

FURUNO

OPERATOR'S MANUAL

A - D CONVERTER

MODEL AD - 100



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NISHINOMIYA, JAPAN

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Your Local Agent/Dealer

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SAFETY INFORMATION

"NOTIICE", "CAUTION" and "WARNING" notices appear throughout this manual. It is the responsibility of the operator and installer of the equipment to read, understand and follow these notices. If you have any questions regarding these safety instructions, please contact a FURUNO agent or dealer.



WARNING

This notice indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

This notice indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or property damage.

NOTICE

This notice indicates an unsafe practice which, if not avoided, could result in property damage or equipment malfunction.



SAFETY INFORMATION FOR THE INSTALLER

WARNING



Only qualified personnel should work inside the equipment.

This equipment uses high voltage electricity which can shock, burn, or cause death.

Turn off the power at the ship's mains switchboard before beginning the installation. Post a warning sign near the switchboard to ensure that the power will not be applied while the equipment is being installed.

Serious injury or death can result if the power is not turned off, or is applied while the equipment is being installed.

CAUTION



Ground the equipment.

Ungrounded equipment can give off or receive electromagnetic interference or cause electrical shock.

Confirm that the power supply voltage is compatible with the voltage rating of the equipment.

Connection to the wrong power supply can cause fire or equipment damage. The voltage rating appears on the label at the rear of the equipment.

NOTICE

The mounting location must satisfy the following condition:

- Away from rain and water splash
- Out of direct sunlight
- Away from air conditioner vents
- Away from magnets and magnetic fields
- Moderate and stable in temperature and humidity
- Observe the following compass safe distances to prevent interference to a magnetic compass:
 - Standard compass: 1.10 m
 - Steering compass: 0.80 m



SAFETY INFORMATION FOR THE OPERATOR

WARNING



Do not open the cover of the equipment.

This equipment uses high voltage electricity which can shock, burn, or cause death. Only qualified personnel should work inside the equipment.

Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can result.

Immediately turn off the power at the ship's mains switchboard if water or foreign object falls into the equipment or the equipment is emitting smoke or fire.

Continued use of the equipment can cause fire, electrical shock or serious injury.

CAUTION

Do not place liquid-filled containers on the top of the equipment.

Fire or electrical shock can result if a liquid spills into the equipment.

Do not place heater near the equipment.

Heat can melt the power cord, which can result in fire or electrical shock.

Do not operate the unit with wet hands.

Electrical shock can result.

Use the correct fuse.

Use of the wrong fuse can cause fire or equipment damage.

(Continued on next page)

NOTICE

Do not use the equipment for other than its intended purpose.

Use of the equipment as a chair or a shelf, for example, can cause equipment damage.

Immediately turn off the power whenever you feel the equipment is abnormal.

Continued use can cause equipment damage.

Keep magnets and magnetic fields (speaker, transformer, etc.) away from the equipment.

Magnets and magnetic fields can cause equipment malfunction.

Handle the equipment carefully.

Rough handling can cause corrosion.

Do not use chemical cleaners to clean the equipment.

Chemical cleaners can remove paint and markings.

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SPECIFICATIONS OF AD-100 A-D CONVERTER

General

The AD-100 A-D converter converts the gyro compass reading into digital coded bearing data and display it on a 4 digit LED display.

The digital bearing output may be sent to navigation equipment such as radar, GPS navigator and autopilot.

Specifications

1. Input Signal Gyro repeater signal (AC Synchro , DC Synchro or Step-by-Step) DIP switch provided to select input signal.
2. Input Voltage AC Synchro Type ----- 20VAC to 135VAC (Rotor)
20VAC to 135VAC (Stator)
50/60Hz, 400Hz or 500Hz
DC Syncho Type -- 20VDC to 100VDC (Rotor)
20VAC to 100VAC (Stator)
Step-by-step ----- 20VDC to 100VDC
3. Power Consumption Less than 5W
4. Tracking Speed 30°/sec
5. Bearing Display 4 digit LED display
6. Data Output AD-10S format ----- Photo-coupler driver type, 4 digit BCD code,
MSB transmission order.
RS-485
NMEA0183 ----- HDT, VHW
RS-485 level
Version.1.5 and 2.0
Baud rate 4800 and 38,400 bps
7. Output Ports AD-10S format ----- 6 ports
NMEA0183 ----- 1 port
8. Data Transmission AD-10S format ----- Switchable between 25ms and 200ms.
Use 25ms for radar only.
NMEA0183 ----- Selectable among 25ms, 100ms, 200ms and 1s.
Note) For 25ms, 100ms or 200ms, \$AGHDT is only output. The 25ms setting sets baud rate to 38,400 bps.
9. Color Cabinet ----- 2.5GY 5/1.5 Newtone No.5
Front Panel ----- N3.0

EQUIPMENT LIST

COMPLETE SET

| No. | Name | Type | Code NO. | Qty | Remarks |
|-----|------------------------|------------|-------------|-----|---------|
| 1 | Main Unit | AD-100 | 000-040-104 | 1 | |
| 2 | Accessories | FP64-00400 | 000-040-107 | 1 | |
| 3 | Installation Materials | CP64-00500 | 000-040-106 | 1 | |
| 4 | Spare Parts | SP64-00400 | 000-040-105 | 1 | |

ACCESSORIES

| No. | Name | Type | Code NO. | Qty | Remarks |
|-----|----------------|-------------|-------------|-----|---------|
| 1 | Tapping Screw | 5x20 SUS304 | 000-802-081 | 4 | |
| 2 | Knob Bolt | KT-B M6x10 | 000-861-924 | 2 | |
| 3 | Flat Washer | M5 SUS304 | 000-864-128 | 4 | |
| 4 | Flat Washer | M6 SUS304 | 000-864-129 | 2 | |
| 5 | Hanger Bracket | RUA-1003 | 380-010-030 | 1 | |

INSTALLATION MATERIALS

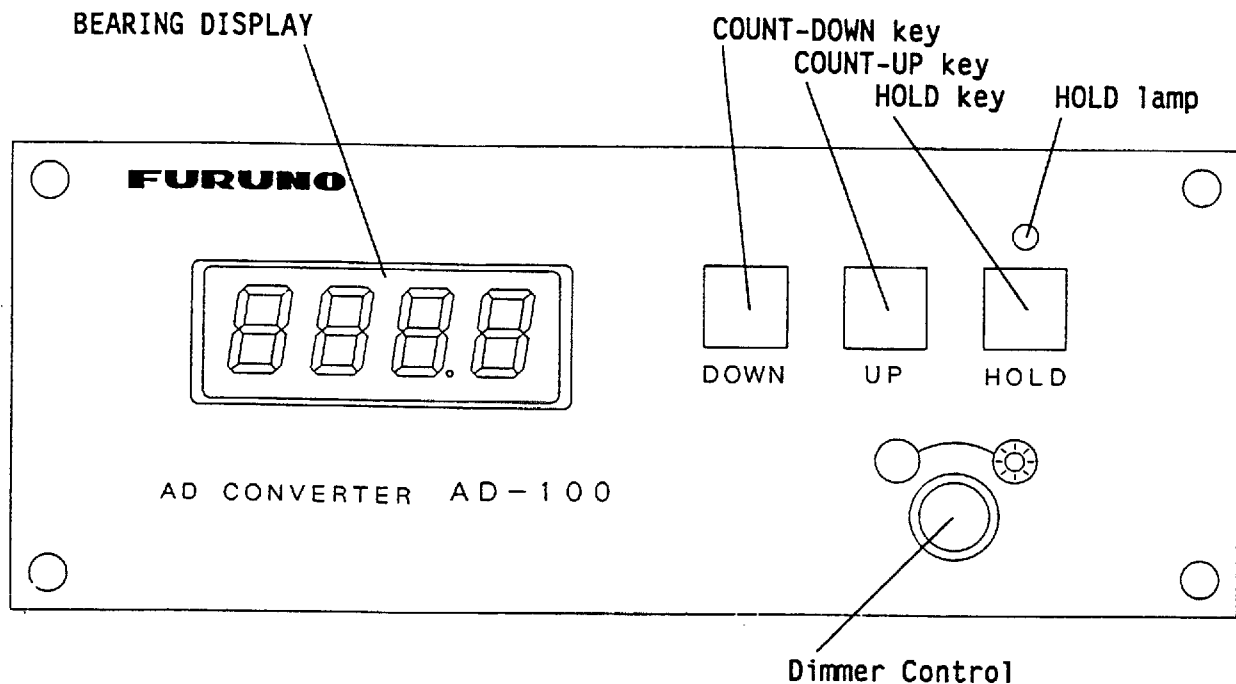
| No. | Name | Type | Code NO. | Qty | Remarks |
|-----|-----------------------|-------------|-------------|-----|---------|
| 1 | NH Connector Assembly | 64-45 (5P) | 004-441-960 | 6 | |
| 2 | NH Connector Assembly | 64-46 (3P) | 004-411-970 | 1 | |
| 3 | NH Connector Assembly | 64-47 (5P) | 004-411-980 | 1 | |
| 4 | NH Connector Assembly | 64-48 (3P) | 004-411-990 | 1 | |
| 5 | Heat-shrink Tube | 5x0.25 0.1m | 000-117-772 | 2 | Black |
| 6 | Heat-shrink Tube | 3x0.25 1m | 000-568-172 | 1 | Black |

SPARE PARTS

| No. | Name | Type | Code NO. | Qty | Remarks |
|-----|-----------------|--------------|-------------|-----|---------|
| 1 | Glass Tube Fuse | FGMB 2A 250V | 000-122-000 | 4 | |

CHAPTER 1 OPERATION

1. FRONT PANEL



FRONT PANEL

2. OPERATION

- (1) Adjust the brightness of the Bearing Display and the backlighting of the keys with the Dimmer Control
- (2) After the gyrocompass reading stabilizes, adjust the bearing display with the COUNT-UP or COUNT-DOWN keys.
Each pressing of the key changes the display by 0.1 degrees. For faster change, press and hold down the key to change the display in 1.0 degree steps.
- (3) To freeze the display, press the Hold key. The HOLD lamp lights. To restart the display press the Hold key.
Since the computing circuit is disengaged from the gyrocompass during hold, readjust the display so it agrees with the gyrocompass reading.

