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FURUNO

OPERATOR'S MANUAL

DOPPLER SONAR
CURRENT INDICATOR

MODEL CI-80

FURUNO ELECTRIC CO., LTD.
NISHINOMIYA, JAPAN

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9-52, Ashihara-cho,
Nishinomiya, Japan

Telephone: 0798-65-2111
Telefax: 0798-65-4200

•Your Local Agent/Dealer

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⚠ SAFETY INSTRUCTIONS

⚠ WARNING



ELECTRICAL SHOCK HAZARD
Do not open the equipment.

Only qualified personnel should work inside the equipment.

Immediately turn off the power at the switchboard if water leaks into the equipment or something is dropped in the equipment.

Continued use of the equipment can cause fire or electrical shock. Contact a FURUNO agent for service.

Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can result.

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.

Immediately turn off the power at the switchboard if the equipment is emitting smoke or fire.

Continued use of the equipment can cause fire or electrical shock. Contact a FURUNO agent for service.

Make sure no rain or water splash leaks into the equipment.

Fire or electrical shock can result if water leaks in the equipment.

⚠ WARNING

Keep heater away from equipment.

A heater can melt the equipment's power cord, which can cause fire or electrical shock.

Use the proper fuse.

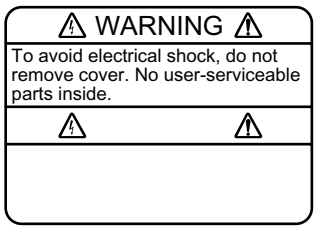
Fuse rating is shown on the equipment. Use of a wrong fuse can result in equipment damage.

Do not operate the equipment with wet hands.

Electrical shock can result.

⚠ CAUTION

A warning label is attached to the equipment. Do not remove the label. If the label is missing or damaged, contact a FURUNO agent or dealer.



Name: Warning Label (1)
Type: 86-003-1011-0
Code No.: 100-236-230

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PRINCIPLE OF MEASUREMENT

PRINCIPLE OF MEASUREMENT, FEATURES

When a moving vessel emits an acoustical pulse into the water at an angle, a portion of emitted energy is reflected from the seabed and other microscopic objects in the sound path, such as plankton or air bubbles. The frequency of the received signal is shifted from the transmitted frequency in proportion to relative velocity between the vessel and underwater reflecting objects. This is called Doppler Effect.

The CI-80 calculates and displays movements of ship and currents at specific depths by measuring Doppler shifts obtained from three separate directions.

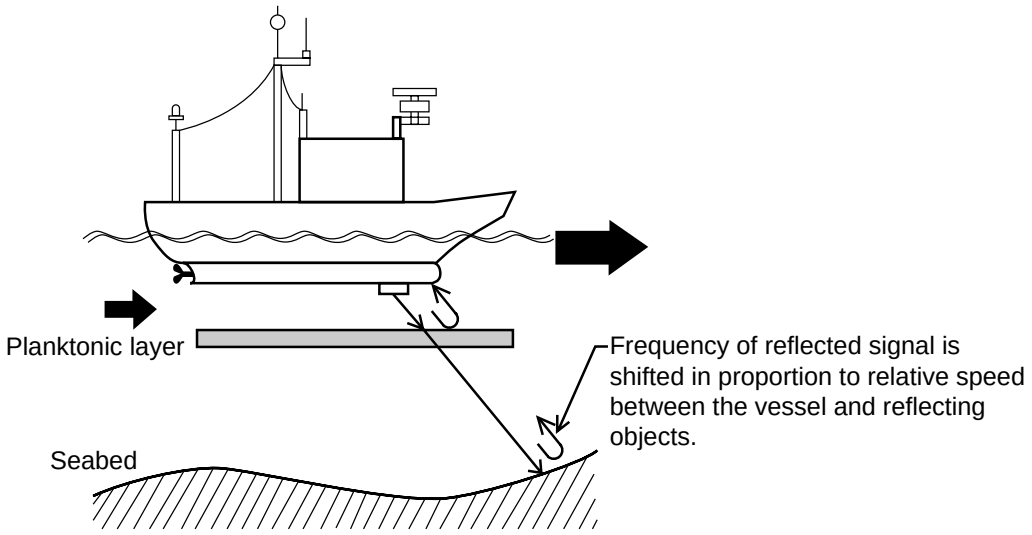


Figure 1

Ship's Speed (Here, speed is a vector value including velocity and direction.)

Depending on the base of measurement, ship's speed is expressed in two ways:

Ground tracking speed: (Absolute speed)	Ship's speed and course relative to seabed (fixed base)
Water tracking speed: (Relative speed)	Ship's speed and course relative to water layer just below the vessel (floating base)
Nav-aided speed: (Absolute speed)	Ship's speed and course obtained by external navigation equipment (GPS)

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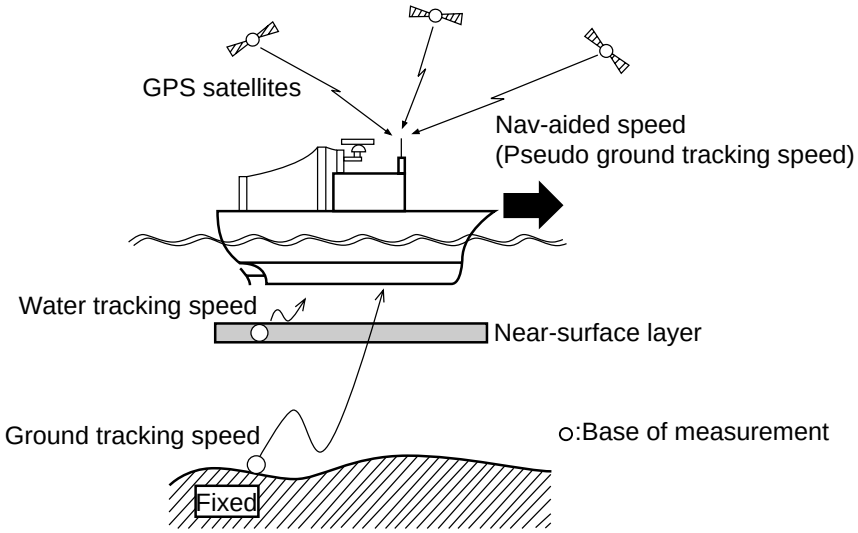


Figure 2

Tide

Tide is movement of watermass at a particular depth.

To know absolute tide (speed on ground), the following two data are required:

① Ship's speed and course based on ground

② Ship's speed and course based on measuring layer (A)

Absolute tide is, then, given as a difference of these two speed vectors.

Absolute Tide = ① – ②

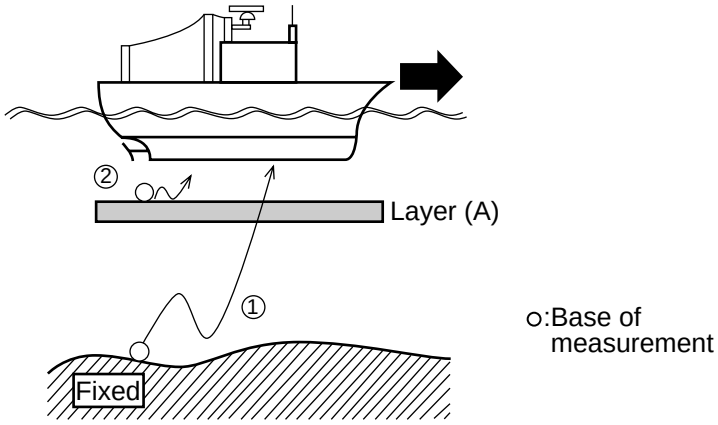


Figure 3

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Nav Tide

Nav-Tide is an absolute movement of watermass at a particular depth, taking speed information from the external navigator (GPS) as a pseudo ground tracking speed.

To calculate Nav-tide, the following two data are required:

① Ship's speed and course obtained by external navigation equipment (GPS)

② Ship's speed and course based on measuring layer (A)

Nav-tide is, then, given as a difference of these two speed vectors.

Absolute Tide = ① – ②

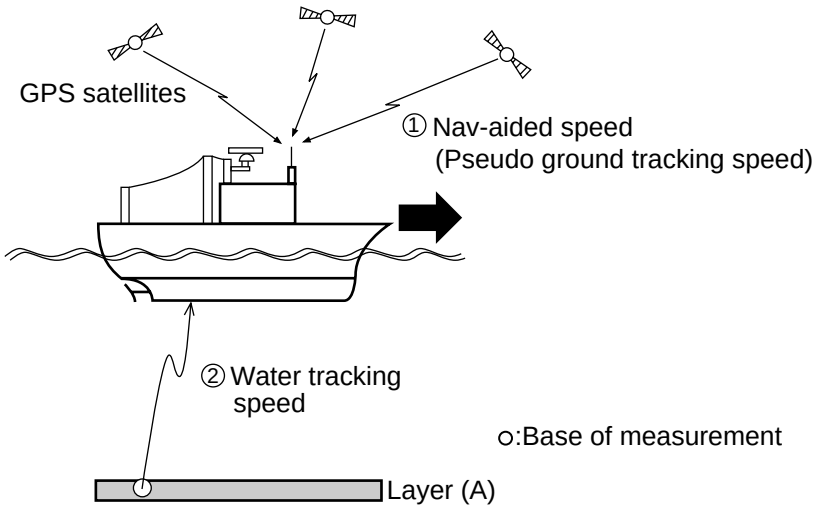


Figure 4

Tide Differential

Tide differential is a relative movement of tides at different depths, layer (A) and layer (B).

To calculate tide differential, the following two data are used:

① Ship's speed and course based on layer (A)

② Ship's speed and course based on layer (B)

Tide differential between two layers is, then, given as a difference of these two speed vectors.

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Tide Difference = ① - ② (Movement of layer B based on layer A)

or

= ② - ① (Movement of layer A based on layer B)

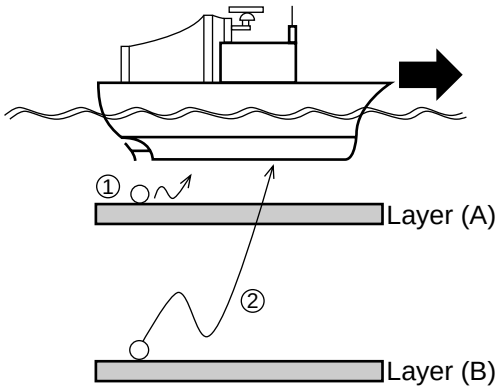


Figure 5

TIDE, NAV-TIDE & TIDE DIFFERENTIAL

Tide (Absolute tide)

Absolute tide can be measured in the ground tracking mode.

