET value

(1) Used measuring equipment

None

(2) Check method

(2-1) Confirm that the default is set to the [PH OFFSET] dial.

1.3.17.3.3 Listening to the changeover ID

(1) Used measuring equipment

None

(2) Check method

(2-1) Adjust the [VOL] volume. Confirm that the ID tones sound and they corresponds to each station code.

1.3.17.3.4 Changeover carrier signal waveform of transmission system (30Hz)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 10msec/div

Voltage: 200mV/div

(2-2) Open the [Adjustment] screen and then, the [SG] screen of the LCD Unit.

(2-3) Set [SPACE] to the Setup Value column of the Parameter [ID SEL].

(2-4) Connect the oscilloscope to the front monitor connector [FWD RF MON].

(2-5) Confirm that the Carrier signal waveform of transmission system (30Hz) is normal with the oscilloscope.

1.3.17.3.5 Changeover carrier signal waveform of stand-by transmission system (30Hz)

Confirmation method of a checked transmitter is indicated below.

An opposite transmitter is turned on and turned off. [XMTR TEST (STBY)] of a checked transmitter is turned on.

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 10msec/div

Voltage: 200mV/div

(2-2) Open the [Adjustment] screen and then, the [SG] screen of the LCD Unit.

(2-3) Set [SPACE] to the Setup Value column of the Parameter [ID SEL].

(2-4) Connect the oscilloscope to the front monitor connector [STBY RF MON].

(2-5) Confirm that the Carrier signal waveform of stand-by transmission system (30Hz) is normal with the oscilloscope.

1.3.17.3.6 Changeover carrier station identification signal waveform of transmission system (1020Hz)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 10msec/div

Voltage: 200mV/div

(2-2) Open the [Adjustment] screen and then, the [SG] screen of the LCD Unit.

(2-3) Set [MARK] in the Setup Value column of the Parameter [ID SEL]. Set [0] to the Setup Value column of the Parameter [30Hz MOD].

(2-4) Connect the oscilloscope and the front monitor connector [FWD RF MON].

(2-5) Confirm that the carrier station identification signal waveform of transmission system (1020Hz) is normal with the oscilloscope.

△

~~Do not carry out 1.3.17.3.4~~ and 1.3.17.3.6 in operation.

1.3.17.3.7 Changeover carrier station identification signal waveform of stand-by transmission system (1020Hz)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 10msec/div

Voltage: 200mV/div

(2-2) Open the [Adjustment] screen and then, the [SG] screen of the LCD Unit.

(2-3) Set [MARK] in the Setup Value column of the Parameter [ID SEL]. Set [0] to the Setup Value column of the Parameter [30Hz MOD].

(2-4) Connect the oscilloscope and the front monitor connector [STBY RF MON].

(2-5) Confirm that the carrier station identification signal waveform of stand-by transmission system (1020Hz) is normal with the oscilloscope.

1.3.17.3.8 Changeover USB SIN beat frequency signal waveform (9960Hz)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 2 μ sec/div

Voltage: 2V/div

(2-2) Connect the oscilloscope to the front monitor connector [U BEAT SIN].

(2-3) Confirm that USB SIN beat frequency signal waveform is normal with the oscilloscope.

1.3.17.3.9 Changeover USB COS beat frequency signal waveform (9960Hz)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 2 μ sec/div

Voltage: 2V/div

(2-2) Connect the oscilloscope to the front monitor connector [U BEAT COS].

(2-3) Confirm that USB COS beat frequency signal waveform is normal with the oscilloscope.

1.3.17.3.10 Changeover LSB SIN beat frequency signal waveform (9960Hz)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 2 μ sec/div

Voltage: 2V/div

(2-2) Connect the oscilloscope to the front monitor connector [L BEAT SIN].

(2-3) Confirm that LSB SIN beat frequency signal waveform is normal with the oscilloscope.

1.3.17.3.11 Changeover LSB COS beat frequency signal waveform (9960Hz)

(1) Used measuring equipment

Oscilloscope

(2) Check method

(2-1) Set the range of an oscilloscope as follows:

Time: 2 μ sec/div

Voltage: 2V/div

(2-2) Connect the oscilloscope to the front monitor connector [L BEAT COS].

(2-3) Confirm that LSB COS beat frequency signal waveform is normal with the oscilloscope.

1.3.17.4 Changeover adjustment method

1.3.17.4.1 Changeover sideband signal (stand-by system) high-frequency phase adjustment

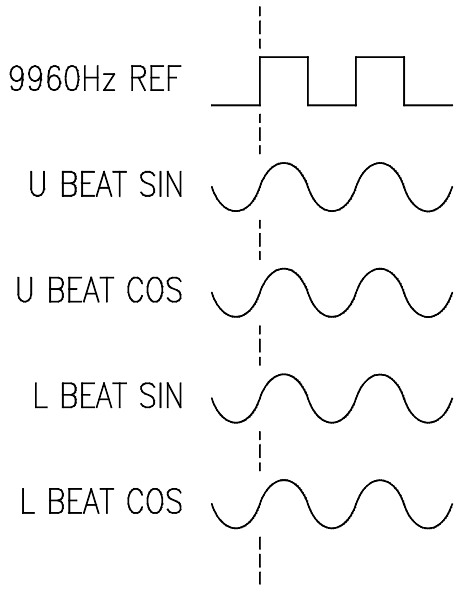
(1) Connect an oscilloscope (CH1) to the check terminal [9960Hz] on the anterior aspect of the SG Unit.

(2) Open the [Adjustment] screen and then, the [SG Page2] screen of the LCD Unit.

(3) Set [MOD OFF] in the Setup Value column of the Parameter [SB MOD SEL]. Press [OK].

(4) Connect an oscilloscope (CH2) to the monitor connector [U BEAT SIN], [U BEAT COS], [L BEAT SIN] or [L BEAT COS] on the anterior aspect of the Changeover.

(5) Adjust the Changeover [PH OFFSET] dial value so that the rising edges of the waveforms shown below become the same as 9960Hz REF.



(6) BEAT frequency signals are staggered to each other.

(6-1) Open the [Adjustment] screen and then, [SG] screen of the LCD Unit.

(6-2) Change the set value in the Setup Value column of the parameter [USB SIN PHASE], [USB COS PHASE], [LSB SIN PHASE] or [LSB COS PHASE] so that the disagreement is eliminated. Then, press the [OK].

1.3.18 CAR Antenna

1.3.18.1 CAR Antenna electric check item table

Table 1.3.18.1-1 CAR Antenna electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.18.1.1 VSWR <B>	Measure the forward wave power and reflective wave power with an LCD unit.	VSWR: 1.2 or less	See 1.3.18.2.1	See 1.3.18.3.1
1.3.18.1.2 Insulation resistance of individual units <E>	Measure the insulation resistance between the antenna element and the post with a resistance meter.	50 MΩ or more.	See 1.3.18.2.2	-

1.3.18.2 CAR Antenna checkup method

1.3.18.2.1 CAR Antenna VSWR

(1) Used measuring equipment

None

(2) Check method

(2-1) Open the [Maintenance Measurement] screen and then, [CHANGEOVER] screen of the LCD Unit.

(2-2) Measure the Carrier forward wave power of the Parameter [CARR FWD PWR] and Carrier reflective wave power of the Parameter [CARR REFL PWR].

(2-3) Obtain VSWR from the following equation based on the ratio between the forward wave power and reflective wave power. Confirm that VSWR is within the setting range.

$$VSWR = \frac{1 + \sqrt{\Phi}}{1 - \sqrt{\Phi}} \qquad \Phi = \frac{\text{reflective wave power}}{\text{forward wave power}}$$

1.3.18.2.2 Insulation resistance of individual CAR Antennas

(1) Used measuring equipment

Insulation-resistance meter

(2) Check method

(2-1) Set LOCAL with [REMOTE/LOCAL] switch on the LCD display. Stop transmitting with the [SHT DN] switch.

(2-2) Turn off the Transmitter TX DC Unit [POWER] switch.

(2-3) Turn off the Controller DC Unit [POWER] switch.

(2-4) Turn off all power switches of the breaker panel.

(2-5) Remove the fixation screws of the radar dome of the CAR Antenna. Remove the cover.

(2-6) Connect the Alford antenna element main body to the post with the insulation-resistance meter. Confirm that the reading of the insulation-resistance meter is within the setting range.

1.3.18.3 CAR Antenna adjustment method

1.3.18.3.1 CAR Antenna VSWR adjustment

Connect a wattmeter to the input of the CAR antenna. Connect the phase shifter A and B instead of the input cable (W2) and open stub (W3) as shown in Figure 1.3.18.3-1. Supply RF power from the CAR Unit. Adjust the phase shifter A and B. Measure the forward wave power and reflective wave power with a wattmeter. Obtain VSWR from the following equation. If VSWR is 1.05 or less, measure the length of the phase shifter A and B to make cables. Make cables referring to the length of conventional cables.

$$\text{VSWR} = \left(1 + \sqrt{\frac{\text{Reflective wave power}}{\text{Forward wave power}}}\right) \div \left(1 - \sqrt{\frac{\text{Reflective wave power}}{\text{Forward wave power}}}\right)$$

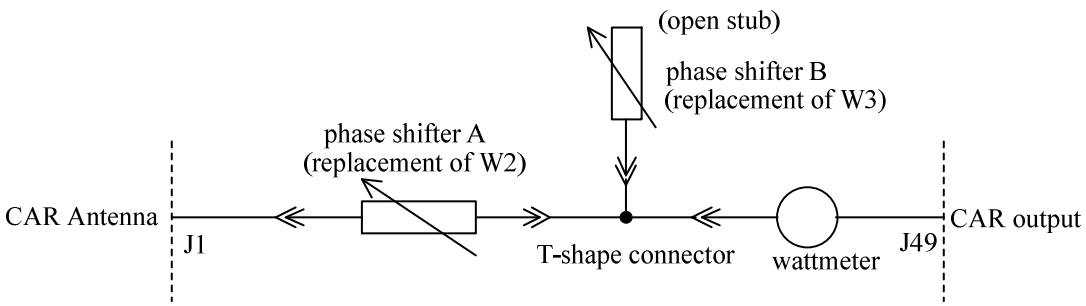


Figure 1.3.18.3-1 VSWR adjustment method

1.3.19 SB Antenna

1.3.19.1 SB Antenna electric check item table

Table 1.3.19.1-1 SB Antenna electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.19.1.1 Insulation resistance of individual units <E>	Measure the insulation resistance between the antenna element and the post with a resistance meter.	50 MΩ or more.	See 1.3.19.2.1	-

1.3.19.2 SB Antenna checkup method

1.3.19.2.1 Insulation resistance of individual SB Antennas

(1) Used measuring equipment

Insulation-resistance meter

(2) Check method

(2-1) Set LOCAL with [REMOTE/LOCAL] switch on the LCD display. Stop transmitting with the [SHT DN] switch.

(2-2) Turn off the Transmitter TX DC Unit [POWER] switch.

(2-3) Turn off the Controller DC Unit [POWER] switch.

(2-4) Turn off all power switches of the breaker panel.

(2-5) Remove the fixation screws of the radome of the SB Antenna. Remove the cover.

(2-6) Connect the Alford antenna element main body to the post with the insulation-resistance meter. Confirm that the reading of the insulation-resistance meter is within the setting range.

1.3.20 RCMS

1.3.20.1 RCMS electric check item table

Table 1.3.20.1-1 RCMS electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.20.1.1 Check of display state <S>	Check that characters and colors are displayed on the liquid crystal panel.	It should be displayed. It should correspond to the current operation state of the device. No alarm should be displayed	See 1.3.20.2.1	

1.3.20.2 RCMS checkup method

1.3.20.2.1 Check of RCMS display state

(1) Used measuring equipment

None

(2) Check method

(2-1) Confirm that characters and colors are displayed on the LCD panel.

(2-2) Confirm that they correspond to the current operation state of the device.

(2-3) Confirm no alarm is displayed.

1.3.21 NAV Panel

1.3.21.1 NAV Panel electric check item table

Table 1.3.21.1-1 NAV Panel electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.21.1.1 Check of display state <S>	The [TEST] switch of front panel is pressed and check the display state of LED and the Buzzer sound.	LEDs should be turned on. Buzzer should sound.	See 1.3.20.2.1	-

1.3.21.2 NAV Panel checkup method

1.3.21.2.1 Check of NAV Panel display and buzzer state

(1) Used measuring equipment

None

(2) Check method

(2-1) The [TEST] switch of front panel is pressed and check the display state of the LEDs (Except BUZ OFF indicator) and the Buzzer sound.

1.3.22 Cable

1.3.22.1 Connection cable electric check item table

Table 1.3.22.1-1 Connection cable electric check item table

No./Item/Category	Outline of check	Setting criteria	Check method	Adjustment method
1.3.22.1.1 Check the connection cables <E>	Confirm that cables connected to each device have no loosening, rust, discoloration. Specially, check loosening and damages of the coaxial system.	They should be normal.	See 1.3.22.2.1	-

1.3.22.2 Connecting cable checkup method

1.3.22.2.1 Check of the connecting cables

(1) Used measuring equipment

None

(2) Check method

(2-1) Confirm that cables connected to each device have no loosening, rust and discoloration. Above all, carefully check loosening and damages of the coaxial system.

1.4 Each Unit initial setting

1.4.1 Back board for Controller initial setting

Initial setting of back board for Controller switches are shown as follows:

Table 1.4.1-1 **Initial setting of back board for controller**

No.	Circuit symbol	Function	Setting
1	E1	For test	E1:ALL OPEN
2	E2	For test	E2:ALL OPEN
3	E11	For test	E11:ALL OPEN
4	E12	For test	E12:ALL OPEN

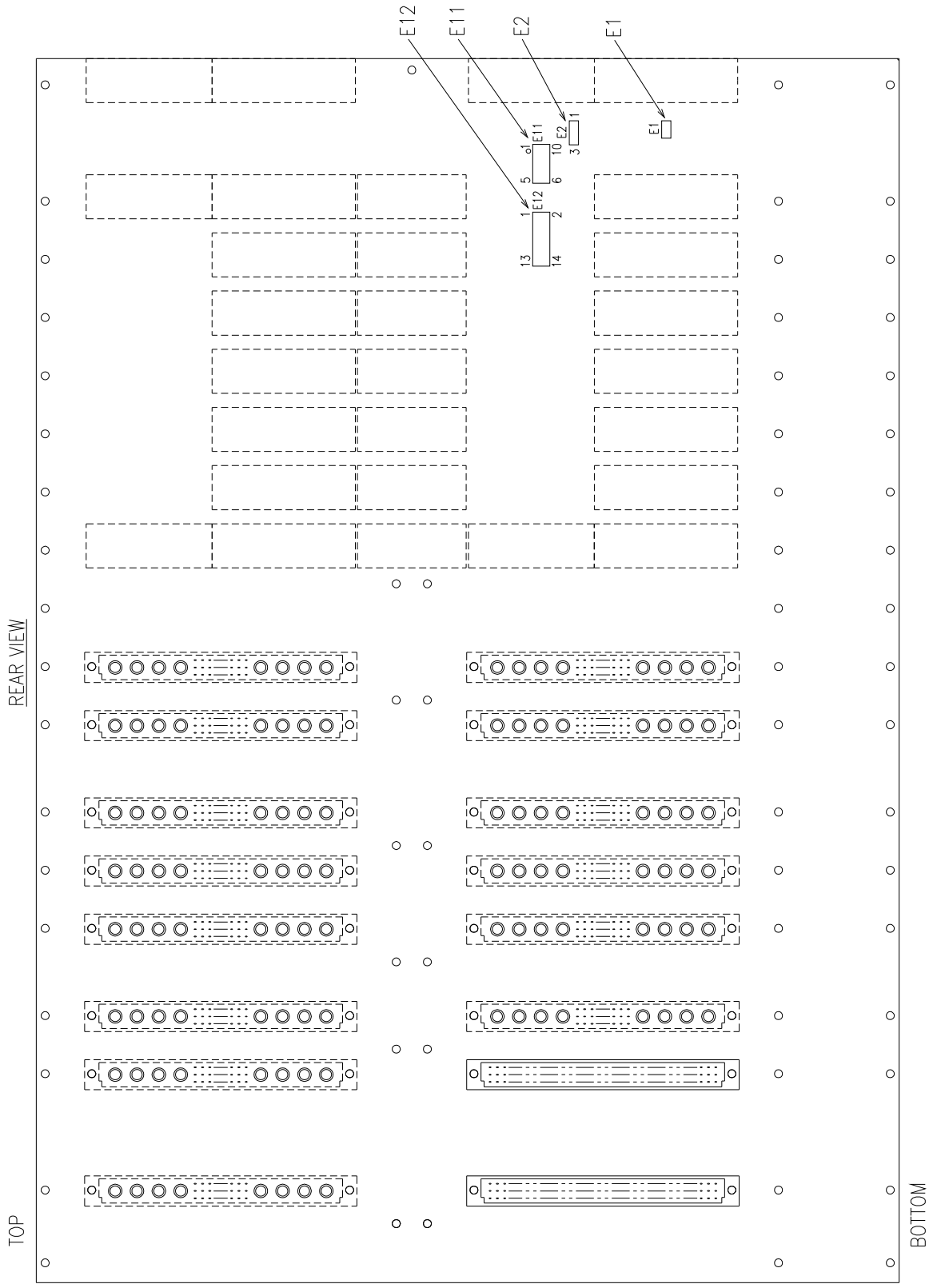


Figure 1.4.1-2 Back board for CONTROLLER

1.4.2 CPU Unit initial setting

1.4.2.1 CPU Board initial setting

(1) Initial setting of CPU board switches are shown as follows:

Table 1.4.2.1 Initial setting of CPU board

No.	Circuit symbol	Function	Setting
1	SW4	USER DIPSW It doesn't relate to the movement of hardware though it is a dip switch that can be used by the user application.	SW4:ALL OFF
2	CN16	Use prohibition For USB DOM connectors	CN16:ALL OPEN

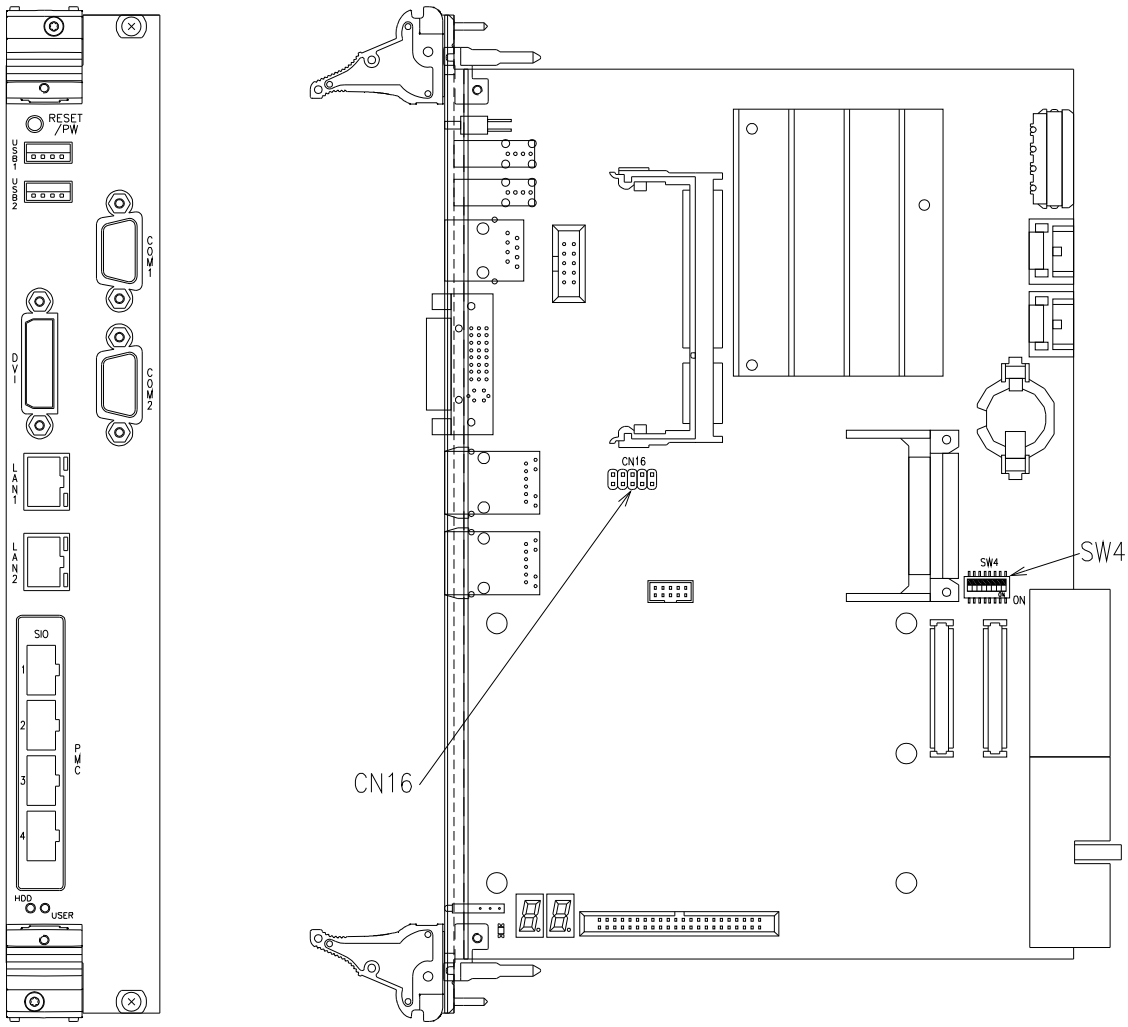


Figure 1.4.2.1 Setting position CPU Board

1.4.2.2 I/O Board initial setting

Initial setting of I/O board switches are shown as follows:

Table 1.4.2.2 Initial setting of I/O Board

<table>
<tr><th>No.</th><th>Circuit symbol</th><th>Function</th><th>Setting</th></tr>
<tr><td>1</td><td>S1 to S8</td><td>Serial interface setting (SIO1)
<table><tr><th>Switch</th><th>RS-232C</th><th>RS-422</th><th>RS-485</th></tr><tr><td>S1 to S5</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>S6 to S8</td><td>ON</td><td>ON</td><td>OFF</td></tr></table></td><td>SIO1 RS232C communication
S1:ON(232)
S2:ON(232)
S3:ON(232)
S4:ON(232)
S5:ON(232)
S6:ON(422)
S7:ON(422)
S8:ON(422)</td></tr>
<tr><td>2</td><td>S9 to S16</td><td>Serial interface setting (SIO2)
<table><tr><th>Switch</th><th>RS-232C</th><th>RS-422</th><th>RS-485</th></tr><tr><td>S9 to S13</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>S14 to S16</td><td>ON</td><td>ON</td><td>OFF</td></tr></table></td><td>SIO2 RS232C communication
S9:ON(232)
S10:ON(232)
S11:ON(232)
S12:ON(232)
S13:ON(232)
S14:ON(422)
S15:ON(422)
S16:ON(422)</td></tr>
<tr><td>3</td><td>S17 to S24</td><td>Serial interface setting (SIO3)
<table><tr><th>Switch</th><th>RS-232C</th><th>RS-422</th><th>RS-485</th></tr><tr><td>S17 to S21</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>S22 to S24</td><td>ON</td><td>ON</td><td>OFF</td></tr></table></td><td>SIO3 RS232C communication
S17:ON(232)
S18:ON(232)
S19:ON(232)
S20:ON(232)
S21:ON(232)
S22:ON(422)
S23:ON(422)
S24:ON(422)</td></tr>
<tr><td>4</td><td>S25 to S32</td><td>Serial interface setting (SIO4)
<table><tr><th>Switch</th><th>RS-232C</th><th>RS-422</th><th>RS-485</th></tr><tr><td>S25 to S29</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>S30 to S32</td><td>ON</td><td>ON</td><td>OFF</td></tr></table></td><td>SIO4 RS232C communication
S25:ON(232)
S26:ON(232)
S27:ON(232)
S28:ON(232)
S29:ON(232)
S30:ON(422)
S31:ON(422)
S32:ON(422)</td></tr>
</table>

Table 1.4.2.2 Initial setting of I/O Board (Continued)

<table>
<tr><th>No.</th><th>Circuit symbol</th><th>Function</th><th>Setting</th></tr>
<tr><td>5</td><td>S33</td><td>Serial port terminating resistor setting</td><td>SIO1 to SIO4 termination ON
S33 Bit1(SIO1):ON
S33 Bit2(SIO2):ON
S33 Bit3(SIO3):ON
S33 Bit4(SIO4):ON</td></tr>
<tr><td>6</td><td>S34</td><td>Board ID setting
<table>
<tr><th>Board ID</th><th>Bit</th><th>ON/OFF</th></tr>
<tr><td rowspan="4">0</td><td>1</td><td>OFF</td></tr>
<tr><td>2</td><td>OFF</td></tr>
<tr><td>3</td><td>OFF</td></tr>
<tr><td>4</td><td>OFF</td></tr>
<tr><td rowspan="4">1</td><td>1</td><td>ON</td></tr>
<tr><td>2</td><td>OFF</td></tr>
<tr><td>3</td><td>OFF</td></tr>
<tr><td>4</td><td>OFF</td></tr>
</table></td><td>Board ID:0
S34 Bit1:OFF
S34 Bit2:OFF
S34 Bit3:OFF
S34 Bit4:OFF</td></tr>
</table>

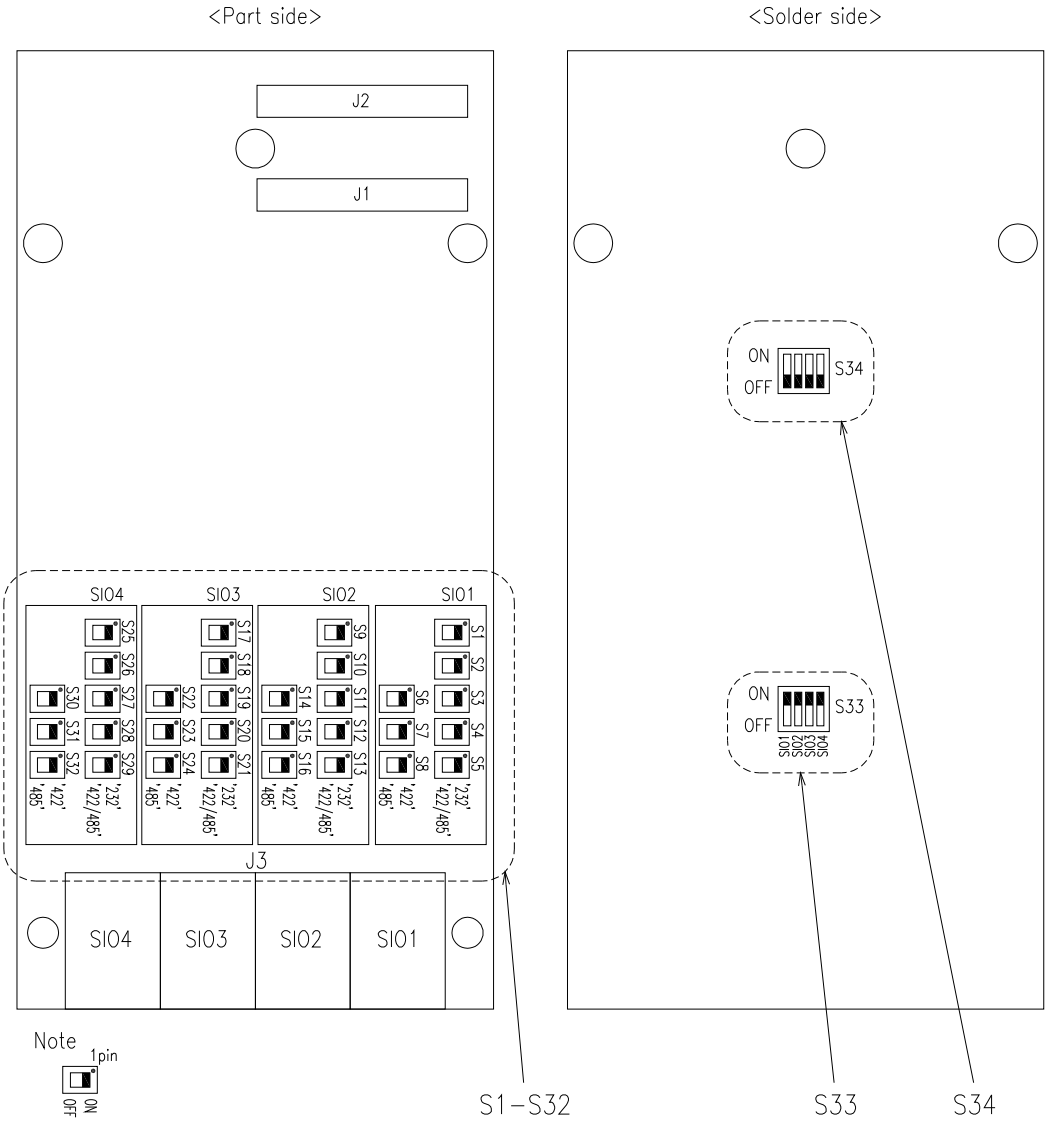


Fig1.4.2.2 Setting position of I/O Board

1.4.3 IO Unit initial setting

Initial setting of IO Unit switches are shown as follows:

Table 1.4.3.1 Initial setting of IO Unit

<table>
<tr><th>No.</th><th>Circuit symbol</th><th>Function</th><th>Setting</th></tr>
<tr><td>1</td><td>E1</td><td>PLX TRST select</td><td>E1:1-2 CONNECTED</td></tr>
<tr><td>2</td><td>E2</td><td>Configmode select</td><td>E2:1-8 CONNECTED
E2:2-7 CONNECTED
E2:3-6 CONNECTED
E2:4-5 OPEN</td></tr>
<tr><td>3</td><td>E3</td><td>IO WDT TEST</td><td>E3:1-2 CONNECTED</td></tr>
<tr><td>4</td><td>E4</td><td>For test</td><td>E4:1-2 CONNECTED</td></tr>
<tr><td>5</td><td>E5</td><td>PLX J-TAG Chain select</td><td>E5:ALL OPEN</td></tr>
<tr><td>6</td><td>E6</td><td>For test</td><td>E6:1-12 CONNECTED
E6:2-11 CONNECTED
E6:3-10 CONNECTED
E6:4-9 CONNECTED
E6:5-8 CONNECTED
E6:6-7 CONNECTED</td></tr>
<tr><td>7</td><td>E7</td><td>BD select</td><td>E7:ALL OPEN</td></tr>
<tr><td>8</td><td>J7</td><td>For test</td><td>J7:ALL OPEN</td></tr>
<tr><td>9</td><td>S4</td><td>Mode select switch setting
<table>
<tr><th colspan="2">S4 setting</th><th>Setting</th></tr>
<tr><td>1</td><td>For test</td><td>OFF</td></tr>
<tr><td rowspan="2">2</td><td>Standard Type</td><td>OFF</td></tr>
<tr><td>Mountaintop Type</td><td>ON</td></tr>
<tr><td>3</td><td>For test</td><td>OFF</td></tr>
<tr><td>4</td><td>For test</td><td>OFF</td></tr>
<tr><td>5</td><td>For test</td><td>OFF</td></tr>
<tr><td>6</td><td>For test</td><td>OFF</td></tr>
<tr><td>7</td><td>For test</td><td>OFF</td></tr>
<tr><td>8</td><td>For test</td><td>OFF</td></tr>
</table></td><td>Mode select

S4:1 OFF
S4:2 OFF or ON
S4:3 OFF
S4:4 OFF
S4:5 OFF
S4:6 OFF
S4:7 OFF
S4:8 OFF</td></tr>
<tr><td>10</td><td>S8</td><td>Critical data acquired period setting
see (Note 1).</td><td>S8:ALL OFF</td></tr>
<tr><td>11</td><td>S9</td><td>For test</td><td>S9:ALL OFF</td></tr>
<tr><td>12</td><td>S1</td><td>LED select for test</td><td>S1:0</td></tr>
<tr><td>13</td><td>S2</td><td>LED select for test</td><td>S2:0</td></tr>
<tr><td>14</td><td>S6</td><td>For test</td><td>S6:0</td></tr>
<tr><td>15</td><td>S7</td><td>For test</td><td>S7:0</td></tr>
</table>

(Note 1)