3. CORRECTION OF THE BEARING DISPLAY

The bearing display is backed up by a battery when the power is turned off, so it is not necessary to adjust the display when you turn on the unit. However it is a good idea to check the display for correctness before each departure.

CHAPTER 2 MAINTENANCE

1. FUSE REPLACEMENT

To protect the unit from serious damage, four 2A fuses are provided on a P.C. board. The fuses protect against overvoltage or internal fault of the equipment. If a fuse blows, find the cause of the problem before replacing it.

CAUTION

Do not use a fuse rated more than 2A, since it may cause more serious damage to the equipment.

2. MINOR TROUBLESHOOTING

Operating problems are most likely caused by loose connectors or wrong setting of DIP switches. The table below provides simple troubleshooting which can be done by the operator.

| Symptom | Possible Cause | Remedy |
|------------------------------|---|---|
| No display | *Dimmer control turned fully CCW. *Gyrocompass not on *External power supply is turned off. *Flat cable between the two P.C. Board is loose is loose *Blown fuse *No power because of wrong jumper setting. *Gyrocompass not connected. | *Turn the control clockwise. *Turn on the power. *Turn on the power. *Reconnect. *Check supply voltage. Replace fuse. *Correct JP1, JP4 and JP5 to the right setting. *Connect gyrocompass. |
| Display is fixed on "000.0". | *DIP switch SW1 is set wrong. | *Correct the setting. |
| No data output | *Loose data output connector *JP6 and/or JP7 not connected. | *Tighten the connector *Connect JP6 and JP7 |
| Bearing display is frozen. | *HOLD function is turned. | *Press HOLD key to release release the HOLD function |

- continued -

| Symptom | Possible Cause | Remedy |
|-------------------------------------|--|-----------------------|
| The bearing display deviates often. | *Jumpers and DIP switches are set wrong. | *Correct the setting. |
| Key input not accepted | *Defective keyboard | *Call for service. |

The status of the LEDs on the Processor Board show equipment condition.

| CR21 | CR22 | |
|-------|------|---------------------------------|
| OFF | OFF | No power |
| OFF | ON | Power supply less than 5V |
| BLINK | OFF | Defective CR22 |
| BLINK | ON | Power supply and CPU are normal |

3. SELF TEST

The AD-100 employs Self tests to check it for proper operation. These are as follows.

- *Display LED test
- *Analog Data Input Test
- *DIP SW Setting Display
- *Program Version Display
- *Key Input Test

1) Sequence

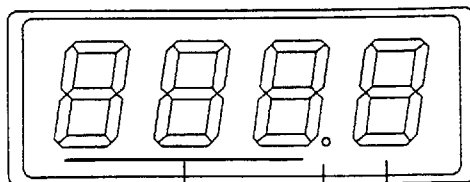
DISPLAY LED TEST

- *The HOLD lamp and all the segments on the display lights for 1 sec.
- *The display changes from "0000", "1111" -- "8888" "9999". every 1 sec.

ANALOG DATA INPUT TEST

- *The input data of S1, S2, S3, R1, R2 alternately appears on the LED for 1 sec. (This test is for factory use only.)

LED Display



- 1 to 5 (1=S1, 2=S2, 3=S3, 4=R1, 5=R2)
- Decimal point
- 0 to 255 (Input analog data)

- Continued -

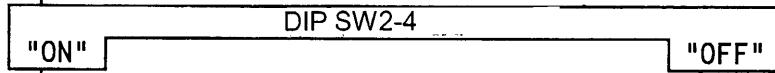
DIP SW1, 2 Setting Display

DIP SW2, 3 Setting Display

*The value shown in the table on the next page appears for 1 sec.
*Refer to "2) LED status according to DIP SW setting"

Program Version Display

*Version number appears for 1 sec.



Continuous

One Cycle

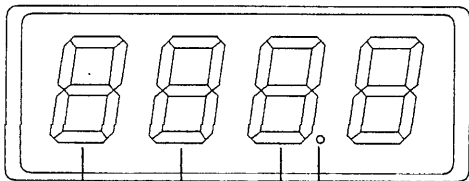
*Continuous test

*Normal operation is restored upon completion of the test.

Key Input Test

The key input test may be done at any time during the Self test. Press the COUNT-UP key, COUNT-DOWN key or HOLD key to enable the key input test.

LED Display



Decimal point

Each pressing of the HOLD key displays "0" or "1".

Each pressing of the COUNT-UP key displays "0" or "1".

Each pressing of the COUNT-DOWN key displays "0" or "1".

To exit from the key input test and return to self test:

Press COUNT-UP and COUNT-DOWN keys together.

2) LED status according to DIP switch setting

| LED for 100 degree place | SW1-1 | SW1-2 | SW1-3 | REMARKS |
|--------------------------|-------|-------|-------|----------|
| 0 | OFF | OFF | OFF | 360x |
| 1 | ON | OFF | OFF | 180x |
| 2 | OFF | ON | OFF | 90x |
| 3 | ON | ON | OFF | 36x |
| 4 | OFF | OFF | ON | Not used |
| 5 | ON | OFF | ON | Not used |
| 6 | OFF | ON | ON | Not used |
| 7 | ON | ON | ON | Not used |

| LED for 10 degree place | SW1-4 | SW1-5 | SW1-6 | REMARKS |
|-------------------------|-------|-------|-------|-----------------------------|
| 0 | OFF | OFF | OFF | AC/DC Synchro |
| 1 | ON | OFF | OFF | DC Step |
| 2 | OFF | ON | OFF | Full Wave Pulsating Current |
| 3 | ON | ON | OFF | Half Wave Pulsating Current |
| 4 | OFF | OFF | ON | Not used |
| 5 | ON | OFF | ON | Not used |
| 6 | OFF | ON | ON | Not used |
| 7 | ON | ON | ON | Not used |

| LED for 1 degree place | SW1-7 | SW1-8 | REMARKS |
|------------------------|-------|-------|---------|
| 0 | OFF | OFF | 50/60Hz |
| 1 | OFF | ON | 400HZ |
| 2 | ON | OFF | 500HZ |
| 3 | ON | ON | DC |

| LED for 0.1 degree place | SW2-1 | SW2-2 | SW2-3 | REMARKS |
|--------------------------|-------|-------|-------|---|
| 0 | OFF | OFF | OFF | The setting of these three DIP switches is decided according to stator voltage and rotor voltage. |
| 1 | ON | OFF | OFF | |
| 2 | OFF | ON | OFF | |
| 3 | ON | ON | OFF | |
| 4 | OFF | OFF | ON | |
| 5 | ON | OFF | ON | |
| 6 | OFF | ON | ON | |

| LED for 100 degree place | SW2-4 | Remarks |
|--------------------------|-------|---|
| 0 | OFF | Refer to "4)-(2) DIP switch SW2, 3" on page 3-10. |
| 1 | ON | |

| LED for 10 degree place | SW2-5 | SW2-6 | Remarks |
|-------------------------|-------|-------|---|
| 0 | OFF | OFF | Refer to "4)-(2) DIP switch SW2, 3" on page 3-10. |
| 1 | ON | OFF | |
| 2 | OFF | ON | |
| 3 | ON | ON | |

| LED for 1 degree place | SW2-7 | Remarks |
|------------------------|-------|---|
| 0 | OFF | Refer to "4)-(2) DIP switch SW2, 3" on page 3-10. |
| 1 | ON | |

| LED for 0.1 degree place | SW3-1 | SW3-2 | SW3-3 | Remarks |
|--------------------------|-------|-------|-------|---|
| 0 | OFF | OFF | OFF | Refer to "4)-(2) DIP switch SW2, 3" on page 3-10. |
| 1 | ON | OFF | OFF | |
| 2 | OFF | ON | OFF | |
| 3 | ON | ON | OFF | |
| 4 | OFF | OFF | ON | |
| 5 | ON | OFF | ON | |
| 6 | OFF | ON | ON | |
| 7 | ON | ON | ON | |

CHAPTER 3 INSTALLATION

1. INSTALLATION

1) General notes on installation

This equipment provides its intended function only when it is installed properly. The installation site is important for proper operation and continued performance. Select it keeping the following points in mind.