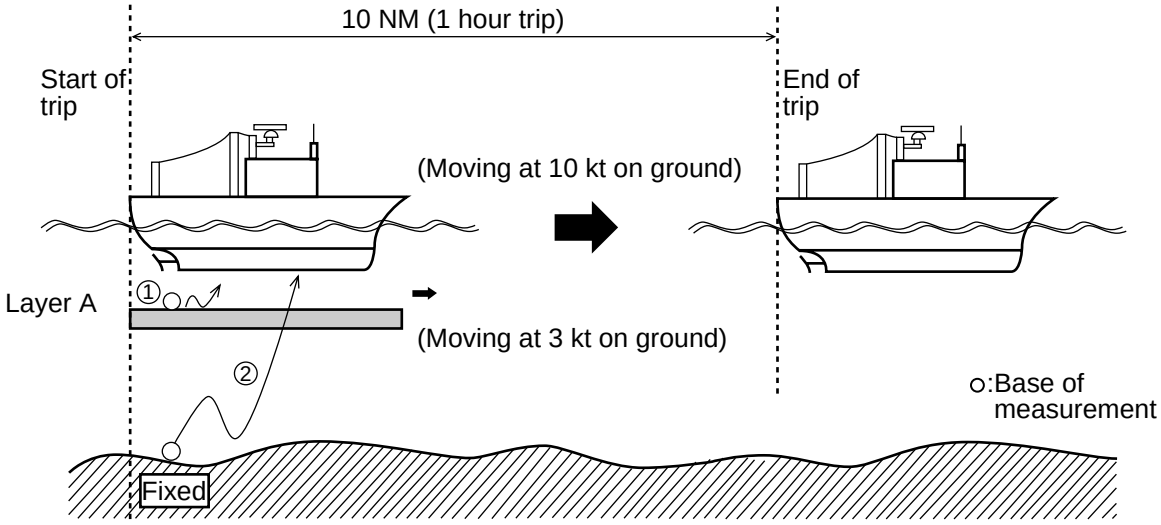


Figure 6

Assume that the ship and layer A are moving in the same direction, and ship's speeds based on ground (Vg) and on layer A (Vwa) are measured as;

Vg = 10 kt (Ship's speed based on ground)

Vwa = 7 kt (Ship's speed based on layer A).

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Speed of layer A based on ground (C1) can be calculated as follows:

C1 = Vg – Vwa

= 10 – 7

= 3 (kt)

Nav-Tide (Absolute tide)

Absolute tide can be measured in the nav-aided mode.

Nav-aided ship's speed (Vn) is equivalent to ship's ground tracking speed in the ideal conditions. That is, the nav-tide can be calculated by simply replacing Vg with Vn in the above equation.

Tide Differential

Tide differential is a relative movement of tides at different depths.

It can be measured in the ground tracking, water tracking and nav-aided modes.

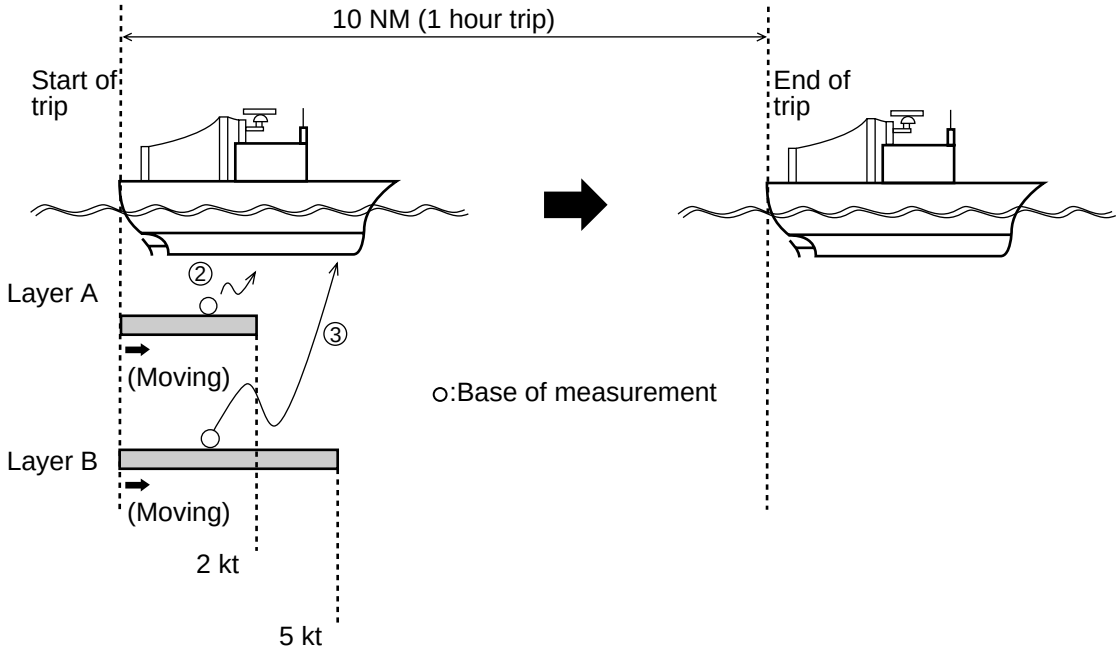


Figure 7

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Assuming that the ship, layer A and layer B are moving in the same direction, and ship's speeds based on layer A (Vwa) and on layer B (Vwb) are measured as;

Vwa = 8 kt (Ship's speed based on layer A)

Vwb = 5 kt (Ship's speed based on layer B)

Tide differential calculations in ground tracking mode

As an absolute ship's speed (Vg) is available in the ground tracking mode, tide speeds of layer A (C1) and layer B (C2) based on ground are calculated as follows:

C1 = Vg - Vwa (Speed of layer A based on ground)

C2 = Vg - Vwb (Speed of layer B based on ground)

Thus, the tide differential (Cd) between layer A and layer B is;

Cd = C2 - C1
= (Vg - Vwb) - (Vg - Vwa)
= Vwa - Vwb
= 8 - 5
= 3 (kt)

Tide differential based on layer A

Speed of layer B viewed from layer A

or

Cd = C1 - C2
= (Vg - Vwa) - (Vg - Vwb)
= Vwb - Vwa
= 5 - 8
= -3 (kt)

Tide differential based on layer B

Speed of layer A viewed from layer B

In the water tracking mode, watermass just below the transducer (near-surface layer) is taken as the base of all measurements (virtual ground). Therefore, the ship and tide speeds in the water tracking mode are not absolute but relative to this near-surface layer.

Vw = 9 kt (Ship's speed based on near-surface layer)

Vwa = 8 kt (Ship's speed based on layer A)

Vwb = 5 kt (Ship's speed based on layer B)

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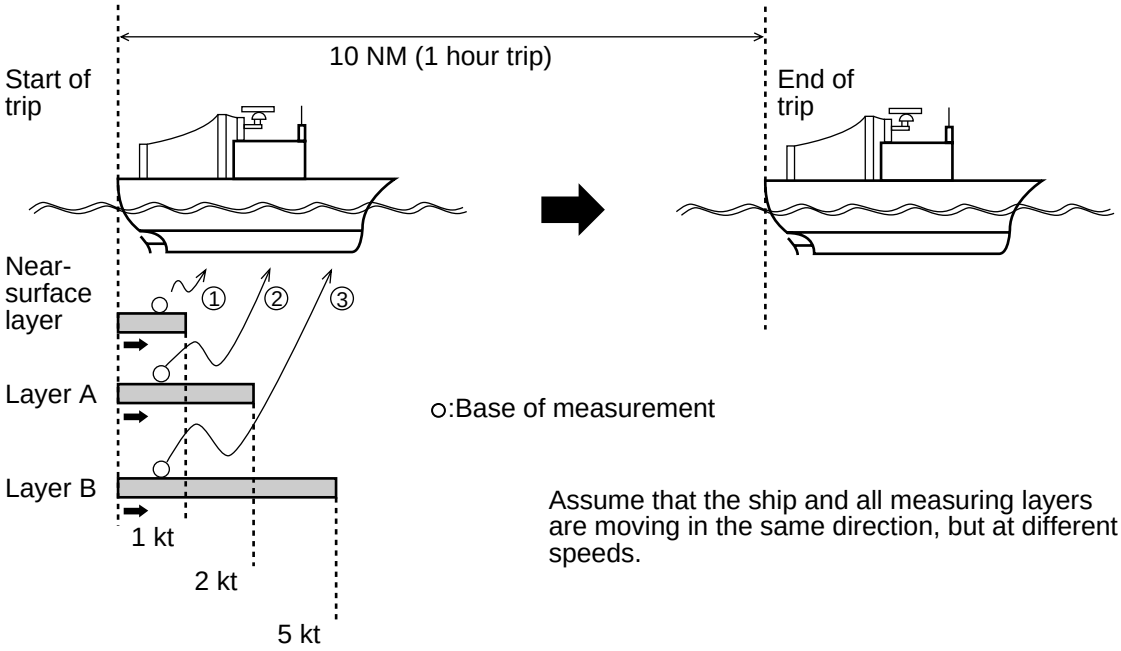


Figure 8

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IMPORTANT NOTICE ON TIDE MEASUREMENTS

(In the nav-aided mode, tide accuracy depends heavily on gyro accuracy.)

SETTING SHIP'S HEADING

The CI-80 has the nav-aided mode to measure absolute tides even in deep waters where ground tracking is unattainable. To achieve reliable measurements, however, you must supply accurate heading (gyro) information and ship's position (or speed/course) data to the CI-80.

If you are going to use the nav-aided mode, set the reading of the AD converter (gyro interface) exactly with that of the master gyrocompass.

Procedure

1. Confirm that the gyrocompass has settled and all the necessary compensations (latitude compensation, weather compensation, etc.) are made correctly.
2. Operate the AD converter to obtain the same reading as you read on the master gyrocompass. (Do not make adjustment while the ship is turning.)

