

INSTRUCTION MANUAL  
OF  
SYNTHESIZED MF/HF CRT  
DIRECTION FINDER

TD-C358/TD-C358K-MKII

- OPERATION
- INSTALLATION
- MAINTENANCE

**TAIYO MUSEN CO., LTD.**




2-11-18, Higashi-Kojiya, Ota-ku





Tokyo 144-0033 Japan

No. : MPP0584  
Oct. 2008

# SAFETY PRECAUTIONS




Symbols as explained below are used in this manual to prevent personal injury or loss of property. Please read following notes and cautions, and well understand the meaning of symbols before proceeding to other section of the manual.

 <b>DANGER</b>	This symbol indicates topics that could lead to death or serious injury if ignored or handled improperly.
 <b>WARNING</b>	This symbol indicates topics that may cause death or serious injury if ignored or handled improperly.
 <b>CAUTION</b>	This symbol indicates topics that may cause injury or damage on property if ignored or handled improperly.

	This symbol indicates topics that may cause electric shock if ignored or handled improperly.
	This symbol indicates to request connection of GND terminal to earth.
	This symbol indicates topics that may cause injury like electric shock if opened.
	This symbol indicates topics that may cause outbreak of fire or smoke if ignored or handled improperly.

## SAFETY INSTRUCTION

Please carefully note the following safety instructions for your safety operation.

 <b>DANGER</b>   	<ul style="list-style-type: none"> <li>● <b>High Tension Electric Shock</b></li> </ul> <p>Do not open a cover of product because there is dangerous high tension electric current of 1200V in the product under its operation, although the product is given careful consideration to prevent high tension electric shock for normal operation.</p> <p>Please note that the products shall be neither opened nor repaired except a special engineer for the purpose.</p>
---	--



## WARNING



### ● Connection to earth system

The product uses high-tension electric power when it's in operation.

Please connect GND wire to earth system in order to prevent electrical shock although the product is given careful consideration for safety.

### ● Caution against electrical shock

- (1) In case you handle inside of the product, the power switch of product should be turned off at first, then switch in switch board should be turned off before you handle the product.

Note: The electric charge may remain in capacitors even though the power switch is turned off.  
Wait for a while and discharge condenser to the ground with a piece of insulated cord.  
Any operation should be made after confirming that the electric in the circuit is fully discharged.

- (2) Do not touch anything inside of the product with wet body. Use dry item of cotton gloves, clothes, rubber sole shoes when touch there.
- (3) Do not open the product to handle inside under the condition of severe vibration, or rolling/pitching of ship, raining, water splashing, and water dropping.



## CAUTION



- The product should be operated with the specified electric power.

The operation with incorrect voltage of electric power may cause electric shock, or outbreak of fire or smoke.

- Do not put any liquid including water in the product since that may cause electric shock.
- Do not put any item including metal in the product since that may cause outbreak of fire due to short-circuit.

## CAUTION FOR INSTALLATION

For the selection of location to install the product, please take the followings into your consideration.



### CAUTION

- Do not install at the location where the main unit receives rainfall, water splash, humidity in order to avoid possible machine trouble caused by them.
- Do not leave the main unit in the area where lots of sunshine, humidity, dust, vibration or shock that may cause possible machine trouble.
- **Compass safety distance**  
If the compass safety distance is specified, the product shall be installed at the place away from the compass by more than the specified distance.  
If the compass safety distance is not specified, the product shall be installed at the place away from the compass not to affect more than 0.5 degree of its readout.  
Since the speaker has strong magnet, safety distance is specified.  
Please install the speaker away from the compass by more than the specified distance.

## CAUTION FOR HANDLING

For the handling of product, please take the followings into your consideration.



### WARNING

- **Take care not to drop the antenna**  
Please paint oily paint once a year to prevent the joint part of the Loop Antenna and a stanchion being corroded. Note that the antenna might fall due to corrosion of antenna base and stanchion when leaving without painting there for a long time.



### CAUTION

- **Operation check when using with Radio Buoys**  
In case of using fishery radio buoys with this product, perform operation test in advance as follows.
  1. Turn on the power of radio buoy on board.
  2. Measure the direction of the radio buoy's signal by the product, and confirm normal working and proper direction finding on the product.
- **Operation check of Gyro Repeater**  
When a gyro repeater motor is built-in to the product, always confirm whether the product indicates to follow to the master compass and to direct a correct direction from the true north.
- **Do not use organic solvent**  
Do not use organic solvent like thinner or alcohol when wipe the product.  
Please wipe the product by squeezing a soft cloth containing neuter cleanser for cleaning.

# - INDEX -

## Chapter 1 INTRODUCTION

1. Introduction .....	2
2. Features .....	2
3. Components .....	3
4. Characteristics .....	3

## Chapter 2 OPERATION

1. Preparation for Operation .....	6
1.1 Check .....	6
1.2 Memory for Spot or Scan Operation .....	7
2. Reception .....	10
2.1 Manual Reception .....	10
2.2 Spot Reception .....	11
2.3 Scan Reception .....	12
2.4 Search Reception .....	14
2.5 Wave Form .....	15
3. Direction Measurement .....	16
3.1 Check .....	16
3.2 Direction Measurement .....	16
3.3 Error Correction .....	18

## Chapter 3 INSTALLATION

1. Installation of Antenna .....	20
1.1 Antenna Site .....	20
1.2 Minimum Separation and Countermeasure .....	21
1.3 Antenna cable .....	25
1.4 Installation of Loop Antenna .....	26
2. Installation of Main Unit .....	29
2.1 Place to Install Main Unit .....	29
2.2 Installation of Main Unit .....	29
2.3 Connection in Main Unit .....	30
2.4 Grounding .....	35
3. Adjustment after Installation .....	36
3.1 CRT Adjustment .....	36
3.2 Sense Adjustment and Sense Reverse .....	38
3.3 Adjustment of Gyro Repeater .....	44
4. Error Correction Curves .....	44

## Chapter 4 MAINTENANCE

1. Periodical Maintenance .....	46
1.1 Mechanical Check .....	46
1.2 Brief Electrical Check .....	47
2. General Maintenance .....	48
2.1 Main Unit .....	48
2.2 Loop Antenna .....	50
2.3 Goniometer Unit .....	51
3. Table of Voltages .....	52
3.1 PCA .....	52
3.2 CRT .....	55
4. Trouble Shooting .....	56

## APPENDIX

Front Panel of Main Unit .....	Appendix 1
Assembly Procedures of Antenna .....	Appendix 2

## DRAWINGS

	Drawing number
Inter Connection Diagram for TD-C358 .....	043998
Inter Connection Diagram for TD-C358K-MKII .....	044303
Connection Diagram for TD-C358 .....	323975-1/2
	323975-2/2
Connection Diagram for TD-C358K-MKII .....	323974
Antenna Circuit Diagram .....	340379A
Connection Diagram Between Main Unit and EG-358MKII ...	333850
Connection Diagram for EG-358MKII .....	324103-1/2
	324103-2/2
External View of Main Unit .....	031410
External View of Speaker .....	044023
External View of Antenna EL-808 .....	042649
External View of Antenna EL-85-04 .....	042456
External View of Goniometer Unit EG-358MKII .....	031421

# Chapter 1 INTRODUCTION



# Chapter 1 INTRODUCTION

## 1. Introduction

TD-C358 / TD-C358K-MKII functions as an aural receiver and a direction finder in MF and HF range designed for ship use and the bearing of received signal is displayed directly on a CRT.

This instruction manual contains information necessary to properly install, operate, and maintain TD-C358 / TD-C358K-MKII. Please read this instruction manual carefully before attempting operation so that safe and efficient operation can be made.

## 2. Features

Main functions with the features are shown below.

### (1) Reception

- Reception in a frequency range from 200kHz to 29,999.9kHz, with various wave forms.
- Reception circuit has a synthesized local oscillator and employs double superheterodyne amplification which enables high sensitive and stable reception, and it is suitable for waiting reception.
- 3 ways of tuning is possible, with numeric keys, shift keys or a tuning dial, in step of 100Hz.

### (2) Reception control

- One of four reception modes, manual, spot, search and scan can be selected.
- 400 frequencies together with their wave forms can be stored in preparation for spot reception, in the memory, grouped in 4 frequency blocks each with 100 channels.
- In scan reception, from 10 up to 100 frequencies with their wave forms stored for spot reception can be scanned. The scan speed, i.e., the time interval to go to next channel, can be selected from 6 values from 0.5 sec to 6 sec. 4 types of scan hold are also provided when a signal is received : a) continue scanning, b) stop scanning, c) hold for 2 sec and restart scanning, or, d) hold for 4 sec and restart scanning.
- In search reception, range for search can be set from 10kHz up to 1000kHz in 2kHz step. Search speed and type of search hold can be designated similar to scan reception.

### (3) Direction finding

- The bearing of received signal can be directly observed on the CRT.
- One-touch determination of the sense is possible. Automatic sense determination is also provided.
- Sense adjustment and phase adjustment functions are provided to give better sense figures in HF band.
- Manual setting of the COMPASS card with compass reading gives true bearing of received signal (with respect to true north or magnetic north).
- When a gyro repeater is built-in to the TD-C358 / TD-C358K-MKII, the COMPASS card is rotated automatically to give the true bearing.

### (4) For TD-C358K-MKII

- TD-C358K-MKII has outside goniometer which is close to the loop antenna and thus, 100m antenna cable between TD-C358K-MKII main unit and loop antenna is available.



Mode of reception	MANUAL : digital setting or with numeric keys, shift keys, or tuning dial
	SPOT : spot calling, max. 400 frequencies possible
	SCAN : possible for 10 frequency groups, max. 100 frequencies in a block
	SEARCH : From 10kHz to 1000kHz, 2kHz step

## (3) Direction measurement of surface wave (no disturbance condition)

Accuracy	In MF, $\pm 1^\circ$ or smaller at 1mV/m In MHF, $\pm 2^\circ$ or smaller at 0.3mV/m
Scattering	In MF, $\pm 6^\circ$ or smaller at 50 $\mu$ V/m In MHF, $\pm 6^\circ$ or smaller at 30 $\mu$ V/m
Signal noise ratio	In MF, 10dB or larger at an input of 50 $\mu$ V/m In MHF, 10dB or larger at an input of 30 $\mu$ V/m
Sense determination	Automatic or manual, sense and phase adjustment device is provided.
Bearing display	Propeller pattern on CRT Reading with cursor, COMPASS card and compass rose.
Gyro repeater	Built-in repeater motor possible (option).

## (4) Power supply

Voltage and cycle	100/110/115/200/220/230 VAC, 50Hz or 60Hz, 50VA  Note: 100 VAC or 220 VAC is selected by connecting coils of power transformer in the main unit. Connect two 100V coils in parallel for 200 VAC or two 110V coils in series for 220 vAC.
Stability	Variation of supply voltage should be within $\pm 10\%$ .

## (5) Environment

Temperature	Should be used in the temperature range from $-10^\circ\text{C}$ to $+50^\circ\text{C}$ .  For Goniometer Unit, EG-358MKII : $-20^\circ\text{C}$ to $+60^\circ\text{C}$
Humidity	95% (relative humidity)
Vibration/shock test	Passed test in 3 directions, for 30 min. each, for vibration amplitude Of 3mm (0 ~ 500 rpm) and 1mm (500 ~ 1800 rpm). Passed shock Test by dropping it to hard wood floor 3 times from a height of 5cm.

# Chapter 2 OPERATION

## Chapter 2 OPERATION

The TD-C358 / TD-C358-K direction finder has two functional modes of operation, RCV and DF.

In RCV mode, it functions as an aural receiver.

In DF mode, it functions as an direction finder system which provides the bearing as a propeller pattern on its CRT display together with the function of aural receiver.

### 1. Preparation for Operation

TD-C358 / TD-C358-K functions as an aural receiver and a direction finder in MF and HF range designed for ship use and the bearing of received signal is displayed directly on a CRT.

This instruction manual contains information necessary to properly install, operate, and maintain TD-C358 / TD-C358-K. Please read this instruction manual carefully before attempting operation so that safe and efficient operation can be made.

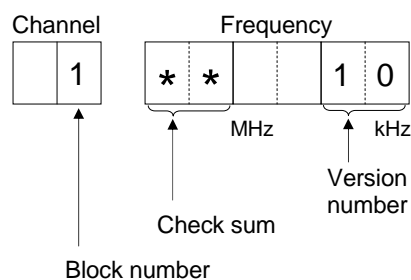
#### 1.1 Check

##### 1.1.1 Connection check

Check connections at the antenna, the main unit, and power supply referring the Connection Diagram in the APPENDIX

##### 1.1.2 Power ON check

- (1) Turn power on by turning the **SYSTEM** switch to one of the 3 positions, **ST'BY**, **DF**, or **RCV**.
- (2) About 2 seconds later, figures appear in the channel and frequency display as follows.



- Block number for SPOT memory appears on the channel display.
  - Check sum number appear on the two spaces on the left side of frequency display, and version number appear on the two spaces on the right side. Two spaces at the center are vacant. Version number and check sum depend on the time of manufacturing.
- (3) About 2 seconds later, figures for channel and frequency appear in the display which are the same as previous settings at the last power off.

## 1.2 Memory for Spot or Scan Reception

Frequencies with their wave forms should have been stored in the memory to receive signals in SPOT or SCAN reception mode. When SCAN reception is intended, divide frequencies in blocks and groups (max. 100 frequencies in a block and 10 frequencies in a group), where the block number is 1,2,3 or 4 and group number is the first figure of the channel number.

It is advised to give channel numbers, 00, 01, 02 etc. to emergency frequencies.

### 1.2.1 Memory input

#### (1) Set frequency by number key

Set a frequency with its wave form.

Turn **SYSTEM** switch to **RCV** and press **MANU** key.

Next, select and check the wave form with LED or press a wave form key.

( **CW** for A1A, **AM** for A2A / A3E and **SSB** for J3E)

Then, press **F** key and input a frequency by number keys.

Finally, press **E** key.

The whole procedure is rewritten as:

**SYSTEM** → **RCV** → **MANU** → **wave form** → **F** → **frequency** → **E**

Example: Set 1,625,5kHz by **F** → **frequency** → **E**

Key operation	Channel display	Frequency display
<b>F</b>	0 0	2. 1 8 2. 0
<b>1</b>	0 0	. 1
<b>6</b>	0 0	1. 6
<b>2</b>	0 0	1 6. 2
<b>5</b>	0 0	1 6 2. 5
<b>5</b>	0 0	1. 6 2 5. 5
<b>E</b>	0 0	1. 6 2 5. 5

Note: When **SYSTEM** switch is turned, all setting of keys restore previous settings at the last power off. Therefore, there may be figures on the channel display.

#### (2) Stepwise setting

When a frequency has been set, another frequency can be set stepwise with a **TUNE** dial or a shift key,

**TUNE** dial changes the frequency in 0.1kHz step.

**▲** (up) or **▼** (down), in 1kHz step.

### 1.2.2 Memory storage

Having set a frequency, by above section (1)-(a) or (1)-(b), press **[M]** key and input a channel number with two figures, and next press **[E]** key.

Then, channel number disappears and the frequency with its wave form is written in the memory. Maximum 100 channels, from 00 to 99 are available in a block.

The procedure is rewritten as: **[M]** → **[channel number]** → **[E]**

Example: Store 1,625,5kHz on the frequency memory in the channel 05 of the memory by **[M]** → **[channel number]** → **[E]**

Key operation	Channel display	Frequency display
<b>[M]</b>	0 0	1. 6 2 5. 5
<b>[0]</b>	0	1. 6 2 5. 5
<b>[5]</b>	0 5	1. 6 2 5. 5
<b>[E]</b>	0 5	1. 6 2 5. 5

### 1.2.3 Memory block

Press **[E]** key in any position of **[ST'BY]**, **[RCV]** or **[DF]** to confirm the block number. Then, the block number of the block being used appears in the channel display.

To change the memory block, press new block number key, one of 1, 2, 3 and 4, while pressing **[E]** key. Then, block number in the channel display changes to a new one.

### 1.2.4 Rewrite a new frequency

The content of a memory channel can be rewritten by check or change of:

**[Wave form]** → **[F]** → **[a new frequency]** → **[E]** → **[M]** → **[E]**

### 1.2.5 Erase memory

#### (1) Erase by channel

Erase the content of a channel.

( [SYSTEM] → [RCV] → [MANU] ) → [M] → [channel number] → [C]

\* ( [SYSTEM] → [RCV] → [MANU] ) means "confirm [RCV] and [MANU] have been selected and if not, select them."

#### (2) Erase by block

(a) Turn [SYSTEM] switch to [OFF] .

(b) Turn [SYSTEM] switch to [RCV] (or, [ST'BY] or [DF] ) while pressing [M] key.

(c) Press number key of the block to be erased.

(d) Press [C] key and [E] key simultaneously. Then all channels in the same block are erased.

(e) Then, press [S] key to return to the initial condition.

Above procedures are rewritten as:

[SYSTEM] → [OFF] → [RCV + M] → [Block number] → [C + E] → [S]

#### (3) Clear all memory, 400 channels in total

(a) Turn [SYSTEM] switch to [OFF] .

(b) Turn [SYSTEM] switch to [RCV] (or, [ST'BY] or [DF] ) while pressing [M] key and [C] key simultaneously.

(c) Then, press [S] key to return to the initial condition.

Above procedures are rewritten as:

[SYSTEM] → [OFF] → [RCV + M + C] → [S]

### 1.2.6 Memory back-up

A battery is built-in to back-up the memory while power supply is off. The battery is charged while the equipment is in operation. However, charge the battery for about 24 hours every half year when operation is suspended.



## 2. Reception

### 2.1 Manual Reception

#### 2.1.1 Reception by frequency setting

(1) Set a frequency with its wave form by the following procedure.

( [SYSTEM] → [RCV] → [MANU] → [wave form] ) → [F] → [frequency] → [E]

When [RCV], [MANU] and [wave form] are checked and are OK, go directly to [F]

Note: When [SYSTEM] switch is turned to [RCV], all setting of frequency and functions restore previous setting at the last power off.

(2) Make ( or confirm) [AGC] "ON". (confirm AGC LED is lit)

Make [RF GAIN] maximum and adjust [VOLUME].

#### 2.1.2 Reception with shift key or tuning dial

(1) Change frequency with shift key

Press one of the shift keys, [▲] or [▼], instead of [F] → [frequency] → [E].

(2) Fine tuning

Shift key operation is suitable for fine tuning in step of 0.1 kHz per click using the level meter as tuning indicator.

Note: Tuning can be effectively made by watching the tuning indicator above the digital display.

In this case, make [AGC] off.

## 2.2 Spot Reception

### 2.2.1 Channel call with channel number

In spot reception, a frequency with its wave form can be called up with its channel number and received. The procedure is written as following.

[SYSTEM] → [RCV] → [SPOT] → [E (to check block number)] → [M] → [channel number] → [E]

Example:	Key operation	Channel display	Frequency display
	[M]	* *	.
	[0]	0	.
	[5]	0 5	.
	[E]	0 5	1. 6 2 5. 5

- Note: i) When turned to [RCV], previous setting at the last power off appear and reception starts automatically
- ii) Block number check may be skipped when channel number and frequency are OK. To change the block number, press 1, 2, 3 or 4 while pressing [E] key.
- iii) Wave form can be changed temporarily by pressing a wave form key. However, the wave form in the memory channel remains unchanged.

### 2.2.2 Channel change with number key

Quick change of channel number in SPOT reception is possible with number keys.

When the last number of a channel number should be changed, a press of the new number is enough for such operation.

To change both of two-digit number, press two number keys one after another within one second. Longer interval would cause change of first digit only.

### 2.2.3 Channel setting with shift key

The channel number can be changed with the shift key [▲] / [▼].

One press of a shift key changes channel number, up or down by and takes 0.3 second approximately (vacant channel is skipped much quickly).

## 2.3 Scan Reception

Channels in the memory are divided into 10 groups where the first figure of the channel number is called the “group number”. For example, channels from 30 to 39 belongs to group 3. Channels can be scanned in groups.

### 2.3.1 Procedure of scan reception



- (1) Turn SYSTEM switch and confirm that RCV and SCAN are on. If not, let them be on.
- (2) Rotate RF GAIN knob clockwise to its maximum.
- (3) Start SCAN reception by designating the group number of starting group and that of the last group by following procedure:

[M] → [group number of starting group] → [group number of last group] → [E] → [S]

Example 1: Scan channels from 10 to 19 : [M] → [1] → [1] → [E] → [S]

Example 2: Scan channels from 00 to 49 : [M] → [0] → [4] → [E] → [S]

Note: Refer to next section 2.2.3.2 for scan speed, scan pass, hold, etc.

- (4) SCAN shift with shift key  /  increases/decreases the group numbers by 1.

The group number can be changed by pressing shift key while reception in SCAN mode. One press of shift key,

- (5) RF GAIN adjustment

The intensity of signal at which scanning stops varies to some extent according to the frequency range. When scanning stops while no signal is being received, reduce RF GAIN a little.

- (6) Stop scanning

Scanning stops when [S] key is pressed while scanning.

Scanning starts again when [S] key is pressed again.

### 2.3.2 SCAN control

#### (1) Pass

When a channel should be skipped in the scanning reception, designate the channel by following procedure:

[SPOT] → [F] → [channel number] → [E]

When that channel is needed again, stop skip by following procedure:

[SPOT] → [M] → [channel number] → [C]

#### (2) Speed control

Select a number key, from 0 to 5, and press it to change the speed of scanning and selected speed is memorized even when power supply is turned off.

Number keys corresponds to the scanning speed as shown in Table 2-1.

Table 2-1 List of equipment and material supplied

Number key	0	1	2	3	4	5
Speed (approx.)	0.5 sec.	1.0 sec.	2.0 sec.	3.0 sec.	4.0 sec.	6.0 sec.

#### (3) Scanning hold

When a signal is received in scanning reception, scanning may stop and hold for a while and restart.

To select a mode of scanning hold, press a number key, from 6 to 9, and press it to change the speed of scanning.

Selected mode of hold is kept even when power supply is turned off.

Number keys corresponds to the mode of scanning hold as shown in Table 2-2.

Table 2-2 List of equipment and material supplied

Number key	Mode of scanning hold
6	Scanning stops when a signal is received
7	Scanning does not stop when a signal is received
8	Scanning stops for 2 seconds when a signal is received and restarts
9	Scanning stops for 4 seconds when a signal is received and restarts

## 2.4 Search Reception

Search reception starts from the lower limit frequency with a step of 2 kHz and following should be designated for search reception: the lower limit, the frequency range, time required for a step, direction of search, the mode when a signal is received, etc.

The range of search should be in the frequency range of TD-C358 / TD-C358-K, i.e., from 200 kHz to 29,999.9 kHz. Therefore, when the lower limit is below 200 kHz or the upper limit of search exceeds 30 MHz, the frequency display remains dark and search does not start.

### (1) Lower limit

Turn **MODE** switch to **MANU** and enter the lower limit in unit of 0.1 kHz by following procedure: **F** → **Lower limit** → **E**

Example: Enter 12.545 MHz as lower limit. **MODE** → **MANU** → **F** → **125450** → **E**

Note: When the frequency of the display is used as the lower limit, press **F** → **E**

### (2) Frequency range

The range should be in between 10 kHz and 1000 MHz in 10 kHz step.

Enter the range in unit of 0.1 kHz by following procedure: **F** → **Range** → **S**

Then, frequency on the display disappears and the lower limit comes out.

Example: Enter 500 kHz as search range. **F** → **5000** → **S**

Note: Search range is kept in the back-up memory. When the range at the last power off is used, press simply, **S** key.

### (3) Start search reception and change search direction

When **S** key is pressed, search reception in upward direction starts.

When one of the shift key is pressed, the direction of search changes, **▲** key (up key) towards higher frequency and **▼** (down key) to lower frequency.

Note that the frequency changes in step of 1 kHz when shift key is pressed for 0.5 second or longer.

### (4) Stop search reception

Search reception stops when **S** key is pressed. **S** key is a cyclic key and let the search reception start and stop in turn.

When **MANU** key is pressed, the mode of reception changes to manual mode and hence, search reception stops.

### (5) Search hold and restart

The level of signal at which the search reception stops is influenced by the frequency but not by the position of RF GAIN. Selected the mode of hold as shown previously in Table 2-2. When the tuning dial is rotated, search function does not change, though the frequency being received changes.

### (6) Search speed

Press a number key to change search speed. Number keys corresponds to the search speed as shown in Table 2-1.

## 2.5 Wave Form

3 modes of reception, i.e., **MANU**, **SPOT** and **SCAN**, can be applied for AM signals. However, some signals require special adjustment and they are not suitable for scan or search reception. Direction should be measured after receiving signal.

### (1) A1A signal

Press A1A. Then the signal can be received with a beat frequency of 1000 Hz.

### (2) Teletype

Press J3E to measure the bearing when receiving teletype (printing teletype, RTTY).

### (3) SSB

SSB signal should be received either by **SPOT** mode or **MANU** mode with frequency input.

a. Press J3E and start reception in **SPOT** mode by:

( **SYSTEM** → **RCV** → ) **SPOT** → **J3E** → **M** → **channel number** → **E** or,

a'. Press J3E and start reception in **MANU** mode by:

( **SYSTEM** → **RCV** → ) **MANU** → **J3E** → **F** → **frequency** → **E** or,

a". Use a shift key or the tuning dial to receive the signal.

b. Adjust **CLARI** knob so that wanted signal can be heard clearly.

Note: a) Avoid too high RF GAIN in SSB reception and keep RF GAIN rather low since too high RF gain may degrade clarity because of noise in the receiver.

b) After the signal is received, go to direction measurement by selecting the **SYSTEM** switch to DF.

The propeller pattern changes following to the voice strength.

### 3. Direction Measurement

#### 3.1 Check

##### 3.1.1 Check main transmitter on board

Open the antenna circuit of the main transmitter except at low frequency in which no harmful influence to bearing measurement has been confirmed.

##### 3.1.2 COMPASS card check (when a gyro-repeater motor is built-in)

Check that the reading of the bow direction on the COMPASS card is the same as that of the main gyro compass (or equivalent). If not, rotate COMPASS knob while pressing GYRO switch. When they coincide, let your hands off.

#### 3.2 Direction Measurement

##### 3.2.1 Reception

- (1) Select the SYSTEM switch to RCV and try to receive the frequency. Check the frequency on the display and wave form lamp are correct.
- (2) Select the SYSTEM switch to DF. (Selection directly from OFF to DF may be possible except in reception of SSB signal. SSB signal should first be received in RCV mode and then, change to DF mode.)

##### 3.2.2 Pattern adjustment

- (1) Make input signal zero by minimizing RF GAIN.
- (2) Adjust PATTERN control to make the circle on the CRT almost equal to the red circle line on the cursor glass.
- (3) Turn RF GAIN to obtain better propeller pattern.

Check if the center of the propeller pattern coincides to the center of the CRT. If not, adjust position adjustment resistor RV4 (↑) and RV5 (↔) on PCA 4 (PCA 20kHz) inside the main unit.

### 3.2.3 Measurement

- (1) Rotate the cursor plate so that its center line (orthogonal to arrow lines) coincides to the center axis of the propeller pattern.

Figures, 2-1 and 2-2 show examples of propeller patterns of various signals.

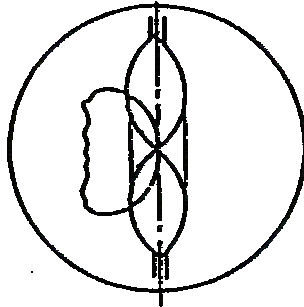


Fig. 2-1 Propeller pattern and sense pattern

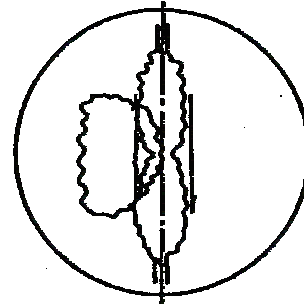


Fig. 2-2 Propeller pattern and sense pattern of a modulated signal

- (2) Press **SENSE** button and find correct arrow, about 90° clockwise of the sense pattern (the arrow on the sense pattern side is the correct one).
- (3) Read the direction on the fixed BEARING scale. This gives the relative bearing, i.e., the direction relative to the heading (keel line).

Reading on the compass card gives the true bearing with respect to the north when the COMPASS card is driven by gyro or, adjusted manually referring to the reading of a gyrocompass or a magnetic compass. Correction of magnetic compass error, the variation and the deviation, is necessary for higher accuracy.

Note: Compass card moves with a time lag to the course change of a ship and hence, read the true bearing while compass card is at rest.

- (4) Signal with large disturbance

When signal is accompanied with large disturbance, propeller pattern shrinks as shown in Fig. 2-3 and hence, accuracy of measurement drops. Then, turn **PATTERN** knob clockwise to make pattern large.