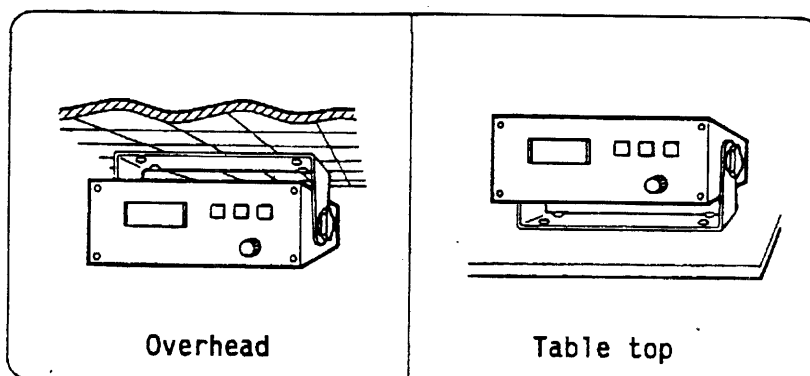
- 1) Keep away from water spray.
- 2) Select a clean and cool place.
- 3) Select a place where shock, vibration and noise are minimal.
- 4) Observe the following compass safe distance to prevent interference to a magnetic compass:
Standard compass: 10 m
Steering compass: 0.80 m

NOTE

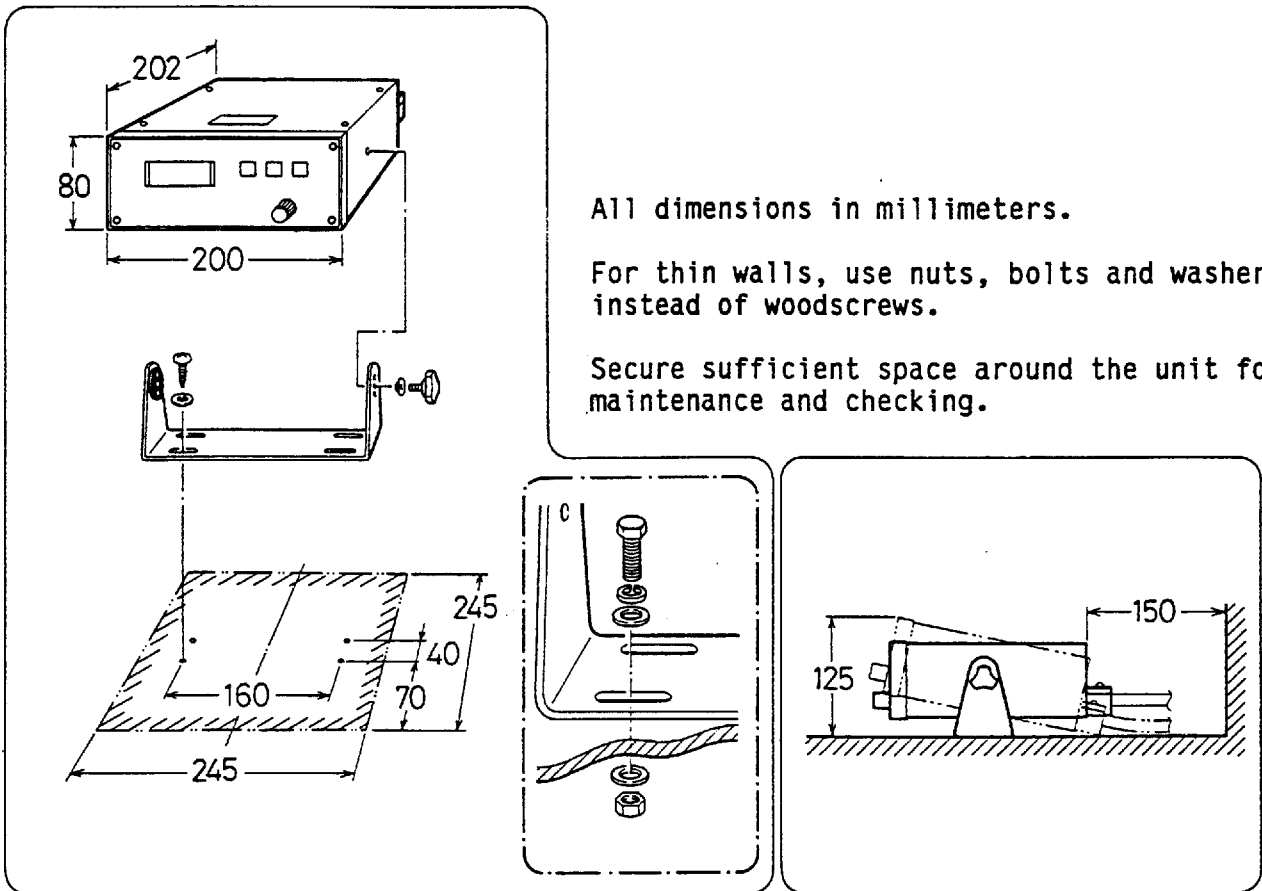
FURUNO will assume responsibility for damage caused by Water spray.

2) Mounting the unit

The equipment can be mounted on the overhead or a table top. Ensure the mounting location is strong enough to support the unit under the condition of shock and vibration normally encountered onboard the vessel. If necessary, reinforce the mounting location with a lining block or doubling plate.



3) Mounting dimensions



4) Mounting procedure

- (1) Drill pilot holes for the hanger.
- (2) Fix the hanger with tapping screws (supplied).
For thin walls, use bolts and nuts instead of the tapping screws.
- (3) Set the equipment to the hanger. Orient the unit for optimum viewing angle and tighten the knob screws.

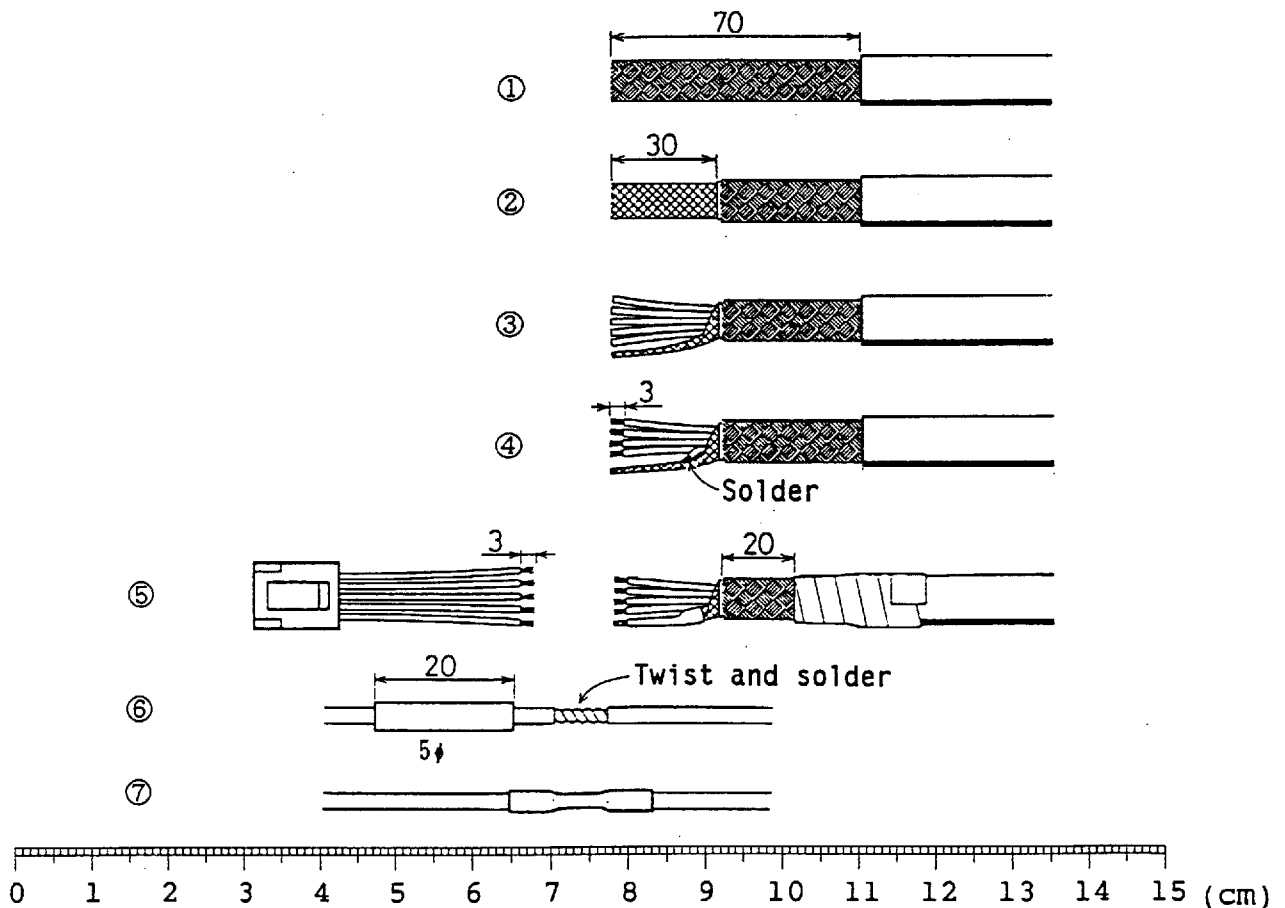
2. CABLE CONNECTION

The connection between the A-D converter and a gyrocompass requires a 5C cable (250V-MPYCS-5 or equivalent). For the connection between the A-D converter and radar, satellite navigator, GPS receiver, doppler sonar, current indicator, etc., 5P cable (CO-SPEVV-SB-C 0.2sq) is required.