Table 1.4.3.2 Critical data acquired period

Data acquisition timing when an EXEC ALM occurs			Data acquisition period	0: OFF 1: ON							
				1	2	3	4	5	6	7	8
NORMAL	OLD 1	OLD 2									
Before 1 sec.	Before 2 sec.	Before 3 sec.	1 sec.	0	0	0	0	0	0	0	0
Before 2 sec.	Before 4 sec.	Before 6 sec.	2 sec.	0	1	0	0	0	0	0	0
Before 3 sec.	Before 6 sec.	Before 9 sec.	3 sec.	0	0	1	0	0	0	0	0
Before 4 sec.	Before 8 sec.	Before 12 sec.	4 sec.	0	1	1	0	0	0	0	0
Before 5 sec.	Before 10 sec.	Before 15 sec.	5 sec.	0	0	0	1	0	0	0	0
Before 6 sec.	Before 12 sec.	Before 18 sec.	6 sec.	0	1	0	1	0	0	0	0
Before 7 sec.	Before 14 sec.	Before 21 sec.	7 sec.	0	0	1	1	0	0	0	0
Before 8 sec.	Before 16 sec.	Before 24 sec.	8 sec.	0	1	1	1	0	0	0	0
Before 9 sec.	Before 18 sec.	Before 27 sec.	9 sec.	0	0	0	0	1	0	0	0
Before 10 sec.	Before 20 sec.	Before 30 sec.	10 sec.	0	1	0	0	1	0	0	0
Before 11 sec.	Before 22 sec.	Before 33 sec.	11 sec.	0	0	1	0	1	0	0	0
Before 12 sec.	Before 24 sec.	Before 36 sec.	12 sec.	0	1	1	0	1	0	0	0
Before 13 sec.	Before 26 sec.	Before 39 sec.	13 sec.	0	0	0	1	1	0	0	0
Before 14 sec.	Before 28 sec.	Before 42 sec.	14 sec.	0	1	0	1	1	0	0	0
Before 15 sec.	Before 30 sec.	Before 45 sec.	15 sec.	0	0	1	1	1	0	0	0
Before 16 sec.	Before 32 sec.	Before 48 sec.	16 sec.	0	1	1	1	1	0	0	0

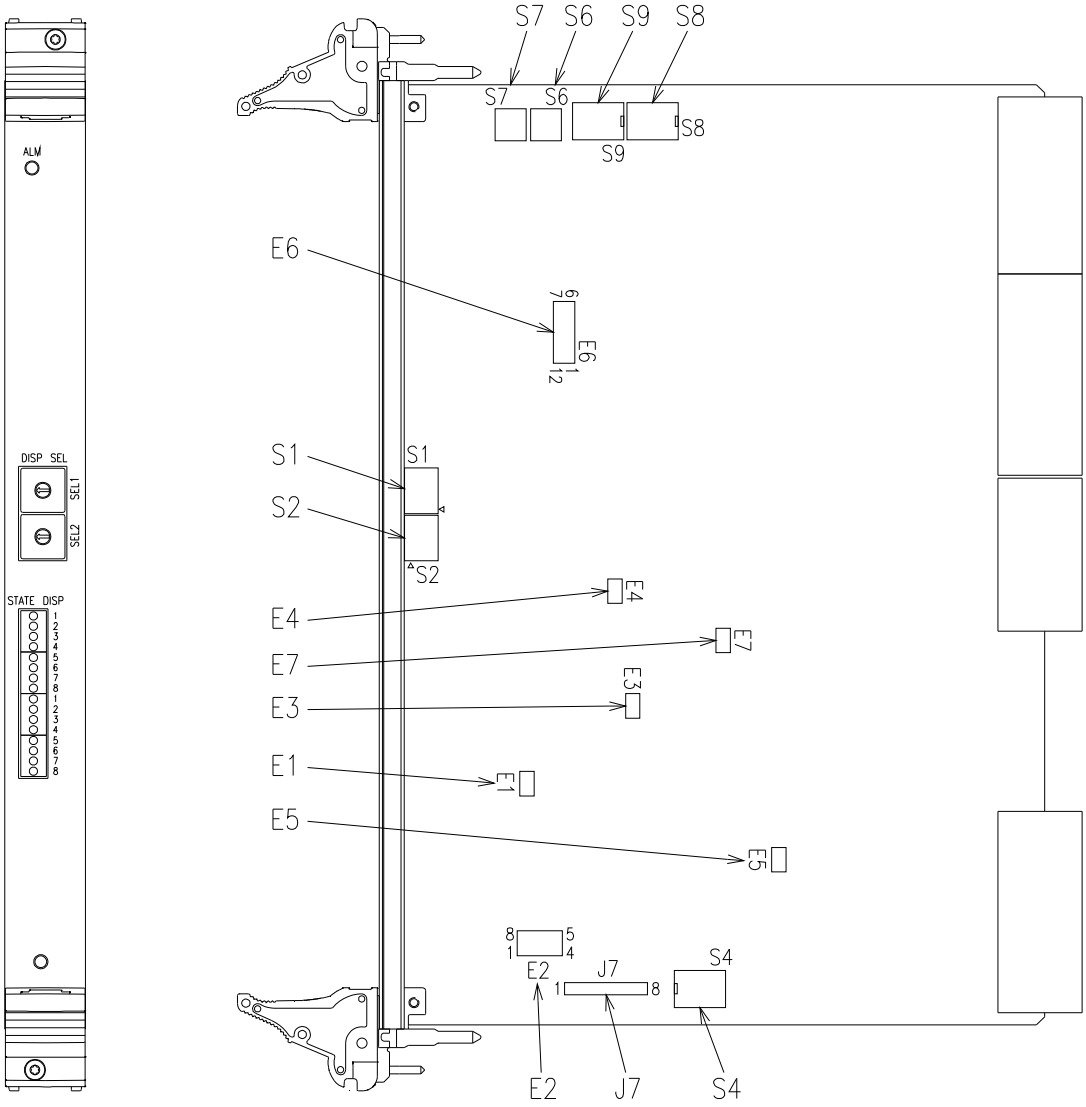


Figure 1.4.3 Setting Position of IO Unit

1.4.4 CONT Unit initial setting

Initial setting of CONT Unit switches are shown as follows:

Table 1.4.4 Initial setting of CONT Unit

<table>
<tr><th>No.</th><th>Circuit symbol</th><th>Function</th><th>Setting</th></tr>
<tr><td>1</td><td>E1</td><td>PLX TRST select</td><td>E1:1-2 CONNECTED</td></tr>
<tr><td>2</td><td>E2</td><td>Configmode select</td><td>E2:1-8 CONNECTED
E2:2-7 CONNECTED
E2:3-6 CONNECTED
E2:4-5 OPEN</td></tr>
<tr><td>3</td><td>E3</td><td>CONT WDT TEST</td><td>E3:1-2 CONNECTED</td></tr>
<tr><td>4</td><td>E4</td><td>PRST ENABLE</td><td>E4:1-2 CONNECTED</td></tr>
<tr><td>5</td><td>E5</td><td>PLX J-TAG Chain select</td><td>E5:ALL OPEN</td></tr>
<tr><td>6</td><td>E6</td><td>For test</td><td>E6:1-12 CONNECTED
E6:2-11 CONNECTED
E6:3-10 CONNECTED
E6:4-9 CONNECTED
E6:5-8 CONNECTED
E6:6-7 CONNECTED</td></tr>
<tr><td>7</td><td>E7</td><td>BD SEL</td><td>E7:1-2 OPEN</td></tr>
<tr><td>8</td><td>E25</td><td>Transmission voltage select
<table><tr><th>E25 setting</th><th>Setting</th></tr><tr><td>1-2 connected</td><td>Set to +5V</td></tr><tr><td>2-3 connected</td><td>Set to +24V</td></tr></table></td><td>Voltage:Set to +24V

E25:2-3 CONNECTED</td></tr>
<tr><td>9</td><td>E26</td><td>Transmission voltage select
<table><tr><th>E26 setting</th><th>Setting</th></tr><tr><td>1-2 connected</td><td>Set to +5V</td></tr><tr><td>2-3 connected</td><td>Set to +24V</td></tr></table></td><td>Voltage:Set to +24V

E26:2-3 CONNECTED</td></tr>
<tr><td>10</td><td>E27</td><td>Transmission voltage select
<table><tr><th>E27 setting</th><th>Setting</th></tr><tr><td>1-2 connected</td><td>Set to +5V</td></tr><tr><td>2-3 connected</td><td>Set to +24V</td></tr></table></td><td>Voltage:Set to +24V

E27:2-3 CONNECTED</td></tr>
<tr><td>11</td><td>E28</td><td>Transmission voltage select
<table><tr><th>E28 setting</th><th>Setting</th></tr><tr><td>1-2 connected</td><td>Set to +5V</td></tr><tr><td>2-3 connected</td><td>Set to +24V</td></tr></table></td><td>Voltage:Set to +24V

E28:2-3 CONNECTED</td></tr>
<tr><td>12</td><td>J7</td><td>For test</td><td>J7:ALL OPEN</td></tr>
</table>

Table 1.4.4 Initial setting of CONT Unit (Continued)

<table>
<tr><th>No.</th><th>Circuit symbol</th><th>Function</th><th>Setting</th></tr>
<tr><td>13</td><td>S10</td><td>Mode select switch setting
<table>
<tr><th colspan="2">S10 setting</th><th>Setting</th></tr>
<tr><td>1</td><td>For test</td><td>ON</td></tr>
<tr><td rowspan="2">2</td><td>Main equipment</td><td>ON</td></tr>
<tr><td>Following equipment</td><td>OFF</td></tr>
<tr><td rowspan="2">3</td><td>Reboot enabled</td><td>ON</td></tr>
<tr><td>Reboot not enabled</td><td>OFF</td></tr>
<tr><td rowspan="2">4</td><td>BMON Unit enabled</td><td>ON</td></tr>
<tr><td>BMON Unit not enabled</td><td>OFF</td></tr>
<tr><td rowspan="2">5</td><td>It's possible to control from Remote Control Panel.</td><td>ON</td></tr>
<tr><td>It's impossible to control from Remote Control Panel.</td><td>OFF</td></tr>
<tr><td rowspan="2">6</td><td>Before XFR alarm operation AND monitor</td><td>ON</td></tr>
<tr><td>Before XFR alarm operation OR monitor</td><td>OFF</td></tr>
<tr><td rowspan="2">7</td><td>After XFR alarm operation AND monitor</td><td>ON</td></tr>
<tr><td>After XFR alarm operation OR monitor</td><td>OFF</td></tr>
<tr><td rowspan="2">8</td><td>Output power 100W</td><td>ON</td></tr>
<tr><td>Output power 200W</td><td>OFF</td></tr>
</table></td><td>Mode select

S10:1 ON
S10:2 ON
S10:3 OFF
S10:4 OFF
S10:5 ON
S10:6 ON
S10:7 ON
S10:8 ON</td></tr>
<tr><td>14</td><td>S13</td><td>For test</td><td>S13:1 OFF
S13:2 OFF
S13:3 OFF
S13:4 OFF
S13:5 OFF
S13:6 OFF
S13:7 OFF
S13:8 OFF</td></tr>
<tr><td>15</td><td>S14</td><td>For test
<table>
<tr><th colspan="2">S14 setting</th><th>Setting</th></tr>
<tr><td>1</td><td>A buzzer rings when pressing the LED TEST switch.</td><td>ON</td></tr>
<tr><td>2</td><td>A buzzer doesn’t ring when pressing the LED TEST switch.</td><td>OFF</td></tr>
</table></td><td>S14:1 OFF
S14:2 OFF
S14:3 OFF
S14:4 OFF
S14:5 OFF
S14:6 OFF
S14:7 ON
S14:8 OFF</td></tr>
<tr><td>16</td><td>S15</td><td>REBOOT TIMER SET at first reboot (X 1min)</td><td>S15:1</td></tr>
<tr><td>17</td><td>S16</td><td>First reboot can be presettable from 0 min to 99 min by S15 and S16. Second reboot is fixed 5 min.
REBOOT TIMER SET at first reboot (X 10min)</td><td>S16:0</td></tr>
</table>

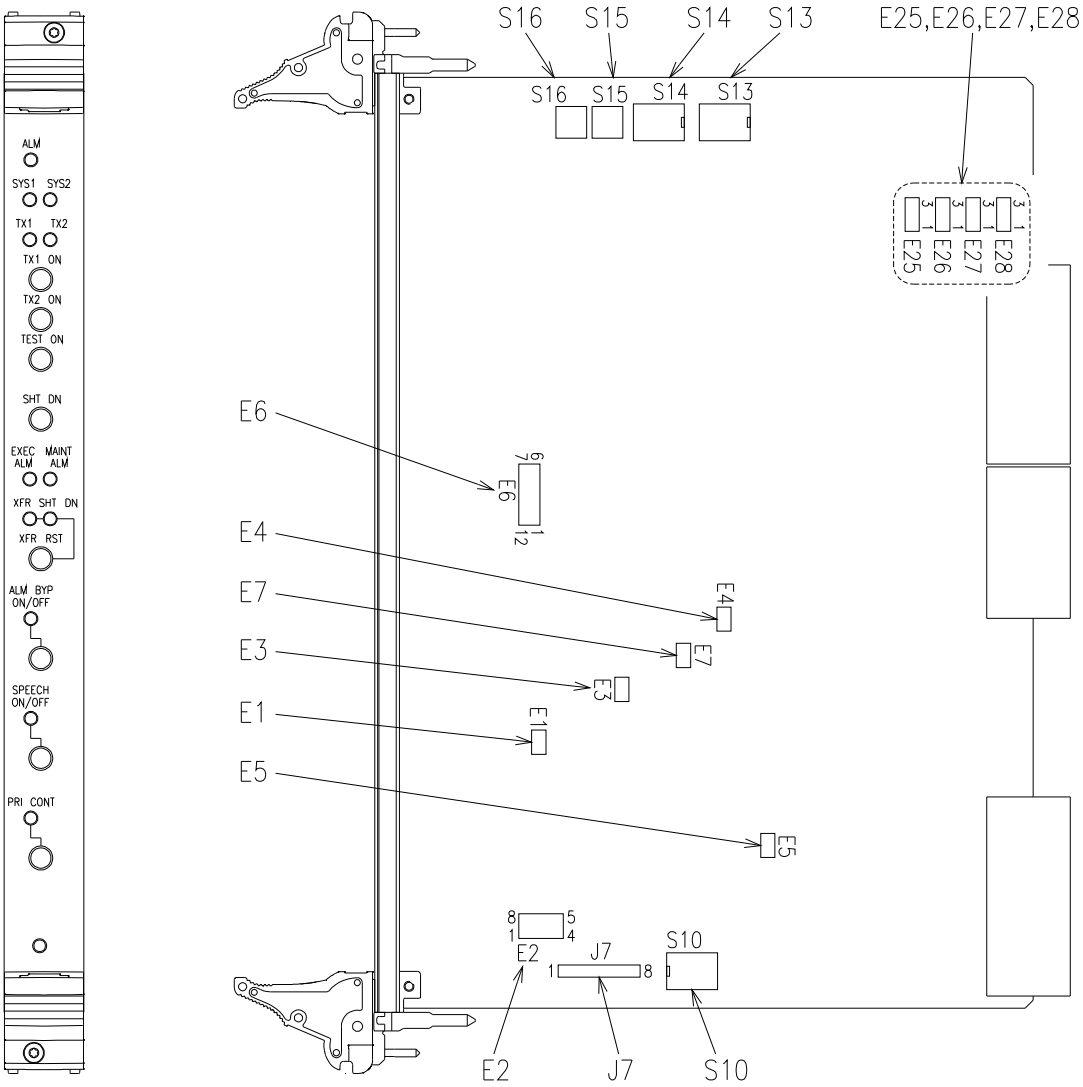


Figure 1.4.4 Setting Position of CONT Unit

1.4.5 TSG Unit initial setting

(1) Initial setting of TSG Unit switches are shown as follows:

Table 1.4.5 Initial setting of TSG Unit

No.	Circuit symbol	Function	Setting
1	E1	For test	E1:ALL OPEN
2	E2	For test	E2:ALL OPEN
3	E3	For test	E3:ALL OPEN
4	E4	BD SEL	E4:1-2 CONNECTED
5	E5	PLX TRST	E5:ALL OPEN
6	J6	For test	J6:ALL OPEN
7	S4	For test	S4:ALL OFF
8	S5	For test	S5:ALL OFF

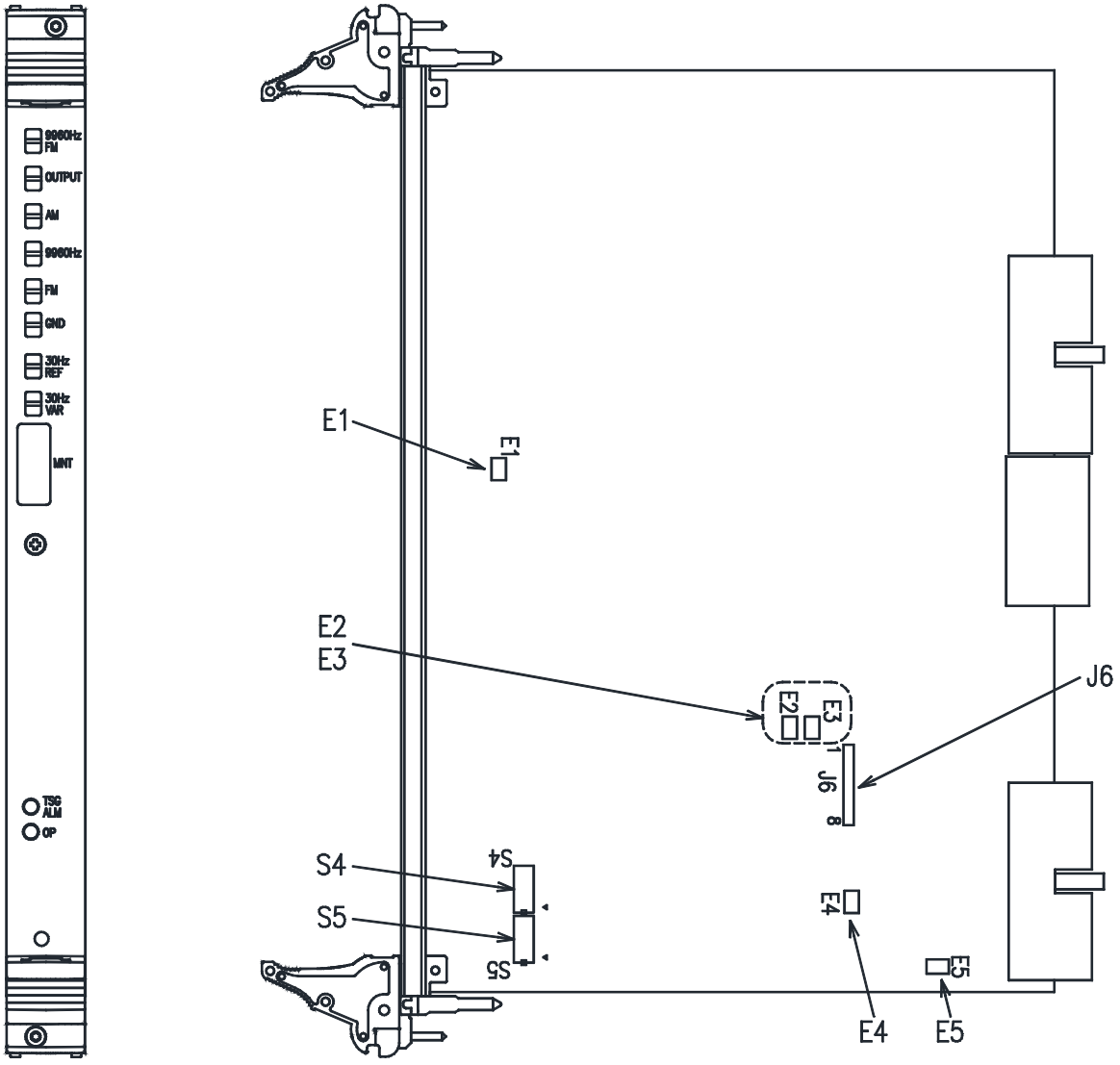


Figure 1.4.5 Setting Position of TSG Unit

1.4.6 MON Unit initial setting

(1) Initial setting of MON Unit switches are shown as follows:

Table 1.4.6 Initial setting of MON Unit

No.	Circuit symbol	Function	Setting
1	E1	For test	E1:ALL OPEN
2	E2	For test	E2:ALL OPEN
3	E3	For test	E3:ALL OPEN
4	E4	BD SEL	E4:1-2 CONNECTED
5	E5	PLX TRST	E5:ALL OPEN
6	J6	For test	J6:ALL OPEN
7	S4	For test	S4:ALL OFF
8	S5	For test	S5:ALL OFF

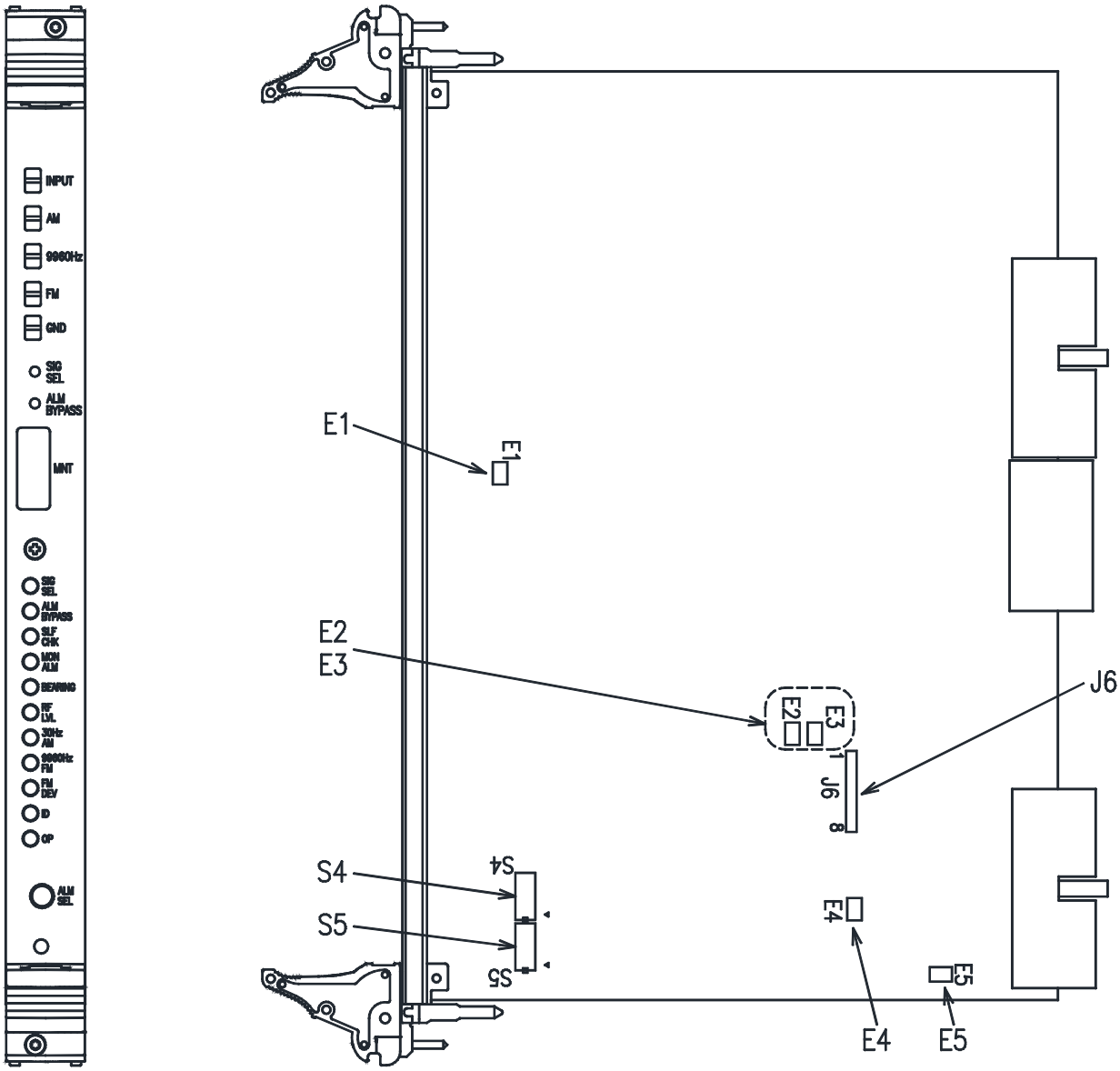


Figure 1.4.6 Setting Position of MON Unit

1.4.7 BMON Unit initial setting

(1) Initial setting of BMON Unit switches are shown as follows:

Table 1.4.7 Initial setting of BMON Unit

No.	Circuit symbol	Function	Setting
1	E1	For test	E1:ALL OPEN
2	E2	For test	E2:ALL OPEN
3	E3	For test	E3:ALL OPEN
4	E4	BD SEL	E4:1-2 CONNECTED
5	E5	PLX TRST	E5:ALL OPEN
6	J6	For test	J6:ALL OPEN
7	S4	For test	S4:ALL OFF
8	S5	For test	S5:ALL OFF

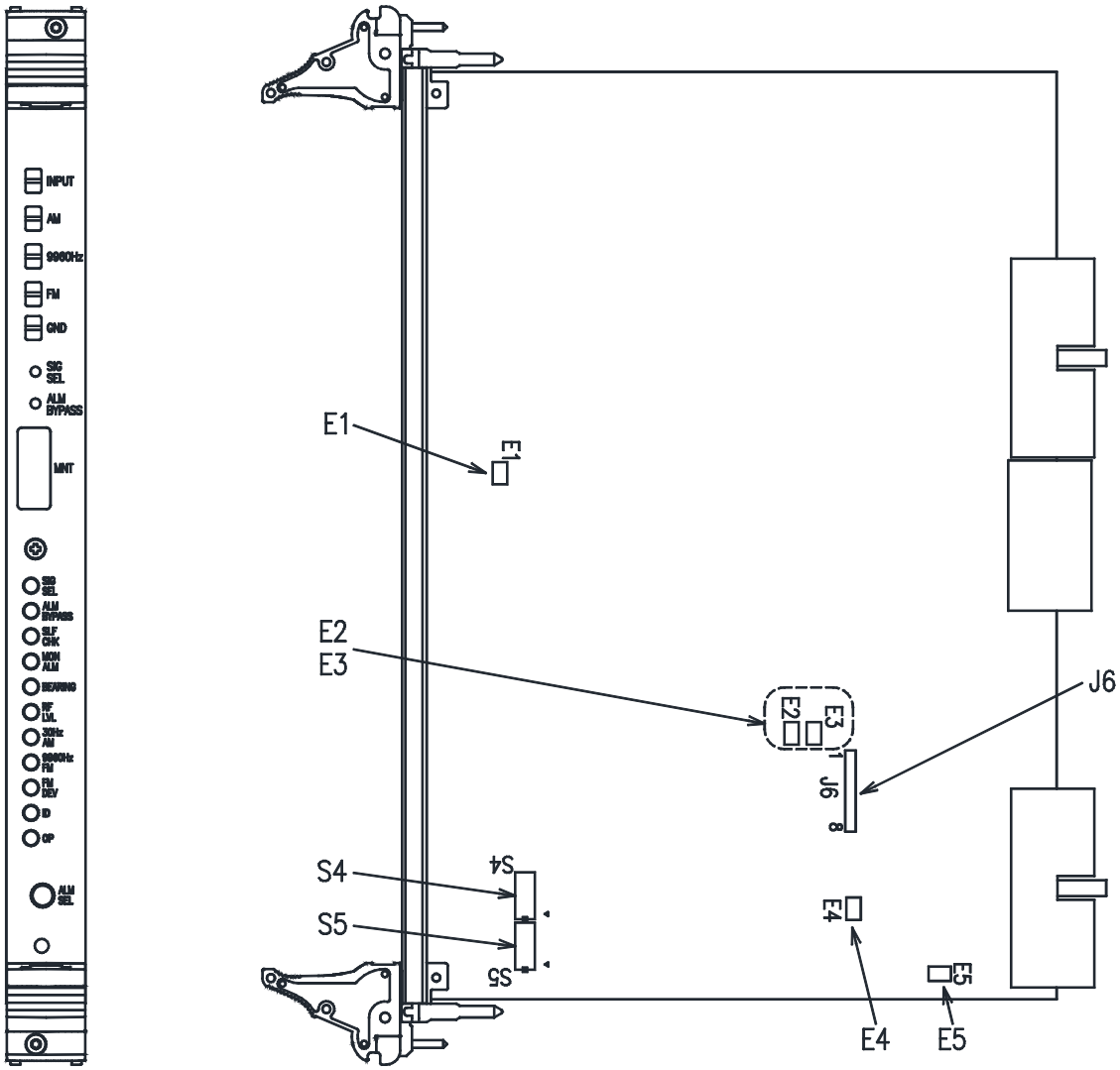


Figure 1.4.7 Setting Position of BMON Unit

1.4.8 DRIVE Unit initial setting

Initial setting of DRIVE Unit switches are shown as follows:

Table 1.4.8 Initial setting of DRIVE Unit

<table>
<tr><th>No.</th><th>Circuit symbol</th><th>Function</th><th>Setting</th></tr>
<tr><td>1</td><td>TB1</td><td>For test</td><td>TB1:ALL OPEN</td></tr>
<tr><td>2</td><td>TB2</td><td>LED ON/OFF setting
<table><tr><th>TB2 setting</th><th>Setting</th></tr><tr><td>1-2 Connected</td><td>Set to LED ON</td></tr><tr><td>2-3 Connected</td><td>Set to LED OFF</td></tr></table></td><td>LED: Set to ON

TB2:1-2 CONNECTED</td></tr>
<tr><td>3</td><td>S5</td><td>For test</td><td>S5:1 ON
S5:2 ON
S5:3 ON
S5:4 ON
S5:5 OFF
S5:6 OFF
S5:7 OFF
S5:8 OFF</td></tr>
<tr><td>4</td><td>S2</td><td>ANT select (X 10)</td><td>S2:0</td></tr>
<tr><td>5</td><td>S3</td><td>ANT select (X 1)</td><td>S3:1</td></tr>
</table>

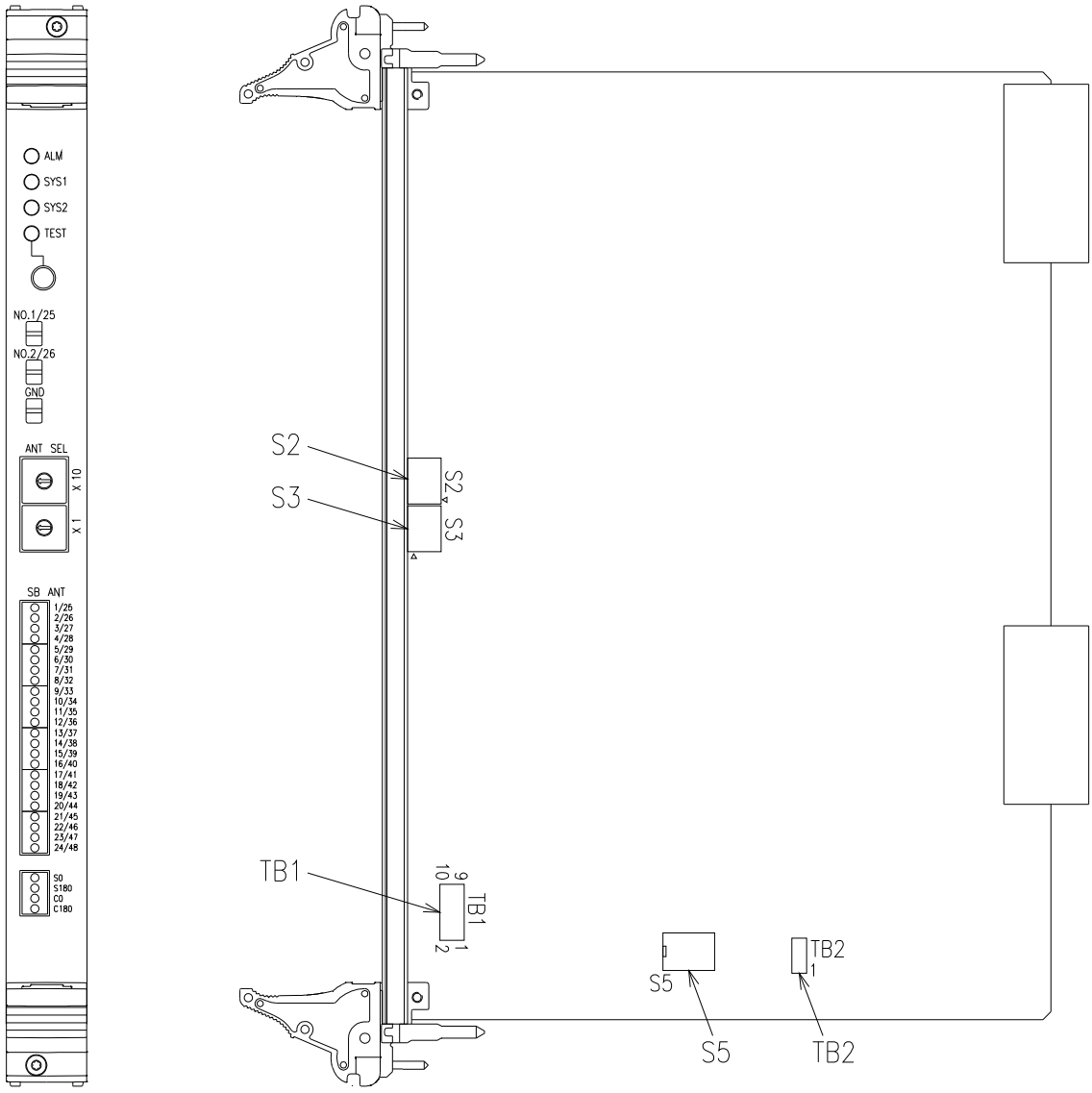


Figure 1.4.8 Setting Position of DRIVE Unit

1.4.9 DC Unit initial setting

Initial setting of DC Unit switches are shown as follows:

Table 1.4.9 Initial setting of DC Unit

No.	Circuit symbol	Function	Setting
1	S1	ALM TEST	S1:1 OFF S1:2 OFF
2	S2	CPU Power ON/OFF	S2:ON

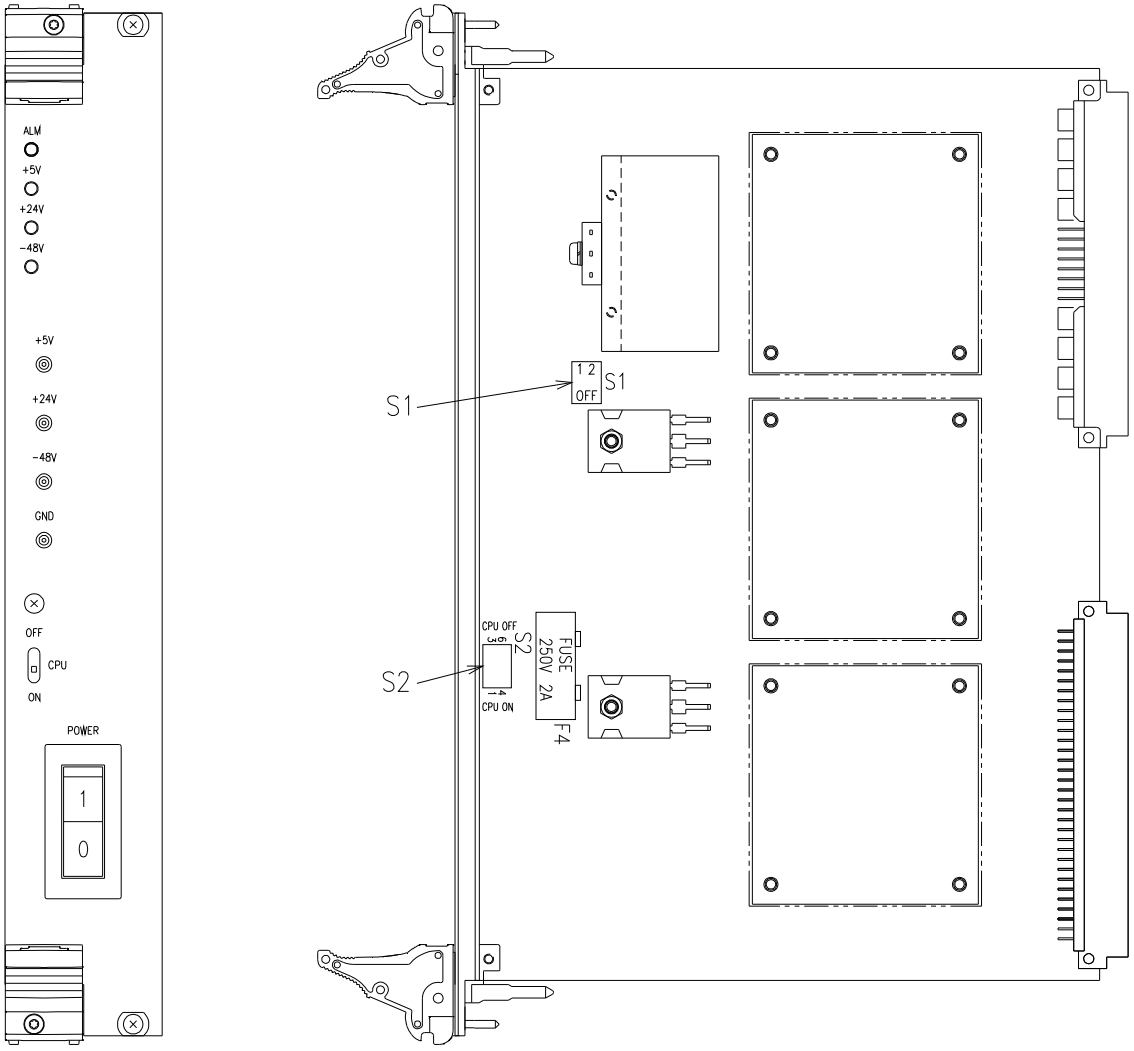


Figure 1.4.9 Setting position of DC Unit

1.4.10 Back board for Transmitter initial setting

Initial setting of back board for Transmitter switches are shown as follows:

Table 1.4.10 Initial setting of back board for Transmitter

No.	Circuit symbol	Function	Setting
1	TB2	For test	TB2:1-8 CONNECTED TB2:2-7 CONNECTED TB2:3-6 CONNECTED TB2:4-5 CONNECTED
2	TB8	For test	TB8:1-4 OPEN TB8:2-3 CONNECTED
3	TB9	For test	TB9:ALL OPEN
4	TB10	For test	TB10:ALL OPEN
5	TB12	For test	TB12:ALL OPEN

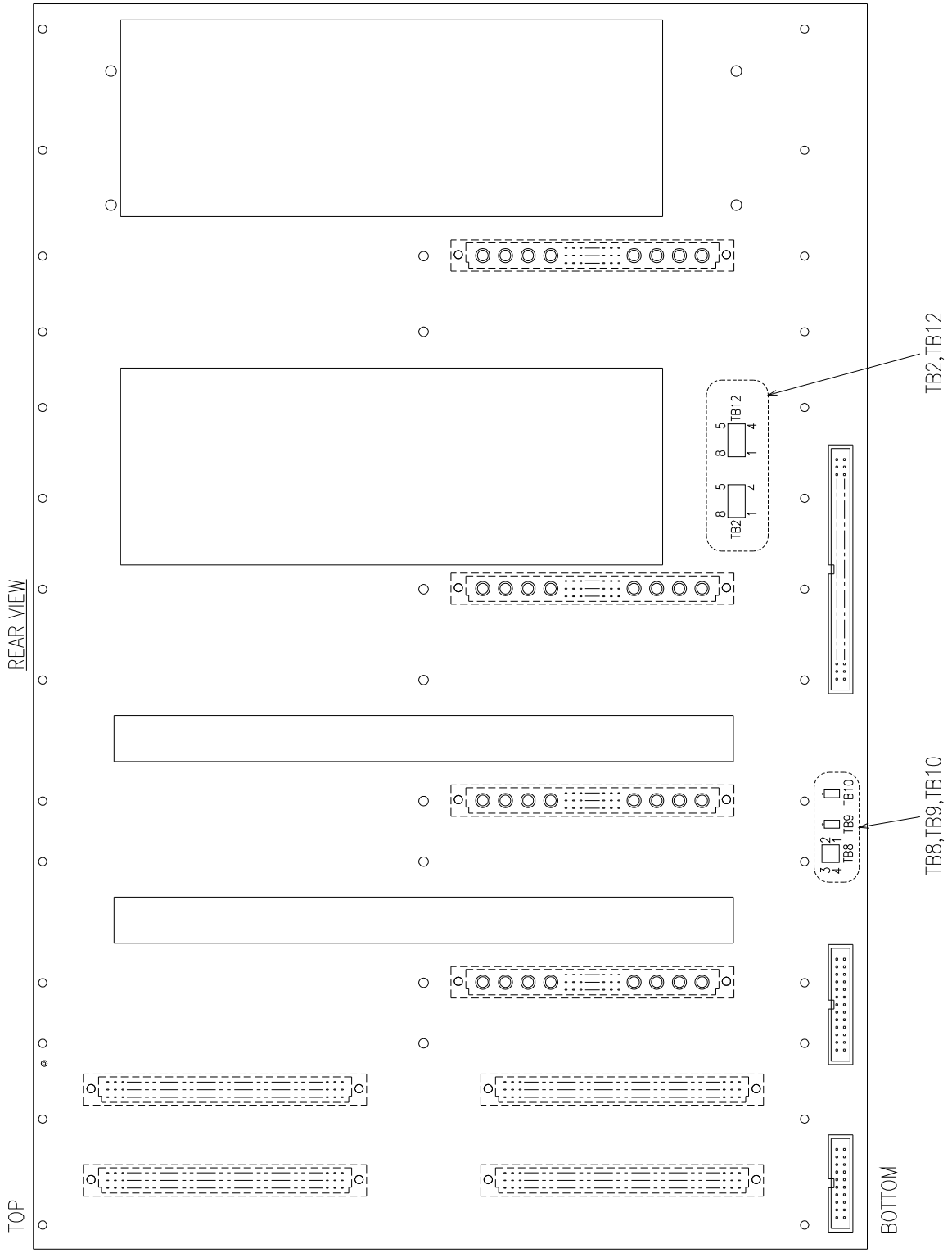


Figure 1.4.10 Setting position of Back board for Transmitter

1.4.11 CAR Unit initial setting

Initial setting of CAR Unit switches are shown as follows:

Table 1.4.11 Initial setting of CAR Unit

<table>
<tr><th>No.</th><th>Circuit symbol</th><th>Function</th><th>Setting</th></tr>
<tr><td>1</td><td>TB1</td><td>TX OP TEST setting
<table><tr><th>TB1 setting</th><th>Setting</th></tr><tr><td>1-4 Connected</td><td>Set to NORMAL</td></tr><tr><td>2-3 Connected</td><td>Set to TEST</td></tr></table></td><td>TX OP TEST: Set to NORMAL

TB1:1-4 CONNECTED
TB1:2-3 OPEN</td></tr>
<tr><td>2</td><td>TB2</td><td>ALM BYP setting
<table><tr><th>TB2 setting</th><th>Setting</th></tr><tr><td>1-4 Connected</td><td>Set to NORMAL</td></tr><tr><td>2-3 Connected</td><td>Set to BYPASS</td></tr></table></td><td>ALM BYP: Set to NORMAL

TB2:1-4 CONNECTED
TB2:2-3 OPEN</td></tr>
<tr><td>3</td><td>TB3</td><td>0°/90° setting
<table><tr><th>TB3 setting</th><th>Setting</th></tr><tr><td>1-8 Connected</td><td>Set to 90°</td></tr><tr><td>2-7 Connected</td><td>Set to 0°</td></tr><tr><td>3-6 Connected</td><td>Set to 90°</td></tr><tr><td>4-5 Connected</td><td>Set to 0°</td></tr></table></td><td>0°/90°: Set to 0°

TB3: 1-8 OPEN
TB3: 2-7 CONNECTED
TB3: 3-6 OPEN
TB3: 4-5 CONNECTED</td></tr>
<tr><td>4</td><td>TB4</td><td>0°/180° setting
<table><tr><th>TB4 setting</th><th>Setting</th></tr><tr><td>1-8 Connected</td><td>Set to 180°</td></tr><tr><td>2-7 Connected</td><td>Set to 0°</td></tr><tr><td>3-6 Connected</td><td>Set to 180°</td></tr><tr><td>4-5 Connected</td><td>Set to 0°</td></tr></table></td><td>0°/180°: Set to 180°

TB4: 1-8 CONNECTED
TB4: 2-7 OPEN
TB4: 3-6 CONNECTED
TB4: 4-5 OPEN</td></tr>
<tr><td>5</td><td>TB5</td><td>APC ON/OFF setting
<table><tr><th>TB5 setting</th><th>Setting</th></tr><tr><td>1-4 Connected</td><td>Set to APC ON</td></tr><tr><td>2-3 Connected</td><td>Set to APC OFF</td></tr></table></td><td>APC ON/OFF: Set to APC OFF

TB5:1-4 OPEN
TB5:2-3 CONNECTED</td></tr>
<tr><td>6</td><td>TB6</td><td>ALC ON/OFF setting
<table><tr><th>TB6 setting</th><th>Setting</th></tr><tr><td>1-4 Connected</td><td>Set to ALC ON</td></tr><tr><td>2-3 Connected</td><td>Set to ALC OFF</td></tr></table></td><td>ALC ON/OFF: Set to APC ON

TB5:1-4 CONNECTED
TB5:2-3 OPEN</td></tr>
<tr><td>7</td><td>TB7</td><td>INT/EXT PWR setting
<table><tr><th>TB6 setting</th><th>Setting</th></tr><tr><td>1-4 Connected</td><td>Set to INT PWR</td></tr><tr><td>2-3 Connected</td><td>Set to EXT PWR</td></tr></table></td><td>INT/EXT PWR: Set to EXT PWR

TB5:1-4 OPEN
TB5:2-3 CONNECTED</td></tr>
</table>

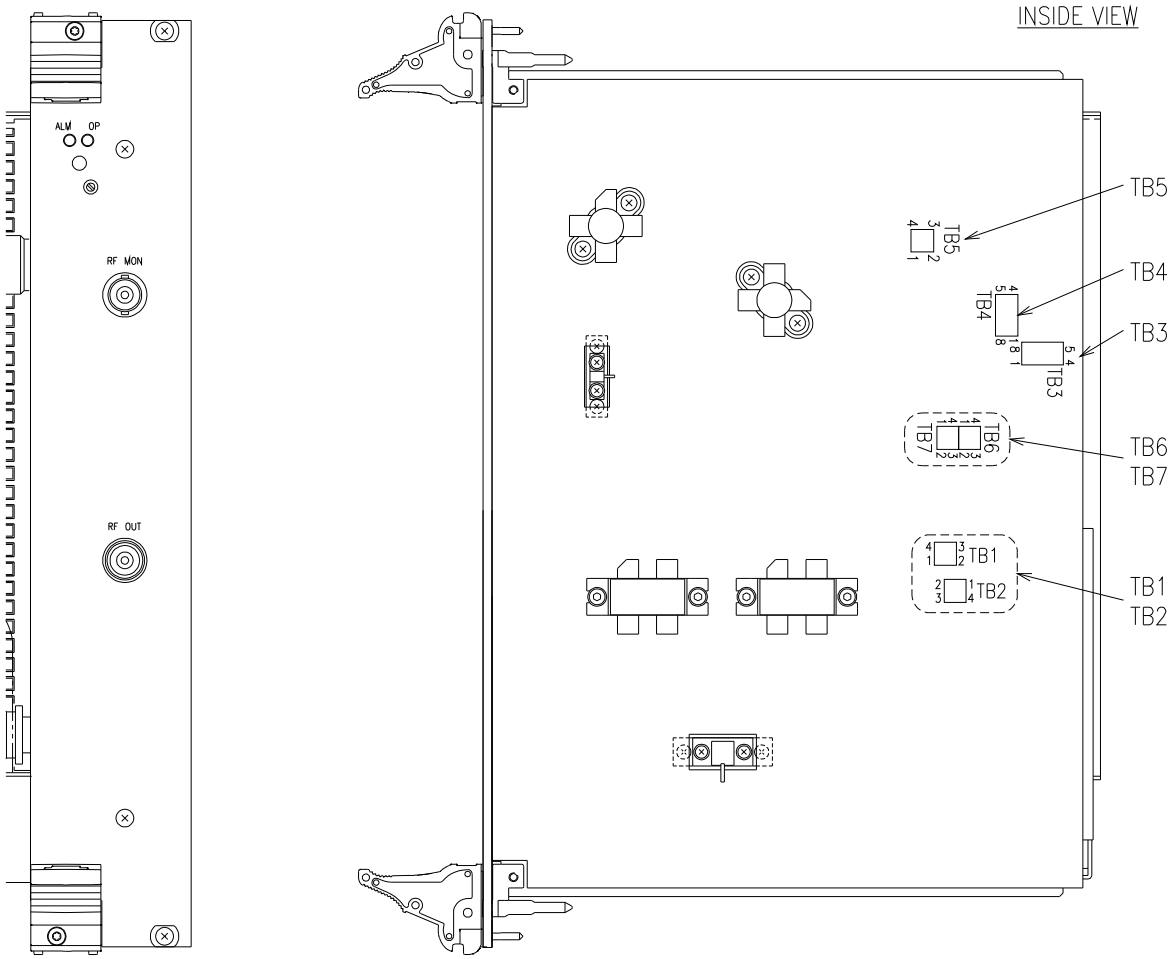


Figure 1.4.11 Setting position of CAR Unit

1.4.12 SB Unit initial setting

Initial setting of SB Unit switches are shown as follows:

Table 1.4.12 Initial setting of SB Unit

No.	Circuit symbol	Function	Setting
1	TB101	TX OP setting TB101 setting / Setting 1-4 Connected / Set to TX OP EXT 2-3 Connected / Set to TX OP TEST	TX OP: Set to TX OP EXT TB101:1-4 CONNECTED TB101:2-3 OPEN
2	TB102	ALM BYP setting TB102 setting / Setting 1-4 Connected / Set to NORMAL 2-3 Connected / Set to BYPASS	ALM BYP: Set to NORMAL TB102:1-4 CONNECTED TB102:2-3 OPEN
3	TB103	TEMP BYP setting TB103 setting / Setting 1-4 Connected / Set to NORMAL 2-3 Connected / Set to BYPASS	TEMP BYP: Set to NORMAL TB103:1-4 CONNECTED TB103:2-3 OPEN
4		Intentional blank	
5	TB202	0°/180° setting TB202 setting / Setting 1-8 Connected / Set to 180° 2-7 Connected / Set to 0° 3-6 Connected / Set to 180° 4-5 Connected / Set to 0°	0°/180°: Set to 0° TB4: 1-8 OPEN TB4: 2-7 CONNECTED TB4: 3-6 OPEN TB4: 4-5 CONNECTED
6	TB203	APC ON/OFF setting TB203 setting / Setting 1-4 Connected / Set to APC ON 2-3 Connected / Set to APC OFF	APC ON/OFF: Set to APC OFF TB203:1-4 OPEN TB203:2-3 CONNECTED
7	TB204	ALC ON/OFF setting TB204 setting / Setting 1-4 Connected / Set to ALC ON 2-3 Connected / Set to ALC OFF	ALC ON/OFF: Set to APC OFF TB204:1-4 CONNECTED TB204:2-3 OPEN
8	TB205	INT/EXT PWR setting TB6 setting / Setting 1-4 Connected / Set to INT PWR 2-3 Connected / Set to EXT PWR	INT/EXT PWR: Set to INT PWR TB5:1-4 OPEN TB5:2-3 CONNECTED
9	TB206	CABLE ALM BYP setting TB206 setting / Setting 1-4 Connected / Set to BYPASS 2-3 Connected / Set to NORMAL	CABLE ALM BYP: Set to NORMAL TB206:1-4 OPEN TB206:2-3 CONNECTED

Table 1.4.12 Initial setting of SB Unit (Continued)

<table>
<tr><th>No.</th><th>Circuit symbol</th><th>Function</th><th>Setting</th></tr>
<tr><td>10</td><td>TB301</td><td>0°/90° setting
<table><tr><th>TB301 setting</th><th>Setting</th></tr><tr><td>1-8 Connected</td><td>Set to 90°</td></tr><tr><td>2-7 Connected</td><td>Set to 0°</td></tr><tr><td>3-6 Connected</td><td>Set to 90°</td></tr><tr><td>4-5 Connected</td><td>Set to 0°</td></tr></table></td><td>0°/90°: Set to 0°

TB301: 1-8 OPEN
TB301: 2-7 CONNECTED
TB301: 3-6 OPEN
TB301: 4-5 CONNECTED</td></tr>
<tr><td>11</td><td>TB302</td><td>0°/180° setting
<table><tr><th>TB302 setting</th><th>Setting</th></tr><tr><td>1-8 Connected</td><td>Set to 180°</td></tr><tr><td>2-7 Connected</td><td>Set to 0°</td></tr><tr><td>3-6 Connected</td><td>Set to 180°</td></tr><tr><td>4-5 Connected</td><td>Set to 0°</td></tr></table></td><td>0°/180°: Set to 0°

TB302: 1-8 OPEN
TB302: 2-7 CONNECTED
TB302: 3-6 OPEN
TB302: 4-5 CONNECTED</td></tr>
<tr><td>12</td><td>TB303</td><td>APC ON/OFF setting
<table><tr><th>TB303 setting</th><th>Setting</th></tr><tr><td>1-4 Connected</td><td>Set to APC ON</td></tr><tr><td>2-3 Connected</td><td>Set to APC OFF</td></tr></table></td><td>APC ON/OFF: Set to APC OFF

TB303:1-4 OPEN
TB303:2-3 CONNECTED</td></tr>
<tr><td>13</td><td>TB304</td><td>ALC ON/OFF setting
<table><tr><th>TB304 setting</th><th>Setting</th></tr><tr><td>1-4 Connected</td><td>Set to ALC ON</td></tr><tr><td>2-3 Connected</td><td>Set to ALC OFF</td></tr></table></td><td>ALC ON/OFF: Set to APC ON

TB304:1-4 CONNECTED
TB304:2-3 OPEN</td></tr>
<tr><td>14</td><td>TB305</td><td>INT/EXT PWR setting
<table><tr><th>TB305 setting</th><th>Setting</th></tr><tr><td>1-4 Connected</td><td>Set to INT PWR</td></tr><tr><td>2-3 Connected</td><td>Set to EXT PWR</td></tr></table></td><td>INT/EXT PWR: Set to EXT PWR

TB305:1-4 OPEN
TB305:2-3 CONNECTED</td></tr>
<tr><td>15</td><td>TB306</td><td>CABLE ALM BYP setting
<table><tr><th>TB306 setting</th><th>Setting</th></tr><tr><td>1-4 Connected</td><td>Set to BYPASS</td></tr><tr><td>2-3 Connected</td><td>Set to NORMAL</td></tr></table></td><td>CABLE ALM BYP: Set to NORMAL

TB306:1-4 OPEN
TB306:2-3 CONNECTED</td></tr>
</table>

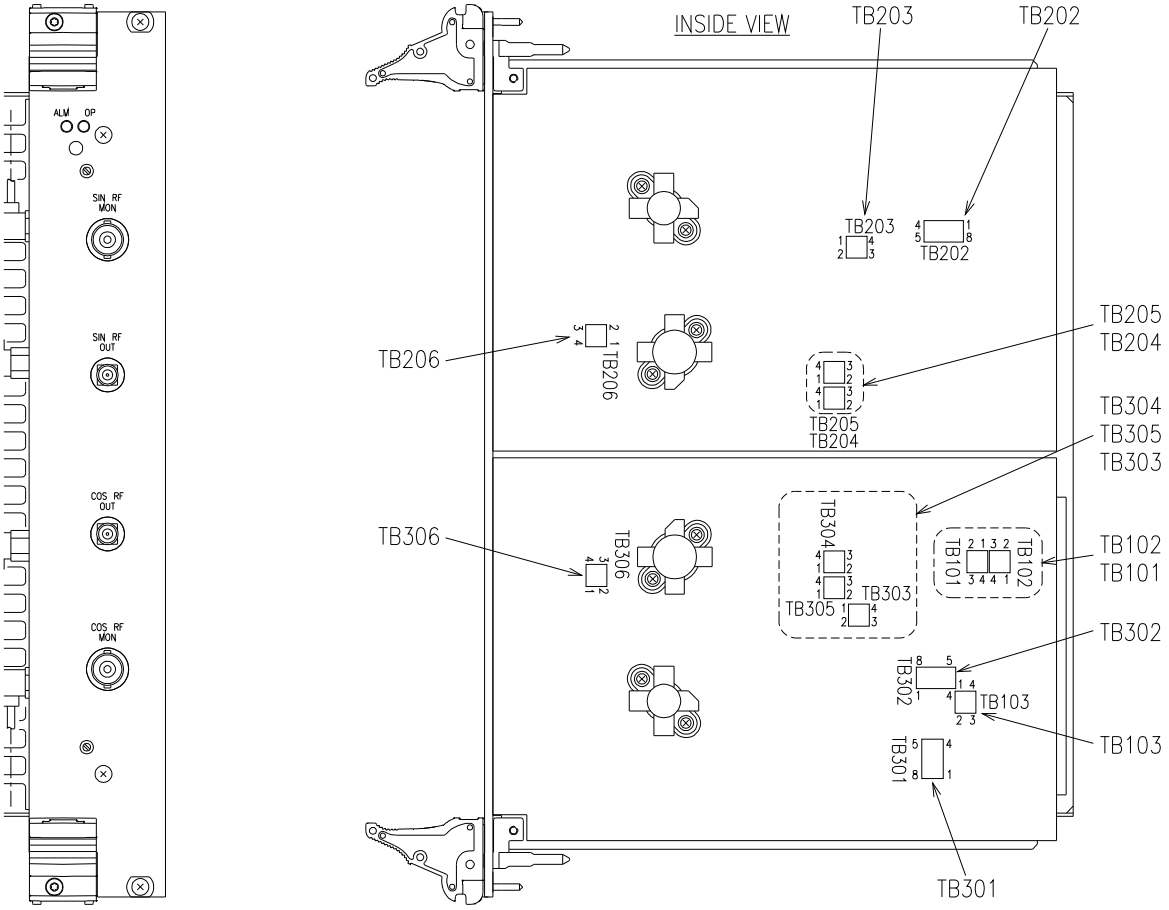


Figure 1.4.12 Setting position of SB Unit

1.4.13 SG Unit initial setting

Initial setting of SG Unit switches are shown as follows:

Table 1.4.13 Initial setting of SG Unit

<table>
<tr><th>No.</th><th>Circuit symbol</th><th>Function</th><th>Setting</th></tr>
<tr><td>1</td><td>E1</td><td>For test</td><td>E1:ALL OPEN</td></tr>
<tr><td>2</td><td>E2</td><td>For test</td><td>E2:1-2 CONNECTED</td></tr>
<tr><td>3</td><td>J5</td><td>For test</td><td>J5:ALL OPEN</td></tr>
<tr><td>4</td><td>S1</td><td>Mode select switch setting
<table>
<tr><th colspan="2">S1 setting</th><th>Setting</th></tr>
<tr><td rowspan="2">1</td><td>Associated mode</td><td>ON</td></tr>
<tr><td>Independent mode</td><td>OFF</td></tr>
<tr><td rowspan="2">3</td><td>ID interval: 10 second (*1)</td><td>ON</td></tr>
<tr><td>ID interval: 7.5 second (*1)</td><td>OFF</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">FM modulation</td><td>ON</td></tr>
<tr><td>OFF</td></tr>
<tr><td rowspan="2">6</td><td>Antenna alarm selection is opposite</td><td>OFF</td></tr>
<tr><td>Antenna alarm selection is random</td><td>ON</td></tr>
</table></td><td>S1:1 OFF
S1:2 OFF
S1:3 OFF
S1:4 OFF
S1:5 OFF
S1:6 OFF
S1:7 OFF
S1:8 OFF</td></tr>
<tr><td>5</td><td>S2</td><td>For test</td><td>S2:ALL OFF</td></tr>
</table>

*1: When DVOR is Slave operation in “Associated mode” and S1:3 is OFF, DVOR should key from DME with 7.5 second ID interval. If keying signal stops, DVOR turns into “Independent mode” with 10 second ID interval. And in case of S1:1 OFF, ID interval is always 10 second (regardless of setting of S1:3).

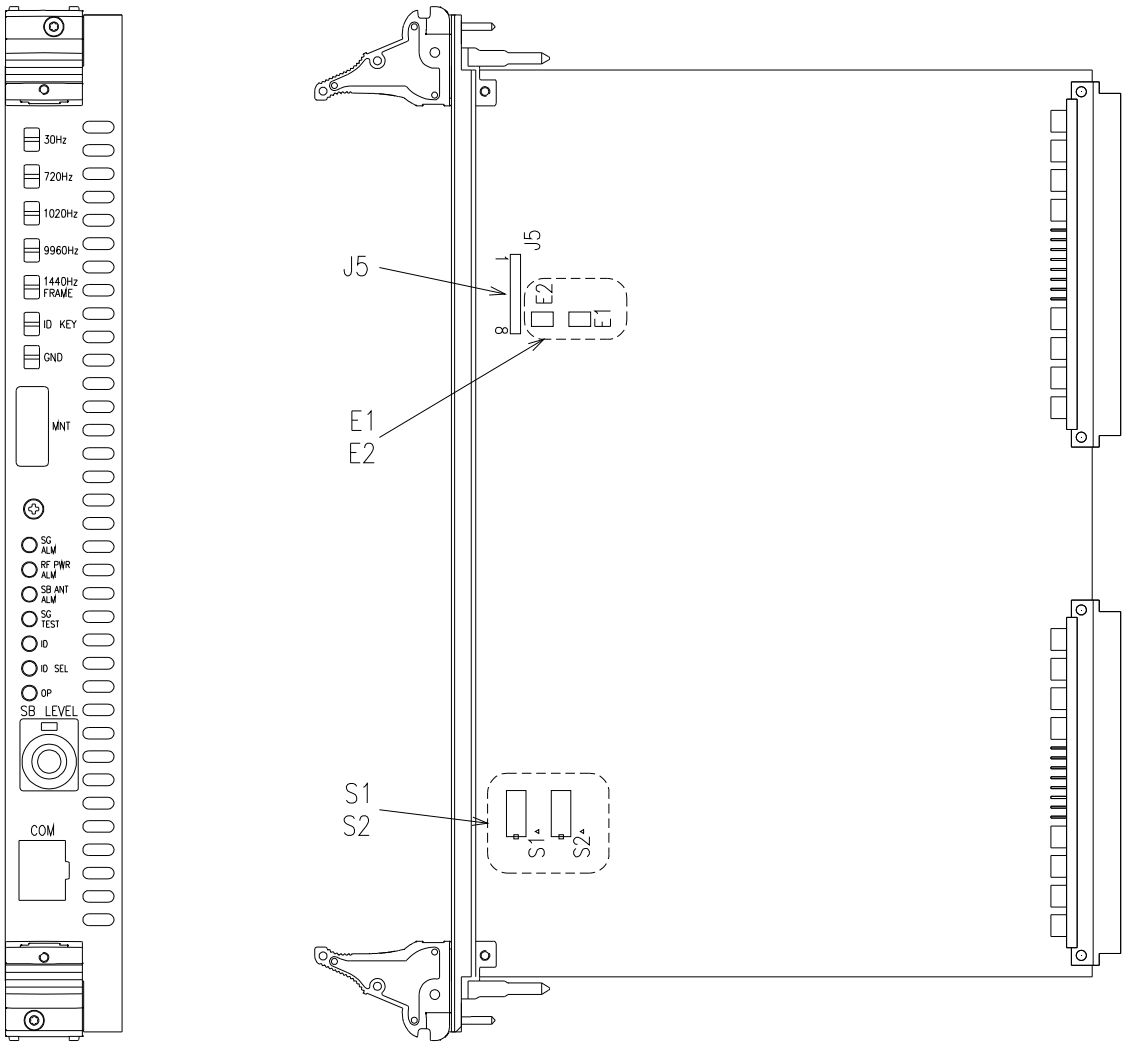


Figure 1.4.13 Setting position of SG Unit

1.4.14 TX DC Unit initial setting

Initial setting of TX DC Unit switches are shown as follows:

Table 1.4.14 Initial setting of TX DC Unit

No.	Circuit symbol	Function	Setting
1	TB8	TEMP ALM H setting TB8 setting: 1-2 Connected → Set to NORMAL; 3-4 Connected → Set to BYPASS	TEMP ALM H: Set to NORMAL TB8:1-2 CONNECTED TB8:3-4 OPEN
2	TB9	For test	TB9:ALL OPEN
3	S1	ALM TEST	S1:1 OFF S1:2 OFF

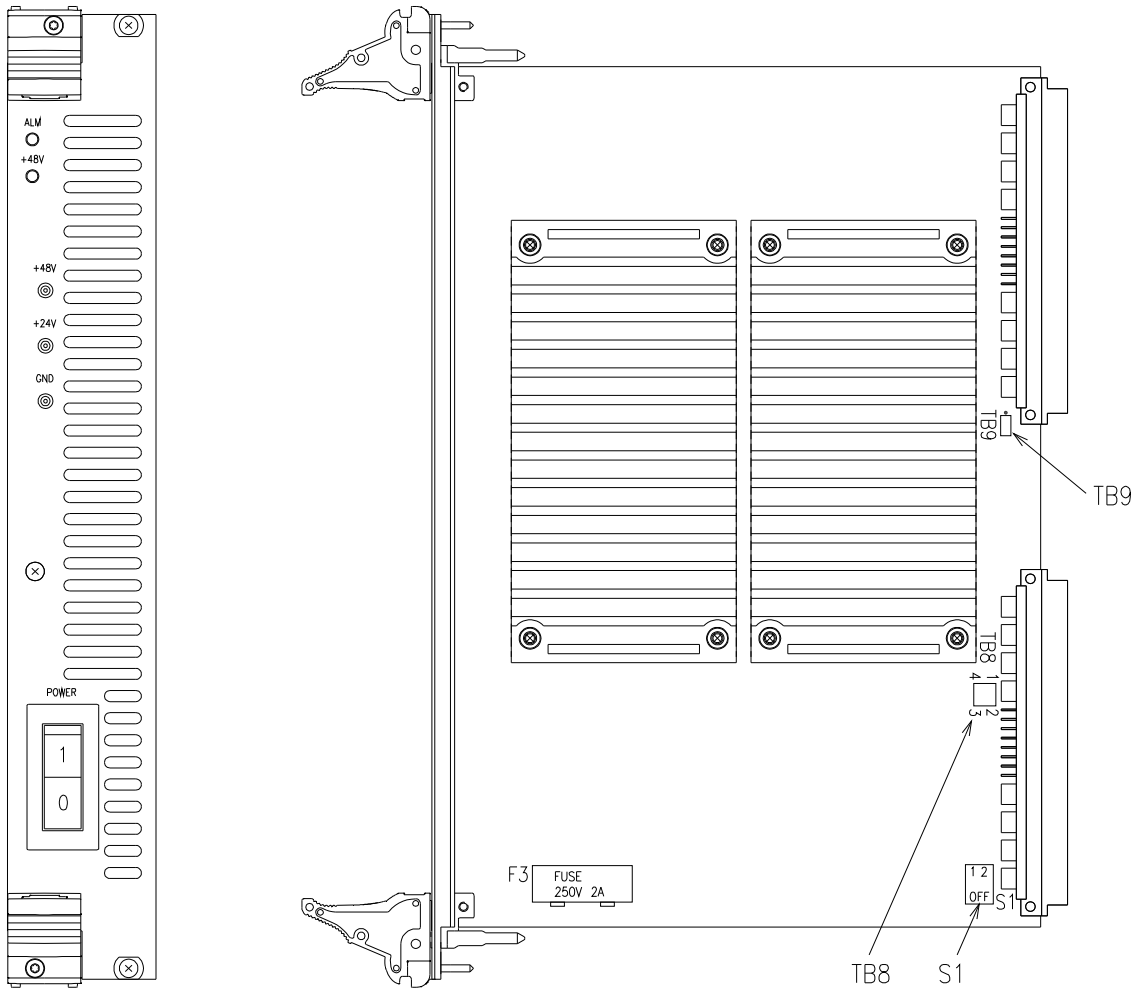


Figure 1.4.14 Setting position of TX DC Unit

1.4.15 Changeover initial setting

1.4.15.1 DVOR SW Unit initial setting

Initial setting of DVOR SW Unit switches are shown as follows:

Table 1.4.15.1 Initial setting of DVOR SW Unit

<table>
<tr><th>No.</th><th>Circuit symbol</th><th>Function</th><th>Setting</th></tr>
<tr><td>1</td><td>TB601</td><td>SYS No1 TEST setting
<table>
<tr><th>TB601 setting</th><th>Setting</th></tr>
<tr><td>1-4 Connected</td><td>Set to NORMAL</td></tr>
<tr><td>2-3 Connected</td><td>Set to SYS No.1 TEST</td></tr>
</table></td><td>SYS No1 TEST: Set to NORMAL

TB601:1-4 CONNECTED
TB601:2-3 OPEN</td></tr>
</table>

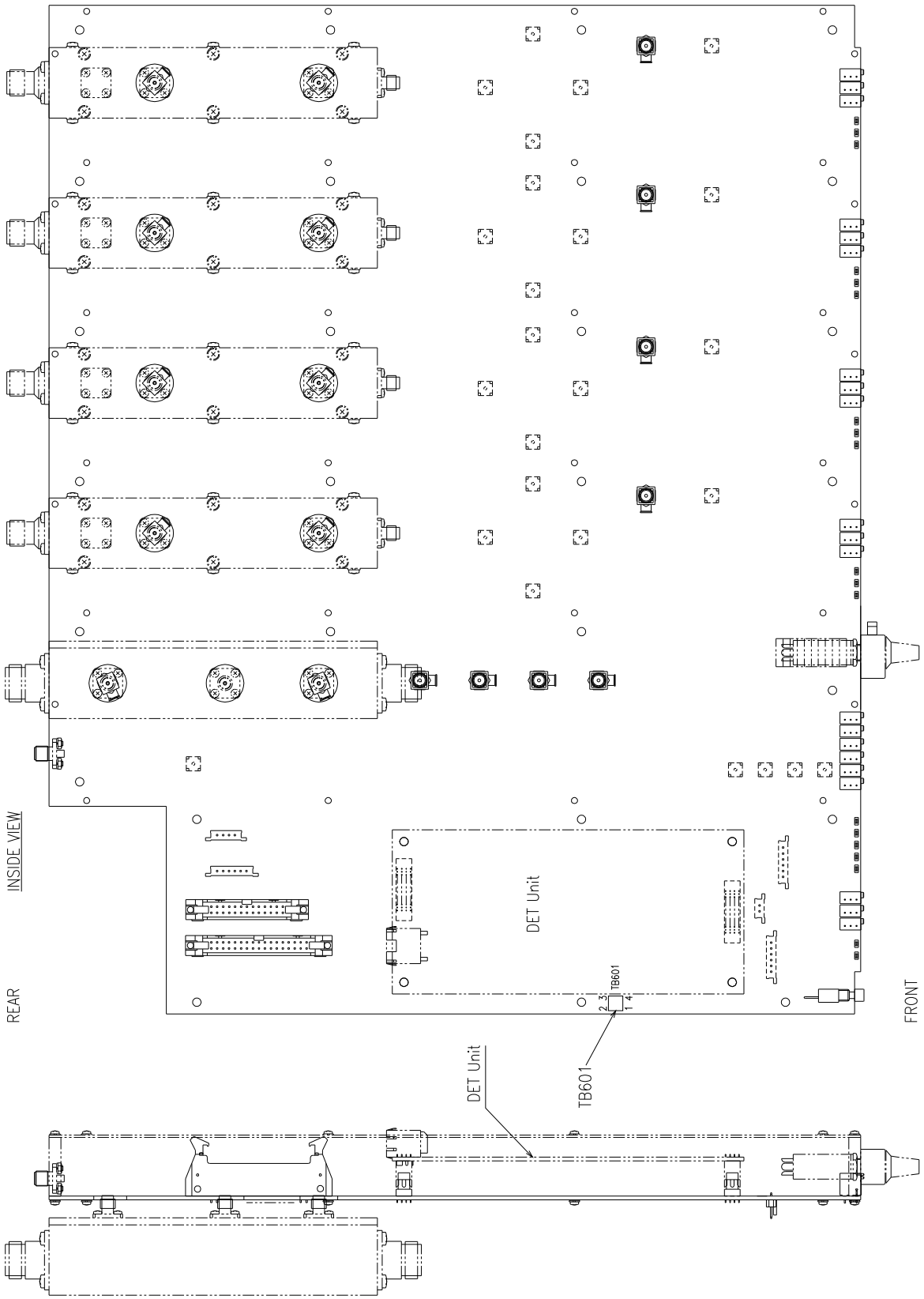


Figure 1.4.15.1 Setting position of DVOR SW Unit

1.4.15.2 DET Unit initial setting

Initial setting of DET Unit switches are shown as follows:

Table 1.4.15.2 Initial setting of DET Unit

No.	Circuit symbol	Function	Setting
1	E1	For test	E1:ALL OPEN
2	E2	For test	E2:1-2 CONNECTED
3	J4	For test	J4:ALL OPEN
4	S1	For test	S1:ALL OFF

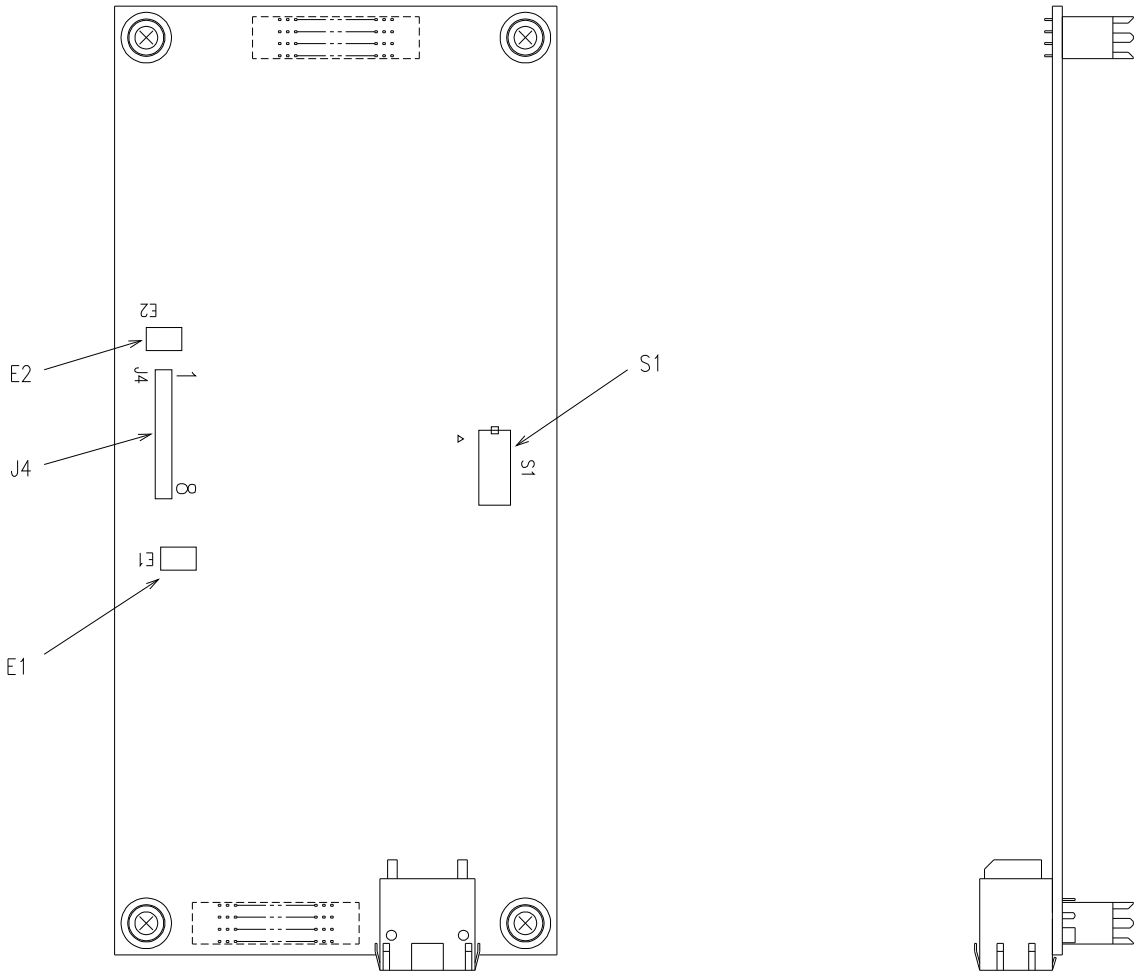


Figure 1.4.15.2 Setting position of DET Unit

1.5 Software

(1) Software installation environment

Item		Specifications
OS		Microsoft Windows 7 or subsequent ones (English Version)
Processor		Hardware specification needed by the OS.
Cache memory		
Chipset		
Memory		
Display function		
Interface		・LAN (100Base-TX/10Base-T(RJ45)) x 1 or more ・Serial (RS-232C) x 1 or more

(2) About CD-ROM of software

a. Confirm that OS of PC can meet with this software.

b. Set Area and Language “ENGLISH (UK)” by control panel of PC.

c. Check "Read me" file in the CD-ROM and follow the instructions before installation of software.

⚠ CAUTION

Set “Region and Language” of PC as English (UK).when it isn’t so, there is a possibility that the equipment operate abnormally and cause breakdown.

1.5.1 RCMS software

1.5.1.1 Installing RCMS software

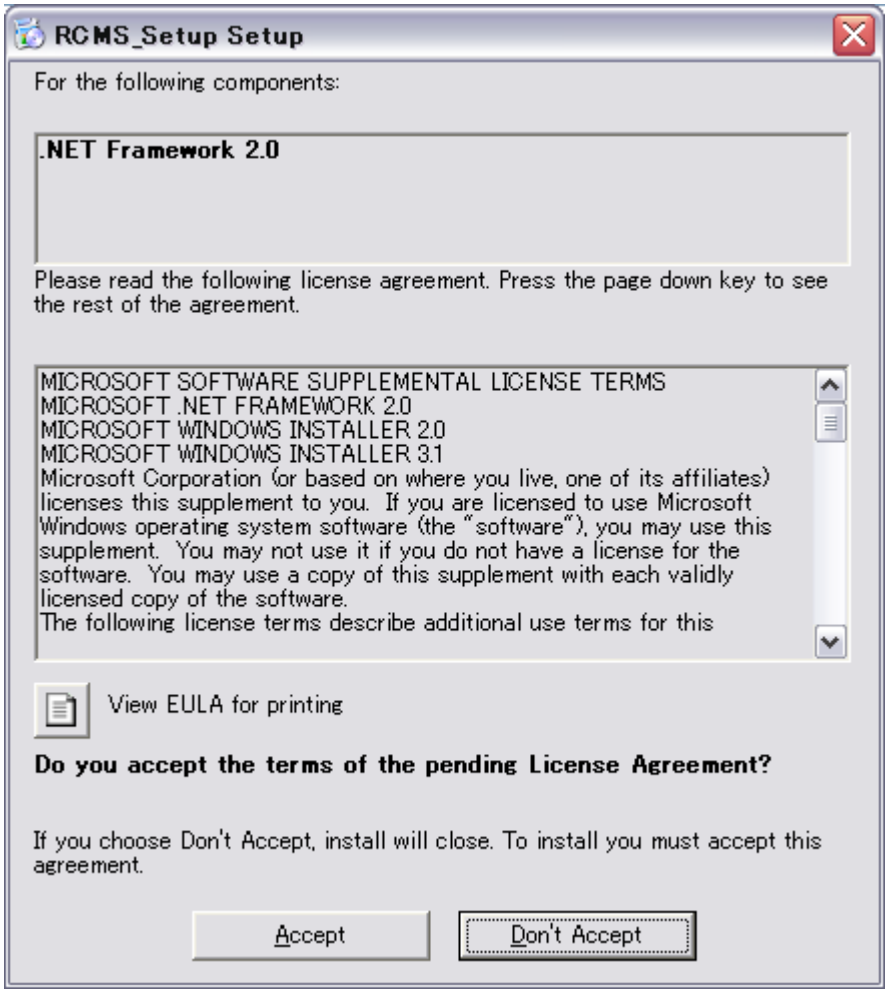
Install the software on the RCMS (general-purpose PC) using the CD-ROM.

(1) Install the CD-ROM on the CD-ROM drive in your PC.

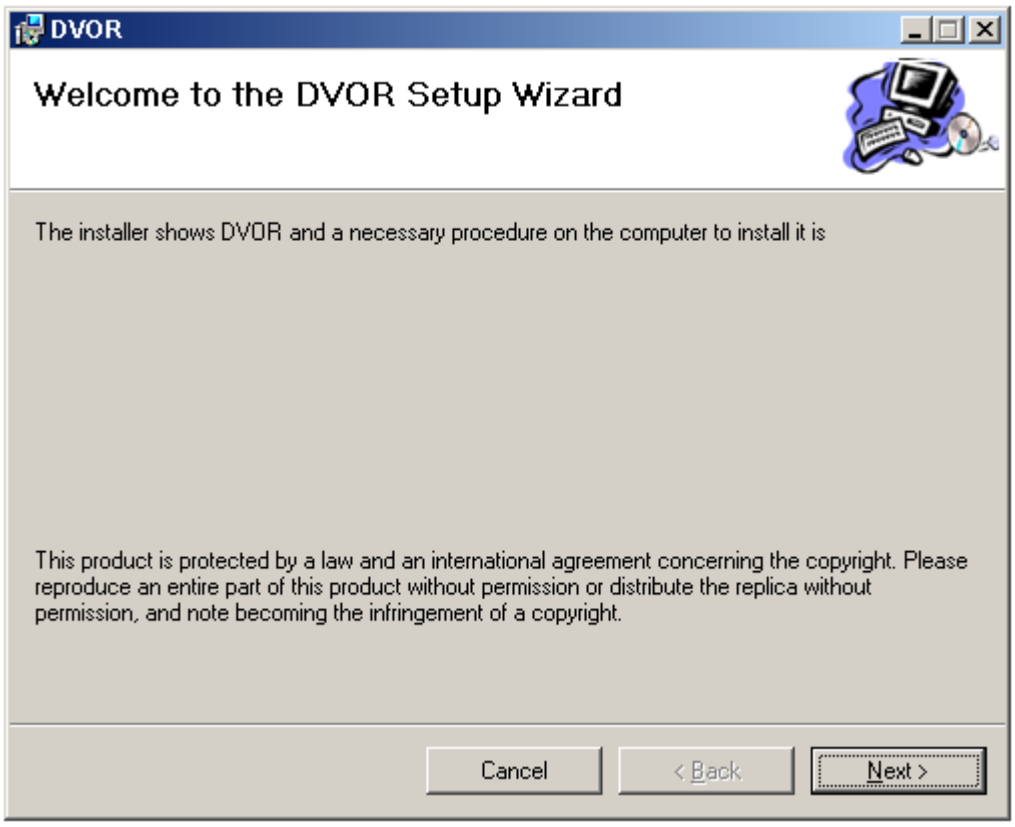
(2) Open the file mamed RCMS then open DVOR.

(3) Implement the CD-ROM [SETUP.EXE].

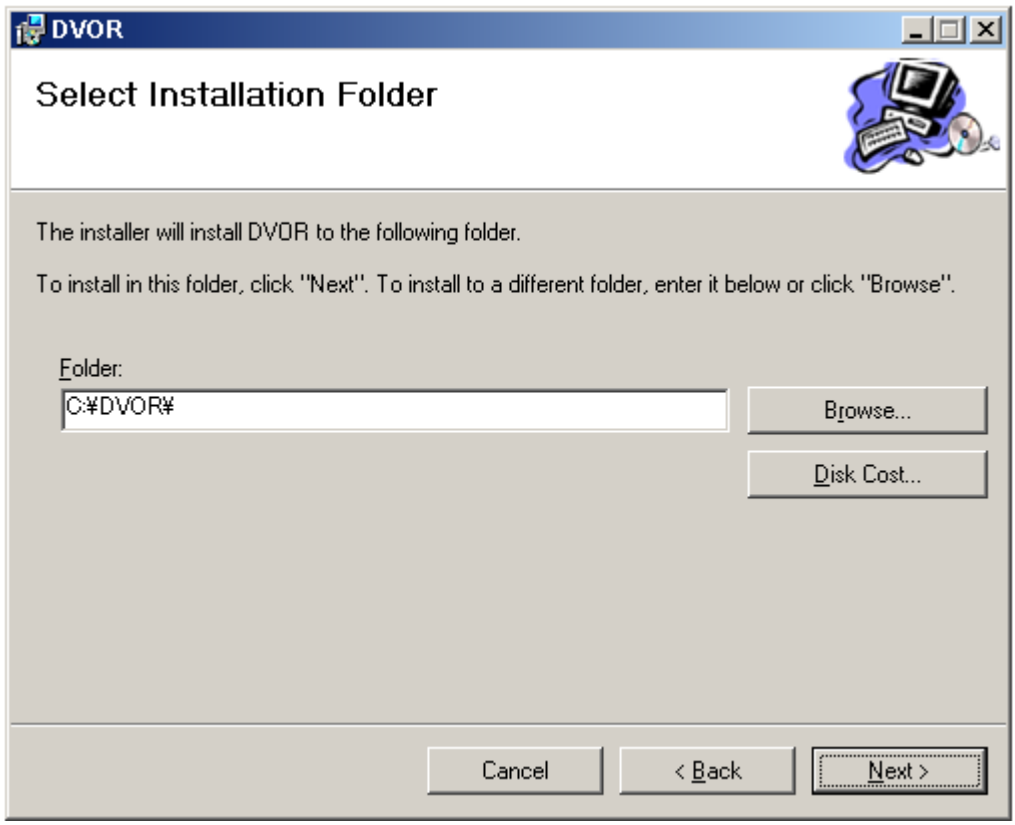
(4) When the following is displayed, click [Accept]. Then installation of [Microsoft.NET Framework2.0] starts.



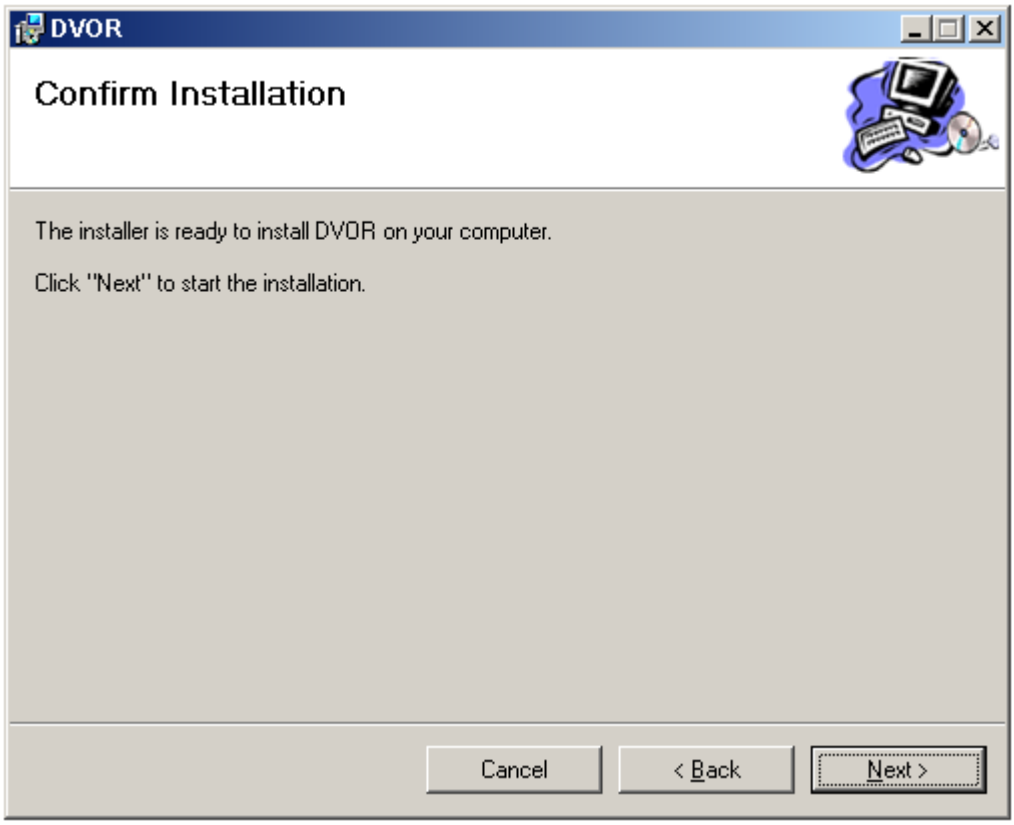
(4) When the setup screen in the figure below is displayed, click [Next] following the wizard screen.



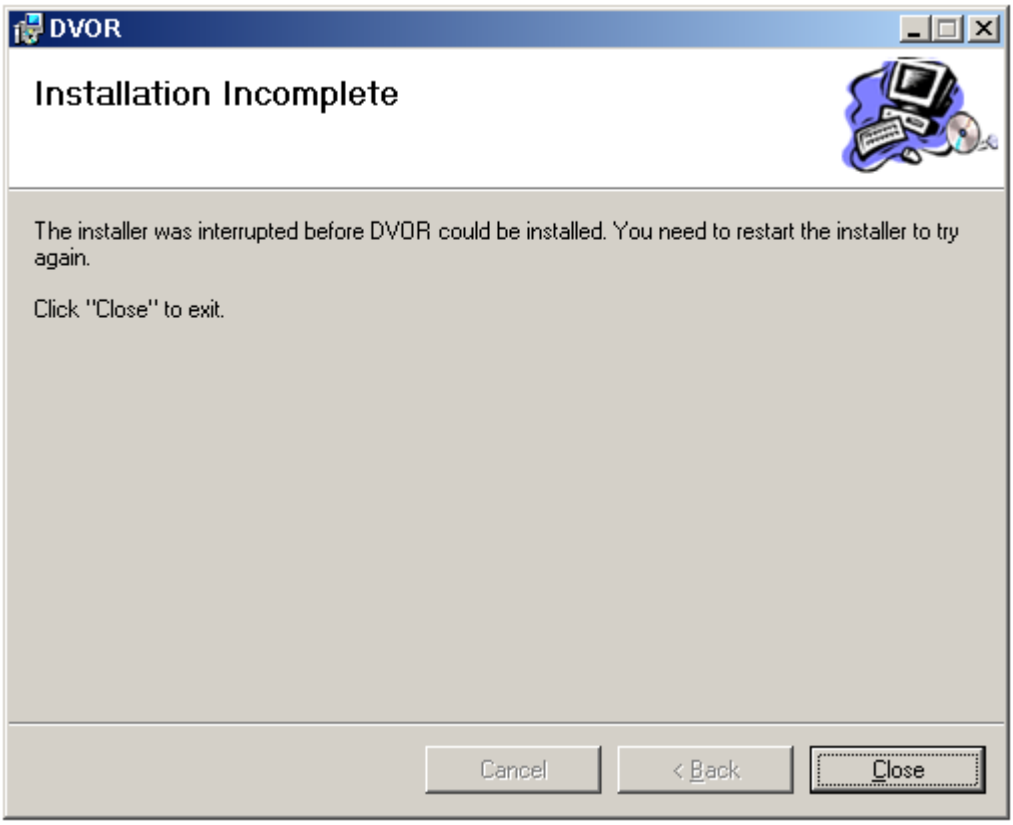
(5) When the following screen appears, you can select the installation folder. By default, DVOR is installed in Drive C. You can also set whether short-cuts created on the desktop are created in all accounts on your PC or only in an account now being logged on. After selecting the installation folder, click [Next].



(6) When the following screen appears and you click [Next]. Then installation starts. When changing the installation folder, click [Back] to return to the previous screen.



(7) After the installation completes, the Installation Complete screen appears. Click [Close] to close the screen.



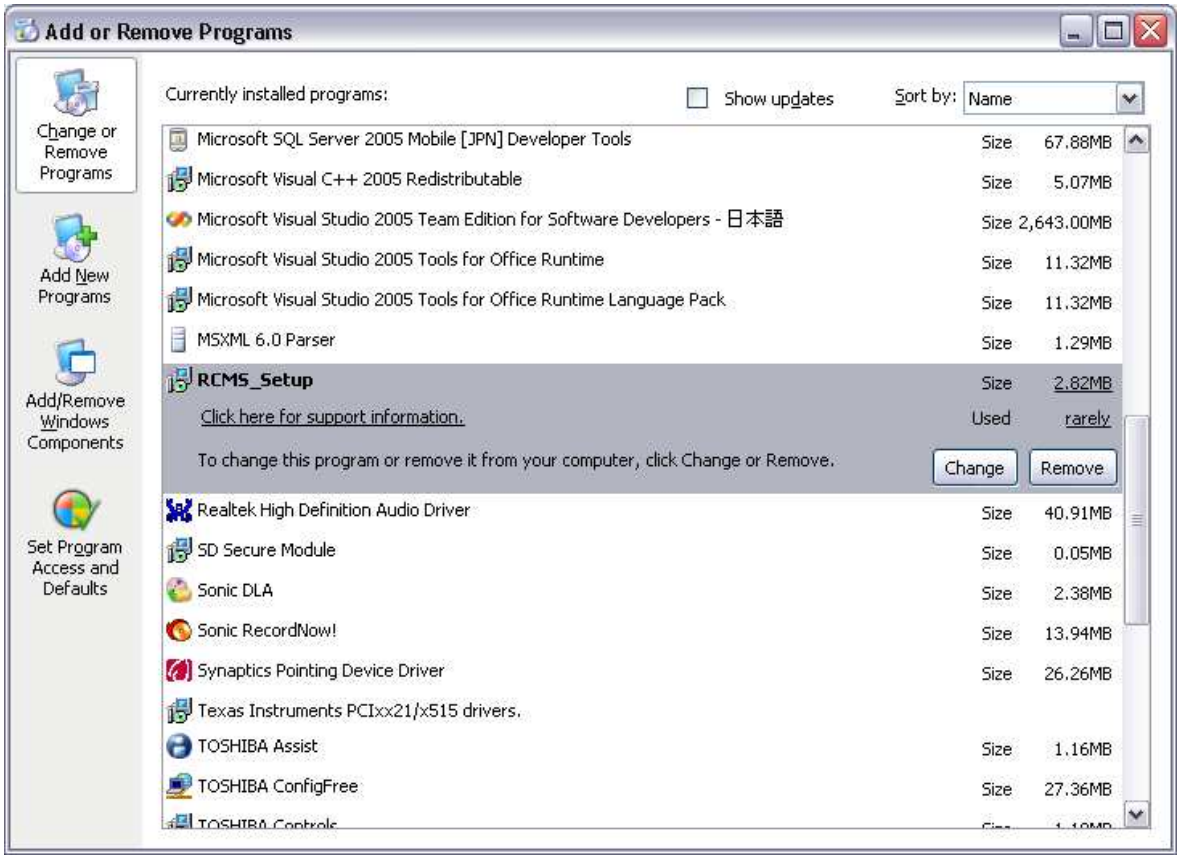
(8) Remove the CD-RM from the CD-ROM drive.

1.5.1.2 Uninstalling RCMS software

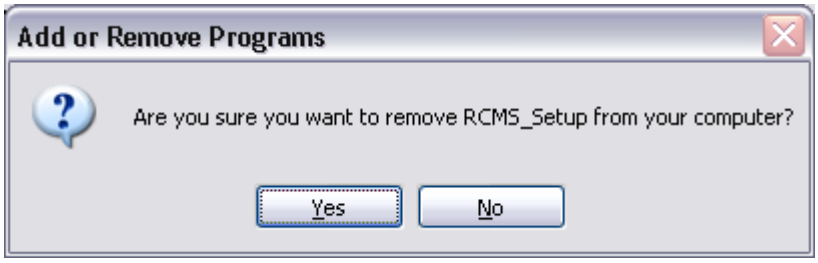
Uninstall the software using the CD-ROM on the RCMS (general-purpose PC).

Or it's uninstalled by the following way.

(1) From the PC control panel, implement deletion of or DVOR. The method of deleting software is a Windows basic function.



(2) When the following file removal confirmation message appears, select [Yes].



1.5.1.3 RCMS environment setting

When connecting the RCMS to the LAN1 or LAN2 side, first set the required network before starting the RCMS software.

IP Address and Subnet mask used in this paragraph are samples.

(1) Click ① Start and ② Control Panel on the Windows screen.

(2) Double-click the "Network and Internet Connections" on the Control Panel.

(3) Double-click the Network Connections.

(4) Double-click the Local Area Connection.

(5) Open the Advanced tab and click the Windows Firewall Settings.

(6) Open the General tab, select Off (not recommended), and then click OK.

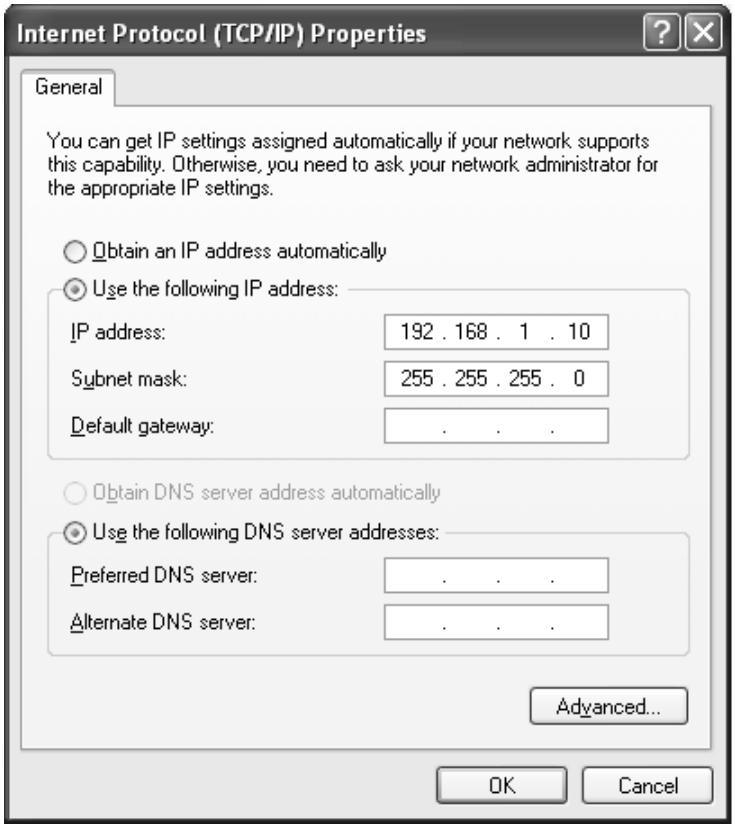
(7) Click OK on the Local Area Connection Properties screen.

(8) Open the General tab on the Local Area Connection Properties screen. Select the Internet Protocol (TCP/IP), and then click “Properties”.

(9) Select the “Use the following IP Address” on the Internet Protocol (TCP/IP) Properties screen to set the IP address and Subnet mask as shown below. Click OK (see the display screen below).

・Use the following IP address

IP address:	192.168. 1 .10	(for LAN1)
	192.168. 2 .10	(for LAN2)
Subnet mask:	255.255.255. 0	
Default gateway:	. . .	

