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FURUNO

OPERATOR'S MANUAL

COLOR VIDEO SOUNDER

MODEL FCV-293

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•Your Local Agent/Dealer

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⚠ SAFETY INSTRUCTIONS

Safety Instructions for the Operator

⚠ 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.

Do not operate the equipment with wet hands.

Electrical shock can result.

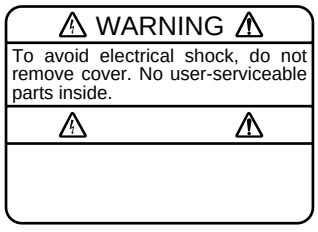
⚠ CAUTION

Use the proper fuse.

Use of a wrong fuse can result in damage to the equipment and void the warranty.

WARNING LABEL

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 about replacement.



Name: Warning Label (1)
Type: 86-003-1011-1
Code No.: 100-236-231

Safety Instructions for the Installer

⚠ WARNING

ELECTRICAL SHOCK HAZARD
Do not open the equipment unless totally familiar with electrical circuits and service manual.

Only qualified personnel should work inside the equipment.

Turn off the power at the switchboard before beginning the installation.

Fire or electrical shock can result if the power is left on.

Do not install the equipment where it may get wet from rain or water splash.

Water in the equipment can result in fire, electrical shock or damage to the equipment.

Be sure no water leaks in at the transducer mounting location.

Water leakage can sink the vessel. Also confirm that the transducer will not loosen by ship's vibration. The installer of the equipment is solely responsible for the proper installation of the equipment. FURUNO will assume no responsibility for any damage associated with improper installation.

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

Connection of an incorrect power supply can cause fire or damage to the equipment.

Install the transducer tank according to the installation instructions.

Failure to install the tank correctly may result in water leakage and damage to the ship's hull.

⚠ CAUTION

Observe the following compass safe distances to prevent interference to a magnetic compass:

	Standard compass	Steering compass
Display unit	1.4 m	0.95 m

The transducer cable must be handled carefully, following the guidelines below.

- **Keep fuels and oils away from the cable.**
- **Locate the cable where it will not be damaged.**
- **The cable sheath is made of chlorophrene or polychloride vinyl, which is easily damaged by plastic solvents such as toulene. Locate the cable well away from plastic solvents.**

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FOREWORD

A Word to FCV-293 Owners

Congratulations on your choice of the FURUNO FCV-293 Color Video Sounder. We are confident you will see why the FURUNO name has become synonymous with quality and reliability.

For over 50 years FURUNO Electric Company has enjoyed an enviable reputation for innovative and dependable marine electronics equipment. This dedication to excellence is furthered by our extensive global network of agents and dealers.

This equipment is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless operated and maintained properly. Please carefully read and follow the recommended procedures for operation and maintenance.

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

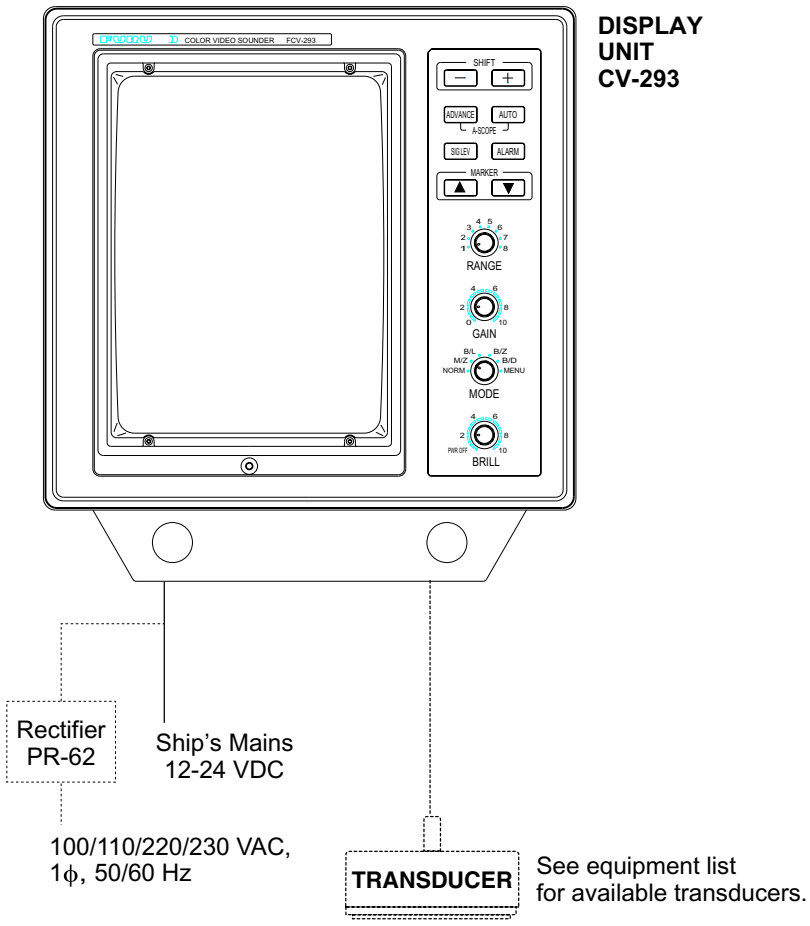
Thank you for considering and purchasing FURUNO equipment.

Features

The FCV-293 is a single-frequency color video sounder which has a large variety of functions, all contained in a remarkably small cabinet.

- 10” diagonal color CRT provides bright and vivid presentation of underwater conditions.
- Wide variety of presentation modes: normal, bottom lock, marker zoom, bottom zoom, bottom discrimination.
- Automatic mode automatically adjusts range to display the bottom echo.
- A-scope presentation displays echoes in their true intensities, vital for the bottom trawler and lobster/crab potter.
- Fish and bottom alarms release audio and visual alarms when a fish echo or bottom echo enters the user-set alarm zone.
- Demonstration mode provides internally generated sounder picture to acquaint you with the FCV-293’s features. Connection of transducer is not required.
- Pulselengths from 0.1 to 3.6 msec for excellent performance on both shallow and deep ranges. Automatic or manual selection.
- White marker shows any echo in white color. Useful for discriminating bottom fish from bottom echo.

SYSTEM CONFIGURATION



System configuration

EQUIPMENT LISTS

Standard supply

Name	Type	Code No.	Qty	Remarks
Display Unit	CV-293	—	1	
Spare Parts*	SP02-04701	002-272-280	1 set	
Installation Materials*	CP02-07301	002-272-290	1 set	
Accessories*	FP03-04310	008-411-810	1 set	

* = See packing list at back of this manual for details.

Optional supply

Name	Type	Code No.	Qty	Remarks
Plastic Cover	02-104-1402	000-802-973	1	
Hood	FP03-03120	008-239-110	1	
Hood w/Lens	OP03-90	008-445-050	1	
Rectifier	PR-62	000-013-484	1	100 VAC
		000-013-485		110 VAC
		000-013-486		220 VAC
		000-013-487		230 VAC
Transducer	See the next several pages for transducer and recommended thru-hull pipe and tank.			

Available transducers: 1kW

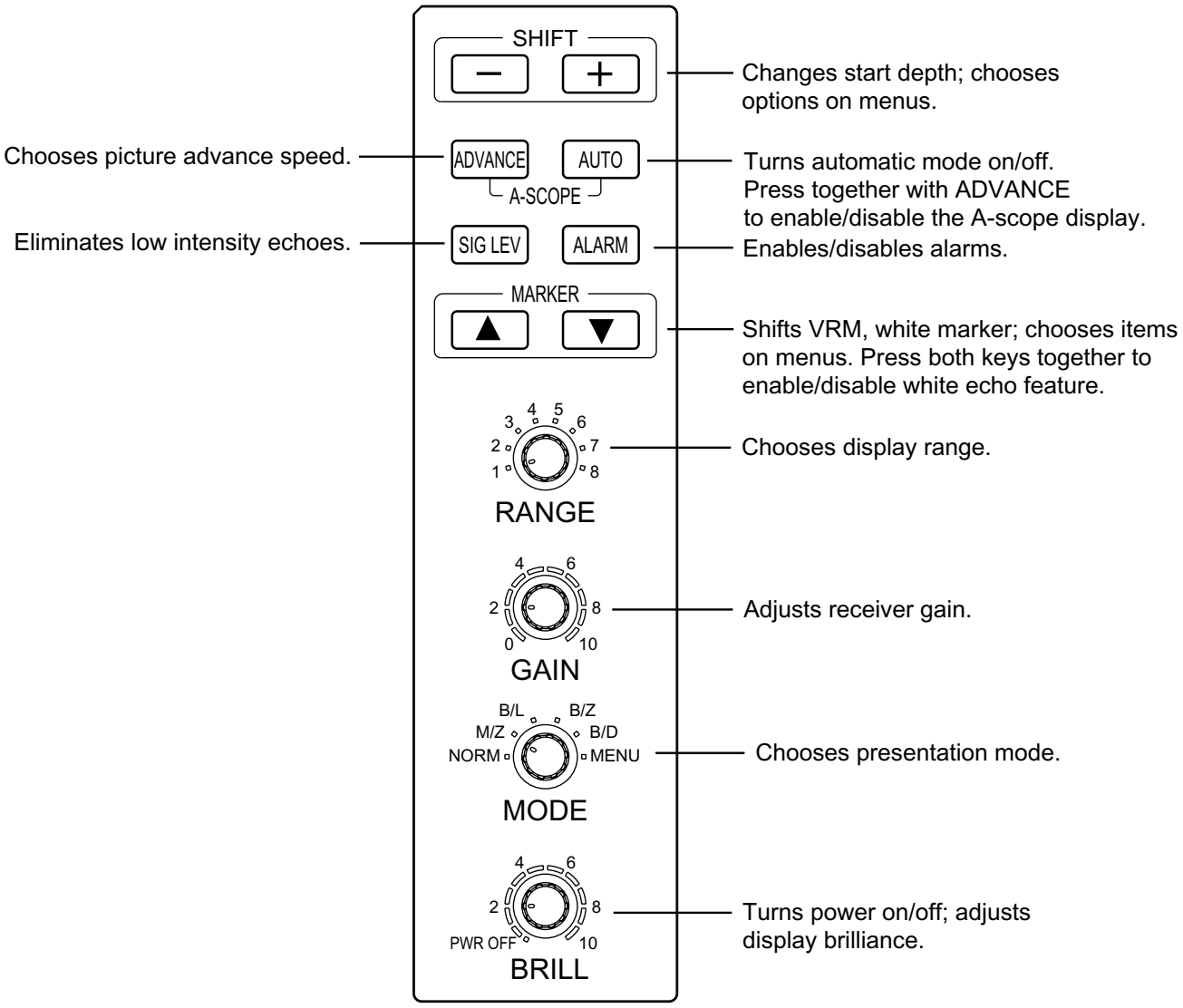
Freq. (kHz)	Transducer	Ship	Thru-hull pipe	Tank
50	50B-6 (000-015-042, 10M)	Steel	TFB-5000(1) 000-015-206)	T-605 (000-015-515)
		FRP	TRB-1000(1) (000-015-215)	T-605-F (000-015-516)
		Wood	TFB-1000(1) (000-015-201) TPB-9000(1) (000-015-213)	T-605-W (000-015-517)
	50B-6B (000-015-043, 15M) (000-015-018), 30M)	Steel	TFB-5000(1) (000-015-206)	T-605 (000-015-515)
		FRP	TRB-1000 (000-015-215)	T-605-F (000-015-516)
		Wood	TFB-1000(1) (000-015-201) TPB-9000(1) (000-015-213)	T-605-W (000-015-517)
	50B-9B (000-015-065, 15M)	Steel	TFB-5000(1) 000-015-206)	T-603 (000-015-509)
		FRP	TRB-1000(1) (000-015-215)	T-603-F (000-015-510)
		Wood	TFB-1000(1) (000-015-201) TPB-9000(1) (000-015-213)	T-603-W (000-015-511) T-64 (000-015-327)
200	200B-5S (000-015-029)	Steel	TFB-5000(1) 000-015-206)	—
		FRP	TRB-1000(1) (000-015-215)	—
		Wood	TFB-1000(1) (000-015-201) TPB-9000(1) (000-015-213)	—