1) Fabrication of 5C cable

- (1) Remove the outer sheath by 70mm.
- (2) Remove the armor and sheath by 30mm.
- (3) Separate the cores from the braided shield.
- (4) Expose the core for 3mm. Cut and solder unused cores to the shield.
- (5) Dress the shield with vinyl tape leaving 3mm of the it exposed.
- (6) Dress the end of armor with vinyl tape leaving 20mm of the it exposed.
- (7) Remove the cable of VH connector (supplied) by 3mm.
- (8) Pass the cable through heat shrink tube. Solder cable and core.
- (9) Heat the heat shrink tube.

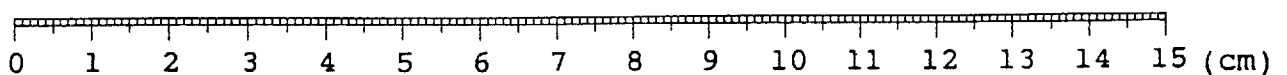
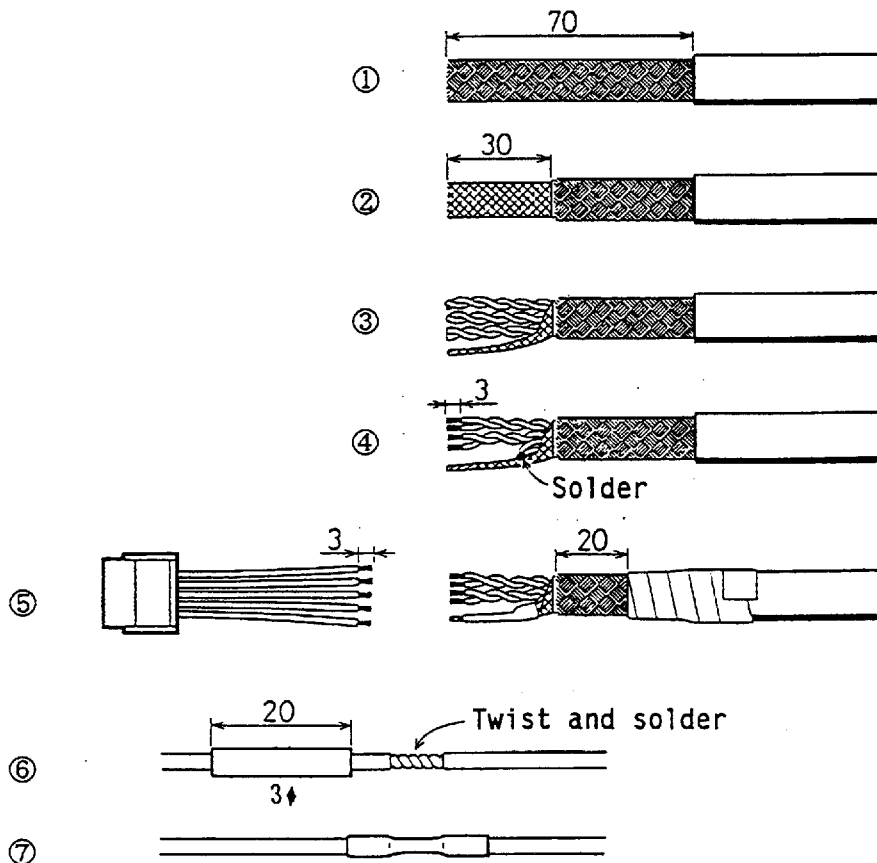
Note : Ground the armor through the cable clamp.



2) Fabrication of 5 pair cable

- (1) Remove the outer sheath by 70mm.
- (2) Remove the armor and sheath by 30mm.
- (3) Separate the cores from the braided shield.
- (4) Expose the cables for 3mm. Cut and solder unused cores to the shield.
- (5) Dress the shield with vinyl tape leaving 3mm of the it exposed.
- (6) Dress the end of armor with vinyl tape leaving 20mm of the it exposed.
- (7) Remove the cable of NH connector (supplied) by 3mm.
- (8) Pass the cable through heat shrink tube. Solder cable and core.
- (9) Heat the heat shrink tube.

Note : Ground the armor through the cable clamp.



3. EXTERNAL POWER SUPPLY

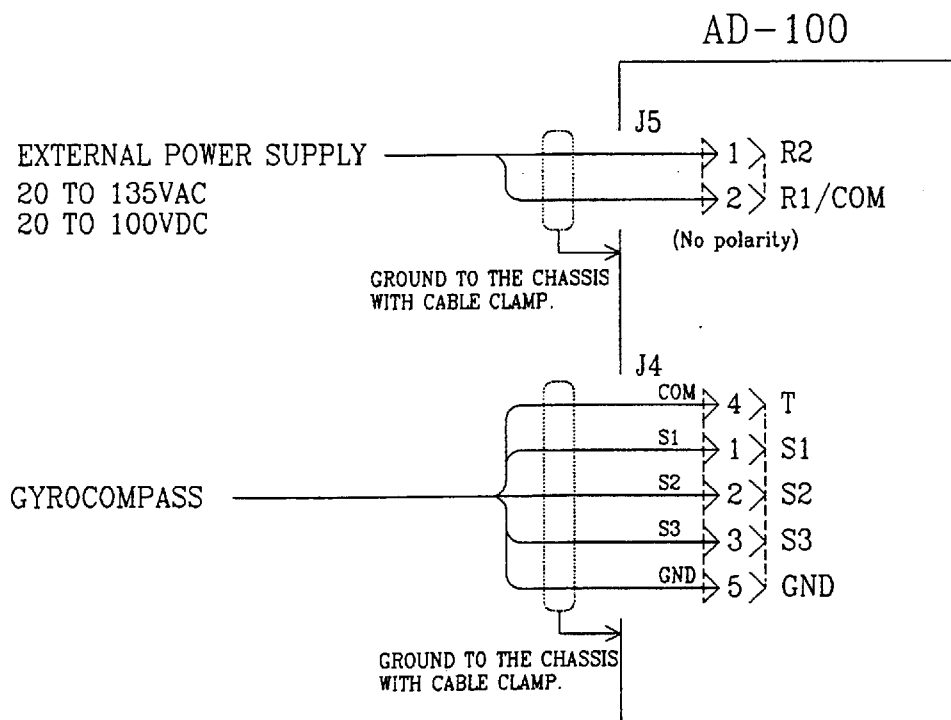
An external power supply is required when a DC Step-by-step gyrocompass is used since it cannot supply 5W or 20V.

1) Jumper wire

If an external power supply is used, remove jumper wire JP1.

2) Cable connection

Connect cables as shown below.



4. SETTING THE DIP SWITCHES AND JUMPER WIRES

The AD-100 can accommodate various brands and specifications of gyrocompasses by means of DIP switches and jumper wires. Below are the specifications of the gyrocompass it can accommodate and the next page shows DIP switch and jumper settings for various brands of gyrocompasses.

•AC synchro

*Frequency : 50/60Hz 400Hz 500Hz
 *Rotor Voltage : _____ VAC
 *Stator Voltage : _____ VAC
 *Gear Ratio : 360x 180x 90x 36x

•DC synchro

*Frequency : 50/60Hz 400Hz 500Hz
 *Rotor Voltage : _____ VDC
 *Stator Voltage : _____ VDC
 *Gear Ratio : 360x 180x 90x 36x

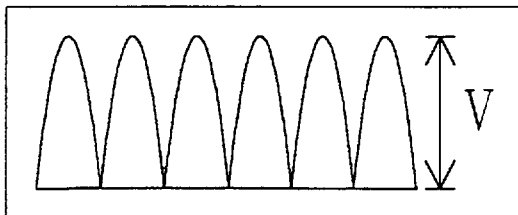
•DC step-by-step

*Supplied Power : _____ VDC
 *Gear Ratio : 360x 180x 90x 36x

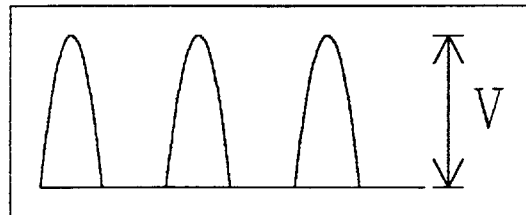
•Full/Half wave pulsating current

*Frequency : 50/60Hz 400Hz 500Hz
 *Supplied Power : _____ VDC
 *Gear Ratio : 360x 180x 90x 36x