- (5) Weak signal

Weak signal does not give good propeller pattern but may give elliptic pattern as shown in Fig. 2-4. Read the direction of long axis of the ellipse. When the signal is very weak, signal may be received and heard but its direction may not be measured.

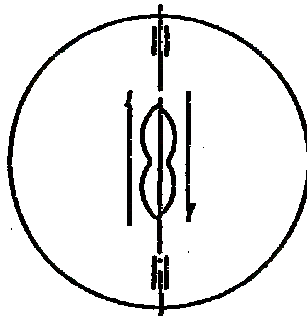


Fig. 2-3 Propeller pattern of a signal  
When there is large disturbance

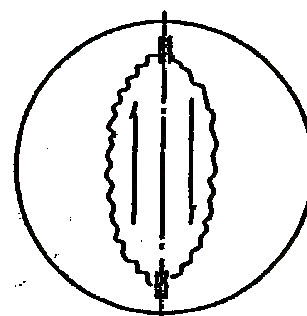


Fig. 2-4 Elliptic pattern of weak signal

- (6) Auto sense

Pull **SENSE** knob to select AUTOMATIC SENSE which turns SENSE automatically and periodically on. The cycle of Automatic Sense indication become longer when the knob is rotated clockwise.



### 3.3 Error Correction

Refer to section Chapter 3 section 4 to make error correction curves.

Suppose that a error correction curve is given as  $E(\theta)$ , a function of  $\theta$ , in that frequency range as shown in Fig. 2-5 where  $\theta$  is the reading of the axis of propeller pattern on the BEARING plate.

Then,  $\theta + E(\theta)$  is the relative bearing after correction.

When the bow direction is B on the COMPASS card, the corrected true bearing is  $B + \theta + E(\theta)$ , i.e., add correction value corresponding to the reading on the BEARING scale,  $E(\theta)$ , to the reading on the COMPASS card,  $B + \theta$ .

Example:

When the reading on the BEARING scale is  $45^\circ$ , the reading on the error correction curve,  $E(\theta)$ , is  $+3.8^\circ$ . Then, corrected value of the relative bearing is  $45^\circ + 3.8^\circ$ , i.e.,  $49^\circ$  when the last figure is rounded up.

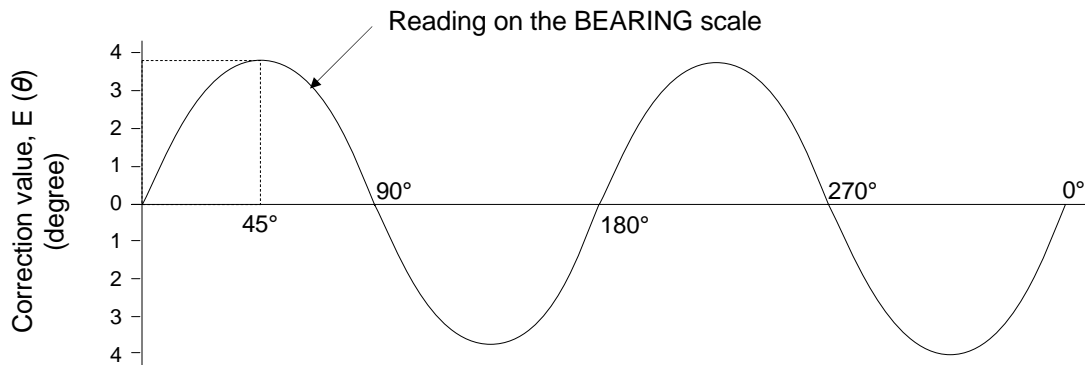


Fig. 2-5 Error correction curve

## **Chapter 3    INSTALLATION**

## Chapter 3 INSTALLATION

### 1. Installation of Antenna

#### 1.1 Antenna Site

Direction finding in the short wave range is vulnerable to conductive structures nearby and hence, antenna site should be selected carefully. Otherwise, large error in bearing measurement may be resulted.

Since the wave length " $\lambda$ " at 10 MHz is 30m, a conductive stay cable or an antenna with a length of  $\lambda/4$  or  $\lambda/2$  is extraordinary harmful for bearing measurement. Therefore, wire with a length of several meters should carefully be separated.

- (1) Install the antenna at the top of foremast so that the loop antenna occupy the highest position and the separation from other conductive object is kept large.
- (2) There are many other antennas and conductive objects on the radar mast on the bridge, and those things would interfere the direction finding. In case of installing the loop antenna on the radar mast, be sure to keep sufficient separation from other conductive objects to avoid from interference (refer to next section 3.2).



#### **WARNING**

- Put up scaffolding when installation of the loop antenna, and wear the safety belt.
- Confirm there is no person right under the loop antenna while installation work.

## 1.2 Minimum Separation and Countermeasure

### (1) Minimum separation

The separation of the bottom of loop antenna from conductive projection out of mast should be larger than  $3L$  where  $L$  is the size of projection.  $2.5L$  is allowable for symmetric projection with respect to the mast. Fig. 3-1 shows examples in the case of a foremast.

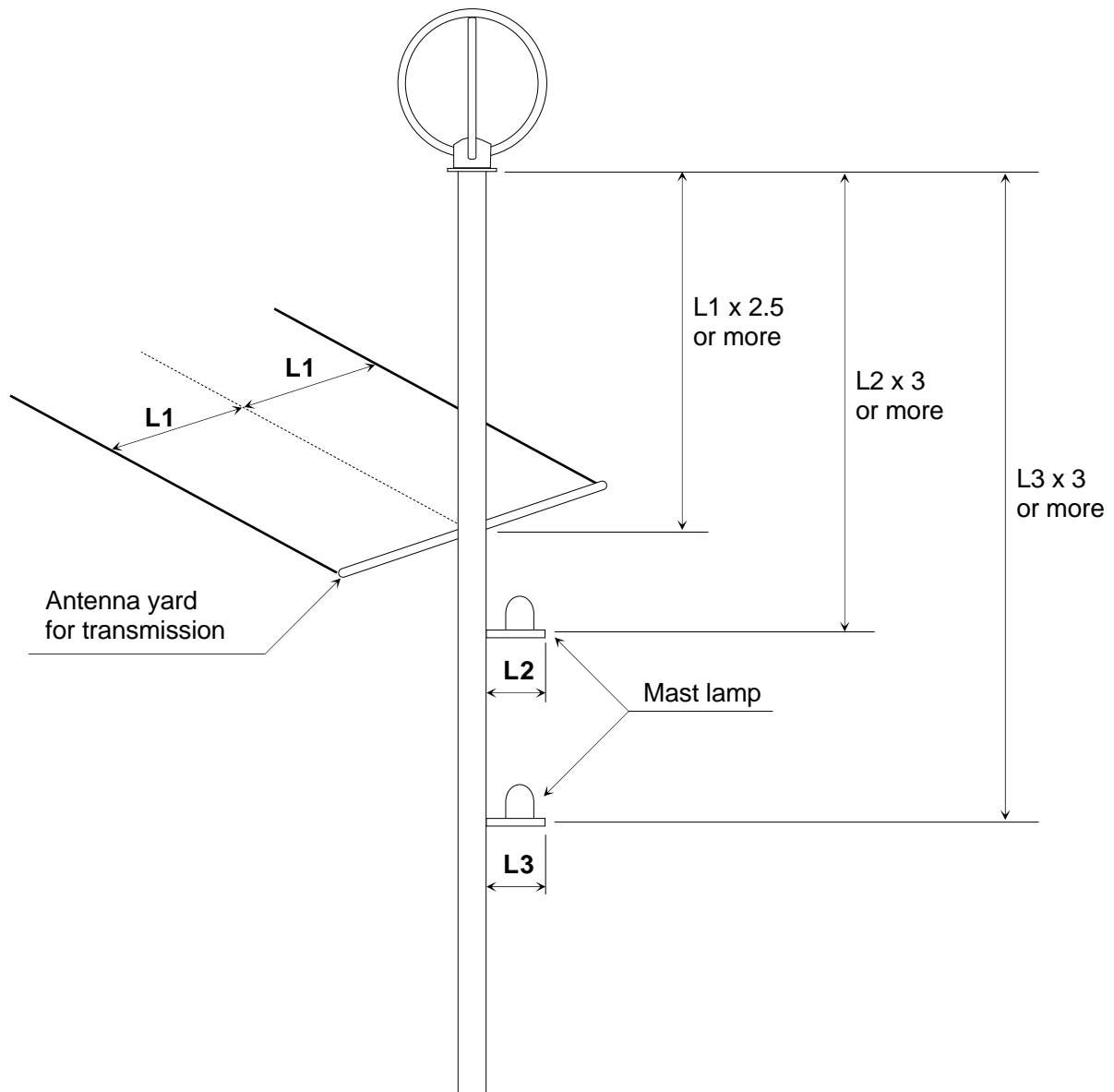


Fig. 3-1 Minimum separation when loop antenna is installed at the top of foremast

## (2) Radar mast

Radar mast is often equipped with whip antennas which requires special attention.

Move whip antenna whenever possible. When it is impossible, keep its tip lower from the bottom of a loop antenna by 1.5m and separated at least by 4m in horizontal direction.

If above separation cannot be kept, tilt the whip antenna backward so that the horizontal separation can clear above value, i.e., 1.5m as shown in Fig. 3-2.

Never surround a loop antenna with whip antennas.

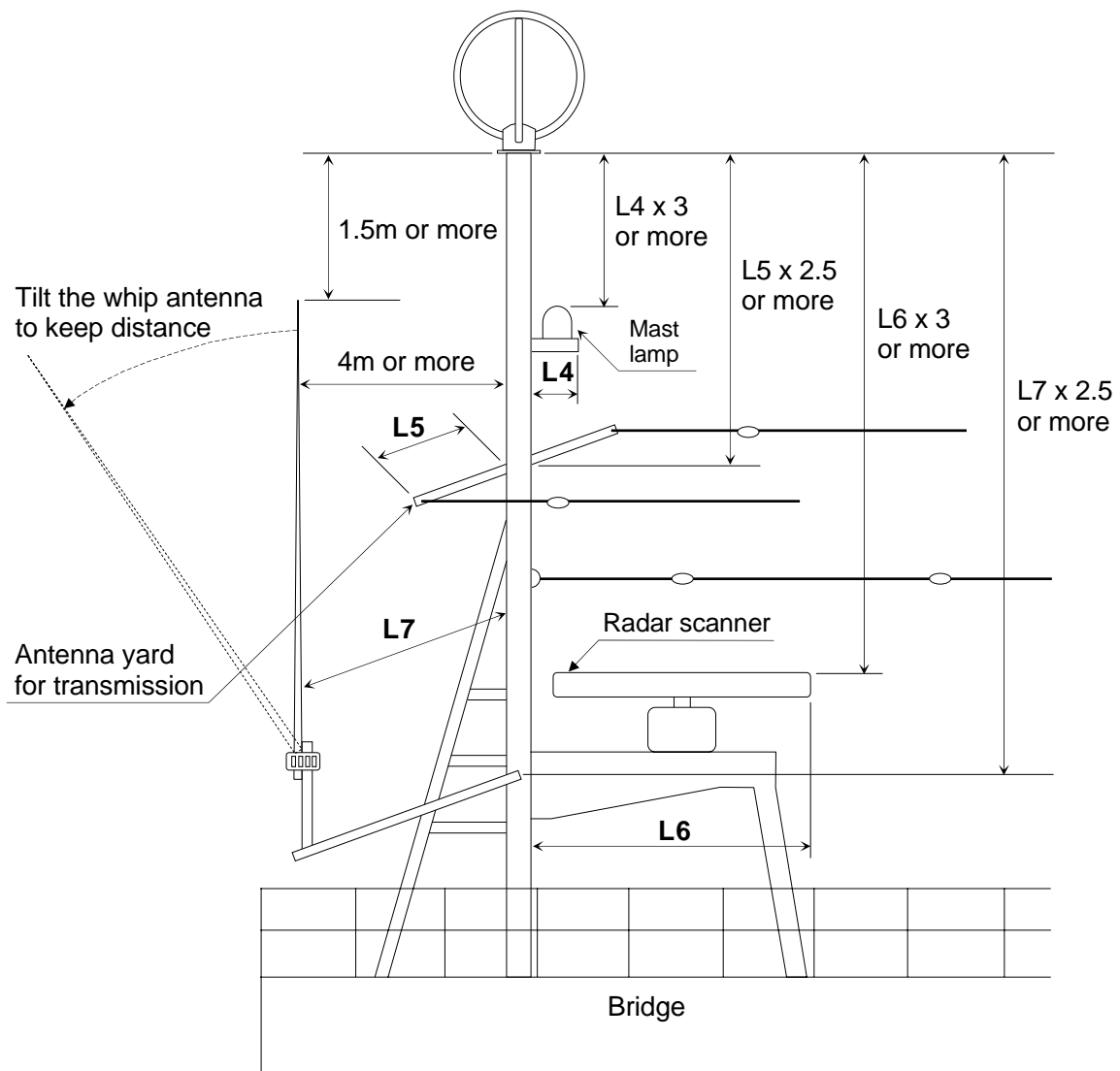


Fig. 3-2 Minimum separation when loop antenna is installed at the top of radar mast

## (3) Transmission antenna and stay

Fig. 3-3 shows points where insulators should be inserted when a loop antenna is installed at the top of foremast.

Fig. 3-4 shows points where insulators should be inserted when a loop antenna is installed at the top of radar mast. Keep off service lines as possible from the radar mast. Whip antennas should be kept lower than loop antenna.

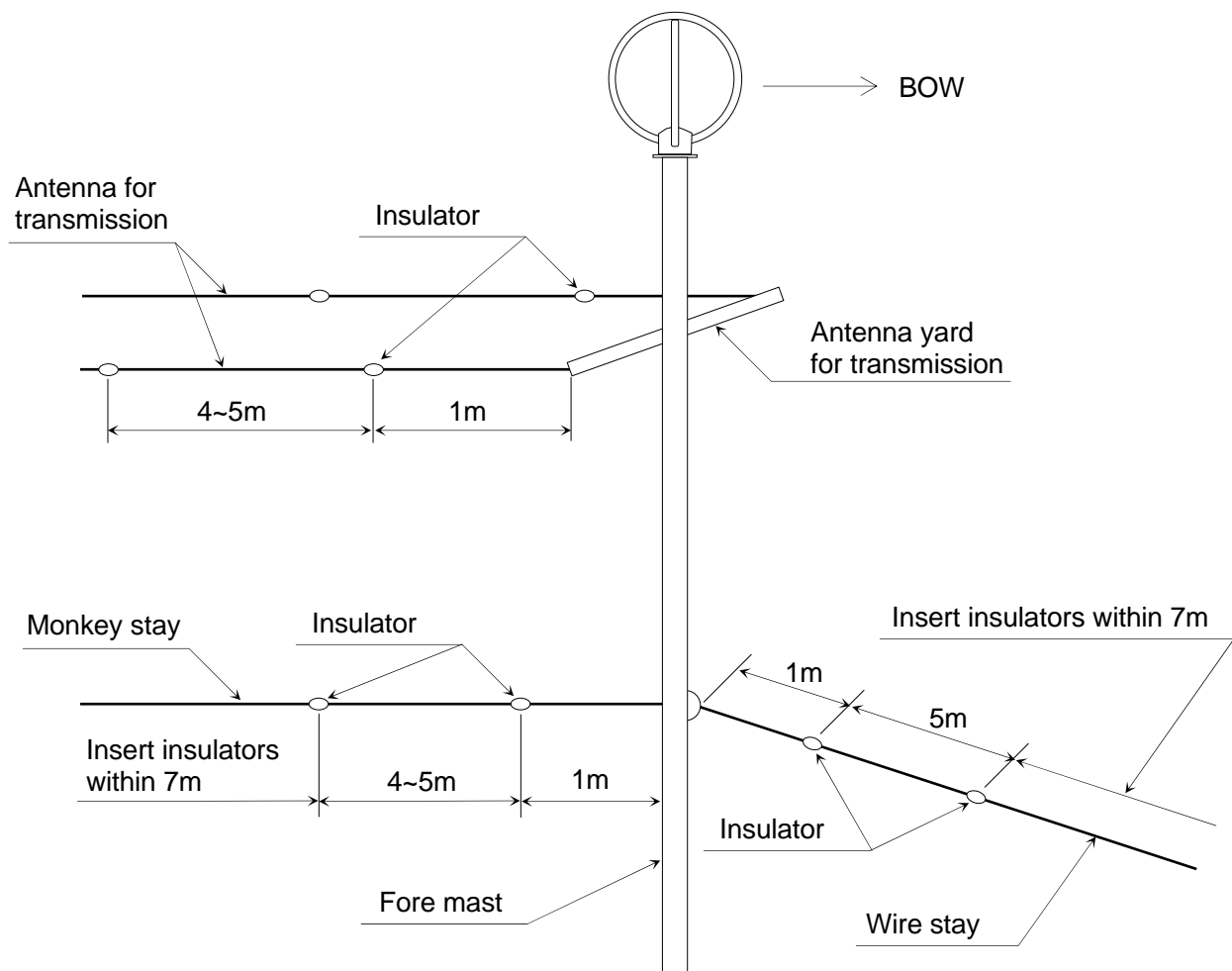


Fig. 3-3 Positions where insulators should be inserted

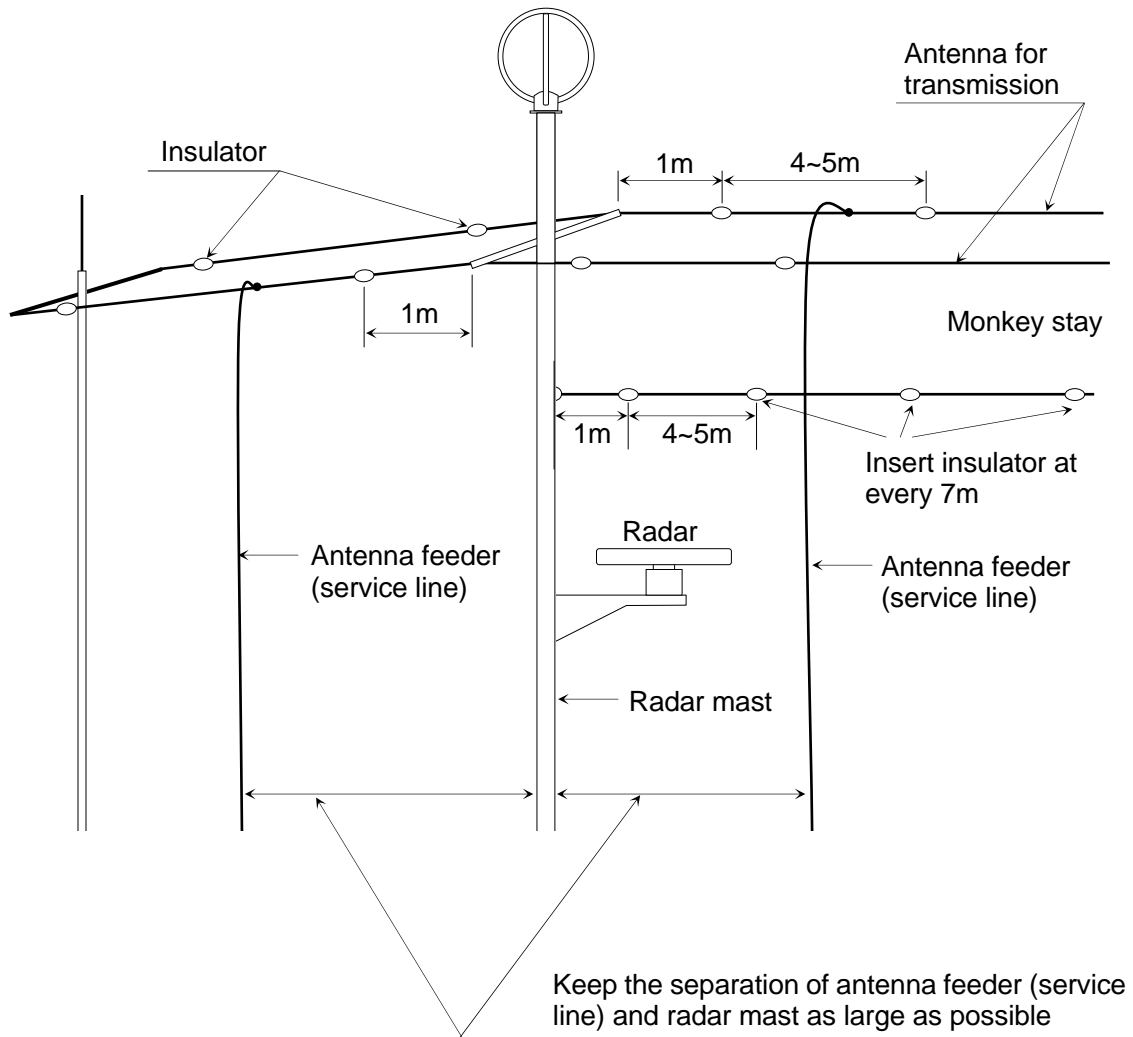


Fig. 3-4 Positions where insulators should be inserted when loop antenna is installed on the top of the radar mast

## 1.3 Antenna Cable

### 1.3.1 Note for laying antenna cable

- (1) Keep separation from heat source. Pay attention to welding after cable is laid.
- (2) Do not lay the naked cable on a path to protect from mechanical damage. When cable is laid on a path, protect the cable by setting it through pipe, steel or plastic.
- (3) Avoid from electromagnetic interference by keeping distance from power cables of other equipment.
- (4) Never set the cable along stays and other wires which may cause large error in direction measurement.
- (5) Keep the length of the cable as shipped. When the length of the cable has to be changed, the main unit has to be readjusted. Consult Taiyo Musen Co., Ltd. when the cable length should be changed. (Refer last page for the contact address of Taiyo Musen Co., Ltd.)

### 1.3.2 Preparation

- (1) Prepare cable as shown in Fig. 3-5 when necessary.
- (2) Use heavy duty soldering iron to solder quickly so as not to melt polyethylene.
- (3) Black vinyl cord is heat-durable. Remove vinyl as long as necessary. Twist well and wind twice around armor. Then, solder it.
- (4) Test insulation after preparation. Insulation to ground should be higher than 50kΩ.

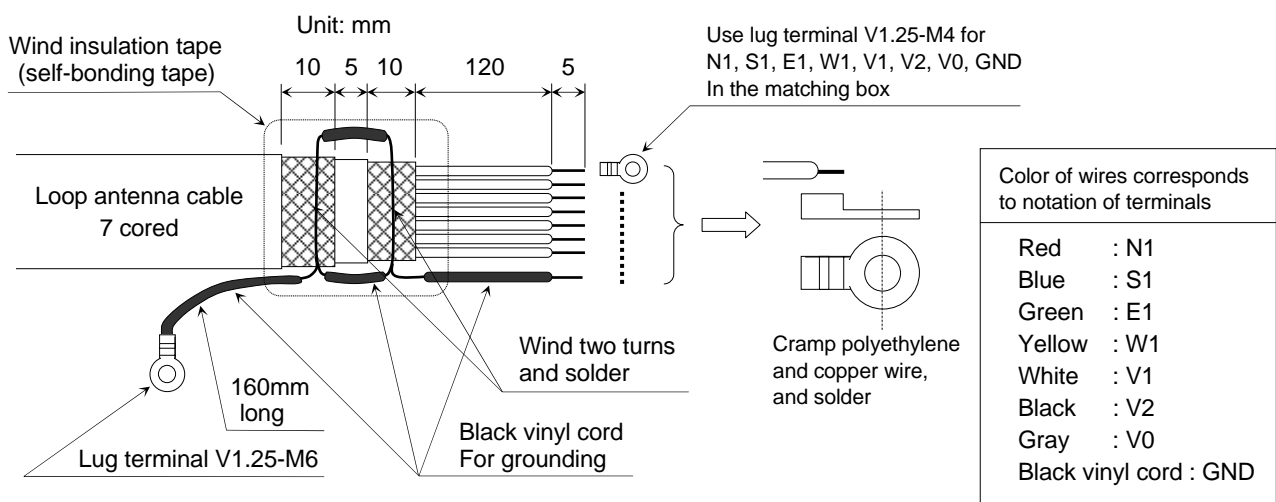


Fig. 3-5 Preparation to connect cable for loop antenna



## 1.4 Installation of Loop Antenna

### 1.4.1 Assembly of loop antenna

Assemble the loop antenna following to the assembly procedure given in the APPENDIX

### 1.4.2 Installation of antenna

#### (1) Flange

Weld its flange to the antenna site i.e., mast or stanchion, paying attention to its direction. The flange is included in the standard supply scope.

Note that antenna cable is not heat resistive.

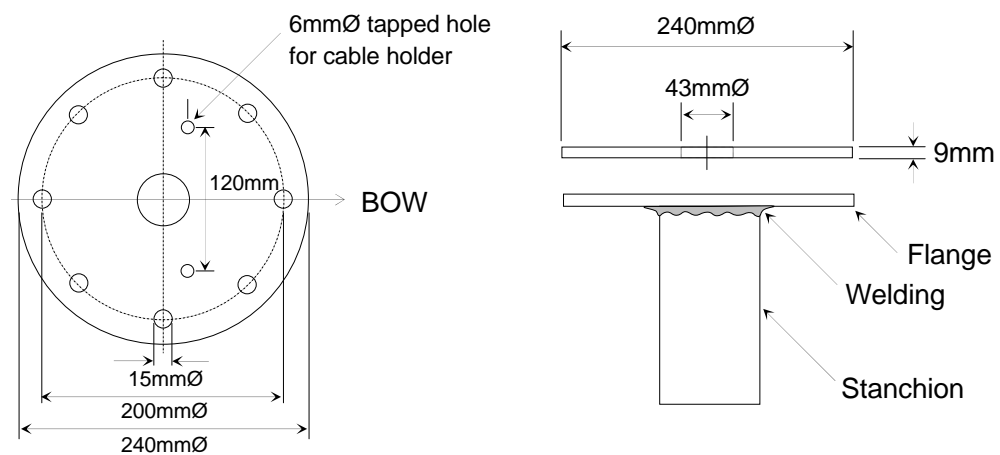


Fig. 3-6 Flange

#### (2) Cable

Fix the processed cable to the flange by cable clamp with two screw bolts (6NS-15, 6 $\phi$  x 15mm) and washers (6SW) where a lug terminal to ground the cable should have good contact to the flange as shown below. Apply contact-cemedyne after fastening screw bolts.

Note that ground line for the loop antenna cable should be tightly fastened to the flange.

When the grounding is not completed, large error may be resulted in measuring direction in MHF frequency range.

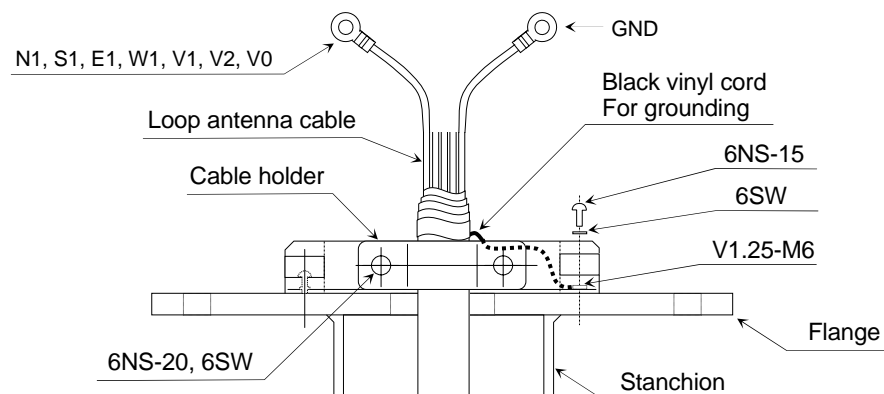


Fig. 3-7 Cable connection

## (3) Installation

- (a) Insert a rubber packing between loop support box and the flange.
- (b) Let the end of the cable go through center hole of matching transformer.
- (c) Install the loop antenna on the keel line (center line of the ship). If it is not possible, install it at closest possible parallel line to the keel line. The side with N mark and BOW label should face the bow direction. ("N" mark stamp and "BOW" mark label are on the bottom of N-S loop antenna element.)