Available transducers: 2kW

Freq. (kHz)	Transducer	Ship	Thru-hull pipe	Tank
50	50B-12 (000-015-020, 15M)	Steel	TFB-5000(1) 000-015-206)	T-611 (000-015-531)
		FRP	TRB-1000(1) (000-015-215)	T-611-F (000-015-532)
		Wood	TFB-1000(1) (000-015-201) TPB-9000(1) (000-015-213)	T-611-W (000-015-533)
	50BL-12 (000-015-013)	Steel	TFB-5000(1) (000-015-206)	T-702 (000-015-041)
		FRP	TRB-1000 (000-015-215)	T-702-F (000-015-240)
		Wood	TFB-1000(1) (000-015-201) TPB-9000(1) (000-015-213)	—
200	200B-8 (000-015-030)	Steel	TFB-5000(1) 000-015-206)	T-608 (000-015-525)
		FRP	TRB-1000(1) (000-015-215)	T-608-F (000-015-526)
		Wood	TFB-1000(1) (000-015-201) TPB-9000(1) (000-015-213)	T-608-W (000-015-527) T-32B (000-015-318)
	200B-8B (000-015-032, 15M 000-015-034, 30M, 000-015-035, 50M)	Steel	TFB-5000(1) 000-015-206)	T-608 (000-015-525)
		FRP	TRB-1000(1) (000-015-215)	T-608-F (000-015-526)
		Wood	TFB-1000(1) (000-015-201) TPB-9000(1) (000-015-213)	T-608-W (000-015-527) T-32B (000-015-318)

1. OPERATION

1.1 Description of Controls



Control panel

1.2 Turning the Power On/Off, Adjusting Brilliance

Turn the [BRILL] control clockwise to turn on the power. The displays shows model no. for several seconds, followed by the last-used display. (You may go immediately to the last-used display from the model no. display by pressing any key.) Turn the control clockwise to raise display brilliance; counterclockwise to lower it. To turn off the power, turn the control fully counterclockwise until you hear a click.

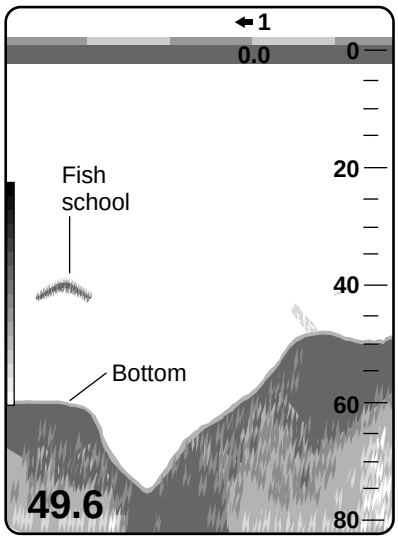
Note: The example screens shown in this manual may not match the screens shown on your display. The screens you see depend on system configuration and system settings.

1.3 Presentation Mode

Use the [MODE] switch to choose presentation mode. Six choices are available: normal display, marker zoom, bottom lock, bottom zoom, bottom discrimination and menu.

1.3.1 Normal display (MODE switch position: NORM)

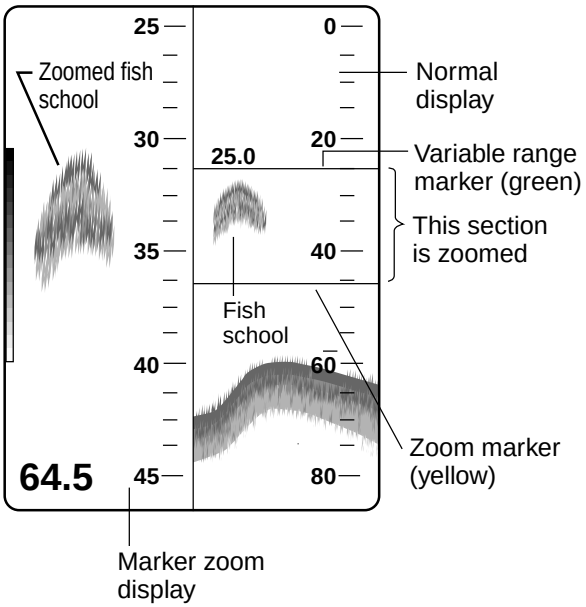
The normal display shows the video sounder picture over the entire screen, and it is useful for general observation of fish schools and bottom.



Normal display

1.3.2 Marker zoom display (MODE switch position: M/Z)

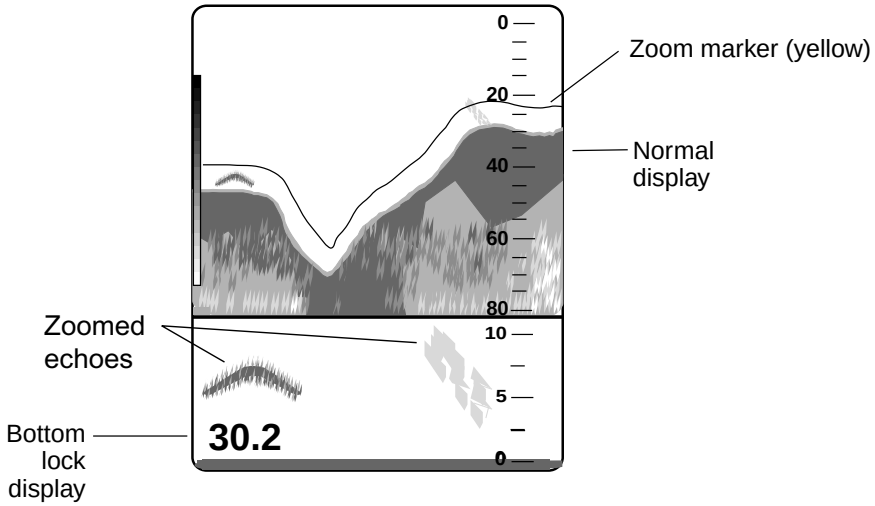
The marker zoom display expands the area between the VRM and the zoom marker on the normal picture to full vertical size of the screen on the left-half window. You may specify the portion to expand by operating the VRM (Variable Range Marker), which you can shift with the [▲] and [▼] keys.



Marker zoom display

1.3.3 Bottom lock display (MODE switch position: B/L)

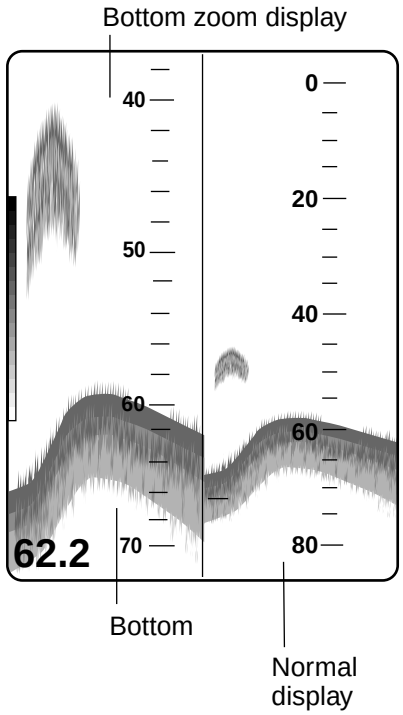
The bottom lock display provides a compressed normal picture on the top 2/3 of the screen and a 2, 5 or 10 meter wide layer in contact with the bottom is expanded onto the bottom 1/3 of the screen. This mode offers excellent fish discrimination which is indispensable for bottom trawlers.



Bottom lock display

1.3.4 Bottom zoom display (MODE switch position: B/Z)

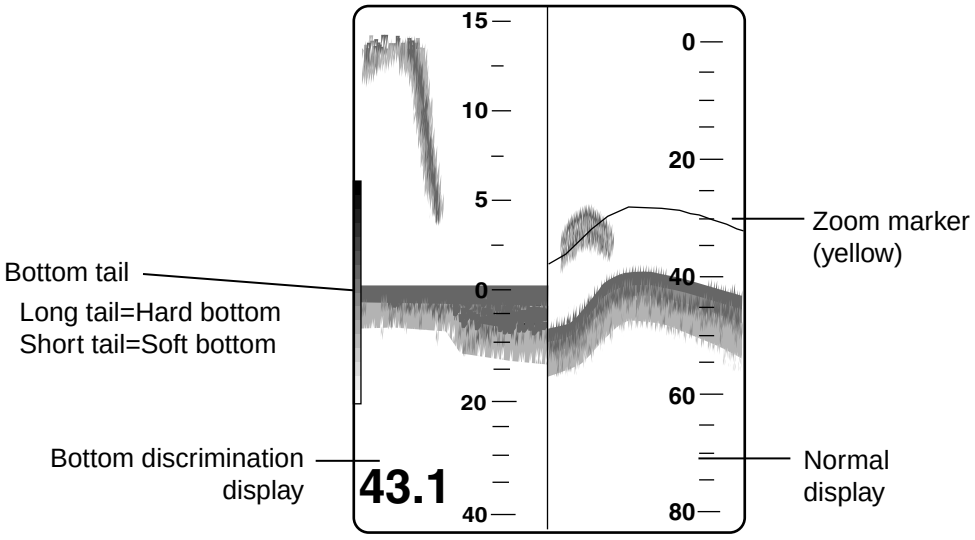
The bottom zoom display expands bottom and bottom fish echoes two to five times to vertical size of the screen. The zone automatically moves so that the bottom echoes are located on the lower half of the screen.



Bottom zoom display

1.3.5 Bottom discrimination display (MODE switch position: B/D)

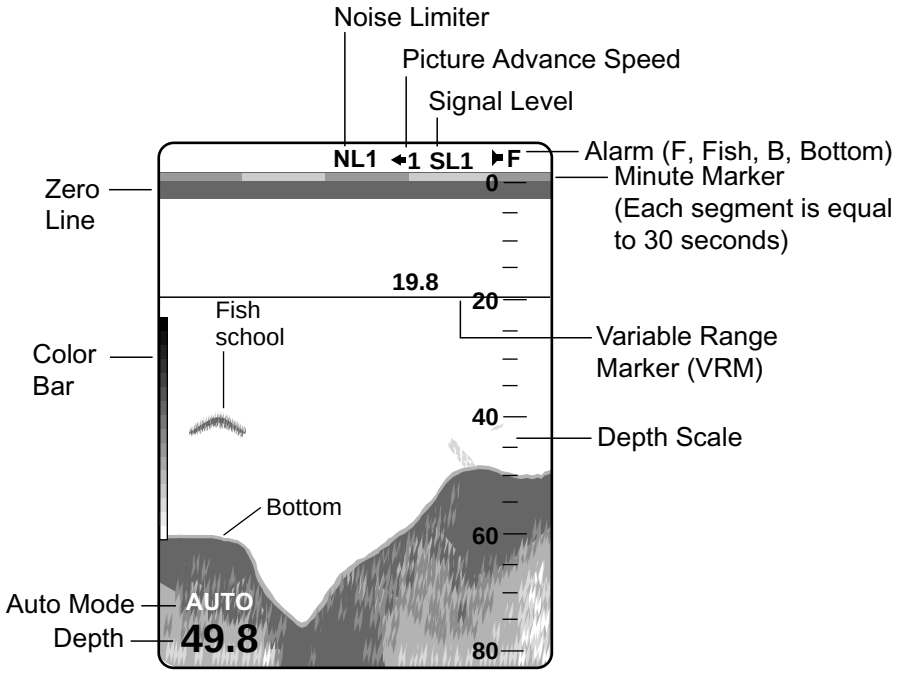
The bottom discrimination display paints the bottom contour as a straight line. The upper part of the bottom discrimination screen displays fish echoes expanded like a bottom-lock picture and the lower part, bottom reflections below the bottom contour with a normal range scale. This mode is useful for finding bottom conditions.