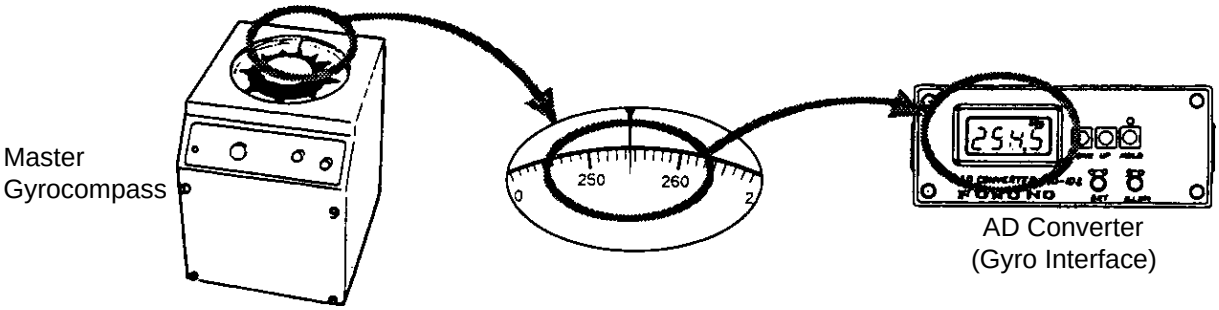


Figure 9

If the gyro reading is accurate, the CI-80 should provide accurate tide information. If the gyro data contains some error, however, you may see the following symptoms.

- Set/drift information on the nav-aided mode differs from that on the ground-tracking mode.
- Tide/tide differential information on the nav-aided mode differs from that on the ground-tracking mode.

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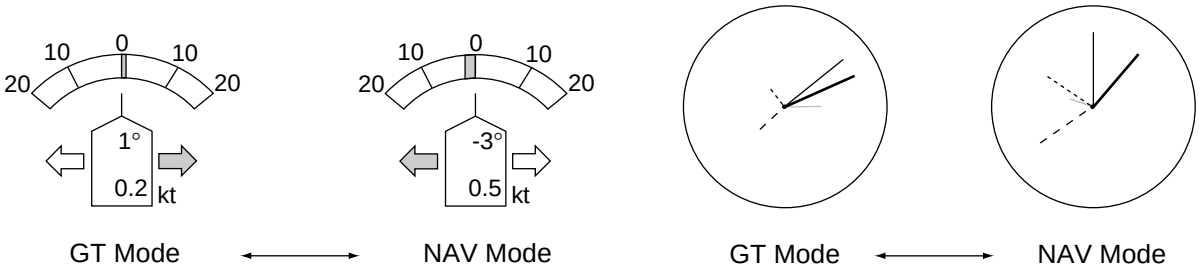


Figure 10

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Features

The CI-80 mainly consists of three units: a display unit, a transceiver unit, and a transducer, each compact enough to fit on small boats.

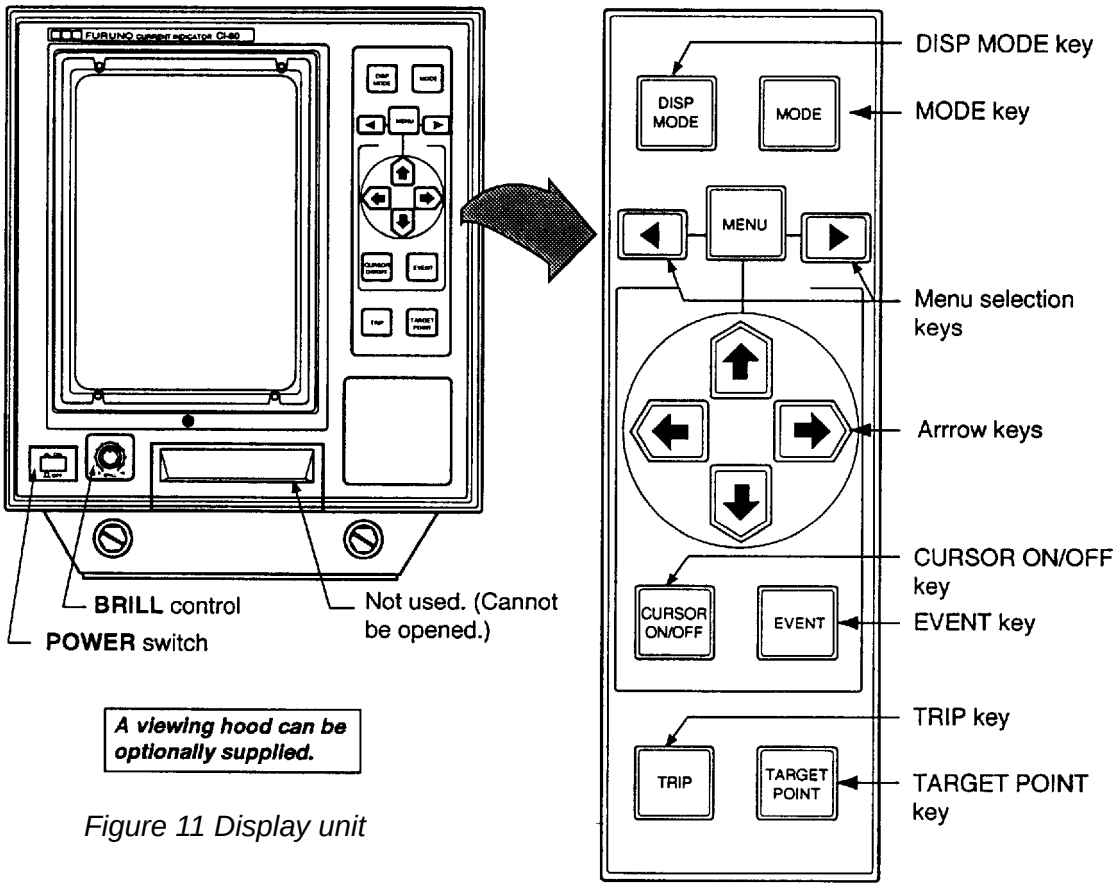
The main features of the CI-80 are;

- Even in deep waters where ground (bottom) reference is not available acoustically, the CI-80 can provide absolute movements of measuring layers by receiving position (or speed) data from GPS navigator and heading data from gyro compass. It may be used on deep sea fishing boats or on ocean research vessels.
- Triple-beam system for automatic compensation against pitching and rolling of vessel.
- Single mold transducer for excellent mechanical beaming accuracy.
- DC powered for economic operation.
- Alphanumeric information display on high resolution 10 inch color CRT.
- Simultaneous display of tide vectors and ship’s track. Indispensable for maneuvering and docking.
- Echo level display constantly displays underwater conditions of three sounding beams.
- Target point feature predicts flow of objects (for example, fishing tackle) against tide.
- Easy-to-follow menu operation for control of various settings and measuring conditions.

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Control Description

Display unit (CI-800)



A viewing hood can be optionally supplied.

Figure 11 Display unit

Transceiver unit (CI-810)

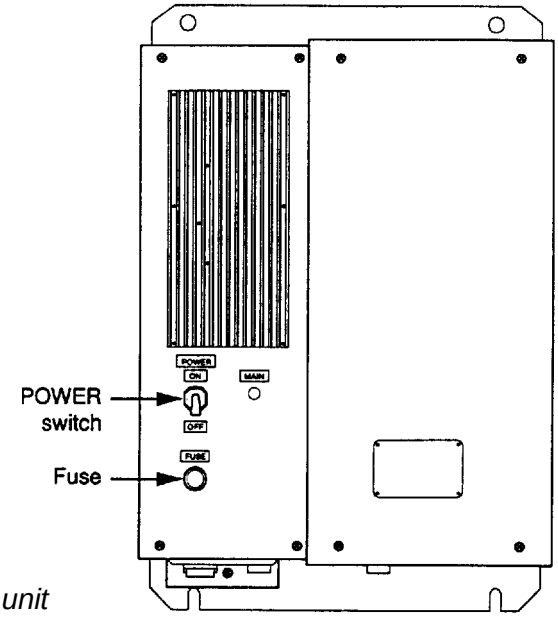
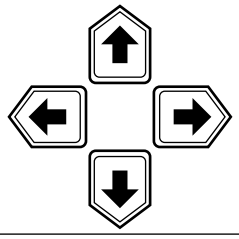


Figure 12 Transceiver unit

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Table 1 Control description

Control	Description
	Turns the system on/off.
	Adjusts brilliance of display. Setting can be locked by pushing in control.
	Alternately selects echo display and course plot display.
	Selects tracking mode among ground tracking, water tracking, nav aided and automatic selection. (G) → (W) → (A) (G) → (N) → (A) Select "T/D" or "NAV" from the item WATER SPEED on the SYSTEM menu.
	Opens/closes the menu.
	Select menu.
	In menu operation, select menu items; change settings; enter data. On the course plot display, shift cursor.
	Turns cursor on/off.
	Enters event mark. Also activates self tests and demonstration display and register calibrations.
	Calculates trip distance. Also enables system menu, when pressed and held down while pressing the MENU key.
	Inscribes target point mark, to predict flow of object (for example, fishing tackle) against tide.

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How to Read the Displays

The CI-80 has two display modes: echo display and course plot display.

A display may be selected with the **DISP MODE** key.