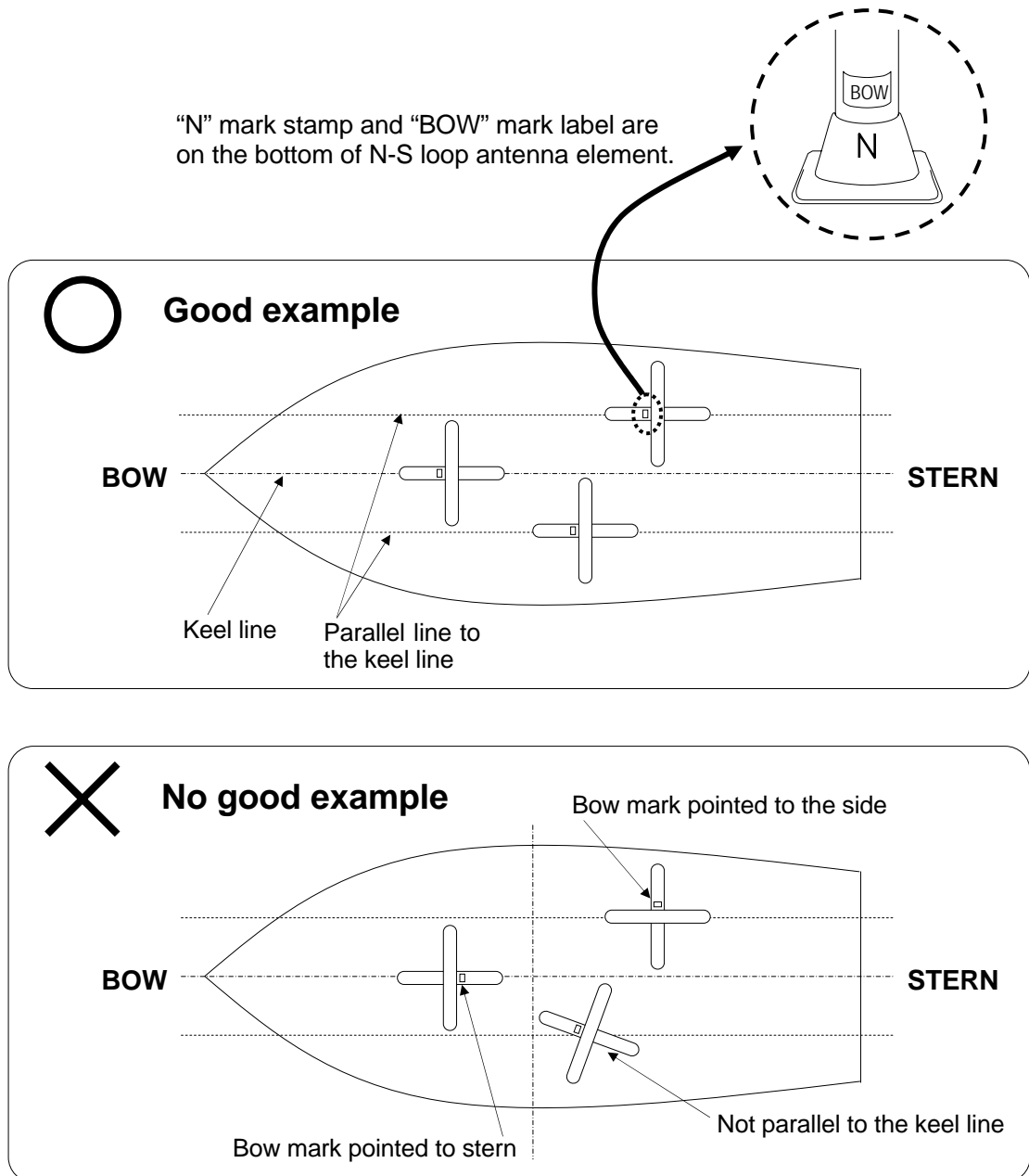


Fig. 3-8 Installation position and direction of loop antenna

- (d) Fix the loop support box with bolts, washers and nuts (12HS-40, 12SW, 12N) as shown in Fig. 3-9.
- (e) Fasten lug terminals of cable to corresponding terminals of the matching transformer with screws and washers (4NS-10, 4SW and 3W)
- (f) Test insulation and conduction and confirm that screws are fixed tightly.
- (g) Insert a rubber packing and fix upper lid with screws and washers (5NS-20, 5SW and 5W).
- (h) Apply contact-cemedyne to screws and nuts.

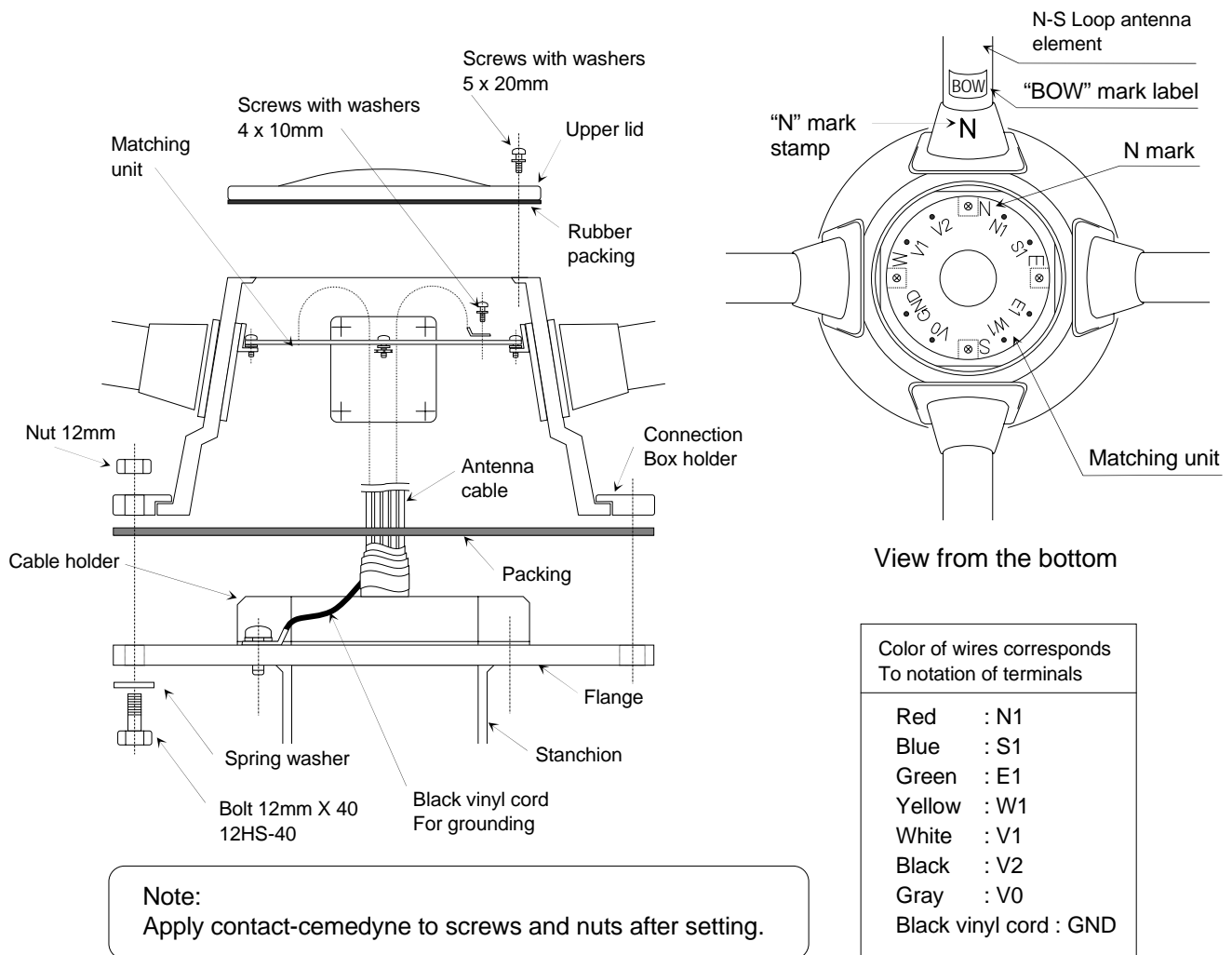


Fig. 3-9 Installation of loop antenna and its cable connection

## (4) Check

Check the connection and insulation in the antenna circuit with a multi-meter or tester. Pull out the connector and measure the resistance. Following values shall be obtained.

Table 3-2 Resistance between two pins of antenna connector

Pin numbers	1 – 3, 2 – 4, 5 – 7	8 – 9	1 – 9, 2 – 9, 5 – 9
Resistance	Less than 2Ω	Larger than 10kΩ	Larger than 20kΩ

## 2. Installation of Main Unit

### 2.1 Place to Install Main Unit

- (1) Select a suitable location for the main unit to avoid direct sunshine, water splash, high temperature and strong vibration.
- (2) Ample space for operation and maintenance and good ventilation as shown in Fig. 3-10 is recommended.
- (3) Keep enough separation from noise sources such as radio transmitter, inverter, radar, etc.

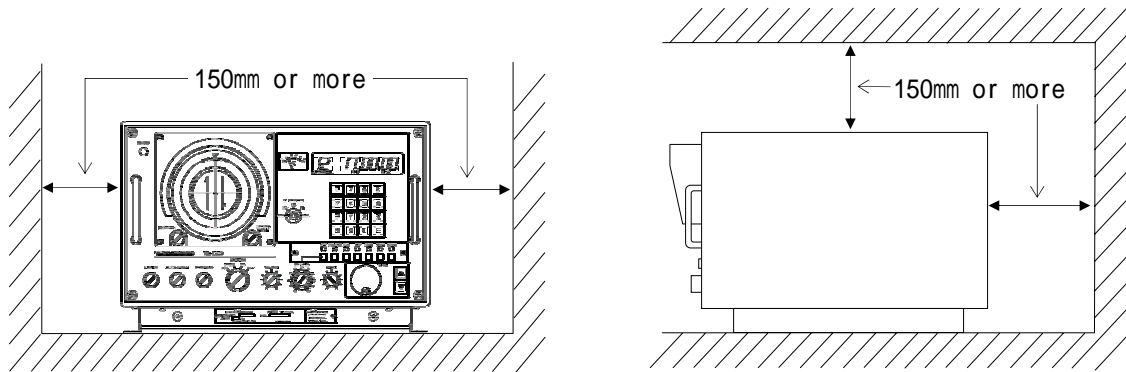


Fig. 3-10 Position of main unit

### 2.2 Installation of Main Unit

- (1) Loosen 2 screws (5mm $\varnothing$ ) to separate its mount, referring to Fig. 3-11.
- (2) Fix the mount to the place to be installed with 6 tapping screws (6mm $\varnothing$ )
- (3) Fit the main unit to the mount with 2 screws (5mm $\varnothing$ )

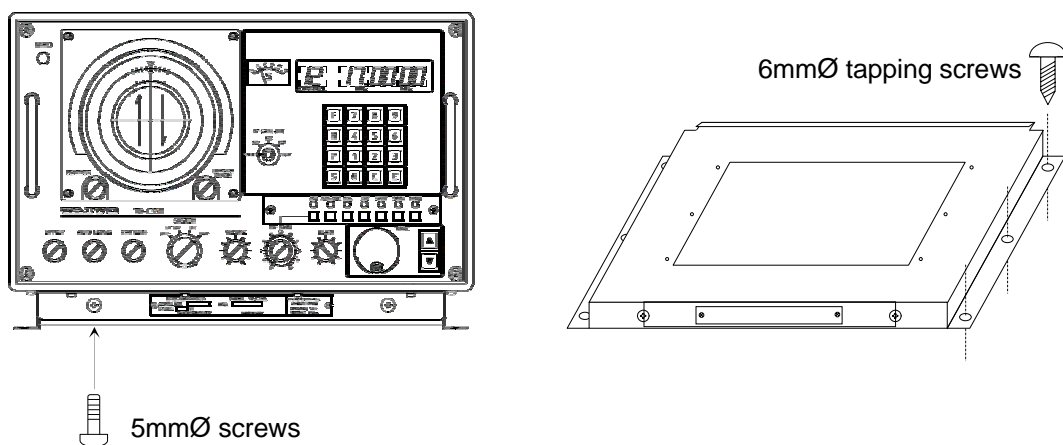


Fig. 3-11 Setting of main unit

## 2.3 Connection in Main Unit

Connect loop antenna cable, power cable and BK properly. Refer to Drawings.

### 2.3.1 Loop antenna cable connection

Prepare one end of the loop antenna cable as shown in Fig. 3-12 for TD-C358 and Fig. 3-15 for TD-C358K-MKII when necessary.

This preparation is similar to that for the other end, i.e., on the antenna side except grounding.

- (1) Use heavy duty soldering iron to solder quickly.
- (2) Insert each core wire and GND wire to cable terminal on rear panel of TD-C358 main unit as shown in Fig. 3-12, 3-13 and 3-14.  
Insert each core wire and GND wire to cable terminal on rear panel of TD-C358K-MKII main unit and on goniometer unit, EG-358MKII as shown in Fig. 3-15, 3-16, 3-17.
- (3) Keep the difference in the length of each core wire within 20mm. Also, keep the length of removed shielding within 30mm.
- (4) Perform insulation test after completion of above procedures.  
Insulation to ground should be higher than 50kΩ.
- (5) For TD-C358K-MKII, 3 kinds of cables are supplied.
  - (a) Antenna cable between Loop antenna and Goniometer unit (EG-358MKII)  
Both ends are assembled by manufacturer before shipment
  - (b) Control cable between Goniometer unit (EG-358MKII) and Main unit (TD-C358K-MKII)  
Both ends are assembled by manufacturer before shipment
  - (c) RF cable between Goniometer unit (EG-358MKII) and Main unit (TD-C358K-MKII)  
Main unit side is assembled by manufacturer before shipment  
Assemble Goniometer unit side after the cable is passed through the cable entrance on the Goniometer unit.

Note: Color of wires corresponds to notation of terminals as follows.

Red	: N1	Blue	: S1	Green	: E1	Yellow	: W1
White	: V1	Black	: V2	Gray	: V0		

### 2.3.2 Power and BK

Connect power supply line and BK line to cable terminal of TD-C358 on the rear panel as shown in Fig.3-14. For TD-C358K-MKII, shown in Fig. 3-17.

- (1) AC supply → AC noise filter → AC terminals,  
BK from a transmitter → BK terminals
- (2) Confirm voltage of AC supply. Change terminal connection of the primary side of power transformer in the main unit when necessary.
- (3) The voltage for the BK relay is 24VDC. When 12VDC has been designated in your specification, apply 12VDC.

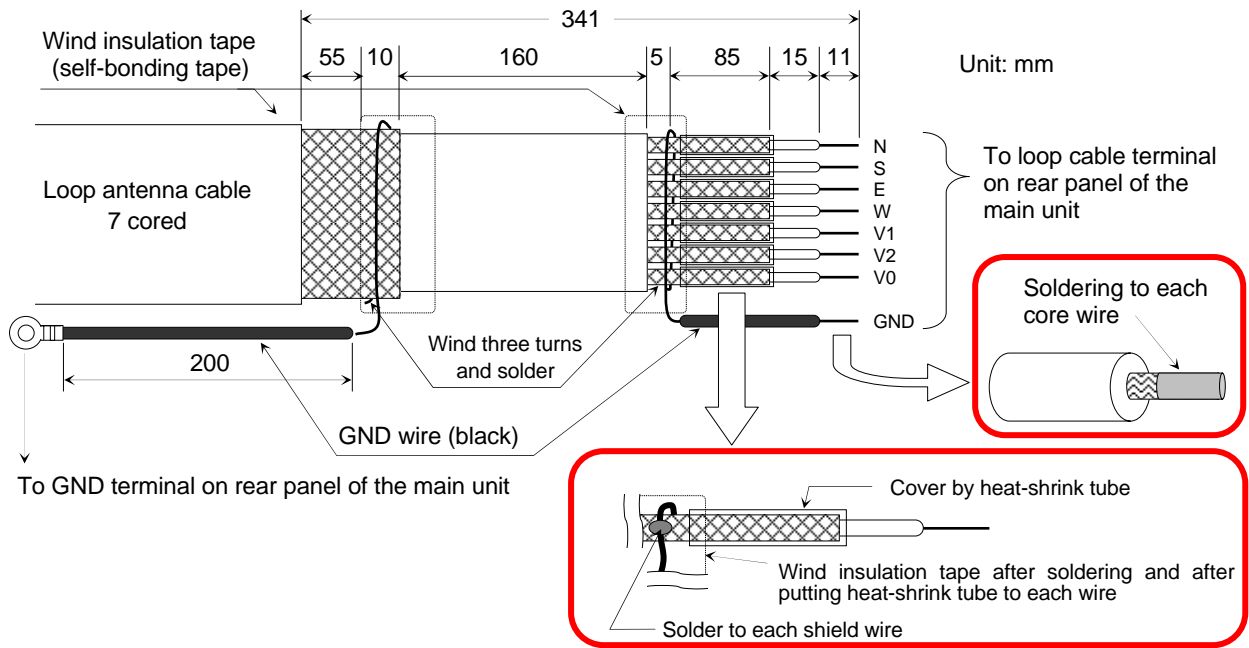


Fig. 3-12 Preparation of connecting loop antenna cable for TD-C358

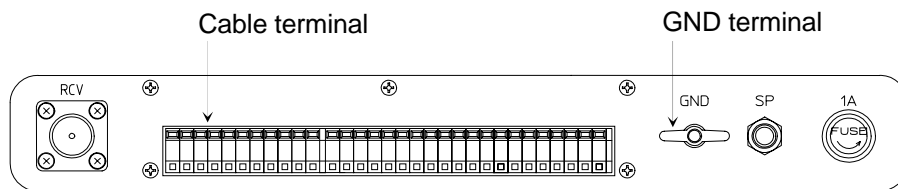
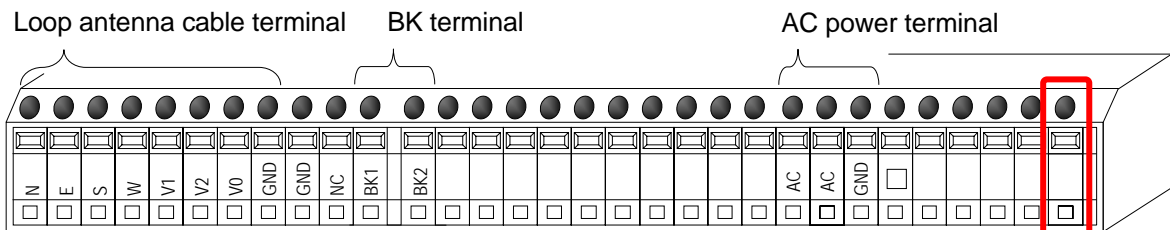


Fig. 3-13 Cable terminal and GND terminal on TD-C358 rear panel



- Insert core wire of each cable to each hole while pushing the knob by a screwdriver.
- Insert angle of core wire shall be about 45°.
- Check electric current by a tester at check point.

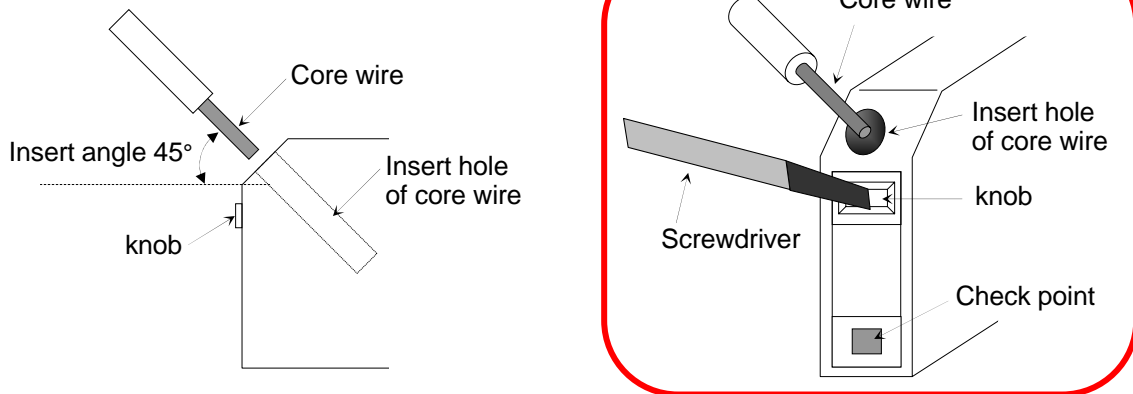


Fig. 3-14 Loop antenna cable terminal, BK terminal and AC power terminal for TD-C358

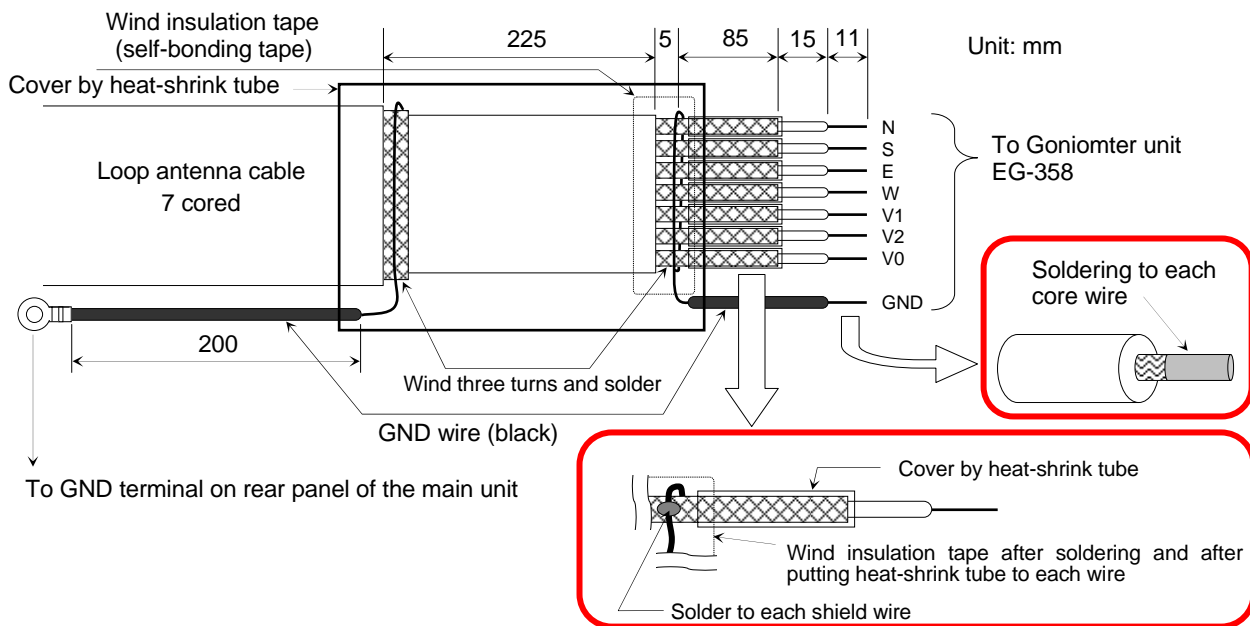


Fig. 3-15 Preparation of connecting loop antenna cable for TD-C358K-MKII

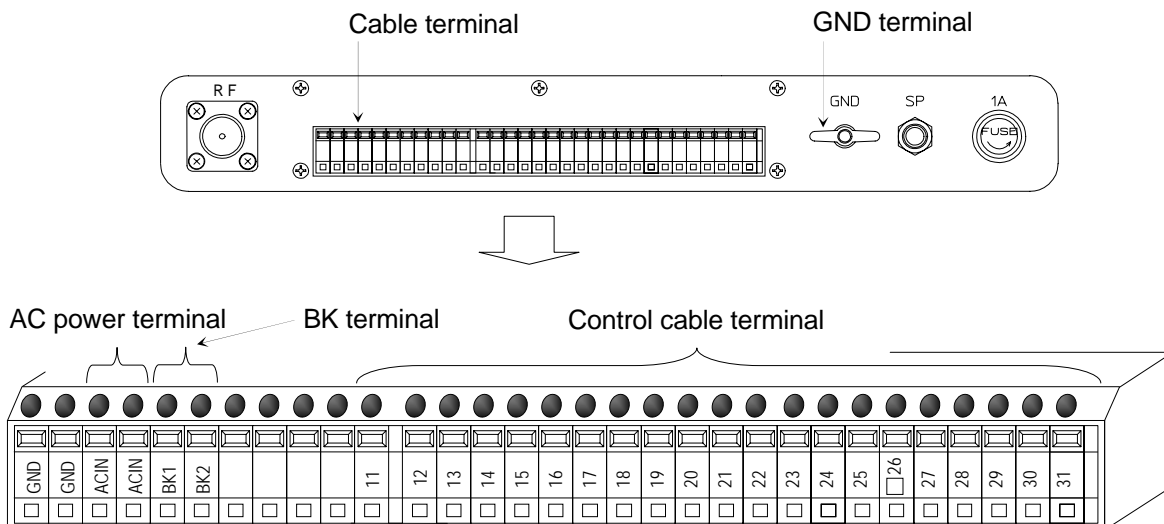


Fig. 3-16 Control cable terminal, AC power terminal and GND terminal on TD-C358K-MKII rear panel

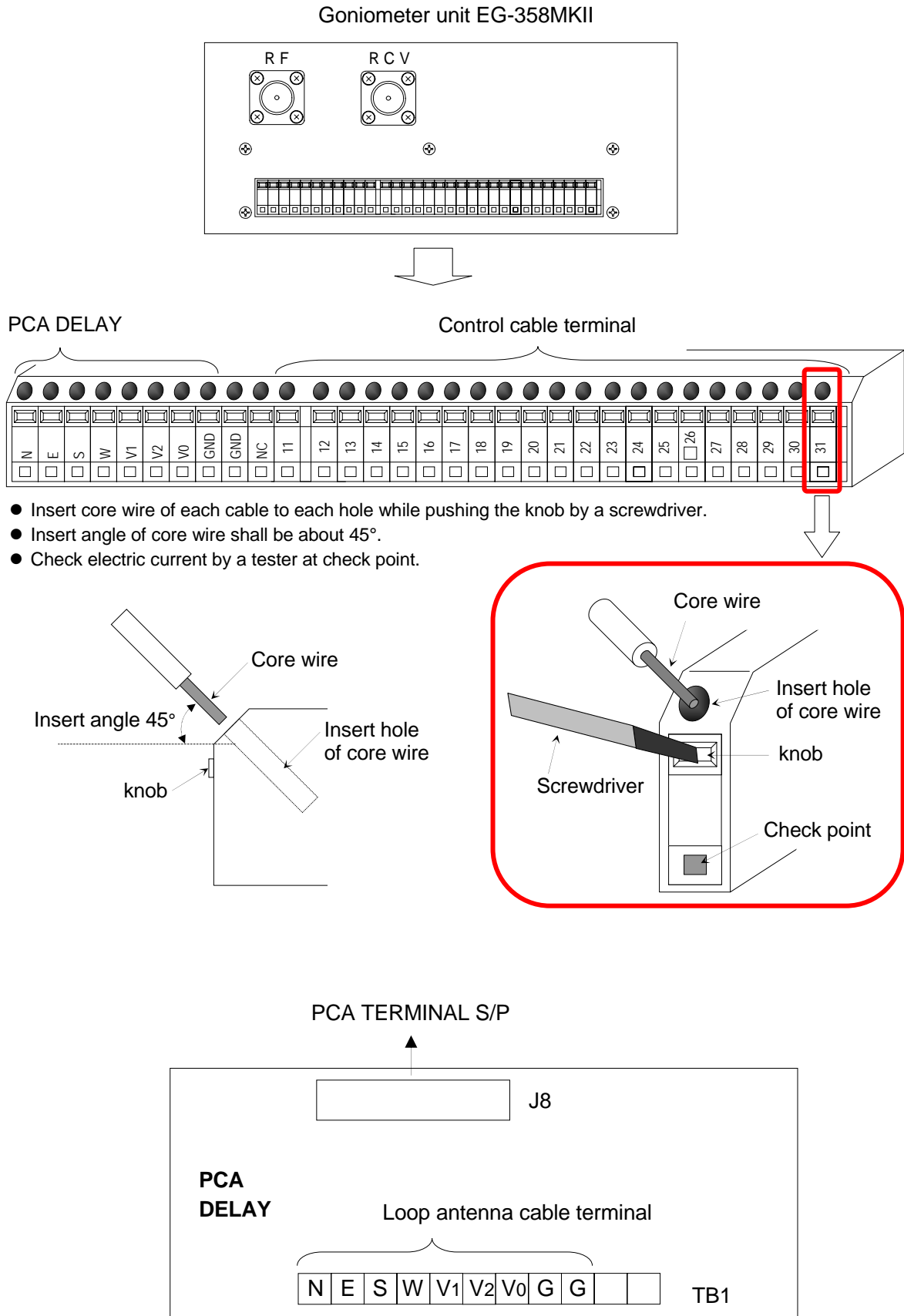


Fig. 3-17 Loop antenna cable terminal and Control cable terminal on goniometer unit, EG-358MKII for TD-C358K-MKII



### 2.3.3 Gyro repeater motor connection

Gyro repeater motor in a main unit is attached optionally.