Bottom discrimination display

1.4 Indications

The illustration below shows all the indications which may appear on the normal display.



Indications

1.5 Automatic Operation

Automatic operation is useful when you are preoccupied with other tasks and do not have the time to adjust the display. The automatic function automatically selects the range scale to display the bottom echo on the display.

Note: RANGE and SHIFT controls and are inoperative in automatic operation.

To activate the automatic mode, press the [AUTO] key to show " AUTO ON" at the screen center. "AUTO" appears above the depth indication when the auto mode is active.

1.6 Manual Operation

Manual operation is useful for observing fish schools and bottom using fixed gain, range and shift settings. To choose manual operation, press the [AUTO] key to show "AUTO OFF" at the screen center.

1.6.1 Range selection

The basic range and range shifting functions used together give you the means to select the depth you can see on the screen. The basic range can be thought of as providing a "window" into the water column and range shifting as moving the "window" to the desired depth.

Basic range

The basic range may be selected with the [RANGE] control, from the ranges shown below.

Basic display ranges (default)

	1	2	3	4	5	6	7	8
Meters	5	10	20	40	80	150	300	500
Feet	15	30	60	120	200	400	1000	1500
Fathoms	3	5	10	20	40	80	150	250
P/B*	3	5	10	30	50	100	200	300

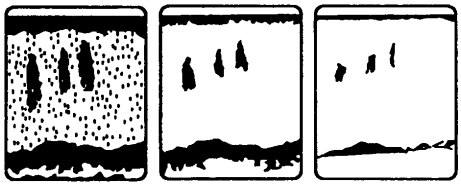
* P/B = Passi/Braza

Range shifting

The basic range may be shifted up or down by using the [-] or [+] key. The amount of range shifting, that is the depth at the upper limit of the window, is shown at each press of the [-] or [+] key.

1.6.2 Gain adjustment

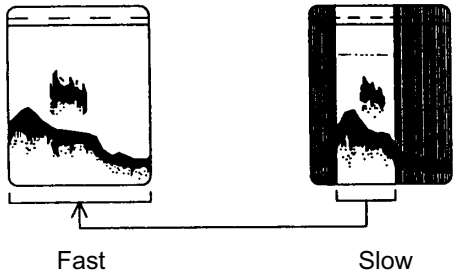
The [GAIN] control adjusts the sensitivity of the receiver. Adjust the control so that a slight amount of noise remains on the screen. Generally, use a higher gain setting for deep waters and a lower setting for shallow waters.



Examples of correct and incorrect gain settings

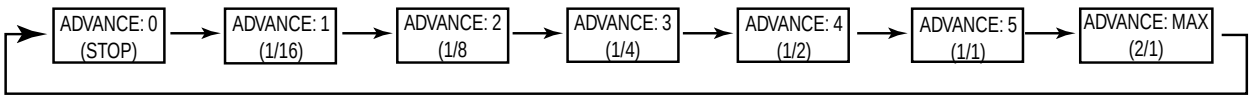
1.7 Picture Advance Speed

The picture advance speed determines how quickly the vertical scan lines run across the screen. When selecting a picture advance speed, keep in mind that a fast advance speed will expand the size of the fish school horizontally on the screen and a slow advance speed will contract it.



Picture advance speed and echo appearance

Press the [ADVANCE] key to show the picture advance speed selection window. Continue pressing the key to choose desired speed. The fraction in the window denotes the number of scan lines produced per transmission. For example, 1/8 means one scan line is produced every eight transmissions. “0” (STOP) freezes the display and it is convenient for taking a photograph of the display.



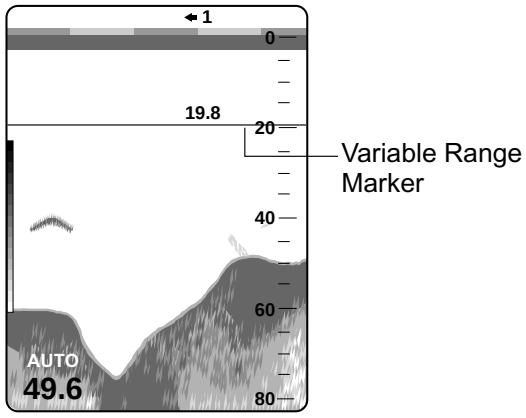
Picture advance speed selection windows

1.8 Eliminating Low Intensity Echoes

Sediments in the water or reflections from plankton may be painted on the display in green or light-blue. These weak echoes may be eliminated by using the [SIG LEV] key. Every press of the key eliminates up to five of the weakest color echoes in the 16-color display or up to the two of the weakest color echoes in the 8-color display. The echoes eliminated can be identified with the color bar; the echo colors eliminated are erased from the color bar.

1.9 Measuring Depth

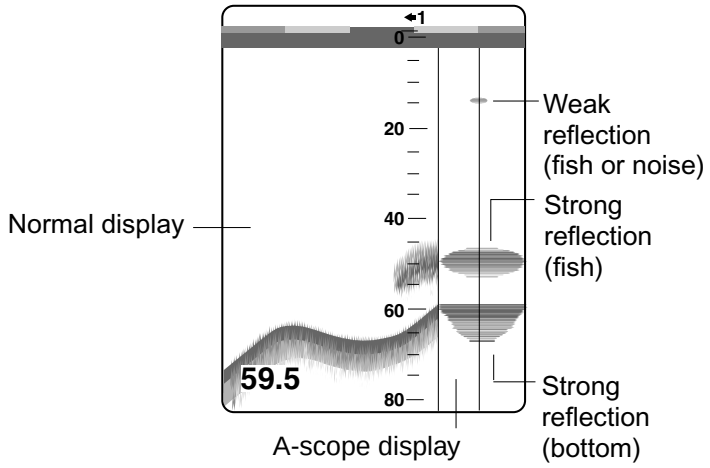
Use the VRM (Variable Range Marker) to measure the depth. Operate the [▲] or [▼] key to shift the VRM. The VRM depth is shown just above the VRM.



VRM

1.10 A-scope Display

The A-scope display shows echoes at each transmission with amplitude and tone proportional to their intensities, on the right 1/3 of the screen. It is useful for estimating the kind of fish school and bottom composition. To turn the A-scope on and off alternately, press the [ADVANCE] and [AUTO] keys together.



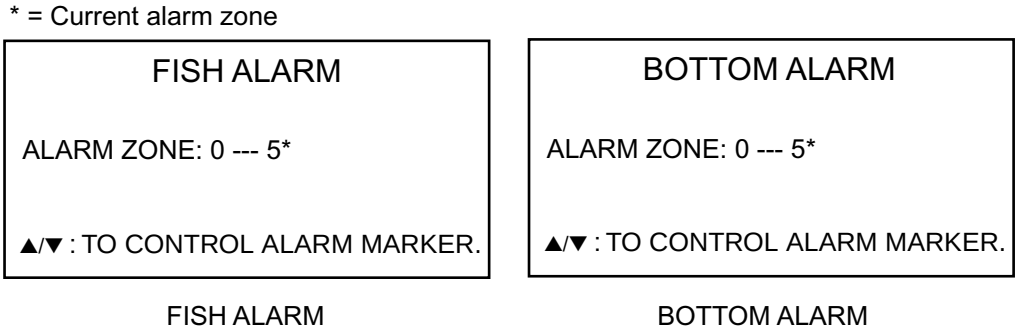
A-scope display

1.11 Alarms

The FCV-293 provides fish and bottom alarms which generate audio and visual alarms when violated. The fish alarm informs you that a fish echo (strength which triggers the alarm determined by system menu setting) has entered the alarm zone and the bottom alarm alerts you when the bottom echo has come within the alarm zone.

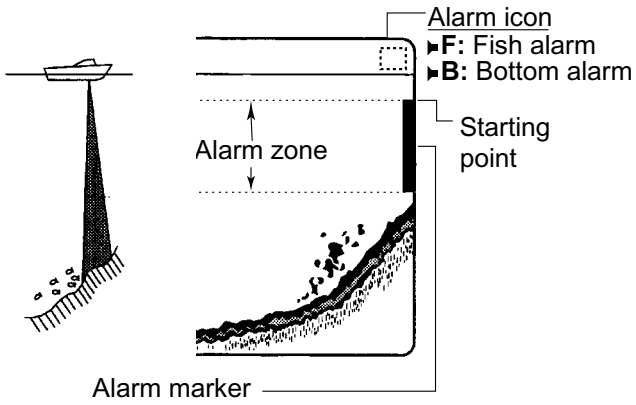
1.11.1 Activating/Deactivating an alarm

1. Press the [ALARM] key to show FISH ALARM or BOTTOM ALARM at the screen center, whichever alarm you want to use. The corresponding alarm icon appears at the top right corner of the display. (See the illustration below for location.)



Fish and bottom alarm setting windows

2. While the alarm setting window is displayed, move the alarm marker to the desired depth with the [▲] or [▼] key. (The default alarm marker width is 5 meters. To change the width, see paragraph 1.11.3.)



How the alarm works

To turn off the alarm, press the [ALARM] key twice or three times (depending on alarm in use) to show “ALARM OFF.”

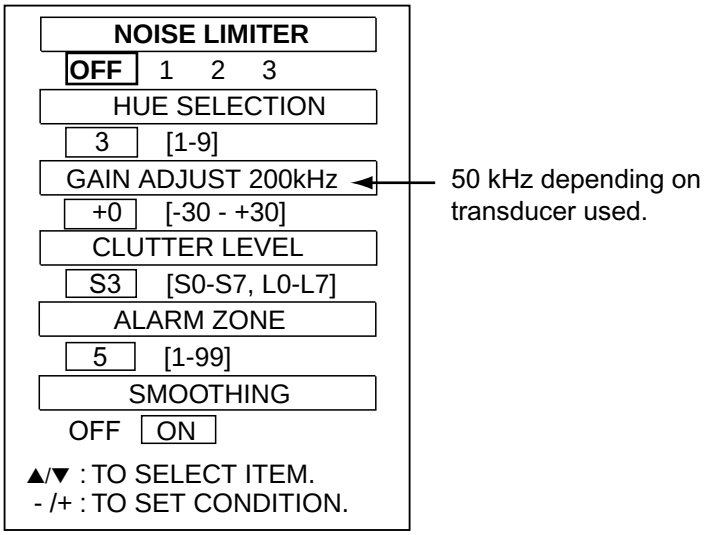
1.11.2 Silencing the audio alarm

The audio alarm sounds when an alarm is violated. Press any key to silence the audio alarm. The audio alarm will be released the next time the alarm setting is violated.

1.11.3 Changing alarm marker width

The default alarm marker width is five meters. You can choose a different width, from 1-99 meters, as follows.

1. Set the [MODE] switch in the MENU position.



Main menu

2. Use the [▲] or [▼] key to choose ALARM ZONE.
3. Use the [+] or [-] key to set width.
4. Set the [MODE] switch in any other mode.

1.12 White Marker

Any color on the color bar can be changed to white. For example, you may want to show the bottom echo in white to discriminate bottom fish close to the bottom.