Echo display

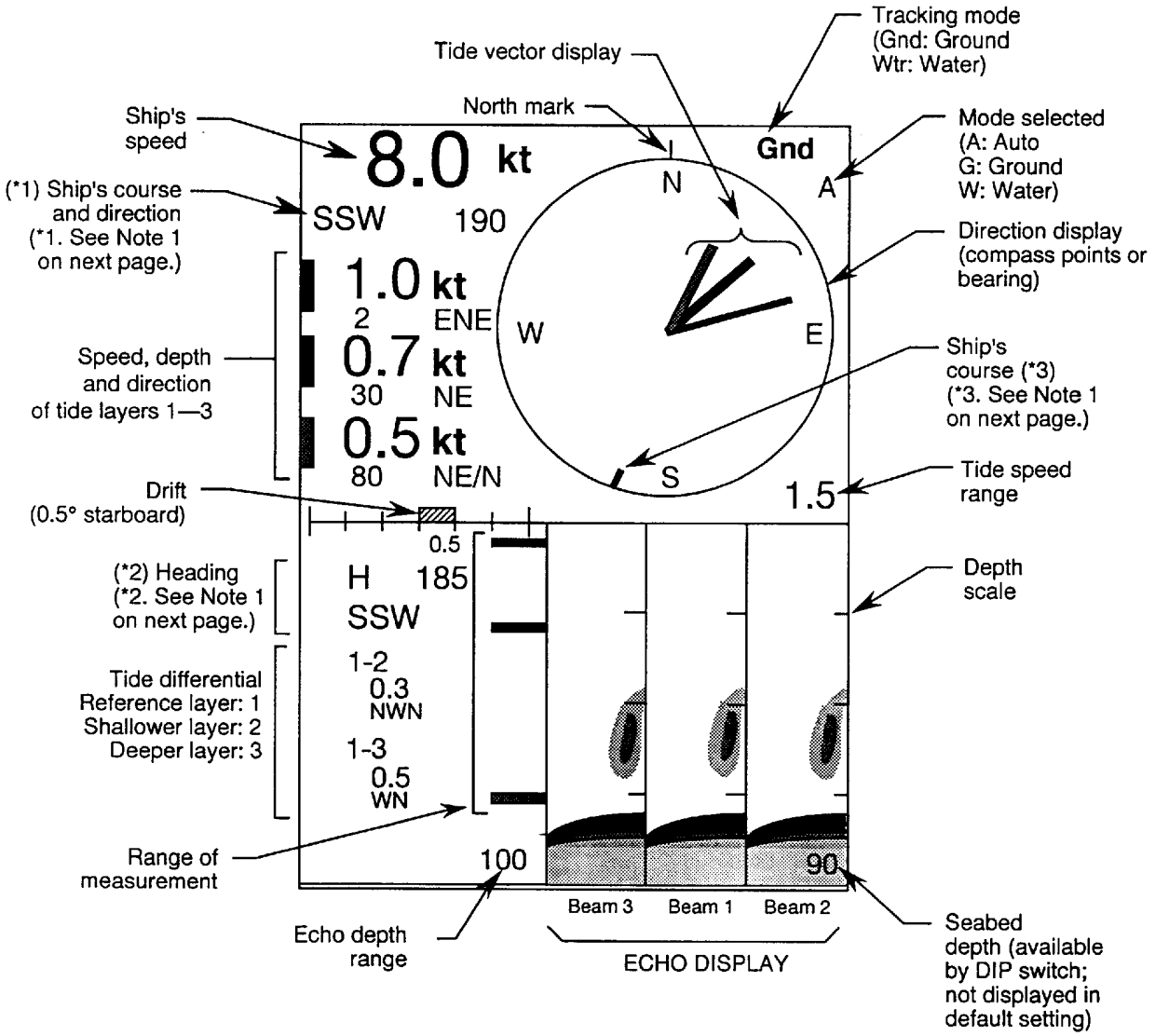


Figure 13 Sample echo display

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When speed or depth data appears in red…

Speed or depth data containing error appears in red.

Ships speed	Cannot find reference echo in respective tracking mode.
Tide speed	Cannot find echo in given layer.
Set depth	Depth set is invalid. In ground tracking mode, depth should be shallower than 7 m, or in the water tracking mode no more 3/4 of seabed depth.
Measured speed	When measured speed (tide or ship's) is unreliable.

Course plot display

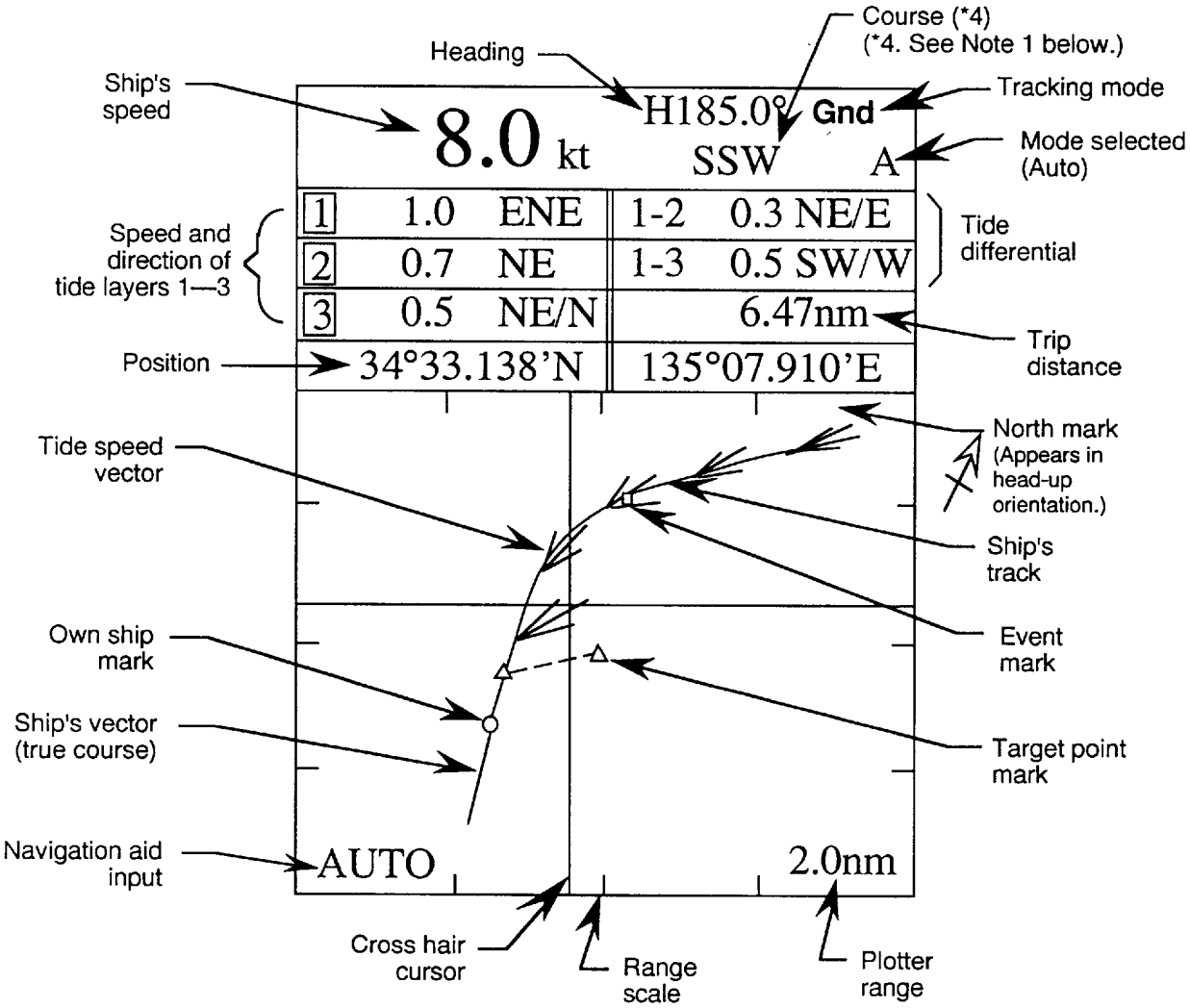


Figure 14 Sample course plot display

NOTE 1: Ship's course and heading displays can be switched with display mode as follows, by a DIP switch in the display unit.

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		Course mode	Heading mode
Echo display	Ship's course (*1)	COURSE	HEADING
	Heading (*2)	HEADING	COURSE
	Ship's course mark (*3)	COURSE	HEADING
Course plot display	Ship's course (*4)	COURSE	HEADING

NOTE 2: Ship's speed and course displays are update every three seconds, in the default setting. They can be updated every second. For details, consult your dealer.

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MAIN MENU DESCRIPTION

Most major functions of the CI-80 are carried out through an easy-to-follow menu system. The menu system consists of two main groups of menus: main (operation) and system (testing, calibration). This chapter covers the main menu. For complete menu tree, see page 36.

Basic Menu Operation

Most major functions of the CI-80 are carried out through an easy-to-follow menu system.

Two general types of menus are used: main (operation) and system (testing).

Opening/closing the menu: Press the **MENU** key.

Selecting menus: Press ◄ / ►.

Selecting menu items: Press ⬆ / ⬇.

Selecting menu options, changing settings: Press ⬅ / ➡.

DEP Menu

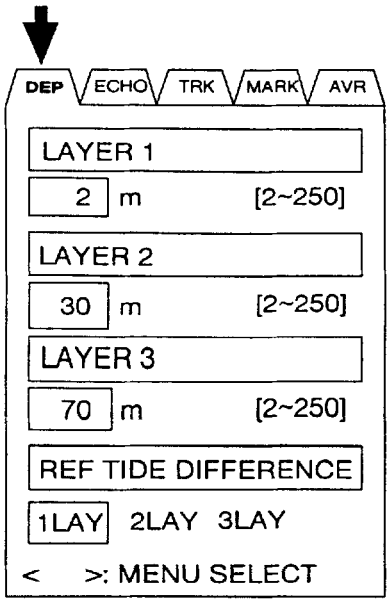


Figure 15 DEP menu

This menu sets both the measuring depths for three layers and the reference layer for tide differential calculation.

LAYER 1, LAYER 2, LAYER 3: Depth for measuring layers 1, 2 and 3 can be set between 2 and 250 meters, in resolution of one meter.

REF TIDE DIFFERENCE: Selects tide layer to be used reference layer in tide differential calculation.

NOTE: The depth of each layer may be set as you like; layer number does not necessarily correspond to depth in ascending order.

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ECHO Menu

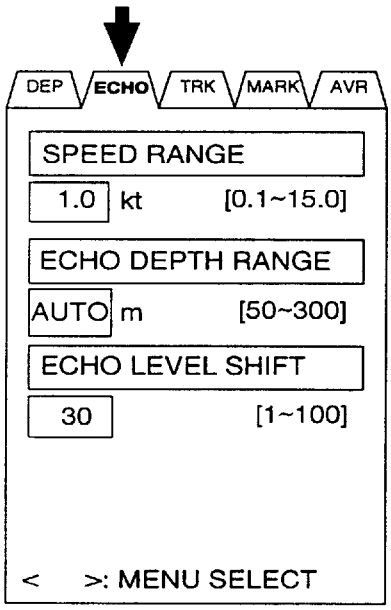


Figure 16 ECHO menu

Sets up the echo display.

SPEED RANGE: Sets length of tide speed vector between 0.1 and 15.0 knots, in resolution of 0.1 knots.

ECHO DEPTH RANGE: Sets echo depth range. Depth can be set either manually between 50 and 300 meters in resolution of 50 meters or automatically. In AUTO, seabed depth is automatically selected as depth range.

