FURUNO

OPERATOR'S MANUAL

DGPS BEACON RECEIVER

MODEL GR-80

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SAFETY INSTRUCTIONS

⚠ WARNING

Do not open the equipment.

Hazardous voltage which can cause electrical shock, burn or serious injury exists inside the equipment. Do not work inside the equipment unless familiar with electrical circuits.

⚠ CAUTION

Position should always be checked against other sources to confirm reliability.

GPS position and velocity accuracies are controlled by the U.S. Department of Defense.

Turn off the equipment whenever you feel it is abnormal.

Continued use may damage the equipment.

The useable temperature range of the display unit is -15°C to +55°C.

Use in temperature out of the above range may damage the equipment.

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 display unit.

Keep the compass safe distance.

Standard compass	Steering compass
0.3 m	0.2 m

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FOREWORD

A Word to GR-80 Owners

FURUNO Electric Company thanks you for purchasing the GR-80 DGPS Beacon Receiver. We are confident you will discover why the FURUNO name has become synonymous with quality and reliability.

For over 50 years FURUNO Electric Company has enjoyed an enviable reputation for quality and reliability throughout the world. This dedication to excellence is furthered by our extensive global network of agents and dealers.

Your DGPS beacon receiver is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless properly installed and maintained. Please carefully read and follow the installation, operation and troubleshooting procedures set forth in this manual.

We would appreciate feedback from you, the end-user, about whether we are achieving our purposes.

Thank you for considering and purchasing FURUNO.

Features

The GR-80 receives differential error correction messages (RTCM SC104 format) which are broadcast by public radio beacons operating in the 283.5 to 325 kHz frequency range. The differential error correction messages are output via a serial port for use in the associated GPS receiver, resulting in differentially correction position data with better than 10 meter accuracy.

The GR-80 may be controlled from the front panel, or remotely via the serial I/O port. The I/O protocol is NMEA 0183. Output format is RS-232C or RS-422 (default).

SPECIFICATIONS

Performance

Frequency range	283.5 – 325.0 kHz
Freq. resolution	0.5 kHz
Receiver	Single superhetero-dyne
IF frequency	455 kHz
Input sensitivity	6 dBμV (MSK rate 100 bps, 10^{-3} bit error)

Data Processing

Modulation	MSK
Data coding	Dual Costas loop
MSK rate	25, 50, 100, 200 bps (auto or manual, selectable)

Beacon Antenna (std. supply)

Gain	6 dB
Protection	Can withstand 30 Vrms input for more than 15 minutes in the range of 100 kHz to 28 MHz

Interface (protocol)

Data protocol	RTCM SC104
Status protocol	NMEA 0183
Control protocol	NMEA 0183
Level	RS-422 or RS-232C (selectable)
Baud rate	300, 600, 1200, 2400, 4800, 9600, 14400, 19200 bps (selectable)

Interface (position input)

Position input	NMEA 0183
Hardware spec.	Current loop
Baud rate	4800 bps (fixed)

Power Requirements

Power	Forward switching (floating)
Input voltage	10.2 to 31.2 VDC
Power consumption	Less than 5 W

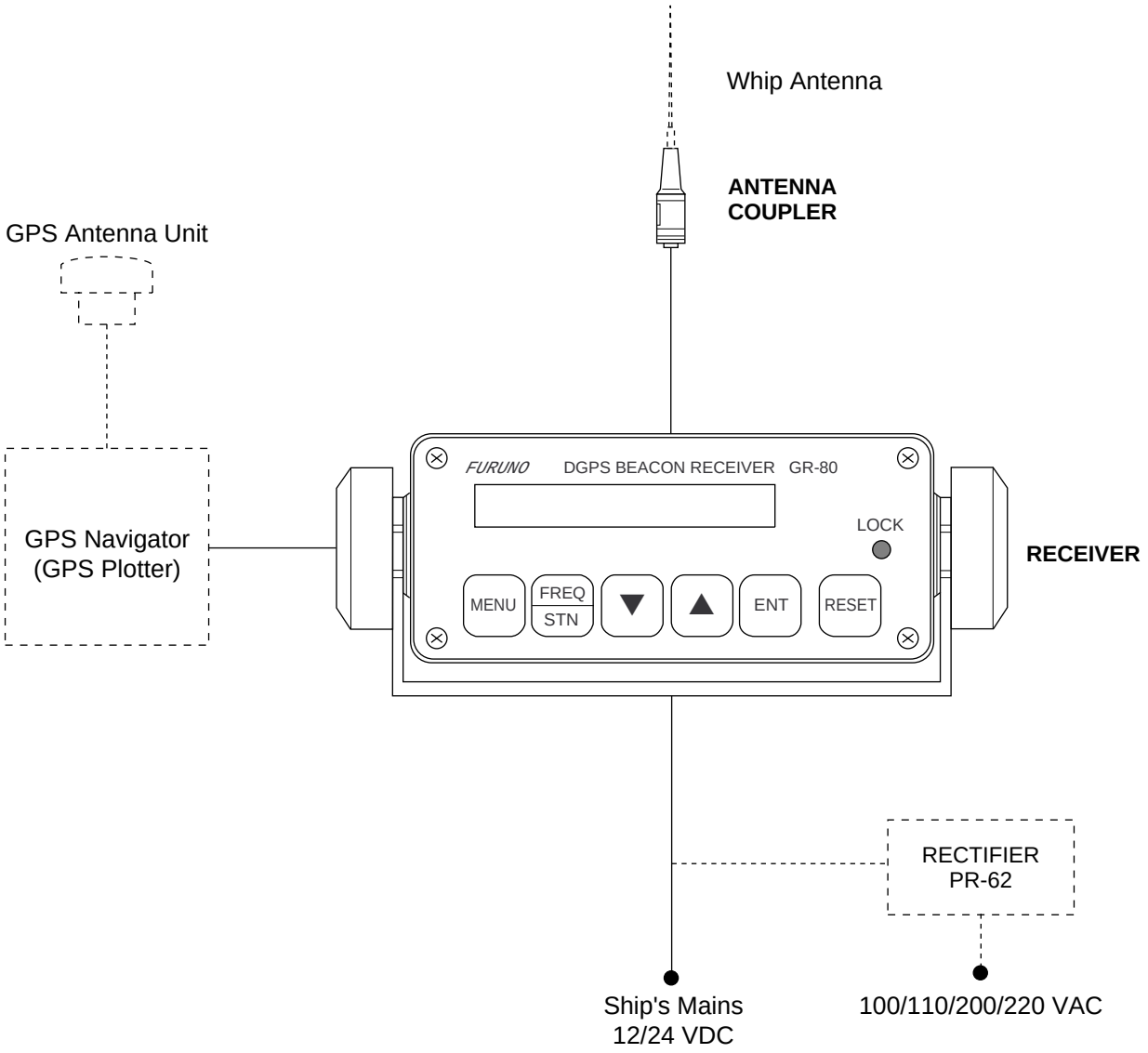
Mechanical

Dimensions (mm)	105(W) x 60(H) x 200(D)
Mass	1 kg
Color	2.5GY5/1.5 (Gray)

Environmental Conditions

Display unit	-15°C to +55°C
Antenna unit	-20°C to +70°C
Humidity	Receiver: 95% (40°C) Antenna: 100% (40°C)
Water resistance	Receiver: IPX-2 Antenna: IPX-6

SYSTEM CONFIGURATION



HOW DGPS WORKS

Position accuracy for civil users of GPS is limited to about 50 meters. This limitation exists not only because of the US Department of Defense's intentional downgrading of the accuracy but also because of signal attenuation and clock error inherent in both GPS satellites and GPS receivers. With Differential GPS (DGPS), however, differential corrections can improve position accuracy to better than 10 meters.

Differential GPS is based upon accurate knowledge of the accurate geographical location of a reference station which is used to compute corrections to GPS parameters, error sources and resultant positions. These differential corrections are transmitted to GPS users, who apply the corrections to their received GPS signals or computed position.

The DGPS reference stations are fixed at a geodetically surveyed position. The reference station tracks all satellites in view, downloads ephemeric data from them, and computes corrections based on its measurement and geodetic position. These corrections are then broadcast to GPS users by radio beacons (transmitters) to improve their position solution.

The radio beacons broadcast in the frequency range of 283.5–325 kHz and have a transmitting range from 40 nm to 300 nm depending on radio beacon.

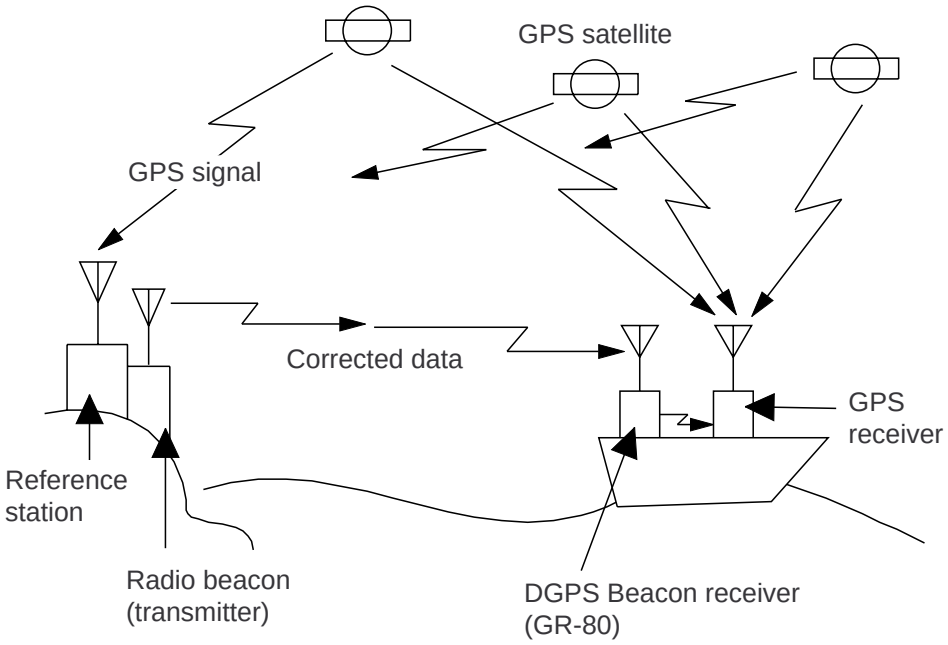


Figure 1 DGPS concept

INSTALLATION

Antenna Installation

Siting considerations

- Install the antenna vertically and as high and far away from surrounding obstacles as possible.
- Separate the antenna at least three meters from any transmitter antennas which are radiating at significant RF power levels.

Mounting the antenna coupler

It can be mounted two ways:

- The threaded antenna base accepts a standard antenna mount with a 1"-14 straight thread. Mount the antenna on a length of pipe with a 1"-14 threaded end. **DO NOT USE TOOLS TO FASTEN THE ANTENNA TO ITS MOUNTING; ONLY HAND TIGHTEN.** Route the antenna cable (antenna extension cable) inside the pipe.
- Attach the antenna coupler to a steel mast with hose clamps (option).

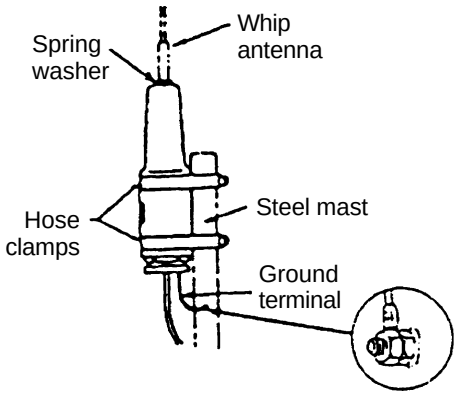


Figure 2 Attachment of antenna coupler to steel mast

Mounting of whip antenna

Screw in the whip antenna in the hole at the top of the preamp unit. Coat junction with silicone rubber.

Ground

If the preamp unit is attached to a steel mast, run a ground wire between the ground terminal on the preamp unit and a stainless steel bolt welded to the mast. The ground wire should be as short as possible. (It is also recommended to ground the preamp unit when it is attached to a non-metallic mast.)

⚠ CAUTION

Ground the equipment to prevent loss of sensitivity.

Connection of antenna cable

The antenna cable (15 m) is attached to the preamp unit. When optional 30 m or 60 m cable is used, tape the junction with self-vulcanizing tape and vinyl tape to waterproof the cable. Finally, attach cable tie near ends of tape to prevent unwinding.