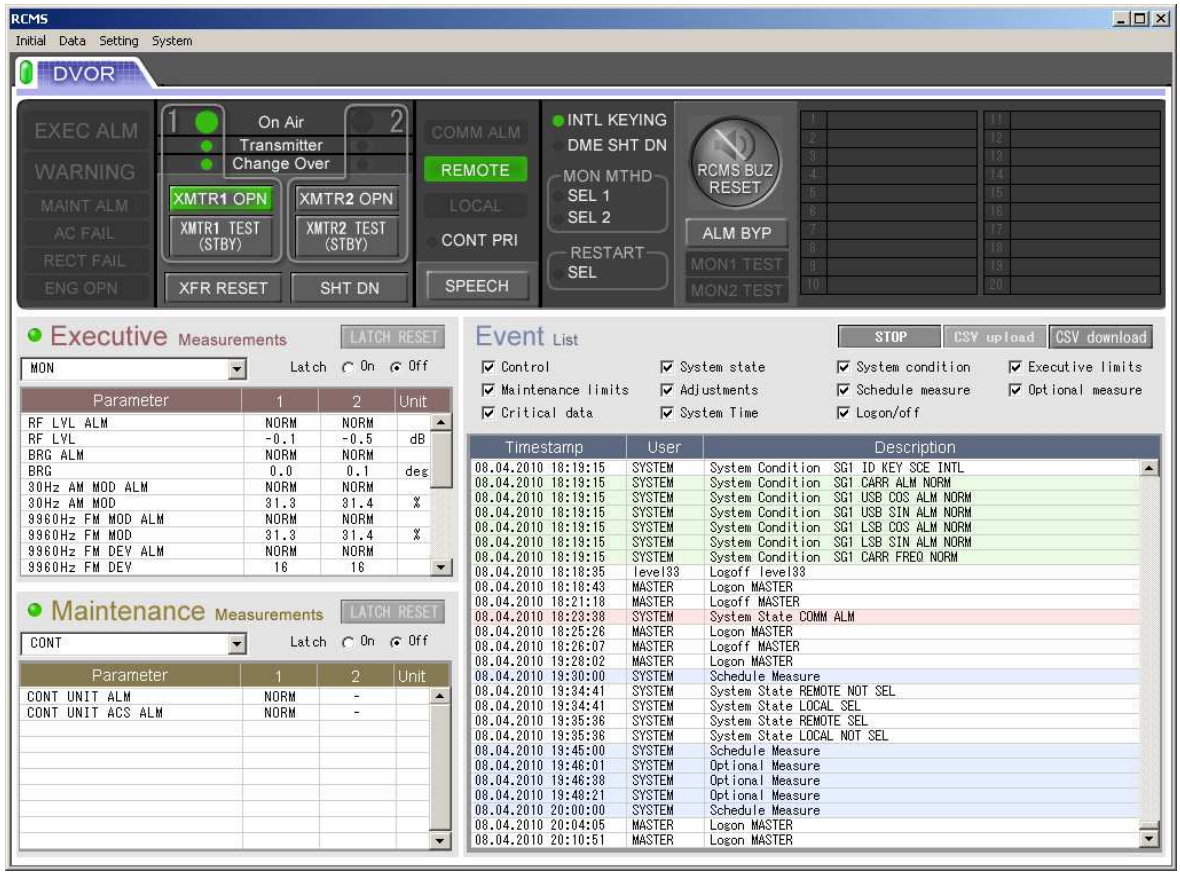


(10) Click OK to exit the screen.

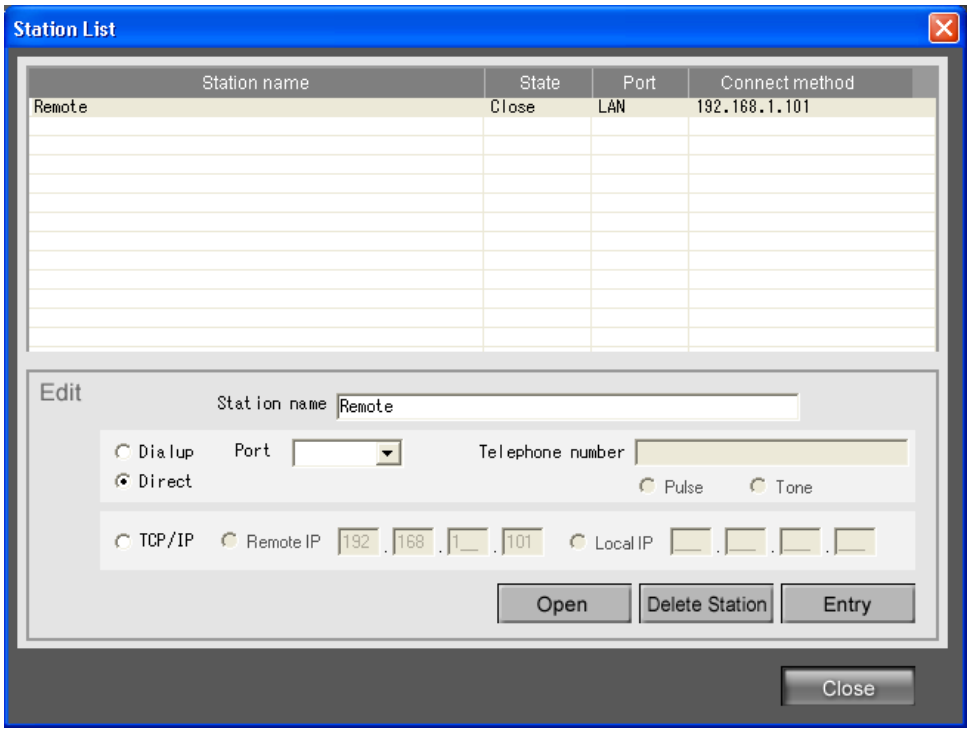
1.5.1.4 Start of RCMS

(1) Connect the RCMS and click the DVOR icon to start the DVOR software.

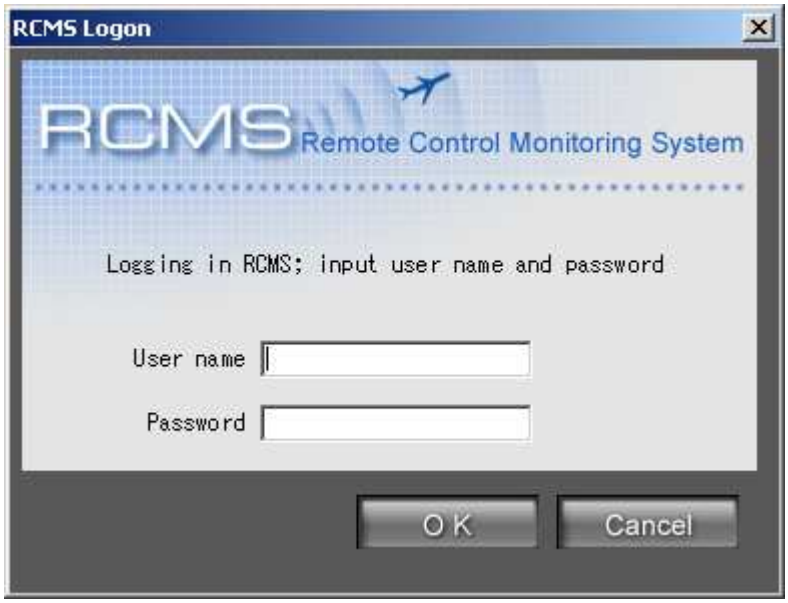
(2) Select "Initial" from the menu in the upper left corner of the screen and select the Station List (see the screen below).



(3) Station List is set referring to the paragraph on the Station List screen of Operation Guidance. The connection destination is selected from Station name after Station List is set, the OPEN button is clicked, and line is connected. (See the screen below. However, Station name and Connect method are samples.)



(4) When a connection with VOR Equipment is requested, Log on screen is displayed. Enter Username (MASTER) and Password (MASTER) (see the RCMS Logon screen below).



1.5.2 Event Viewer software

1.5.2.1 Installation function

The installation function is a function to install the event viewer software in general purpose PC with CD-ROM.

The installation function has the function to install the event viewer software newly, the restored function, and the function to uninstall.

1.5.2.2 Installation execution of Event Viewer software

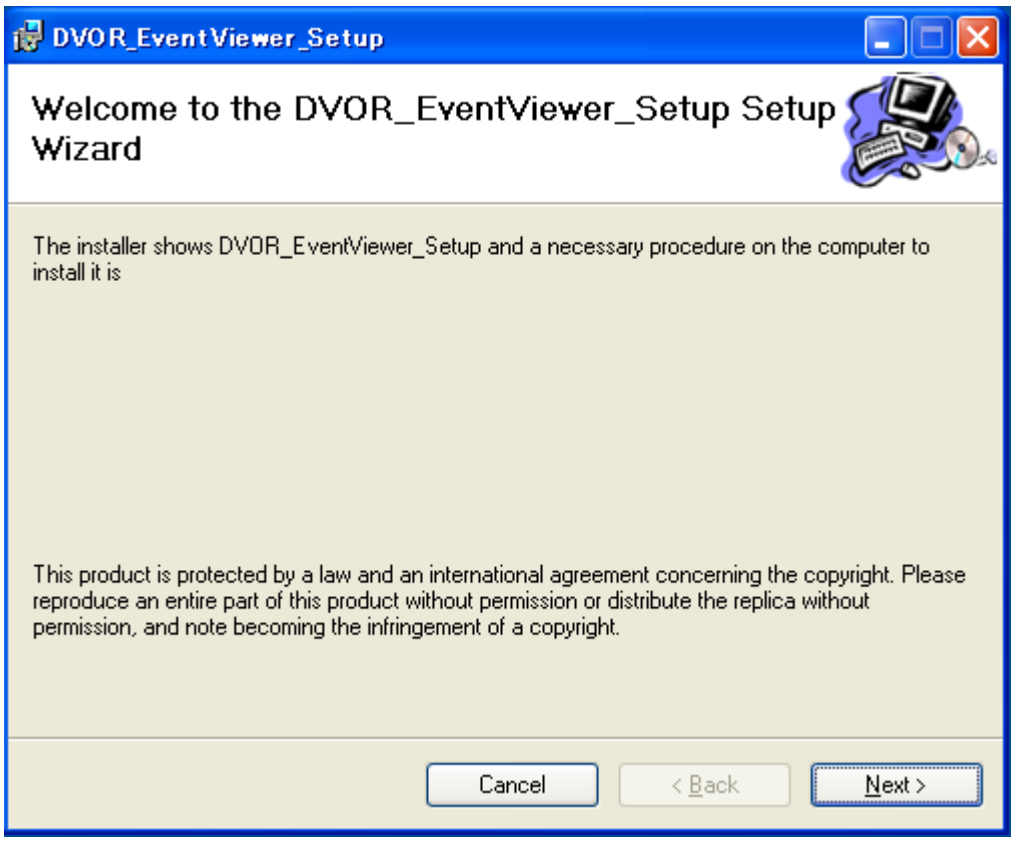
(1) CD-ROM is mounted on the CD-ROM drive of PC.

(2) Open the file momed Event_Viewer

(3) Implement the CD-ROM[SET UP.EXE]

(4) On PC in which the event viewer software is not installed when the installer starts, the installer start screen is displayed.

The installation of "Event Viewer" begins when "Next" is clicked if the following screen is displayed.

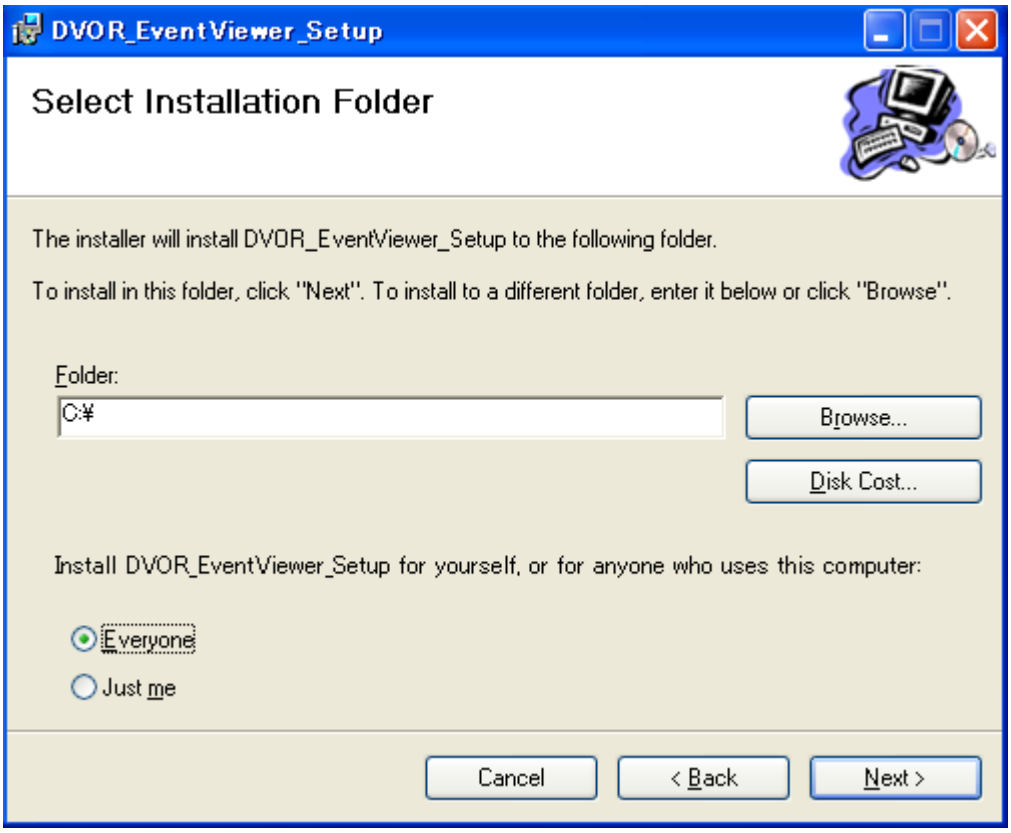


(5) If the following screen is displayed, the appointment of the folder at the installation destination, the appointment of the user who installs it, and the capacity of the disk are checked.

It's installed under the C drive by default.

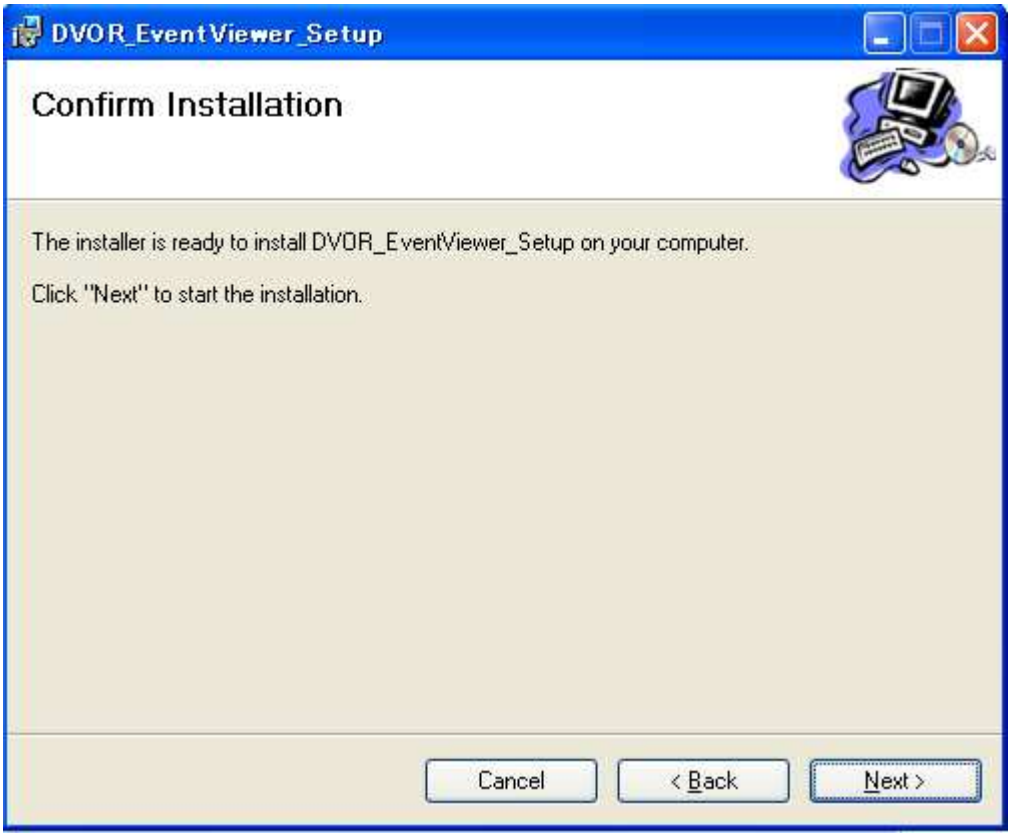
The short cut made for desktop sets whether to make for all accounts of PC or to make it only for the account being logged on now.

If an installation destination is appointed, "Next" is clicked.



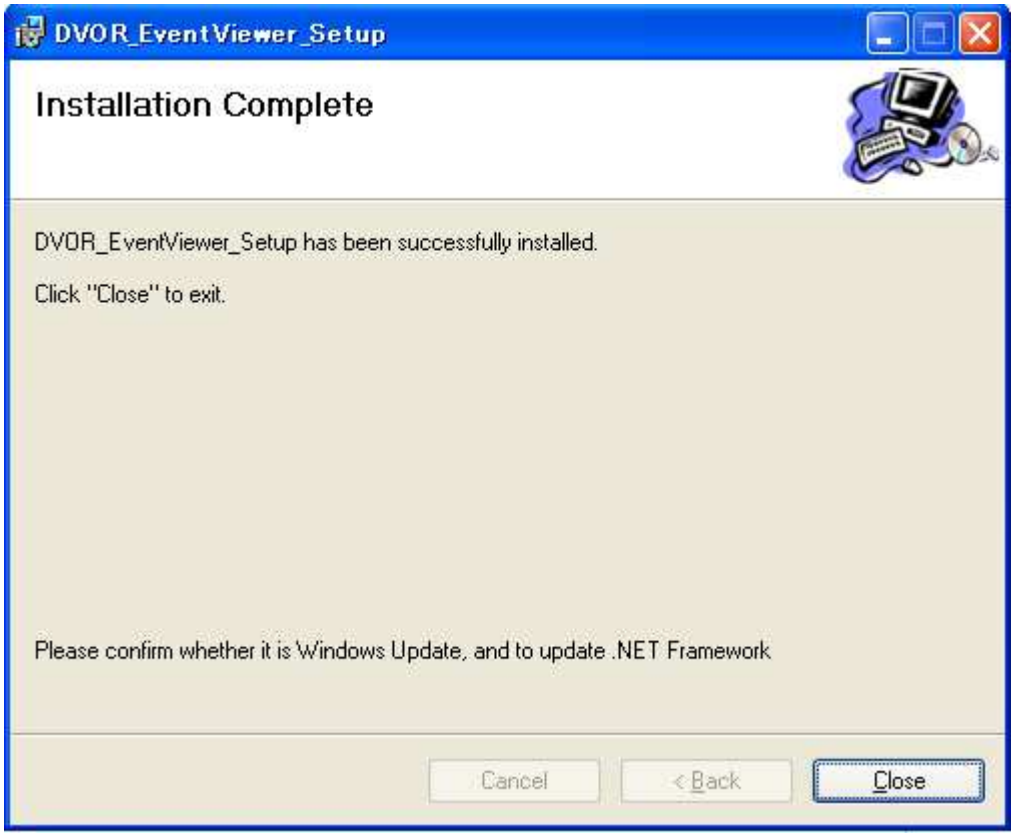
(6) When "Next" is clicked, the installation is executed if the following screen is displayed.

It returns to the former screen clicking "Back" when the installation destination etc. are changed.



(7) Because the following screen is displayed when the installation ends, the Event Viewer installer is ended clicking "Close".

The short cut of the event viewer execution file is made for desktop.

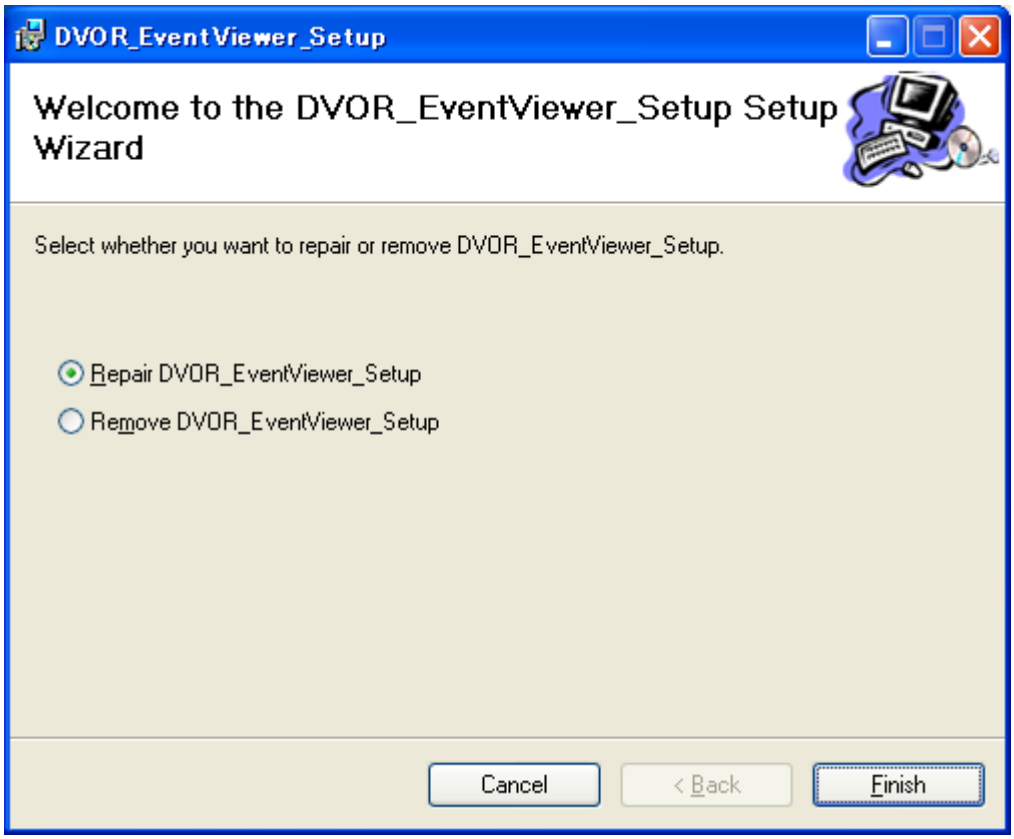


(8) CD-ROM is taken out from a CD-ROM drive.

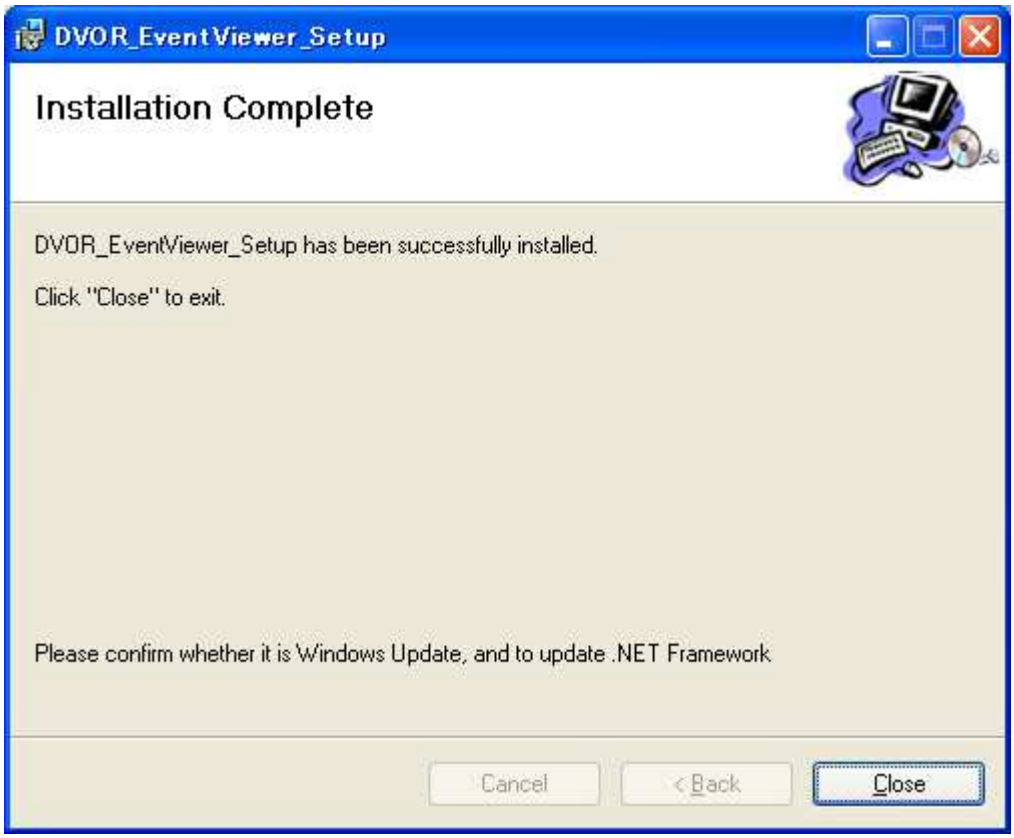
1.5.2.3 Restoration execution with installer of Event Viewer software

(1) When the installer is started on PC in which the Event Viewer software is installed, the selection screen of uninstaller and restoration are displayed.

When "Finish" is clicked after the check is put in "Repair DVOR_EventViewer_Setup", the restoration with the installer is executed if the following screen is displayed.



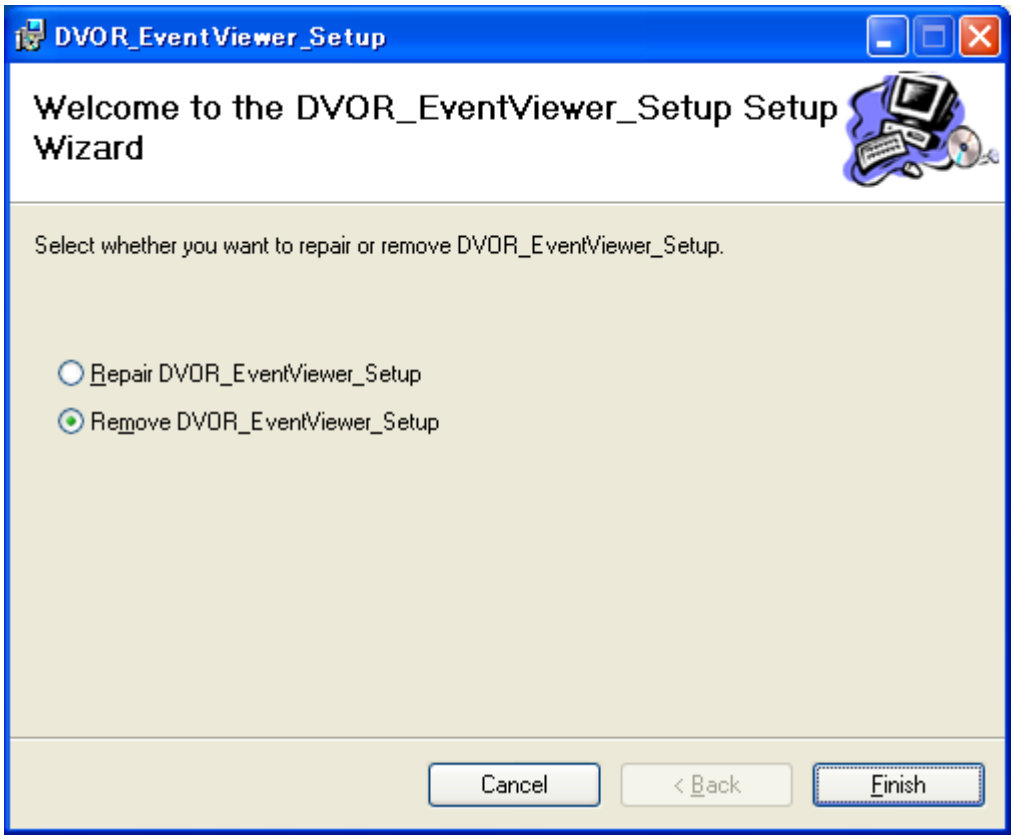
(2) The Event Viewer installer ends if “Close” is clicked if the following screen is displayed.



1.5.2.4 Uninstallation execution of Event Viewer software

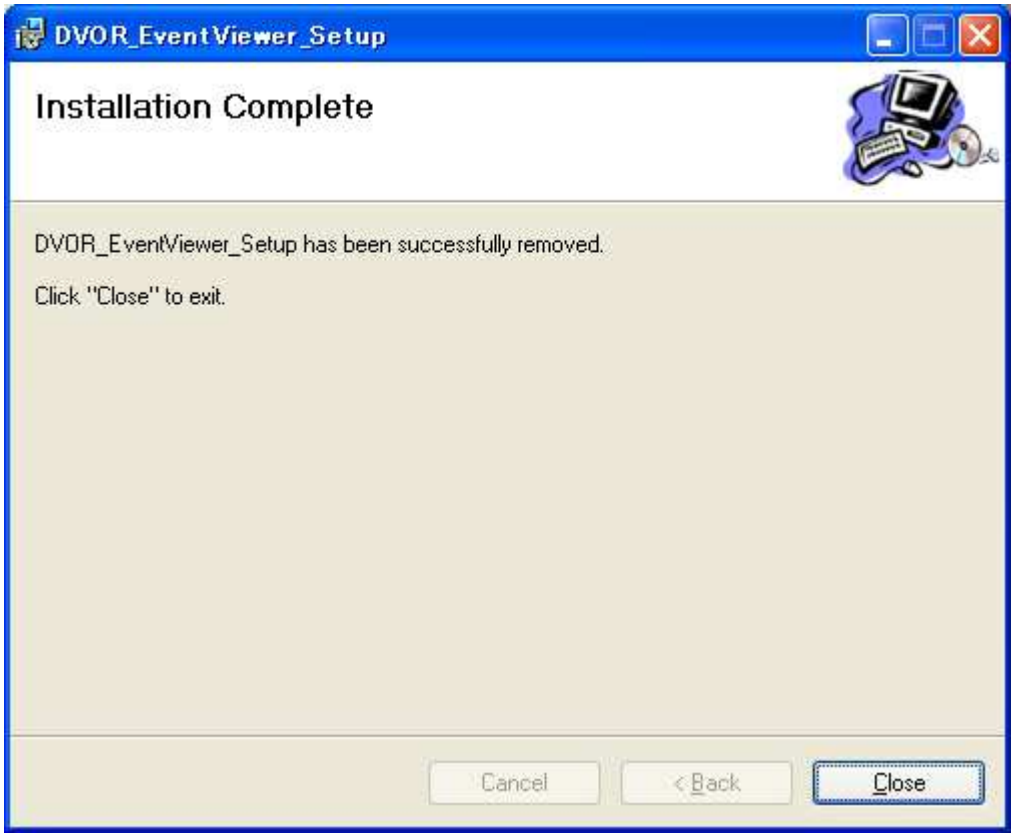
(1) When the installer is started on PC in which the Event Viewer software is installed, the selection screen of uninstaller and restoration are displayed.

When “Finish” is clicked after the check is put in "Remove DVOR_EventViewer_Setup", uninstallation with the installer is executed if the following screen is displayed.



(2) The Event Viewer installer ends if “Close” is clicked if the following screen is displayed.

After uninstallation ends, the installed Event Viewer software is deleted. And, the short cut of the Event Viewer execution file on desktop is deleted.



1.6 Mechanical check items

Most mechanical items are checked visually and acoustically. Inspect carefully rusts and water leakages of outdoor machines.

1.6.1 CAR Unit

1.6.1.1 CAR Unit mechanical check items table

Table 1.3.22.2-3 CAR Unit mechanical check items table

No./ Items/ Category	Overview of check	Criteria	Check methods
1.6.1.1.1 Transmitter (No.1) CAR Unit (No.1) <D>	Visual check	No dust adhering to the radiator.	See clause 1.6.1.2
1.6.1.1.2 Transmitter (No.2) CAR Unit (No.2) <D>	Visual check	No dust adhering to the radiator.	See clause 1.6.1.2

1.6.1.2 CAR Unit checkup method

(1) Used measuring equipment

None

(2) Check method

(2-1) It is visually confirmed that dust doesn't adhere from the front side of CAR Unit to the radiator.

1.6.2 FAN Unit

1.6.2.1 FAN Unit mechanical check items table

Table 1.6.2.1-1 FAN Unit mechanical check items table

No./ Items/ Category	Overview of check	Criteria	Check methods
1.6.2.1.1 DVOR Equipment CONT FAN Unit <C>	Listen to rotational sound. Visually check the rotational state.	Rotates normally with no abnormal sound.	See clause 1.6.2.2.1
1.6.2.1.2 Transmitter (No.1) TX FAN Unit (No.1) <C>	Listen to rotational sound. Visually check the rotational state.	Rotates normally with no abnormal sound.	See clause 1.6.2.2.2
1.6.2.1.3 Transmitter (No.2) TX FAN Unit (No.2) <C>	Listen to rotational sound. Visually check the rotational state.	Rotates normally with no abnormal sound.	See clause 1.6.2.2.2

1.6.2.2 FAN Unit checkup method

1.6.2.2.1 CONT FAN Unit checkup method

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the rotational state of the blower from the ceiling side of DVOR Equipment.

(2-2) Confirm the air volume by putting a hand over the evacuation side of the blower.

1.6.2.2.2 TX FAN Unit checkup method

(1) Used measuring equipment

None

(2) Check method

(2-1) Check the rotational state of the blower from the back side of DVOR Equipment.

(2-2) Confirm the air volume by putting a hand over the evacuation side of the blower.