Full wave pulsating current



Half wave pulsating current



1) DIP switch and jumper wire setting

Revised at Apr. 9. 2001

| Maker | Models | Specification | SW 1-1 | SW 1-2 | SW 1-3 | SW 1-4 | SW 1-5 | SW 1-6 | SW 1-7 | SW 1-8 | SW 2-1 | SW 2-2 | SW 2-3 | JP1 | JP2 | JP3 | JP4 | JP5 | |
|--|---|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------------|--------------|-----|-----|-----|----|
| FURUNO | GY-700 | DC step 100V 180x 5-wire, open collector | ON | OFF | OFF | ON | OFF | OFF | ON | ON | - | OFF | OFF | #4, #5,#6 | #2 | - | #1 | #1 | |
| Anschutz | Standard 2,3 | AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 22V 360x | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | ON | OFF | #1, #2,#3 | #2 | #2 | #1 | #1 | |
| | Standard 4,6 | AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 90V 360x | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | #1, #2,#3 | #2 | #1 | #1 | #1 | |
| | Standard 20 | DC step 35V 180x COM(-), 3-wire(+) | ON | OFF | OFF | ON | OFF | OFF | ON | ON | - | ON | OFF | #4, #5,#6 | #2 | - | #2 | #2 | |
| Yokogawa Navtec (Plaith type) | C-1/1A/2/3 A-55, B-55 | AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 22V 360x | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | ON | OFF | #1, #2,#3 | #2 | #2 | #1 | #1 | |
| | CMZ-700 | DC step 24V 180x COM(+), 3-wire(-) | ON | OFF | OFF | ON | OFF | OFF | ON | ON | - | ON | OFF | Remove | #2 | - | * | * | |
| | CMZ-250X/ 300X/500 | DC synchronous 360x | OFF | OFF | OFF | OFF | OFF | OFF | OFF | ON | ON | - | ON | OFF | Remove | #2 | - | * | * |
| | | DC step 35V 180x COM(+),3-wire(-) | ON | OFF | OFF | ON | OFF | OFF | OFF | ON | ON | - | ON | OFF | #4, #5,#6 | #2 | - | #2 | #2 |
| | CMZ-100/200/ 300 C-1Jr,D-1Z/1/3 IPS-2/3 | AC synchronous 50/60Hz Rotor voltage: 100V Stator voltage: 90V 360x | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | #1, #2,#3 | #1 | #1 | #1 | #1 |
| CMZ-50 Note 2 | step 35V 180x COM(+),3-wire(-) | ON | OFF | OFF | ON | OFF | OFF | OFF | ON | ON | - | ON | OFF | Remove | #2 | - | * | * | |
| Plaith | NAV GAT II/III | AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 68V 360x | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | #1, #2,#3 | #2 | #2 | #1 | #1 | |
| Tokimec (Sperry type) | ES-1/2/11 GLT-101/102/ 103/106K/107 | AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 90V 36x | ON | ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | #1, #2,#3 | #1 | #1 | #1 | #1 | |
| | ES-11A/110 TG-200 PR222R/2000 PR237L/H GM 21 | AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 22V 90x | OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | #1, #2,#3 | #1 | #1 | #1 | #1 | |
| | MK-14 MOD-1/2/T NK-EN,NK-EI | DC step 70V 180x COM(-), 3-wire(+) | ON | OFF | OFF | ON | OFF | OFF | ON | ON | - | OFF | OFF | #4, #5,#6 | #2 | - | #1 | #1 | |
| | SR-130/140 | DC step 70V 180x 5-wire, open collector | ON | OFF | OFF | OFF | ON | OFF | OFF | OFF | - | OFF | OFF | #4, #5,#6 | #2 | - | #1 | #1 | |
| | TG-100/5000 PR-357/130/ 140, ES-17 GLT-201/202 /203 | DC step 70V 180x COM(+), 3-wire(-) | ON | OFF | OFF | ON | OFF | OFF | ON | ON | - | OFF | OFF | #4, #5,#6 | #2 | - | #1 | #1 | |
| | TG-6000 | DC step 24V 180x | ON | OFF | OFF | ON | OFF | OFF | ON | ON | - | ON | OFF | #4, #5,#6 | #2 | - | #2 | #2 | |
| | GM-11 | AC synchronous 50/60Hz Rotor voltage: 100V Stator voltage: 90V 90x | OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | #1, #2,#3 | #1 | #1 | #1 | #1 | |
| | SR-120,ES-16 MK-10/20/30 | DC step 35V 180x | ON | OFF | OFF | ON | OFF | OFF | ON | ON | - | ON | OFF | #4, #5,#6 | #2 | - | #2 | #2 | |
| Kawasaki | GX-81 | AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 90V 90x | OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | #1, #2,#3 | #1 | #1 | #1 | #1 | |
| Armabrown | MK-10,MKL-1 SERIES1351, MOD-4 | DC step 50V 180x COM(+), 3-wire(-) | ON | OFF | OFF | ON | OFF | OFF | ON | ON | - | OFF | OFF | #4, #5,#6 | #2 | - | #1 | #1 | |
| Robertson | SKR-80 | DC step 35V 180x COM(-), 3-wire(+) | ON | OFF | OFF | ON | OFF | OFF | ON | ON | - | ON | OFF | #4, #5,#6 | #2 | - | #2 | #2 | |

Note1) *: Set JP4 and JP5 according to the voltage of the external power supply.

Note2) If CMZ-50 has 35VDC, set JP1 to #4, #5, #6.

2) Default setting

This unit is set at the factory for connection with the gyrocompass specifications tabulated below. This is the default setting for DIP switches and jumper wires; all DIP Switches off, all jumper wire set for #1.

| | | |
|-------------------|---|--------------------------|
| 1) Type | : | AC synchro |
| 2) Frequency | : | 50/60Hz |
| 3) Rotor Voltage | : | Between 60VAC and 135VAC |
| 4) Stator Voltage | : | Between 60VAC and 135VAC |
| 5) Gear Ratio | : | 360x |
| 6) Supplied Power | : | Between 30VAC and 135VAC |

3) Setting procedure

(1) Type of gyrocompass

| Type | SW1-4 | SW1-5 | SW1-6 | JP1 |
|----------------------------|-------|-------|-------|------------|
| AC Synchro | OFF | OFF | OFF | #1, #2, #3 |
| DC Synchro | OFF | OFF | OFF | #2, #3, #4 |
| DC step-by-step | ON | OFF | OFF | #4, #5, #6 |
| Fullwave pulsating current | OFF | ON | OFF | #4, #5, #6 |
| Halfwave pulsating current | ON | ON | OFF | #4, #5, #6 |

(2) Frequency

| Frequency | SW1-7 | SW1-8 |
|-----------|-------|-------|
| 50/60Hz | OFF | OFF |
| 400Hz | ON | OFF |
| 500Hz | OFF | ON |
| DC | ON | ON |

(3) Rotor voltage

This is for AC synchro type gyrocompass only. For the rotor voltage of the DC synchro type will be at step 6.

| Rotor Voltage | SW2-1 | JP3 |
|---------------|-------|-----|
| 20 to 45VAC | ON | #2 |
| 30 to 70VAC | OFF | #2 |
| 40 to 90VAC | ON | #1 |
| 60 to 135VAC | OFF | #1 |

(4) Stator voltage

| Stator Voltage | SW2-2 | SW2-3 | JP2 |
|----------------|-------|-------|-----|
| 20 to 45VAC | ON | OFF | #2 |
| 30 to 70VAC | OFF | OFF | #2 |
| 40 to 90VAC | ON | OFF | #1 |
| 60 to 135VAC | OFF | OFF | #1 |
| 20 to 60VDC | ON | OFF | #2 |
| 40 to 100VDC | OFF | OFF | #2 |

- Continued -

(5) Gear ratio

| Gear Ratio | SW1-1 | SW1-2 | SW1-3 |
|------------|-------|-------|-------|
| x360 | OFF | OFF | OFF |
| x180 | ON | OFF | OFF |
| x 90 | OFF | ON | OFF |
| x 36 | ON | ON | OFF |

(6) Power supply voltage

| Voltage | JP4 | JP5 |
|--------------|-----|-----|
| 20 to 45VAC | #2 | #2 |
| 30 to 135VAC | #1 | #1 |
| 20 to 60VDC | #2 | #2 |
| 40 to 135VDC | #1 | #1 |

(7) NMEA0183 transmitting interval and output sentence, version no. and baud rate.

| Tx interval | SW2-5 | SW2-6 | Output sentence | Version no. | SW3-1 | Baud rate | SW3-2 |
|-------------|-------|-------|-----------------|-------------|-------|-----------|-------|
| 1 s | OFF | OFF | HDT+VHW | 1.5 | OFF | 4860 bps | OFF |
| 200 ms | ON | OFF | HDT | 2.0 | ON | 38400 bps | ON |
| 100 ms | OFF | ON | HDT | | | | |
| 25 ms | ON | ON | HDT | | | | |

(8) Data transmitting interval of AD-10S format

Select data transmitting interval for each port by changing the proper jumper wire on JP6 or JP7.

NOTE : Use the interval 25ms. for radar only.

END

4) Function of DIP switches and jumper wires

The function of each DIP switch and jumper wire is as listed below. Set them according to the specifications of the gyrocompass connected. After setting, reset CPU or turn the power off and then on again to write setting into the CPU.