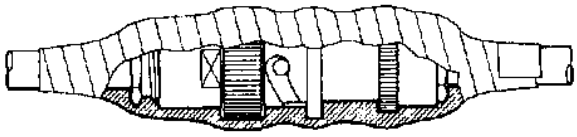
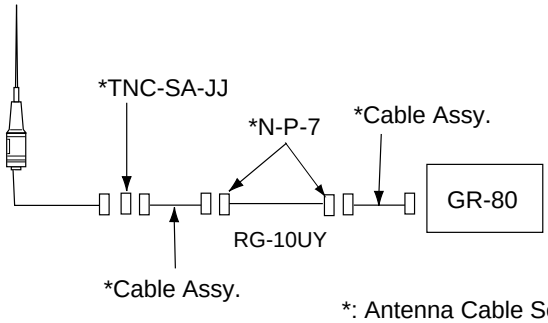


Figure 3 How to tape the antenna cable

Connection of RG-10UY cable

Use the Antenna Cable Set (option) to connect the RG-10UY cable.



*: Antenna Cable Set parts

Receiver Unit Installation

Siting considerations

The receiver can be mounted on a tabletop, on the overhead or in a panel (requires optional flush mount kit). When selecting a mounting location keep the following points in mind;

- Locate the receiver away from rain and water splash.
- Keep the receiver away from heat sources.
- Install the receiver out of direct sunlight.
- The viewing angle of the front panel is ±45°.
- Leave at least 100 mm space behind the receiver and 80 mm space at the sides to permit easy access to connectors at the rear and knobs at the sides.

Tabletop or overhead mounting

1. Fix the hanger to the mounting location with tapping screws.
2. Loosely screw knobs into the receiver. Set the receiver to the hanger and tighten knobs.

Flush mounting (option)

See outline draing at the end of the manual.

Note: Remove gasket at right and left sides of receiver before mounting in panel.

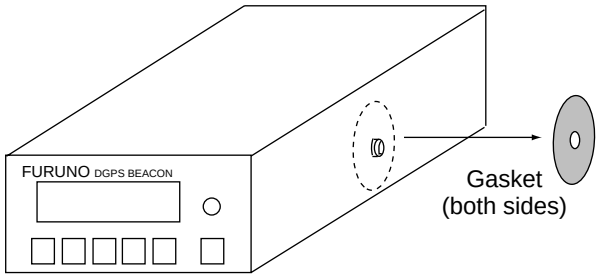


Figure 4 GR-80 receiver unit

Note: For flush mounting, use only the screws supplied with the flush mount kit to fix the receiver. Use of other screws may damage the equipment.

Connections

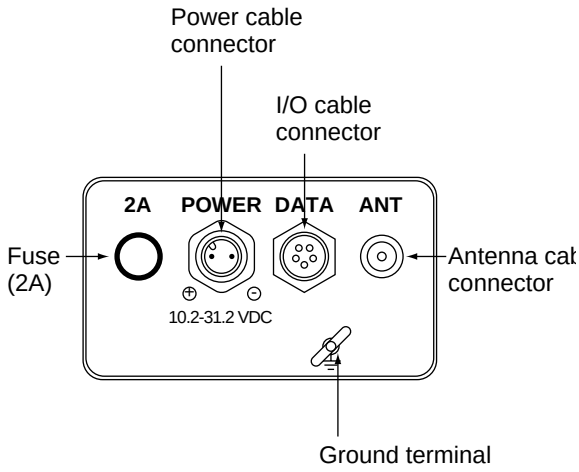


Figure 5 Connections on rear panel of receiver

Power cable

A power cable, complete with connector, is supplied. Connect the leads to the power supply; red wire to positive (+) terminal and black wire to negative (–) terminal.

The receiver does not have a power switch. We recommend that a switch be dedicated to the receiver on the mains switchboard.

Antenna cable

Connect the cable to the ANT connector.

I/O input cable

The 7-pin DATA connector connects the GPS navigator. A signal cable is supplied with the navigator; attach the connector (FM14-7P) supplied with the GR-80 to the cable. For no signal cable the following cables are optionally available:

Cable Type	Code No.	Remarks
MJ-A6SPF0003-050	000-117-603	6P, 5m
MJ-A7SPF0003-050	000-136-730	7P, 5m

Note: If the GR-80 is causing interference to a VHF radiotelephone, follow the proce dure on page 23.

Pin arrangement on the DATA connector is shown below. For connection at the GPS navigator, see its manual.

For RS-232C

Pin#	Signal	Description
1	TXD	Output data
2	NC	No connection
3	RXD	Input data
4	NC	No connection
5	RX-H	* Nav Data (current loop)
6	RX-C	* Nav Data (current loop)
7	FG	Ground

** For auto L/L mode. See page 11.*

For RS-422

Pin#	Signal	Description
1	TXD(+)	Output data (H)
2	TXD(-)	Output data (C)
3	RXD(+)	Input data (H)
4	RXD(-)	Input data (C)
5	RX-H	* Nav Data (current loop)
6	RX-C	* Nav Data (current loop)
7	FG	Ground

** For auto L/L mode. See page 11.*

Ground

Connect a ground wire between the ground terminal at the rear of the receiver and a suitable ground point.

Interface Format

The interface format can be RS-232C or RS-422 and the default format is RS-422. For RS-232C, do the following:

1. Disconnect cables at the rear of the receiver.
2. Unscrews eight screws to remove the receiver.
3. Disconnect cables connected to the front panel.
4. Remove printed circuit board from rear of the receiver.
5. On the MAIN Board (08P3192), unplug the connector plugged into J3 (RS-422) and plug it into J4 (RS-232C).

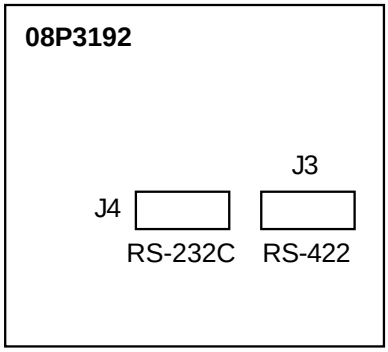


Figure 6 MAIN Board

6. Reassemble the receiver.

Initial Settings

After installing the equipment, enter baud rate of connected GPS receiver, output data byte format and your area as follows:

Default settings

Baud rate:	4800 bps
Output data byte format:	6 of 8
Your area:	Area 1 (USA, Canada, Bermuda, Brazil)

1. Press [MENU] and [RESET] together. Release the keys when the display shows "SELF TEST?"
2. Press the [▼] key once to display "SET BAUD RATES?"
3. Press the [ENT] key.
4. Press [▲] or [▼] to select baud rate which matches that of connected GPS navigator; 300, 600, 1200, 2400, 4800, 9600, 14400, 19200 bps.
5. Press the [ENT] key. "SET DATA FORMAT?" appears.
6. Press the [ENT] key.
7. Press [▲] or [▼] to select output data byte format; 6-8 or 8-8.
8. Press the [ENT] key.
9. Press the [RESET] key to reset the CPU and return to the normal operation mode.
10. Press the [MENU] key. "SET RCV MODE?" appears.
11. Press [▲] or [▼] to display "SET STN AREA?"
12. Press the [ENT] key.
13. Press [▲] or [▼] to select your area (your vessel's location);

    AREA 1: USA, Canada, Bermuda, Brazil
    AREA 2: Europe
    AREA 3: Australia, Japan, Korea

14. Press the [ENT] key.
15. Press the [MENU] key to close the menu.

GR-80 Output signal

Signal level:	RS-232C or RS-422
RTCM ver. no.:	2.01
Byte format:	8-6 or 8-8
First bit:	LSB
Parity bit:	NONE
Stop bit:	1
Bit rate:	8

OPERATION

Turning the Power On/Off

Power to the equipment may be turned on/off at the mains switchboard. When the power is applied or the CPU is reset ([RESET] key pressed) the equipment proceeds as follows:

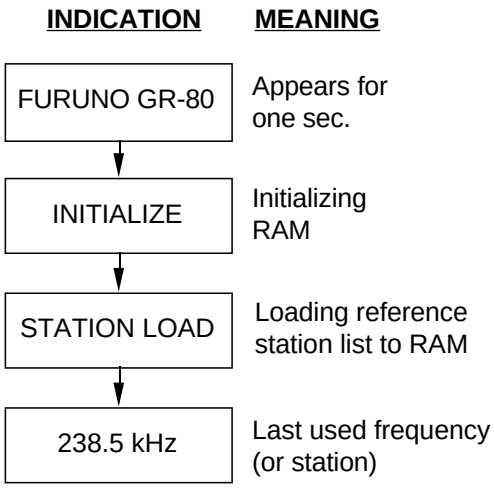


Figure 7 Power-on/reset sequence

Controls and Indications

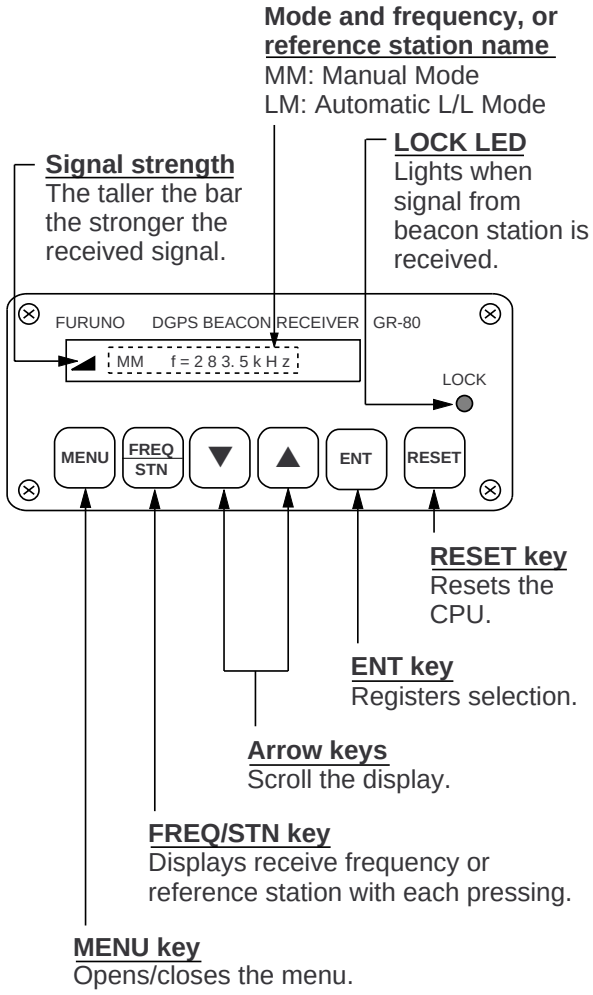


Figure 8 Front panel of GR-80

Menu Operation

Most functions are carried out through menus and there are two sets of menus, normal operation menu and option mode menu.

Normal operation menu

The normal operation menu mostly contains items used in everyday operations such as dimmer and contrast level adjustment. The [MENU] key opens/closes the menu and goes to preceding menu item when pressed with a menu option displayed. The arrow keys scroll the display. Use the [ENT] key to register option.

operation menu. To escape from the option mode menu, press the [RESET] key.

Menu tree

Figure 9 shows the menu tree.