2 examples of connection of gyro repeater motor in the main unit are shown in Fig. 3-18, 3-19.

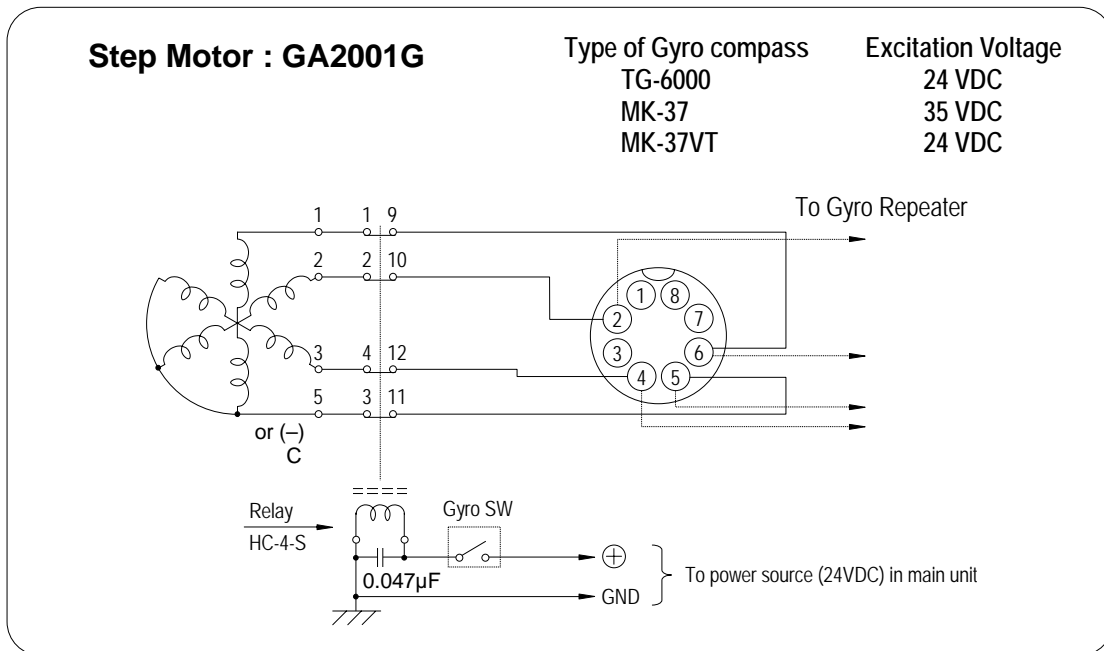


Fig. 3-18 Connection example of step motor

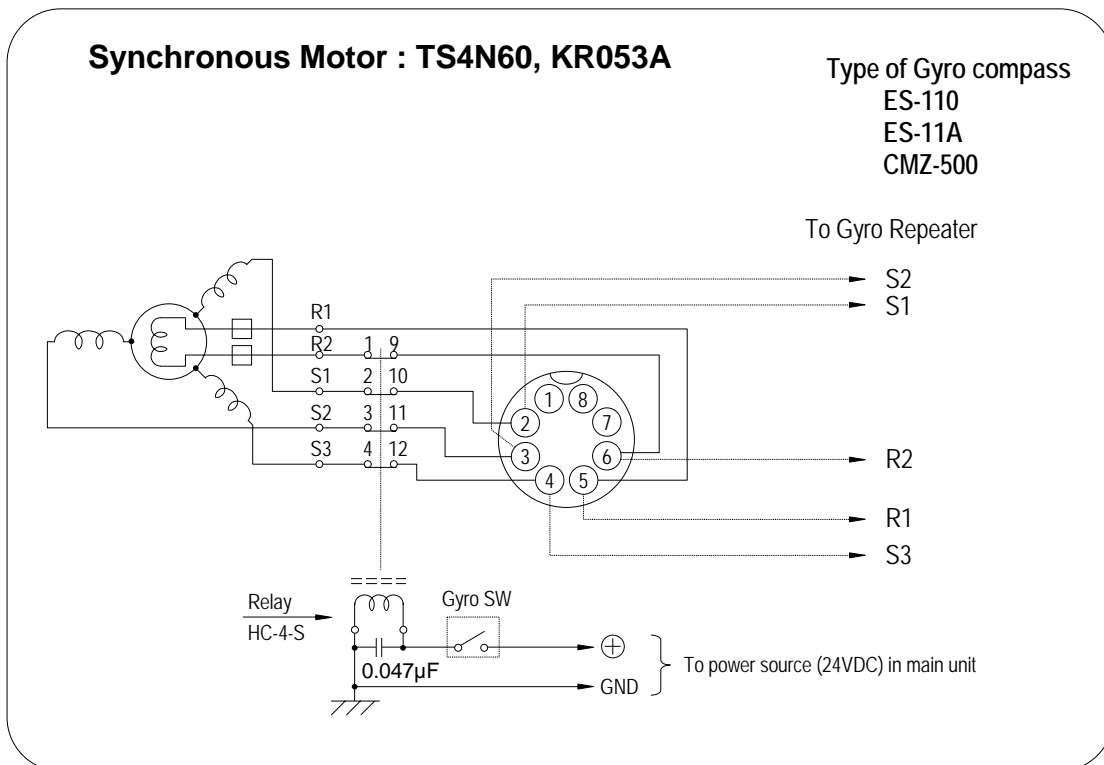


Fig. 3-19 Connection example of synchronous motor

## 2.4 Grounding

Poor grounding decreases the sensitivity of reception and increases noise and interference. Following notes should be kept when connecting ground lines.

### 2.4.1 Grounding of main unit

- (1) Grounding should be made with KIV cable (0.5 x 30 mm or equivalent copper belt) directly to the nearest possible grounding point of the ship body (metal vessel) or copper plate (300 x 450 mm) at the bottom of the ship (non-metallic vessel) referring to Fig. 3-20 "Good example".
- (2) Do not directly connect the GND terminal of TD-C358 main unit with GND terminal of other equipment since it would cause the adverse effect by the noise trouble etc. (Refer to Fig. 3-20 "No good example")

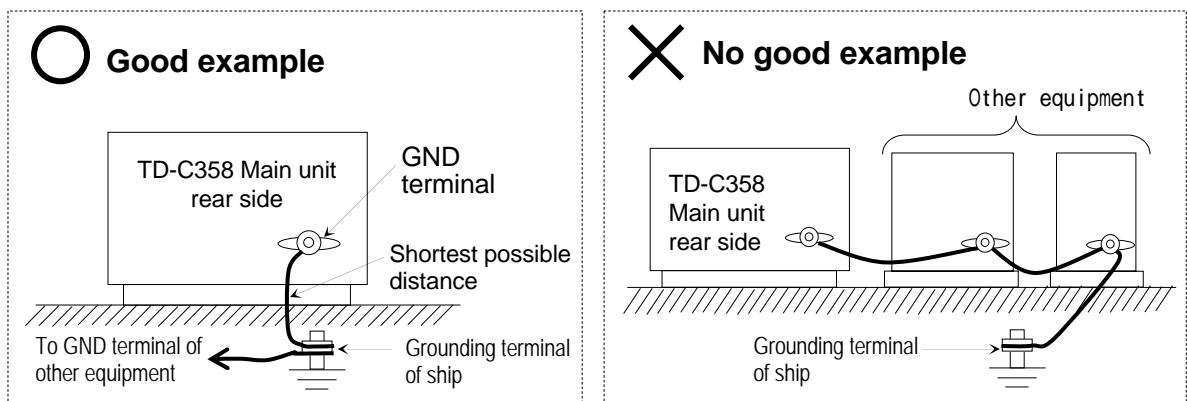


Fig. 3-20 Grounding of the main unit

### 2.4.2 Grounding of loop antenna side

- (1) Grounding cord of loop antenna cable should be fastened to the flange tightly. When grounding is not complete, error in direction measurement may increase.
- (2) The mast to which the loop antenna is installed should be grounded well.

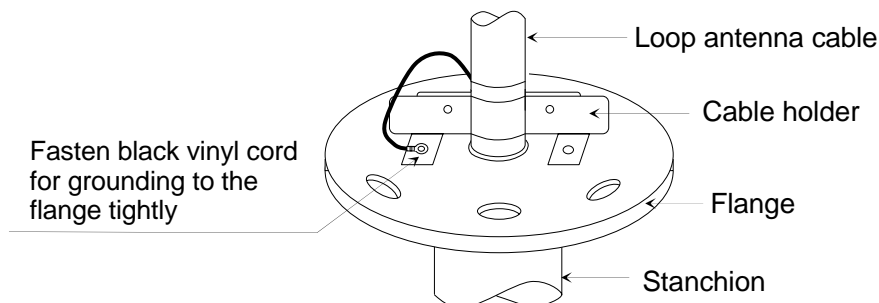


Fig. 3-21 Grounding of loop antenna

### 2.4.3 Grounding of other cables

Other cables, i.e., power, BK, and gyro, should also be grounded at their both ends with shortest possible length. Poor grounding may increase noise.

### 3. Adjustment after Installation


#### 3.1 CRT Adjustment

##### 3.1.1 Precautions


Main unit is shipped after adjustment.

However, pattern check on the CRT is suggested when propeller pattern is not good.

Adjust the pattern following the procedures given here, paying attention to the note given below.



**DANGER**



Power unit inside the main unit has a high voltage generator which gives 1200 VDC.  
Though the generator is protected with insulator cover, pay enough attention to prevent electric shock while adjusting pattern on the CRT.

##### 3.1.2 Pattern adjustment

###### (1) Circle adjustment

Set and receive a frequency where there is no signal.

Select **SYSTEM** switch to **RCV**.

Then, reduce **RF GAIN** by rotating it counterclockwise.

When a circle appears and there is no diamond-shaped figure at the center, pattern adjustment is not necessary.

When a diamond-shaped figure appears at the center, the tuning of PCA 20 kHz might have drifted. In that case, adjust CV1 and CV2 so that the pattern becomes circle and diamond-shaped figure at the center is focused as shown in Fig. 3-22.

When above procedure does not give true circle, adjust RV2 (variable resistor for amplitude control) so that true circle is obtained.

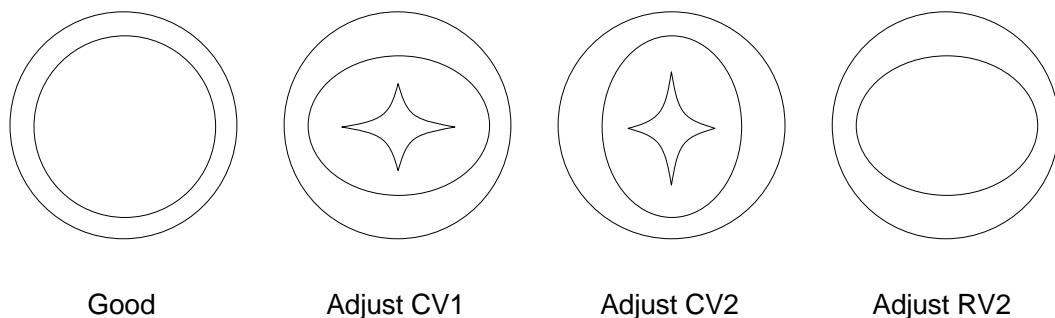


Fig. 3-22 Adjustment of pattern on CRT

## (2) Position adjustment

If a figure on the CRT deviates from center position, adjust "variable resistor for position control" RV4 ( $\updownarrow$ ), RV5 ( $\leftarrow\rightarrow$ ) on the PCA 20 kHz so that the figure locates at the center of the CRT.

## (3) Focus adjustment

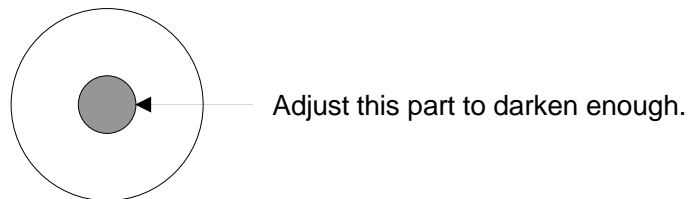
Adjust the focus by RV6 (FOCUS) on the PCA 20 kHz when a figure is out of focus.

## (4) Brightness adjustment

Adjust the brightness of CRT by RV7 (INTEN) on the PCA 20 kHz.

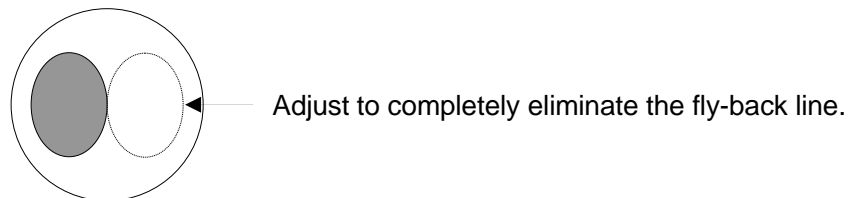
## (5) Brightness adjustment at the center position

Adjust T2 core on the PCA 20 kHz so that the center part of the CRT becomes dark enough.



## (6) Fly-back line elimination

Adjust T1 core on the PCA 20 kHz so that the fly-back line is completely eliminated.



Note : For detail position of each item for adjustment, refer to below Fig. 3-23.

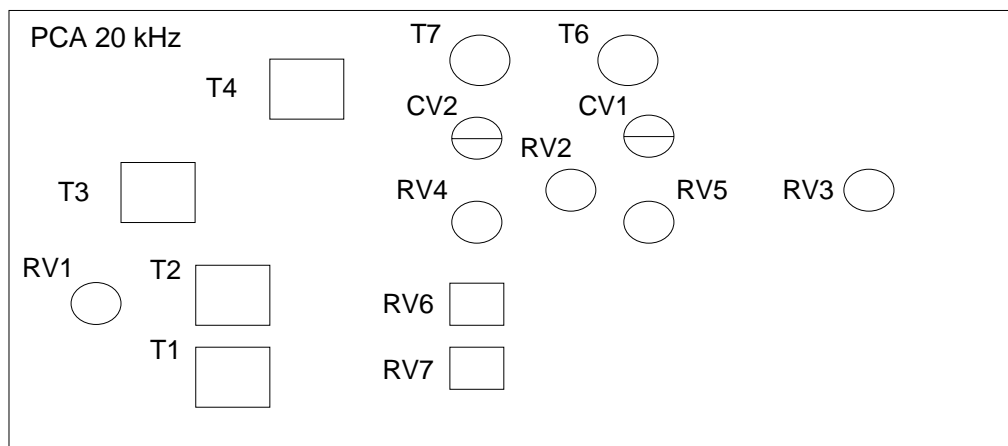


Fig. 3-23 Drawing of PCV 20 kHz

## 3.2 Sense Adjustment and Sense Reverse

### 3.2.1 Sense signal and directional signal

The directional signal from the L signal (loop) gives propeller pattern indicating two bearing  $180^\circ$  apart. Sense signal, often called V signal (vertical), removes this ambiguity when it is mixed with the directional signal provided that the amplitude ratio (V/L ratio), and their phase difference are within suitable range. Two ways to adjust two parameters, i.e., V/L ratio and phase difference are provided: sense adjustment in bands and sense adjustment in frequency ranges. In practical adjustment in the main unit, coarse adjustment is made by selection of coil tap and fine adjustment of V/L ratio and phase difference.

The pattern of mixed signal on the CRT shown as pattern A in Fig. 3-24 shows a case when adjustment of both indices is good. Pattern B is fair though V/L ratio is considerably smaller than unity. Pattern C is poor with too much sense signal and/or phase shift.

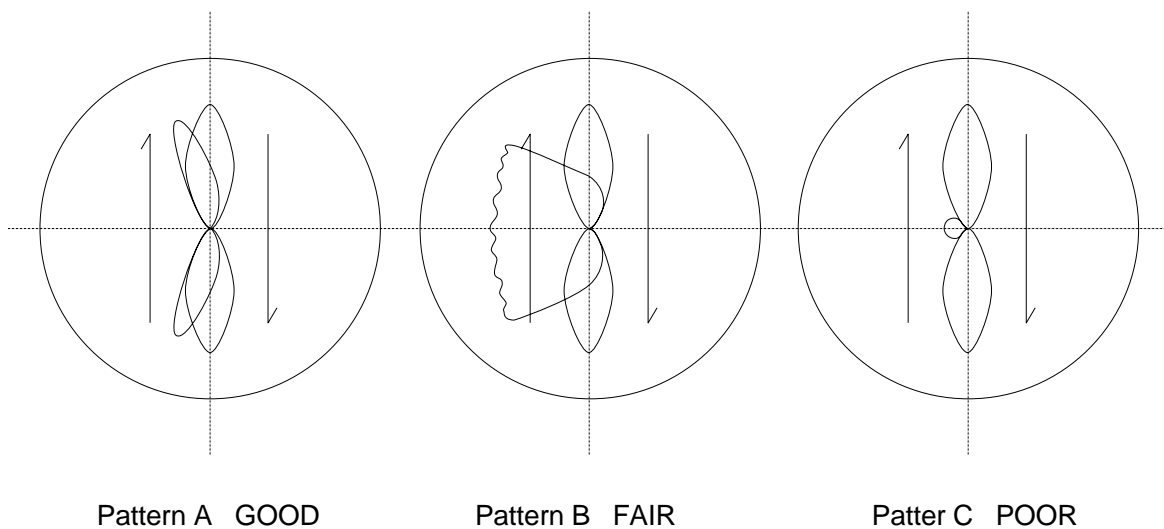


Fig. 3-24 Propeller pattern with sense signal

In the MHF band however, resonance in the antenna and cable circuit may occur and the phase of the sense signal is reversed beyond this resonance frequency. Countermeasures to such resonance are provided in the main unit to reverse the phase of sense signal in the designated frequency ranges where the phase of sense signal is reversed.

### 3.2.2 Test measurement

After installation of the main unit and the antenna, move the ship and anchor at a point free from other ship or shore within 2 km.

Provide a boat with a test oscillator and an antenna to emit radio signals.

Then, measure the bearing at various frequencies from the boat at about 1 km and find frequency ranges where there is sense reverse and/or poor pattern.

### 3.2.3 Sense adjustment in frequency bands

Two ways for sense adjustment is provided, i.e., by frequency bands and by frequency ranges. In the former, the frequency is divided into 7 bands as shown in Table 3-3.

Table 3-3 Frequency bands (in kHz) for sense adjustment

Frequency band (kHz)	Band
200.0 ~ 449.9	Band 1
450.0 ~ 999.9	Band 2
1000.0 ~ 1999.9	Band 3
2000.0 ~ 3999.9	Band 4
4000.0 ~ 7999.9	Band 5
8000.0 ~ 15999.9	Band 6
16000.0 ~ 29999.9	Band 7

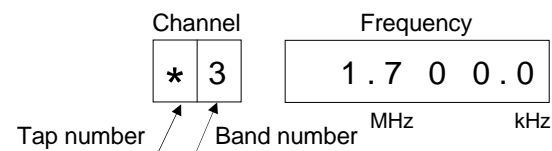
#### (1) Entering sense adjustment by frequency bands and setting a band

Select a frequency in each band which is important in practical operation or select the center frequency in a band. Emit a selected frequency in a chosen band from the boat to which sense adjustment is performed and receive it with the main unit on board the ship by following procedure.

[SYSTEM] → [DF] → [MANU] → [P] → [MANU] → [F] → [Frequency] → [E]

Note: a) Instead of frequency setting by [F] → [Frequency] → [E], shift key ▲ / ▼ or the tuning dial may be used.

- b) Channel display gives the coil tap number on the left and the band number on the right. Frequency is displayed on the frequency display. When the frequency is set, the band number to which the chosen frequency belongs appears and the tap number already chosen comes out.

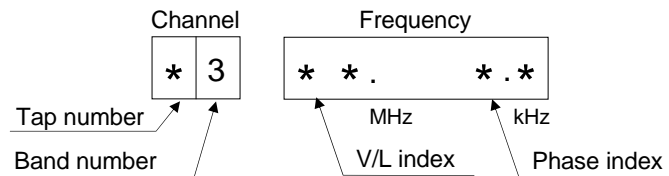


- a) Sense adjustment or sense reversal by frequency ranges does not function while sense adjustment by frequency bands. However, blinking of tap number tells that the frequency is in the range of sense reverse and that of band number indicates it is in the range of frequency adjustment by frequency ranges.

## (2) Adjustment of V/L ratio and Phase

**SCAN** key of mode switch is for phase adjustment and **SPOT** key is for V/L ratio adjustment.

When **SCAN** or **SPOT** key is pressed, corresponding LED is lit and frequency display changes to V/L index on the left and phase index on the right as shown below.



The range of V/L index is from 00 to 15 and phase index is from 00 to 99.

The V/L index and phase index increase with V/L ratio and phase difference which increase/decrease when shift key **▲** or **▼** is pressed.

Check the pattern on the CRT so that the best pattern is obtained.

The number of coil tap can be altered by pressing a number key while pressing sense switch and watching pattern on the CRT.

However, tap selection is unnecessary for Band 1 and Band 2.

Note: a) I Sense signal increases with the tap number. However, that at 6 is the largest.

b) When a shift key **▲** or **▼** is pressed for 0.3 second or longer in phase adjustment, the phase index changes rapidly in step of 10.

(3) Iterate the procedure shown in above section (2) so that the best pattern is obtained.

(4) Press **MANU** and change the frequency to another one in the same band and check that the pattern is good.

(5) Then, change to another frequency in other bands by following procedures.

**MANU** → **F** → **Frequency** → **E** →

**SCAN** → **▲** or **▼** → **SPORT** → **▲** or **▼** → **SENSE + Number** → iterate

(6) When adjustment is finished, finish operation by pressing **S**. (Or, turn **SYSTEM** switch to **OFF**).

### 3.2.4 Sense adjustment by frequency ranges

When adjustment by frequency bands cannot cover the frequency, designate frequency ranges in 100 kHz step for range adjustment.

10 channels for each coil tap, i.e. No.1 to No.7 are provided so that maximum 70 channels can be memorized which are maintained by back-up battery.

The sense adjustment in frequency ranges is made by following procedures.

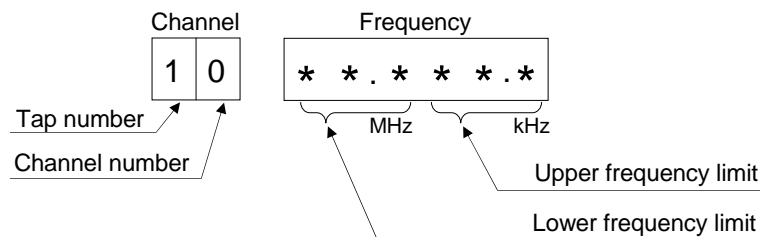
#### (1) Entering sense adjustment by frequency ranges and setting a range

Identify frequency ranges in test measurements after adjustment by frequency bands.

Turn **[SYSTEM]** switch to **[DF]** while pressing **[P]** key. Then, the system enters mode of sense adjustment by frequency range and following display appears.

Tap number 1 ~ 7 is displayed in the left, and Channel number 0 ~ 9 is displayed in the right of Channel display.

Frequency display is vacant when there has been no setting or previous range appears.



Frequency range is displayed, lower limit on the left and upper limit on the right in unit of 100 kHz. For example, **[10]** **[1.702.5]** means that a frequency range from 1.7 MHz to 2.5 MHz is memorized in Channel 0 of coil tap No. 1.

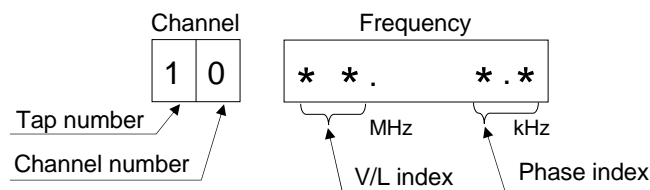
#### (2) Press **[MANU]** key and let a signal be sent from the boat and tune the main unit to that frequency either by **[F]** → **[Frequency]** → **[E]** or with shift key **[▲]** / **[▼]** or the tuning dial.

Note: a) When the frequency is in the frequency range of sense reverse, the tap number blinks. However, sense reverse does not function.

- b) When the tap number blinks, cancel the range of sense reverse and reset the sense reverse range after sense adjustment by frequency range has been finished.

#### (3) Adjustment of V/L ratio and Phase

SCAN key of mode switch is for phase adjustment and SPOT key is for V/L ratio adjustment. When SCAN or SPOT key is pressed, corresponding LED is lit and frequency display changes to V/L index on the left and phase index on the right as shown below.



These indices increase/decrease when shift key **[▲]** / **[▼]** is pressed.

Check the pattern on the CRT so that the best pattern is obtained.

The number of coil tap can be altered by pressing a number key while pressing **[SENSE]** switch and watching the pattern on the CRT

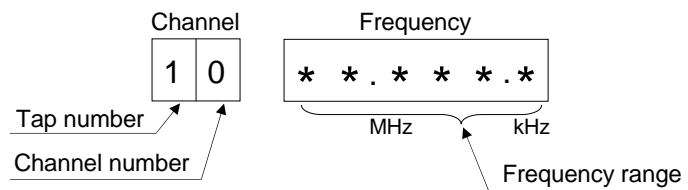


- (4) Iterate the procedure shown in above section (2) and (3) so that the best pattern is obtained.
- (5) Press **[MANU]** key to change the frequency to another one in the same range and check that the pattern is good. Check the frequency range again to ascertain adjustment is valid. Then, determine the frequency range in which chosen coil tap number, V/L index and phase index are valid.

Note: Record the frequency range, coil tap number, V/L index and phase index in the attached memory sheet

- (6) Enter data given above section (4) in the memory by following procedure.

- (a) Press **[P]** key and following display appears. Previous range appears or frequency display is vacant when there has been no setting and model LEDs are not lit.



- (b) Search a vacant memory channel belonging to that coil tap number by shift key operation.

Note 1 : Do not touch a number key. If a number key is touched the coil tap number changes instead of channel number.

Note 2 : Record the channel number in the attached memory sheet.

- (c) Enter frequency range in unit of 100 kHz by following procedure:

**[M]** → **[Lower frequency limit]** → **[Upper frequency limit]**

Note 1 : Zero(s) in the lower limit does not appear in the display but that of upper limit appears. For example, **[.2 0 0.9]** means that a frequency range from 0.2 MHz to 0.9 MHz.

Note 2 : The true upper limit of the frequency range is 0.1 kHz lower from the input frequency which is displayed, e.g., 2.5 MHz, displayed as 02.5 means that true upper limit is 2.499.9 MHz.

- (d) Enter the coil tap number and frequency range, both on the display and indices already selected (V/L index and phase index) in the channel by pressing **[E]** key. Then, figures on the display disappear once and reappears.

Note 1 : When a limit outside of 0.2 MHz ~ 30 MHz is entered or when the upper limit is entered before the lower limit, figures on the display do not blink and do not reappear. It is not memorized.

Note 2 : The frequency already entered can be rewritten (changed) by following procedure : **[M]** → **[New frequency range]** → **[E]**

Note 3 : The frequency already entered can be erased by following procedure :

**[M]** → **[0 0 0 0 0 0]** → **[E]**

## (7) Confirm data in the memory

Change tap number with number key or channel number with shift key.

Then, go back to chosen tap number and channel number. Then, confirm that the displayed frequency range is correct. Next, call up the V/L index and the phase index with key operation, **[M]** → **[SCAN or SPOT]**.

## (8) Then, change to another frequency range and repeat the procedure.

(9) When data input for adjustment by frequency range is finished, finish operation by pressing **[S]** (Or, turn **[SYSTEM]** switch to **[OFF]**)

### 3.2.5 Sense reverse by frequency ranges

In high frequency range, resonance in the antenna and cable circuit or other influences due to the environment of loop antenna may sometimes reverse the phase of the sense signal and hence, the direction to the radio source is reversed.

10 frequency ranges, in 100 kHz step, are provided to cope with the problem as shown below.

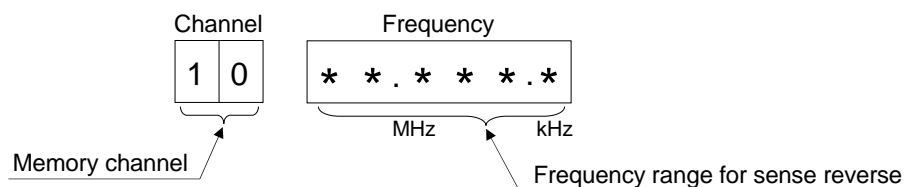
Recording of the frequency range(s) with sense reverse is recommended in the test measurement after installation.

## (1) Entering sense reverse mode

Identify frequency ranges in test measurement. Record the frequency range in the attached memory sheet.

Turn **[SYSTEM]** switch to **[DF]** while pressing **[F]** key.