(1) DIP Switch SW1 (1/2)

| Segment | Function | Setting | | |
|---------------|-----------------------------|---------|-------|-------|
| SW1-1, -2, -3 | Gear Ratio | SW1-1 | SW1-2 | SW1-3 |
| | x360 | OFF | OFF | OFF |
| | x180 | ON | OFF | OFF |
| | x 90 | OFF | ON | OFF |
| | x 36 | ON | ON | OFF |
| SW1-4, -5, -6 | Type of Gyrocompass | SW1-4 | SW1-5 | SW1-6 |
| | AC Synchro | OFF | OFF | OFF |
| | DC Synchro | OFF | OFF | OFF |
| | DC Step | ON | OFF | OFF |
| | Full Wave Pulsating Current | OFF | ON | OFF |
| | Half Wave Pulsating Current | ON | ON | OFF |

DIP switch SW1 (2/2)

| Segment | Function | Setting |
|-----------|--|---|
| SW1-7, -8 | Frequency 50/60Hz 400Hz 500Hz DC | SW1-7 SW1-8 OFF OFF ON OFF OFF ON ON ON |

(2) DIP switch SW2, SW3

| Segment | Function | Setting |
|-----------------|--|---|
| SW2-1 | Rotor Voltage 20 to 90VAC 30 to 135AC | SW2-1 ON OFF |
| SW2-2, SW2-3 | Stator Voltage 20 to 90VAC or 20 to 60VAC 30 to 135VAC or 40 to 100VDC | SW2-2 SW2-3 ON OFF OFF OFF |
| SW2-4 | Selftest | SW2-4 ON Continuous OFF One cycle |
| SW2-5 SW2-6 | Output interval of NMEA | SW2-5 SW2-6 OFF OFF 1s ON OFF 200ms OFF ON 100ms ON ON 25ms |
| SW2-7 | Not used | |
| SW2-8 | Reset CPU | Normally off Turn ON and OFF to reset CPU |
| SW3-1 | NMEA0183 Version no. | SW3-1 ON 2.0 OFF 1.5 |
| SW3-2 | NMEA0183 Baud rate | SW3-2 ON 38,400bps OFF 4,800bps |
| SW3-3 | Talker | SW3-3 OFF AG ON HE |
| SW3-4 | Not used | |

Jumper JP1

| Segment | Function | Setting |
|------------|--|--|
| #1, #2, #3 | Type of Gyrocompass AC Synchro DC Synchro DC Step Full Wave Pulsating Current Half Wave Pulsating Current | #1, #2, #3 #2, #3, #4 #4, #5, #6 #4, #5, #6 #4, #5, #6 |

Jumper JP2

| Segment | Function | Setting |
|---------|---|----------|
| | Stator Voltage 20 to 70VAC or 20 to 100VDC 40 to 135VAC | #2 #1 |

Jumper JP3

| Segment | Function | Setting |
|---------|--|----------|
| | Rotor Voltage 20 to 70VAC 40 to 135VAC | #2 #1 |

Jumper JP4

| Segment | Function | Setting |
|---------|--|----------|
| | Power Supply 20 to 45VAC or 20 to 60VDC 30 to 135VAC or 40 to 100VDC | #2 #1 |

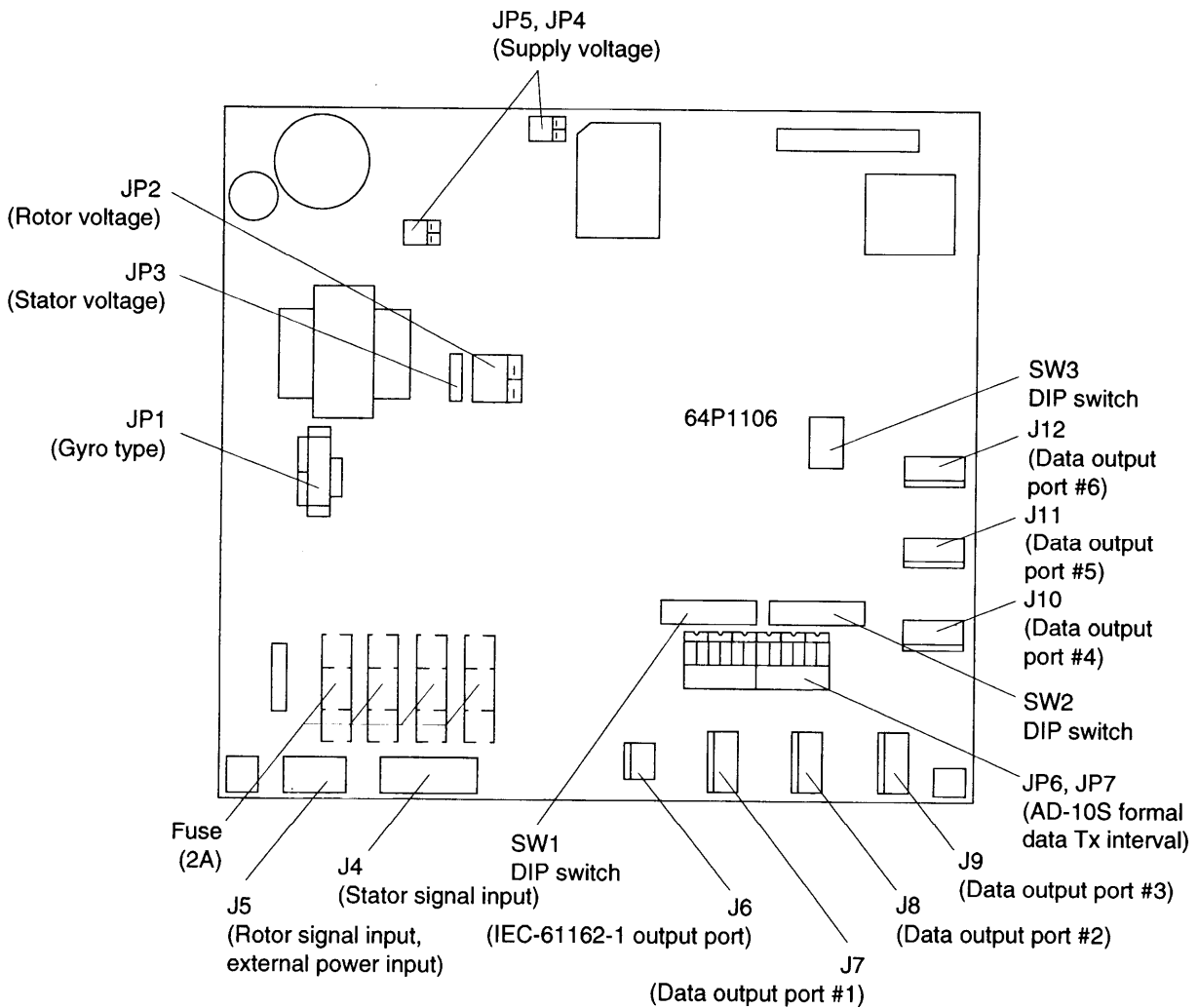
Jumper JP5

| Segment | Function | Setting |
|---------|--|----------|
| | Power Supply 20 to 45VAC or 20 to 60VDC 30 to 135VAC or 40 to 100VDC | #2 #1 |

5. INITIALIZING THE UNIT

- (1) Adjust the brightness of the Bearing Display and backlighting for the keys with the Dimmer Control.
- (2) Press the HOLD key to disengage the computing circuit from the gyrocompass. The HOLD lamp lights.
- (3) After the gyrocompass reading stabilizes, adjust the bearing display with the COUNT-UP or COUNT-DOWN keys.
Each pressing of the key changes the display by 0.1 degrees. For faster change, press and hold down the key to change the display in 1.0 degree steps.
- (4) To freeze the display, press the Hold key. The HOLD lamp lights. To restart the display press the Hold key.
Since the computing circuit is disengaged from the gyrocompass during hold, readjust the display so it agrees with the gyrocompass reading.

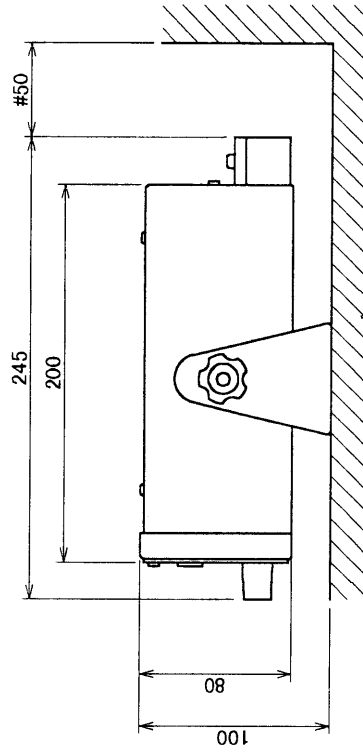
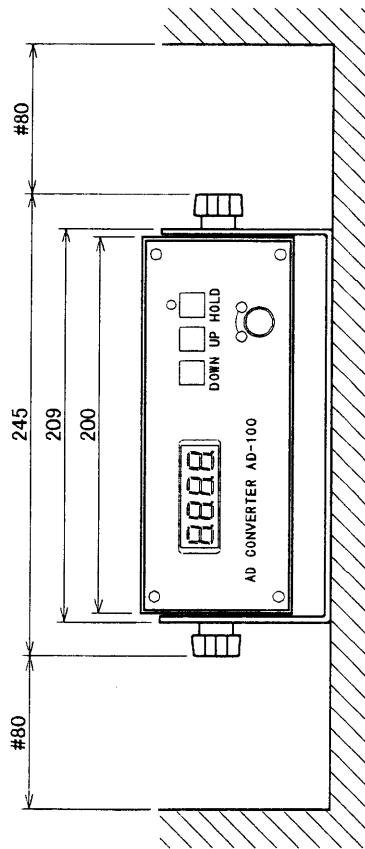
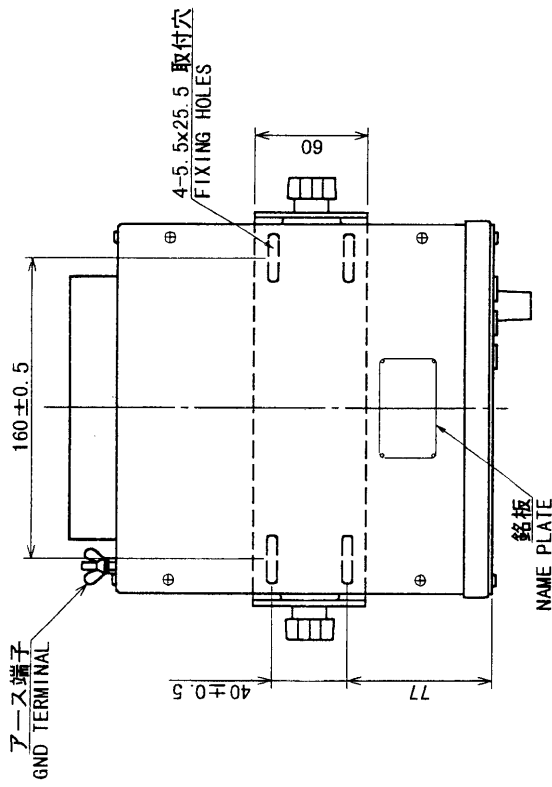
CHAPTER 4 PARTS LOCATION