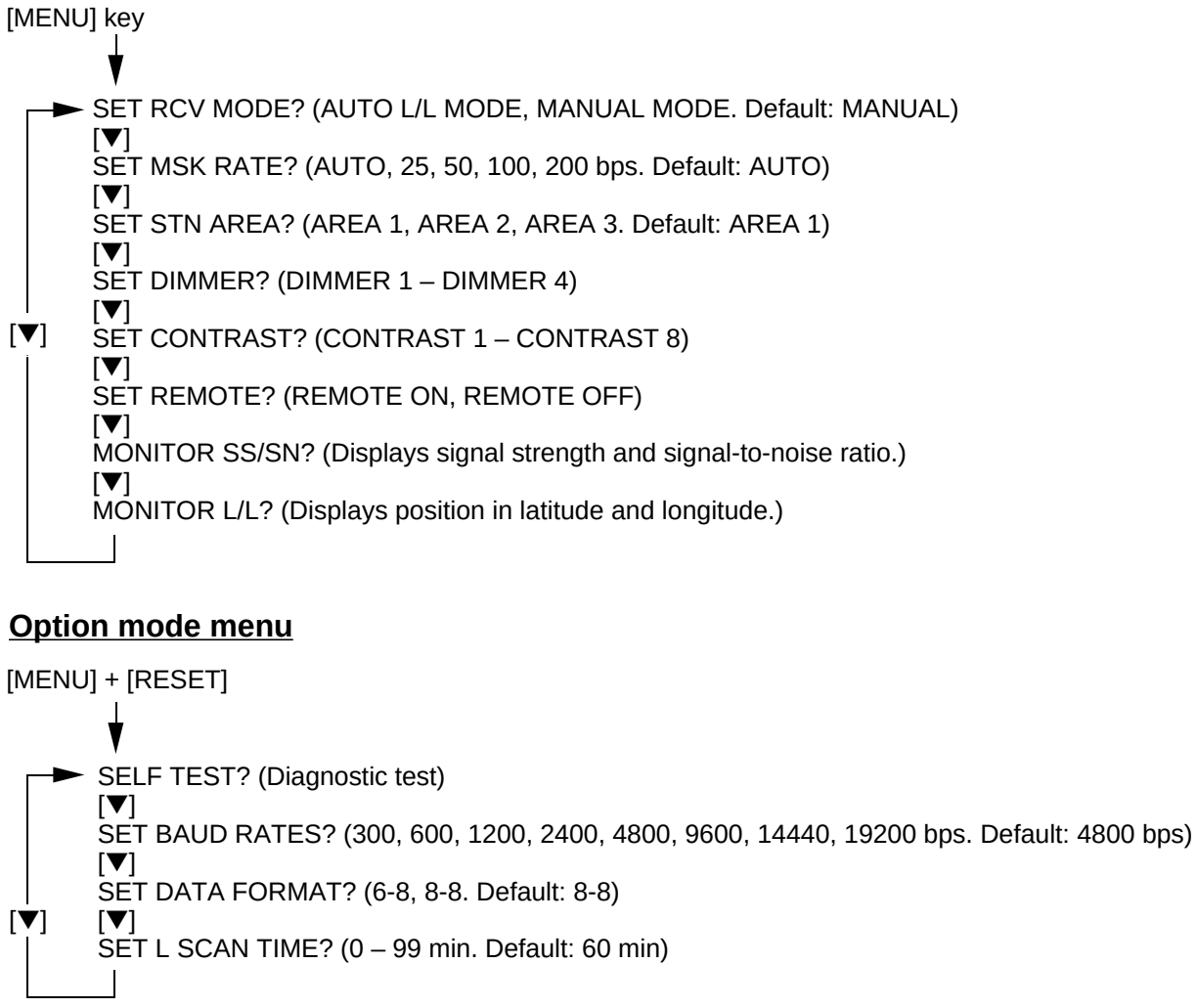


Figure 9 Menu tree

Adjusting Brilliance, Contrast

The brilliance and contrast of the LCD can be adjusted as follows:

1. Press the [MENU] key.
2. Press [▲] or [▼] to display "SET DIMMER?"
3. Press the [ENT] key.
4. Press [▲] or [▼] to select level desired. Four levels are available.
5. Press the [ENT] key. The display shows "SET CONTRAST?"
6. Press [▲] or [▼] to select level desired. Eight levels are available.
7. Press the [ENT] key.
8. Press the [MENU] key.

Manual Operation

1. Press the [MENU] key. "SET RCV MODE?" appears.
2. Press the [ENT] key.
3. Press [▲] or [▼] to display MANUAL MODE.
4. Press the [ENT] key.
5. Press the [MENU] key.
6. Press the [FREQ/STN] key to display frequency or station in the display window.
7. Press [▲] or [▼] to select appropriate frequency (or station). Refer to the DGPS reference station lists which start on page 15.
8. If you selected a frequency at step 7, set MSK rate as follows:
   a) Press the [MENU] key.
   b) Press [▲] or [▼] to display "SET MSK RATE?"
   c) Press the [ENT] key.
   d) Press [▲] or [▼] to select MSK rate corresponding to frequency selected in step 7. Refer to the DGPS reference station lists which start on page 16.
   e) Press the [ENT] key.
   f) Press the [MENU] key.

When signal is received, LOCK LED lights.

Note: If you do not know the MSK rate, select AUTO, which is 100 or 200.

Automatic Operation

In automatic operation the receiver searches for reference station nearest your vessel.

1. Press the [MENU] key. "SET RCV MODE?" appears.
2. Press the [ENT] key.
3. Press [▲] or [▼] to display AUTO L/L MODE.
4. Press the [ENT] key.
5. Press the [MENU] key.

No key input is accepted while the receiver is searching for station. When signal is received, LOCK LED lights.

Automatic mode conventions

- The display shows STATION SEARCH while the receiver is searching stations.
- The receiver re-scans for nearest station when currently selected station becomes unacceptable for a certain number of minutes. (The number of minutes to wait before re-scanning can be selected on the option mode menu, between 0 and 99 minutes. When signal is received, LOCK LED lights.)
- L/L ERROR appears when there is no L/L data. In this case, press any key to erase the indication and then select the manual mode.

Displaying Position

1. Press the [MENU] key.
2. Press [▲] or [▼] to display "MONITOR L/L?"
3. Press the [ENT] key. Position in latitude and longitude appears. L/L ERROR appears when there is no L/L data.

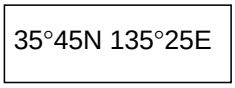


Figure 10 Sample latitude and longitude display

4. Press the [MENU] key.

Station Scan Time Out

You may set the time in minutes the receiver waits (in the AUTO L/L mode) before re-scanning for nearest reference station, when the station currently selected becomes unacceptable (LOCK LED off). The default setting is 10 minutes.

1. Press [RESET] while pressing and holding down [MENU]. Release [MENU] when the display shows "SELF TEST?"
2. Press [▲] or [▼] to display "SET L SCAN TIME?"
3. Press the [ENT] key.
4. Press [▲] or [▼] to set time.
5. Press the [ENT] key followed by the [MENU] key.

Displaying Signal Strength and Signal-to-Noise Ratio

Signal strength displays a numeric representation of field strength of the received signal on the selected frequency. The higher the number the stronger the received signal.If a noise appears at reception band width,the number becomes bigger.

Signal-to-noise (S/N) ratio displays the ratio between the desired signal and unwanted noise on the selected frequency. The higher the S/N ratio the better the quality of the signal.

When the ship is in the sy\ervice area of a beacon station,this number should fbe between 20 and 22.If not,chack as follows.

- Check the grounding.
- Check the radar beam interference.
- Check the noise of power generator of the ship.

1. Press the [MENU] key.
2. Press [▲] or [▼] to display "MONITOR SS/SN?"
3. Press the [ENT] key. Signal strength and S/N ratio appear. DATA ERROR appears when no data is received from the DSP.

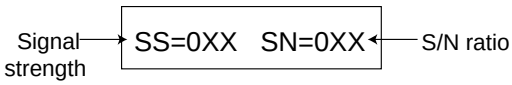


Figure 11 Sample signal strength and S/N ratio displays

4. Press the [MENU] key.

Remote Control

The GR-80 can be controlled remotely via the serial I/O port by the GPS receiver connected.

1. Press the [MENU] key.
2. Press [▲] or [▼] to display "SET REMOTE?"
3. Press the [ENT] key.
4. Press [▲] or [▼] to select REMOTE ON or REMOTE OFF.
5. Press the [ENT] key followed by the [MENU] key.

TROUBLESHOOTING

Troubleshooting Table

The table which follows will help the user with diagnosing operational problems.

Symptom	Remedy
No output data	• Check power supply. • Check DATA connector. • Check host port assignment.
Random output data	• Check if tuned to valid beacon. • Radio beacon may be in test mode or off air. • Check if MSK rate is correct. • Check if baud rate is correct. • Measure voltage at antenna coax cable. • Try different beacon antenna.
No signal lock	• Check power supply. • Follow remedies in "Random output data."
Low signal-to-noise ratio	• Check if MSK rate is correct. • Check if antenna ground wire is connected. • Try different antenna location. • Electrical equipment on board may be interfering. Install noise filters on interfering equipment. • For outboard motor, install grounded shield inside hood.
Signal strength higher than usual	• Check if antenna ground wire is connected. • Check for interfering sources near antenna. Move antenna if necessary. • Follow remedies in "Low signal-to-noise ratio."
GPS not accepting RTCM	• Check if DPGS setting on GPS receiver is correct. • Check if I/O baud rate is correct. • Check if I/O pin out is correct. • Check if I/O cable is connected.
S/N ratio is under 10	• Check the grounding.

Diagnostic Test

The diagnostic test checks the circuit board and keys for proper operation.

To conduct the diagnostic test;

1. Press [RESET] while pressing and holding down [MENU]. Release [MENU] when the display shows "SELF TEST?"
2. Press the [ENT] key to start the test. The test proceeds in the sequence shown in the figure below.

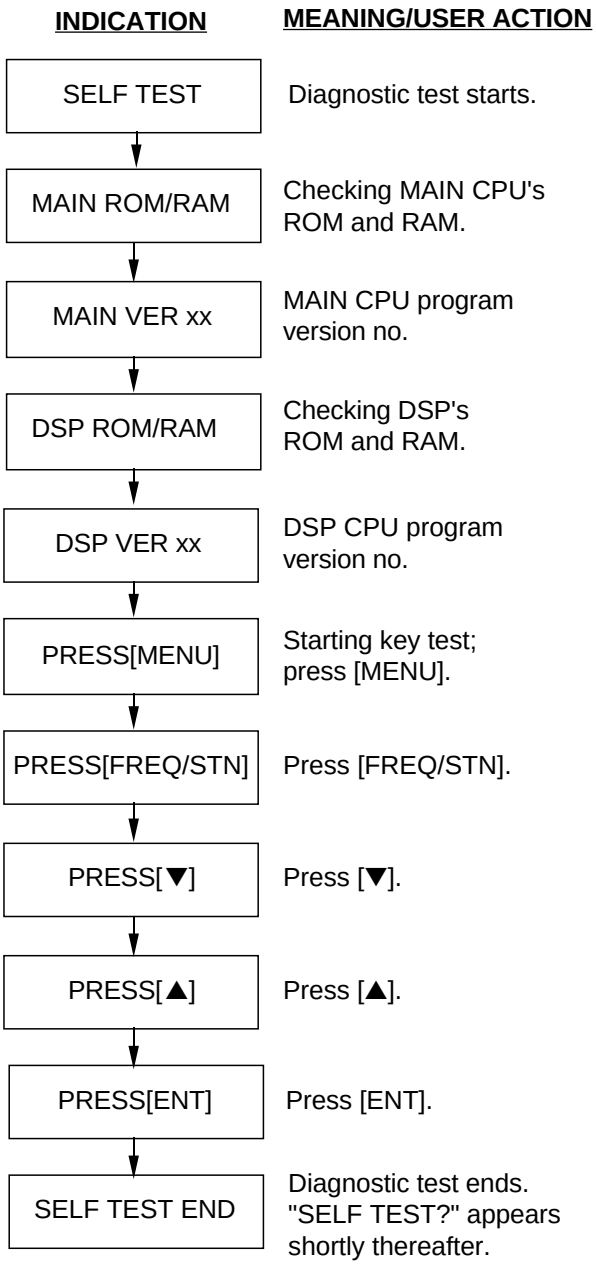


Figure 12 Sequence of diagnostic test

3. Press the [RESET] key to quit the diagnostic test.

Remarks on the diagnostic test

- When the equipment finds RAM or ROM error RAM NG (No Good) or ROM NG appears and the test stops. Press the [RESET] key to reset the CPU. Try the test again.
- When the equipment detects a faulty key two beeps are released.