Then, the system enters mode of sense reverse by frequency range and following display appears. Frequency display is vacant when there has been no setting or previous range appears.



## (2) Find a vacant channel with the shift key.

(3) Enter frequency range, the lower limit first and the upper limit next, then press **[E]**.

**[F + DF]** → **[Lower frequency limit]** → **[Upper frequency limit]** → **[E]**

Then, figures on the display disappear once and reappears.

Note 1 : Zero(s) in the lower limit does not appear in the display but that of upper limit appears. For example, **[.2 0 0.9]** means that a frequency range from 0.2 MHz to 0.9 MHz.

Note 2 : The true upper limit of the frequency range is 0.1 kHz lower from the input frequency which is displayed, e.g., 2.5 MHz, displayed as 02.5 means that true upper limit is 2.499.9 MHz.

## (4) Then, change to another frequency range and repeat the procedures, above (2) and (3).

(5) When data input for sense reverse by frequency range is finished, finish operation by pressing **[S]** (Or, turn **[SYSTEM]** switch to **[OFF]**).

### 3.3 Adjustment of Gyro Repeater



#### WARNING

- Following voltage is supplied to the motor of gyro repeater even the **SYSTEM** switch is off and hence, do not touch parts in the main unit excluding specialist.
  - 20 VAC ~ 115 VAC for synchronous type repeater motor
  - 24 VDC ~ 70 VDC for step type repeater motor



#### CAUTION

- Do not push the GYRO switch after adjustment. It would cause bearing error by stopping of gyro signal when the GYRO switch is pushed by mistake.

Adjust the bearing of gyro repeater motor in the main unit by following procedures.

Note that adjustment can not be made when **SYSTEM** switch is **OFF**.

- (1) Turn the **SYSTEM** switch to **DF**. (**ST'BY** or **RCV** is also OK)
- (2) Rotate the **COMPASS** knob to correspond to the bearing of gyro compass on board a vessel, while pressing **GYRO** switch. (The gyro repeater is OFF when **GYRO** switch is pressed.)
- (3) When the bearing is adjusted, hand off **GYRO** switch and the repeater works to move the compass card.

## 4. Error Correction Curves

Draw error collection curves, error versus reading of the bearing indicator as shown in Fig. 3-25. To correct error, first read the bearing on the bearing scale. Then find correction value corresponding to the reading on the error correction curve. Add the correction value to the reading on the bearing scale to obtain more accurate value of relative bearing, or to the reading on the compass card to obtain more accurate value of true bearing.

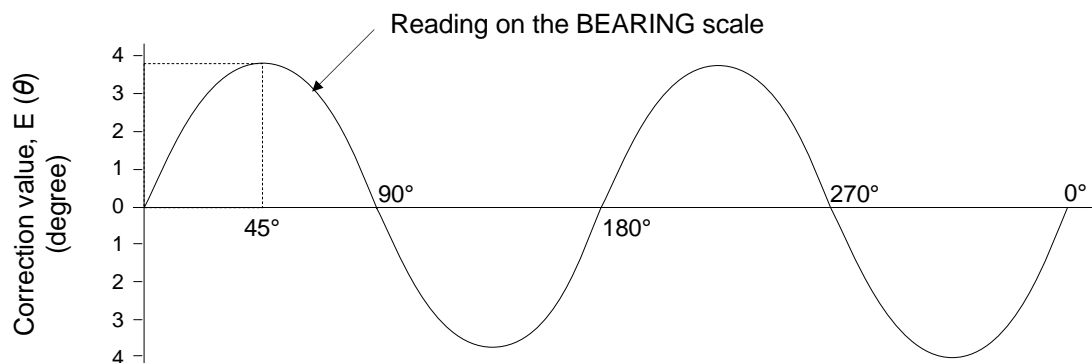


Fig. 3-25 Error correction curve

# Chapter 4 MAINTENANCE

## Chapter 4 MAINTENANCE

### 1. Periodical Maintenance

Perform both mechanical and brief electrical check every several months.

When its environment is severe, e.g., high temperature or moisture, large variation in power supply, shorten the period in half.

When a failure or abnormality is found, refer to Section 4 of this chapter, and shoot/fix the trouble. When a trouble cannot be fixed easily, consult the agent or the manufacturer, Taiyo Musen Co., Ltd.

#### 1.1 Mechanical Check

Check the system visually, especially paying attention to following.

##### 1.1.1 Main unit

- (1) Check setting of equipment to the rack especially loosening of bolts.
- (2) Check breakage of lock and breakage/fall-off of equipments/parts.
- (3) Check damage or contamination due to rats, insects, etc., especially of cables and connectors.
- (4) Check trace of water invasion, breakage of lock and sound of blower.
- (5) Remove air-filters, clean and set it in the original place.
- (6) Check abnormalities related to the system, i.e., power supply, heat sensor, etc.

##### 1.1.2 Loop antenna

- (1) Check tilt, bend, damage or erosion of antenna elements, flange, support box, antenna pole and stanchion.
- (2) Check crack or breakage on elements, flange, support box, antenna pole and stanchion and base and connectors. Check also, flaking of paint or generation of harmful rust.
- (3) Check slackness, damage or breakage of cables and cable holders. Check also damage, erosion or fall-off of parts such as connectors at the support box.
- (4) Open the lid of the support box and check whether water has entered or not. Check its rubber packing. When it is aged, replace it.

## **1.2 Brief Electrical Check**

This consists of external check, power check, reception check and bearing check.  
When a trouble is found, go to Section 4 Trouble Shooting.

### **1.2.1 External check**

- (1) Examine fuse, cables and connectors visually.
- (2) Confirm normal operation of gyro compass when a gyro repeater motor is built-in.

### **1.2.2 Power check**

- (1) Check the voltage of AC power supply.
- (2) Check that brightness of indicators and LEDs decrease when the dimmer control is rotated counterclockwise.
- (3) Check voltage at voltage stabilizers by referring Section 4 of this chapter.


### **1.2.3 Reception and bearing check**


- (1) Receive a known station(s).
- (2) Measure its bearing.

## 2. General Maintenance

### 2.1 Main Unit

Please pay attention to followings when performing maintenance/check on the main unit.

 **DANGER**



- Turn off the power supply of main unit together with its switch on the switch board when replacing PCA and CRT.
- There is dangerous high tension electric current of 1200V in the socket of the CRT.

The electric charge may remain in capacitors even though the power switch is turned off. Wait for a while and discharge condenser to the ground with a piece of insulated cord.

Any operation such as replacement of CRT unit should be made after confirming that the electric in the circuit is fully discharged.

#### 2.1.1 Replacement of PCA

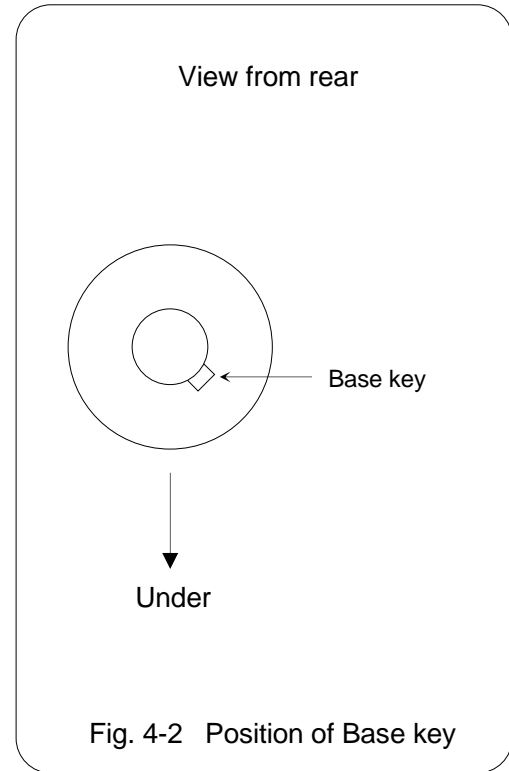
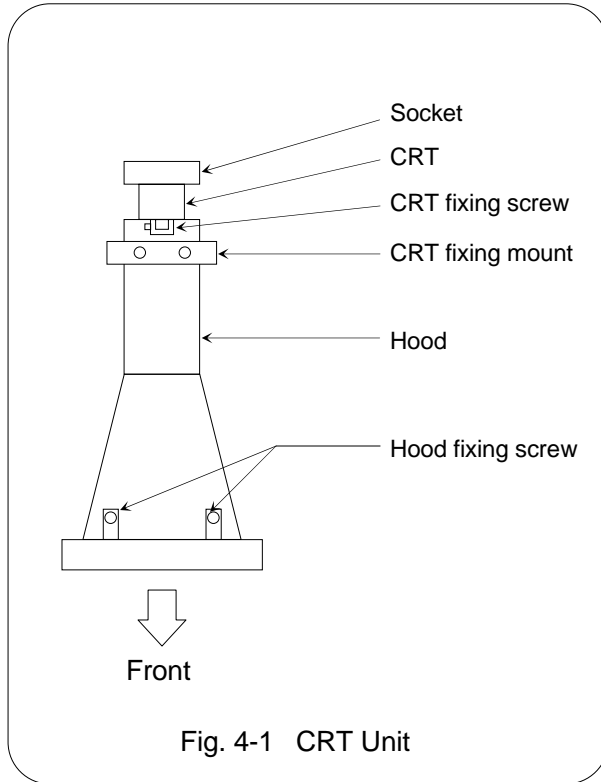
Following procedures shall be taken when replacing a PCA.

- (a) Pull out all connectors from the PCA.
- (b) Unfasten screws which fix the PCA to the chassis.
- (c) Replace the PCA to new one, and firmly fasten all screws.
- (d) Install all connectors on the PCA.

### 2.1.2 Replacement of CRT

Following procedures shall be taken when replacing a CRT unit.

Note that erroneous procedure of replacement would cause bearing error and sense reversing.



- (a) Remove the CRT and socket.
- (b) Unfasten the CRT fixing screw.
- (c) Unfasten the Hood fixing screw, and remove the CRT together with the Hood.
- (d) Unfasten the CRT fixing screw, and replace the CRT to new one.
- (e) Loosely tighten the CRT fixing screw.
- (f) Decide the position of Base key referring above Fig. 4-2.
- (g) Turn on the power switch of main unit, and receive no signal.
- (h) Short circuit between terminal 7 and 8 of LF Goniometer. Then, bright vertical line appears on the CRT.
- (i) Adjust the direction of CRT so that the bright vertical line shall become parallel to the arrow mark on the BEARING scale (fixed), and firmly fasten the CRT fixing screw
- (j) Short circuit between terminal 5 and 6 of LF Goniometer, and confirm bright horizontal line appears on the CRT.



## 2.2 Loop Antenna

Please pay attention to followings when performing maintenance/check on the loop antenna.



### WARNING

- Perform visual check every 3 ~ 6 months whether there's no crack, damage or loosening of bolt/nut antenna elements, flange, support box, antenna pole and stanchion.
- Paint oily paint once a year to prevent the joint part of the Loop Antenna and a stanchion being corroded. Note that the antenna might fall due to corrosion of antenna base and stanchion when leaving without painting there for a long time.
- Put up scaffolding when installation of the loop antenna, and wear the safety belt. Also, confirm there is no person right under the loop antenna while its installation work.

### 2.2.1 Paint on loop antenna

- (1) Clean the loop antenna elements by wet soft cloth before painting.
- (2) Paint the oily paint only to metal loop antenna element. Do not paint to the support box since it would decrease the insulation of the loop antenna.

### 2.2.2 Conduction & insulation test

Remove the loop antenna cable from loop antenna terminal on the rear panel of the main unit, and perform conduction and insulation test for loop antenna and loop antenna cable referring to following table 3.

Table 3 Resistance value of loop antenna cable

Pin number	Resistance value	Pin number	Resistance value
N - S	Less than 2 Ω	V0 - GND	Larger than 10k Ω
E - W	Less than 2 Ω	N - GND	Larger than 20k Ω
V1 - V2	Less than 2 Ω	E - GND	Larger than 20k Ω
		V1 - GND	Larger than 20k Ω

Note: Perform conduction and insulation test using a tester.

If above mentioned resistance value is/are not measured, check as following procedures.

- (a) Open the lid of supporting box by a wrench, and check its inside. If inside of the supporting box is wet by moisture, dry inside by keeping lid open. If there's water, loosen the bottom bolt/nut of the supporting box to drain the water, and dry inside.
- (b) After confirmed dry up inside the supporting box, check whether no breakage of cable or loosening of cable fixing screws.
- (c) Close the lid of support box, and firmly fasten the bolt/nut on it.
- (d) Repeat the conduction and insulation test again, and confirm if the resistance value listed on the table 3 is measured.

## 2.3 Goniometer Unit

### 2.3.1 Check on 20.5 VDC & 5 V line

Check following points to confirm whether 20.5 VDC and 5 VDC are supplied to Goniometer unit.

PCA terminal

Pin No. on J5	Voltage
A1	+20.5V $\pm$ 0.5V
A2	+5V $\pm$ 0.5V

### 2.3.2 Check of PCA

Refer to Section 3 Table of Voltages.

### 2.3.3 Check on screws and cables

Check whether there's no breakage of cable or loosening of screws on connecting terminal for Goniometer unit.

### 3. Table of Voltages

#### 3.1 PCA



#### DANGER



PCA A6 (PCA 20 KHz) has a high voltage generator which gives 1200 VDC. Though the generator is protected with insulator cover, pay enough attention to prevent electric shock while checking voltage on the PCA.

#### CAUTION:

The value mentioned on following table 4 is the standard value measured by analogue tester with 20 kΩ internal resistance. Therefore, measured value would be different if an analogue tester with different internal resistance or digital tester is used.

Table 4 Voltage of each circuit on PCA

PCA SYNTH (A9)	B(G) V	C(D) V	E(S) V	
Q1 2SK61	0	6.4	0.1	BUFFER AMP
Q2 2SC1815	7.2	9.1	6.4	"
Q3 2SK61	0	6.5	0.2	"
Q4 2SC1815	7.2	9.2	6.5	"
Q5 2SC535	2.2	4.9	1.5	AMP
Q6 2SA781	1.4	4.9	4.4	"
Q7 2SC535	1.7	6.8	1.3	OSC
Q8 2SC535	2.2	8.8	1.4	BUFFER AMP
Q9 2SC535	2.2	8.9	1.4	"
Q10 2SC535	1.1	2.3	0.5	MIXER
Q11 2SC535	0.8	1.9	0.1	AMP
Q12 2SA1015	2.2	4.8	4.8	"
Q13 2SC535	2.4	8.5	1.9	OSC
Q14 2SK61	0	4.0	0.9	BUFFER AMP
Q15 2SC1815	4.7	9.3	4.0	BUFFER AMP
Q16 2SC535	1.7	9.2	0.9	"
Q17 2SK61	0	6.4	0.5	200 ~ 6999.9kHz ON
Q18 2SK61	0	6.4	0.5	7000 ~ 14999.9kHz ON
Q19 2SK61	0	6.4	0.5	15000 ~ 29999.9kHz ON
Q20 2SA1015	6.4	7.1	7.1	200 ~ 6999.9kHz ON
Q21 2SA1015	6.4	7.1	7.1	7000 ~ 14999.9kHz ON
Q22 2SA1015	6.4	7.1	7.1	15000 ~ 29999.9kHz ON

PCA RF (A2)	B(G1)	G2	C(D)	E(S)	
Q1 3SK73	2.7	2.4 ~ 4.0	12.6	3.0	SENSE [7] ON
Q2 3SK73	2.7	2.4 ~ 4.0	12.6	3.0	SENSE [6] ON
Q3 3SE73	2.7	2.4 ~ 4.0	12.6	3.0	SENSE [1] ~ [5] ON
Q4 3SK73	2.8	5.7	11.9	3.1	200 ~ 999.9kHz ON
Q5 3SK73	2.8	5.7	11.9	3.1	1000 ~ 3999.9kHz ON
Q6 3SK73	2.8	5.7	11.9	3.1	4000 ~ 15999.9kHz ON
Q7 3SK73	2.8	5.7	12.4	3.1	16000 ~ 29999.9kHz ON

PCA MIX (A3)	B(G1)	G2	C(D)	E(S)	
Q1 2SC535	4.4		17.3	3.7	1st MIXER
Q2 2SC535	3.3		10.9	2.6	2nd IFAMP
Q3 2SC1815	11.6		16.8	10.9	"
Q4 2SC535	3.5		17.8	2.8	2nd MIXER

PCA IF-AF (A1)	B(G1)	C(D)	E(S)	
Q1 2SK61	0	14.9	0.9	2nd IFAMP (455kHz)
Q2 2SC1815	3.4	17.9	2.7	"
Q3 "	4.2	14.8	3.5	"
Q4 "	0.6	2.3	0	AGC AMP
Q5 "	2.4	3.9	1.7	IF AMP (455kHz)
Q6 "	4.0	16.4	4.6	"
Q7 "	3.1	4.8	2.7	"
Q8 "	2.1	7.6	1.4	NOISE AMP
Q9 "	0.2	4.2	0	DC AMP
Q10 "	9.2	17.3	8.5	IF AMP (455kHz)
Q11 "	1.3	4.5	0.6	"
Q12 "	5.8	4.8	5.1	"
Q13 "	1.6	4.5	1.0	"
Q14 "	5.8	9.1	5.1	"
Q15 "	1.6	20.3	0.9	"
Q16 "	3.6	11.8	2.9	"
Q17	0.6	6.1	0	AGC AMP
Q18 2SA1015	4.5	4.2	5.1	LEVEL
Q19 2SC1815	8.4	16.6	7.8	IF AMP (455kHz)
Q20 "	4.6	14.9	4.0	"
Q21 "	0.8	7.2	0.3	BFO (456.5kHz)
Q22 "	3.2	10.0	2.5	AF AMP
Q23 "	4.9	11.6	4.2	"
Q24 2SC1627	1.8	9.4	1.1	"
Q25 2SD526	10.7	21.1	10.1	"
Q26 2SB596	9.4	0	10.0	"
Q27 2SC1815	4.1	12.0	3.5	EXTERNAL S METER
Q28 "	2.3	17.8	1.6	2nd IF AMP (455kHz)

PCA 20kHz (A6)	B (G)	C (D)	E (S)	
Q1 2SC1815	4.0	16.7	3.3	SENSE
Q2 2SC1627	4.9	18.1	4.5	SPOT KILLER
Q3 2SC1815	1.7	5.8	1.2	20kHz OSC
Q4 “	0.38	12.3	0	20kHz MIXER
Q5 2SC3419	7.5	19.0	6.9	20kHz AMP
Q6 2SH21	0 ~12	0 ~ 12	12 ~ 0	AUTO SENSE
Q7 2SA495	20.0	0 ~ 20	20.5	“
Q8 2SC1815	10 ~ 20	10 ~ 20	0	“
Q9 “	8 ~ 10	10 ~ 20	10 ~ 10.4	“
Q10 “	6 ~ 10	10 ~ 20	10 ~ 10.4	“
Q11 2SA495	25.2	20.5	25.7	AVR (20.5V)
Q12 2SC1815	9.0	25.2	8.4	“

PCA DISPLAY (A5)	B (G)	C (D)	E (S)	
Q1 2SC1815	6.1	6.7	6.1	DIMMER

PCA BAND SW (A4)	B(G)	C(D)	E(S)	
Q1 2SC1627	20.3	20.5	19.7	200 ~ 449.9kHz ON
Q2 “	20.3	20.5	19.7	450 ~ 999.9kHz ON
Q3 “	20.3	20.5	19.7	1000 ~ 1999.9kHz ON
Q4 “	20.3	20.5	19.7	2000 ~ 3999.9kHz ON
Q5 “	20.3	20.5	19.7	4000 ~ 7999.9kHz ON
Q6 “	20.3	20.5	19.7	8000 ~ 15999.9kHz ON
Q7 “	20.3	20.5	19.7	16000 ~ 15999.9kHz ON
Q8 2SC1815	20.3	20.5	19.9	BFO ON
Q9 “	20.3	20.5	19.9	SENSE [7] ON
Q10 “	20.3	20.5	19.9	SENSE [1] ON
Q11 “	20.3	20.5	19.9	SENSE [2] ON
Q12 “	20.3	20.5	19.9	SENSE [3] ON
Q13 “	20.3	20.5	19.9	SENSE [4] ON
Q14 “	20.3	20.5	19.9	SENSE [5] ON
Q15 “	20.3	20.5	19.9	SENSE reverse
Q16 “	20.3	20.5	19.9	SENSE [6] ON

PCA DIMMER (A10)	B(G)	C(D)	E(S)	
Q1 2SB596	26.1	20.5	26.7	AVR
Q2 2SB596	19.9	20.5	20.5	DIMMER
Q3 2SA495	0.8	0	1.6	“
Q4 2SB596	1.6	0	2.5	“

## 3.2 CRT

**DANGER**

- There is dangerous high tension electric current of 1200V in the socket of the CRT. Though the generator is protected with insulator cover, pay enough attention to prevent electric shock while measuring voltage of the CRT.
- Use a tester or voltmeter enable to measure 1200 V in case of measuring voltage in the CRT listed in Table 5.
- Marked \* on the Table 5 is the measured value between Pin No.1 and Pin No. 4 by AC voltage.

**CAUTION:**

The value mentioned on following table 5 is the standard value measured by analogue tester with 20 k $\Omega$  internal resistance. Therefore, measured value would be different if an analogue tester with different internal resistance or digital tester is used.

Table 5 Voltage of CRT

V1 75ARB31	1	2	3	4	5	6	7
	* 6.3	-1200	-1250	-1150	0	0	0
	8	9	10	11	12	13	14
	-	-	-	0	0	0	* 6.3

## 4. Trouble Shooting

When a trouble has occurred, first try to find the category of the trouble in one of following three categories:

- (1) in the main unit
- (2) in cables and connections
- (3) in the antenna or its environment

When the main unit is suspected, measure voltages of parts in the main unit with a circuit tester or a multimeter and compare them with those given in the previous section 3.

This helps to find the spot of trouble and to remove the trouble.

Following table is prepared for trouble shooting.

Please pay attention to followings when performing maintenance/check on the loop antenna.



### DANGER



- There is dangerous high tension electric current of 1200V generated in the circuit of PCA A6 (PCA 20 kHz). Though the generator is protected with insulator cover, pay enough attention to prevent electric shock when checking or measuring voltage of PCA A6.
- Use a tester or voltmeter enable to measure 1200 V in case of measuring voltage in the CRT listed in Table 5.



### CAUTION

- When replace PCA(s), the power switch of the product should be turned off at first, then switch in switch board should be turned off.
- The electric charge may remain in capacitors even though the power switch is turned off. Wait for a while and discharge capacitors to the ground with a piece of insulated cord. Any operation should be made after confirming that the electric in the circuit is fully discharged.

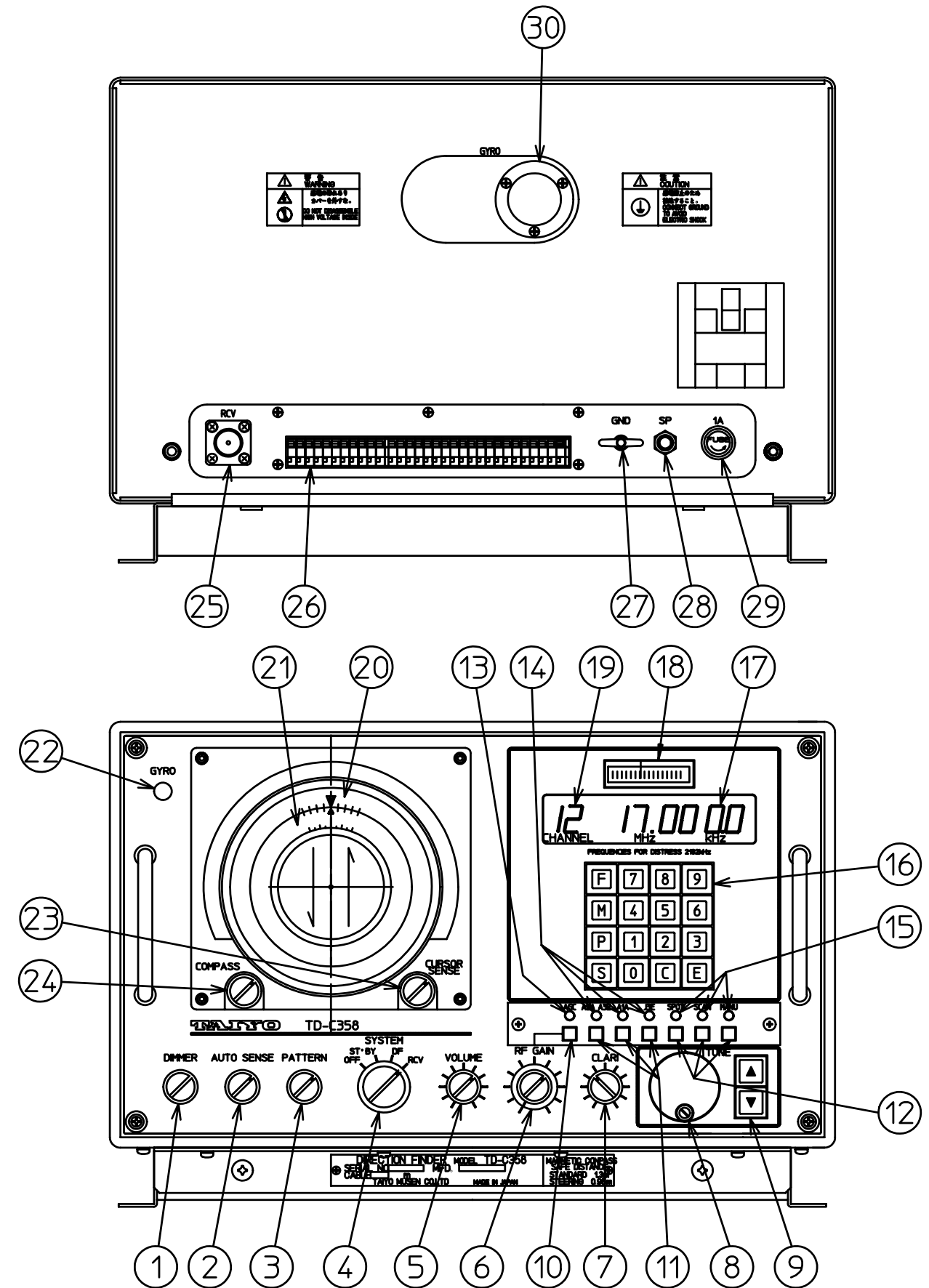
Symptom	Probable cause	Procedure / Countermeasure
Complete silence and no LED nor display is lit when the system switch is turned to DF.	<ol style="list-style-type: none"> <li>1. No power supply.</li> <li>2. Trouble in power transformer.</li> <li>3. Trouble in voltage regulator circuit on PCA 20 kHz (A6).</li> </ol>	<ol style="list-style-type: none"> <li>1. Check fuse.</li> <li>2. Check terminal voltage.</li> <li>3. Check PCA 20 kHz (A6).</li> </ol>
Sound is normal. No pattern appears on the CRT though other displays are normal.	<ol style="list-style-type: none"> <li>1. Poor contact in CRT socket.</li> <li>2. Trouble in power transformer.</li> <li>3. Trouble in high voltage circuit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check contact.</li> <li>2. Check voltages.</li> <li>3. Check PCA 20 kHz (A6).</li> </ol> <p>Note: Pay attention to high voltage.</p>
Circle does not appear on CRT though spot is seen.	<ol style="list-style-type: none"> <li>1. Trouble in 20 kHz oscillator.</li> <li>2. Trouble in LF goniometer.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check voltages on PCA 20 kHz (A6). Replace it when necessary.</li> <li>2. Check conduction.</li> </ol>
Motor or goniometer does not rotate.	<ol style="list-style-type: none"> <li>1. Trouble in C31(1<math>\mu</math>F) on PCA DIMMER (A10).</li> <li>2. Trouble in motor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the capacitor</li> <li>2. Check conduction.</li> </ol>
Vertical or horizontal line appears but not both.	<ol style="list-style-type: none"> <li>1. Broken wire in goniometer.</li> <li>2. Trouble in T6/T7 on PCA 20 kHz (A6).</li> <li>3. Poor contact at CRT socket.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check conduction.</li> <li>2. Check conduction.</li> <li>3. Make good contact.</li> </ol>
Diamond-shaped figure (rhombic figure) appears at the center of CRT.	<ol style="list-style-type: none"> <li>1. Mistuning at T6/T7.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tune with CV1 and CV2 on PCA 20 kHz (A6).</li> </ol>
Pattern appears on CRT but no sound is heard.	<ol style="list-style-type: none"> <li>1. Trouble in speaker.</li> <li>2. Poor contact at jacks.</li> <li>3. Trouble in T3.</li> <li>4. Trouble in AF circuit on PCA IF-AF (A1).</li> </ol>	<ol style="list-style-type: none"> <li>1. Check conduction.</li> <li>2. Check contact.</li> <li>3. Check conduction.</li> <li>4. Measure voltages.</li> </ol>
Sound is heard but propeller pattern does not appear.	<ol style="list-style-type: none"> <li>1. Trouble in Q3 or CR7 on PCA IF-AF (A1).</li> <li>2. Trouble in Q4 on PCA 20 kHz (A6).</li> </ol>	<ol style="list-style-type: none"> <li>1. Check voltages, replace PCA IF-AF (A1).</li> <li>2. Check voltages, replace PCA 20 kHz (A6).</li> </ol>
CRT pattern does not focus. Sense patterns appear on both sides.	<ol style="list-style-type: none"> <li>1. Adjustment of RV6 is shifted.</li> <li>2. Trouble in cancellation circuit.</li> <li>3. Malfunction of Q1 on PCA 20 kHz.</li> </ol>	<ol style="list-style-type: none"> <li>1. Readjustment.</li> <li>2. Readjust T1 on PCA 20 kHz (A6).</li> <li>3. Replace PCA 20 kHz (A6).</li> </ol>
Propeller pattern always shows one direction, 0° - 180° or 90° - 270°.	<ol style="list-style-type: none"> <li>1. Broken wire of E-W or N-S.</li> <li>2. Poor contact at connector P1.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check conduction.</li> <li>2. Check contact.</li> </ol>
Sense pattern does not appear.	<ol style="list-style-type: none"> <li>1. Trouble in Q1 on PCA 20 kHz (A6).</li> <li>2. Trouble in U1 on PCA RF (A2).</li> <li>3. Malfunction of Relay K3.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the PCA 20 kHz (A6).</li> <li>2. Replace the PCA RF (A2).</li> <li>3. Check conduction.</li> </ol>