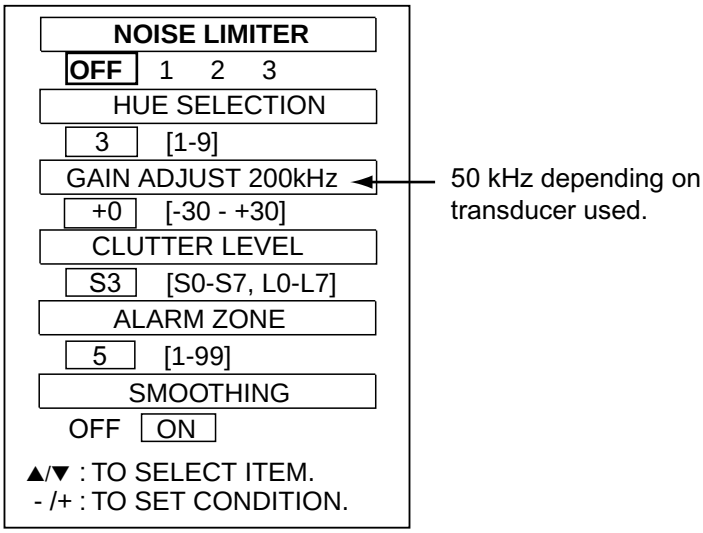
1. Press the [▲] and [▼] keys together.
2. Press the [▲] or [▼] key to place the white marker at the location desired on the color bar.

To remove the white marker from the color bar, press the [▼] key several times until the white marker disappears. (The white marker feature remains active – press the [▲] key several times to redisplay the white marker.) To disable the white marker, press the [▼] key several times to erase the white marker from the color bar and then press the [▲] and [▼] keys together.

1.13 Adjusting the Picture From the Main Menu

The main menu provides several functions for adjustment of the picture. To show the main menu and set options, do the following:

1. Set the [MODE] switch in the MENU position.

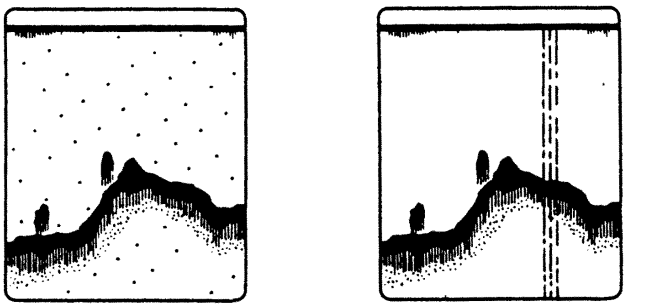


Main menu

2. Use the [▲] or [▼] key to choose menu item. Selected item and its current setting are shown in yellow color.
3. Use the [+] or [-] key to set option.
4. Set the [MODE] switch to any other mode to register settings.

1.13.1 Suppressing interference

Interference from other acoustic equipment operating nearby or electrical equipment on board own ship may appear on the screen as shown in the illustration below. To suppress these forms of interference, use the NOISE LIMITER. The higher the number the greater the degree of interference suppression. The current noise limiter setting is shown as NL1, NL2 or NL3 at the top of the screen. Turn off the noise limiter when no interference exists so as not miss weak echoes.



Interference from other sounder

Electrical interference

Interference

1.13.2 Background and echo colors

HUE SELECTION provides various echo color gradations and background color combinations. Refer to the table below to choose hue.

Hue, echo color and background color

Hue	Hue 1	Hue 2	Hue 3	Hue 4	Hue 5	Hue 6	Hue 7	Hue 8	Hue 9
No. of colors	16	8	16	8	16	8	8	8	8
Colors	RB RED ORG YEL GRN LBLU DBLU (bkgd)	RB RED ORG YEL GRN SKYBLU LBLU DBLU (bkgd)	RB RED ORG YEL GRN WHT LBLU BLU (bkgd)	RB RED ORG YEL GRN WHT LBLU BLU (bkgd)	RB RED ORG YEL GRN WHT LBLU BLK (bkgd)	RB RED ORG YEL GRN WHT LBLU BLK (bkgd)	RED YEL GRN PPL WHT SKYBLU BLU (bkgd)	RED YEL GRN PPL BLU SKYBLU BLK (bkgd)	Mono-chrome

RB = Reddish brown, DBLU = Dark-blue, LBLU = Light-blue, bkgd = background

1.13.3 Adjusting preset gain

You may adjust the preset gain when the GAIN control on the front cannot sufficiently adjust the gain (sensitivity). Changing the setting of GAIN ADJUST by 10 corresponds to changing the gain by the front panel GAIN control by 1.

1.13.4 Eliminating low level noise

Light-blue dots, mainly caused by sediments in the water, may appear over most of screen. These dots can be suppressed by adjusting CLUTTER LEVEL, referring to the table below. Turn off the clutter level function when no clutter is present so as not to miss weak echoes.

Clutter level setting and use

Clutter level setting	Use
S0 – S7	Suppresses weak echo colors according to setting level.
L0 – L7	Narrows dynamic range over whole echo color.

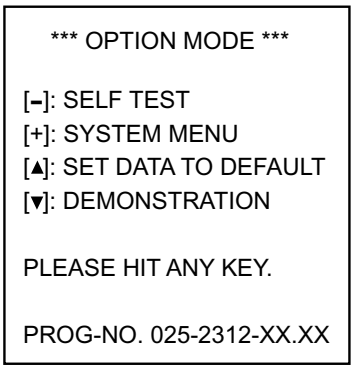
1.13.5 Smoothing echoes

When echoes look “spotty,” turn on the SMOOTHING feature. (The default setting is “ON.”) Echoes in the horizontal direction are averaged to smooth the echo presentation.

1.14 System Menu

The system menu provides functions which once preset do not required frequent adjustment. You can access this menu as follows:

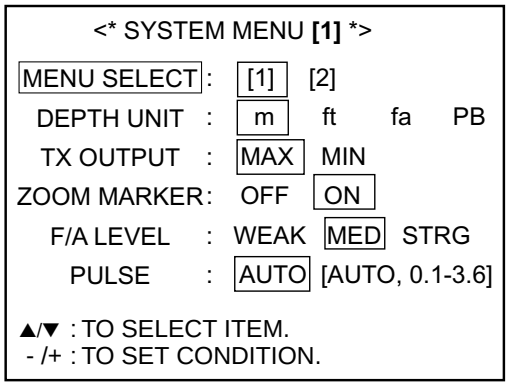
1. Turn on the power while pressing any key to show the option mode menu.



XX.XX = Program version no.

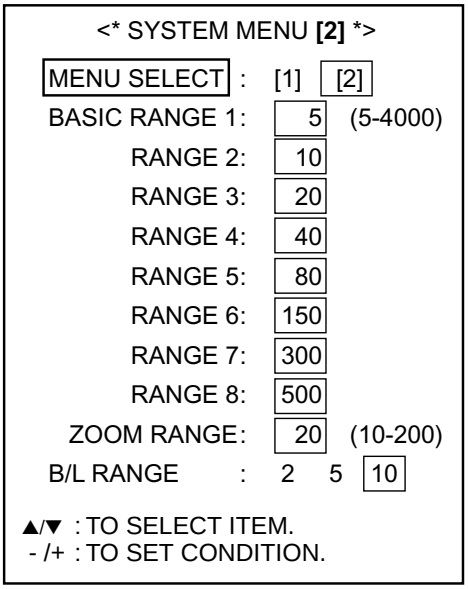
Option mode menu

2. Press the [+] key to show menu no. 1 of the system menu.



System menu, menu no. 1

3. To display menu no. 2 of the system menu, press the [▲] key to choose MENU SELECT and then press the [+] key to choose "[2]."



System menu, menu no. 2

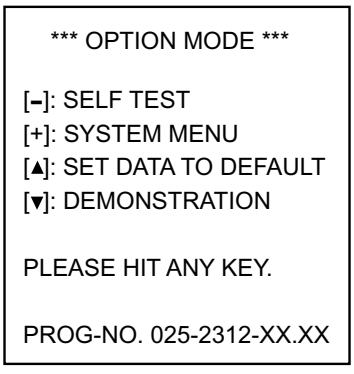
Description of system menu

Item	Description
Menu no. 1	
MENU SELECT	Chooses menu no. 1, menu no. 2.
DEPTH UNIT	Chooses unit of depth measurement among meters, feet, fathoms and passi/braza.
TX OUTPUT	Chooses transmitter output power: minimum or maximum.
ZOOM MARKER	Turns the zoom marker on or off.
F/A LEVEL	Chooses the fish echo strength level which triggers the fish alarm, weak, medium or strong.
PULSE	Chooses pulselength selection mode, automatic or manual. For manual selection, choose a short pulselength for better resolution; a longer pulselength for longer detection range.
Menu no. 2	
MENU SELECT	Chooses menu no. 1, menu no. 2.
BASIC RANGE 1-8	Program basic ranges. The available range is from 5 to 4000 (meters). Set in order from lowest to highest.
ZOOM RANGE	Sets the range of the zoom marker in the bottom zoom display. The range is 10-200 meters.
B/L RANGE	Sets the bottom lock range, that is, the distance from the bottom to expand. The choices are 2, 5 and 10 meters.

1.15 Demonstration Mode

The demonstration mode provides a simulated video sounder picture, using internally generated echoes, to help acquaint you with the many features of the FCV-293. All controls are operative. Connection of the transducer is not required.

1. Turn on the power while pressing any key.



XX.XX = Program version no.

Option mode menu

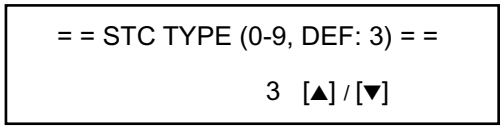
2. Press the [▼] key to activate the demonstration mode.

To restore normal operation, turn the power off and on again.

1.16 Short-Range Gain Setting

STC (Sensitivity Time Control) compensates for propagation attenuation of the ultrasonic wave. It does this by equalizing echo presentation so that fish schools of the same size appear in the same density in both shallow and deep waters. In addition, it reduces surface noise. Note that if the STC level is set too high short-range echoes may not be displayed.

1. Turn on the power while pressing any key to show the option mode menu.
2. Press the [ADVANCE] key five times to show the STC setting window.



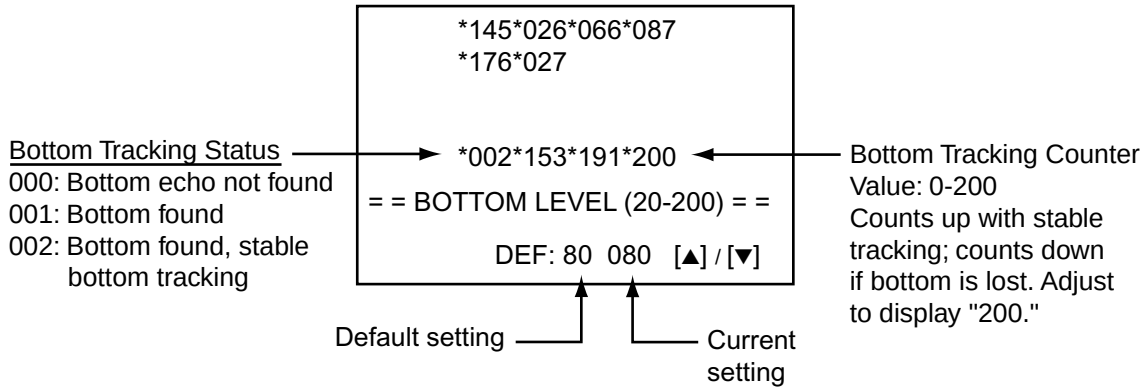
STC setting window

3. Use the [▲] or [▼] key to change the setting. Increase the setting when surface noise is present on the screen.
4. Turn the power off and on again.

1.17 Bottom Echo Level

If the depth indication is unstable in automatic operation or the bottom echo cannot be displayed in reddish-brown by adjusting the [GAIN] control in manual operation, you may adjust the bottom echo level detection circuit to stabilize the depth indication. Note that if the level is set too low weak echoes may be judged as the bottom echo and if it is set too high the depth indication will not be displayed.

1. Turn on the power while pressing any key to show the option mode menu.
2. Press the [ALARM] key five times to show the bottom level setting window.