ECHO LEVEL SHIFT: Sets echo intensity level, between 1 and 100 in resolution of 1. The higher the figure the stronger the echo level.

NOTE: ECHO LEVEL SHIFT is not related to amplifier gain; it does not affect detection of tide speed or ship's speed.

TRK Menu

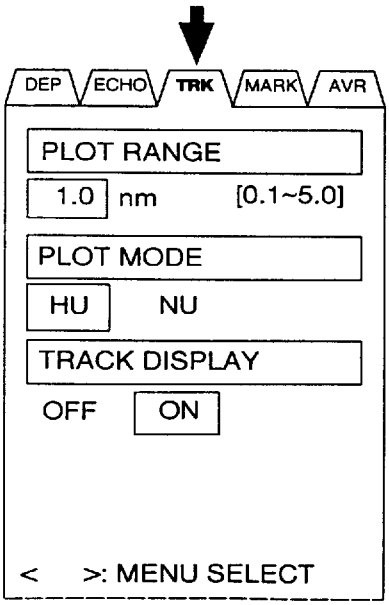


Figure 17 TRK menu

Sets up the course plot display.

PLOT RANGE: Sets latitude and longitude range of course plot, between 0.1 and 5.0 miles in resolution of 0.1 mile.

PLOT MODE: You may select either Head-up (bow at top of display) or North-up (North at top of display) orientation.

TRACK DISPLAY: Turn on/off trackline display.

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MARK Menu

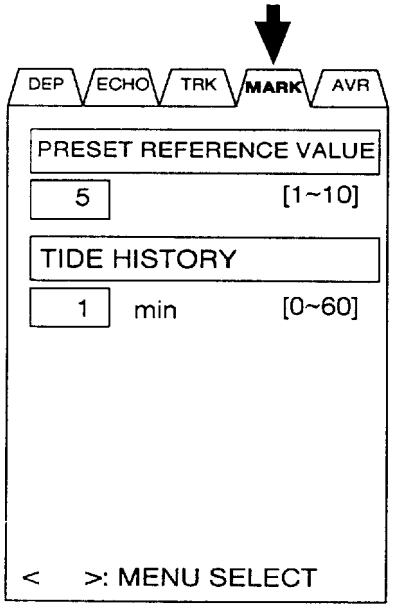


Figure 18 MARK menu

This menu sets measuring conditions for tide vector and target point mark.

PRESET REFERENCE VALUE: Sets the effect of tide on the target point mark. The higher the figure, the greater the effect of tide.

TIDE HISTORY: Sets tide vector plotting interval, among 0 (turns off tide vector display), 15 sec. (1/4 min.), 1 min., 5 min., 10 min., 30 min., and 60 min.

AVR Menu

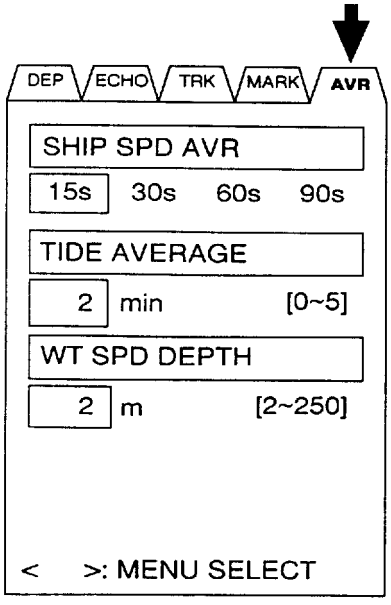


Figure 19 AVR menu

The AVR (Averaging) sets averaging time for measuring raw speed, tide and water tracking data, to smooth out random variation of data.

SHIP SPD AVR: Raw speed data (from connected sensor) may change randomly due to receiving conditions, etc. If speed data varies greatly increase speed averaging. Speed averaging is available in times of 15 sec., 30 sec., 60 sec., and 90 sec. The default setting is 15 sec., which is suitable for most conditions.

TIDE AVERAGE: Direction and speed of a tide changes with time, place and depth. Therefore it is important that the current indicator not respond to quickly or too slowly to tide movement. Tide averaging time is available between 0 and 5 minutes in the nearest minute. (“0” is for use of raw tide data.) In most cases “2 min.” provides excellent results. Too high a setting may prevent detection of rapid changes in tide movement, such as a current rip.

WT SPD DEPTH: Sets measuring depth of water speed in the water tracking mode. The default setting is two meters, and it is suitable for most conditions. Change the setting when water tracking speed display becomes unstable (due to air bubbles, etc.), or to measure water tracking speed at a given depth.

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Basic Operating Procedure

Turning on the system

1. Turn on the transceiver unit.
2. Turn on the display unit.
3. Adjust brilliance of display.

The display unit conducts a check of the system, displaying the results about 40 seconds after turning on the power.

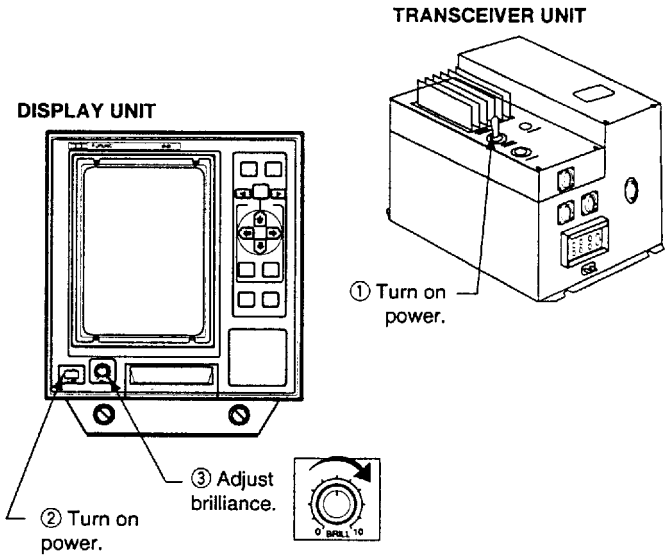


Figure 20 Display unit and transceiver unit

Selecting operating mode

Press the **MODE** key to select operating mode among water tracking, ground tracking, or automatic selection. Selected mode appears at top right corner on the display.

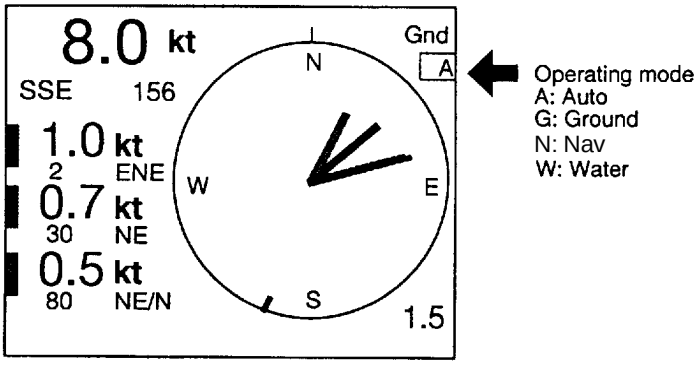


Figure 21 Location of operating mode indication on echo display

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- **Ground Tracking Mode:** Shows absolute ship and tide movements based on ground. (Bottom echo required.)
- **Water Tracking Mode:** Shows movements of ship and tide relative to near-surface water.
- **Nav-aided Mode:** Shows ship's movement measured by the external navigation equipment, and the tide movements based on the nav speed data.
- **Auto Tracking Mode:** Uses ground tracking mode when bottom echo is available. Switches to water tracking mode (or nav-aided mode) when bottom echo is lost. Bottom echo is continuously searched for, and if re-acquired the ground tracking mode is restored.

Setting measuring depths

1. Press the **MENU** key.
2. Press ◄ / ► to select DEP menu.
3. Press ⬆ / ⬇ to select layer.
4. Press ⬅ / ➡ to set depth.
5. Repeat steps 1-4 to set other layers.

Note that measuring depth can also be set on the echo display. See next page for further details.

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Setting tide differential layer

1. On the DEP menu, press ⬆ / ⬇ to select REF TIDE DIFFERENCE.
2. Press ⬅ / ➡ to set layer.

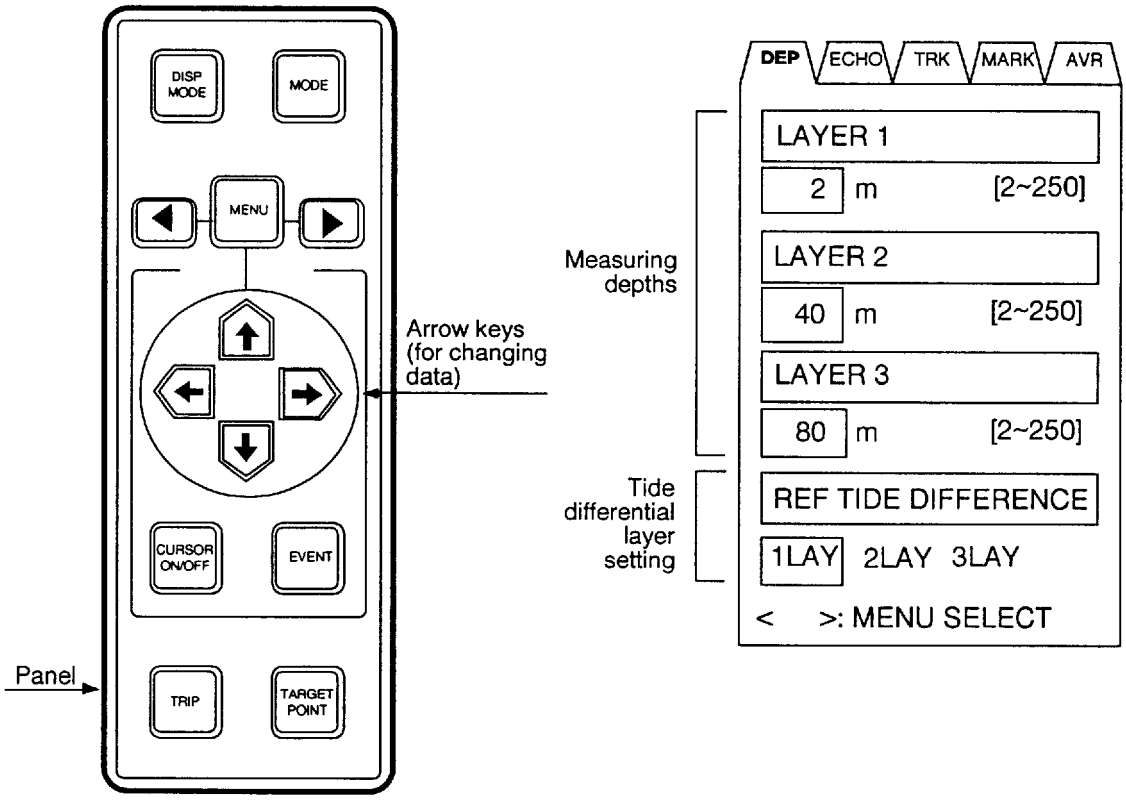


Figure 22 How to set tide differential

Turning off the power

Press the power switch on the display unit.