Symptom	Probable cause	Procedure / Countermeasure
Normal in RCV mode but very low sensitivity in DF mode.	1. Trouble in loop antenna. 2. Trouble in antenna cable.	1. Check conduction and insulation. 2. Check conduction.
Normal in DF mode but very low sensitivity in RCV mode.	1. Trouble in receiving antenna 2. Trouble in relay K1 on PCA IF-AF (A1).	1. Check receiving antenna. 2. Check conduction.
No TF output at any wave form key.	1. Trouble in T12 on PCA IF-AF (A1). 2. Trouble in Q15 on PCA IF-AF (A1).	1. Check T12, replace it. 2. Check voltage, replace PCA when necessary.
Reception is not possible in one of 7 bands.	1. Trouble in PCA BAND SW (A4).	1. Check voltage. Replace PCA when necessary.
Reception is not possible in any band.	1. Trouble in PCA MPU (A7). 2. Trouble in PCA SYNTH (A9). 3. Trouble in Q12 ~ Q15 on PCA RF (A2).	1. Replace PCA MPU (A7). 2. Replace PCA SYNTH (A9). 3. Check voltage, replace PCA RF (A2).
Low sensitivity in all bands.	1. Inadequate tuning voltage. 2. Trouble in PCA IF-AF (A1).	1. Check voltage, replace PCA MPU (A7). 2. Check voltage, replace PCA IF-AF (A1).
SPOT reception impossible.	1. Trouble in mode switch. 2. Trouble in PCA MPU (A7).	1. Replace switch. 2. Replace PCA MPU (A7).
DF error has increased in high frequency, but not in low frequency.	1. Change in antenna environment. 2. Ground line of antenna cable is broken	1. Check environment, upper structures (check any change of structure on the ship after installation [calibration curve] of the product). 2. Check conduction.
DF error is large for all frequencies.	1. Trouble in loop antenna. 2. Trouble in antenna cable. 3. Poor angle adjustment for gyro repeater.	1. Check conduction. 2. Check conduction. 3. Readjust.
Reception is possible but frequency cannot be shown.	1. Trouble in PCA MPU (A7). 2. Trouble in PCA DISPLAY (A5).	1. Replace PCA MPU (A7). 2. Replace PCA DISPLAY (A5).
Scanning reception is impossible.	1. Inadequate setting of RV2 on PCA IF-AF (A1). 2. Trouble in PCA IF-AF (A1).	1. Readjust RV2 on PCA IF-AF (A1). 2. Check voltages, replace PCA IF-AF (A1).

## Appendix 1 Front Panel of Main Unit

No.	Name	Function
1	DIMMER control	Adjustment of brightness
2	AUTO SENSE	Activation of AUTO SENSE
3	PATTERN control	Adjustment of shape of pattern
4	SYSTEM switch	Selection switch of Power ON/OFF, ST'BY, DF, RCV
5	VOLUME control	Sound volume control
6	RF GAIN control	Adjustment of sensitivity
7	CLARI	Clarifier
8	TUNE	Tuning dial
9	Shit key ▲, ▼	UP-DOWN switch
10	AGC switch	AGC ON/OFF switch
11	Wave form selection	Selection switch of wave form, A1A, A2A/A3E, J3E
12	MODE switch	Mode selection switch, SPOT, SCAN, MANU
13	AGC LED	AGC ON/OFF indication LED ON : LED lights
14	Wave form LED	Indication LED of selected wave form, A1A, A2A/A3E, J3E
15	MODE LED	Indication LED of selected mode, SPOT, SCAN, MANU
16	Keyboard switch	Keyboard to input frequency, memory setting etc.
17	Frequency display	Frequency display
18	Tuning display	Level meter to indicate level of received signal
19	CHANNEL	Channel display
20	COMPASS card	Linked with Gyro compass (when gyro repeater motor is built-in)
21	BEARING scale (fixed)	Bearing scale as BOW = 0°
22	GYRO	Gyro switch
23	CURSOR/SENSE	Cursor knob, Sense switch
24	COMPASS	Compass knob
25	RCV	Receiving antenna cable connector
26	Cable terminal	Cable terminal for Loop antenna, AC power, BK
27	GND	Grounding terminal
28	SP	Speaker jack
29	1A	Fuse (1A)
30	GYRO	Connector for Gyro repeater (Option)

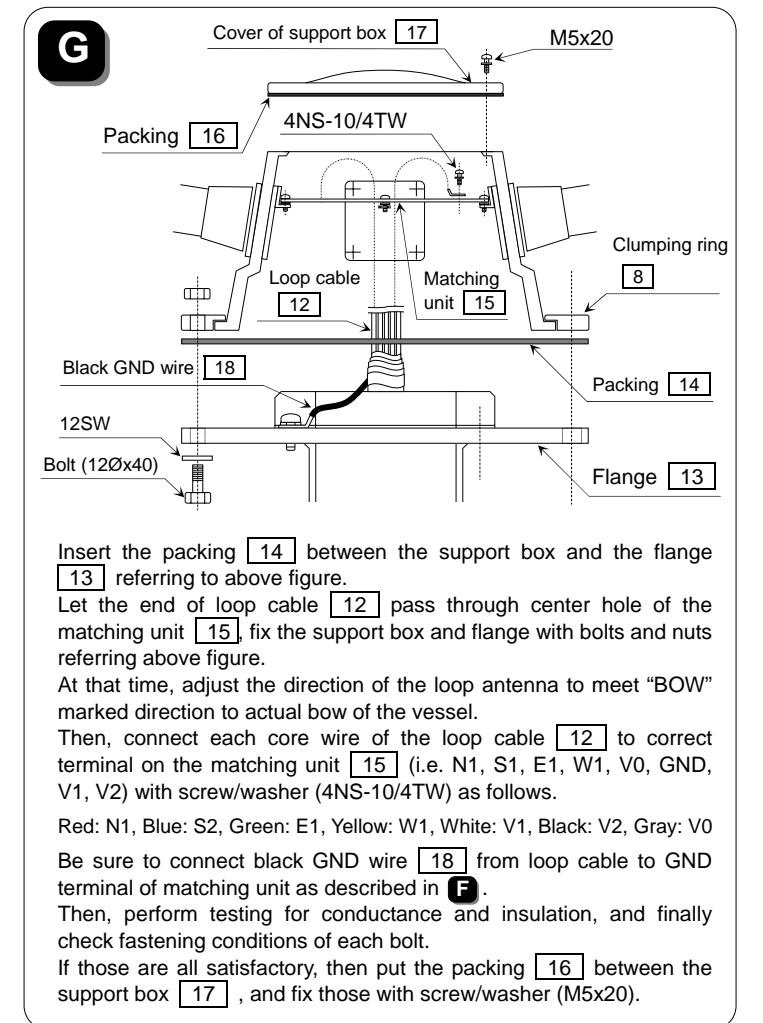
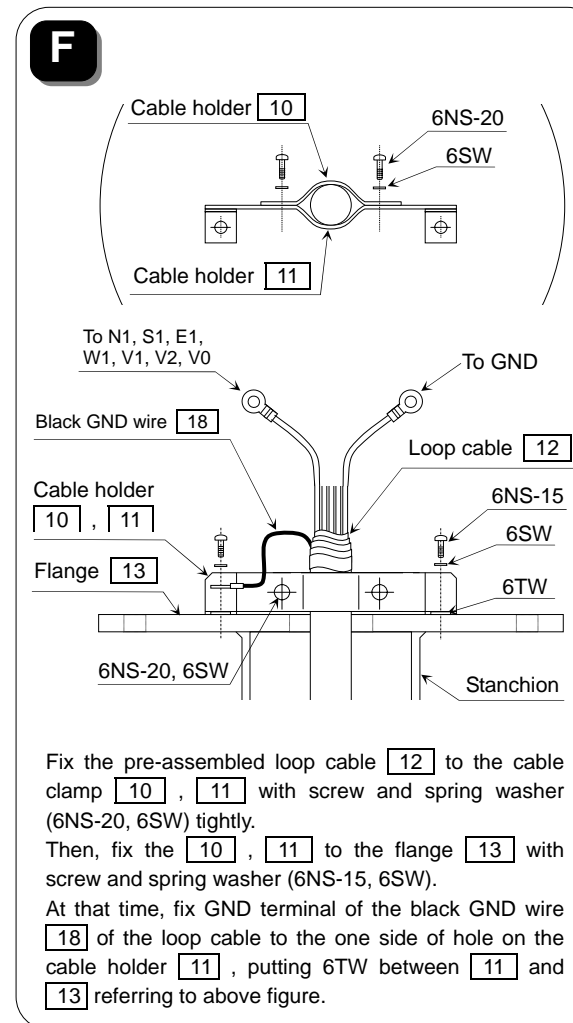
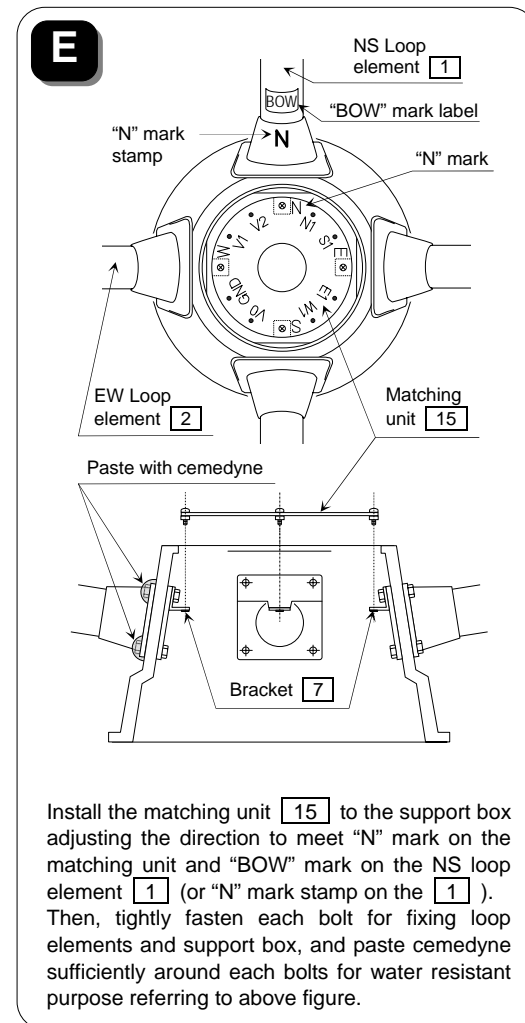
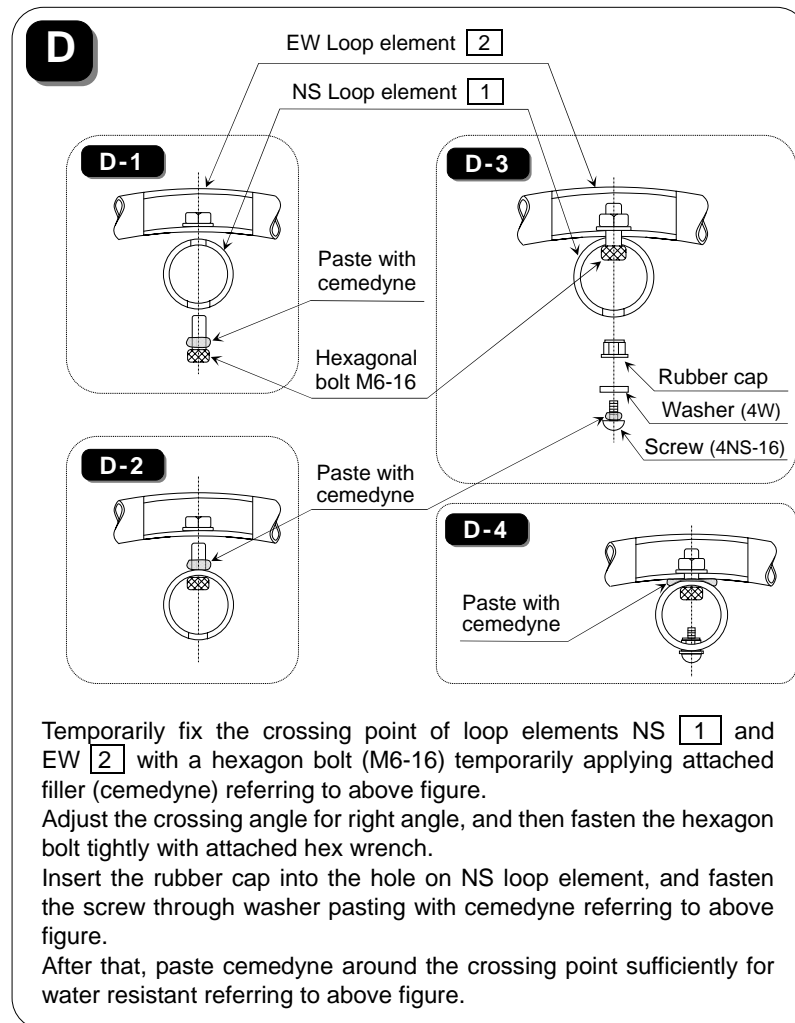
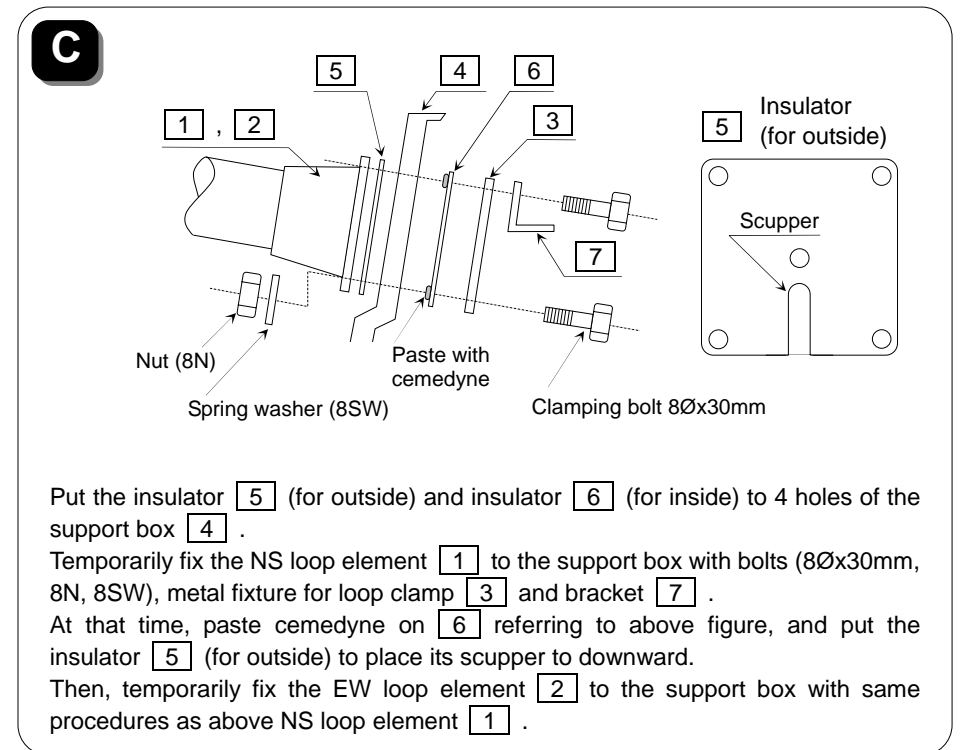
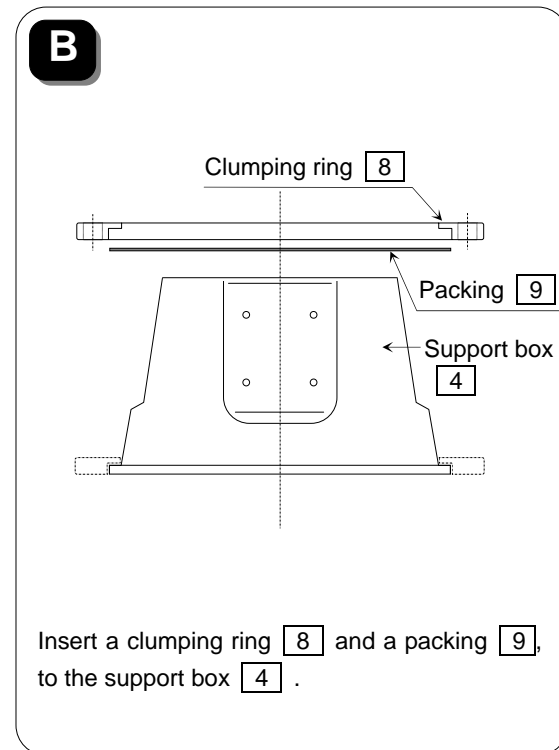
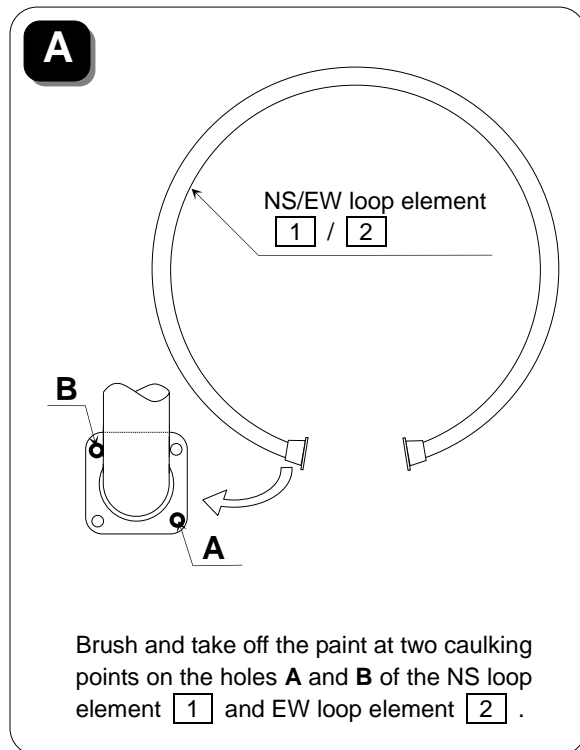
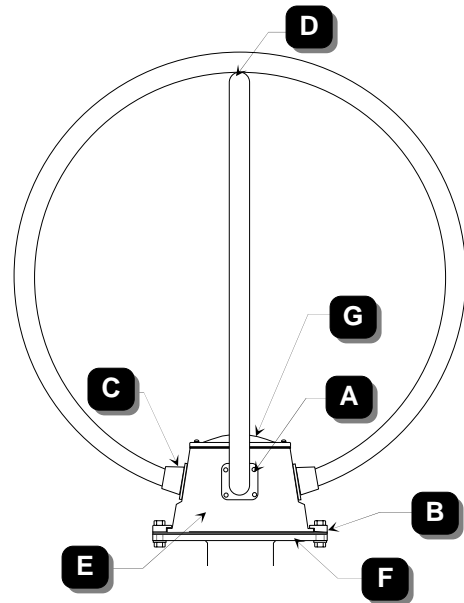


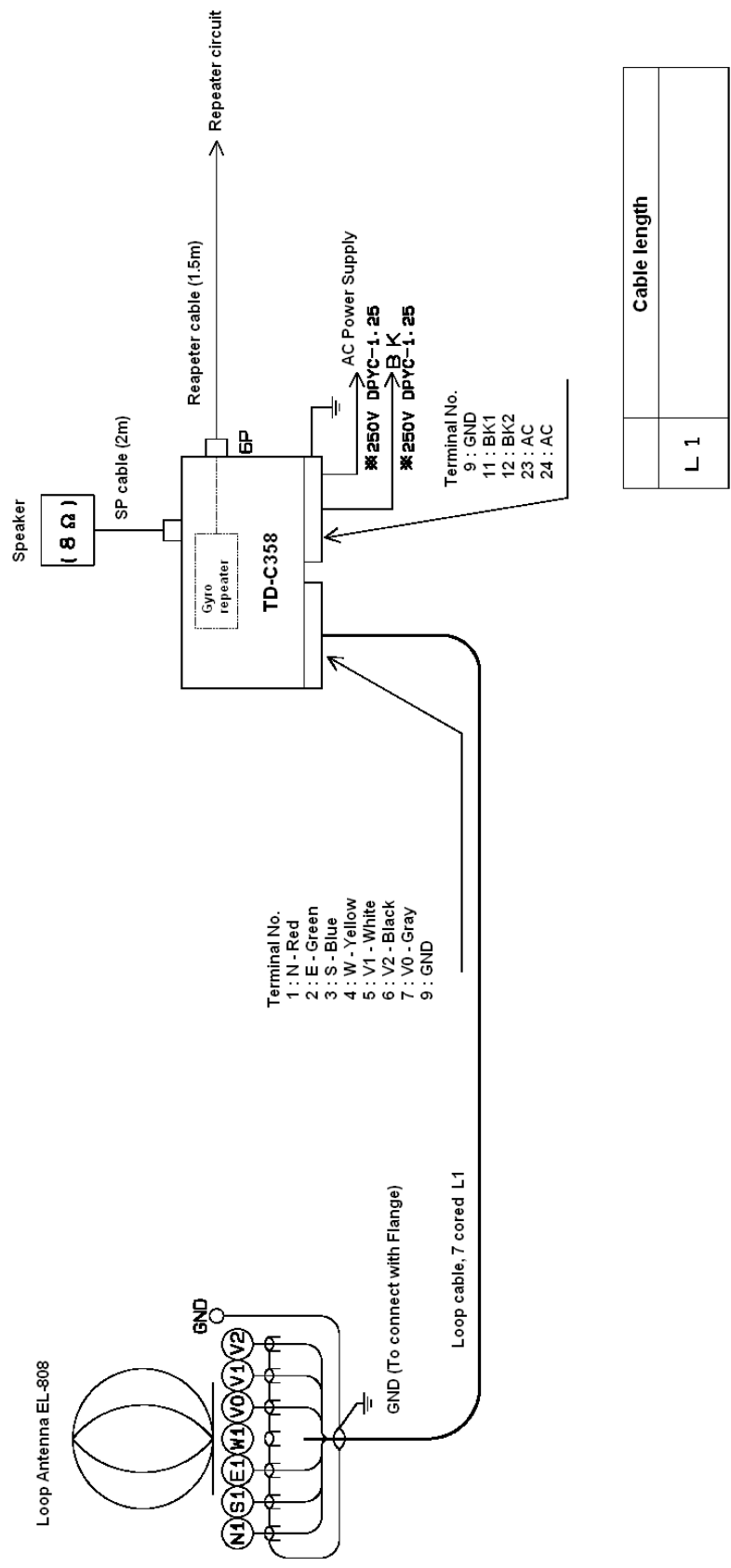
Appendix 1  
Front panel of Main Unit

## Appendix 2 Assembly Procedures of Antenna

Note: All fastening screws must be fixed with the attached filler (cemydyne).

### PROCEDURES





関連図面

- 組立図:
- 接続図:
- 部品諸元表:

名称 TITLE(20)

型号 TYPE TD-C358

作図 DATE 05.06.20

設計 DESIGNED 原木

検査 CHECKED

尺度 SCALE / NTS

3rd ANGLE PROJECTION

検認 APPROVED

REV. SHEET 1 of 1

043998

作図 DATE 05.06.20

設計 DESIGNED 原木

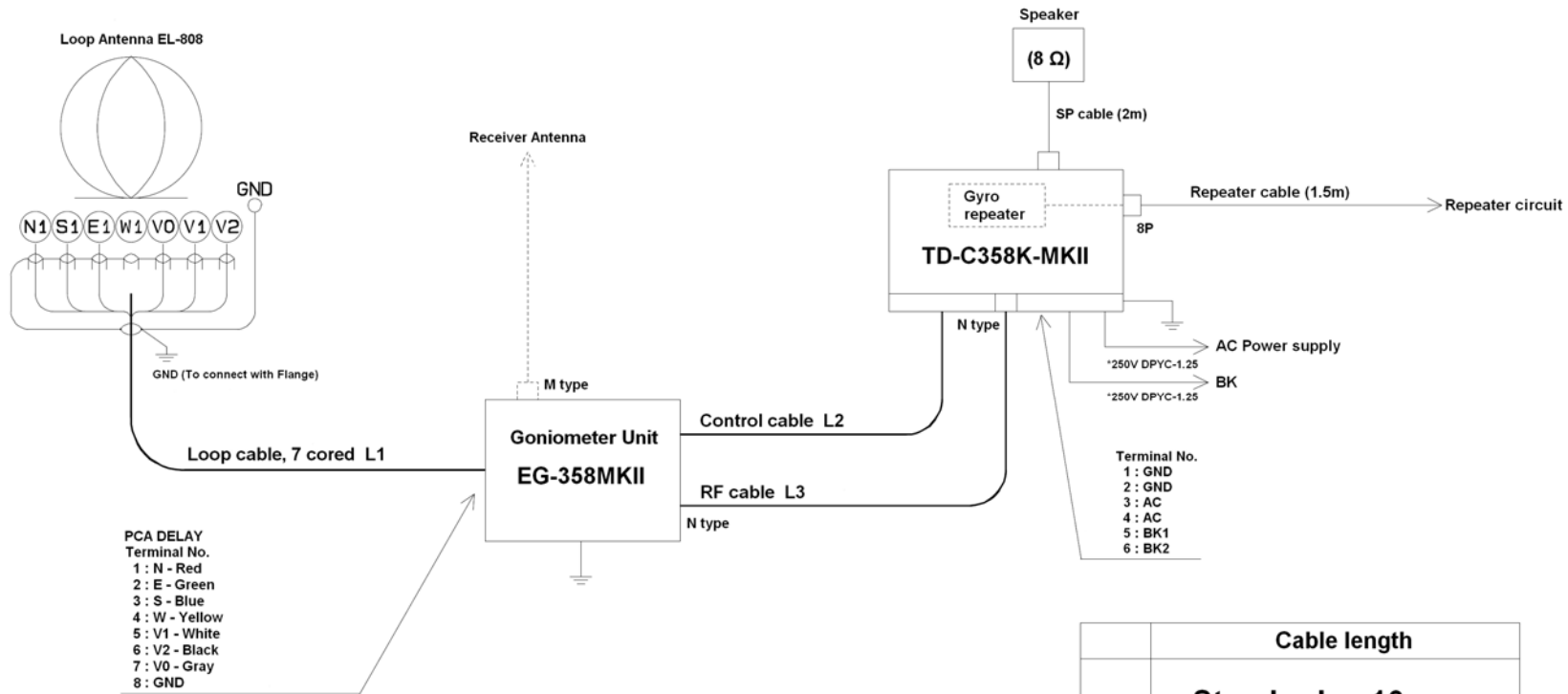
検査 CHECKED

尺度 SCALE / NTS

3rd ANGLE PROJECTION

検認 APPROVED

TAIYO MUSEN CO.,LTD.