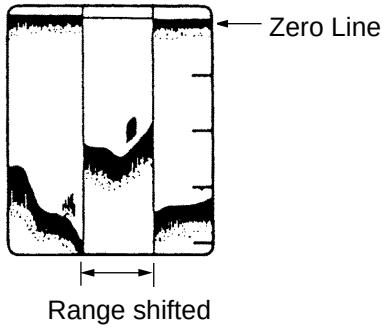
Bottom level setting window

3. Use the [▲] or [▼] key to set. The depth indication appears when the bottom echo is correctly captured.
4. Turn the power off and on again.

2. INTERPRETING THE DISPLAY

2.1 Zero Line

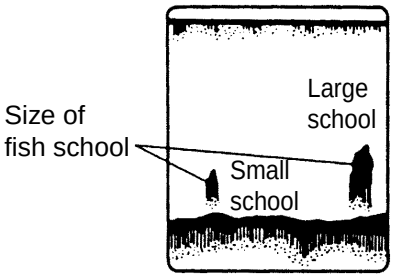
The zero line (sometimes referred to as the transmission line) represents the transducer's position, and moves off the screen when a deep phased range is used.



Zero line

2.2 Fish School Echoes

Fish school echoes will generally be plotted between the zero line and the bottom. Usually the fish school/fish echo is weaker than the bottom echo because its reflection property is much smaller when compared to the bottom. The size of the fish school can be ascertained from the density of its echo.



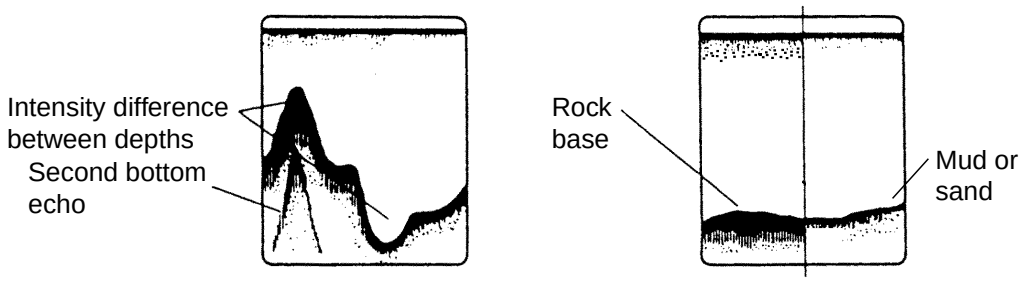
Fish school echoes

2.3 Bottom Echo

Echoes from the bottom are normally the strongest and are displayed in reddish-brown color (in default color arrangement) but the color and width will vary with bottom composition, water depth, frequency, sensitivity, etc.

In a comparatively shallow depth, a high gain setting will cause a second or sometimes a third or a fourth echo to be displayed at the same interval between them below the first echo trace. This is because the echo travels between the bottom and the surface twice or more in shallow depths.

The color and tail of the bottom echo can be used to help determine the density of the bottom materials (soft or hard), and the harder the bottom, the wider the trace. If the gain is set to show only a single bottom echo on mud, a rocky bottom will show a second or third bottom return. When determining bottom hardness, the range should be chosen so the first and second bottom echoes are displayed. Note that the line in the center of the right-hand illustration below appears for demonstration purposes; it does not appear on the normal display.

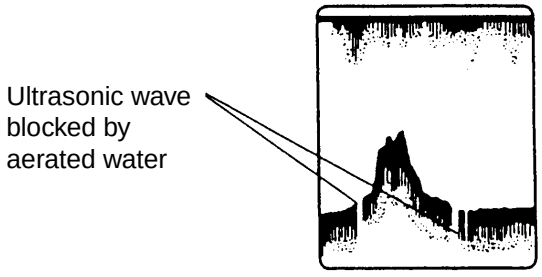


Bottom echoes

2.4 Surface Noise/Aeration

When the waters are rough or the boat passes over a wake, surface noise may appear near the zero line. As surface turbulence is acoustically equivalent to running into a brick wall, the bottom echo will be displayed intermittently.

In rough waters the display is occasionally interrupted due to below-the-ship air bubbles obstructing the sound path. This also occurs when the boat makes a quick turn or reverses movement. Reconsideration of the transducer installation may be necessary if the interruption occurs frequently.



Aerated water and video sounder picture

3. MAINTENANCE, TROUBLESHOOTING

⚠ WARNING

ELECTRICAL SHOCK HAZARD
Do not open the equipment.

Only qualified personnel should work inside the equipment.

3.1 Maintenance

Regular maintenance is essential for good performance. Checking the items listed in the table below on a regular basis will keep the equipment in good shape for years to come.

Checking

Item	Action
Transducer cable	If conductors are exposed, replace cable.
Power cable, transducer cable	If loosened, secure firmly.
Ground	If corroded, clean.
Ship's mains voltage	Voltage should be 10.8-31.2 V. If not, correct problem.
Display unit	Remove dust or dirt from the display unit with a soft cloth. If desired a water-moistened cloth may be used. Do not use solvents such as thinner, acetone or benzene for cleaning; they can remove paint and markings or deform the unit.
Transducer	Marine life on the transducer face will result in a gradual decrease in sensitivity. Check the transducer face for cleanliness each time the boat is dry-docked. Carefully remove any marine life with a piece of wood or fine-grade sandpaper.

3.2 Replacing the Fuse

The 5A fuse in the power cable protects the system from reverse polarity of the ship's mains and equipment fault. If the fuse blows, find the cause before replacing it. A 1A fuse is also incorporated inside the display unit, on the pcb PG774A (1/2) for the monitor. If the power cannot be turned on and the fuse in the power cable is normal, have a service technician check the fuse on the MAIN Board.

⚠ CAUTION

Use the proper fuse.

Use of a wrong fuse can result in damage to the equipment.

3.3 Troubleshooting

The table below provides simple troubleshooting procedures which you may follow to restore normal operation. If you cannot restore normal operation, contact your dealer for advice.

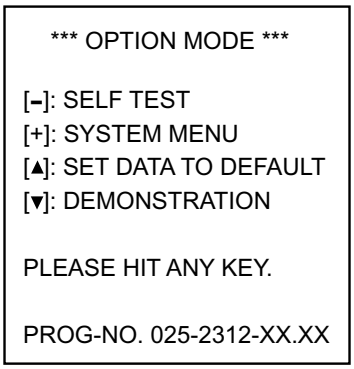
Troubleshooting table

If…	Then…
neither echo nor fixed range scale appears	• check if the battery is dead. • check fuse. • check if power cable is firmly fastened.
no echo appears but fixed range scale is displayed	• check if the picture advance speed is set to "0." • check if the transducer cable is firmly fastened.
echo appears but zero line does not appear	• check if the range has been shifted (manual operation).
sensitivity is low	• check if the gain setting is suitable. • check for air bubbles or underwater growth clinging to the transducer face. • water may be full of sediments. • bottom may be too soft to return an echo.
there is no water depth readout	• check if the bottom echo is displayed.
noise or interference is present	• check if the transducer or its cable is located too close to the engine. • check the ground. • check if other echo sounders of the same frequency are being operated nearby.

3.4 Diagnostics

The FCV-293 has a diagnostic facility which you may use to check the equipment for proper operation.

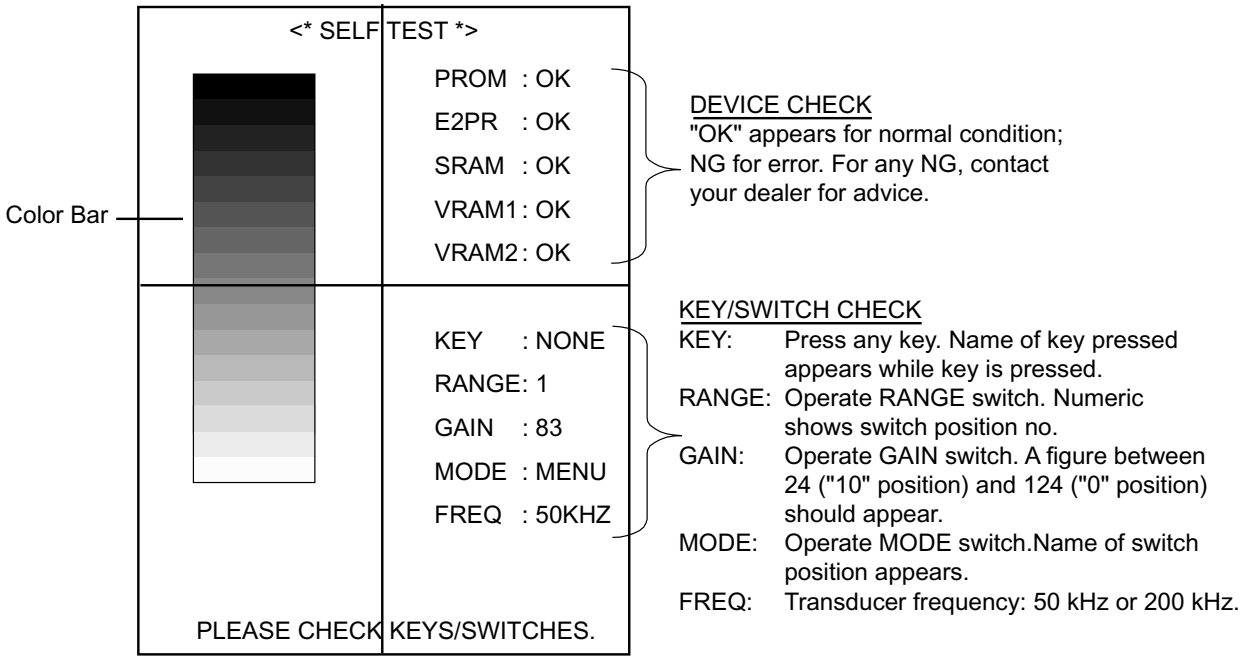
1. Turn on the power while pressing any key to show the option mode menu.



XX.XX = Program version no.

Option mode menu

2. Press the [-] key to start the diagnostic test. The major devices of the equipment are checked, and the results displayed as OK or NG (No Good). For any NG, contact your dealer for advice.



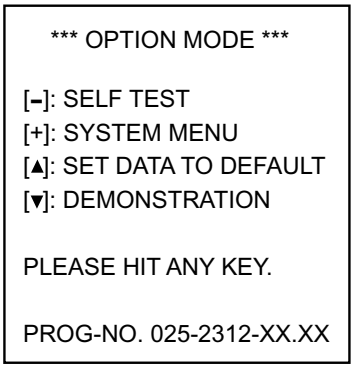
Diagnostic test results

3. Operate keys and switches to check them for proper operation:
   a) Press each key one by one. The name of key pressed appears to the right of “KEY” if the key is functioning properly.
   b) Operate RANGE, GAIN and MODE switches.
      RANGE switch: Switch position no. appears.
      GAIN switch: Appropriate numeric (24-124) appears.
      MODE switch: Mode name appears.
4. To escape from the diagnostic test, turn the power off and on again.

3.5 Restoring Default Settings

All default menu settings can be restored as follows:

1. Turn on the power while pressing any key to show the option mode menu.



XX.XX = Program version no.

Option mode menu

2. Press the [▲] key to restore default menu settings. The message “SET DATA TO DEFAULT!” appears while default menu settings are being restored. Then, the startup screen appears followed by the last-used display.

4. INSTALLATION

⚠ WARNING

ELECTRICAL SHOCK HAZARD
Do not open the equipment.

Only qualified personnel should work inside the equipment.