PROCESSOR BOARD 64P1106

表 1 TABLE 1

| 寸法区分 (mm) DIMENSION | 公差 (mm) TOLERANCE |
|------------------------|----------------------|
| 0 < L ≤ 50 | ±1.5 |
| 50 < L ≤ 100 | ±2.5 |
| 100 < L ≤ 500 | ±3 |



注記

- 1) 指定なき寸法公差は表 1 による。
- 2) #: 推奨する最小サービス空間寸法。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
2. #: RECOMMENDED SERVICE CLEARANCE.

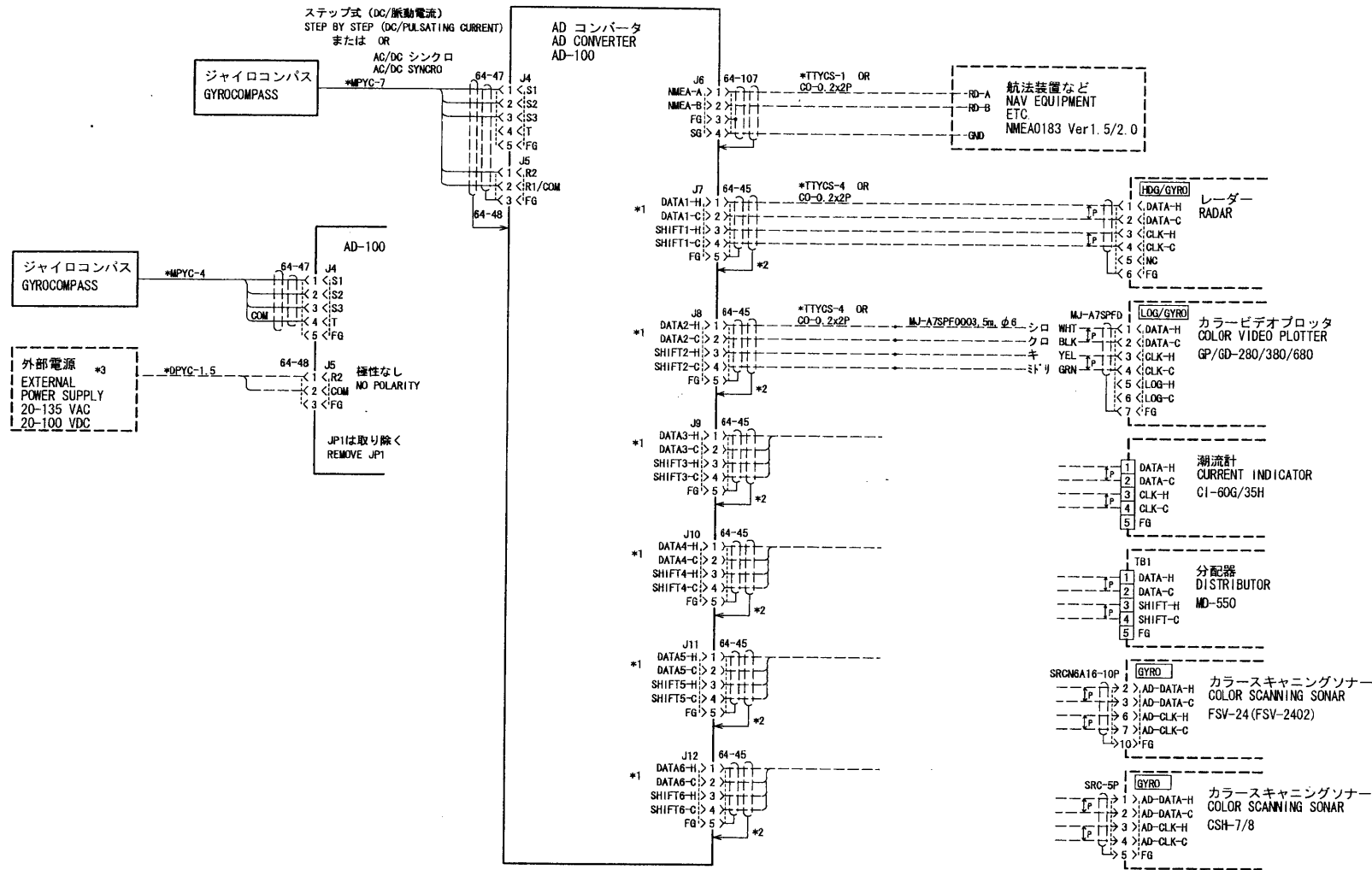
| | |
|----------------------------------|-----------------------|
| DRAWN Apr 17 '60 T. Yamashita | TITLE AD-100 |
| CHECKED Apr 17 '60 Y. Kimura | 名称 A-Dコンバータ |
| APPROVED Apr 17 '60 Y. Kimura | 外寸図 |
| SCALE 1/4 | NAME A-D CONVERTER |
| MASS 2.0 kg | OUTLINE DRAWING |
| DWG. No. C4340-G01-E | |

A

B

C

D



注記

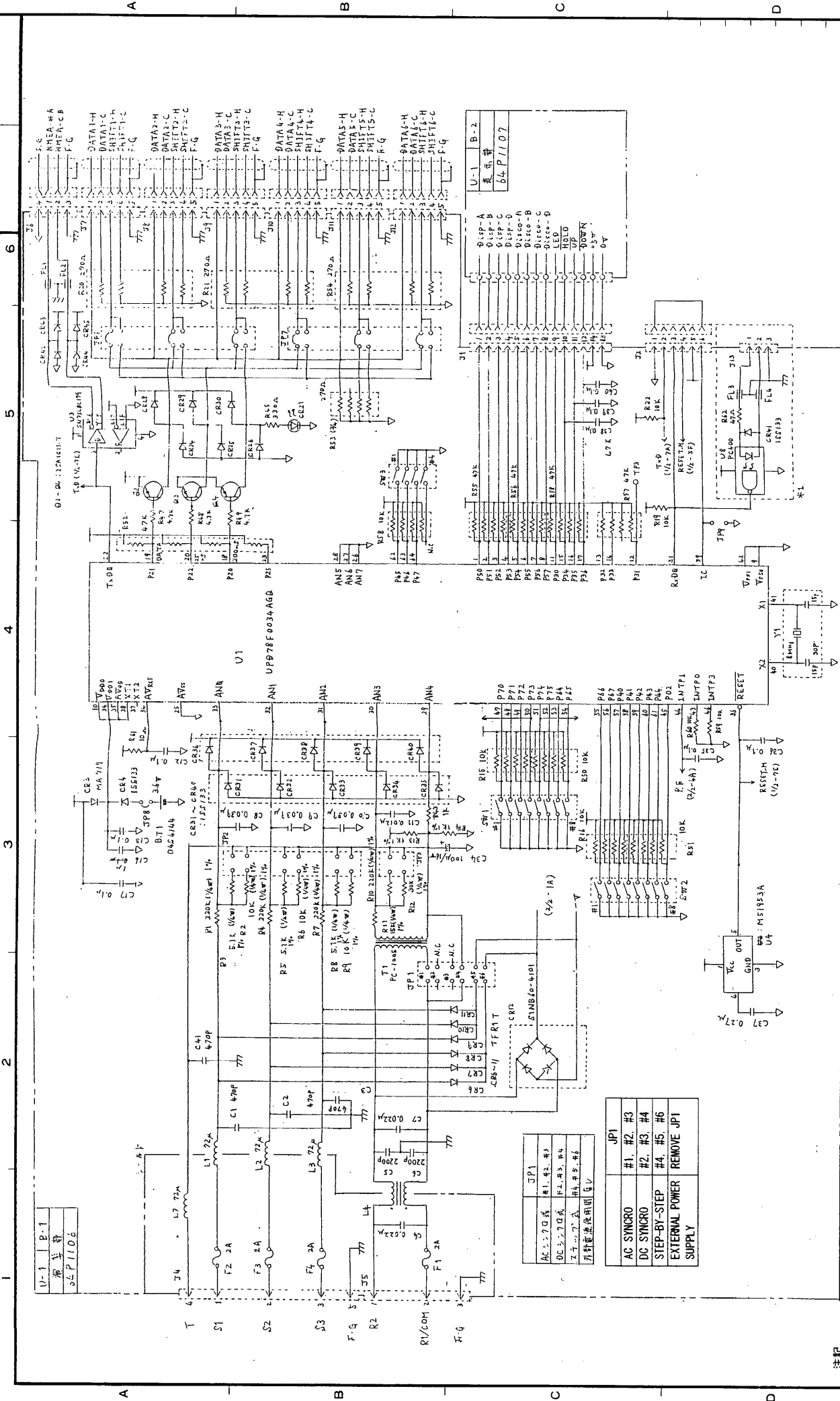
- * 1) データ送信間隔は25msまたは200msから選択。ただしレーダーは25msを使用のこと。
- * 2) シールドおよび使用しないワイヤはFGピンでアースに落とす。
- * 3) DCステップ電力が5W以下のとき、または電圧が20V以下のときは外部電源を使用する。

NOTE

- *1. SELECT DATA TRANSMISSION INTERVAL BETWEEN 25 ms AND 200 ms. RADAR REQUIRES 25 ms INTERVAL.
- *2. GROUND SHIELD AND UNUSED WIRES THRU FG PIN.
- *3. USE THE EXTERNAL POWER SUPPLY WHEN DC STEP CANNOT SUPPLY 5W OR 20V.