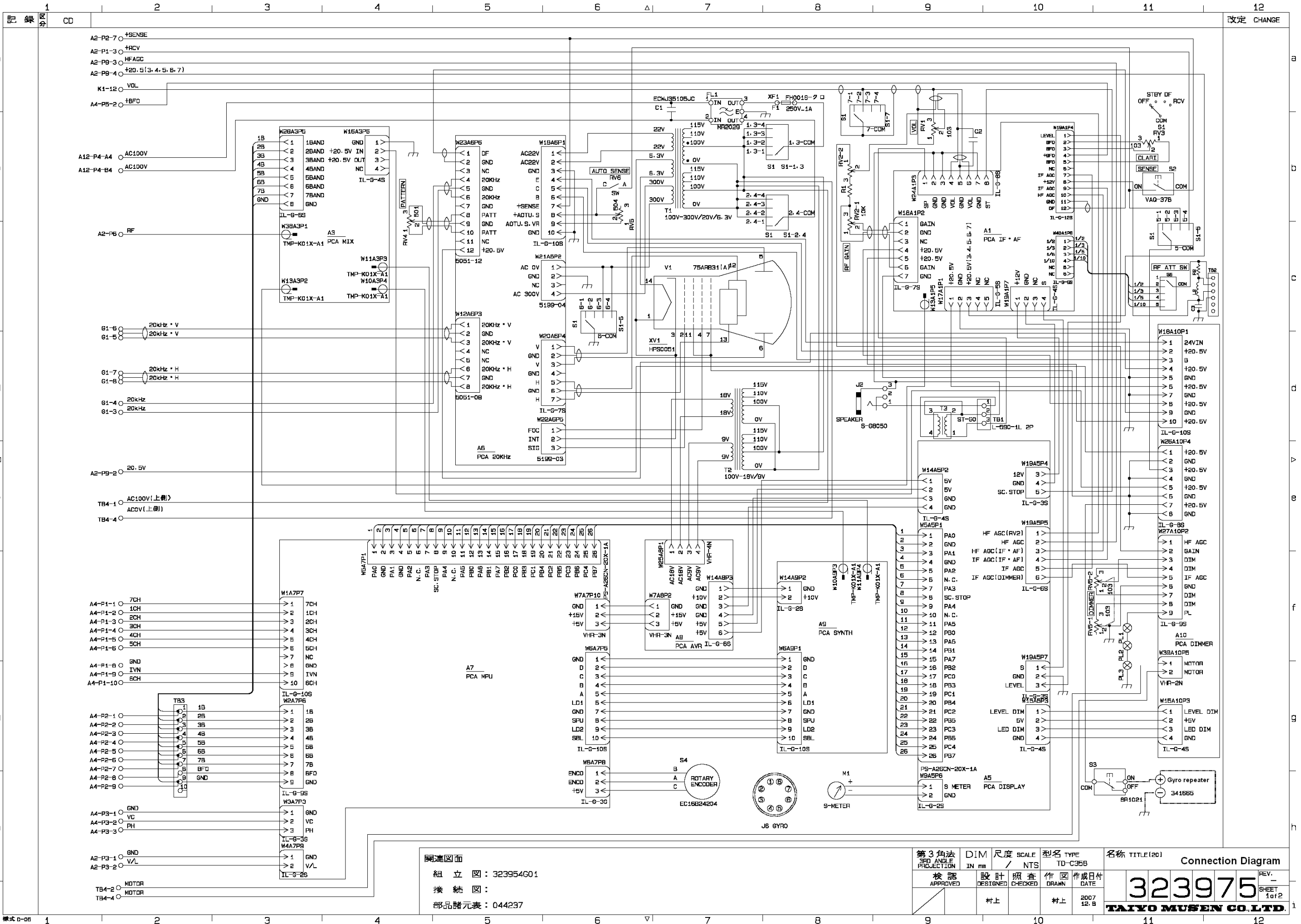


Cable length	
L1	<b>Standard : 10m</b> <small>* Do not cut the L1 cable at customer side, or it may cause the sensitivity down of TD-C358K-MKII.</small>
L2	On request
L3	On request

関連図面

- 組立図:
- 接続図:
- 部品諸元表:

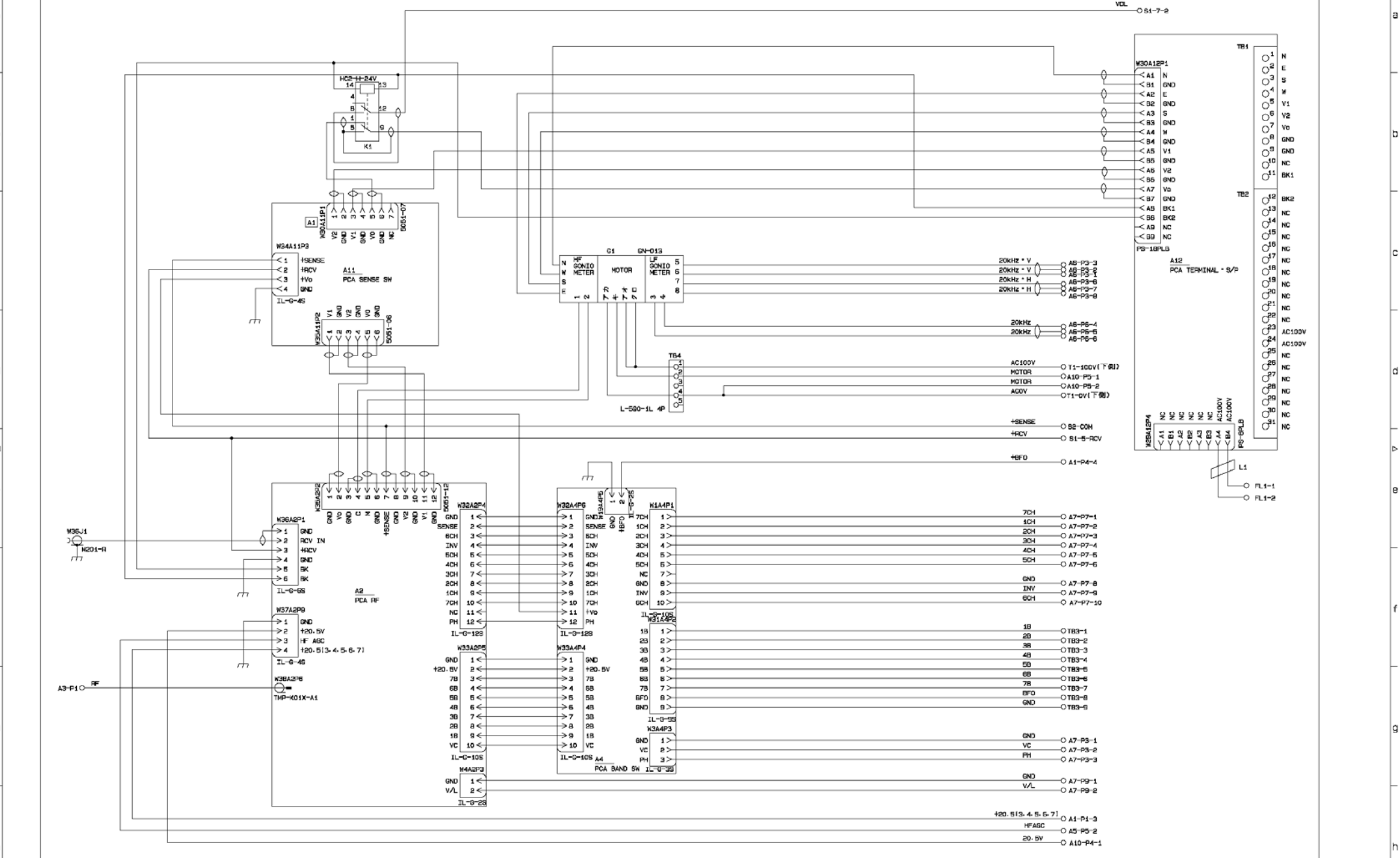
第3角法 3RD ANGLE PROJECTION	DIM IN mm	尺度 SCALE / NTS	型名 TYPE	名称 TITLE (20)
検認 APPROVED	設計 DESIGNED	照査 CHECKED	作図 DRAWN	作成日付 DATE
				2008. 10. 23
				Inter Connection Diagram for TD-C358K-MKII
				REV. _
				SHEET 1 of 1
<b>TAIYO MUSEN CO.,LTD.</b>				



関連図面  
 組立図: 323954601  
 接続図:  
 部品銘元表: 044237

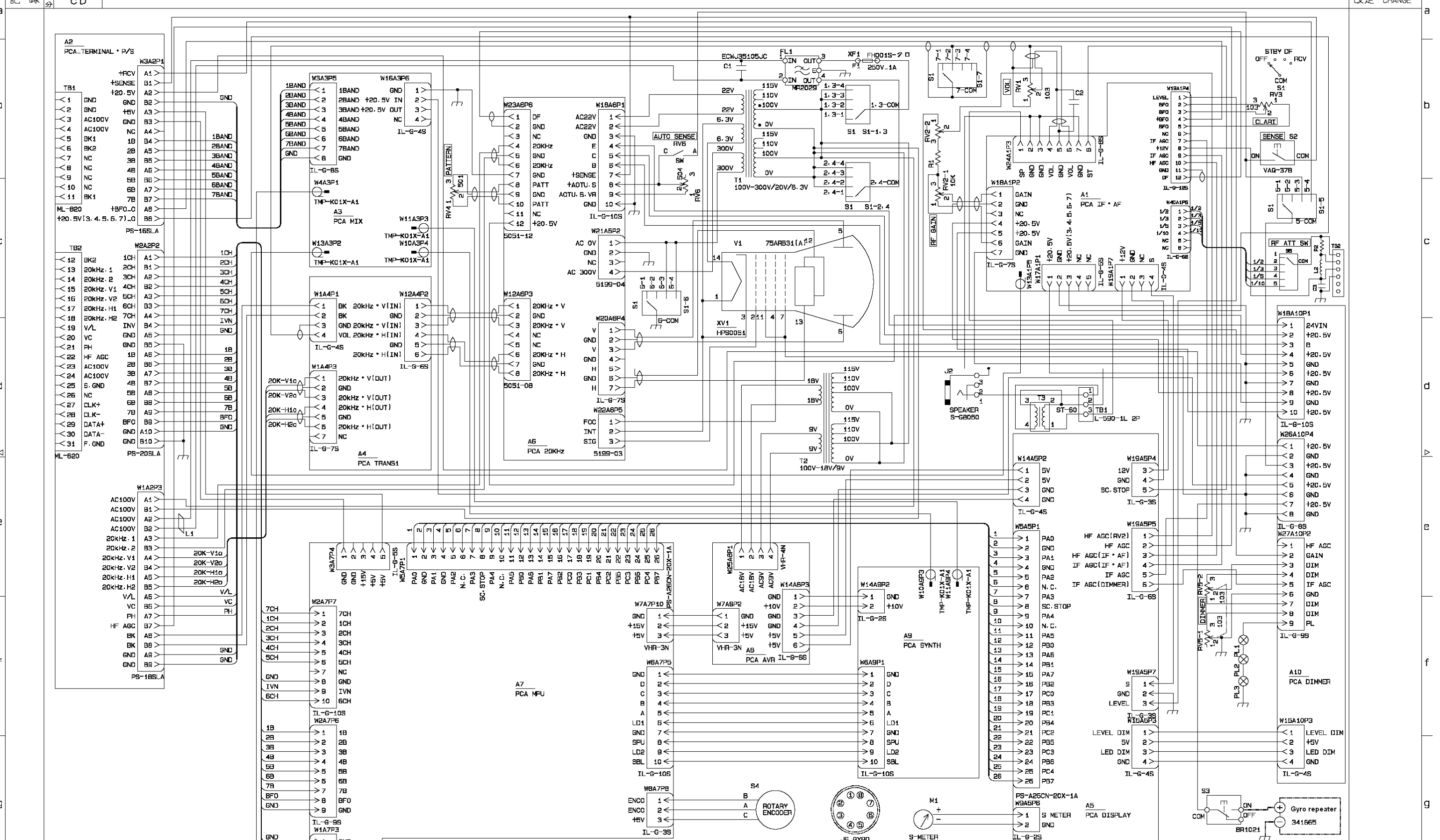
第3角法 3RD ANGLE PROJECTION	DIM 尺度 IN mm / NTS	型名 TYPE TD-C35B	名称 TITLE(20)
校 認 APPROVED	設 計 DESIGNED	照 査 CHECKED	作 図 DRAWN
作成日付 DATE	2007 12. 8	作成日付 DATE	2007 12. 8
323975		TAIYO MUSEN CO., LTD.	

Connection Diagram  
 323975  
 SHEET 1 of 2



関連図面  
 組立図: 323954G01  
 接続図:  
 部品略元表: 044237

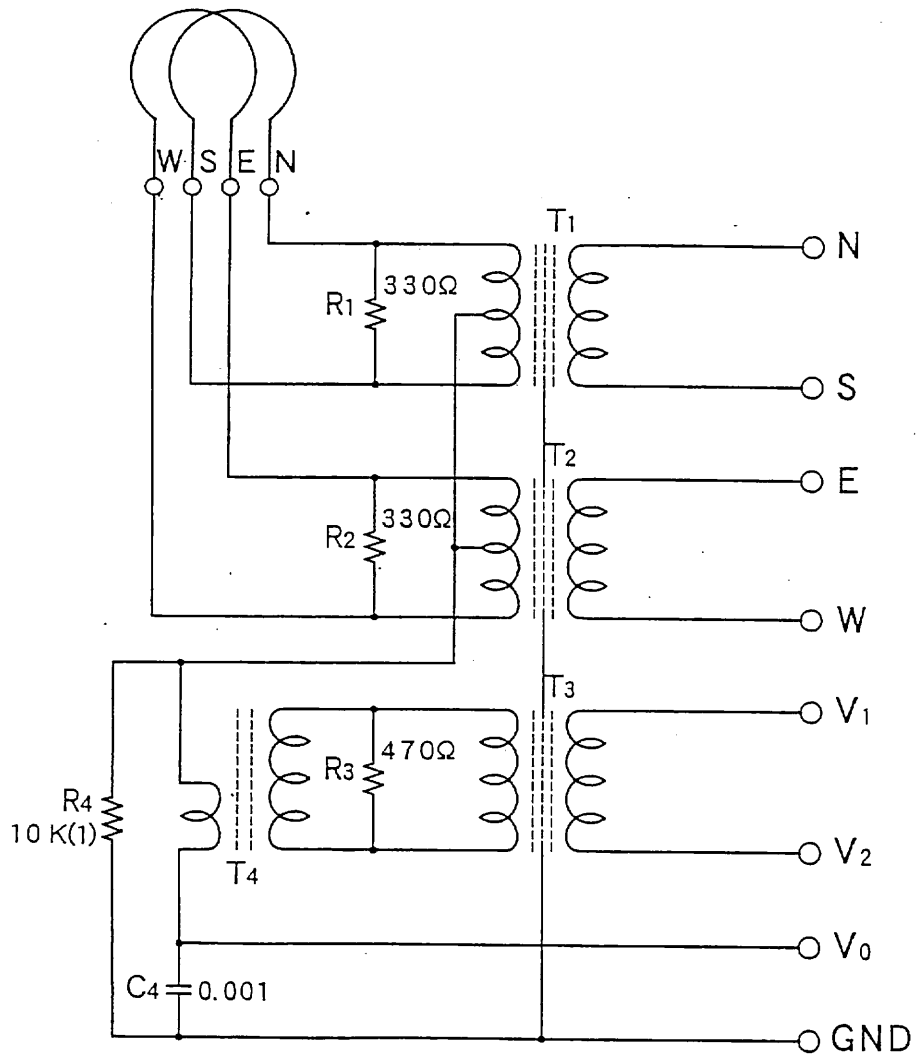
第3角法 3RD ANGLE PROJECTION	DIM IN mm	尺度 SCALE 1:1	尺碼 SCALE 1:1	型名 TYPE TD-C358	名称 TITLE T01	Connection Diagram for TD-C358
校 認 APPROVED	設 計 DESIGNED	照 查 CHECKED	作 図 DRAWN	作 成 日 付 DATE	REV. SHEET	
	村上		村上	2007-12-8	323975	REV. SHEET 2012
<b>TAIYO MUSEN CO., LTD.</b>						



<p>関連図面</p> <p>組立図: 323954902</p> <p>接続図:</p> <p>部品諸元表: 044235</p>	<p>第3角法 3RD ANGLE PROJECTION</p> <p>検 査 APPROVED</p>	<p>DIM 尺度 SCALE IN mm / NTS</p> <p>設 計 DESIGNED</p>	<p>照 査 CHECKED</p> <p>作 図 DRAWN</p>	<p>作 成 日 付 DATE</p> <p>2007 12.8</p>	<p>名 称 TITLE(20)</p> <p>Connection Diagram</p> <p>323974</p> <p>TAIYO MUSEN CO., LTD.</p>
--	--	---	---	--	---



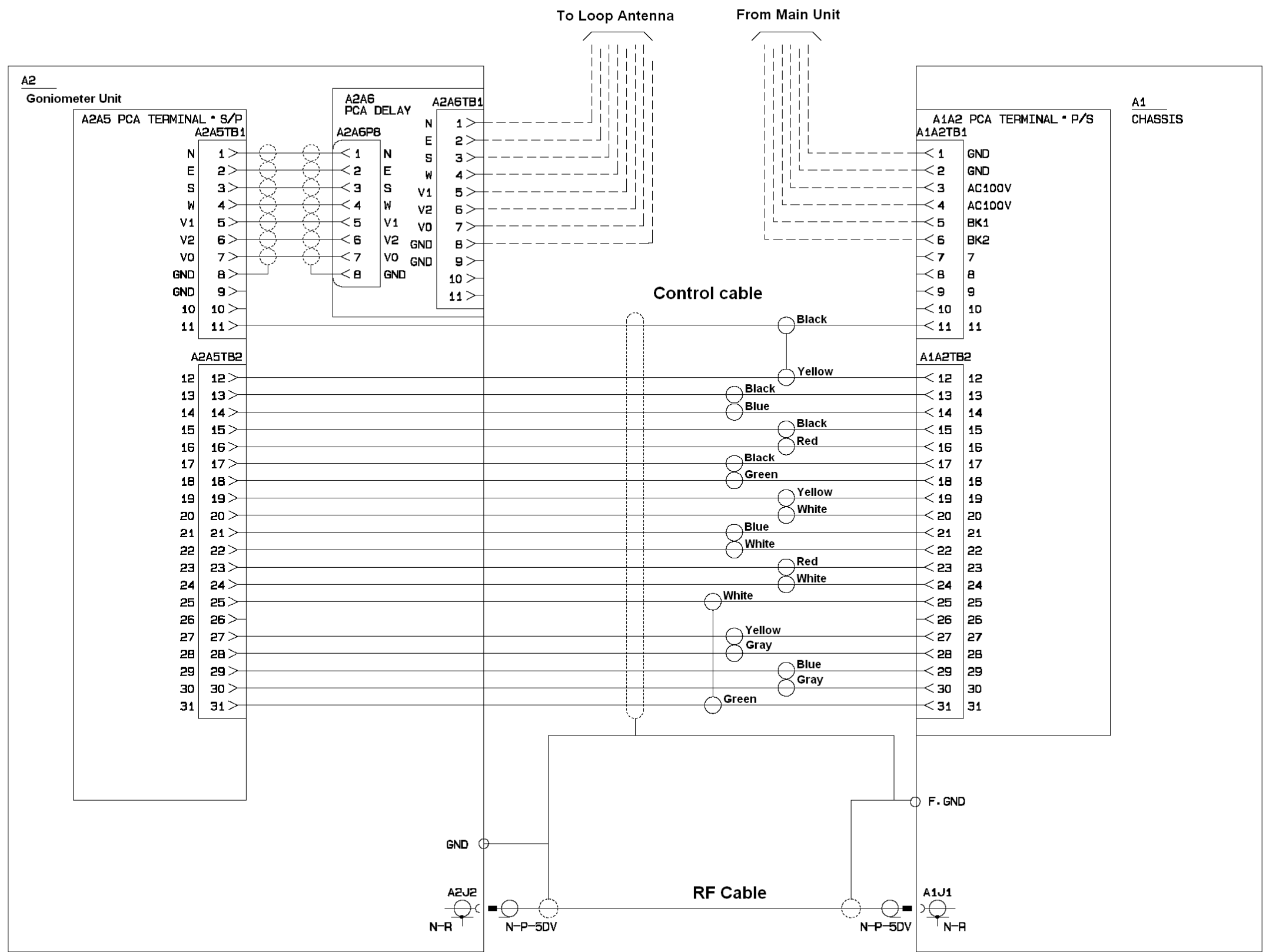
# Antenna Diagram:



Antenna Circuit Diagram  
Drawing No. 340379A

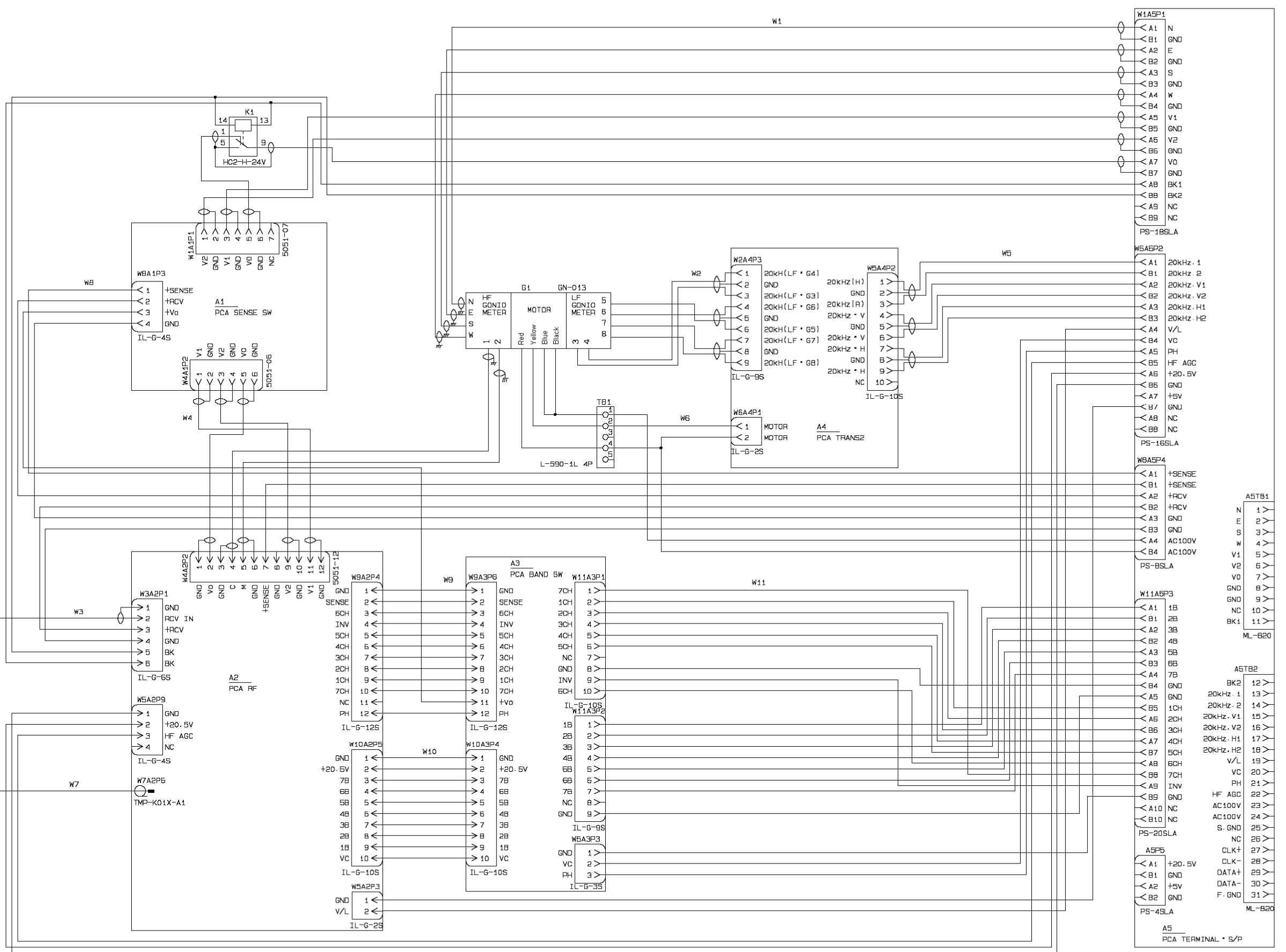
a  
b  
c  
Δ  
d  
e  
f

a  
b  
c  
Δ  
d  
e  
f



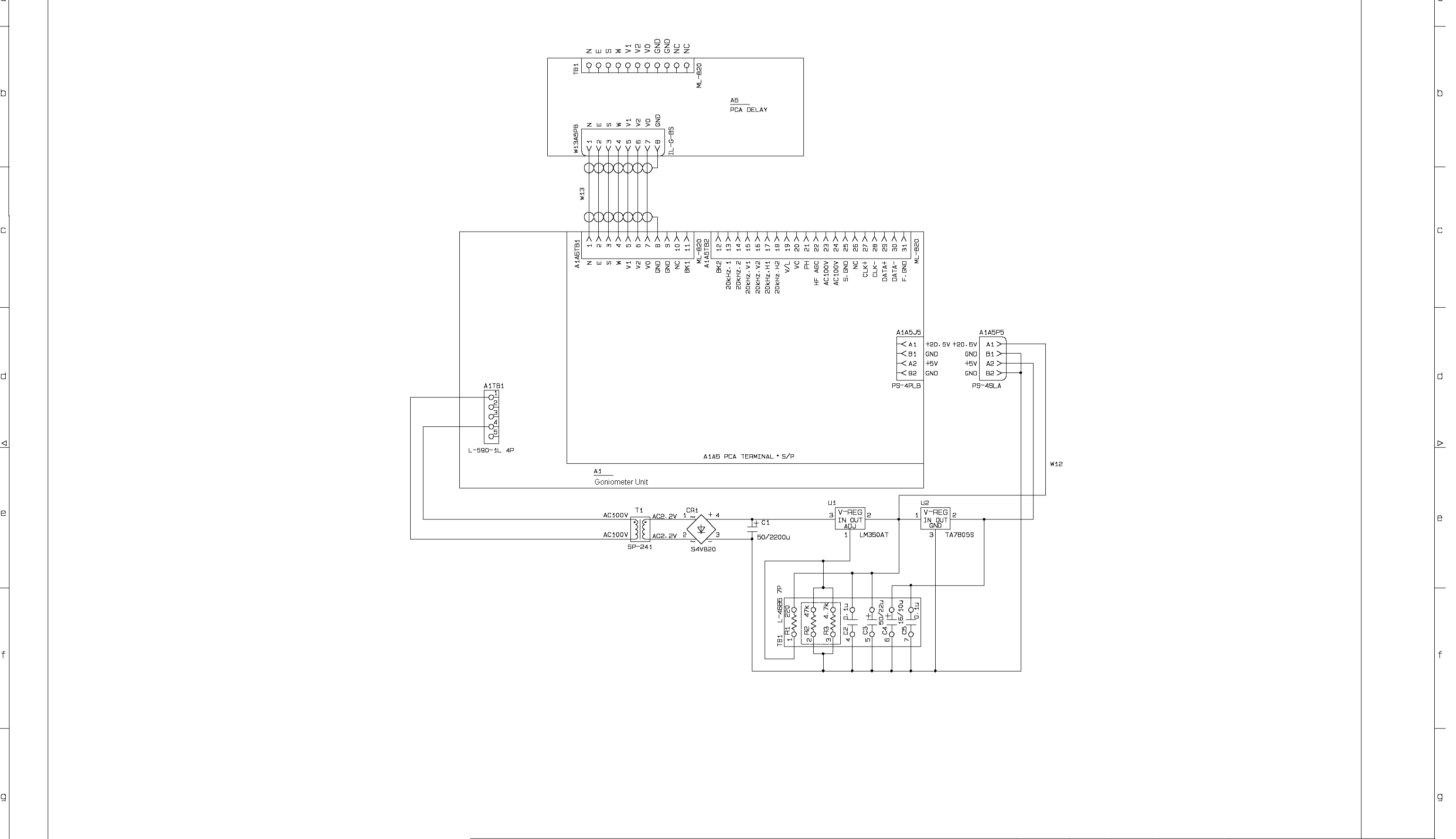
関連図面  
 組立図：  
 接続図：  
 部品諸元表：

第3角法 3RD ANGLE PROJECTION	DIM IN mm	尺度 SCALE / NTS	型名 TYPE	名称 TITLE(20) Connection Diagram Between Main Unit and EG-358MKII
検認 APPROVED	設計 DESIGNED	照査 CHECKED	作図 DRAWN	作成日付 DATE
				2008 9.30
				REV. - SHEET 1 of 1
<b>TAIYO MUSEN CO.,LTD.</b>				