DGPS REFERENCE STATIONS

Area 1: USA, Canada, Bermuda

(0 = Auto)

Location	Name in GR-80	Freq. (kHz)	Latitude	Longitude	MSK Rate	Country
ALEXANDRIA	ALEXANDRIA	305	N38.45	W77.07	100	VA,USA
ANNETTE ISLAND	ANNETTE.IS	323	N55.04	W131.36	100	AK,USA
APPLETON	APPLETON	300	N45.47	W121.19	100	WA,USA
ARANSAS PASS	ARANSAS	304	N27.50	W97.04	100	TX,USA
BARBERS PT	BARBERS.PT	325	N21.18	W158.07	100	HI,USA
BASS HARBOR	BASS.H	316	N44.13	W68.20	100	ME,USA
BRUNSWICK	BRUNSWICK	316	N43.53	W69.57	100	ME,USA
BUFFALO	BUFFALO	322	N42.52	W78.54	100	NY,USA
C.MENDOCINO	MENDOCINO	292	N40.26	W124.24	100	CA,USA
CAPE CANAVERAL	CANAVERAL	289	N28.28	W80.33	100	FL,USA
CAPE HENLOPEN	C.HENLOPEN	298	N38.47	W75.05	200	DE,USA
CAPE HENRY	C.HENRY	289	N36.56	W76.00	100	VA,USA
CAPE HINCHEN-BROOK	HINCHENBRK	292	N60.14	W146.39	100	AK,USA
CHARLESTON	CHARLESTON	298	N32.45	W79.51	100	SC,USA
CHATHAM	CHATHAM	325	N41.40	W69.57	200	MA,USA
CHEBOYGAN	CHEBOYGAN	292	N45.39	W84.28	200	MI,USA
CLARK	CLARK	309	N44.56	W97.58	100	SD,USA
COLD BAY	COLD.BAY	289	N55.06	W162.32	100	AK,USA
DETROIT	DETROIT	319	N42.18	W83.06	200	MI,USA
DULUTH	DULUTH	296	N46.47	W92.05	100	MN,USA
EGMONT KEY	EGMONT.KEY	312	N27.36	W82.46	200	FL,USA
ENGLISH TURN	ENG.TURN	293	N29.53	W89.57	200	LA,USA
FORT MACON	FT.MACON	294	N34.42	W76.41	100	NC,USA
FORT STEVENS	FT.STEVENS	287	N46.12	W123.57	100	OR,USA
GALVESTON	GALVESTON	296	N29.20	W94.44	100	TX,USA
GUSTAVUS	GUSTAVUS	288	N58.25	W135.42	100	AK,USA
ISABELLA	ISABELLA	295	N18.28	W67.04	100	PR,USA
KANSAS CITY	KANSAS.C	305	N39.07	W95.25	200	MO,USA
KENAI	KENAI	310	N60.40	W151.21	100	AK,USA
KEY WEST	KEYWEST	286	N24.00	W82.00	100	FL,USA
KODIAK	KODIAK	313	N57.37	W152.12	100	AK,USA
KOKOLE POINT	KOKOLE.PT	300	N21.59	W159.46	200	HI,USA
LOUISVILLE	LOUISVILLE	290	N38.01	W85.18	200	KY,USA
MEMPHIS	MEMPHIS	310	N35.28	W90.12	200	TN,USA
MIAMI	MIAMI	322	N25.44	W80.10	100	FL,USA
MILLERS FERRY	MILLERS	320	N32.05	W87.24	200	AL,USA
MILWAUKEE	MILWAUKEE	297	N43.00	W87.53	100	WI,USA
MOBILE PT	MOBILE.PT	300	N30.14	W88.01	100	AL,USA
MONTAUK PT	MONTAUK.PT	293	N41.04	W71.52	100	NY,USA
MORICHES	MORICHES	293	N40.47	W72.45	100	NY,USA
NEEBISH IS.	NEEBISH.IS	309	N46.19	W84.09	200	MI,USA
OMAHA	OMAHA	298	N41.47	W95.55	200	NE,USA
ONONDAGA	ONONDAGA	296	N42.48	W84.28	200	MI,USA
PENOBSCOT	PENOBSCOT	290	N44.33	W68.46	200	ME,USA
PIGEON PT	PIGEON.PT	287	N37.11	W122.24	100	CA,USA
PORTSMOUTH	PORTSMOUTH	288	N43.04	W70.43	100	NH,USA
POTATO PT	POTATO.PT	298	N61.04	W146.42	100	AK,USA
PRESQUE ILE	PRESQUE	293	N45.21	W83.30	100	MI,USA
PT ARGUELLO	ARGUELLO	321	N34.35	W120.39	100	CA,USA
PT BLUNT	PT.BLUNT	310	N37.51	W122.25	200	CA,USA
PT LOMA	PT.LOMA	302	N32.40	W117.15	100	CA,USA
REEDY POINT	REEDY.PT	309	N39.34	W75.34	200	DE,USA
ROBINSON PT	ROBINSON.P	323	N47.23	W122.23	200	WA,USA
ROCK ISLAND	ROCK.IS	311	N42.00	W90.14	200	IA,USA
SAGINAW BAY	SAGINAW.B	301	N43.38	W83.50	100	MI,USA
SALLISAW	SALLISAW	299	N35.22	W94.49	200	OK,USA
SANDY HOOK	SANDY.HOOK	286	N40.28	W74.00	200	NJ,USA
SAVANNAH	SAVANNAH	319	N32.08	W81.42	100	GA,USA
SEUL CHOIX PT	SEUL.CHOIX	322	N45.55	W85.55	200	MI,USA
ST LOUIS	ST.LOUIS	322	N38.37	W89.46	200	MO,USA
ST PAUL	ST PAUL	317	N44.18	W91.54	200	MN,USA
STURGEON BAY	STURGEON.B	322	N44.48	W87.19	100	WI,USA
UPOLU PT	UPOLU.PT	286	N20.15	W155.53	100	HI,USA
UPPER KEWEENAW	KEWEENAW	298	N47.14	W88.38	100	MI,USA

Area 1: USA, Canada, Bermuda (continued)

(0 = Auto)

Location	Name in GR-80	Freq. (kHz)	Latitude	Longitude	MSK Rate	Country
VICKSBURG	VICKSBURG	313	N32.20	W90.55	200	MS,USA
WHIDBEY IS	WHIDBEY.IS	302	N48.19	W122.42	100	WA,USA
WHITEFISH PT	WHITEFISH	318	N46.46	W84.57	100	MI,USA
WHITNEY	WHITNEY	310	N42.44	W103.19	200	NE,USA
WILDWOOD	WILDWOOD	301	N38.57	W74.52	200	NJ,USA
WISCONSIN PT	WISCONSIN	296	N46.43	W92.01	100	WI,USA
YOUNGSTOWN	YOUNGSTOWN	322	N43.14	W78.58	100	NY,USA
ALERT BAY	ALERT.BAY	309	N50.35	W126.55	200	CANADA
AMPHITRITE POINT	AMPHITRITE	315	N48.55	W125.33	200	CANADA
BASSANO	BASSANO	317	N50.47	W112.27	200	CANADA
CAPE NORMAN	CAPENORMAN	310	N51.30	W55.49	200	CANADA
CAPE RACE	C.RACE	315	N46.46	W53.11	200	CANADA
CAPE RAY	C.RAY	290	N47.38	W59.15	200	CANADA
CARDINAL	CARDINAL	306	N44.47	W75.25	200	CANADA
FOX ISLAND	FOX ISLAND	307	N45.20	W61.05	200	CANADA
LAUZON	LAUZON	309	N46.49	W71.10	200	CANADA
MOISIE	MOISIE	313	N50.12	W66.07	200	CANADA
PARTRIDGE ISLAND	PARTRIDGE	295	N45.14	W66.03	200	CANADA
RICHMOND(ATKINSON)	RICHMOND	320	N49.11	W123.07	200	CANADA
POINT PETRIE	PT.PETRIE	303	N43.50	W77.09	100	CANADA
PORT AUX BASQUES	AUXBASQUES	290	N47.34	W59.09	200	CANADA
PORT WELLER	PT.WELLER	302	N43.14	W79.13	100	CANADA
PT.ESCUMINAC	ESCUMINAC	319	N47.04	W64.48	200	CANADA
RIGOLET	RIGOLET	299	N54.15	W58.30	200	CANADA
RIVIERE DU LOUP	RIVIERE	300	N47.46	W69.36	200	CANADA
SANDSPIT	SANDSPIT	300	N53.14	W131.49	200	CANADA
SOMBRA	SOMBRA	306	N42.42	W89.29	100	CANADA
ST JEAN SUR RICHELIEU	ST.JEAN	296	N45.19	W73.19	200	CANADA
TRIPLE ISLAND	TRIPLE.IS	308	N54.17	W130.53	100	CANADA
TROIS RIVIERES	TROIS.R	321	N46.23	W72.27	200	CANADA
WATROUS	WATROUS	321	N50.40	W105.26	200	CANADA
WESTERN HEAD	WESTERN.HD	312	N43.59	W64.40	200	CANADA
WIARTON	WIARTON	286	N44.45	W81.07	200	CANADA
WINNIPEG	WINNIPEG	312	N49.50	W97.30	200	CANADA
ST.DAVIDS HEAD	ST DAVID	323	N32.22	W64.39	100	BERMUDA

Area 2: Europe, Egypt

(0 = Auto)

Location	Name in GR-80	Freq. (kHz)	Latitude	Longitude	MSK Rate	Country
OOSTENDE PHARE	OOSTENDE	311.5	N51.14	E02.55	100	BELGIUM
BLAAVANDS HUK	BLAAVANDS	296.5	N55.34	E08.05	100	DENMARK
HAMMERODDE	HAMMERODDE	289	N55.18	E14.46	100	DENMARK
SKAGEN	SKAGEN	298.5	N57.44	E10.35	100	DENMARK
RISTNA LT	RISTNA LT	307	N58.56	E22.04	200	ESTONIA
MANTYLUOTO	MANTYLUOTO	298	N61.36	E21.28	200	FINLAND
OUTOKUMPU	OUTOKUMPU	293.5	N62.41	E29.01	200	FINLAND
PORKKALA	PORKKALA	285	N59.58	E24.23	200	FINLAND
PUUMALA	PUUMALA	301.5	N61.24	E28.14	200	FINLAND
TURKU	TURKU	304	N60.26	E22.13	200	FINLAND
CAP BEAR	CAP.BEAR	304.5	N42.31	E03.08	100	FRANCE
CAP FERRET	CAP.FERRET	287	N44.39	E01.15	100	FRANCE
ECKMUHL	ECKMUHL	312.5	N47.48	W04.23	100	FRANCE
GATTEVILLE	GATTEVILLE	297.5	N49.42	W01.16	100	FRANCE
LES BALEINES	BALEINES	299.5	N46.15	W01.34	100	FRANCE
PORQUEROLLES	PORQUEROLL	314.5	N42.59	E06.12	100	FRANCE
REVELLATA	REVELLATA	294.5	N42.35	E08.46	100	FRANCE
SAINT MATHIEU	ST.MATHIEU	291.5	N48.19	W04.46	100	FRANCE
HELGOLAND	HELGOLAND	313	N54.11	E07.53	200	GERMANY
WUSTROW	WUSTROW	314.5	N54.20	E12.23	200	GERMANY
BJARGTANGAR	BJARGTANG	289	N65.30	W24.32	100	ICELAND
DJUPIVOGUR	DJUPIVOGUR	295.5	N64.39	W14.16	100	ICELAND
RAUFARHOFN	RAUFARHOFN	301.5	N66.27	W15.57	100	ICELAND
REYKJANES	REYKJANES	292.5	N63.49	W22.42	100	ICELAND
SKAGATA	SKAGATA	304.5	N66.07	W20.06	100	ICELAND
SKARDSFJARA	SKARDSFJAR	313	N63.31	W17.59	100	ICELAND
LOOP HEAD	LOOP.HD	312	N52.34	W09.56	100	IRELAND
MIZEN HEAD	MIZEN.HD	300.5	N51.27	W09.49	100	IRELAND
TORY ISLAND	TORY.IS	313.5	N55.16	W08.15	100	IRELAND
VENTSPILS	VENTSPILS	308.5	N57.22	E21.31	100	LATVIA
HOEK VAN HOLLAND	HOOKOFHOL	287.5	N51.59	E04.07	200	HOLLAND
VLIELAND(AMELAND)	VLIELAND	299.5	N53.27	E05.38	200	HOLLAND
ANDENES	ANDENES	284.5	N69.19	E16.07	100	NORWAY
FAERDER	FAERDER	288	N59.02	E10.32	100	NORWAY
FRUHOLMEN	FRUHOLMEN	309.5	N71.06	E23.59	100	NORWAY
HALTEN	HALTEN	313.5	N64.10	E09.25	100	NORWAY
LISTA	LISTA	301	N58.07	E06.34	100	NORWAY
SKLINNA	SKLINNA	288.5	N65.12	E11.00	100	NORWAY
SKOMVAER	SKOMVAER	300	N67.25	E11.53	100	NORWAY
SVINOEY	SVINOEY	293.5	N62.20	E05.16	100	NORWAY
TORSVAAG	TORSVAAG	291.5	N70.15	E19.31	100	NORWAY
TORUNGEN	TORUNGEN	292.5	N58.23	E08.48	100	NORWAY
UTSIRA	UTSIRA	307	N59.19	E04.52	100	NORWAY
UTVAER	UTVAER	300	N61.02	E04.31	100	NORWAY
VARDOE	VARDOE	307	N70.23	E31.09	100	NORWAY
DZIWNOW	DZIWNOW	288	N54.01	E14.44	100	POLAND
ROZEWIE	ROZEWIE	311	N54.49	E18.20	100	POLAND