4.1 Display Unit

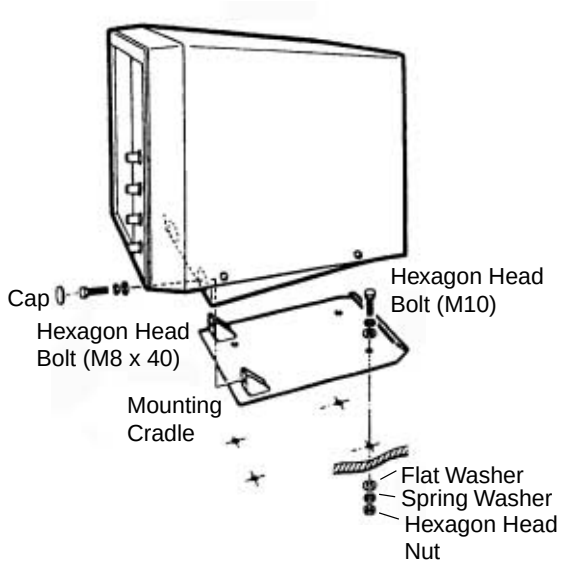
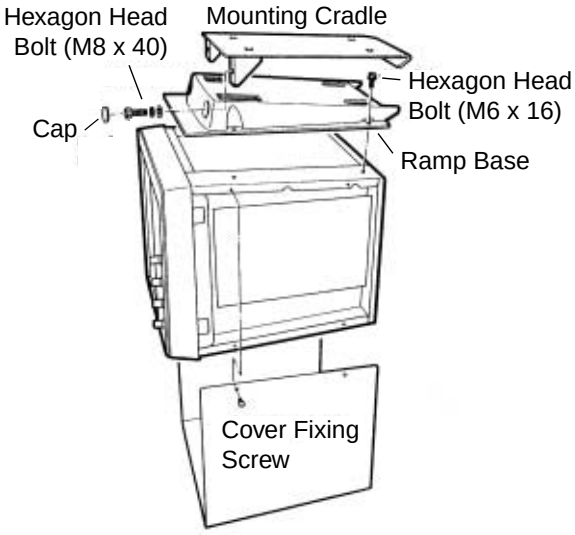
4.1.1 Mounting considerations

The display unit may be mounted on a desktop or on the overhead. When selecting a mounting location for the display unit keep the following points in mind:

- Keep the unit out of direct sunlight.
- The temperature and humidity of the mounting location should be moderate and stable.
- Locate the unit away from exhaust pipes and vents.
- The mounting location should be well ventilated.
- Mount the unit where shock and vibration are minimal.
- Keep the unit away from electromagnetic field-generating equipment such as motors and generators.
- For maintenance and checking ease, leave sufficient space at the sides and rear of the unit and leave slack in cables.
- For overhead mounting, be sure the mounting location is strong enough to support the weight of the unit under the continued vibration normally encountered onboard the vessel. Reinforce the mounting location if necessary.
- A magnetic compass will be affected if the display unit is placed too close to it. Observe the following compass safe distances to prevent disturbance to a magnetic compass:

  Standard compass: 1.4 m
  Steering compass: 0.95 m

4.1.2 Mounting procedure

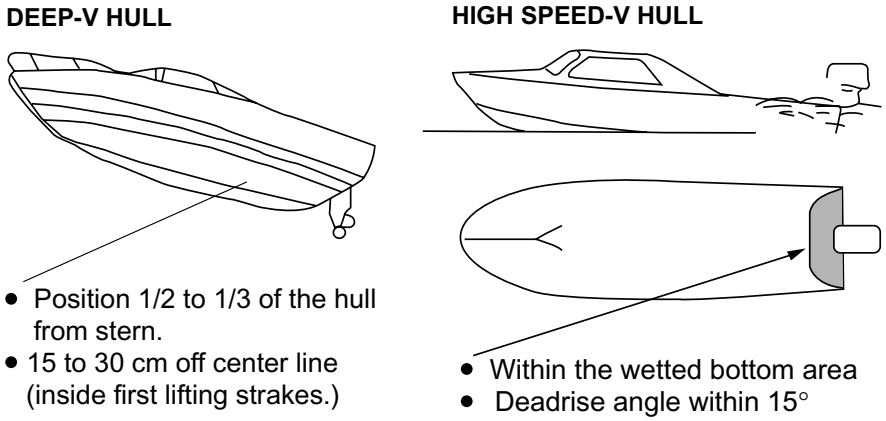
Desktop Mounting	Overhead Mounting
1. Unscrew two bolts (M8 x 40) from the front of the display unit to detach the mounting cradle. 2. Drill four ϕ11 bolt holes in the desktop, referring to the outline drawing at the back of the manual for mounting dimensions. 3. Fasten the mounting cradle to the mounting location with M10 bolts, nuts and washers. 4. Set the display unit to the mounting cradle and fix it with the bolts removed at step 1. 5. Put cosmetic caps (supplied) on the heads of the bolts fastened at step 4. 	1. Detach the display unit cover. 2. Unfasten two bolts (M8 x 40) from the front of the display unit to detach the mounting cradle. 3. Unfasten four bolts (M4 x 16) from the bottom of the unit to remove the ramp base. 4. Fasten the ramp base at the top of the display unit with the four bolts unfastened at step 3. 5. Fix the mounting cradle to the mounting location with four sets of M10 nuts, bolts and washers. Do not use tapping screws to fix the mounting cradle; they are not strong enough to support the weight of the unit. 6. Fasten the ramp base with display unit to the mounting cradle with the two bolts removed at step 2. 7. Put cosmetic caps (supplied) on the heads of the bolts fastened at step 6. 8. Reattach the cover. 

Desktop and overhead mounting procedures

4.2 Transducer

The performance of this sounder is directly related to the mounting location of the transducer, especially for high-speed cruising. The installation should be planned in advance, keeping the following factors in mind:

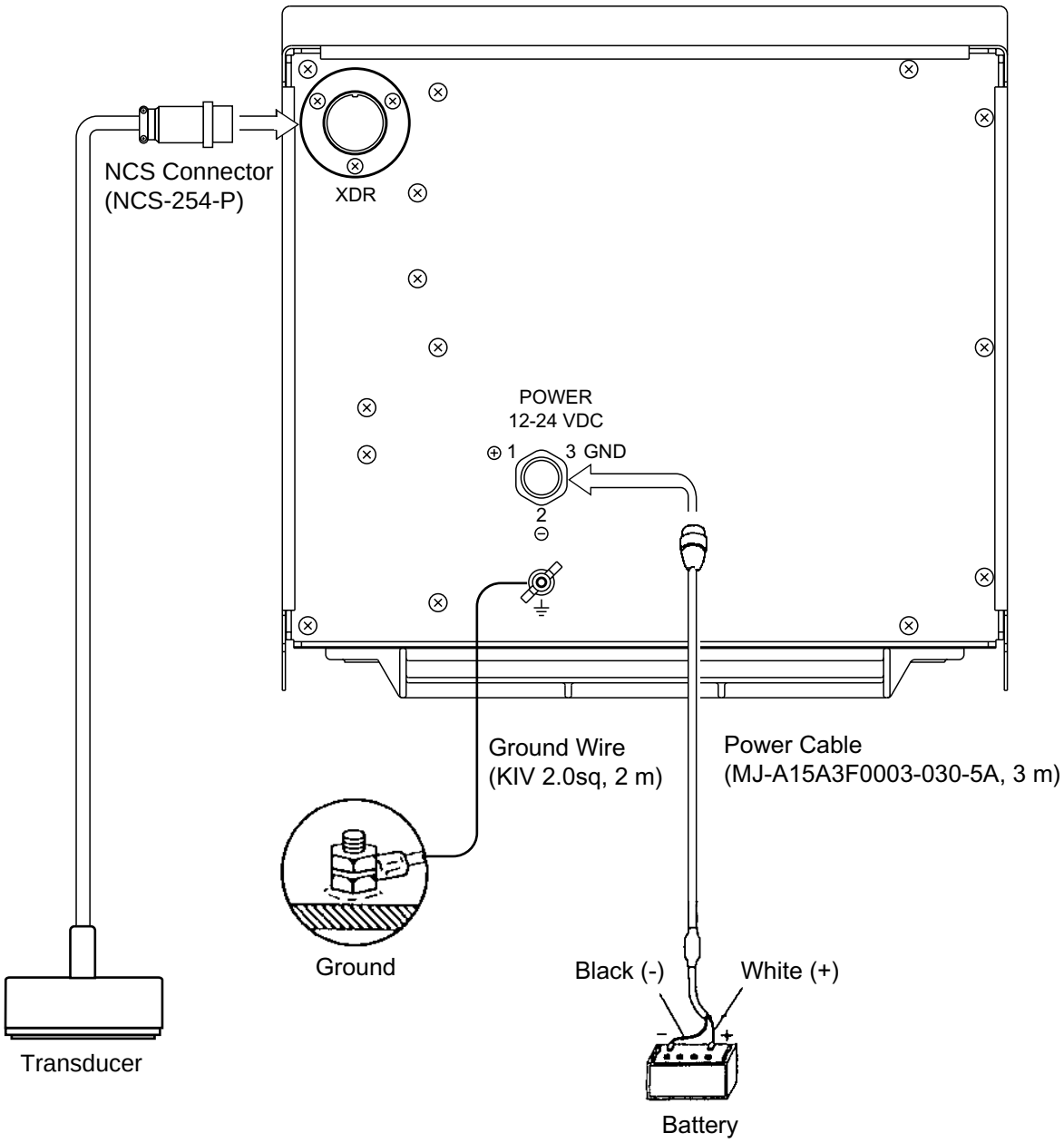
- Air bubbles and turbulence caused by movement of the boat seriously degrade the sounding capability of the transducer. The transducer should, therefore, be located in a position where water flow is the smoothest. Noise from the propellers also adversely affects performance and the transducer should not be mounted nearby. The lifting strakes are notorious for creating acoustic noise, and these must be avoided by keeping the transducer inboard of them.
- The transducer must always remain submerged, even when the boat is rolling, pitching or up on a plane at high speed.
- A practical choice would be somewhere between 1/3 and 1/2 of the boat's length from the stern. For planing hulls, a practical location is generally rather far astern, so that the transducer is always in water regardless of the planing attitude.



Suitable transducer locations

4.3 Wiring

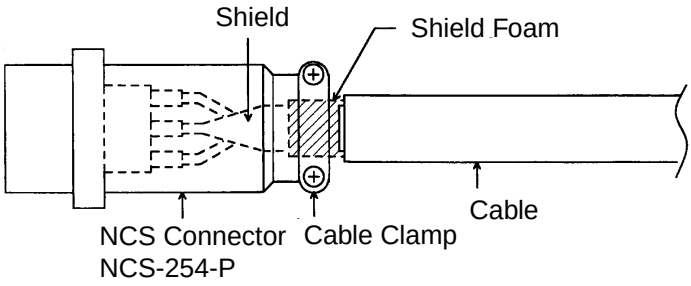
Connect transducer, power supply and ground wire as below.



Wiring

Transducer

Route the transducer cable well away from power cables, televisions and CRTs to prevent interference to the sounder. Attach the NCS connector NCS-254-P to the transducer cable as below and connect it to the XDR connector at the rear of the display unit.



How to attach connector to transducer cable

Ground

To prevent interference to the picture and radio equipment, connect the supplied ground wire between the ground terminal and ship's grounding bus. The length of the wire should be as short as possible.

To obtain a good ground on an FRP vessel, a 20 × 30 cm copper plate can be welded on the outside of the ship's hull. Connect the ground wire to the copper plate.

Note: Use a "closed-type" lug (⊂⊃◎) to make the connection at the display unit. Do not use an "open-type" lug (⊂⊃⊂).

⚠ CAUTION

Ground the equipment to prevent mutual interference.

4.4 Output Power

Set the output power on the MAIN Board (02P6315) as below.