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Setting Tide Measuring Depths on the Echo Display

Earlier you learned how to set tide measuring depths on the DEP menu.

Measuring depths can also be set directly on the echo display.

Selecting a layer, setting depth

1. On the echo display, press ⬆ / ⬇ to select layer desired. Selected layer's depth indication changes from white to orange.

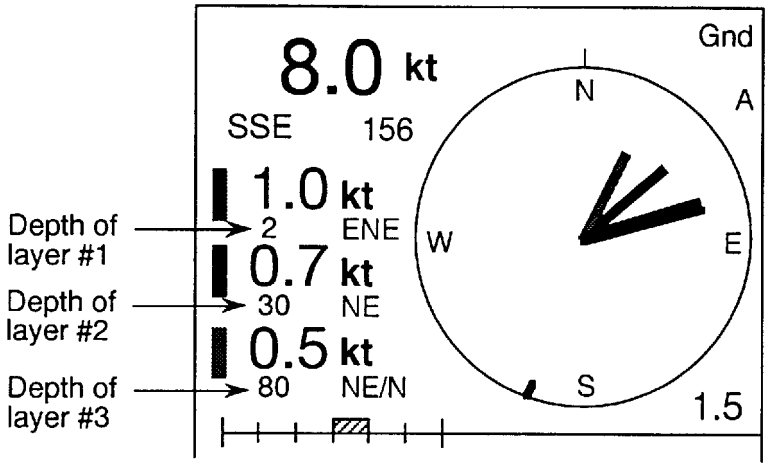


Figure 23 Echo display

2. Press ⬅ / ➡ to set depth. "DEPTH SETTING" appears while setting depth.
3. Press ⬇ to finish. Depth indications change from orange to white.

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Setting up the Echo Display

Setting tide speed vector range

1. Press the **MENU** key.
2. Press ◄ / ► to select the ECHO menu.
3. Press ⬆ / ⬇ to select SPEED RANGE.
4. Press ⬅ / ➡ to set speed. (Default setting: 1.0 knot)

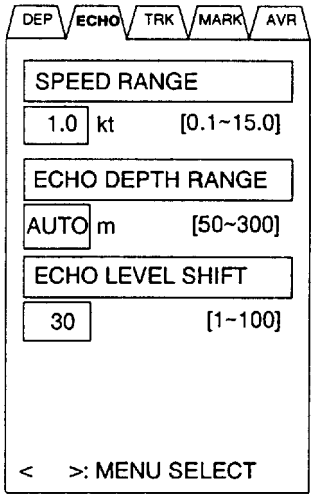


Figure 24 ECHO menu

Setting echo depth range

1. Press ⬆ / ⬇ to select ECHO DEPTH RANGE.
2. Press ⬅ / ➡ to set depth. (Default setting: 100 meters)

Setting echo intensity

1. Press ⬆ / ⬇ to select ECHO LEVEL SHIFT.
2. Press ⬅ / ➡ to set echo intensity.

Registering settings, closing the menu

Press the **MENU** key.

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Setting up the Course Plot Display

The course plot display mainly plots ship's track. It can be displayed by pressing the **DISP MODE** key.

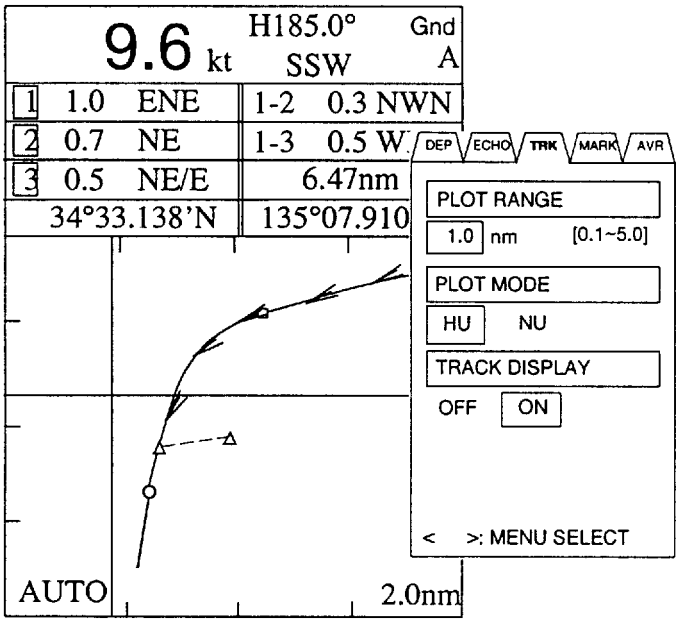


Figure 25 Sample course plot display, TRK menu

Setting the plot range

1. Press the **MENU** key.
2. Press ◄ / ► to select the TRK menu.
3. Press ⬆ / ⬇ to select PLOT RANGE.
4. Press ⬅ / ➡ to set plot range.

Setting plot orientation

1. Press ⬆ / ⬇ to PLOT MODE.
2. Press ⬅ / ➡ to select HU (Head-up) or NU (North-up).

Setting tide vector plotting interval

1. Press ◄ / ► to select the MARK menu.
2. Press ⬆ / ⬇ to select TIDE HISTORY.
3. Press ⬅ / ➡ to set plotting interval.

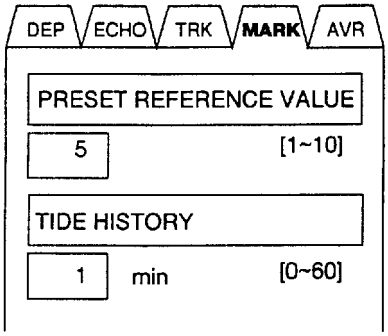


Figure 26 MARK menu

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Marks

The CI-80 has two types of marks which can be inscribed on the display: event mark and target point mark.

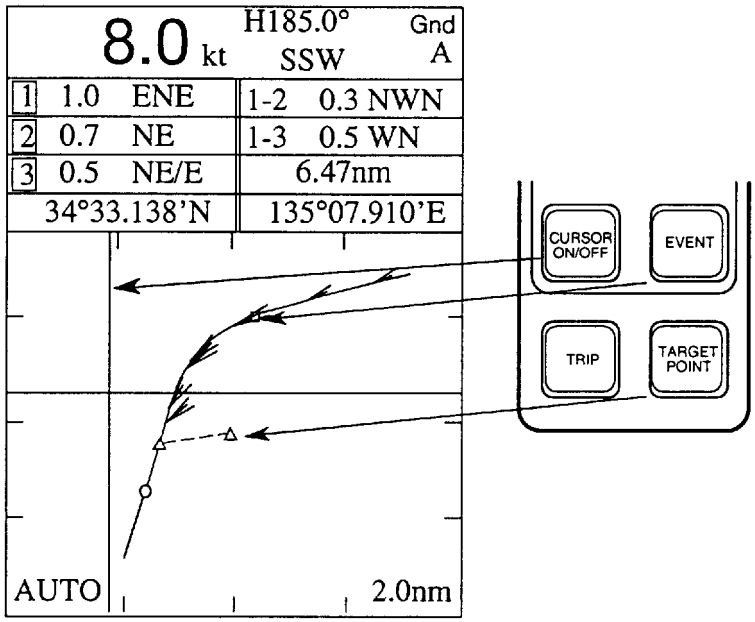


Figure 27 Appearance of event mark and target point mark

Event mark

The **EVENT** key inscribes present position on the display. It is useful for marking important locations, etc. 25 event marks may be entered. When the event mark memory is full the oldest event mark is erased to make room for the latest.

Target point mark

The **TARGET POINT** key inscribes a target point mark on the display. The target point mark is useful for estimating 3-D deformation of fishing tackle (net, etc.) by the effect of tides at different depths. 25 target point marks can be entered. When the target point mark memory is full the oldest target point mark is erased to make room for the latest.

Tide effect can be set on the MARK menu.

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Erasing marks

1. Press the **CURSOR ON/OFF** key.
2. Operate the four arrow keys to place cursor on mark to erase.
3. Press the **EVENT** key (or **TARGET POINT** key).

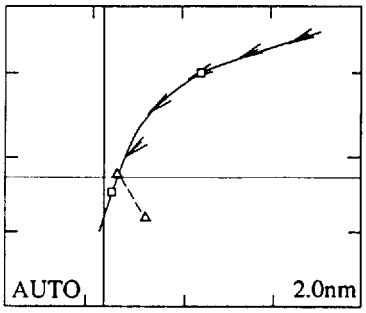


Figure 28 How to erase marks

Calculating Trip Distance

Press the **TRIP** key to start calculation of trip distance from present position. The trip distance indication is automatically reset to zero.

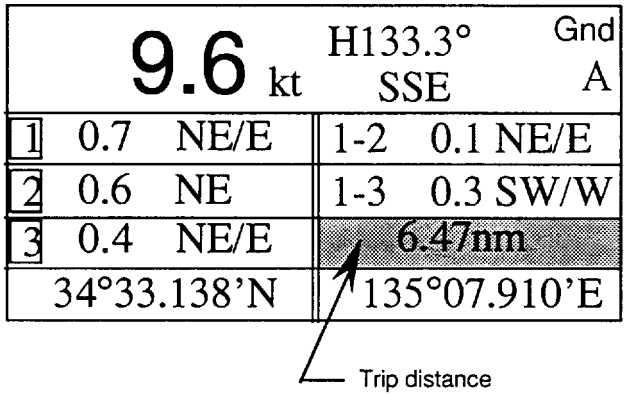


Figure 29 Course plot display, showing location of trip distance indication

Calibrations (offsets)

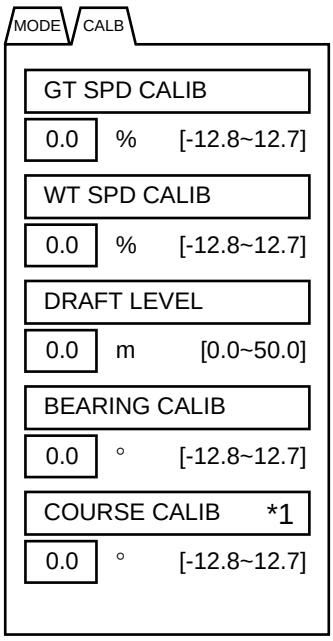
Offsets can be applied to measured values to further refine accuracy. This can be done on the CALB menu.