Area 2: Europe, Egypt (continued)

(0 = Auto)

Location	Name in GR-80	Freq. (kHz)	Latitude	Longitude	MSK Rate	Country
CABO DE LA NAO	NAO	284.5	N38.44	E00.14	0	SPAIN
CABO DE PALOS	PALOS	313.5	N37.38	W00.41	0	SPAIN
CABO FINISTERRE	FINISTERRE	289	N42.53	W09.16	0	SPAIN
CABO GATA	GATA	298.5	N36.43	W02.11	0	SPAIN
CABO PENAS	PENAS	297	N43.39	W05.51	0	SPAIN
CABO SALOU	SALOU	289	N41.03	E01.10	0	SPAIN
CABO SAN SEBASTIAN	SEBASTIAN	290.5	N41.53	E03.12	0	SPAIN
CASTELLON	CASTELLON	311	N39.58	E00.01	0	SPAIN
CEUTA	CEUTA	311.5	N35.54	W05.18	0	SPAIN
ESTACA DE BARES	BARES	310	N43.47	W07.41	0	SPAIN
LA ENTALLADA	ENTALLADA	292.5	N28.13	W13.56	0	SPAIN
MACHICHACO	MACHICHACO	285	N43.27	W02.45	0	SPAIN
MAHON	MAHON	292.5	N39.52	E04.18	0	SPAIN
MALAGA	MALAGA	304.5	N36.43	W04.25	0	SPAIN
PUNTA DE CALA FIGUERA	FIGUERA	286	N39.27	E02.31	0	SPAIN
ROTA	ROTA	302.5	N36.38	W06.23	0	SPAIN
TENERIFE	TENERIFE	287.5	N28.30	W16.30	0	SPAIN
ALMAGRUNDET	ALMAGRUNDE	287	N59.09	E19.10	200	SWEDEN
BJUROKLUBB	BJUROKLUBB	303.5	N64.29	E21.35	200	SWEDEN
HJORT UDDE	HJORT UDDE	297	N58.38	E12.40	200	SWEDEN
HOBURG	HOBURG	302	N56.55	E18.09	200	SWEDEN
KULLEN	KULLEN	293.5	N56.18	E12.27	200	SWEDEN
OERSKAER	OERSKAER	291.5	N60.32	E18.23	200	SWEDEN
SKAGS UDDE	SKAGS	306.5	N63.11	E19.01	200	SWEDEN
BUTT OF LEWIS	LEWIS	294	N58.31	W06.16	100	U.K.
FLAMBOROUGH HEAD	FLAMBOR	302.5	N54.07	W00.05	100	U.K.
GIRDLE NESS	GIRDLENESS	311	N57.08	W02.03	100	U.K.
LIZARD	LIZARD	284	N49.58	W05.12	100	U.K.
LOOP HEAD	LOOP HEAD	312	N52.34	W09.56	100	U.K.
MIZEN HEAD	MIZEN HEAD	300.5	N51.27	W09.49	100	U.K.
NASH POINT	NASH POINT	299	N51.24	W03.34	100	U.K.
NORTH FORELAND	N.FORELAND	310.5	N51.23	E01.27	100	U.K.
POINT LYNAS	PT.LYNAS	305	N53.25	W04.17	100	U.K.
RHINNS OF ISLAY	RHINNS	293.5	N55.40	W06.31	100	U.K.
ST.CATHERINE'S	CATHERINES	293.5	N50.35	W01.18	100	U.K.
SUMBURGH HEAD	SUMBURGH	304	N59.52	W01.16	100	U.K.
TORY ISLAND	TORYISLAND	313.5	N55.16	W08.15	100	U.K.
AL BANDAR	AL BANDAR	298	N28.07	E50.39	200	BAHRAIN
MINA AL AHMADI	AHMADI	295	N29.07	E48.08	200	KUWAIT
ADU DHABI	ADU DHABI	314	N24.06	E52.56	200	U.A.E.
RAS AL KHAIMAH	KHAIMAH	292	N25.59	E56.04	200	U.A.E.
ALEXANDRIA	ALEXANDRIA	284	N31.10	E29.50	200	EGYPT
MERSA MATROH	M.MATROH	307	N31.21	E27.14	200	EGYPT
PORT SAID	PORT SAID	290	N31.16	E31.17	200	EGYPT
QUSEIR	QUSEIR	314.5	N26.08	E34.15	200	EGYPT
RAS GHARIB	RAS GHARIB	298	N28.21	E33.06	200	EGYPT
RAS UMM SID	R.UMM SID	293.5	N27.51	E34.19	200	EGYPT

Area 3: Japan, Korea,S.America,Russia, China, Singapore

Location	Name in GR-80	Freq. (kHz)	Latitude	Longitude	MSK Rate	Country
ABASHIRI	ABASIRI	309	N44.00	E144.18	200	JAPAN
DAIOZAKI	DAIOZAKI	288	N34.17	E136.54	200	JAPAN
ESAKI	ESAKI	320.5	N34.36	E135.00	200	JAPAN
GESASHI	GESASI	288	N26.36	E128.09	200	JAPAN
HAMADA	HAMADA	305	N34.53	E132.02	200	JAPAN
HACHIJOJIMA	HATIJO	302	N33.05	E139.51	200	JAPAN
HEKURAJIMA	HEKURAJIMA	295	N37.51	E136.55	200	JAPAN
INUBOZAKI	INUBOZAKI	295	N35.42	E140.52	200	JAPAN
KINKAZAN	KINKAZAN	316	N38.17	E141.35	200	JAPAN
KUSHIROZAKI	KUSIROZAKI	288	N42.58	E144.23	200	JAPAN
MATUMAE	MATUMAE	309	N41.25	E140.05	200	JAPAN
MIYAKOZIMA	MIYAKOSIMA	316	N24.44	E125.26	200	JAPAN
MUROTO MISAKI	MUROTO	295	N33.15	E134.11	200	JAPAN
NAGOYA	NAGOYA	320	N35.02	E136.51	200	JAPAN
TOKARA NAKANOSHIMA	NAKANOSIMA	320.5	N29.49	E129.55	200	JAPAN
OHAMA	OHAMA	321	N34.05	E132.59	200	JAPAN
OSEZAKI	OSEZAKI	302	N32.37	E128.36	200	JAPAN
SAKATA	SAKATA	288	N38.57	E139.50	200	JAPAN
SETO	SETO	320	N33.26	E132.13	200	JAPAN
SHAKOTAN MISAKI	SHAKOTAN	316	N43.22	E140.28	200	JAPAN
SHIRIYAZAKI	SIRIYASAKI	302	N41.26	E141.28	200	JAPAN
SOUYA MISAKI	SOYAMISAKI	295	N45.31	E141.56	200	JAPAN
TANGO	TANGO	316	N35.44	E135.05	200	JAPAN
TOI MASAKI	TOIMISAKI	309	N31.22	E131.20	200	JAPAN
TURUGIZAKI	TURUGIZAKI	309	N35.08	E139.41	200	JAPAN
URAYASU	URAYASU	321	N35.37	E139.54	200	JAPAN
WAKAMIYA	WAKAMIYA	295	N33.52	E129.41	200	JAPAN
CHANGGI	CHANGGI	310	N36.05	E129.34	100	KOREA
CHINDO	CHINDO	290	N34.13	E125.58	100	KOREA
CHUMUNJIN	CHUMUNJIN	295	N37.54	E128.50	100	KOREA
KOMUNDO	KOMUNDO	287	N34.00	E127.20	100	KOREA
OCHONGDO	OCHONGDO	295	N36.07	E125.58	100	KOREA
PALMIDO	PALMIDO	313	N37.21	E126.30	100	KOREA
YONGDO	YONGDO	300	N35.03	E129.06	100	KOREA
KAU YI CHAU	KAUYICHAU	289	N22.15	E114.04	200	HONG KONG
BRISBANE	BRISBANE	294	S27.04	E153.03	200	AUSTRALIA
CAPE FLATTERY	C.FLATTERY	304	S14.58	E145.18	200	AUSTRALIA
CAPE SCHANCK	C.SCHANCK	314	S38.30	E144.53	200	AUSTRALIA
GLADSTONE	GLADSTONE	313	S24.02	E151.21	200	AUSTRALIA
HORN ISLAND	HORN.IS	320	S10.36	E142.17	200	AUSTRALIA
KARRATHA	KARRATHA	304	S20.45	E116.27	200	AUSTRALIA
MACKAY	MACKAY	315	S21.06	E149.13	200	AUSTRALIA
SYDNEY	SYDNEY	308	S33.59	E150.59	200	AUSTRALIA
ABROLHOS	ABROLHOS	290	S17.57	W38.41	100	BRAZIL
ARACAJU	ARACAJU	320	S10.58	W37.02	100	BRAZIL
CALCANHAR	CALCANHAR	305	S05.09	W35.29	100	BRAZIL
CANIVETE	CANIVETE	310	N00.30	W50.24	100	BRAZIL
I.MOELA	I.MOELA	305	S24.02	W46.15	100	BRAZIL
I.RASA	I.RASA	315	S23.04	W43.09	100	BRAZIL
PONTA DE SAO MARCOS	SAO MARCOS	300	S02.29	W44.18	100	BRAZIL
RIO GRANDE	RIO GRANDE	290	S32.08	W52.06	100	BRAZIL
SANTA MARTA	SANTAMARTA	310	S28.36	W48.48	100	BRAZIL
SAO TOME	SAO TOME	300	S22.02	W41.03	100	BRAZIL
SAN BERNARDO	BERNARDO	317.5	S36.22	W60.03	100	ARGENTINA
SAN CARLOS CENTRO	SAN CARLOS	297.5	S31.58	W60.55	100	ARGENTINA

Area 3: Japan, Korea, S.America,Russia, China, Singapore (continued)

Location	Name in GR-80	Freq. (kHz)	Latitude	Longitude	MSK Rate	Country
AFRICA	AFRICA	291.5	N56.11	E163.21	100	RUSSIA
ALEVINA	ALEVINA	303.5	N58.50	E151.21	100	RUSSIA
ANAPSKY	ANAPSKY	315.5	N44.53	E37.18	100	RUSSIA
ANDREA	ANDREA	291.5	N76.44	E110.27	100	RUSSIA
ASTRAHNASKY	ASTRAHNASK	291.5	N44.28	E48.01	100	RUSSIA
BALTIYSK	BALTIYSK	298.5	N54.41	E19.59	100	RUSSIA
BEGICHEV	BEGICHEV	300.5	N47.31	E112.15	100	RUSSIA
CAMENKA	CAMENCA	318.5	N69.28	E161.14	100	RUSSIA
CANIN NOSE	CANIN NOSE	285.5	N68.38	E43.18	100	RUSSIA
CARAGINSKY	CARAGINSKY	301.5	N58.33	E163.33	100	RUSSIA
CORSAKOVSKY	CORSAKOVSK	312.5	N46.37	E142.48	100	RUSSIA
COTELNY	COTELNY	310.5	N75.59	E137.53	100	RUSSIA
CRUTOGOROVA	CRUTOGOROV	300.5	N55.05	E155.35	100	RUSSIA
DEDGNEVA	DEDGNEVA	303.5	N66.01	E169.43	100	RUSSIA
DGEDGINSKY	DGEDGINSKY	298.5	N65.13	E36.49	100	RUSSIA
ELIZAROVA	ELIZAROVA	318.5	N54.25	E143.43	100	RUSSIA
ENISEY	ENISEY	315.5	N68.25	E86.18	100	RUSSIA
GAMOV	GAMOV	306.5	N42.33	E131.13	100	RUSSIA
INDYGIRSKY	INDYGIRSKY	324.5	N71.16	E150.17	100	RUSSIA
OLENIY	OLENIY	294.5	N72.35	E77.39	100	RUSSIA
PETROPAVLOVSKY	PETROPAVLO	291.5	N52.33	E158.42	100	RUSSIA
RUSSIAN CAT	RUSSIANCAT	315.5	N64.34	E178.33	100	RUSSIA
SET.NAVOLOCK	NAVOLOCK	318.5	N69.24	E33.03	100	RUSSIA
SHEPELEVSKIY	SHEPELEVSK	298.5	N59.59	E29.09	100	RUSSIA
STERLEGOV	STERLEGOV	318.5	N75.24	E88.45	100	RUSSIA
STOLBOVOY	STOLBOVOY	306.5	N74.10	E135.27	100	RUSSIA
TONKY	TONKY	303.5	N69.51	E61.06	100	RUSSIA
VAN DER LINDA	LINDA	312.5	N45.35	E149.24	100	RUSSIA
VASILIEVA	VASILIEVA	294.5	N50.00	E155.23	100	RUSSIA
VIZE	VIZE	294.5	N79.30	E76.59	100	RUSSIA
VRANGELIA	VRANGELIA	309.5	N70.59	E178.29	100	RUSSIA
YARANGAI	YARANGAI	291.5	N69.54	E170.32	100	RUSSIA
BAOHUJIAO	BAOHUJIAO	310.5	N20.00	E110.56	200	CHINA
BEITANG	BEITANG	310.5	N39.06	E119.43	200	CHINA
DAJISHAN	DAJISHAN	307.5	N30.49	E122.10	200	CHINA
DASANSHAN	DASANSHAN	301.5	N38.52	E121.50	200	CHINA
QINHUANGDAO	QINHUANDAO	287.5	N39.55	E119.37	200	CHINA
WANGJIAMAI	WANGJIAMAI	313.5	N36.04	E120.26	200	CHINA
SINGAPORE	SINGAPORE	298	N01.10	E103.45	100	SINGAPORE