1.6.3 Air filter

1.6.3.1 Air filter mechanical check items table

Table 1.6.3.1-1 Air filter mechanical check items table

No./ Items/ Category	Overview of check	Criteria	Check methods
1.6.3.1.1 Air filter <D>	Visual check	No stain and dust adhering to the air filter.	See clause 1.6.3.2

1.6.3.2 Air filter checkup method

(1) Used measuring equipment

None

(2) Check method

(2-1) Open the front door of DVOR Equipment.

(2-2) It is visually confirmed that dust doesn't adhere to the air filter installed in the back of front door.

1.6.4 CAR Antenna

1.6.4.1 CAR Antenna mechanical check items table

Table 1.6.4.1-1 CAR Antenna mechanical check items table

No./ Items/ Category	Overview of check	Criteria	Check methods
1.6.4.1.1 Radar dome <E>	Visually check if there are any cracks from the outside.	No crack	See clause 1.6.4.2.1
1.6.4.1.2 Alford antenna <E>	Visual check	No stain and rust adhering to the antenna.	See clause 1.6.4.2.2
1.6.4.1.3 Antenna support <E>	Visual check	No stain and rust adhering to the antenna.	See clause 1.6.4.2.3
1.6.4.1.4 Spacing between capacitor plates <E>	Measure it with a vernier caliper.	The value at installation has not been changed.	See clause 1.6.4.2.4
1.6.4.1.5 Length of end plate <E>	Measure it with a vernier caliper.	The value at installation has not been changed.	See clause 1.6.4.2.4

1.6.4.2 CAR Antenna checkup method

1.6.4.2.1 Radar dome (CAR Antenna) checkup method

(1) Used measuring equipment

None

(2) Check method

(2-1) Select LOCAL from REMOTE/LOCAL switch on the LCD display. Stop transmission by SHT DN switch.

(2-2) Turn OFF the "POWER" switch of the TX DC Unit of the Transmitter.

(2-3) Turn OFF the "POWER" switch of the DC Unit of the Controller.

(2-4) Turn OFF all power switches of the Breaker panel.

(2-5) Confirm that there is no crack on the radar dome of CAR Antenna.

1.6.4.2.2 Alford antenna (CAR Antenna) checkup method

(1) Used measuring equipment

None

(2) Check method

(2-1) Select the LOCAL from the REMOTE/LOCAL switch on the LCD display. Stop transmission by the SHT DN switch.

(2-2) Turn OFF the "POWER" switch of the TX DC Unit of the Transmitter.

(2-3) Turn OFF the "POWER" switch of the DC Unit of the Controller.

(2-4) Turn OFF all power switches of the Breaker panel.

(2-5) Remove setscrews from the CAR Antenna of the radar dome. Remove the cover.

(2-6) Visually confirm the Alford antenna and its support have no abnormal rust.

1.6.4.2.3 Antenna support (CAR Antenna) checkup method

(1) Used measuring equipment

None

(2) Check method

(2-1) Select the LOCAL from the REMOTE/LOCAL switch on the LCD display. Stop transmission by the SHT DN switch.

(2-2) Turn OFF the "POWER" switch of the TX DC Unit of the Transmitter.

(2-3) Turn OFF the "POWER" switch of the DC Unit of the Controller.

(2-4) Turn OFF all power switches of the Breaker panel.

(2-5) Visually confirm the CAR Antenna support has no abnormal rust.

1.6.4.2.4 Interval between capacitor plates (CAR Antenna) checkup method
Length of the end plate (CAR Antenna) checkup method

(1) Used measuring equipment

Vernier caliper

(2) Check method

(2-1) Select the LOCAL from the REMOTE/LOCAL switch on the LCD display. Stop transmission by the SHT DN switch.

(2-2) Turn OFF the "POWER" switch of the TX DC Unit of the Transmitter.

(2-3) Turn OFF the "POWER" switch of the DC Unit of the Controller.

(2-4) Turn OFF all power switches of the Breaker panel.

(2-5) Remove setscrews of the radar dome of the CAR Antenna. Remove the cover.

(2-6) Confirm the fixing nuts of the capacitor plate and end plate of the Alford antenna element are locked without looseness.

(2-7) Measure the interval and length with a vernier caliper.

(2-8) Confirm that these measurements are recorded in the adjustment data during the field adjustment work and not different from the recorded values.

1.6.5 SB Antenna

1.6.5.1 SB Antenna mechanical check items table

Table 1.6.5.1-1 SB Antenna mechanical check items table

No./ Items/ Category	Overview of check	Criteria	Check methods
1.6.5.1.1 Radar dome <E>	Visually check if there are any cracks from the outside.	No crack	See clause 1.6.5.2.1
1.6.5.1.2 Antenna support <E>	Visual check	No stain and rust	See clause 1.6.5.2.2

1.6.5.2 SB Antenna checkup method

1.6.5.2.1 Radar dome (SB Antenna) checkup method

(1) Used measuring equipment

None

(2) Check method

(2-1) Select the LOCAL from the REMOTE/LOCAL switch on the LCD display. Stop transmission by the SHT DN switch.

(2-2) Turn OFF the "POWER" switch of the TX DC Unit of the Transmitter.

(2-3) Turn OFF the "POWER" switch of the DC Unit of the Controller.

(2-4) Turn OFF all power switches of the Breaker panel.

(2-5) Confirm that there is no crack on the radar dome of each SB Antenna.

1.6.5.2.2 Antenna support (SB Antenna) checkup method

(1) Used measuring equipment

None

(2) Check method

(2-1) Select the LOCAL from the REMOTE/LOCAL switch on the LCD display. Stop transmission by the SHT DN switch.

(2-2) Turn OFF the "POWER" switch of the TX DC Unit of the Transmitter.

(2-3) Turn OFF the "POWER" switch of the DC Unit of the Controller.

(2-4) Turn OFF all power switches of the Breaker panel.

(2-5) Confirm that there is no removed coating and rust on each SB Antenna support.

1.6.5.2.3 Interval between the capacitor plates (SB Antenna) checkup method
Length of the end plate (SB Antenna) checkup method

(1) Used measuring equipment

Vernier caliper

(2) Check method

(2-1) Select the LOCAL from the REMOTE/LOCAL switch on the LCD display. Stop transmission by the SHT DN switch.

(2-2) Turn OFF the "POWER" switch of the TX DC Unit of the Transmitter.

(2-3) Turn OFF the "POWER" switch of the DC Unit of the Controller.

(2-4) Turn OFF all power switches of the Breaker panel.

(2-5) Remove the setscrews from the radar dome of the SB Antenna. Remove the cover.

(2-6) Confirm that the setscrews of the capacitor plate and end plate of the Alford antenna element are locked without looseness.

1.6.6 FMON Antenna

1.6.6.1 FMON Antenna mechanical check items table

Table 1.6.6.1-1 FMON Antenna mechanical check items table

No./ Items/ Category	Overview of check	Criteria	Check methods
1.6.6.1.1 Antenna <D>	Visually check bend, warp and direction.	The antenna has no bend and warp. The antenna faces the right direction (i.e., directionality).	See clause 1.6.6.2

1.6.6.2 Antenna (FMON Antenna) checkup method

(1) Used measuring equipment

None

(2) Check method

(2-1) Confirm that the antenna has no bend and kink.

(2-2) Confirm that the antenna faces the right direction (i.e., directionality).

CHAPTER 2 Periodical replacement parts

2.1 Table of periodical replacement parts

Table 2.1-1 shows the periodical replacement parts of this device.

Table 2.1-1 Periodical replacement parts

No.	Product name and part type	Manufacturer	Replacement cycle	Necessary time	Note
1	CONT FAN Unit	Toshiba Corporation	100,000 hours	10 minutes/ unit	
2	TX FAN Unit (No.1)	Toshiba Corporation	100,000 hours	5 minutes/ unit	
3	TX FAN Unit (No.2)	Toshiba Corporation	100,000 hours	5 minutes/ unit	
4	LCD Unit	Toshiba Corporation	40,000 hours (Back light turn on time)	15 minutes/ unit	

2.2 Table of parts to be replaced on lightning strike

When the system is struck by lightning, the parts listed in Table 2.2-1 will need to be replaced.

Table 2.2-1 parts to be replaced on lightning strike

No.	Product name and part type	Manufacturer	Necessary time	Note
1	Arrester RKV30H11456 B01	Fuji Electric Technica Co,Ltd.	20 minutes/ unit	CN227-EBT (Note 1)
2	Tie down strap for arrester RKW93H04406 A03	Hellermann Tyton Co,Ltd.	Included in No.1	INSULOK T50R

(Note 1)

If the system is subjected to an inflow of surge current that exceeds the arrester's impulse voltage withstand capability, the arrester will, depending on the volume of the passing current, switch to a failure mode of either short or open circuit, resulting in abnormal communication.

Therefore, if a lightning strike leads to abnormal communication, disconnect the LAN cables from the arrester and, using adaptors or similar means, reconnect the LAN cables directly to each other. With the LAN cables reconnected, if communication is restored back to normal, that means the arrester is faulty.

Promptly replace the arrester with one of known performance.

Impulse voltage withstand capability of the system's LAN cable surge arrester: 500A (8/20 μs)

CHAPTER 3 Repairing methods

3.1 Methods for repairing mechanical parts

3.1.1 Repair of radome

NOTE

The radar dome is made of resin. So, take enough care that a local force may break the radar dome (e.g., an edge of things hits against the radar dome).

Resin does not resist heat as metal. If a fire is moved closer to the radar dome, it may degrade or catch fire to a certain degree. Never put fire close to the radar dome.

3.1.1.1 Repair of the panel of the main body

Use this method for repairing film peeling, cracks, dents and scratches inside and outside. The table below shows the materials and equipment used for repairing the panel of the main body.

	Product name	Note
Materials	・Resin: Upica FLP425 or equivalent ・Hardening agent: Parmeck N or equivalent ・Colorant: Poly-Tone color or equivalent ・Glass mat EMC-450 ・Glass roving (#800) ・Acetone ・Mylar film or cellophane ・Masking tape ・Sandpaper ・Waste cloth	Toyobo Co., Ltd. (nonflammable resin) NOF Corporation Dainippon Ink And Chemicals, Incorporated For 450g (Any manufacturers are allowed) For 570g (Any manufacturers are allowed)
Equipment	・Polyethylene beaker (500-1000ml) ・Brush (natural bristles)approximate width : 60-100 ・Scissors ・Sharp blade (knife, chisel, etc) ・Hand grinder ・Flat file (coarse file) ・Sandpaper (#80-120) ・Stirrer (approximately 200-300)	

Repairing methods

(1) Draw a mark-off line for cutting off on the damaged surface. In principle, a circular or ellipsoidal area is removed.

(2) Make a cut in the surface to the damaged layer along the mark-off line with a sharp knife and chisel. Shear damaged areas. Remove layers with difference of 25mm or more in width. (STEP 1)

(3) Use a sandpaper (#80-#120) on the surface (i.e., a surface to which the new surface adheres) having contact with the new surface (patch) in order to make the surface rough. Taper edges of layers as possible. (STEP 2)

(4) Remove chips and grinding sludges with a cleaner. Remove grease with a clean cloth soaked with acetone. (STEP 3)

(5) Dry it well after cleaning.

(6) Caulking work

The lamination layer of the panel consists of gel coating, glass mat and glass roving.

(7) Preparation of resin (STEP 4)

Add a hardening agent corresponding to the working temperature and mix it well. It turns into a gel in approximately 50 minutes. Apply it taking care of the time to form lamination layers.

Resin Upica FLP425 100 parts

Colorant Poly-Tone color 5 parts weight ratio (%)

Hardening agent Parmeck N 0.5-2 parts

Approximate additive amount of hardening agent (assuming the gelation time of 50 minutes)

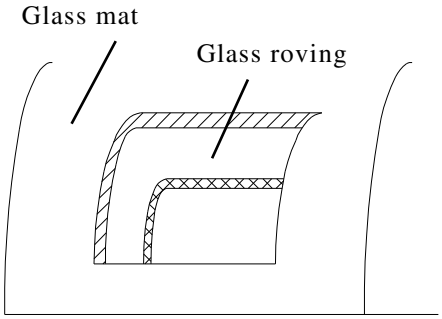
Working temperature	5℃	10℃	15℃	20℃	25℃	30℃
Amount of hardening agent	2.0	1.5	1.0	0.8	0.7	0.5

(8) Apply the resin from the surface of the broken part. Put a glass mat or roving on it and apply resin again. Superimpose the glass mats or rovings. (STEP 5)

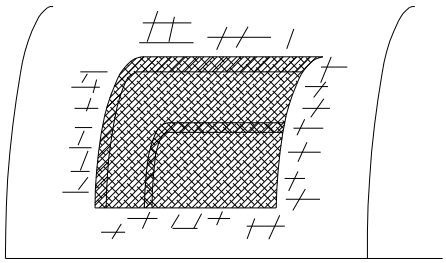
(9) Perform finish processing on the boundary surface with sandpaper (#80-#120) after the resin has been cured. (STEP 6)

(10) Apply fluorine resin paint.

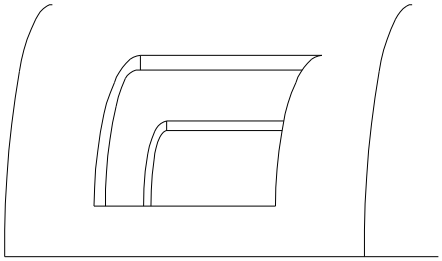
STEP 1 Remove the broken parts with a knife. Make a difference of 25mm or more in width for each layer.



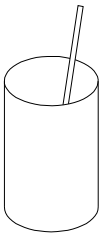
STEP 2 Make the surface rough with sandpaper.



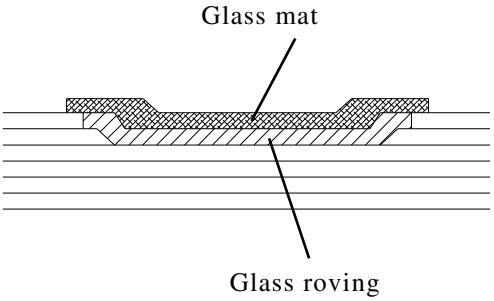
STEP 3 Clean the surface of the panel and removed areas.



STEP 4 Prepare the resin.



STEP 5 Form layers of a glass mat and a glass roving with resin.



STEP 6 Perform finish processing on the boundary surface between layers with sandpaper.

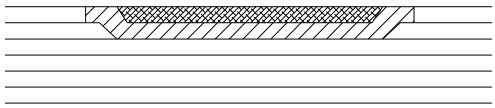


Figure 3.1.1.1-1 Repair process chart of the main body panel

3.1.2 Repair of gel coating of radome

The table below shows the materials and equipment used for repairing the gel coating of the radar dome.

	Product name	Note
Materials	・V Freon 200 primer or equivalent ・V Freon T enamel or equivalent ・V Freon T thinner or equivalent ・V Freon T hardening agent or equivalent ・Special putty TP for coating ・Acetone ・Waste cloth	Dai Nippon Toryo Co., Ltd.
Equipment	・Spray gun ・Paint brush ・Compressor ・Air hose ・Portable cylinder ・Polyethylene beaker (500-1000ml) ・Stirrer ・Sandpaper (#80-#120) ・Knife, cutter, chisel and razor ・Paddle for applying special putty	Nozzle hole diameter: 2.5mm Working pressure: 5kg/cm^2 or more

NOTE

Do not start work in fog or when water droplets are adhering to the surface to be coated because the adhesive power is reduced.

Repair methods

Repair the gel coated surface of the radar dome by painting.

3.1.3 Adjustment of interval between condenser plates

Maximize the interval between the condenser plates of Alford antenna. Adjust the length of the condenser plate by loosening the nuts. Lock the screws after adjustment.

3.1.4 Adjustment of length of the end plate

The end plate of Alford antenna is for adjusting the length of the element of the antenna. Adjust the length of the end plate to optimize the element. Adjust the length of the end plate by loosening the nuts. Lock the screws after adjustment. .

3.1.5 Coating of antenna support

Repair the antenna support of the CAR Antenna or SB Antenna by the following methods if the coating has been peeled off or the antenna support has gathered rust. The table below shows the materials and equipment used for coating the antenna support.

	Product name	Note
Materials	Eponix 90 primer V Freon T enamel or equivalent Thinner Waste cloth	Dai Nippon Toryo Co., Ltd.
Equipment	Brush (60-100 nn width) Waste cloth Sand paper (#300-#400)	

3.2 Cleaning of radiator and air filter

3.2.1 Cleaning of radiator of CAR Unit

(1) Take up dusts with a vacuum sweeper.

(2) Always clean when it gets dusty.

3.2.2 Cleaning of air filter

(1) Clean the air filter on the front door of the DVOR Equipment every six months in order to maintain the cooling effect. The method to clean the air filter is explained below (See Figure 3.2.2-1). Always clean when it gets dusty.

(1-1) Open the front door. Remove the air filter attached to the backside of the front door with Velcro.

(1-2) Take up dusts with a vacuum sweeper. Wash the filter if dusts cannot be taken up well. Gently wash the air filter with mild detergent in water by hands. Repeat washing several times if the air filter is very filthy. Finally, rinse the air filter with water and dry it in a shaded area.

(1-3) Attach the air filter on the backside of the front door.

NOTE

Holding force of Velcro is reduced if it gets dusty. Also clean Velcro when cleaning the air filter. Take up dusts with a vacuum sweeper.

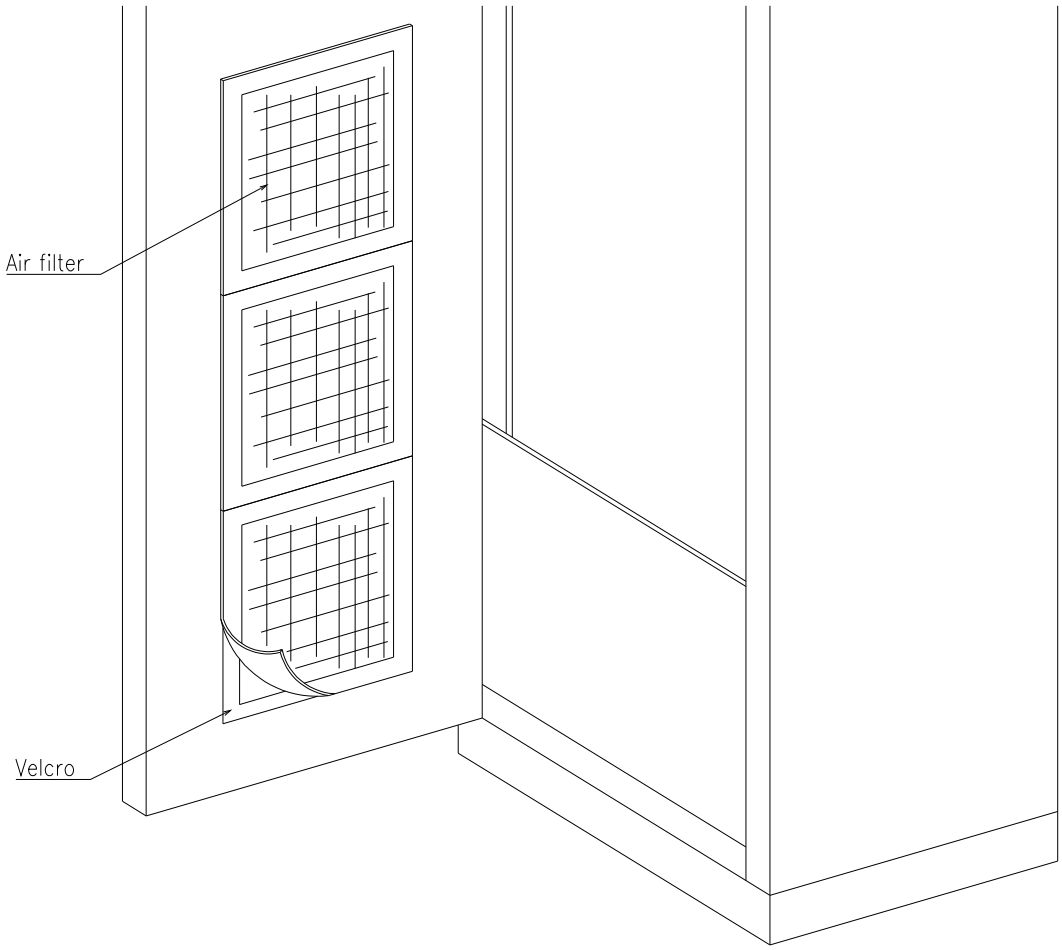


Figure 3.2.2-1 Removal of air filter

4

4 Trouble shooting

4.1 Overview

Troubleshooting for errors occurred in the DVOR system will now be explained using a flowchart.
(See Figure 4.1.1)

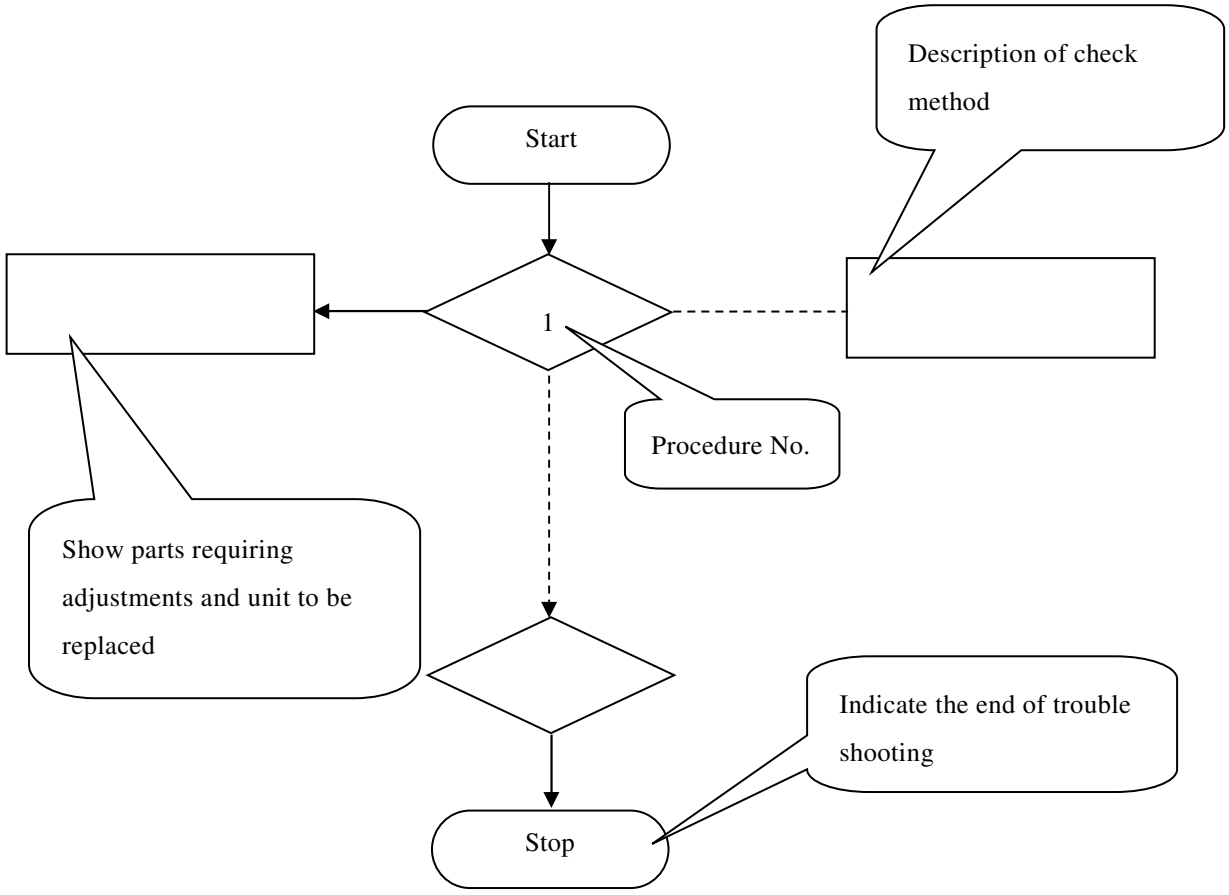


Figure 4.1.1 Explanation of flowchart

4.2 Trouble shooting by symptom

This is a flowchart to determine which component caused an alarm from the monitor.