Opening the system menu

1. Press the **DISP MODE** key to display the echo display.
2. While pressing and holding down the **TRIP** key, press the **MENU** key.

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Displaying the CALB menu



*1: Shown when current (tide) processor is active.

Figure 30 CALB menu

1. Press ◄ / ► to select the CALB menu.
2. Press ⬆ / ⬇ to select menu item.
3. Press ⬅ / ➡ to set offset.

Menu items

GT SPD CALIB: Raise setting when ground tracking speed is slower than ship's speed.

WT SPD CALIB: Raise setting when water tracking speed is slower than ship's speed.

DRAFT LEVEL: Enter depth of transducer from sea surface.

BEARING CALIB: Compensate for bearing error in relation to ship's bow.

COURSE CALIB: Compensate for course error.

NOTE: If course indication by ground tracking mode differs from that of navigator (GPS) even with a correct bearing calibration, enter the course calibration angle.

4. Press the **MENU** key to register settings and close the menu.

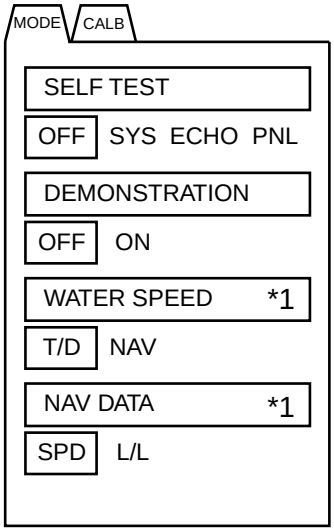
Water Speed Display Setting

1. Press the **DISP MODE** key to display the echo display.
2. While pressing and holding down the **TRIP** key press the **MENU** key.
3. Press ◄ / ► to select MODE.
4. Press ⬆ or ⬇ to select WATER SPEED.
5. Press ⬅ or ➡ to select T/D or NAV.

T/D: Ship's speed, tide and tide differential are calculated from doppler shift frequency. Press the **MODE** key to select measuring mode, in the sequence of G(Ground), W(Water), A(Auto).

NAV: Ship's speed and position data are fed from the GPS navigator. Tide and tide differential are calculated using GPS data when the ground echo cannot be detected. Press the **MODE** key to select measuring mode, in the sequence of G(Ground), N(Nav), A(Auto).

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*1: Shown when tide processor is active.

Figure 31 MODE menu

Nav Data Setting

1. Press the **DISP MODE** key to display the echo display.
2. While pressing and holding down the **TRIP** key press the **MENU** key.
3. Press ◄ / ► to select MODE.
4. Press ⬆ or ⬇ to select NAV DATA.
5. Press ⬅ or ➡ to select L/L or SPD.

   “L/L”: Calculates speed internally from position data change.

   “SPD”: Takes speed data from external navigator as they are. (Select “SPD” if connected with GPS.)

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MAINTENANCE & TROUBLESHOOTING

Preventive Maintenance

Regular checks

- Regular maintenance is important for continued performance. Check the following on a monthly basis.
- Check that all connectors and cables are securely tightened.
- Check grounding systems of units for corrosion.
- Also regularly measure voltage to confirm that it is within prescribed rating.

Cleaning of units

Display unit/ transceiver unit

Accumulated dirt can be wiped off with a soft cloth. If necessary, a mild detergent diluted in water may be used. Chemical cleaners should not be used to clean any unit; they can remove paint and markings.

Transducer unit

Barnacles and other marine life adhering to the transducer face can cause a considerable drop in performance. Check the transducer face regularly for marine life and clean if necessary. The transducer should never be painted.

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Troubleshooting

The troubleshooting table which follows provides simple troubleshooting procedures which the user may use to restore normal operation. If normal operation cannot be restored, do not attempt to check inside any unit. Any repair is best left to a qualified technician.

Table 2 Troubleshooting table

If…	Then…
power is on but nothing appears on the display	• adjust BRILL control. • check power cable. • check for loosened power connector. • check for blown fuse.
nothing appears on the echo display	• check that transceiver unit is turned on. • check power cable and connector on transceiver unit for tight connection. • check fuse on transceiver unit.
echo display is normal but echo or tide is not displayed	• check interconnection cable between transceiver unit and display unit.
color is distorted or display is too bright/ dark	• adjust BRILL control.
certain colors are abnormal or picture jumps	• check for magnets near display unit. • try turning off and on the power to restore normal picture.
tide vector is not displayed	• “TIDE HISTORY” on the MARK menu may be set to “0”.
no echoes are displayed	• “ECHO LEVEL SHIFT” on the ECHO menu may be set too narrow.
If ship’s track is not displayed	• “TRACK DISPLAY” on the TRK menu may be turned off.
seabed does not appear on the echo display	• “ECHO DEPTH RANGE” on the ECHO menu is set too shallow. Set to suitable depth, or select AUTO. • depth is beyond measurable depth (300 meters).
echo display is interrupted	• vessel is in heavy seas or passing over wake of another vessel. • marine life may be adhering to the transducer.
tide data is unstable	• “TIDE AVERAGE” on the AVR menu may be set to “0”.
interference is present on the display	• check ground for corrosion. • cables of other equipment may be too near transducer cable.

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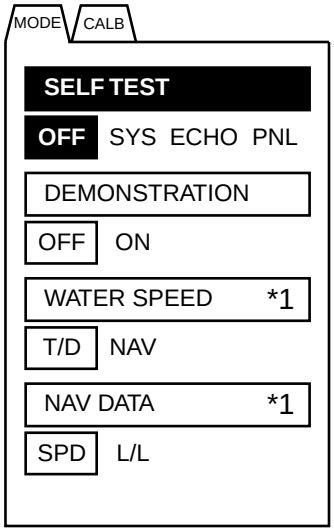
Self Tests, Demonstration Display

The CI-80 has four self tests and a demonstration display which check the system for proper operation.

Display the system menu

1. Press the **DISP MODE** key to select the echo display.
2. While pressing and holding down the **TRIP** key, press the **MENU** key.

Conducting self tests



*1: Shown when tide processor is active.

Figure 32 MODE menu

1. Press ◄ / ► to select the MODE menu.
2. Press ⬆ / ⬇ to select SELF TEST
3. Press ⬅ / ➡ to select test.

Self test menu description

SYS: Conducts general check of all circuit boards.

ECHO: Checks receiver and transmitter.

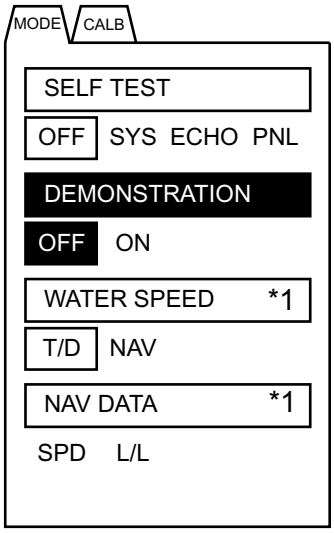
PNL: Checks key and switches of display unit.

4. Press the **EVENT** key to start test.
5. Press the **MENU** key when test is completed.

To quit the self test, Select “SELF TEST-OFF” on the MODE menu and press the **EVENT** key.

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Starting the demonstration display



*1: Shown when tide processor is active.

Figure 33 MODE menu

The demonstration display checks the controls on the display unit and conducts a loopback test between the display unit and the transceiver unit.

1. Press ⬆ / ⬇ to select DEMONSTRATION.
2. Press ➡ to select ON.
3. Press the **EVENT** key.

The echo display appears and the demonstration begins. "DEMO DATA OUTPUTTING" appears while the demonstration display is on. All data shown is for purpose of demonstration; it is not actual data.

To quit the demonstration display, select "DEMONSTRATION-OFF" on the MODE menu and press the **EVENT** key.

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Self Test Results

System test

The system test check results appear at each power on or whenever the system check is conducted though the self test.

SYSTEM CHECK

---------CI-800---------

IP VOL	66503001**	ICP Board ROM prog. no.
IP DSW	“00 00”	IPU Board’s DIP switch setting in hexadecimal notation
IP MEM	1 2 3 4 5 6 OK	ICP Board memory test
IP MEM	7 8 9	

---------CI-810---------

CP VOL	66503101**	JCPA Board ROM prog no.
CP VOL	66503110**	
CP MEM	1 2 3 4 5 6 7 8 OK	JCPA Board memory test
CP DSW	“00 00 00 00”	JCPA Board’s DIP switch setting in hexadecimal notation
FT VOL	66503201**	JFTA Board ROM prog. no.
FT NEM	1 2 3 4 5 6 7 OK	JFTA Board memory test.
TX DEV	1 OK	TX device test.
IF VOL	66500401**	JIFA Board ROM prog no.
IF MEM	1 2 3	JIFA Board memory test
IF DSW	“00 00 00”	JIFA Board’s DIP switch setting in hexadecimal notation
IF DEV	1	JIFA Board device test
IF AN1	RU3 00V RL2.00V OK	AD Converter reference voltage test
IF AN2	MLD 2.50V	Temperature sensor signal test
IF AN3	PWR 1.01V	Power check
IF AN4	PTH…RLL…V	Inclinometer signal test
IF AN5	IS1 1.01V IS2 1.01V	
ERR No.	Error Number	*NOTE: **indicates version no.*

Test	ICP	JCPA	JFTA	JIFA
Prog. ROM test	5	6	1	1
Data ROM test	6			
Memory test	1-4, 7-9	1-5, 7-8	2-7	2-3

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Error display

"OK" appears for normal memory IC test. For fault NG (No Good) and asterisk (*) appear next to ROM/RAM number.