EQUIPMENT LISTS

Standard equipment

Name	Type	Code No.	Qty	Remarks
Receiver Unit	GR-80		1	
Antenna Coupler	GR-8		1	With preamp
Installation Materials	CP08-01601	004-396-030	1 set	
	CP08-01601	004-396-900	1 set	
	CP08-01611	004-396-560	1 set	
Spare Parts	SP08-01800	004-396-020	1 set	

Installation materials

Name	Type	Code No.	Qty	Remarks
Power Cord	22S0019-2	000-109-000	1	CP08-01601 (004-396-900)
Ground Wire	08S0087-0	000-108-138	1	CP08-01601 (004-396-030)
Connector	FM14-7P	000-113-345	1	
Tapping Screw	4x16 SUS304	000-802-080	4	
Spring Washer	M10 SUS304	000-864-261	1	CP08-01611

Spare parts

Name	Type	Code No.	Qty	Remarks
Fuse	FGMB 2A 125 V	000-103-165	1	

Option

Name	Type	Code No.	Qty	Remarks
Rectifier	PR-62		1	
Extension Cable	OP08-15-30	004-396-440	1	30 m
Extension Cable	OP08-15-60	004-396-090	1	60 m
Flush Mount Kit	OP08-16	004-394-410	1	
Whip Antenna	FAW-1.2	000-130-046	1	1.2 m
Whip Antenna	04S4176-2	000-112-845	1	2.6 m
Hose Clamp	OP08-18	004-396-570	1	
Insulating Tape	U-tape 0.5x1.9x5M	000-800-985	1	
Antenna Cable Set	OP08-17	004-392-510	1	For cable RG-10UY

CONNECTABLE FURUNO EQUIPMENT

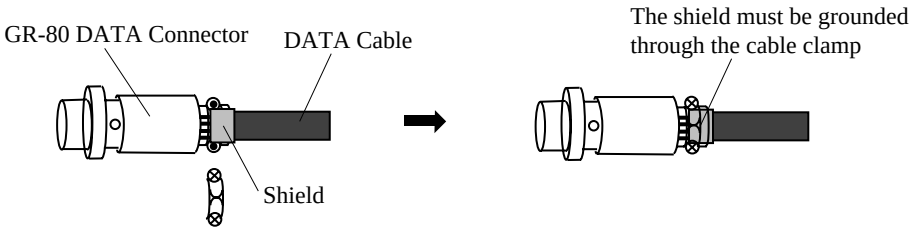
Model	Connectable?	Remote Control?	RS Spec.
GP-50	YES ROM Ver. 3 and higher	NO	422
GP-50 M2	YES	NO	232C
GP-50 M3	YES	NO	232C
GP-70	NO	–	–
GP-70 M2	YES ROM Ver. 3 and higher	NO	232C/422
GP-80	YES	YES	232C/422
GP-188	YES MAIN Board: Ver. 28, ARTOP: Ver. 24 and higher	NO	422
GP-500	NO	–	–
GP-500 M2	YES ROM Ver. 3 and higher	NO	232C/422
GP-1600	YES	NO	232C/422
GP-1600F	YES	NO	232C/422
GP-1610C	YES	YES	422
GP-1610CF	YES	YES	422
GP-1800	YES	NO	422
GP-1800 M2	YES	NO	422
GP-1800F	YES	NO	232C/422
GP-1810	YES	NO	232C/422
GP-1810F	YES	NO	232C/422
GP-3000	YES ROM Ver. 9 and higher	NO	422
GP-3100	YES ROM Ver. 5 and higher	NO	422
GP-3100 M2	YES	NO	422
GP-8000	YES	NO	232C/422
GP-8000 M2	YES	NO	232C/422
PS-8000	YES	NO	422
PS-8000 M2	YES	NO	422

REMEDY FOR THE INTERFERENCE TO A VHF RADIOTELEPHONE

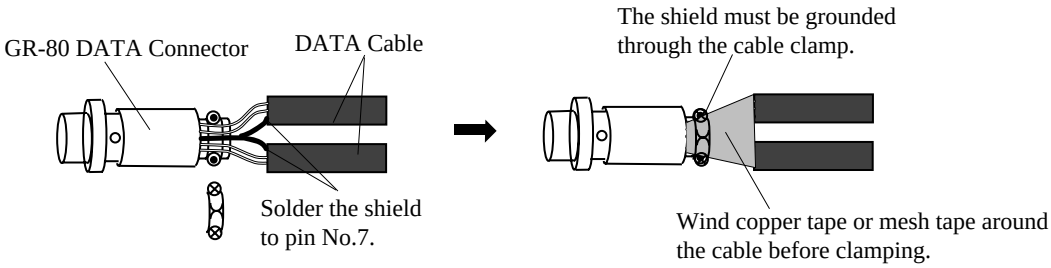
If a VHF radiotelephone is interfered by signal from the data cable between GPS receiver and the GR-80, follow the procedure shown below.

Procedure

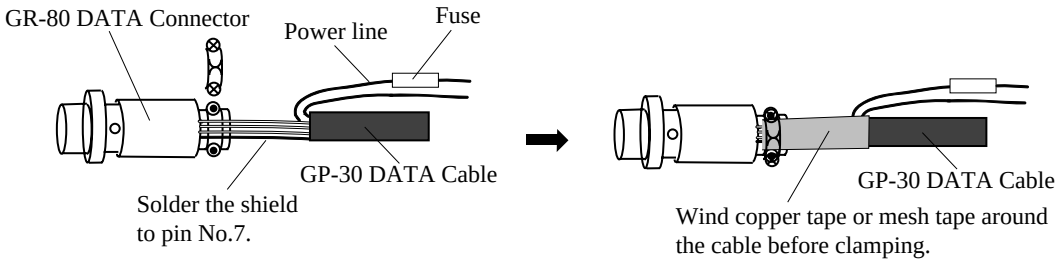
1. The screen of the data cable is grounded effectively.



Signal Cable

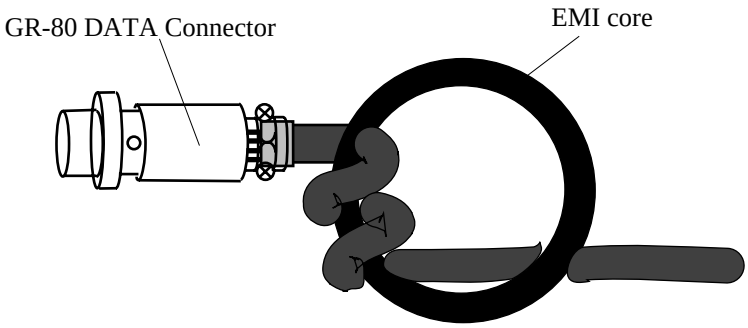


Two Cables

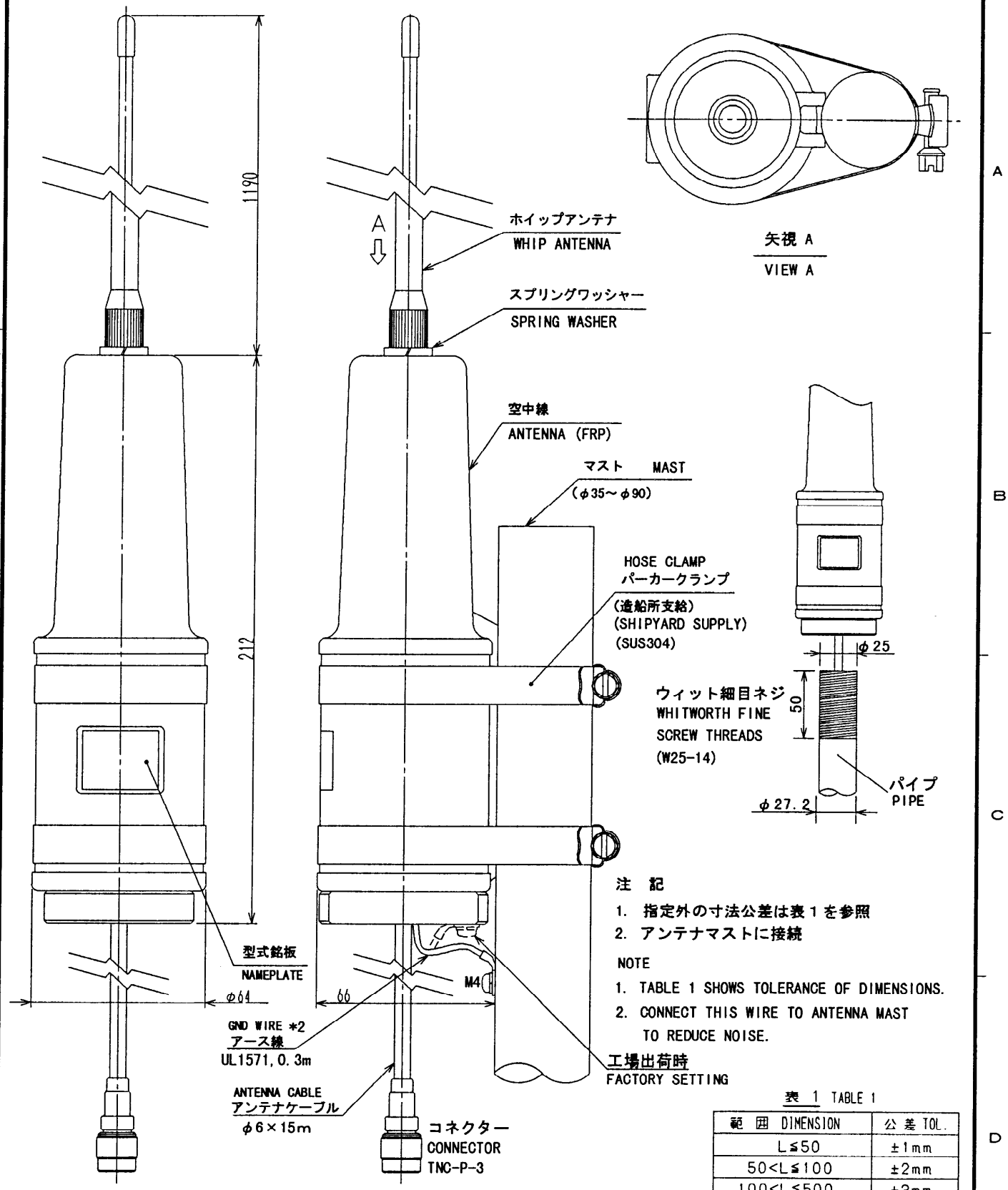


When connecting with GP-30

2. Add an EMI core, TRCN-40-27-15 (Code No. 000-113-798) as shown in the figure below.



EMI core on the cable



注 記

1. 指定外の寸法公差は表１を参照
2. アンテナマストに接続

NOTE

1. TABLE 1 SHOWS TOLERANCE OF DIMENSIONS.
2. CONNECT THIS WIRE TO ANTENNA MAST TO REDUCE NOISE.

工場出荷時
FACTORY SETTING

表 1 TABLE 1

範 囲 DIMENSION	公 差 TOL.
L≦50	±1mm
50<L≦100	±2mm
100<L≦500	±3mm
500<L≦1000	±4mm
1000<L≦2000	±5mm