4.2.1 In case of increased bearing error

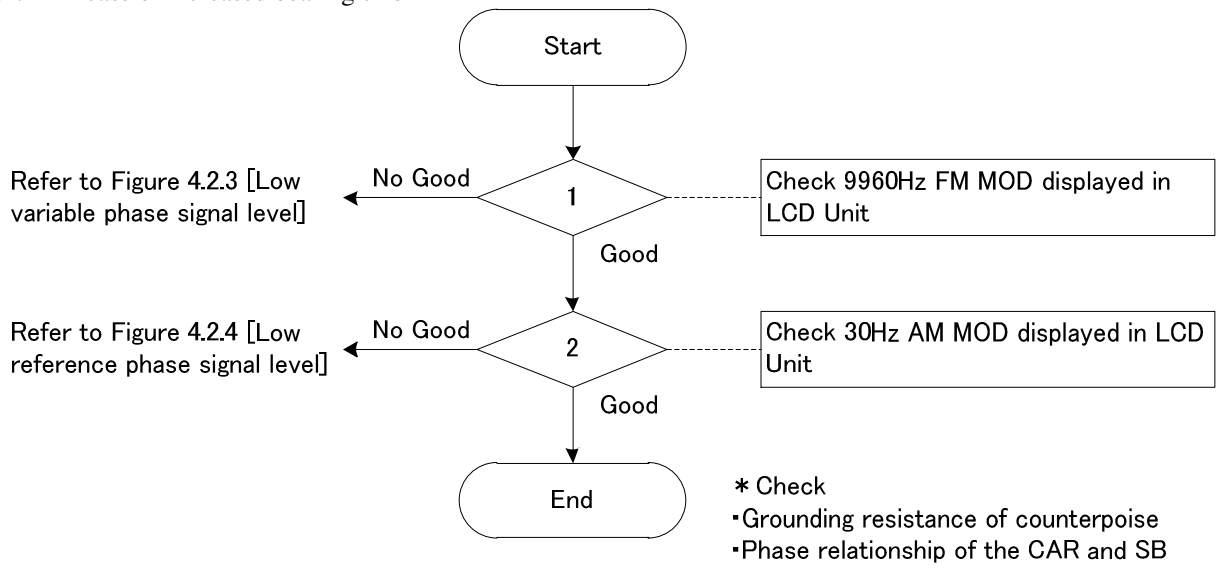


Figure 4.2.1 Increased of bearing error

4.2.2 In case of low receiving RF level

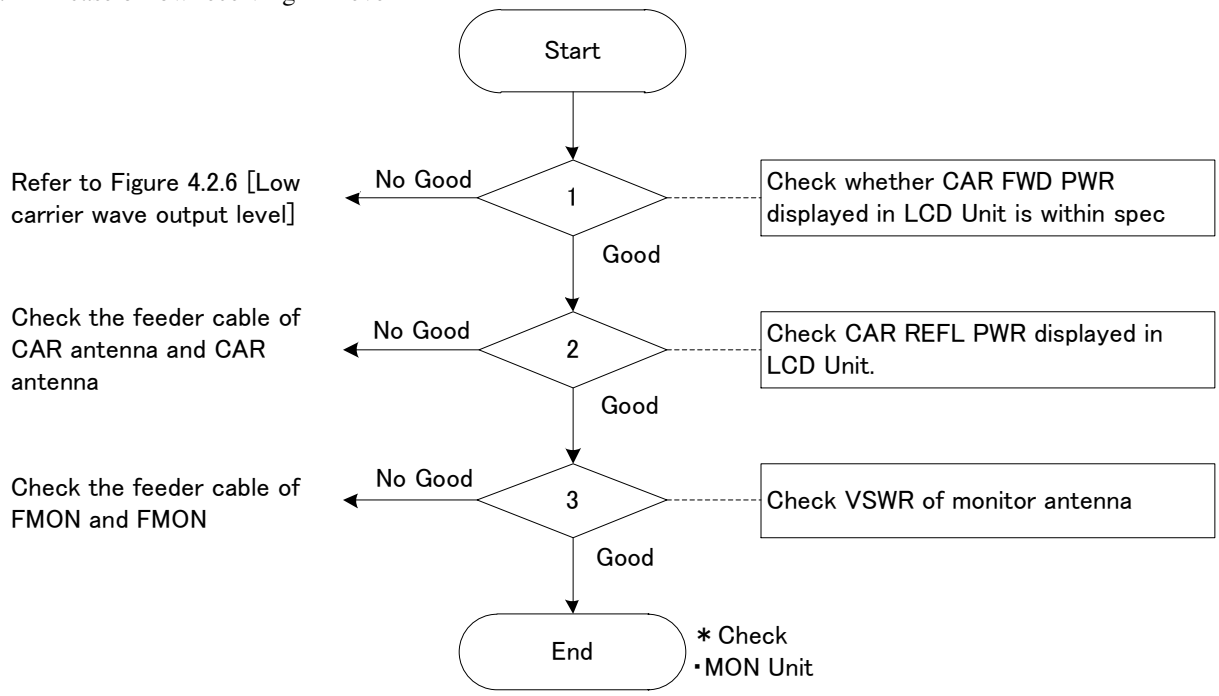


Figure 4.2.2 Low receiving RF level

4.2.3 In case of low variable phase signal level

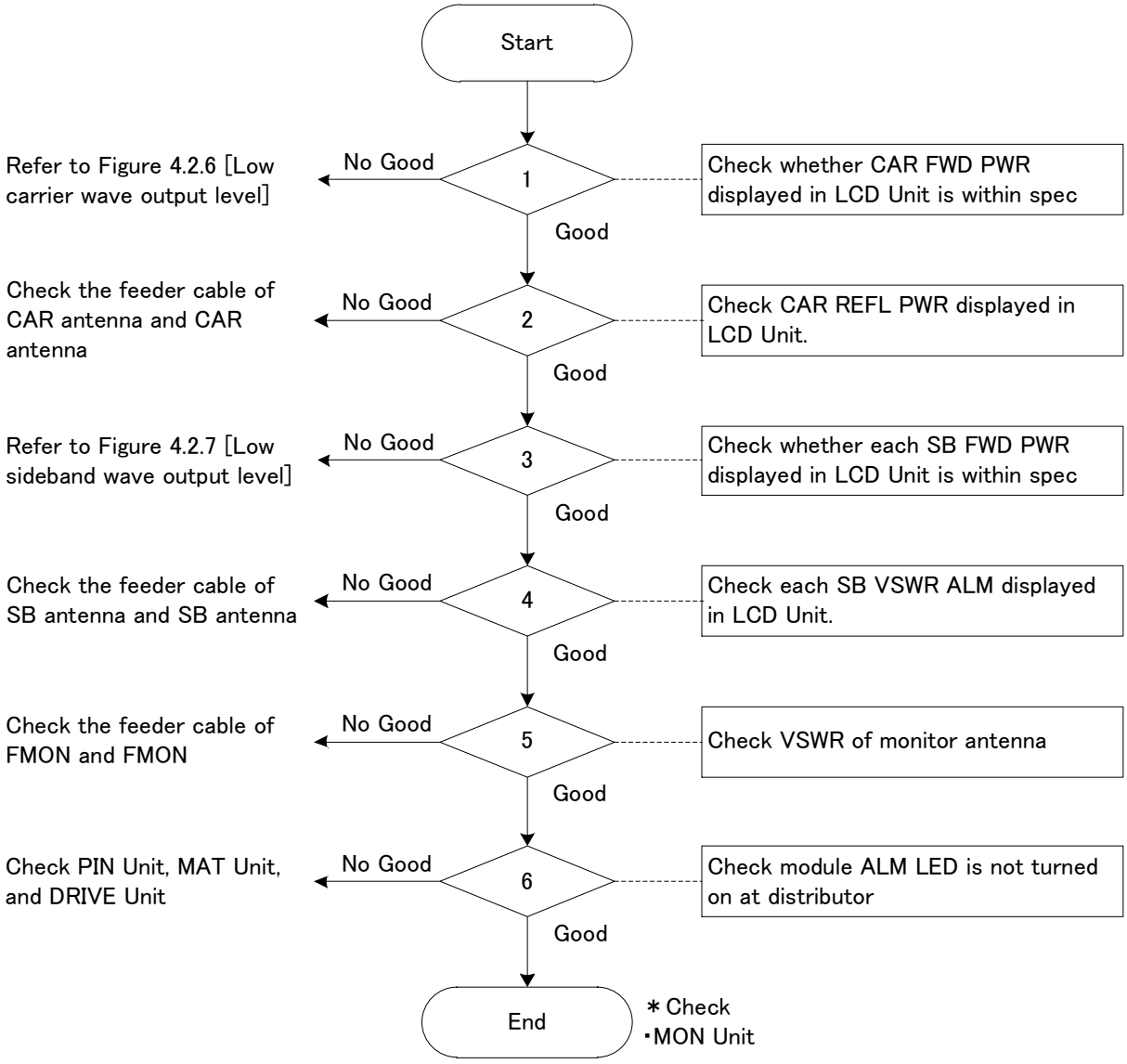


Figure 4.2.3 Low variable phase signal level

4.2.4 In case of low reference phase signal level

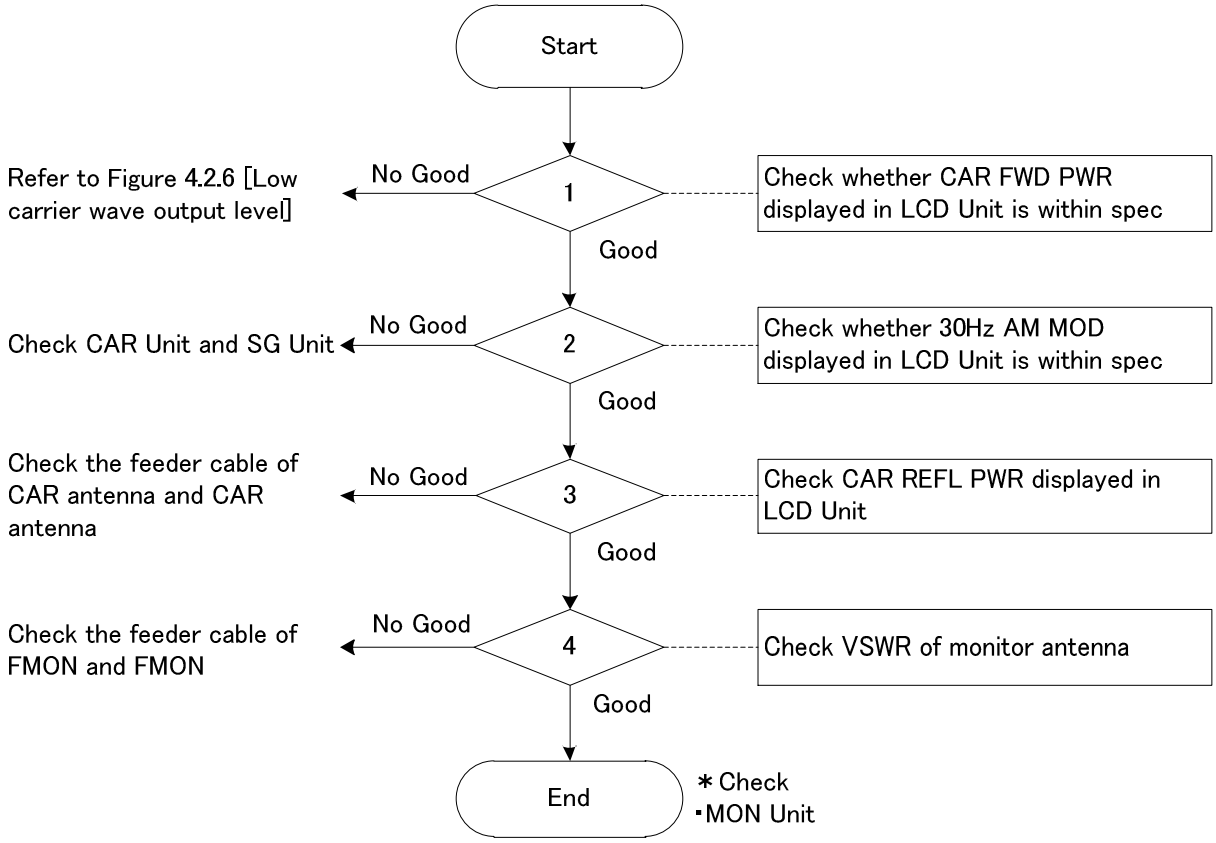


Figure 4.2.4 Low reference phase signal level

4.2.5 In case of low keying signal level

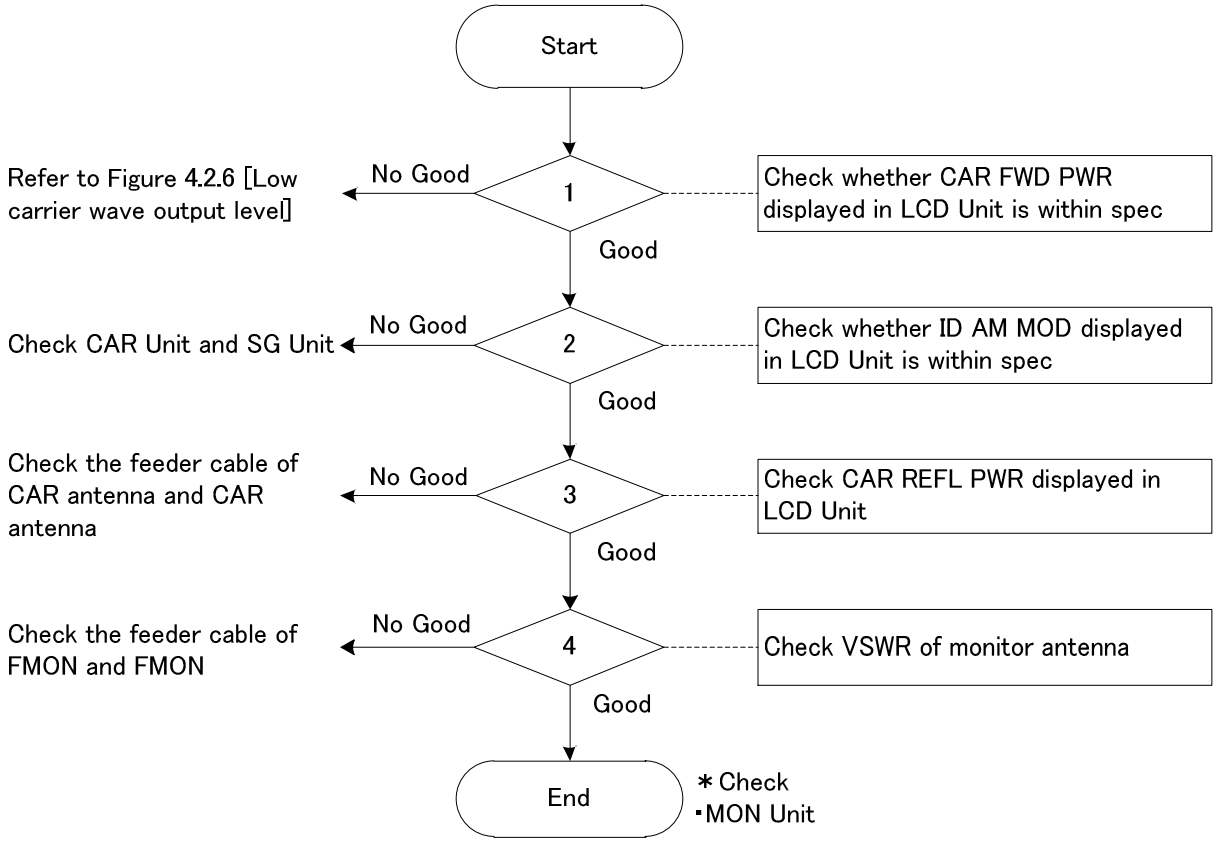


Figure 4.2.5 Low keying signal level

4.2.6 In case of low carrier wave output level

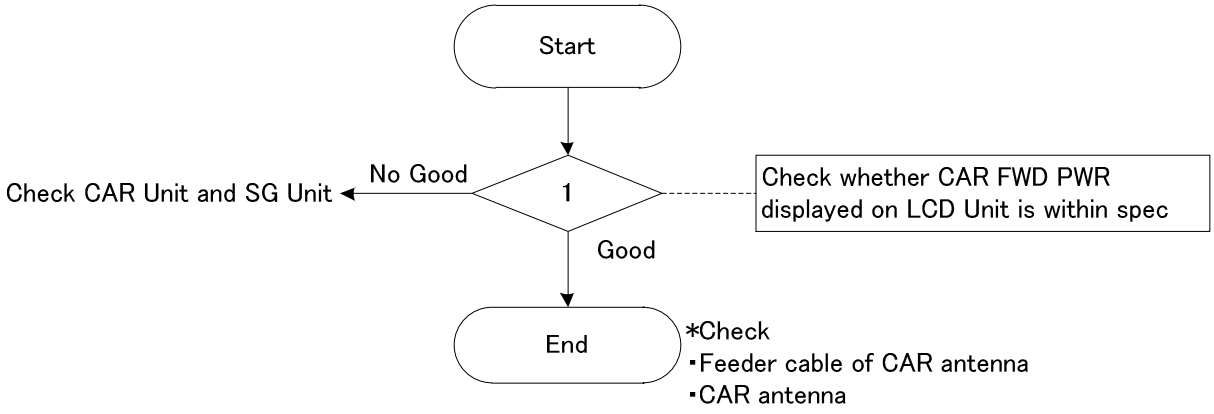


Figure 4.2.6 Low carrier wave output level

4.2.7 In case of low sideband wave output level

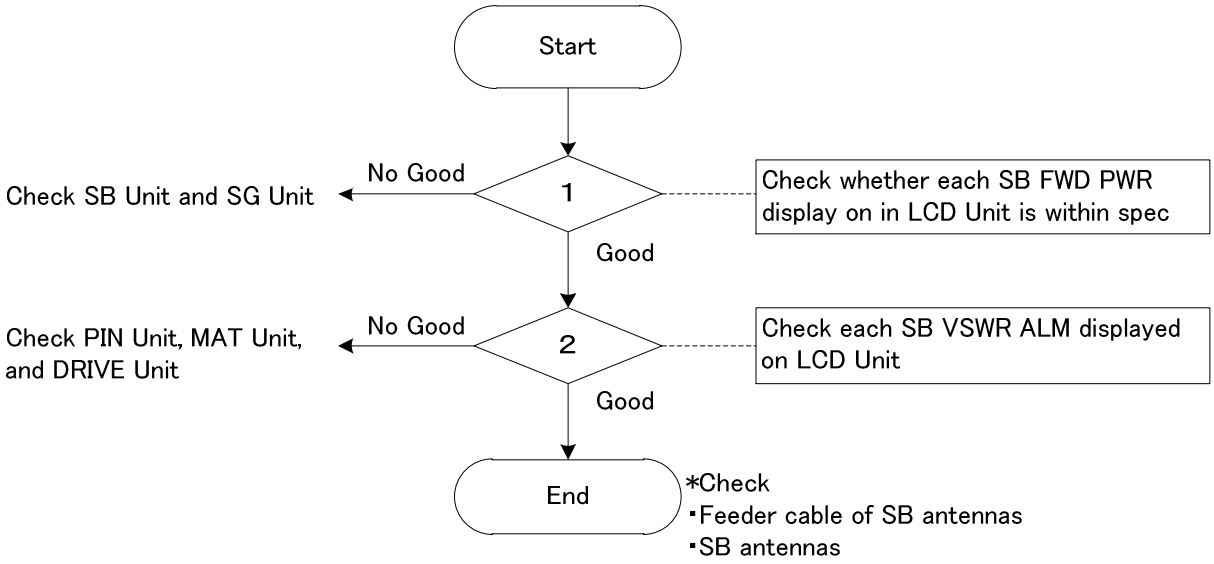


Figure 4.2.7 Low sideband wave output level

4.3 Trouble shooting by component

This section shows procedures to investigate whether a part or a unit is broken in a broken component using flowchart.