⚠ CAUTION

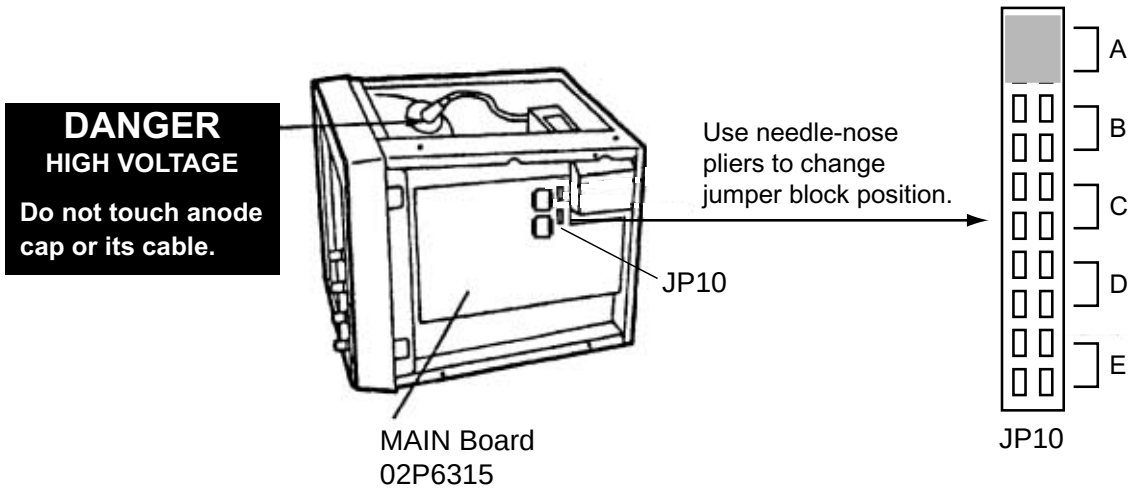
Set the jumper block correctly.

Incorrect setting may damage display unit and transducer.

Note: If the transducer frequency is different from that specified when ordering, the MAIN Board must be replaced.

1. Turn off the power.
2. Remove the cover.
3. Change jumper block JP10's setting according to transducer used, referring to the table below.

Freq. (kHz)	Output (kW)	Transducer	Tap (JP10)	Factory Setting
50	1	50B-6/6B	A	A
	1	50B-9B	A	
	2	50B-12	C	
	2	50BL-12	C	
200	1	200B-5S	D	C
	2	200B-8/8B	C	

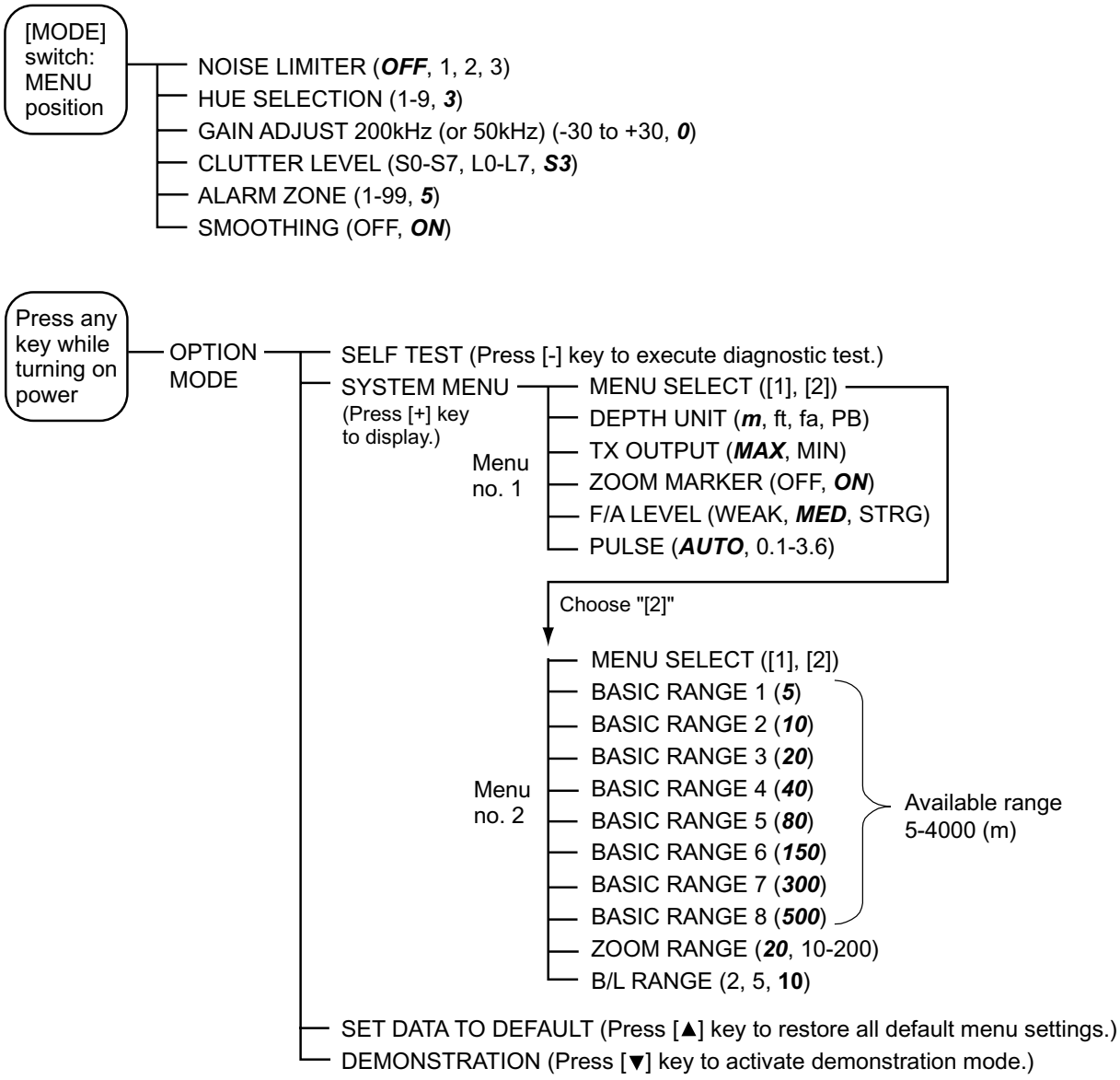


Display unit, cover removed, right side view

4. Close the cover.

5. MENU OVERVIEW

Default settings in bold italic.



SPECIFICATIONS OF COLOR VIDEO SOUNDER
FCV-293

1 GENERAL

1.1 Display 10'' diagonal CRT

1.2 Echo Color 8 or 16 colors according to echo intensity.

1.3 Basic Range

Range No.	1	2	3	4	5	6	7	8
Meters	5	10	20	40	80	150	300	500
Feet	15	30	60	120	200	400	1000	1500
Fathoms	3	5	10	20	40	80	150	250
Passi/Braza	3	5	10	30	50	100	200	300

1.4 Range Shift Display start depth can be shifted in 1, 10 or 100 m (ft, fa, PB)

1.5 Zoom Range 10-200 m

1.6 Bottom Lock Expansion Range 2/5/10 m

1.7 TX Frequency 50 kHz or 200 kHz selectable

1.8 Output Power 1 or 2 kWrms

1.9 Pulse Length 0.1-3.6 ms

1.10 Auto Mode Automatically changes depth range and sensitivity according to depth

1.11 Presentation Mode

NORMAL: Normal Display

B/L: Normal + Bottom lock expansion

B/Z: Normal + Bottom zoom

B/D: Normal + Bottom discrimination

M/Z: Normal + Marker zoom

*A-scope presentation is also available.

1.12 Picture Advance Speed 1/16, 1/8, 1/4, 1/2, 1/1, 2/1 and freeze

1.13 Alarm Fish or bottom echo comes into the alarm zone.

2 POWER SUPPLY

2.1 Main Unit 12-24 VDC: 3.3-1.7 A, 40 VA max.

3 ENVIRONMENTAL CONDITION

3.1 Ambient Temperature 0°C to +50°C

3.2 Damp Heat 95% at 40°C

3.3 Waterproof IPX2

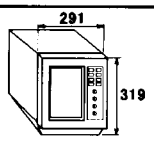
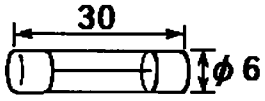
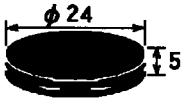
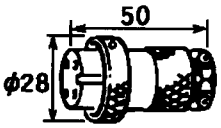
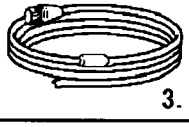
3.4 Vibration IEC 60945

4 COATING COLOR

4.1 Display Unit Chassis: 2.5GY5/1.5

PACKING LIST

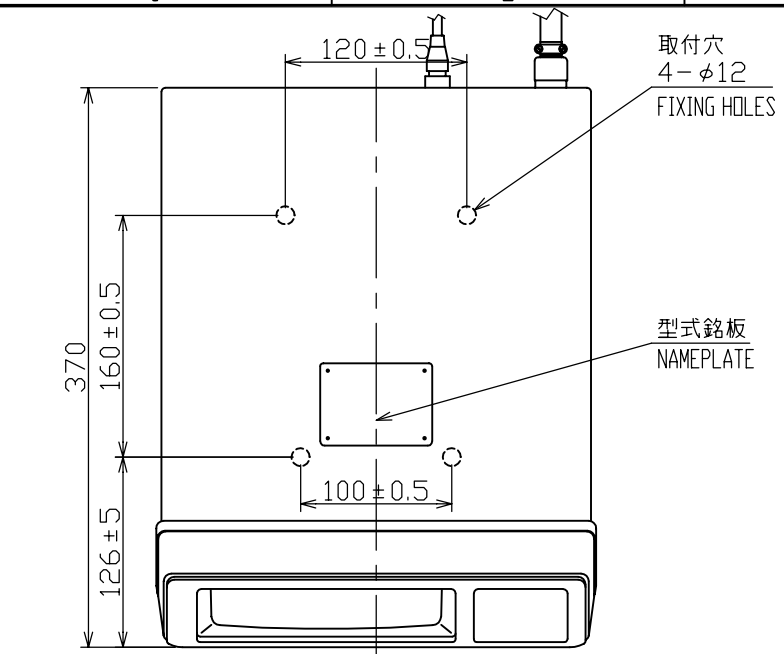
FCV-293E/T/C

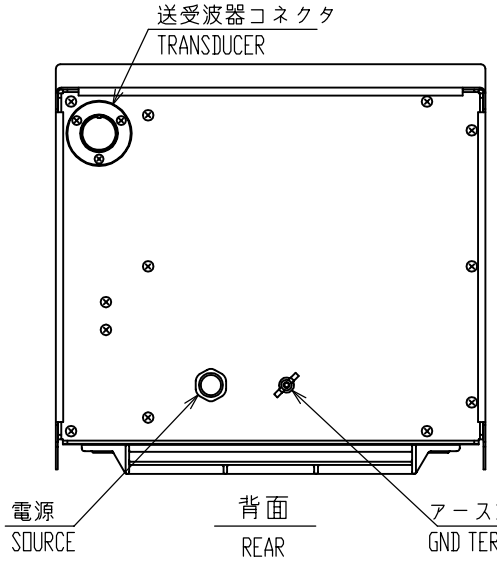
NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
(完) 指示器 DISPLAY UNIT		CV-293E/T/C 000-022-222 **	1
予備品 SPARE PARTS		**SP02-04701**	
ﾋｭｰｽﾞ FUSE		FGBO-A 5A AC125V 000-549-064	3
付属品 ACCESSORIES		**FP03-04310**	
ｷｬｯﾌﾟ BLIND CAP		040-5025 000-117-940	2
工事材料 INSTALLATION MATERIALS		**CP02-07301**	
ﾋﾞﾆｰﾙ線 VINYL WIRE		KIV 2.0SQ ｸﾛ *2M* 000-554-516	1
ｺﾈｸﾀ(NCS) CONNECTOR		NCS-254-P 000-506-505	1
ｹｰﾌﾞﾙ組品MJ CABLE ASSY.		MJ-A15A3F0003-030-5A 000-146-334	1

ｺｰﾄﾞ末尾に[**]の付いたﾕﾆｯﾄは代表の型式/ｺｰﾄﾞを表示しています。
DOUBLE ASTERISK DENOTES COMMONLY USED EQUIPMENT.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO



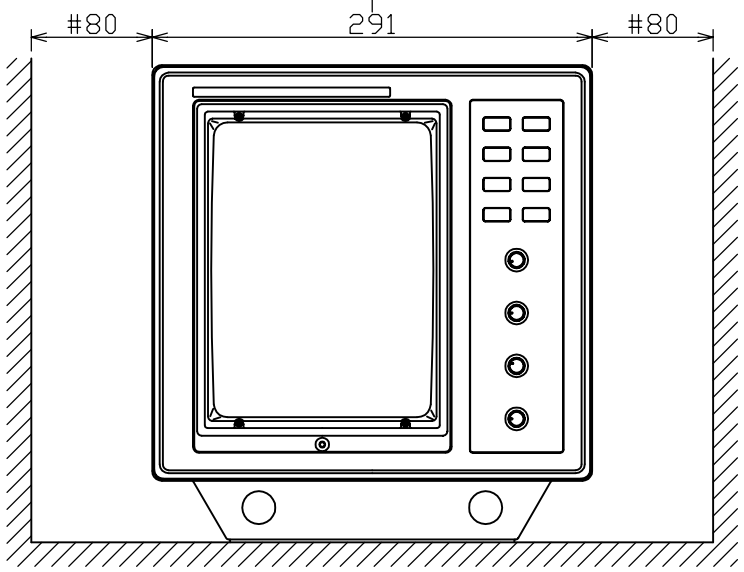


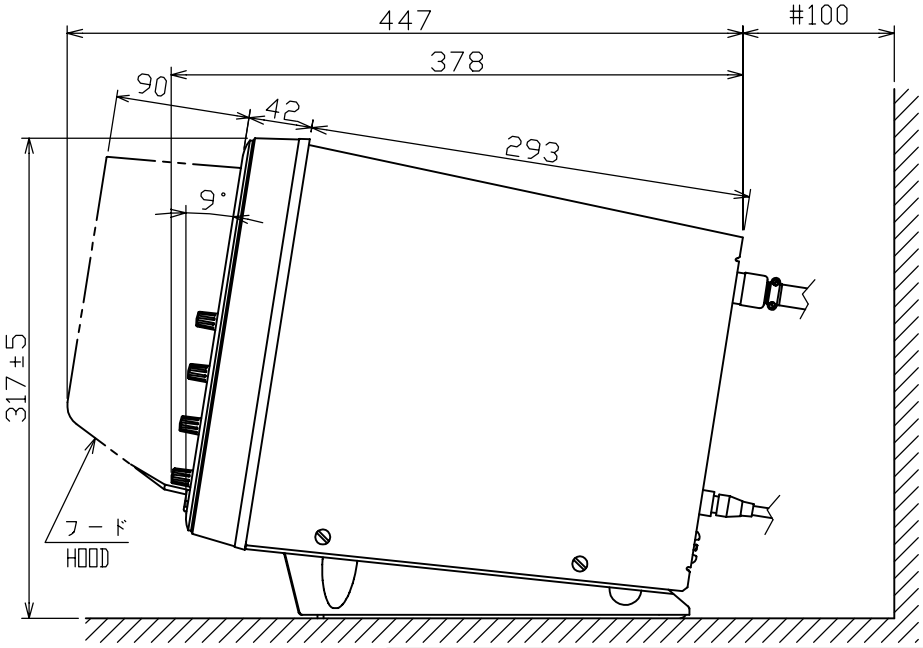
寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3

表1 TABLE 1

注 記
1）＃印寸法は最小サービス空間寸法とする。
2）指定外の寸法公差は表1による。
3）取付にはM10ボルト、またはトラスタッピンネジ呼び径9を使用。

NOTE
1. #: RECOMMENDED SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
3. USE M10 BOLTS OR TAPPING SCREWS φ9 FOR FIXING THE UNIT.





DRAWN Sep. 19 '02 T.YAMASAKI			TITLE CV-293
CHECKED Sep. 19 '02 Y.KIMURA			名称 指示部
APPROVED	FCV-293		外寸図
SCALE 1/5 MASS 11.0 +10% kg			NAME DISPLAY UNIT
DWG No. C2370-G01- B	02-144-1006-1		OUTLINE DRAWING

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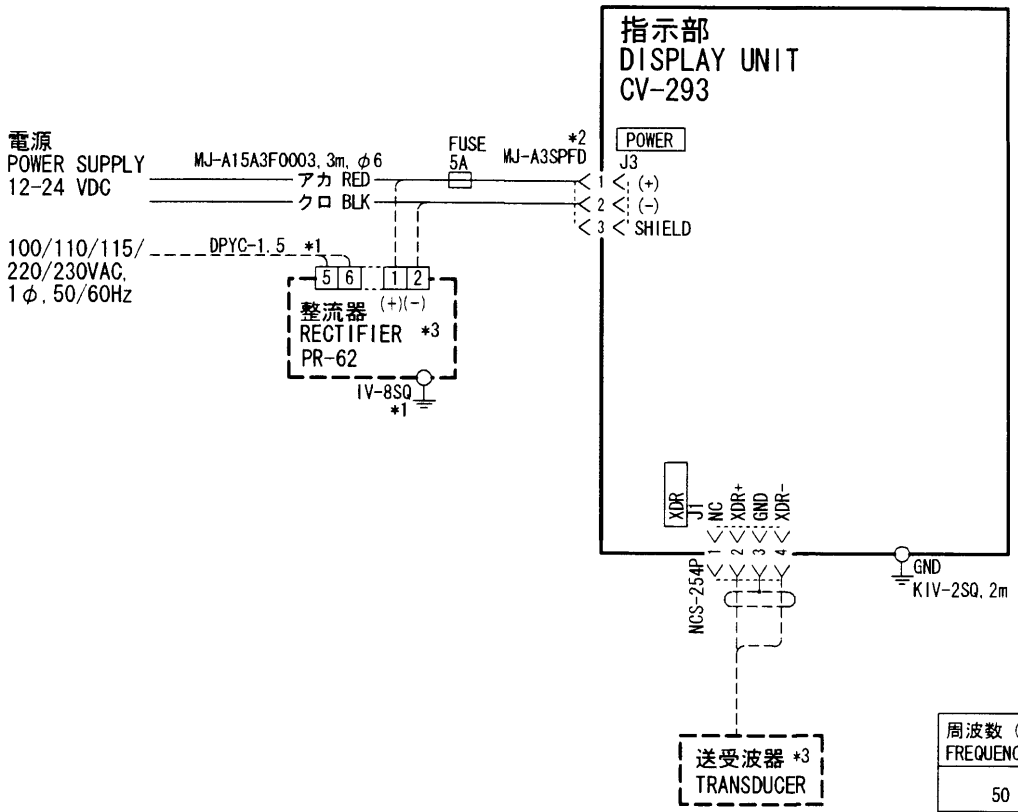

周波数 (kHz) FREQUENCY	出力 POWER	
	1 kW	2 kW
50	50B-6/6B 50B-9B	50B-12 50BL-12
200	200B-5S	200B-8/8B

注記
＊1）現地手配。
＊2）コネクタは工場にて取付済み。
＊3）オプション。

NOTE
*1. LOCAL SUPPLY.
*2. CONNECTOR PLUG FITTED AT FACTORY.
*3. OPTION.

DRAWN Aug. 30 '02 T. YAMASAKI			TITLE FCV-293
CHECKED Aug. 30 '02 Y. K!			名称 カラー魚群探知機
APPROVED Sep. 4 '02 Y. K!			相互結線図
			NAME COLOR ECHO SOUNDER
DWG. No. C2370-C01- A			INTERCONNECTION DIAGRAM

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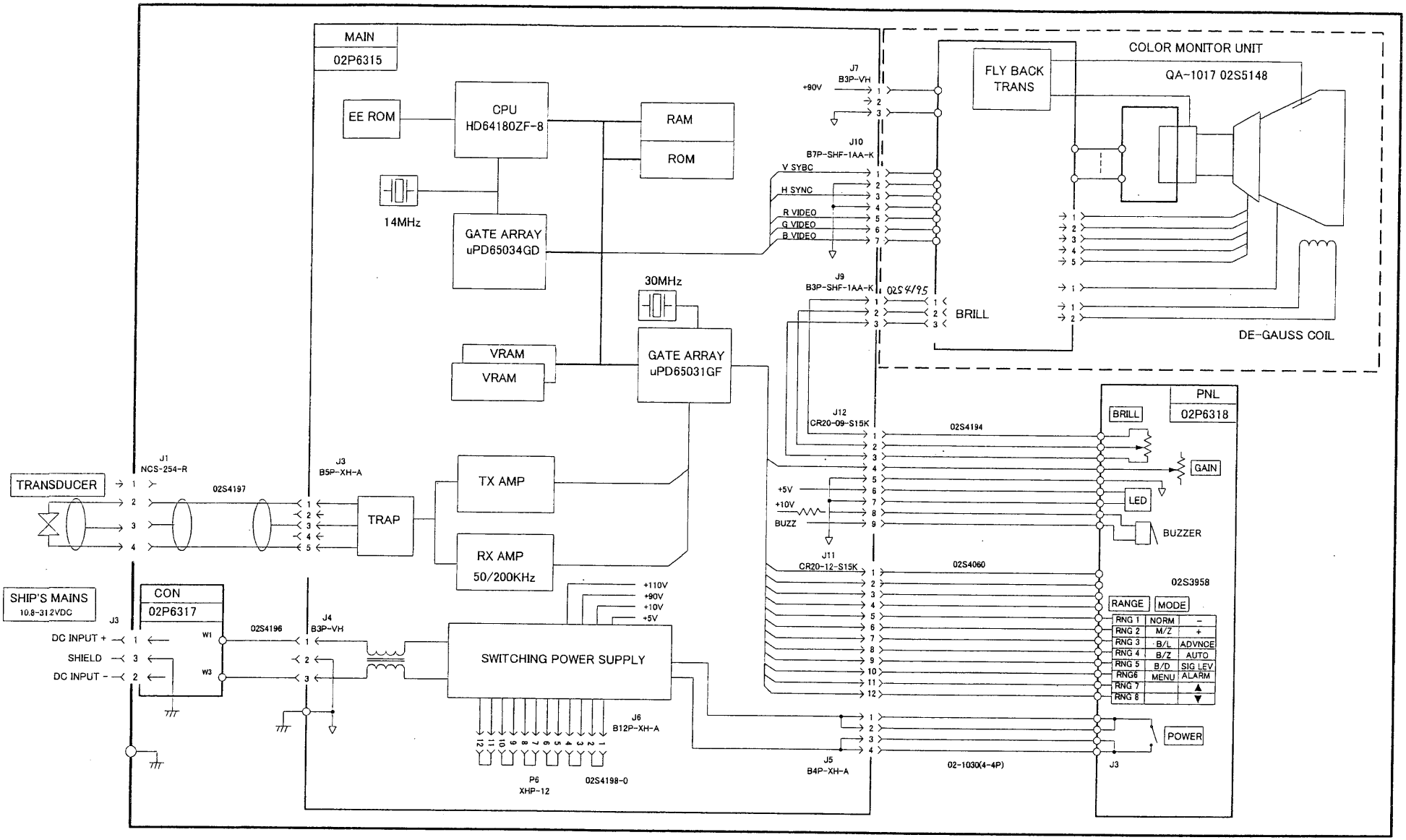

DRAWN 02/08/22 T. YAMASAKI		TYPE	CV-293
CHECKED 02/8/22 Y.K		名称	指示部（総合）
APPROVED 02/8/22 Y.K	FCV-293		回路図
SCALE / MASS	MODEL / BLOCK No.	NAME	DISPLAY UNIT (GENERAL)
Dwg No. C2370-K01- A	02-144-1000-0		SCHEMATIC DIAGRAM

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