DRAWN Sep25 '97 T. YAMASAKI		TITLE GR－8
CHECKED Sep25 '97 K. Kusunoki		名称 アンテナ部
APPROVED Sep25 '97 H. Yamaguchi		外寸図
SCALE - MASS 0.6kg	(本体のみ) MASS W/O CABLE.	NAME ANTENNA UNIT
DWG. No. C4019-G01- F	08-020-2100-G0	OUTLINE DRAWING

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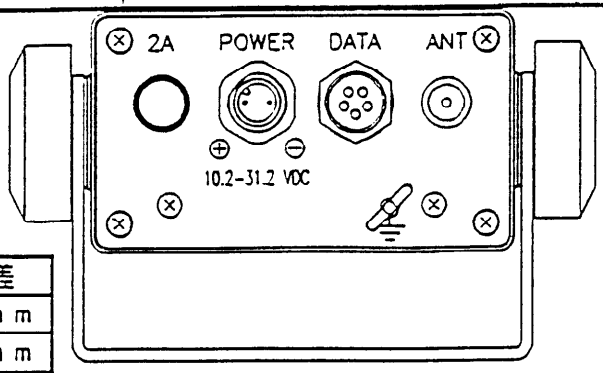
FURUNO

D - 2



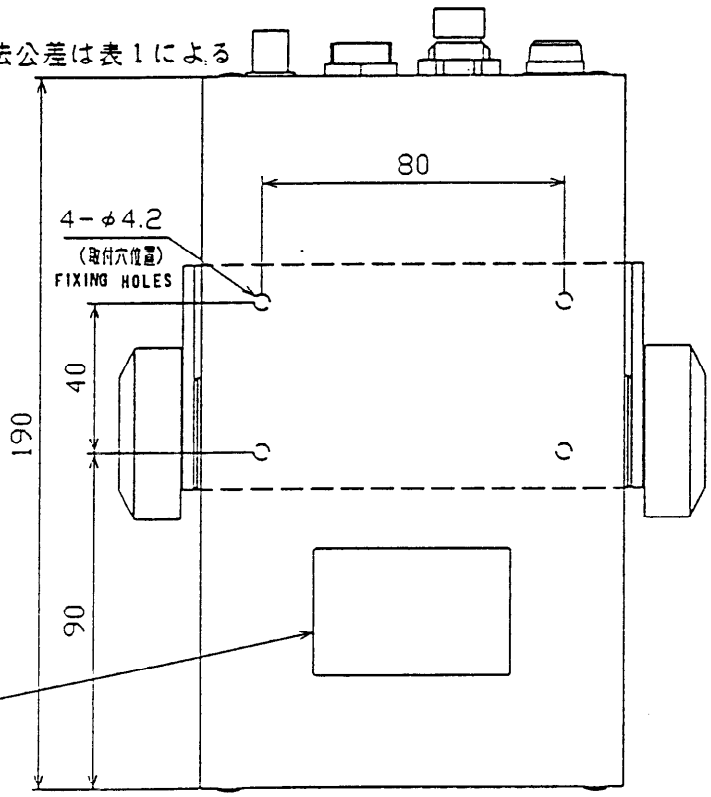
背面図

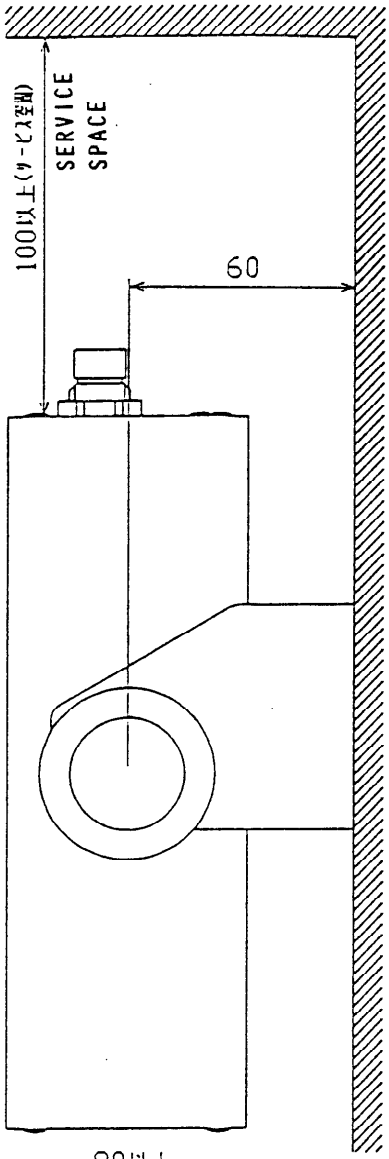
表 1

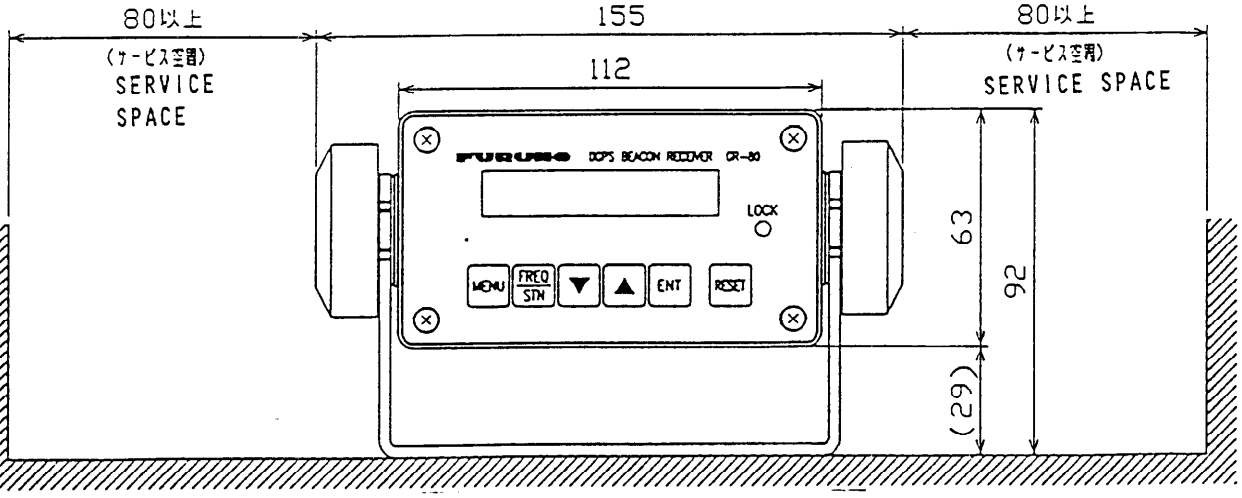
範　囲	公　差
L≦50	±1mm
50<L≦100	±2mm
100<L≦500	±3mm

注　記

1）指定外寸法公差は表1による





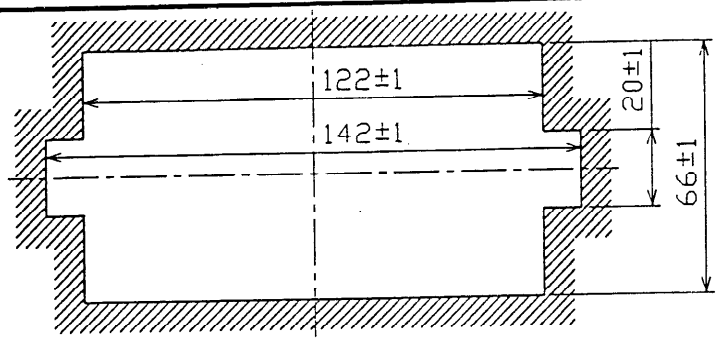


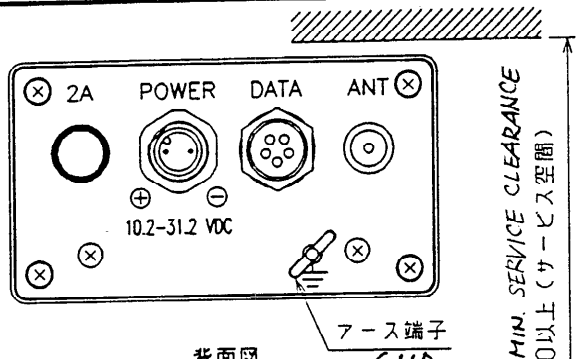
DRAWN Mar.27.'97 Y.IBISU				TYPE GR-80
CHECKED Mar.27.'97 T.SHISHIDO				名称 ディファレンシャルGPSビーコン受信機
APPROVED Mar.27.'97 S.Yamaguchi		GR80		外寸図
SCALE	MASS 1.0kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME D-GPS BEACON RECEIVER
DWG NO. C4383-G01- A		08-020-1100-G0		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