CO-0. 2x2P: CO-SPEVV-SB-C 0. 2x2P, φ 10. 5

| | |
|-------------------------------------|-------------------------|
| DRAWN May 23 '03 T. YAMASAKI | TITLE AD-100 |
| CHECKED May 23 '03 T. Takeno | 名称 ADコンバータ |
| APPROVED May 23 '03 Masaguchi | 相互結線図 |
| SCALE MASS kg | NAME AD CONVERTER |
| DWG No. C4340-C01- G | INTERCONNECTION DIAGRAM |



図名: 64P1106 (1/2) 演算部基板
回路図
PROCESSOR BOARD
SCHEMATIC DIAGRAM

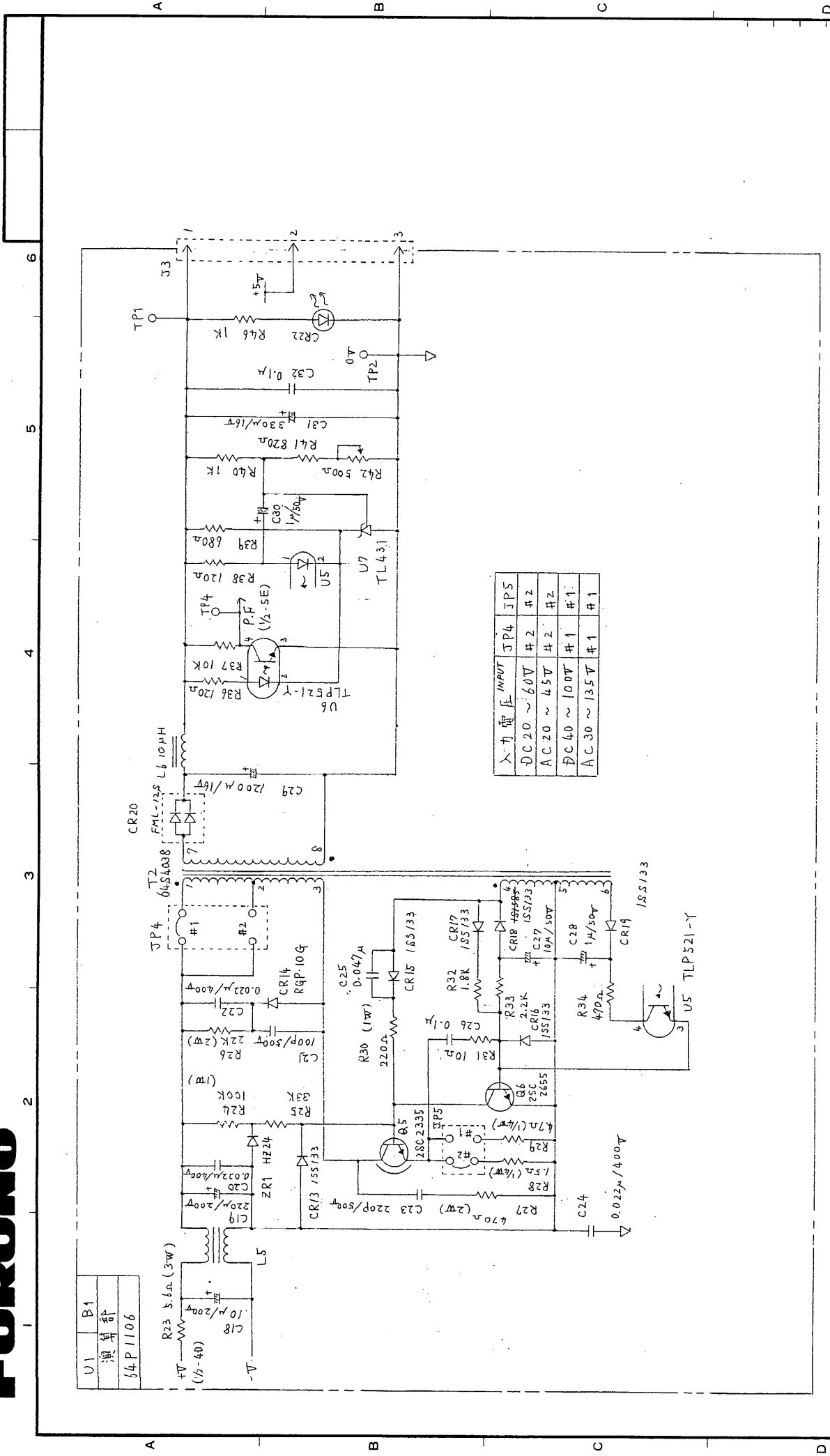
DRW: 03/05/19 I. YAMASAKI
CHECKED: 05/08/20 Z. Masuyoshi
APPROVED: 03/05/20 S. Yamamoto
SCALE: MASS

TYPE: 64P1106 (1/2)
名称: 演算部基板
回路図
PROCESSOR BOARD
SCHEMATIC DIAGRAM

MODEL: AD-100
BLOCK No.: I B1
Dwg No.: CA340-K01-E
64-014-1023-3

注記:
 1) 単位記入なき抵抗はΩ、コンデンサはF、コイルはHとする。
 2) 破線部内の部品は実装なし。

NOTE:
 1. UNLESS OTHERWISE SPECIFIED, RESISTANCE IN OHMS, CAPACITANCE IN FARADS, AND INDUCTANCE IN HENRY.
 2. BROKEN LINE SHOWS PATTERN ONLY.



| 入力電圧 INPUT | JP4 | JP5 |
|--------------|-----|-----|
| DC 20 ~ 60V | #2 | #2 |
| AC 20 ~ 45V | #2 | #2 |
| DC 40 ~ 100V | #1 | #1 |
| AC 30 ~ 135V | #1 | #1 |

| | | | | |
|----------|----------|-------------|---------------|-------------------|
| DRAWN | 03/05/19 | T. YAMASAKI | TYPE | 64P1106 (2/2) |
| CHECKED | 03/05/20 | Z. Igarashi | 名称 | 演算部基板 |
| APPROVED | 03/05/20 | S. Yamamura | 回路図 | 回路図 |
| SCALE | 1:1 | MODEL | AD-100 | PROCESSOR BOARD |
| | | BLOCK No. | 1 B1 | SCHEMATIC DIAGRAM |
| | | Dwg No. | 64-014-1023-0 | |

注記
 1) 単位記入なき抵抗はΩ、コンデンサはF、コイルはHとする。
 NOTE
 1. UNLESS OTHERWISE SPECIFIED, RESISTANCE IN OHMS, CAPACITANCE IN FARADS, AND INDUCTANCE IN HENRY.

FURUNO®

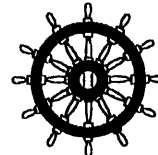
FURUNO ELECTRIC CO., LTD.

9-52 Ashihara-Cho, Nishinomiya City, 662-8580, Hyogo, Japan

Tel: +81 798-65-2111 Fax: +81 798-65-4200

Pub NO. DOC-255

Declaration of conformity to type

We **FURUNO ELECTRIC CO., LTD.**

(Manufacturer)

9-52 Ashihara-Cho, Nishinomiya City, 662-8580, Hyogo, Japan

(Address)

hereby declare under our sole responsibility that the product

Compass interface model AD-100

(Model names, type numbers)

to which this declaration relates conforms to the following standard(s) or normative document(s)

StandardTest standard

IMO Resolution A.477 (XII)

IEC 60936

IMO Resolution A.694 (17)

IEC 60945

IMO Resolution MSC.64(67) Annex 4

(title and/or number and date of issue of the standard(s) or other normative document(s))

For assessment, see EC – type approval certificate no. 050558/99 of 01 October 1999 issued by Federal Maritime and Hydrographic Agency, the Federal Republic of Germany

This declaration is issued according to the provisions of European Council Directive 96/98/EC on marine equipment modified by Commission Directive 98/85/EC.

On behalf of Furuno Electric Co., Ltd.

Hiroaki Komatsu
Manager,
International Rules and RegulationsNishinomiya City, Japan
December 14, 1999

(Place and date of issue)

(name and signature or equivalent marking of authorized person)