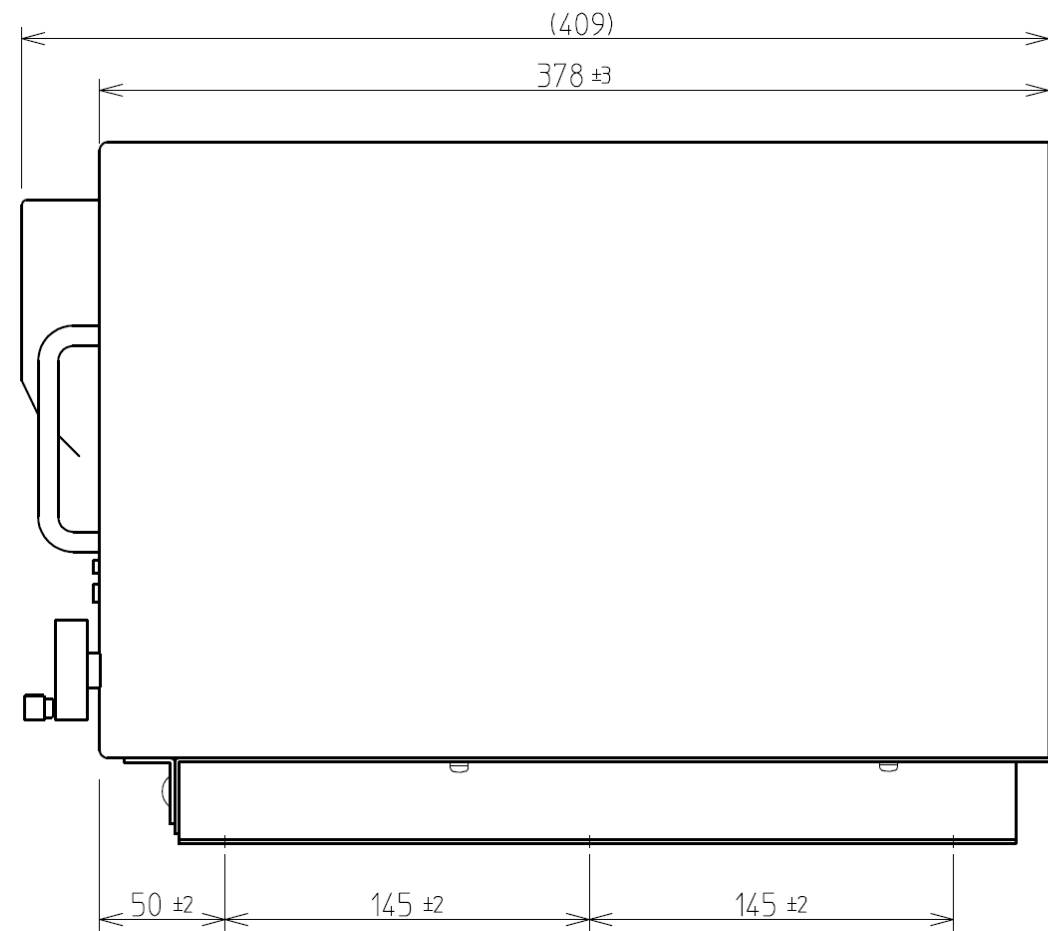
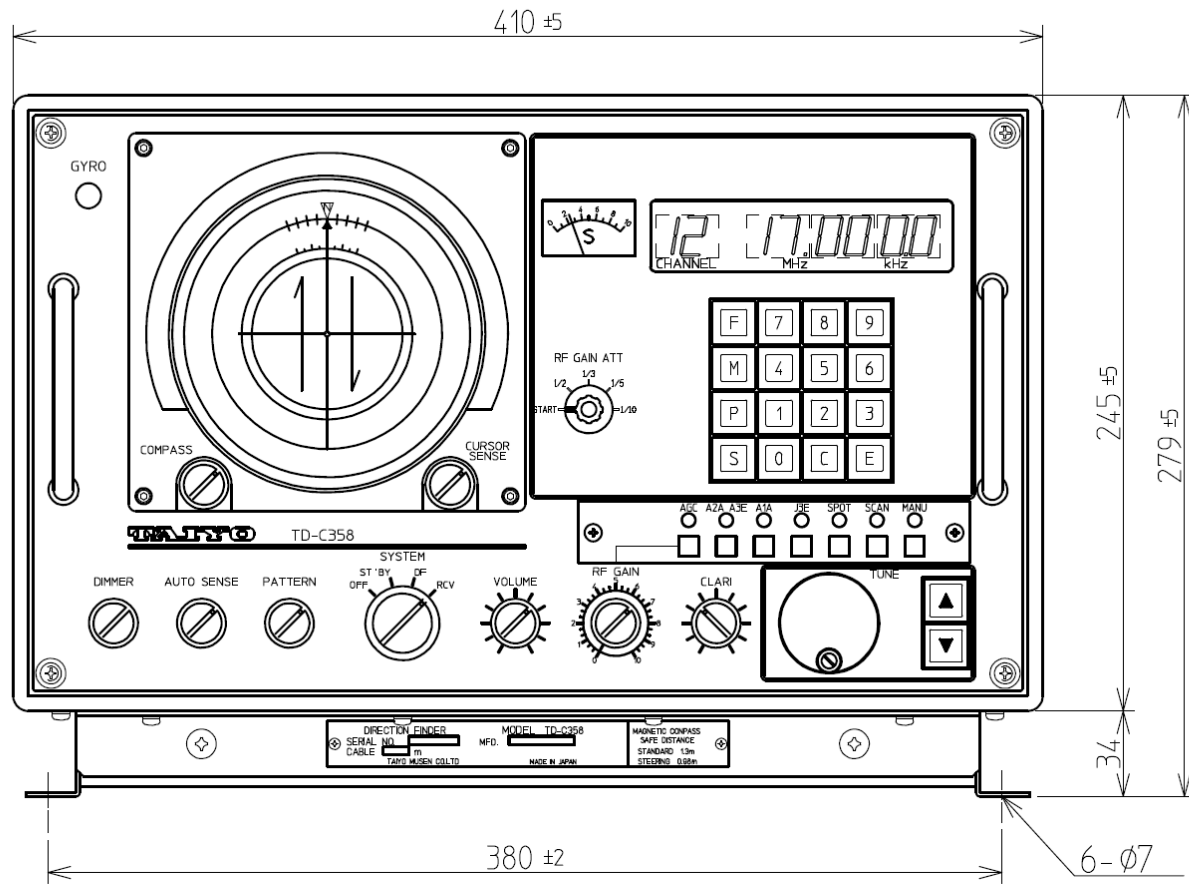
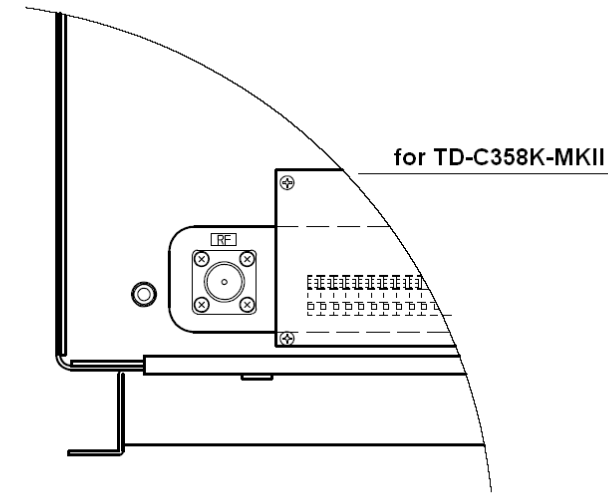
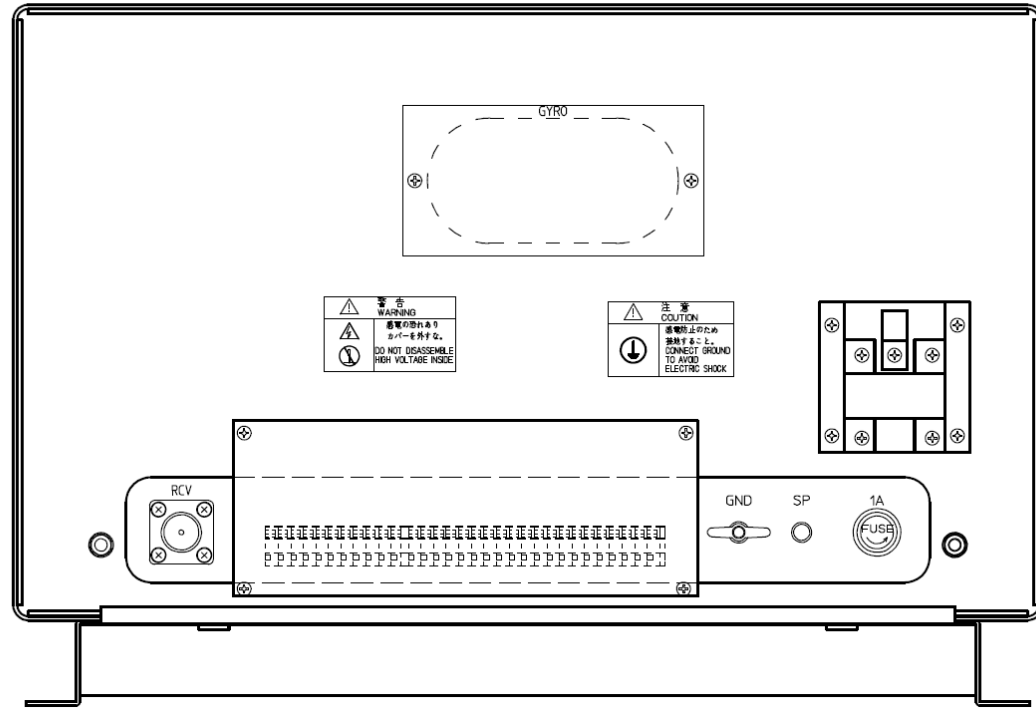
関連図面  
 組立図: 323817G02.333623G02  
 接続図:  
 部品諸元表: 044302

第3角法 3RD ANGLE PROJECTION	DIM 尺度 SCALE IN mm / NTS	型名 TYPE	名称 TITLE(20)
検認 APPROVED	設計 DESIGNED	照査 CHECKED	作図 DRAWN
		作成日 DATE	作成日付 DATE
		2008. 9.30	
			名称 TITLE(20) Connection Diagram for EG-358MKII
			REV. - 324103 SHEET 1 of 2
TAIYO MUSEN CO., LTD.			



関連図面  
 組立図：323817G02, 333623G02  
 接続図：  
 部品諸元表：044302

第3角法 3RD ANGLE PROJECTION	DIM IN mm	尺度 SCALE / NTS	型名 TYPE	名称 TITLE(20)
検 認 APPROVED	設 計 DESIGNED	照 査 CHECKED	作 図 DRAWN	作 成 日 付 DATE
				2008. 9. 30
324103				REV. - SHEET 2 of 2
<b>TAIYO MUSEN CO., LTD.</b>				

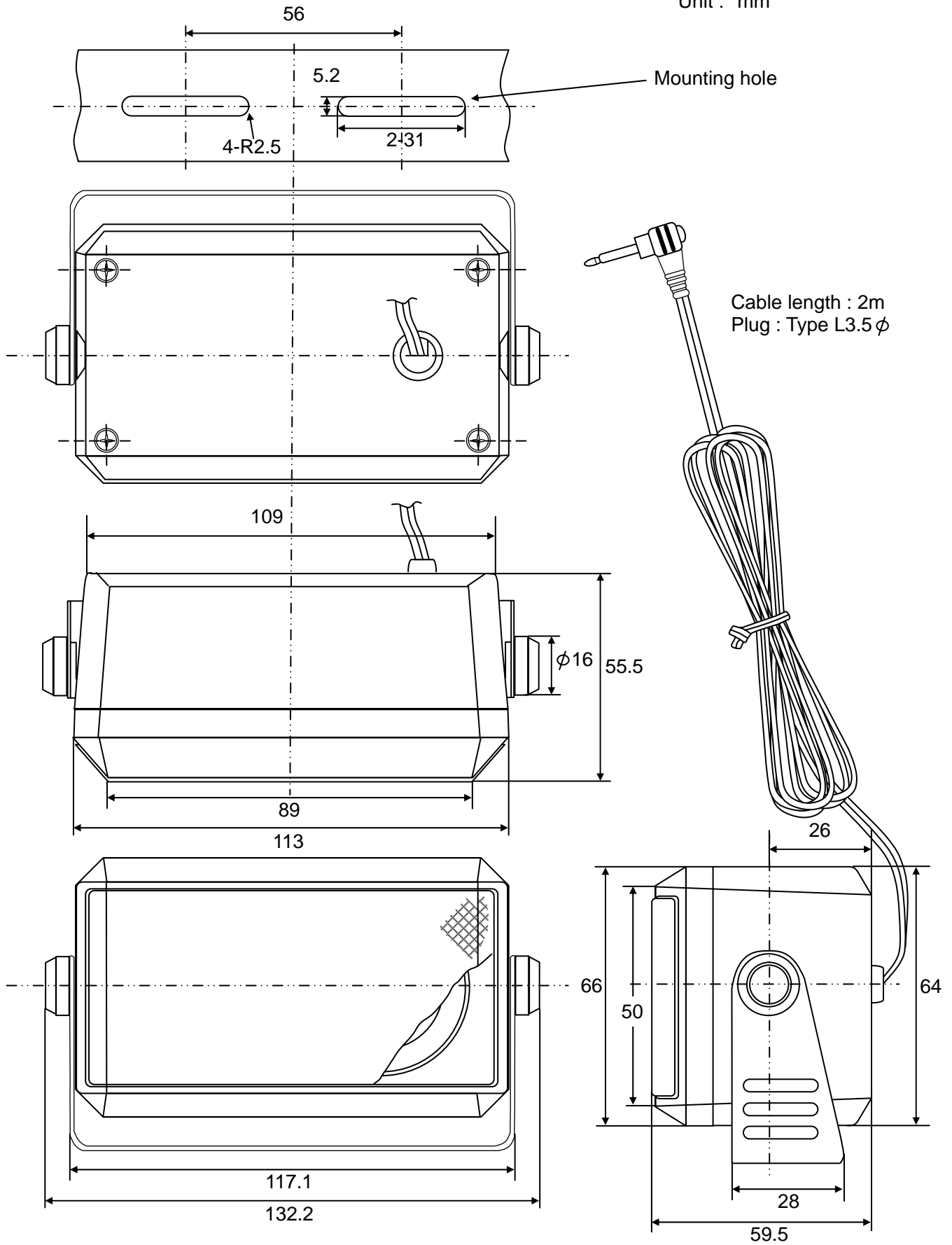


関連図面  
組立図：  
接続図：  
部品諸元表：

第3角法 3RD ANGLE PROJECTION	DIM IN mm	尺度SCALE NTS	型名TYPE	名称TITLE(20)
検認 APPROVED	設計 DESIGNED	照査 CHECKED	作図 DRAWN	作成日付 DATE
			外山	07.12.04
				External View of Main Unit
				031410
				REV. - SHEET 1of1
TAIYO MUSEN CO.,LTD.				

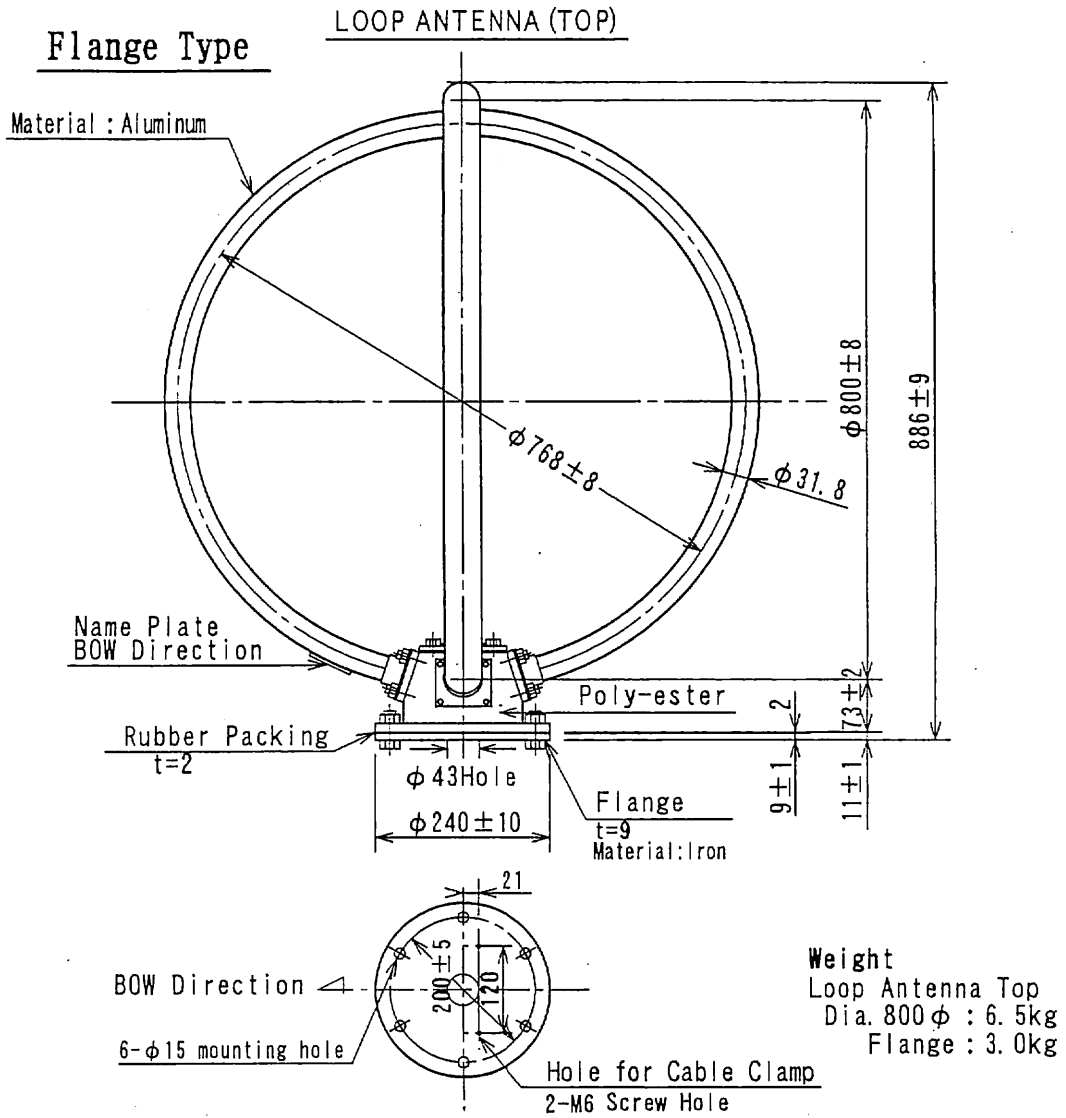
# External View of Speaker

Weight : 350 g  
Unit : mm



External View of Speaker  
Drawing No. 044023

# External View of Antenna EL-808

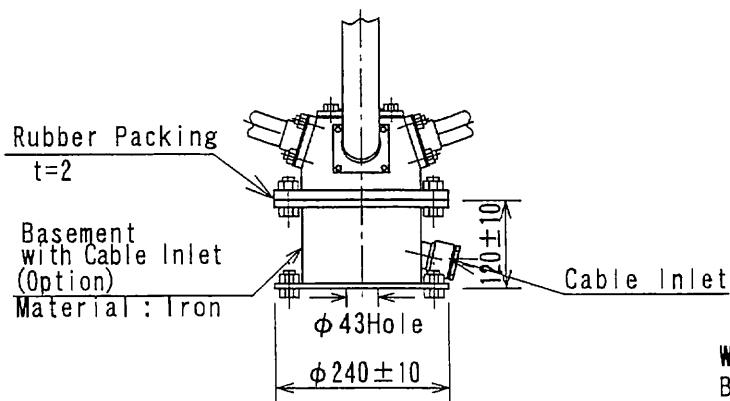


## Basement Type

(OPTION)

[Remarks]

In case of deliver with Basement,  
loop flange is not supplied.

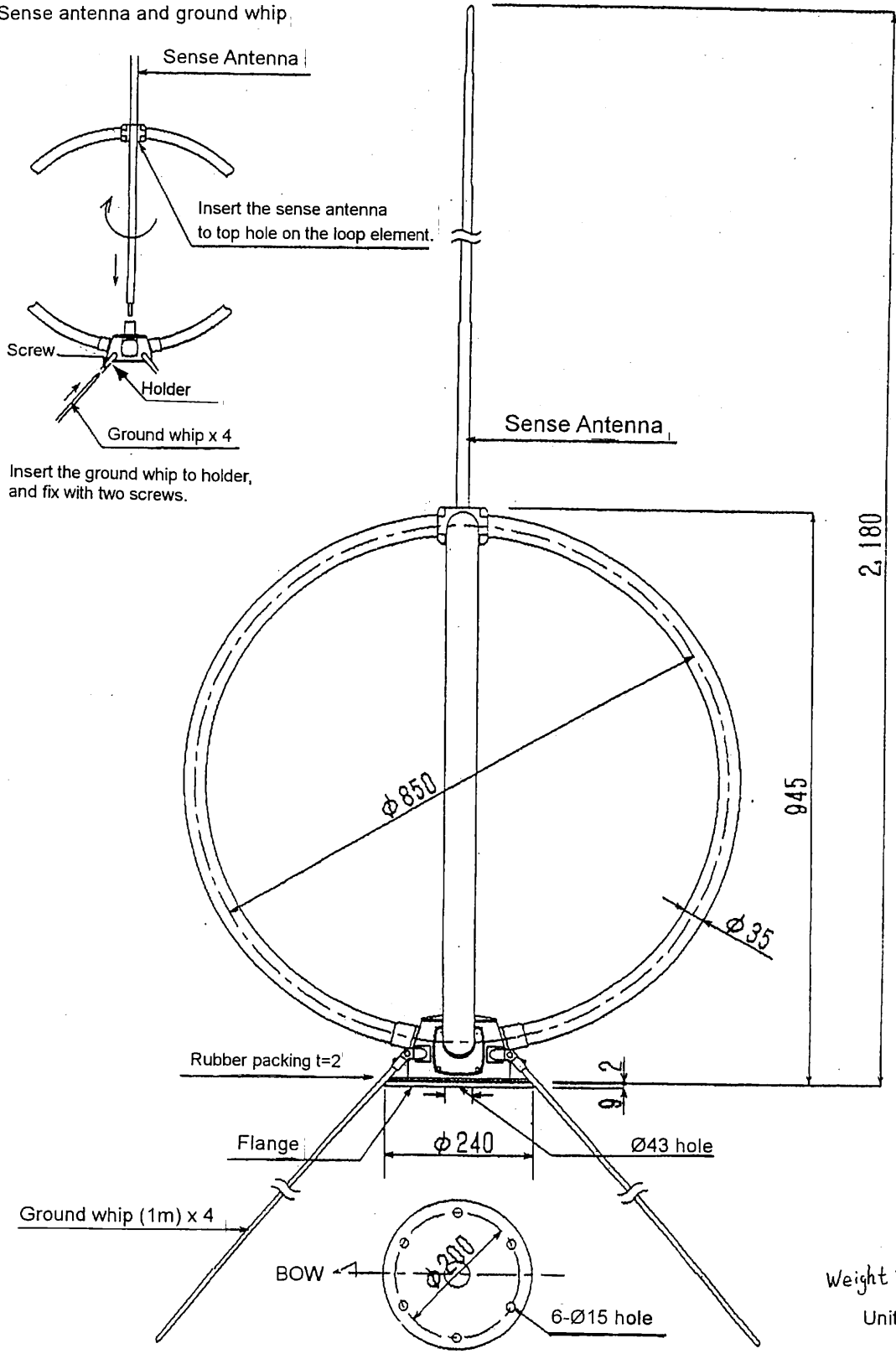


External View of Antenna EL-808

Drawing No. 042649

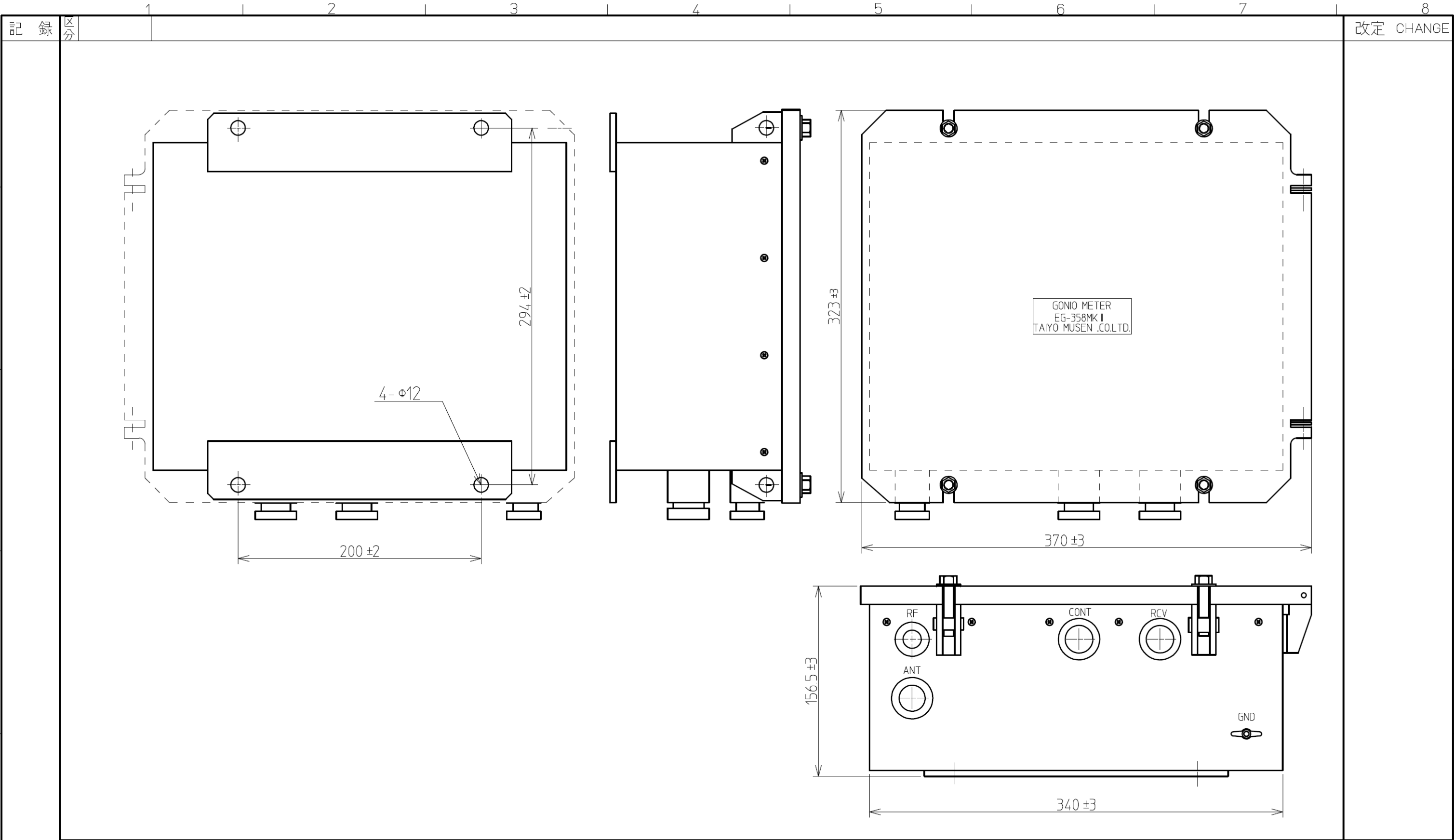
# External View of Antenna EL-85-04

Installation procedure of Sense antenna and ground whip.



External View of Antenna EL-85-04  
 Drawing No. 042456





記録区分

改定 CHANGE

関連図面  
 組立図：  
 接続図：  
 部品諸元表：

第3角法 3RD ANGLE PROJECTION	DIM IN mm	尺度SCALE NTS	型名TYPE EG-358MK II	名称TITLE(20) External View of Goniometer Unit EG-358MKII
検認 APPROVED	設計 DESIGNED	照査 CHECKED	作図 DRAWN	作成日付 DATE
			外山	08.10.31
031421				REV. - SHEET 1 of 1
TAIYO MUSEN CO.,LTD.				

## FOR SERVICE REQUIREMENT

---

---

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

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

### **TAIYO MUSEN CO., LTD.**

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

#### **Overseas Trading Dept.**

TEL: 81-3-5735-1243

FAX: 81-3-5735-1683