Table 3 Error number display and meaning

Error number	Reason	Circuit board to check
000	Input voltage	JCPA, JIFA
001	Overheated transducer element	JLGA, JCPA, JIFA*
002	Abnormal Tx B voltage	STXA, UPW, JCPA
003	Tx voltage of beam 1	JCPA, STXA
004	Tx voltage of beam 2	JCPA, STXA
005	Tx voltage of beam 3	JCPA, STXA
006	Tx current of beam 1	JCPA, STXA
007	Tx current of beam 2	JCPA, STXA
008	Tx current of beam 3	JCPA, STXA
100	External position data	JCPA, JIFA
101	External speed data	JCPA, JIFA
102	External time data	JCPA, JIFA
103	External depth data	JCPA, JIFA
104	Heading data	JCPA, JIFA
105	Heading error angle	JCPA, JIFA
106	Water temperature data	JCPA, JIFA
200	External KP input interval	JCPA, JIFA, abnormal external KP interval
201	Depth sensor input	JLGA, JCPA, JIFA, faulty temperature sensor
202	Inclinometer roll signal	JCPA, JIFA, no inclinometer data
203	Inclinometer pitch signal	JCPA, JIFA, no inclinometer data

** Abnormally high Tx voltage, abnormally low transducer impedance, too high Tx duty, faulty temperature sensor (faulty element), high water temperature, and other factors may also cause this error display.*

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Echo test

Checking echo display intensity

Press the right and left arrow keys. The SHIFT indication should change with key operation, between 0 and 100.

Checking echo display range

Press the up and down arrow keys. The echo display range should in steps of 50 between 0 and 300.

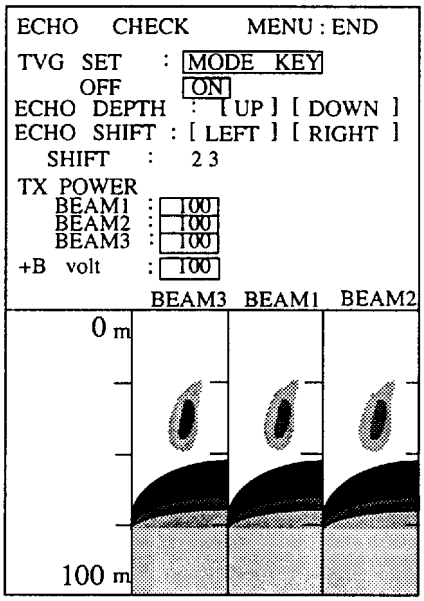


Figure 34 Sample echo test display

Panel test

Press each key on the control panel one by one. The pressed key's corresponding "0" on the display should change to "1".

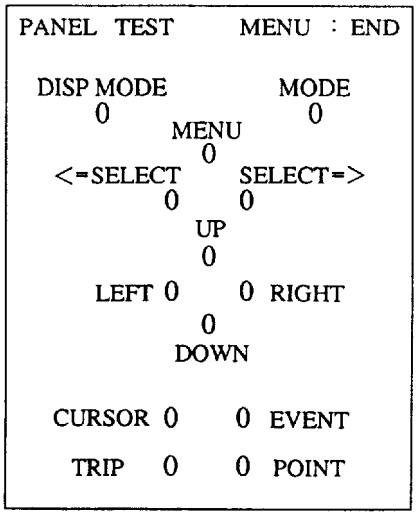
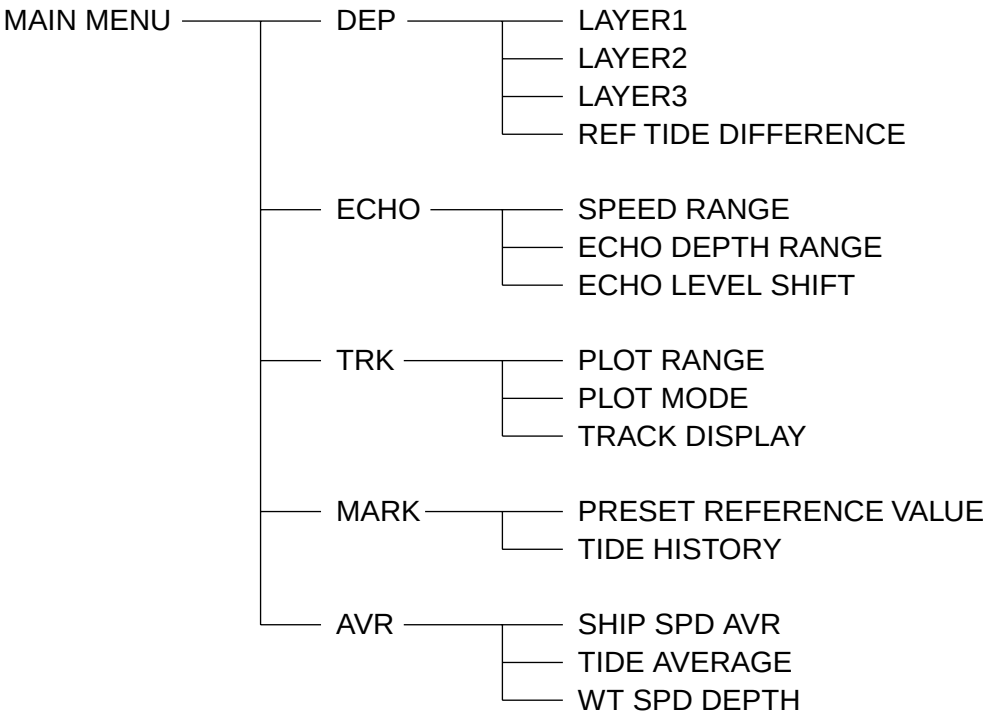
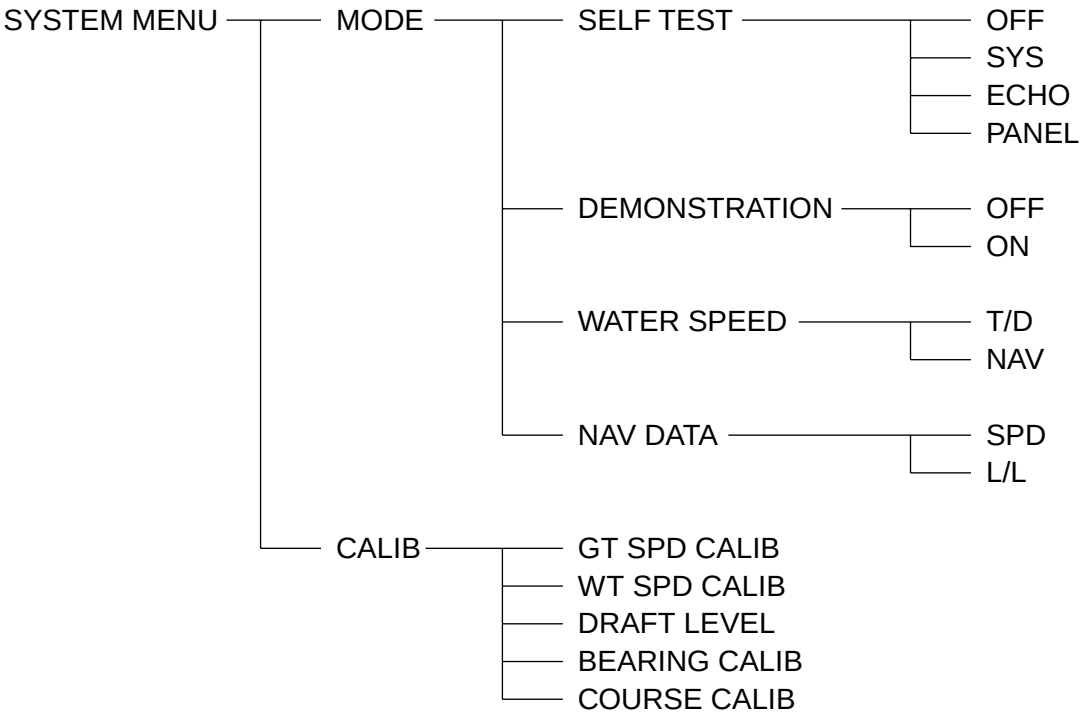


Figure 35 Panel test display

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MENU TREE





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SPECIFICATIONS OF CI-80 DOPPLER SONAR CURRENT INDICATOR

1. General

(1)	Ground tracking acquirable depth	3m-200m (measure able range 300m)
(2)	Measurable tide range	2m-100m, or 75% of depth, whichever is shallower
(3)	Measurable tide depth	10m (measurable from 7m)
(4)	Measurable ship's speed	Fore/aft: +30kts to –10kts, Port/starboard: +9.9kts to –9.9kts
(5)	Measurable tide speed	0kts to 9.9kts
(6)	Tide differential range	–9.9kts to +9.9kts
(7)	Measuring accuracy	Ship's speed: ±1 (1% +0.1kt), Tide speed: (±2% +0.1kt)
(8)	Number of beams	Three (tilt angle 60° each beam)
(9)	Transmitting frequency	288kHz
(10)	Display type	10-inch color CRT

2. Display

(1)	Common displays	Speed, heading:	360 degree or 32 compass points
		Tide speed, direction:	Three layers
(2)	Course plot display	Track display:	DR, max. 1000 pts.
		Tide vector:	Three layers, max. 1000 pts.
		Target point mark:	25 pts.
		Event mark:	25 pts.
		Ship's position:	Latitude, longitude
		Orientation:	Head-up (true motion), North-up
		Trip distance indication:	Provided
(3)	Echo display	Tide vector:	Three layers, circular graph
		Tide differential:	Three layers, measurement between two layers
		Video sounder:	Three directions
(4)	Other	Self test:	All circuit boards, controls
		demonstration:	With internal data
		Calibration facilities	
		Range selection	
		Object flow prediction	

3. Input/Output Signal

(1)	Input signal	Compass signal (heading):	AD-100 format
		KP (2 circuits):	Photo isolation (current loop)
		CIF/NMEA 0183:	Position data
(2)	Output signal	Log signal:	200/400 pulses, contact signal
		KP signal:	TTL
		CIF/NMEA 0183:	Speed, tide
		CI-7000 format signal	

4. Environmental Conditions

(1)	Useable temperature	0°C to 45°C
(2)	Relative humidity	85%

5. Power Supply & Power Consumption

Main's input	11-40VDC, less than 120W avg., or 100/110/115/220/230VAC, 1 ϕ , 50/60Hz (rectifier required)