4.3.1 LCD Unit

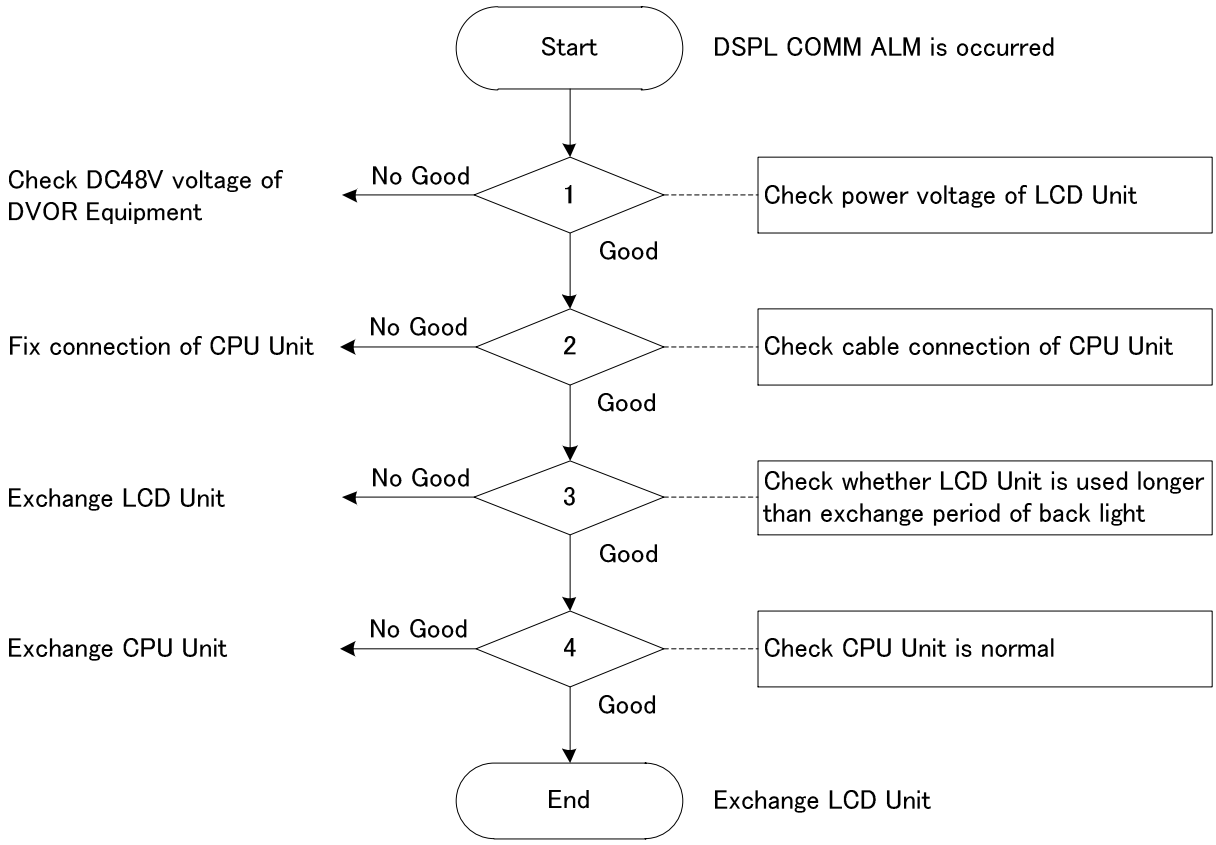


Figure 4.3.1 LCD Unit

4.3.2 CPU Unit

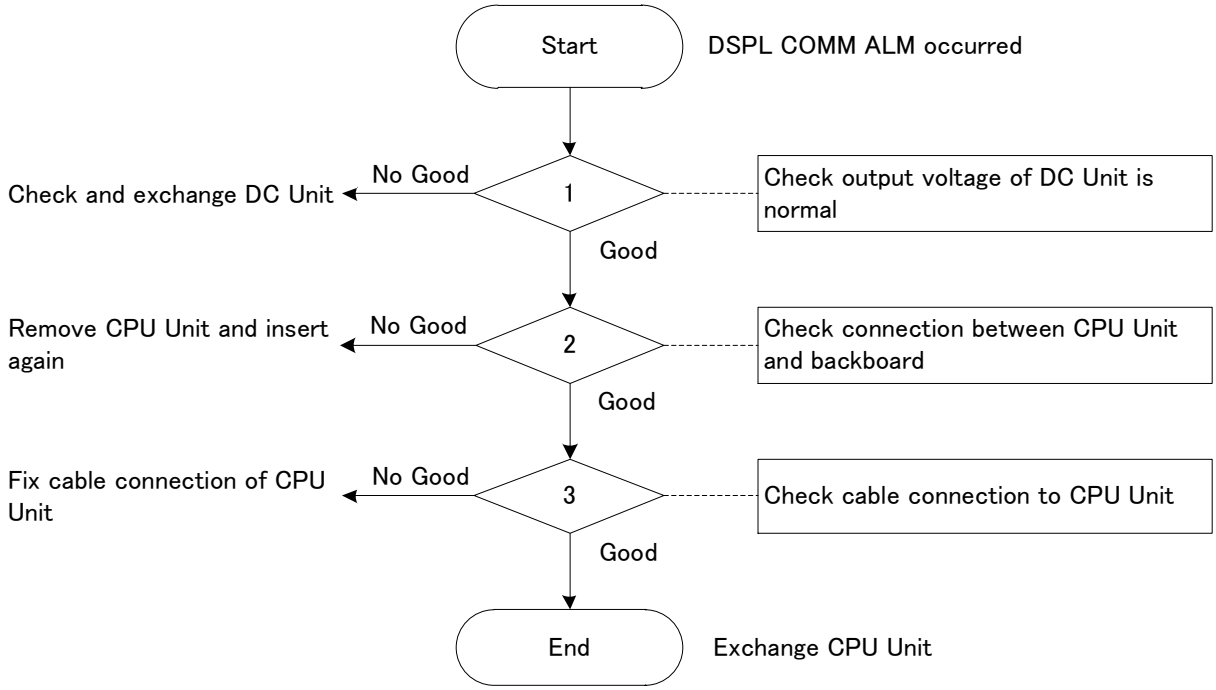


Figure 4.3.2 CPU Unit

4.3.3 IO Unit

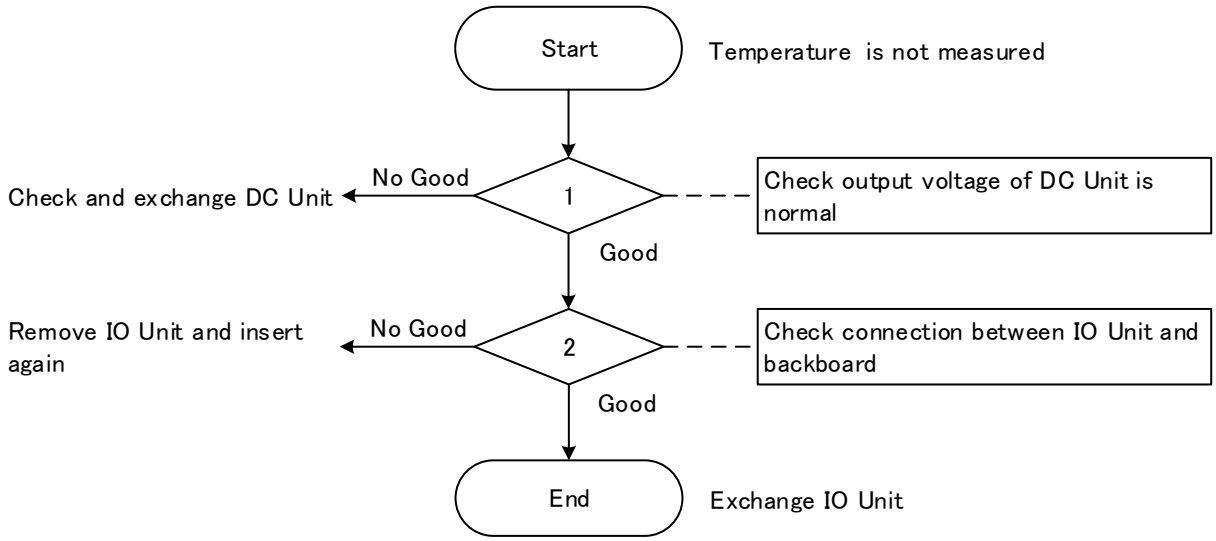


Figure 4.3.3 IO Unit

4.3.4 CONT Unit

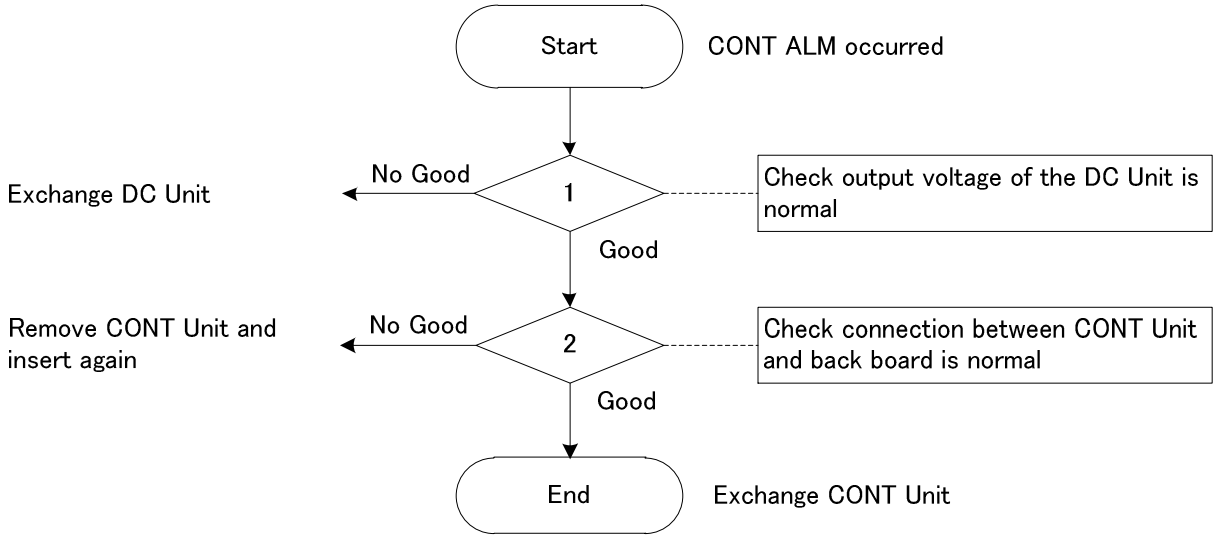


Figure 4.3.4 CONT Unit

4.3.5 TSG Unit

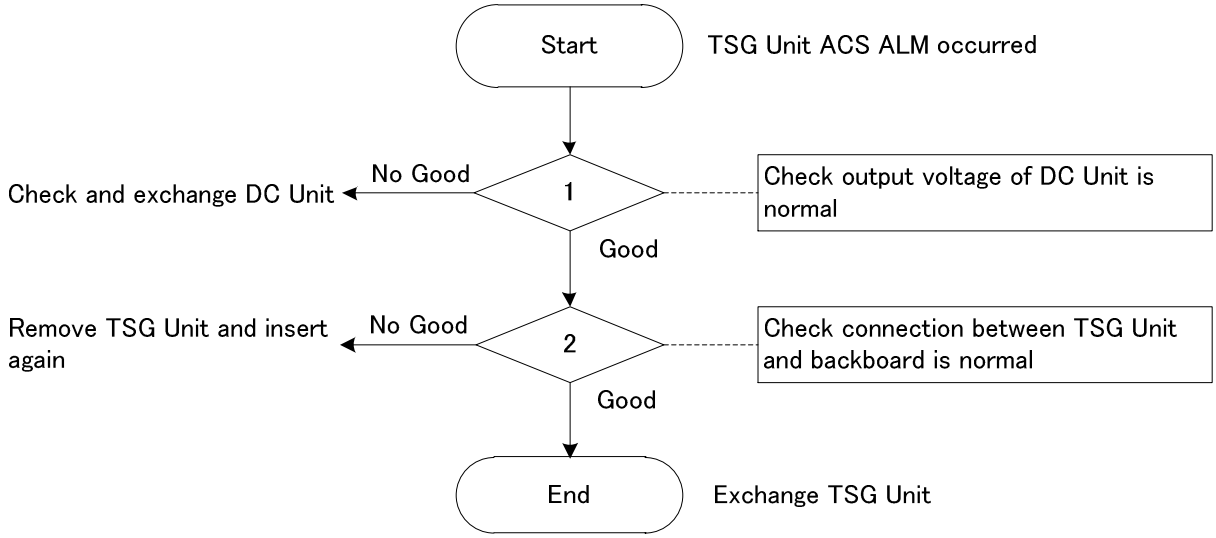


Figure 4.3.5 TSG Unit

4.3.6 MON Unit

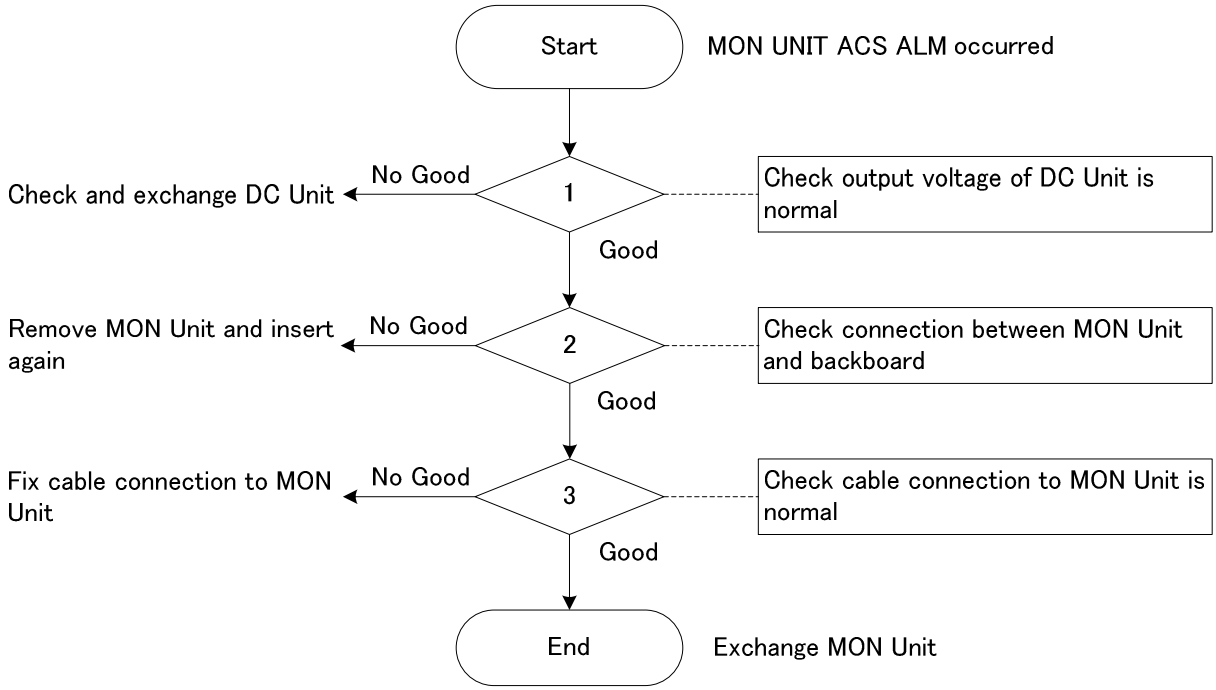


Figure 4.3.6 MON Unit

4.3.7 BMON Unit

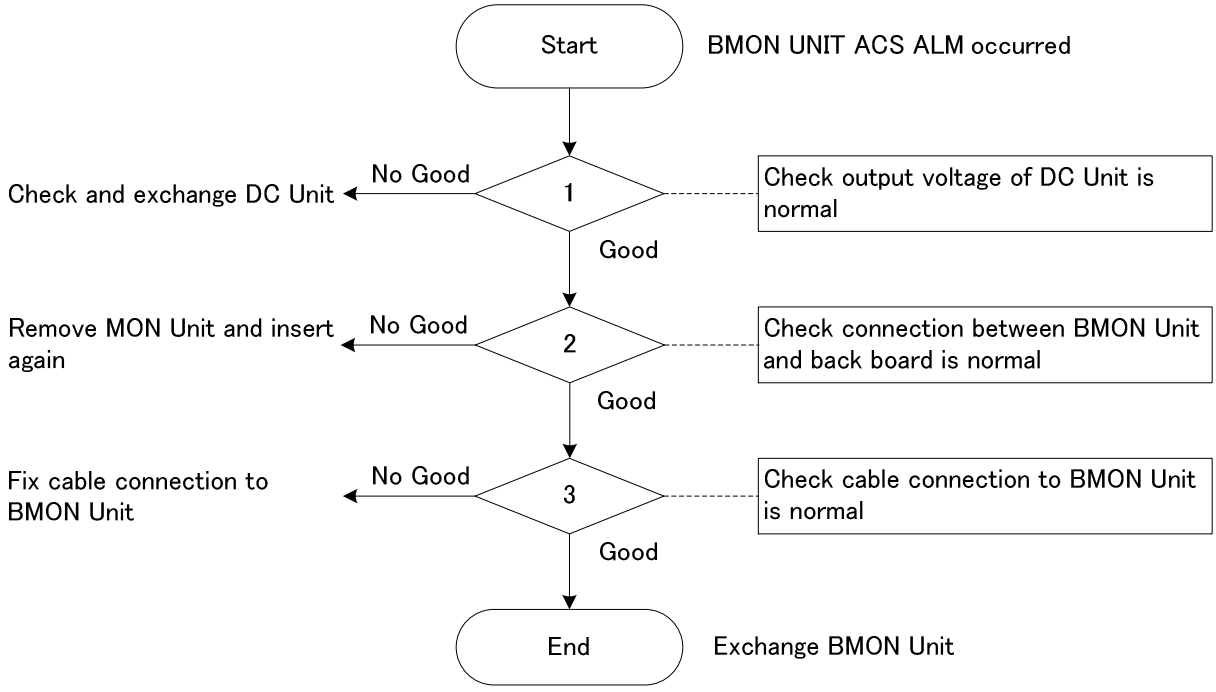


Figure 4.3.7 BMON Unit

4.3.8 DC Unit

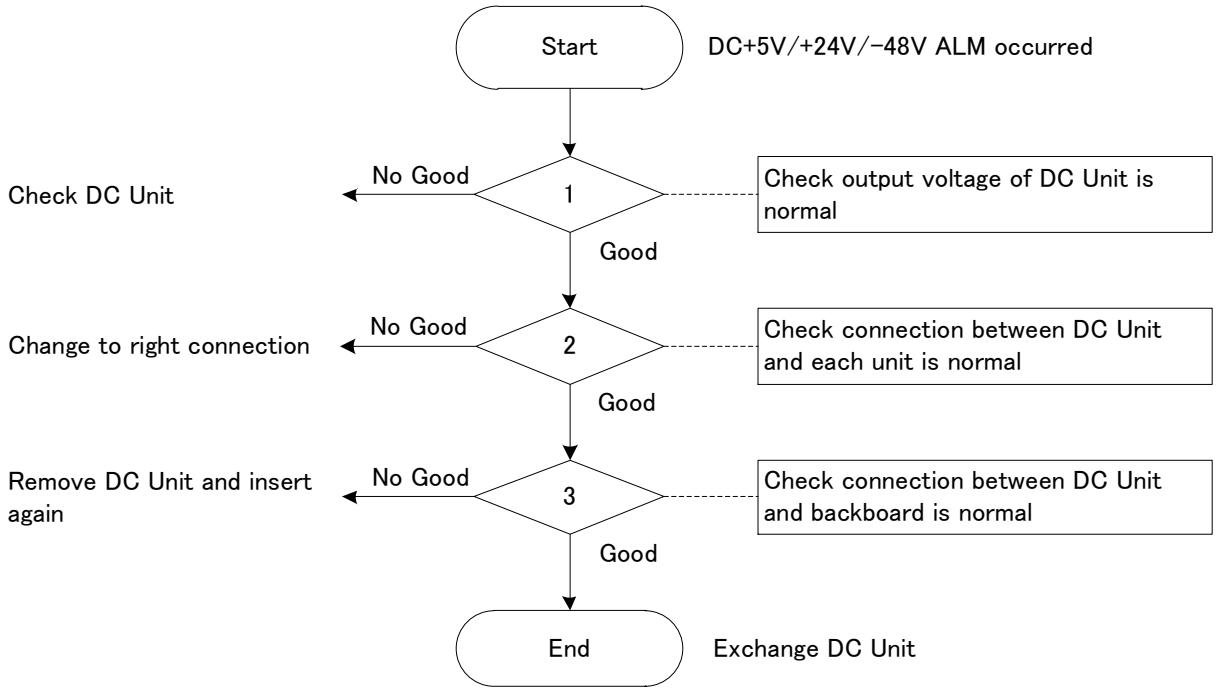


Figure 4.3.8 DC Unit

4.3.9 CAR Unit

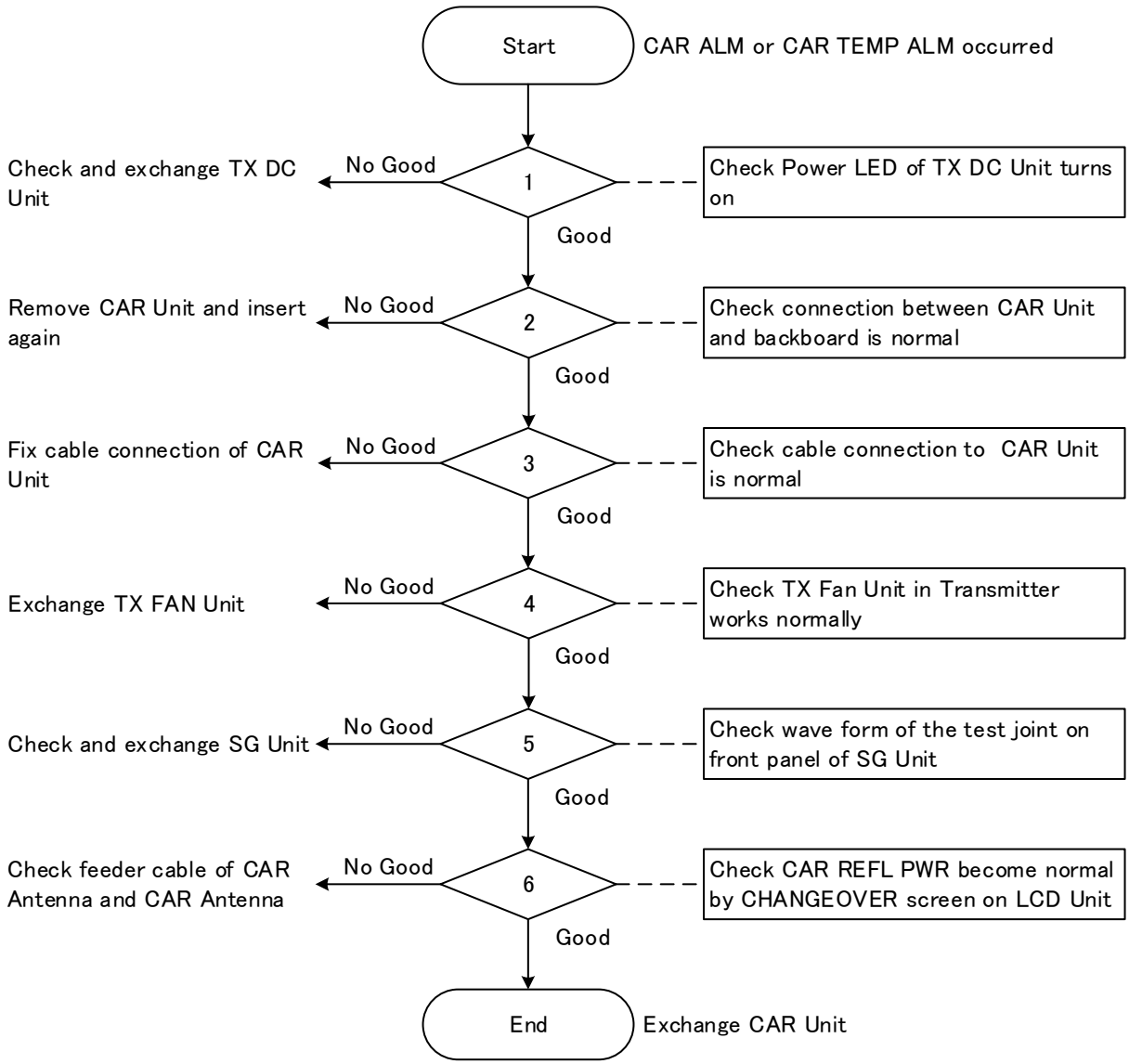


Figure 4.3.9 CAR Unit

4.3.10 SB Unit

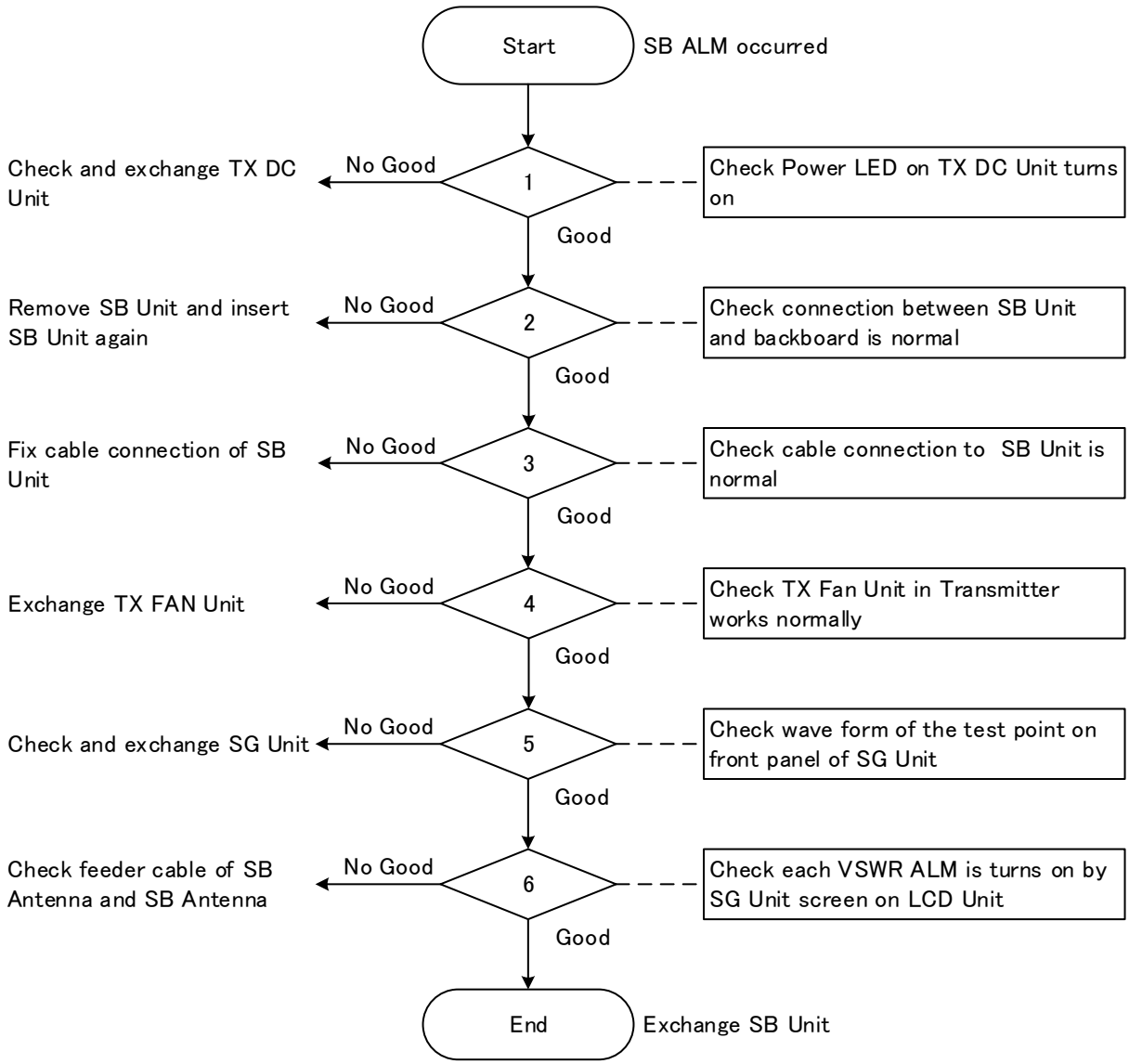


Figure 4.3.10 SB Unit

4.3.11 SG Unit

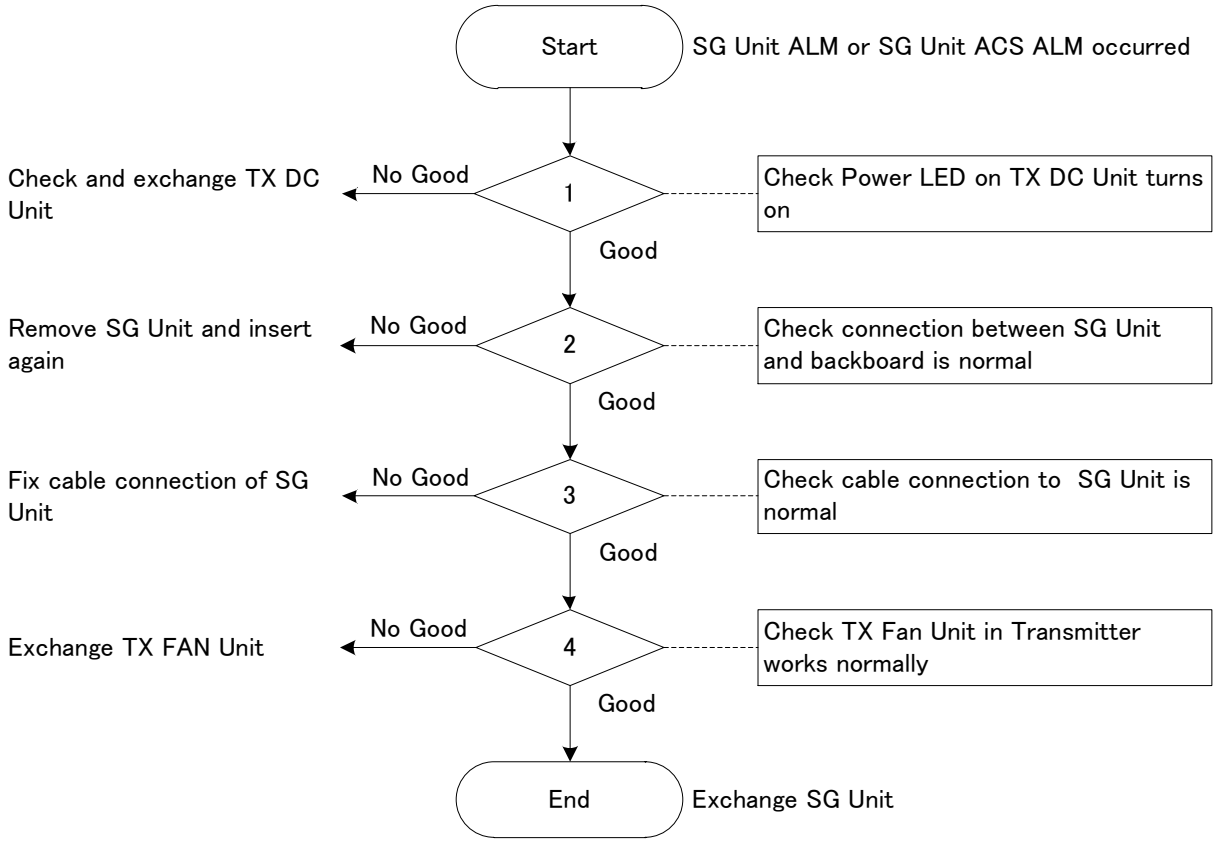


Figure 4.3.11 SG Unit

4.3.12 Changeover

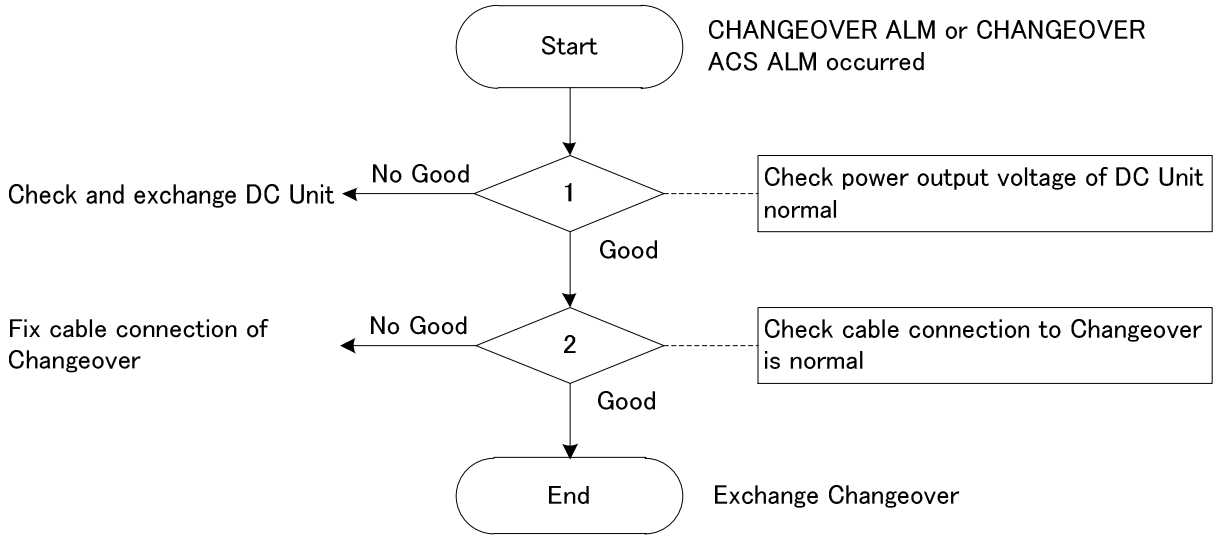


Figure 4.3.12 Change over

4.3.13 TX DC Unit

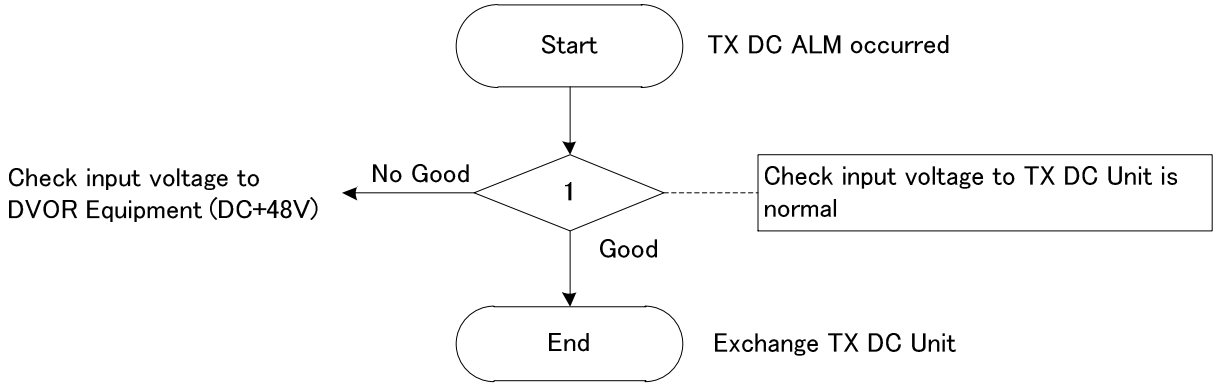


Figure 4.3.13 TX DC Unit

4.3.14 MAT Unit

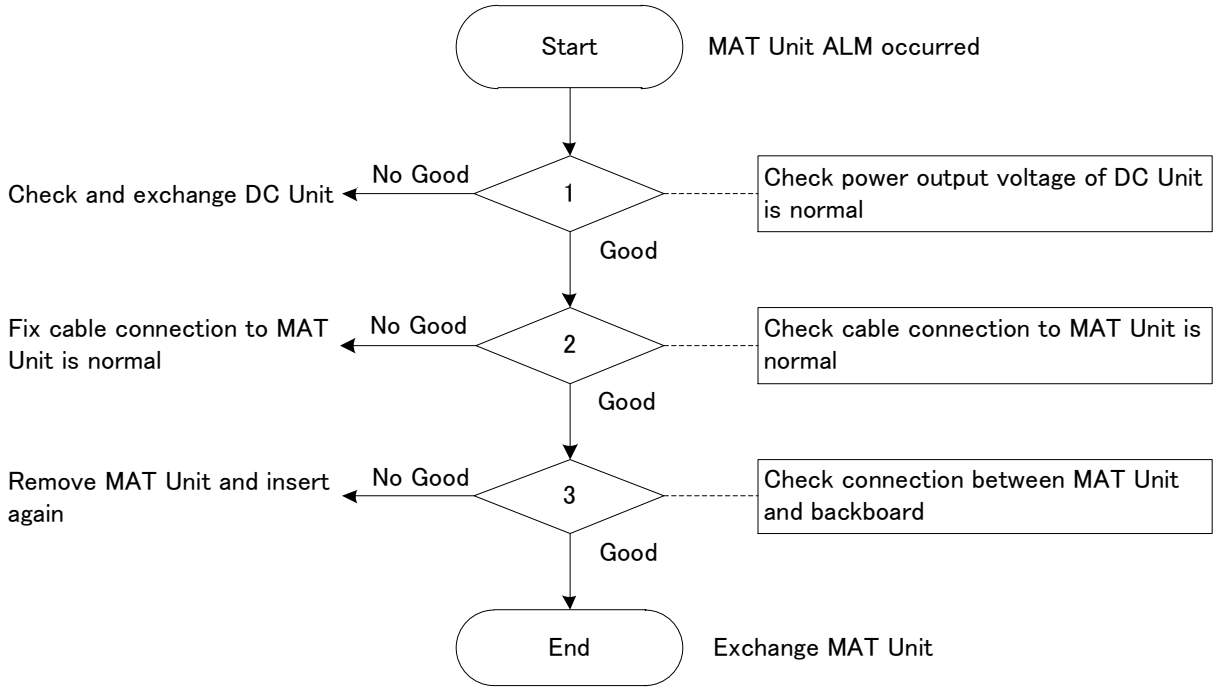


Figure 4.3.14 MAT Unit

4.3.15 PIN Unit

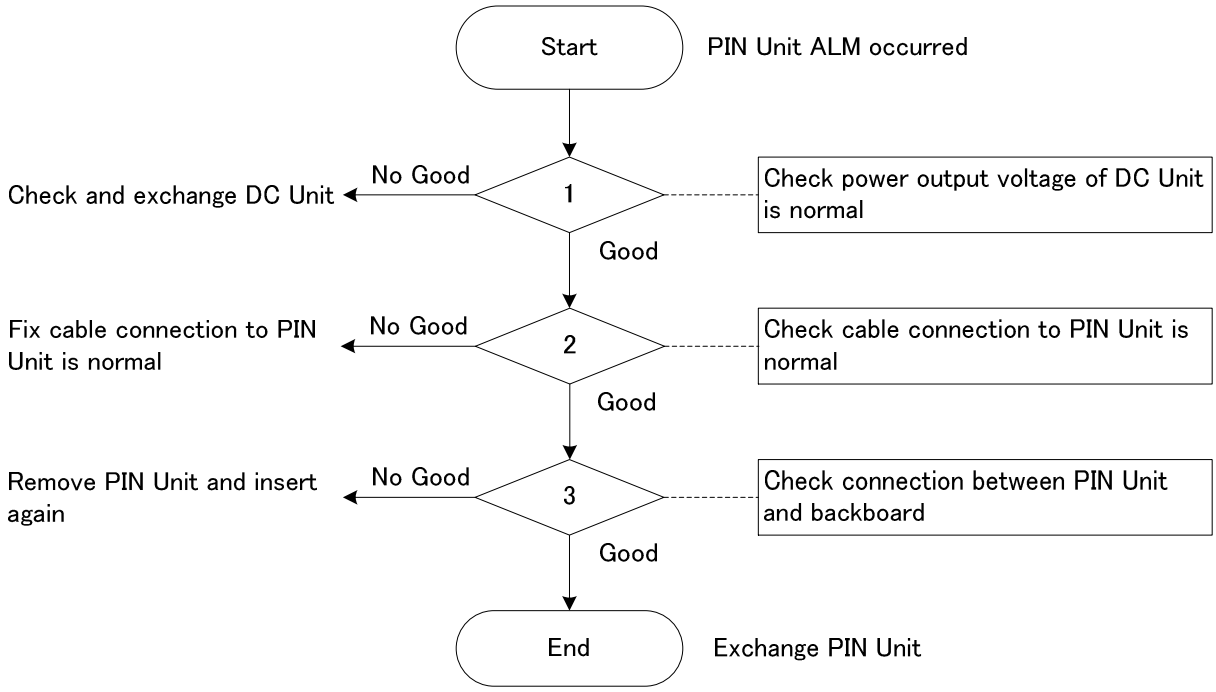


Figure 4.3.15 PIN Unit

4.3.16 DRIVE Unit

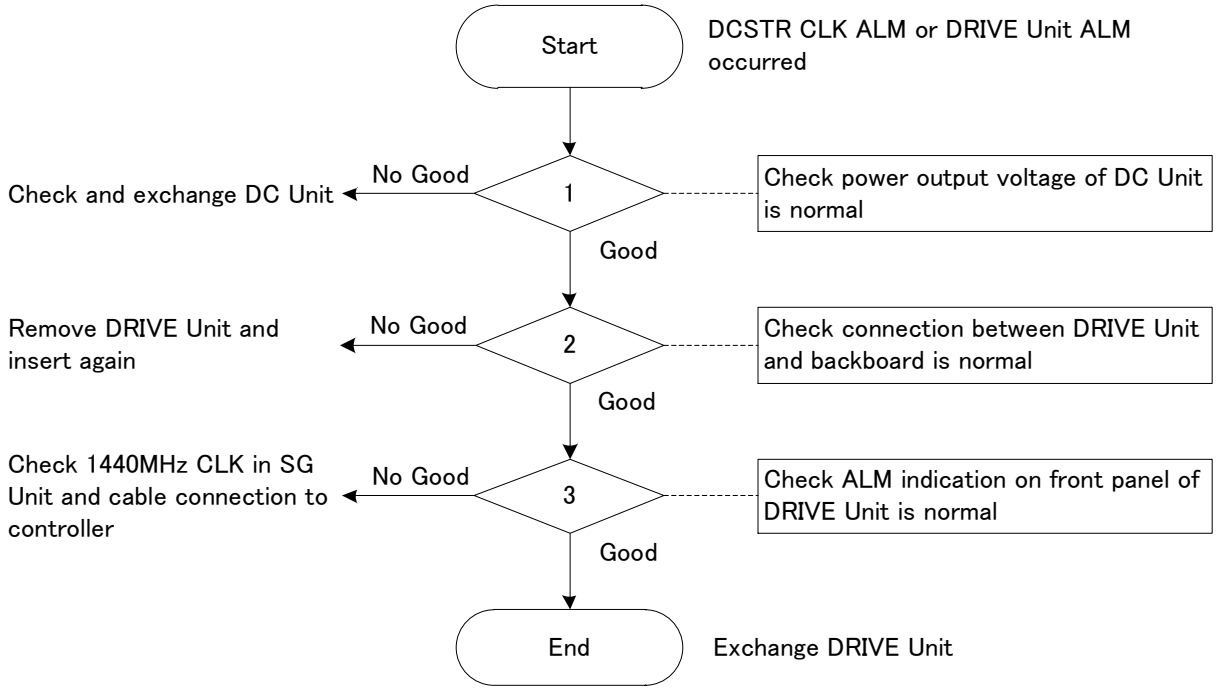


Figure 4.3.16 DRIVE Unit

4.3.17 CAR Antenna

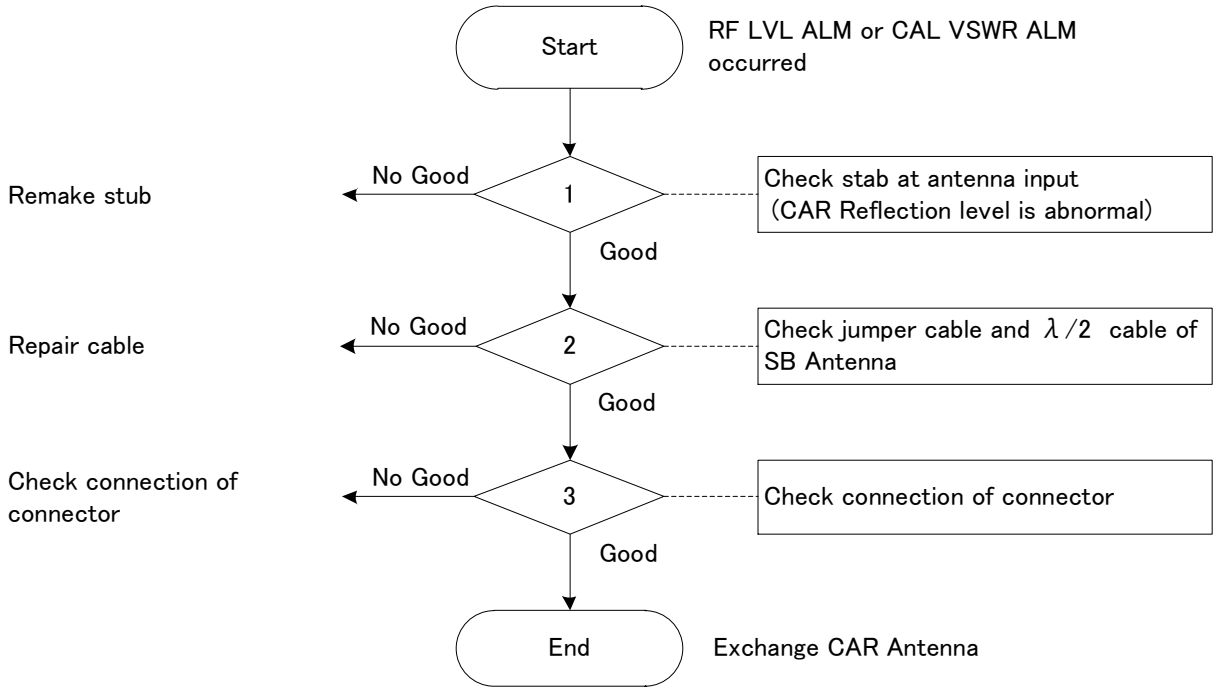


Figure 4.3.17 CAR Antenna

4.3.18 SB Antenna

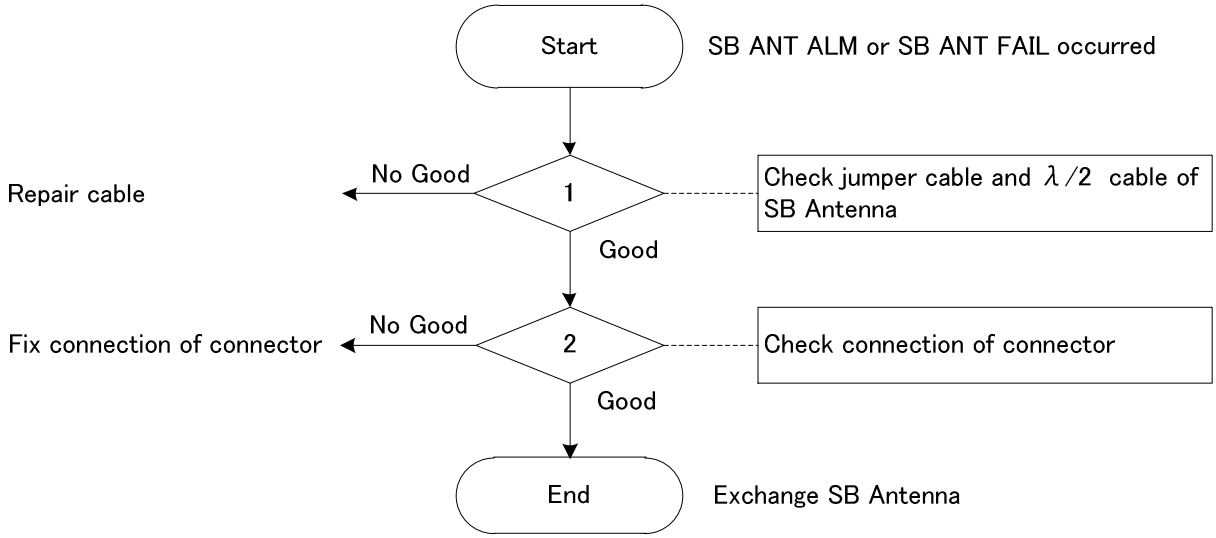


Figure 4.3.18 SB Antenna

4.3.19 FMON Antenna

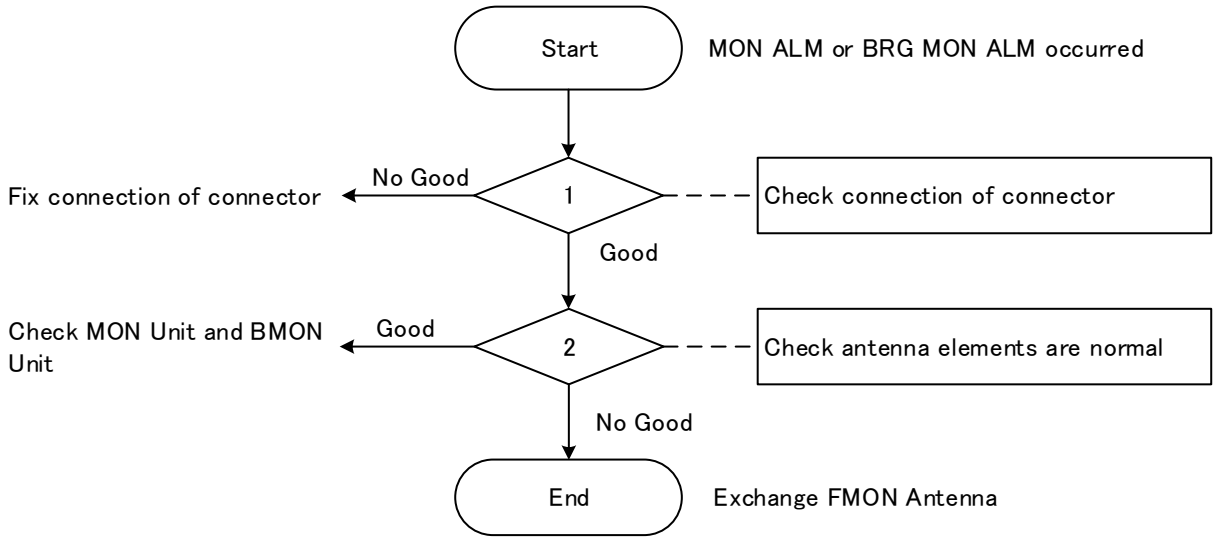


Figure 4.3.19 FMON Antenna

4.3.20 RCMS

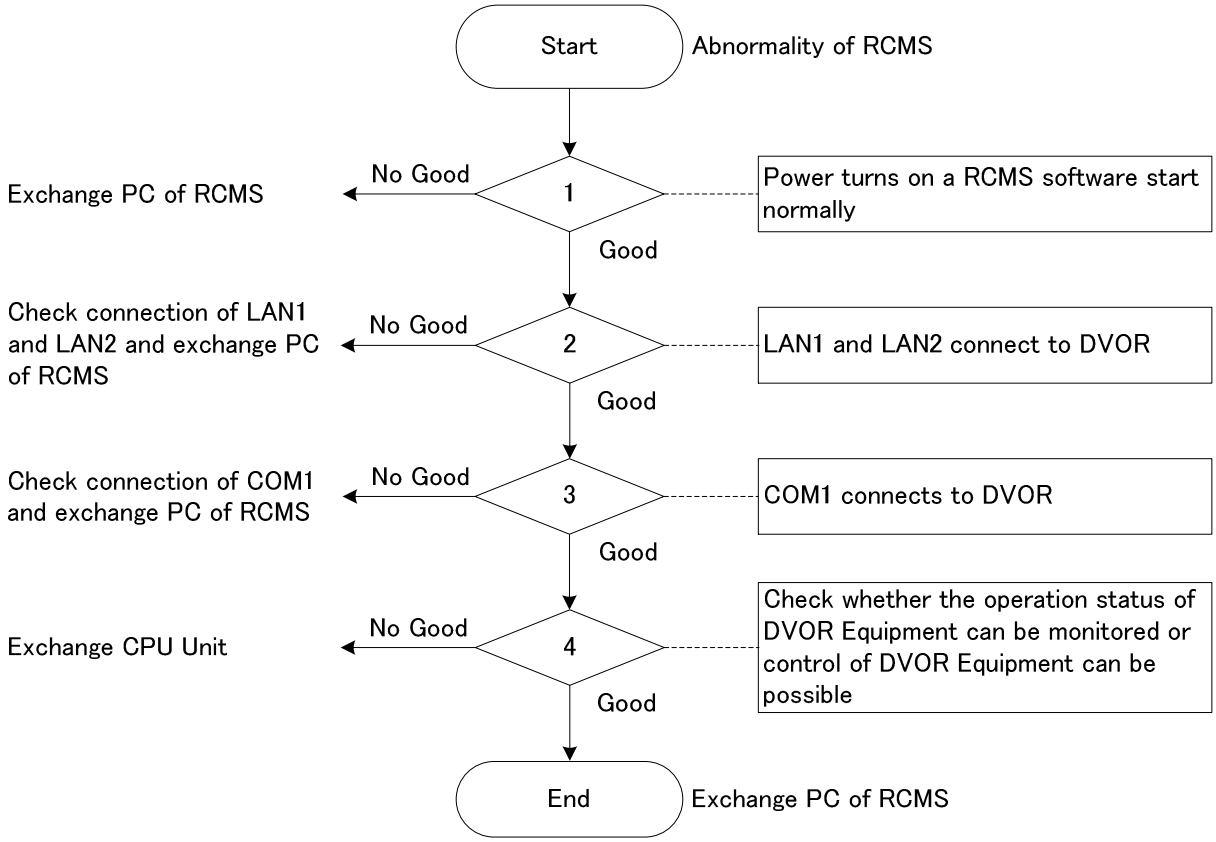


Figure 4.3.20 RCMS

EU Declaration of Conformity (DoC)

The regulation references	
	Radio Equipment directive: 2014 / 53 / EU
The Name and address of the manufacture	
	Toshiba Infrastructure Systems & Solutions Corporation Komukai Complex 1, Komukai, Toshiba-cho, Saiwai-ku Kawasaki 212-8581 Japan
Product description	
	DVOR
Description of procedure followed in order to declare conformity of Radio Equipment directive: 2014 / 53 / EU	
	Toshiba corporation have read and understood the essential requirements pertaining to the DVOR Model No. TW4133A to Z. Toshiba declares the DVOR TW4133A to Z meets all applicable essential requirements of Radio Equipment directive: 2014 / 53 / EU
All the relevant provisions met by the constituent	
	ICAO Annex 10 6th Ed. EN 50383, EN 50385 EN 60215+A1+A2 EN 61000-4-4, EN 61000-4-6 EN 301 489-1, EN 301 489-22
Name and address of notified body	
	Radio Equipment directive Notified Body: Telefication Edisonstraat 12A, 6902 PK Zevenaar, The Netherlands Notified body number 0560

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