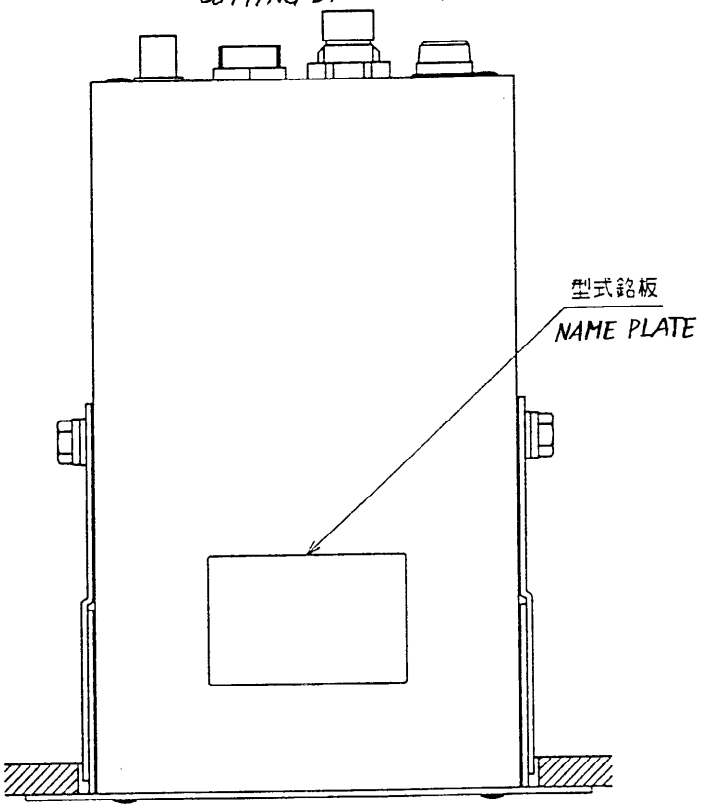
FURUNO

D - 3

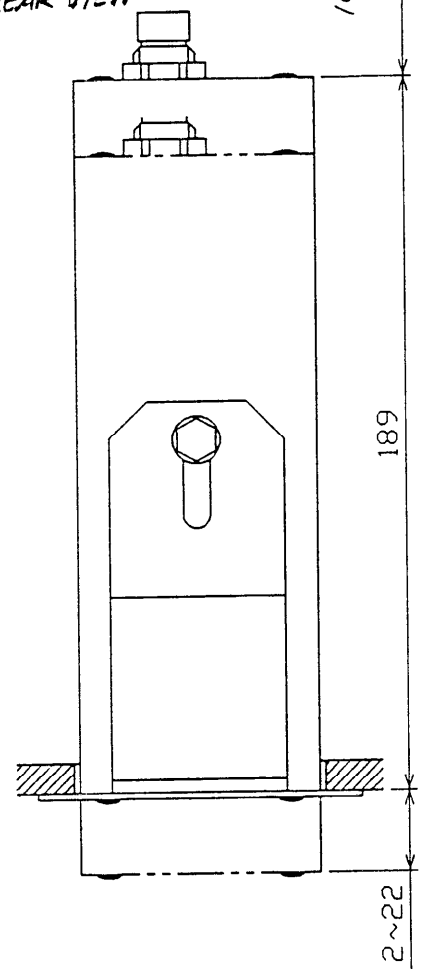




取付穴寸法（参考図）
CUTTING DIMENSION



背面図
REAR VIEW



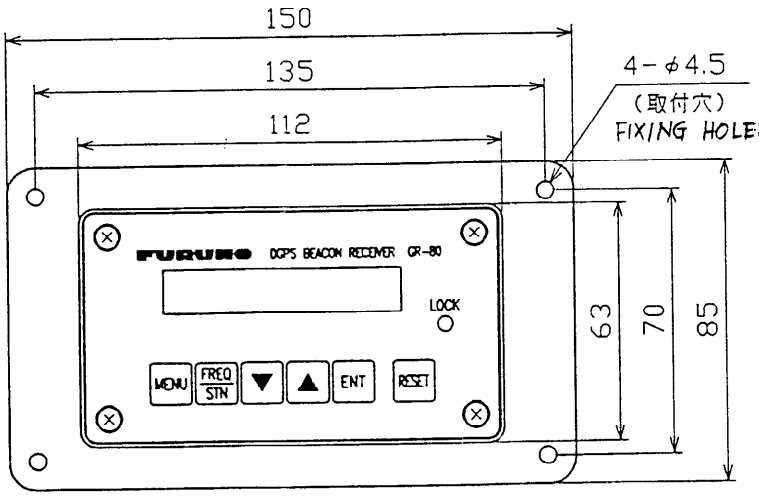


表 1 TABLE 1

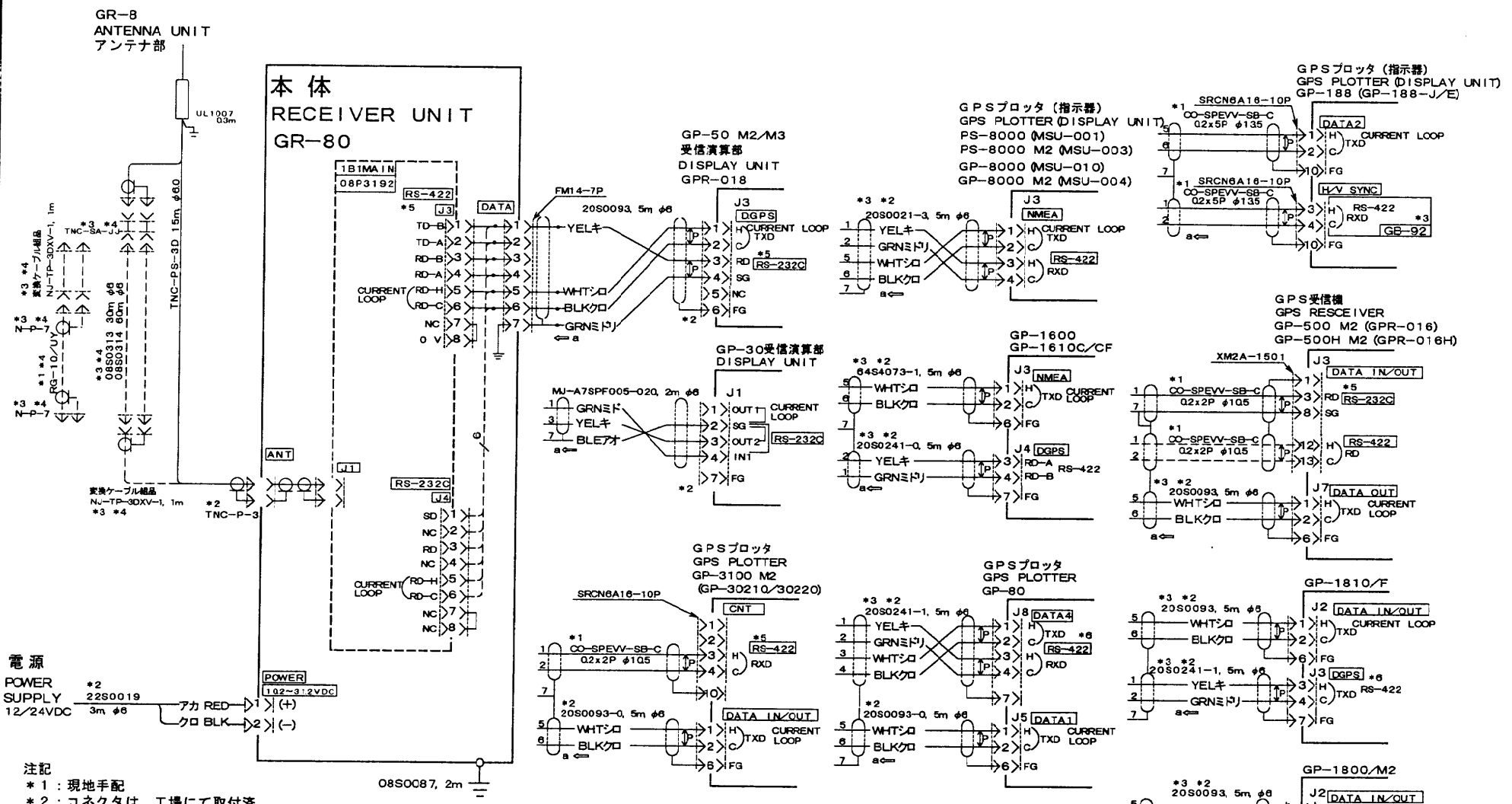
範　囲 DIM.	公　差 TOL.
L ≦ 50	± 1 mm
50 < L ≦ 100	± 2 mm
100 < L ≦ 500	± 3 mm

注　記 NOTE

1）指定外寸法公差は表1による
TABLE 1 SHOWS TOLERANCE OF DIMENSIONS.

DRAWN May. 19 '97 T.YAMASAKI			TYPE GR-80
CHECKED May 19 '97 K.KUSUNOKI			名称 DGPSビーコン受信機（Fマウント）
APPROVED May 20 '97 H.Yamaguchi			外寸図
SCALE 1/2	MASS 1.4 kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME D-GPS BEACON RECEIVER(F-MOUNT)
DWG NO. C4383-G02- A		08-020-1400- G		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.



注記
＊1：現地手配
＊2：コネクタは、工場にて取付済
＊3：オプション
＊4：アンテナケーブル延長時に使用
＊5：工場設定
＊6：メニューにて選択
＊7：各ケーブルのシールド線はＧＲ－８０コネクタのピン7かクランプでアースする。

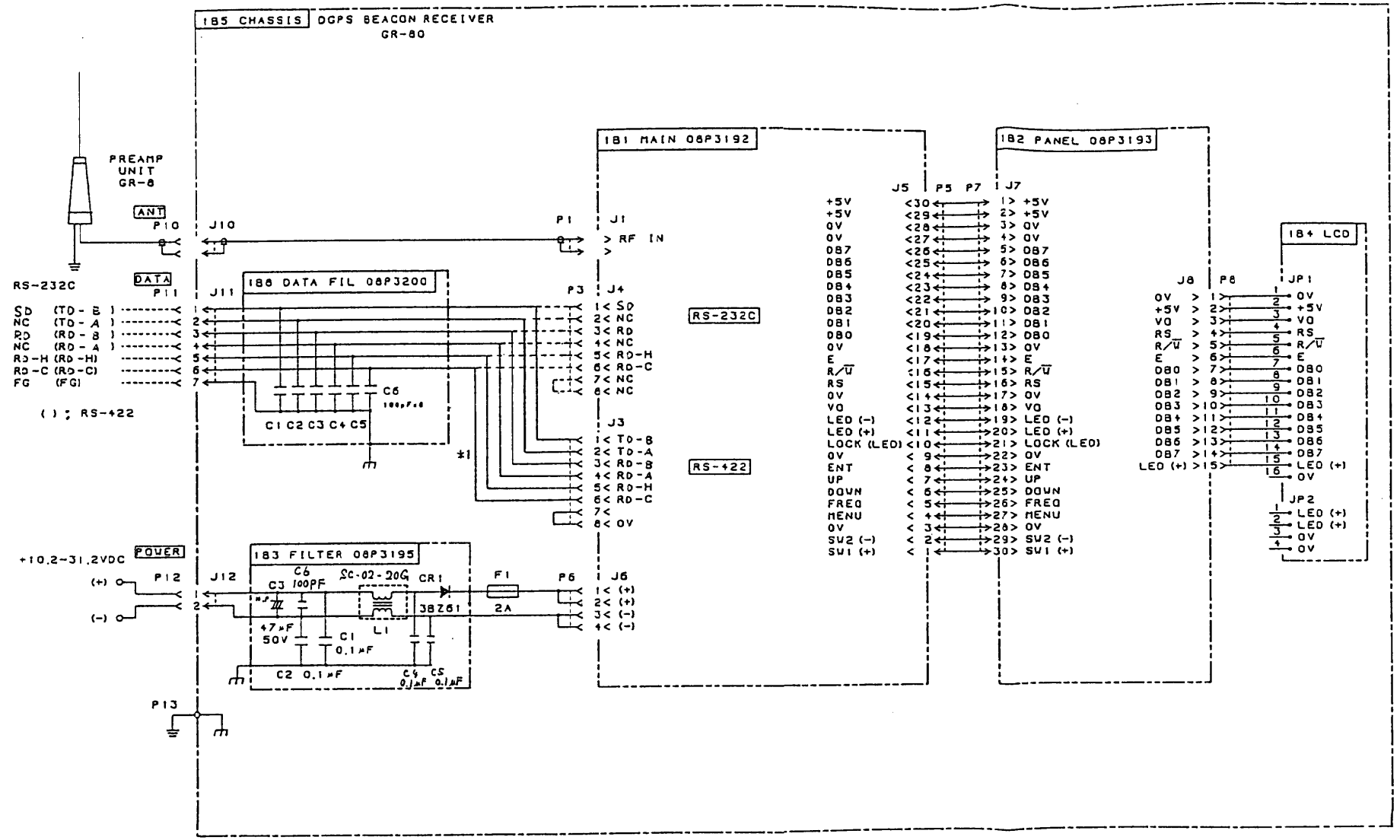
NOTE
*1: LOCAL SUPPLY.
*2: CONNECTOR FITTED AT FACTORY.
*3: OPTIONAL SUPPLY.
*4: USE FOR ANTENNA CABLE EXTENSION
*5: DEFAULT SETTING
*6: SELECTED BY MENU
*7: GROUND CABLE SHIELD THRU CLAMP OR PIN 7 OF CONNECTOR ON GR-80

DRAWN Dec.9'97 T.YAMASAKI		TITLE	GR-80
CHECKED Dec.9'97 K.Kusunoki		名称	ディファレンシャルＧＰＳビーコン受信機
APPROVED Dec.9'97 F.Yamamoto			相互結線図
SCALE	MASS kg	NAME	D-GPS BEACON RECEIVER
DWG.No. C4383-C03- E			INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.

S-1

FURUNO



注記

1）RS-422 と RS-232C のどちらかを選択。
　（）内は RS-422 の場合

NOTE:

1: SELECTED BETWEEN RS-422 AND RS-232C.
(): INDICATES PIN CONNECTIONS FOR RS-422.

DRAWN Nov. 25 '97 T. YAMASAKI				TYPE GR-80
CHECKED Nov 25 '97 K. Kusunoki				名称 ディファレンシャルGPSビーコン受信機
APPROVED Nov 25 '97 K. Kusunoki				回路図
SCALE /	MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME D-GPS BEACON RECEIVER
DWG NO. C4383-K01- B		08-101-3134- 03		SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

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-321

Declaration of Conformity CE 0560

We FURUNO ELECTRIC CO., LTD.

(Manufacturer)

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

(Address)

declare under our sole responsibility that the product

DGPS beacon receiver Model GR-80
(Serial No. 3506-0011)

(Model name, serial number)

is in conformity with the essential requirements as described in the Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment (R&TTE Directive) and satisfies all the technical regulations applicable to the product within this Directive

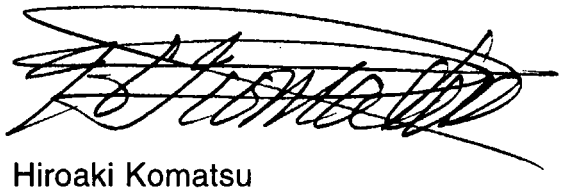
EN 60945: 1997-01 (IEC 60945 Third edition: 1996-11)

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

For assessment, see

- Statement of Opinion N° 01214007/AA/00 of 11 January 2001 issued by KTL Certification, The Netherlands
- Test report TI-1617 of 16 December 1996 prepared by Furuno Electric Co., Ltd.

On behalf of Furuno Electric Co., Ltd.



Hiroaki Komatsu
Manager,
International Rules and Regulations

Nishinomiya City, Japan
January 25, 2001

(Place and date of issue)

(name and signature or equivalent marking of authorized person)